Man, Economy, and Liberty

Essays in Honor of Murray N. Rothbard

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Professor Rothbard and the Theory of Interest

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The Theory of Interest in Perspective

It has become increasingly true that individual economists are categorized in accordance with their chosen fields of specialization—regulation, for instance, or theory of finance, or monetary theory. Economists become known for some special insight or assumption that sets their analysis apart from the analyses of others—rent-seeking behavior, the efficient-market hypothesis, or so-called rational expectations. Name recognition and professional stature are directly proportional to the single-mindedness of the approach and to the extremes to which the economist is willing to push the analysis.

Students of economics have little difficulty grasping these special insights—unless the doggedness with which their expositors flush out implausible implications lead to a questioning of the underlying kernels of truth. The difficulties come in understanding how all these separate insights fit together into a coherent view of the economy. Rational expectations and the political business cycle, for example, are difficult to reconcile. The easy way out, students soon discover, is to pick a field, focus on an idea within the field, and leave the rest to others. Increased specialization, though, comes at the cost of a comprehension of and appreciation for economics more broadly conceived.

Professor Rothbard has provided for students a more rewarding, but more demanding, alternative—a coherent and comprehensive treatment of man, economy, and state. His treatise on economics offers a well integrated view of economic relationships, one that ignores artificial boundaries that confine the specialists to their own sub-disciplines. His writings taken as a whole advance the level of integration still further. The economics of liberty meshes with the ethics of liberty, and

together they help us to understand the history of a country that was conceived in liberty. Although economics, ethics, and history are distinct disciplines in academe, Professor Rothbard has regarded them as different perspectives within a single discipline. By repackaging his ideas as libertarian studies, he has provided a coherent and comprehensive world view.

Thus, a full appreciation of Professor Rothbard's achievement requires that we recognize the breadth of his contribution. It is with some reluctance, then, that I narrow the focus of attention in order to consider the Austrian theory of interest and Professor Rothbard's treatment of it. It is as if we were to try to appreciate the handiwork of a highly skilled stonemason by focusing upon a particular stone. But at least we have picked an interesting and revealing stone. You tell me your theory of interest, and I'll have a good guess about the rest of your economics. Interest is just another word for profit? You're a Ricardian. To collect interest is to exploit labor? You're a Marxian. The interest rate is wholly determined by the growth rate of capital? You're a Knightian. Interest is fundamentally a monetary phenomenon? You're a Keynesian.

Professor Rothbard is none of these. This much is not in dispute. The controversy comes when we begin to distinguish Rothbardians from Fisherians. Are time preferences of market participants and capital productivity independent co-determinants of the rate of interest, as Irving Fisher would have it? Or does time preference alone—the systematic discounting of the future—account for the payment that we call interest?

This latter view, which is properly attributed to Ludwig von Mises, is adopted by Professor Rothbard. Borrowing phraseology from Milton Friedman, it might be claimed that interest is always and everywhere a time-preference phenomenon in the same sense that inflation is always and everywhere a monetary phenomenon. Rothbard's defense of the time-preference theory of interest and his use of the theory as a building block in his treatise on economics inspires the remainder of this essay.

Productivity of the Factors

Those who have learned their interest theory from Professor Rothbard have learned to be suspicious about the use—the many uses—of the word "productive" in the literature on distributive shares, or factor imputation. The factors of production (land, labor, and capital) are employed in some combination to produce output. The idea that the factors are considered to be "productive" is indissociable from our under-

standing of what the factors are and what they can do. But using the term in this sense has no specific implications about the value of the separate factors or about the phenomenon of interest.

An additional dose of one of the factors of production, the other factors being employed in unchanged quantities, will allow for an increase in output. Each factor is productive at the margin. This marginal productivity, measured in value terms, has important implications about the prices of the factors—the price of an acre of land, of an hour's labor, or of the services of a capital good. Through the pricing mechanism, the value of the output is imputed to the individual factors in accordance with the values of their marginal products. The process of imputation, however, has no simple or direct bearing on questions concerning the rate of interest. The relationship between factor prices and the interest rate will be discussed at greater length in subsequent sections.

Does one of the factors of production allow for an output whose value exceeds the combined values of the factors of production? If such a factor exists, it would be productive in a very special sense. This factor would produce *surplus* value. If the search for the source of a supposed surplus value is confined to questions concerning the nature of the individual factors of production, the possible answers are few in number. A survey of the different positions taken, however, is revealing. Without digging very deep into the history of economic thought, we can find four points of view that, collectively, exhaust the possibilities.

Francois Quesnay believed that only land was capable of producing a surplus. The inherent productive powers of the soil allow for a given quantity of corn—employed as seed and worker sustenance—to be parlayed into a greater quantity of corn. The notion of land's natural fecundity lies at the root of Physiocratic thought.

Karl Marx believed that only labor can produce surplus value. Without labor, nothing at all can be produced. This one factor, then, is the ultimate source of all value. Income received by other factors represents not the productivity of those factors but the exploitation of labor.

Frank Knight believed that there is only one factor of production and that it should be called capital. Rather than argue in terms of a factor that yields a surplus, he argued in terms of a stock that yields a flow. Capital consists of all inputs that have the dimensions of a stock (land, machines, human capital); the corresponding flow is the annual output net of maintenance costs. This net yield is a consequence of capital productivity. The net yield divided by the capital stock is the rate of interest.

Joseph Schumpeter, following Leon Walras, denied that there was any surplus to be explained. In long-run general equilibrium, the sum of the values imputed to the several factors of production must fully exhaust the value of the economy's output. Schumpeter insisted that in the long run, the interest rate must be zero; the positive rate of interest that we actually observe is to be understood as a disequilibrium phenomenon.

We can pause at this point for a midterm exam: Which of the factors of production is *truly* productive? (a) Land; (b) Labor; (c) Capital; (d) None of the above. Quesnay, Marx, Knight, and Schumpeter would answer (a), (b), (c), and (d), respectively. Professor Rothbard would reject the question. The notion of productivity in this sense—and hence the issue of the source of such productivity—vanishes once we take adequate account of the temporal pattern of inputs and outputs and of the effects of time preference on their relative values.

Analogies, Time Preference, and the *Pons Asinorum*

Analytical constructions that pass as theories of capital and interest are, in many instances, question-begging analogies. Hardtack is nonperishable; sheep multiply; a Crusonia plant grows. The rates of growth of these things—zero for hardtack—are dimensionally similar to the rate of interest. The interest rate is based on the comparison of the value of output net of inputs to the value of the inputs. It is tempting to think of the implied growth in *value* as being analogous to the *physical* growth rates of sheep or of Crusonia plants. But does the analogy hold? If not, then the economics of an all-sheep economy or of a Crusonia plant will result in a hopeless conflation of interest rates and growth rates.

Such analogies serve to obscure what the phenomenon of time preference can illuminate. According to Menger's Law, the value of ends is imputed to the means that make those ends possible. But if the end, the final output of a production process, lies in the future, its current value will be discounted in the minds of market participants. The general preference in the market for output sooner over output later has—or should have—the same status as the general preference for more output over less output. Market participants discount the future. The extent to which a particular individual discounts it depends upon his own time preferences, which in turn depend upon his particular circumstances.

Currently existing means are valued in the marketplace in accordance with the *discounted* value of the corresponding (future) ends.

Because of this discounting, the total value of the currently existing factors of production falls short of the value of the future output that these factors make possible. It would be misleading to claim that there is a "growth" in value between the employment of inputs and the emergence of output. And the value difference (between output and inputs) does not constitute a "surplus" in any meaningful sense.

The existence of (positive) time-preferences—the general preference for achieving ends sooner over achieving them later—is both necessary and sufficient for the emergence of the market phenomenon called interest. If market participants were characterized by a general indifference about when their ends are achieved, about the remoteness in time of output, then the value of the means, of inputs, would reflect the full, undiscounted value of their contribution to the production of output. There would be no value difference, no interest return to account for. If market participants do discount the future, then the value of present inputs will be systematically less than the value of future output. The value difference is interest.

These propositions hold for all production processes. The inputs may grow in some literal, biological sense into outputs, or the inputs may be converted into outputs by means of some technologically advanced—or technologically backward—production process. Indeed, with appropriate changes in wording, these propositions that establish (positive) time preference as a necessary and sufficient condition for the emergence of interest in a production economy can be applied to a pure-exchange economy as well: Goods promised for future delivery will exchange at a discount for goods presently available.

The time-preference theory of interest provides us not only with a firm understanding of the phenomenon of interest but also with a *pons asinorum*, or acid test, for productivity theories of whatever variety. A particular input, or factor, may be productive, maybe even especially productive, in some sense. There is no simple relationship, however, between this productivity and the phenomenon of interest. The critical question is tirelessly posed by Professor Rothbard: Why is the ability of this factor to produce not fully reflected in its market price?

The answer, of course, is that the discounting is a direct implication of the existence of time preferences. The output which this productive factor helps to produce lies in the future. The market value of the factor itself, then, is discounted accordingly. An argument that a particular factor is highly productive may explain why its price is as high as it is, but it does not and cannot explain why its price is not higher still. That is, productivity does not and cannot explain why the factor's

price fails to exhaust the undiscounted contribution to the production of output.

Is the Interest Rate the Price of a Factor Called "Waiting"?

Somewhere between the time-preference theory of interest and the alternative theories already mentioned lies the view that the interest rate is the price of a factor of production called "waiting." The notion of waiting or abstinence as the basis for interest payments has a rich history and predates the Austrian school and its time-preference theory. Abstinence was treated as a "real cost" in Nassau Senior's nineteenth-century analysis. Waiting or abstinence in a more abstract sense figured heavily in the turn-of-the-century writings of Gustav Cassel and of John B. Clark and in the subsequent writings of Frank Knight. In recent years Leland Yeager, following Cassel, has directed our attention once again to the centrality of the concept of waiting in theories of interest-rate determination.

Although theorizing in terms of time preferences and theorizing in terms of the factor of production called waiting can yield the same conclusions, the Austrians have not fully embraced this alternative mode of analysis. Eugen von Böhm-Bawerk was critical of Cassel's formulation; Friedrich Hayek considered Knight's productivity theory to be counterproductive; and Israel Kirzner has taken issue with modern reformulations. Neither Mises nor Rothbard has specifically addressed the question of waiting as a factor of production, but passages can be found in the writings of each suggesting that the time-preference view and the waiting-as-a-factor view are to some extent compatible. It may be worthwhile, then, to consider the kinship between the two views.

Cassel was careful to point out that the word 'waiting' is not being used with its ordinary dictionary meaning. Waiting as a factor of production and waiting for a bus are two different things. In fact, they are even *dimensionally* different. The latter is measured strictly in units of time; the former is measured in compound units that account for both value and time. More specifically, Casselian waiting is the product of value and time and is measured in dollar-years (or $-years). Thus, an individual who forgoes the spending of $100 for a period of two years supplies (neglecting the effects of compounding) 200 $-years of waiting. This constitutes more waiting than a second individual who forgoes the spending of only $75 for the same two years, and more waiting than a third individual who forgoes the spending of $50 for three years.

The issue of units is a critical one not only for understanding what waiting means and how it is measured but also for checking the dimensional conformability between waiting as a factor and the interest rate as its price. The price of any factor is measured in terms of dollars per unit of the factor. Land rent is measured in \$/(acre-year); the wage rate in \$/(worker-hour); the service price of a capital good, say a machine, in \$/(machine-hour). The interest rate is measured in frequency units, in inverse time. That is, the dimensions of the interest rate are 1/year—e.g. 10% *per year.* Any attempt to recast the interest rate as the price of a factor must be squared with this dimensional characteristic.

It can be seen immediately that the interest rate cannot be the price—or even the service price—of capital goods. The dimensions of \$/machine—or of \$/(machine-hour)—are not the same as the units of the interest rate. Nor can waiting in the ordinary dictionary sense be the thing whose price is the interest rate. The price of waiting in this sense would be measured in \$/year.

But the concept of waiting introduced by Cassel and adopted by Yeager is measured in \$-years. The price of Casselian waiting, then, is measured in units of \$/(\$-year), or, simplifying, in units of 1/year. Thus, the claim that waiting is a factor of production whose price is the rate of interest squares with the fact that the interest rate is measured in units of inverse time. It should be argued, though, that the interest rate is determined by the supply and demand for waiting whether or not the waiting is employed as a factor of production. In fact, this argument can be seen as no more than a generalization of the fact that the more narrowly conceived loan rate of interest is determined by the supply and demand for loans. Loans, whether to producers or consumers, have both a value and a time dimension, are measured in units of \$-years, and constitute one form of waiting. Theorizing in terms of waiting—whatever particular form it may take—serves to emphasize the pervasiveness of the phenomenon of interest. And this emphasis is characteristic of the writings of both Yeager and Rothbard.

The generalizing from loans to waiting, however, introduces some analytical difficulties. Marshallian partial-equilibrium analysis applies in its conventional way to the market for loans. Shifts in the supply or in the demand for loans can be analyzed on the basis of the familiar *ceteris paribus* assumption: Prices in other markets, such as factor markets, are assumed not to change. The *ceteris paribus* assumption breaks down, though, when the analysis is extended from the market for

loans to the general phenomenon of waiting. This is only to say that partial-equilibrium analysis cannot be applied in any straightforward way to an all-pervasive economy-wide phenomenon. The particular difficulties introduced can be illustrated with a simple example.

Suppose the current rate of interest (the price of waiting) is 5 percent and that the equilibrium quantity of waiting supplied and demanded is 1000 $-years, which consists of owning durable machines, whose current value is $1000, for one year. Now suppose that the demand for waiting increases. Simple supply-and-demand analysis would allow us to predict that the interest rate will rise, say from 5 to 10 percent, and that the quantity of waiting supplied and demanded will increase.

If the value of the machines could be assumed not to change, this prediction would be valid. But a rise in the interest rate will cause the value of the machines, which is simply the discounted value of the machines' future output, to fall. More specifically, the doubling of the rate of interest, which serves as the basis for the discounting, will cause the value of the machines to decrease from $1000 to $500. Owning those same machines for a year now constitutes only half the waiting. It is possible, then, that in the subsequent equilibrium, more machines will be owned for a longer period of time yet the amount of waiting, which is now based on a lower machine price, may be less than in the initial equilibrium.

The ambiguity identified in the example is unavoidable. The amount of waiting increases as we move up the supply schedule because of the nature of the supply relationship, but it decreases as the interest rate rises because of the way waiting is linked computationally to factor prices, which in turn are affected by changes in the rate of interest. There is no ambiguity, however, about the direction of change in the rate of interest given a particular shift in supply or in demand. An increase in the demand for waiting, which is the same thing as a rise in time preferences, will cause the rate of interest to rise.

Thus, the view that the interest rate is determined by the supply and demand for waiting is compatible with the view that it is determined by time preferences. But the waiting-as-a-factor theory strains our intuition about the meaning of waiting, involves unavoidable ambiguities about the direction of changes in the "amount" of waiting, and adds little to our understanding of the phenomenon of interest. Occam's Razor provides a clear basis for favoring the time-preference theory embraced by Professor Rothbard.

The Eclectic View: Time Preference and Capital Productivity

The comparison of the waiting-as-a-factor view and the time-preference view paves the way for a summary assessment of the more conventional treatment of interest-rate determination. Following Irving Fisher, modern textbooks make use of a two-period model which includes a convex intertemporal opportunity curve and a family of concave intertemporal indifference curves. The slope of the opportunity curve is intended to represent the marginal productivity of capital; the slope of the indifference curves represents the marginal rate of time preference. Self interest and unhampered markets are enough to assure that the actual intertemporal pattern of consumption is the one represented by the point at which an indifference curve is tangent to the opportunity curve. The slope at the point of tangency reflects the equilibrium rate of interest.

Time preferences and the productivity of capital, then, are depicted as independent co-determinants of the market rate of interest. Neither co-determinant, by itself, is capable of determining anything. And the question of which determinant is the more decisive, is at best, a question of the relative degrees of curvature. To illustrate the polar cases, if either the indifference cures or the opportunity curve is a straight line, then the slope of the straight line will determine the rate of interest no matter where on that line the point of tangency occurs.

The Fisherian analytics are simple enough, but the basic construction is conceptually flawed. Again, the issue of dimensions comes into play. The slope of the indifference curves has the dimensions of the interest rate (1/year). The slope of the opportunity curve must be dimensionally the same if the point of tangency is to have any intelligible meaning at all. If the slope is a marginal value product, then it must be the marginal value product of *waiting*, not of *capital*. But as demonstrated in the previous section, the quantity of waiting is itself dependent upon factor prices, which in turn are dependent upon the interest rate. It cannot legitimately be argued, then, that the rate of interest has two independent co-determinants; one of those co-determinants is dependent upon the magnitude it supposedly helps to determine.

Modern textbook writers have attempted to skirt this problem by using a one-good model. In all such models, questions of value, which may be affected by changes in the rate of interest, simply do not arise. Value productivity and physical productivity are indistinct; productivity is modelled as the rate of increase in the quantity of the good. The

phenomenon of interest is being analogized once again to sheep that reproduce or to plants that grow. But, as Professor Rothbard often reminds us, the rate of interest is a ratio of values, not of quantities. This modelling technique unavoidably conflates growth rates with interest rates and fails thereby to shed any light on the phenomenon of interest.

It is interesting to note that Fisher himself clearly acknowledged the actual interdependency of the two co-determinants, but he seemed not to realize the problem that this poses for the eclectic view. Once it is understood that the opportunity curve incorporates interest-rate considerations, the time-preference view comes into its own. The formal demonstration that the equilibrium rate of interest is given by the slope of the tangency in a Fisher diagram can be easily reconciled with the Mises-Rothbard view. The equilibrium rate, which on grounds of logical consistency must reflect both time preferences and the rate of discount on which the opportunity curve is based, is to be attributed to the interaction of market participants who systematically discount the future. That is, the rate of interest is simply the market's reflection of time preferences.

The rejection of the idea that the Fisher diagram identifies two independent co-determinants does not mean that the diagram is totally without meaning. And the recognition that time preferences are represented on both sides of the tangent suggests a particular reinterpretation. The family of indifference curves can retain their conventional interpretation. At the point of tangency, the opportunity curve depicts the time preferences of market participants as currently embodied in the economy's capital structure. Points on the opportunity curve to either side of the point of tangency depict the extent to which the capital structure can be modified so as to alter the time pattern of output in each direction.

This reinterpretation is consistent with that of Hayek, who went on to argue that the slope of the opportunity curve at a given point may depend upon which direction market forces are pushing. More specifically, he argued that once the construction of a particular capital structure is underway, the opportunities for producing output sooner than initially planned may be severely limited. But employing Fisherian analytics to illustrate the limited modifiability of the economy's capital structure is not at all at odds with the time-preference theory of interest.

A Summary Assessment

Theories of capital and interest are considered by many to be the most difficult theories in the discipline of economics. The difficulties stem in large part from the multiple meanings of productivity and from the

issue of units—the fact that the quantity of capital or the quantity of waiting is reckoned in terms of its own price. Biological and botanical analogies have added confusion. Their deceptively simple answers come at the cost of losing sight of the question. Propositions about growth rates cannot be translated in any direct way into propositions about interest rates.

The Fisher diagram has its uses. This is not to be denied. And the payment of interest can be accounted for in terms of the supply and demand for waiting. But these conceptual contrivances mask more than they reveal. Those who have learned their capital and interest theory from *Man, Economy, and State* should be able to strip the mask away and pass the final exam: What economist has tirelessly and eloquently reminded us that (positive) time preference is a necessary and sufficient condition for the emergence of the phenomenon we call interest and that the productivity of capital (or of waiting) is neither necessary nor sufficient for interest payments to occur? (a) Gustav Cassel, (b) Irving Fisher, (c) Frank Knight, (d) Murray Rothbard.

Professor Rothbard has taught us a theory of interest that allows us to sort out some of the thorniest issues in economic theory and in the history of economic thought. And he has used this theory as an important building block in his system of economics, which he in turn has integrated into a coherent view of social relationships. For all this we owe him our deepest gratitude.

Over a period of more than a decade, I have participated in a number of seminars and symposiums where I have had the opportunity to hear Professor Rothbard lecture and to discuss economic issues with him on an informal basis. This essay draws heavily from those experiences. It also draws from similar interactions with Israel M. Kirzner, Gerald P. O'Driscoll, Jr., and Leland B. Yeager. Although specific references to the published work of these or other theorists is not provided in the essay, a selected bibliography has been appended.

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