

# Understanding the Price of Money

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[[Study Guide of Man, Economy, and State](#) (2006)]

In a money economy, the money commodity is on one side of every transaction, and hence reduces the number of relevant prices. The direct exchange ratio between any two commodities can easily be computed from their respective money prices. The "price" or *purchasing power* of money is the array of goods and services for which a unit of money can be exchanged.

Individual supply and demand schedules in a money economy are determined by the same principles applicable to a barter economy. An individual's value scale contains units of the money commodity as well as all other commodities and services, and the individual will engage in market exchanges to achieve the bundle of goods (including units of the money commodity) that he or she believes will yield the greatest utility. There have been various attempts to gauge the total "surplus" that individuals enjoy from the existence of markets, but these procedures suffer from methodological errors. Individuals benefit from voluntary exchanges, but it is nonsensical to ask how *much* they benefit, because utility is not a cardinal magnitude.

The utility from *selling* a good for money is the value of the most highly ranked use to which the additional money can be devoted (whether to spend on consumption, invest, or add to the cash balance). The utility from *buying* a good with money is the value of the most highly ranked end (consumption, production, or future sale) to which the good can be devoted.

Unlike the position of other goods, the economist must offer some explanation for the precise position of units of money on individuals' value scales. In short, the economist must explain, not only the relative prices of real goods, but also their absolute *nominal* (money) prices. For example, why aren't money prices double, or half, of what they in fact are?

To explain the current purchasing power of money (PPM), the economist relies on the current *anticipations* of the *future* PPM. That is, people right now give up other goods for units of money, because these people expect that these units of money will be exchangeable for other goods in the near future. The current anticipations of future PPM, in turn, are explained by people's memories of the prices of the immediate past, i.e., by the past PPM.

Ultimately, then, today's PPM is largely influenced by yesterday's PPM, and yesterday's PPM was in turn influenced by the day *before* yesterday's PPM, and so on. We push this explanation back until the moment when there were no media of exchange, and (what is now) the money commodity was valued solely for its direct use in consumption and/or production. (This is Mises's famous *regression theorem* or *money regression*.)

Durable goods yield a flow of *services* over time. The price of a service is the *rental* or *hire* price of the good and is determined by the marginal productivity or marginal utility of the service. The outright purchase price of a durable good is its *capitalized value*, and tends to equal the (discounted) present value of its total expected flow of future services.

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## THE INTEREST PROBLEM

Eugen von Böhm-Bawerk's three-volume work, *Capital and Interest*,<sup>[1]</sup> is a classic, both because of its brilliant analysis and its witty exposition. The first volume provides a history and critique of all preceding explanations of the "interest problem." For Böhm-Bawerk, the task of the interest theorist was to explain why a capitalist could regularly earn a net return on his financial assets, even though (unlike laborers) he apparently did nothing to "earn" this interest income.<sup>[2]</sup>



### BÖHM-BAWERK'S "AGIO THEORY"

Böhm-Bawerk's solution consisted of two steps. First, he framed the phenomenon of interest, not as a return to financial investments, but rather as a premium, or *agio*, in intertemporal exchanges. For example, take the case of a tractor. Typically, a capitalist who invests in a tractor (either directly or by lending funds to a farmer) can earn an interest return on his investment; that is, he will have more real wealth after the tractor has been used to harvest crops than before. What Böhm-Bawerk realized was that this phenomenon—the growth in real financial wealth through investment in the tractor—relies on an apparent *undervaluation* of the tractor.

To see this, suppose that the tractor is expected to yield an additional \$1,000 worth of revenue every year, and that it will last ten years (before being junked). Böhm-Bawerk argued that the only reason a capitalist could [earn money](#) through ownership of the tractor is that its initial purchase price is *less* than \$10,000. Only in that case could an investor use an initial amount of financial wealth and turn it into a *greater* subsequent amount (ten years later).

Thus, Böhm-Bawerk had transformed his original question. Rather than asking, "Why do capitalists earn an effortless flow of interest income?" he could instead wonder, "Why is it that the initial purchase prices of capital goods systematically fall short of the future profits their use is expected to yield?"

The second [step](#) in Böhm-Bawerk's solution was to make the claim that present goods are preferred to future goods. Generally speaking, a person values present apples, houses, etc. more than he values *claims* to such goods that cannot be redeemed until the future. In the case of our hypothetical tractor, its purchase price is denominated in *present* dollars, while it only [offers](#) the hope of a stream of *future* dividends (of \$1,000 each year for ten years). Since no one would be willing to give \$10,000 now in exchange for a promise of \$1,000 payments for each of the next ten years, it naturally follows that no one would pay \$10,000 for our hypothetical tractor. Because of this fact—that present goods are worth more than future goods—the tractor can be purchased for less than \$10,000, and a capitalist can increase the market value of his wealth by [investing](#) in tractors (and waiting ten years).

## THE "NAÏVE PRODUCTIVITY THEORY"

Of particular interest to modern Austrians is Böhm-Bawerk's refutation of a popular, rival explanation for the phenomenon of interest. Many economists would argue that, in the case of our tractor, the reason a capitalist earns a net return on his wealth is that the tractor is *productive*: After all, a farmer can harvest more crops, year after year, with a tractor than without one, and so naturally (these economists believe) someone who buys a tractor can earn an income over time. More generally, such economists argue that borrowers are willing and able to pay interest because of the "productivity of capital."

Böhm-Bawerk brilliantly refuted this line of reasoning, which he referred to as the "naïve productivity theory" of interest:

I grant without ado that capital actually possesses the physical productivity ascribed to it, that is to say, that more goods can actually be produced with its help than without. I will also grant...that the greater amount of goods produced with the help of capital has higher value than the smaller amount of goods produced without it. But there is not one single feature in the whole set of circumstances to indicate that this greater amount of goods must be worth more *than the capital consumed in its production*. And that is the feature of the phenomenon of excess value which has to be explained. (I, p. 93, italics original)

We can understand Böhm-Bawerk's argument in terms of our tractor example. The "naïve productivity" theorist claims that the owner of a tractor earns a net return on his investment

because the tractor yields \$1,000 in marginal revenue each year of its life. So *this* explains (so thinks the naïve productivity theorist) the annual percentage return reaped by the capitalist.

But Böhm-Bawerk points out that this is only looking at one side of the matter. Yes, the productivity of the tractor explains why its owner enjoys \$1,000 per year in extra income; if he wished, the owner could rent out the tractor and charge up to \$1,000 per year for its services.

However, this flow of income will only represent a net return *on the original investment* if the original purchase price is *less* than \$10,000. For suppose that the tractor initially cost \$10,000. In that case, its owner would still receive \$1,000 per year for the ten years of the tractor's life, but at the end of the decade the capitalist would have recovered only his initial principal, \$10,000. In other words, the depreciation of the tractor would exactly offset the flow of dividends, so that the net rate of interest on the investment would be zero. Note that this is perfectly consistent with the fact that the tractor is productive, and so the tractor's productivity as such *cannot* be the explanation for a positive rate of interest.

## THE NEOCLASSICAL APPROACH

Modern mathematical economists, who explain economic phenomena through systems of simultaneous equations, are often bewildered by the Austrian stress on subjective intertemporal preferences—rather than capital productivity—when it comes to interest theory. Indeed, a standard condition in a typical mainstream model is

$$r = f'(k),$$

which denotes the fact that in equilibrium, the real rate of interest is equal to the marginal product of capital, i.e. the increment in output produced by an increment in the capital stock  $k$ .

On the face of it, the neoclassical approach seems to commit the very fallacy that Böhm-Bawerk pointed out over one hundred years ago: The mainstream economists seem to argue that the real rate of interest is directly proportional to (and in a sense "caused by") the extra output yielded by additional units of capital. So what's going on here? Do the mainstream models contain a logical error?

Actually, they do not. What has happened is that, because of their need for analytical simplicity, the mainstream models assume that the world has only one good. Consequently, *capital goods and consumption goods are the same thing*, and all of the difficulties in "Austrian" capital theory are assumed away.

We can see this most clearly by a simple example. In order to motivate their assumption of a single good serving as both capital and consumption, the neoclassicals might adopt a model in which sheep are the only good. In this fictitious world, people own stocks of sheep. They can choose to consume their sheep in the present, enjoying the current marginal utility of consumption, or they can postpone consumption (i.e. save their sheep) for a future period. If they choose the latter course, their stock of sheep will multiply (because of natural reproduction). If, say, the number of sheep doubles every year, then (the neoclassical would

argue) the equilibrium real rate of interest in this fictitious world must be 100 percent.<sup>[3]</sup> It is through reasoning such as this that the mainstream economist believes that the "marginal product of capital" is linked to the equilibrium real rate of interest.

However, as I claimed above, this type of model assumes away the thorny issues in capital theory, which only the more sophisticated Austrian analysis attempts to handle. Recall that in our tractor example, the fatal flaw in the naïve productivity explanation was that it did not explain the initial purchase price, or market valuation, of the tractor, *in terms of dollars*. The tractor represents a claim on future dollars, but we cannot know the implicit interest rate on the investment until we know the *present* market value of the tractor *in terms of dollars*.

In contrast, consider the sheep example. In a fictitious world where sheep are the only good, the only measure of a person's real financial wealth is the number of sheep that he owns. In this simplified scenario, yes, if someone's stock of sheep physically doubles every year, then the market-clearing (real) interest rate must be 100 percent.

To put it another way: One sheep now represents a claim on an endless stream of future sheep. But unlike the tractor example, we do not here run into the Böhm-Bawerkian problem: The current market value of one present sheep, *in terms of sheep*, is always one! In the tractor case, physical facts alone could not tell us how many dollars would exchange for the capital good; the tractor might cost \$5,000, or \$10,000, or \$15,000. But in the case of the sheep, we *can* say what the real price of the capital good (sheep) in terms of its future consumption good (sheep) has to be: One sheep trades for one sheep. Thus, the incidental use of a one-good model has allowed the neoclassical to completely sidestep the "Austrian" problem<sup>[4]</sup> of valuing the capital stock in terms of its eventual output of consumption goods.

## AUSTRIAN ANALYSIS STILL RELEVANT

I would like to conclude with a personal anecdote that illustrates the relevance of Böhm-Bawerk's critique. After I had reconciled the verbal logic of Böhm-Bawerk with the mathematical models of the mainstream, I wrote a first draft of one of my dissertation essays in which I explained away the apparent conflict by pointing out the tremendous importance of the mainstream's assumption of a single-good world. I handed in my draft to a renowned mainstream economist, just to make sure that I hadn't misunderstood neoclassical theory.

When I got my draft back, I was quite surprised to find that the professor had clipped a single piece of paper to the front. On it he had written something like, "This is the only interest theory that I, and just about everyone else, understand." Below he had drawn a simple diagram, with  $C(t)$  (i.e. consumption in period  $t$ ) on the x-axis, and  $C(t+1)$  on the y-axis. There was a semicircle connecting the two axes, which denoted the production possibilities frontier (PPF) for present and future consumption through tractors.

The professor had drawn two dots on the PPF. The dot that was higher on the circle represented the tradeoff that was available through saving: By moving to the left on the x-axis, a person reduced current consumption in order to invest in tractors. By moving up on the y-axis, a person increased future consumption because of the marginal output of the tractors.

And now the crucial step: Because of the shape of the PPF, and because he had chosen points on the right side of the curve, it turned out that the leftward shift in present consumption was smaller than the upward shift in future consumption. Therefore, my professor thought that this simple diagram had shown a technological cause of interest: Because of the productivity of tractors, my professor was claiming that a small reduction in present consumption would cause a great increase in future consumption, i.e. a positive rate of interest.

What was so frustrating about this diagram was not that it was wrong per se, but that it completely overlooked Böhm-Bawerk's critique! My professor had completely overlooked the problem of *pricing* the tractors! Yes, the technological facts allow us to say that a given increment in future consumption (i.e. the gap on the y-axis) will require the present investment in a definite number of tractors; this is an engineering problem that does not involve subjective preferences.

However, just because we know how many tractors we need to buy in the present, we do *not* know how much such an investment will reduce our present consumption. In order to know this, we need to know the *market price* of tractors in terms of present consumption. By drawing the gap on the x-axis, my professor had just assumed that the tractors would cost less in terms of present consumption than their future output. In other words, my professor had assumed a positive rate of interest.

After several minutes of discussion, I finally got the professor to realize that he had been assuming away this difficulty. But he still refused to concede that physical facts alone could not explain a positive interest rate. No, instead he proclaimed: "Assume we can turn tractors into bananas one-for-one."

In conclusion, Böhm-Bawerk's critique of the naïve productivity theory was a brilliant leap forward for subjectivist economics. Unfortunately, its lessons are as relevant today as they were in the 1880s.

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[1] Böhm-Bawerk, Eugen von. (1959 [1881]) *Capital and Interest* (3 vols. in 1), South Holland, IL: Libertarian Press.

[2] Specifically, Böhm-Bawerk wondered, "Whence and why does the capitalist receive this endless and effortless flow of wealth?" (I, p. 1, italics removed).

[3] No one would lend out 10 sheep today in exchange for 15 sheep next year, because the owner could simply hold on to his 10 sheep and allow them to double into 20 sheep next year through reproduction.

[4] Actually, one does not need to use verbal logic to see the problem. In the mathematical appendix to my dissertation (available here

<http://homepages.nyu.edu/~rpm213/files/Dissertation.pdf> ), I develop a few general equilibrium models with two goods to illustrate Böhm-Bawerk's insight.

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## Final Utility: The Cornerstone of Austrian Theory

Mises Daily: Friday, July 16, 2010 by [Eugen von Böhm-Bawerk](#)

[This is an excerpt from an essay that was originally published in the *Annals of the American Academy of Political and Social Science*, volume 1 (1891).]



The province of the Austrian economists is theory in the strict sense of the word. They are of the opinion that the theoretical part of political economy needs to be thoroughly transformed. The most important and most famous doctrines of the classical economists are either no longer tenable at all or are tenable only after essential alterations and additions. In the conviction of the inadequacy of the classical political economy, the Austrian economists and the adherents of the historical school [agree](#). But in regard to the final cause of the inadequacy, there is a fundamental difference of opinion that has led to a lively contention over methods.

The historical school believes the ultimate source of the errors of the classical economy to be the false method by which it was pursued. It was almost entirely abstract-deductive, and, in their

opinion, political economy should be only, or at least chiefly, inductive. In order to accomplish the necessary reform of the science, we must change the method of investigation; we must abandon abstraction and set ourselves to collecting empirical material — devote ourselves to history and statistics.

The Austrians, on the contrary, are of the opinion that the errors of the classical economists were only, so to speak, the ordinary diseases of the childhood of the science. Political economy is even yet one of the youngest sciences, and it was still younger in the time of the classical economy, which, in spite of its name "classical," given, as the event proved, too soon, was only an incipient, embryonic science. It has never happened in any other case that the whole of a science was discovered, at the first attempt, even by the greatest genius; and so it is not surprising that the whole of political economy was not discovered, even by the classical school.

Their greatest fault was that they were forerunners; our greatest advantage is that we come after. We who are richer by the fruits of a century's research than were our predecessors, need not [work](#) by different methods, but simply work better than they. The historical school are certainly right in holding that our theories should be supported by as abundant empirical material as possible; but they are wrong in giving to the work of collection an abnormal preference, and in wishing either entirely to dispense with, or at least to push into the background, the use of abstract generalization. Without such generalization there can be no science at all.

Numerous works of the Austrian economists are devoted to this strife over methods.<sup>[1]</sup> Among them the *Untersuchungen über die Methode der Sozialwissenschaften*, by Carl Menger, stands first in its deep and exhaustive treatment of the problems involved. It should be noticed in this connection that the "exact," or, as I prefer to call it, the "isolating" method recommended by Menger, together with the "empirico-realistic" method, is by no means purely speculative or unempirical, but, on the contrary, seeks and always finds its foundation in experience.

"The [idea](#) of final utility is to the expert the open sesame, as it were, by which he unlocks the most complicated phenomena of economic life and solves the hardest problems of the science."

But although the strife of methods, perhaps more than anything else, has drawn attention to the Austrian economists, I prefer to regard it as an unimportant episode of their activity. The matter of importance to them was, and is, the reform of positive theory. It is only because they found themselves disturbed in their peaceful and fruitful labors by the attacks of the historical school, that they, like the farmer on the frontier who holds the plow with one hand and the sword with the other, have been constrained, almost against their will, to spend part of their time and strength in defensive polemics and in the solution of the problems of method forced upon them.

What, now, are the peculiar features that the Austrian School presents in the domain of positive theory?

Their researches take their direction from the theory of value, the cornerstone being the well-known theory of final utility. This theory can be condensed into three unusually simple propositions. The value of goods is measured by the importance of the want whose satisfaction is dependent upon the possession of the goods. Which satisfaction is the dependent one can be



determined very simply and infallibly by considering which want would be unsatisfied if the goods whose value is to be determined were not in possession. And again, it is evident that the dependent satisfaction is not that satisfaction for the purpose of which the goods are actually used, but it is the least important of all the satisfactions that the total possessions of the individual can procure.

Why? Because, according to very simple and unquestionably established prudential considerations of practical life, we are always careful to shift to the least-sensitive point an injury to well being that comes through loss of property. If we lose property that has been devoted to the satisfaction of a more important want, we do not sacrifice the satisfaction of this want, but simply withdraw other property that had been devoted to a less important satisfaction and put it in place of that which was lost. The loss thus falls upon the lesser utility, or — since we naturally give up the least important of all our satisfactions — upon the "final utility."

Suppose a peasant have three sacks of corn: the first, A, for his support; the second, B, for seed; the third, C, for fattening poultry. Suppose sack A was destroyed by fire. Will the peasant on that account starve? Certainly not. Or will he leave his field unsown? Certainly not. He will simply shift the loss to the least sensitive point. He will bake his bread from sack C, and consequently fatten no poultry. What is, therefore, really dependent upon the burning or not burning of sack A is only the use of the least important unit that may be substituted for it, or, as we call it, the final utility.

As is well known, the fundamental principle of this theory of the Austrian School is shared by certain other economists. A German economist, Gossen, had enunciated it in a book of his that appeared in 1854, but at that time it attracted not the slightest attention.<sup>[2]</sup> Somewhat later, the same principle was almost simultaneously discovered in three different countries, by three economists who knew nothing of one another and nothing of Gossen — by the Englishman W.S. Jevons,<sup>[3]</sup> by Carl Menger, the founder of the Austrian School,<sup>[4]</sup> and by the Swiss Walras.<sup>[5]</sup> Professor J.B. Clark, too, an American investigator, came very near the same idea.<sup>[6]</sup>

But the direction in which I believe the Austrians have outstripped their rivals is the use they have made of the fundamental idea in the subsequent construction of economic theory. The idea of final utility is to the expert the open sesame, as it were, by which he unlocks the most complicated phenomena of economic life and solves the hardest problems of the science. In this art of explication lies, as it seems to me, the peculiar strength and the characteristic significance of the Austrian School.

Eugen von Böhm-Bawerk, Austrian economist at the University of Vienna, and Austrian finance minister, made the modern intertemporal theory of interest rates possible in his work *Capital and Interest*. His second book in this series of two, *The Positive Theory of Capital*, continued on to study the accumulation and influences of capital, proposing an average period of production. This work on capital stood in contrast to the contemporaneous work of John Bates Clark on the marginal productivity of capital, and set off a great debate in economics. Although marginal productivity theory proved more accurate, Böhm-Bawerk's highlighting the importance of thinking clearly about interest rates and their intertemporal nature permanently changed economic theory. In the process, he also helped highlight errors in the economic foundations of

socialism, as proposed by Rodbertus and Marx. Böhm-Bawerk was influenced by Carl Menger; Ludwig von Mises and Joseph Schumpeter were Böhm-Bawerk's students. See Eugen von Böhm-Bawerk's [article archives](#).

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