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The Nature of Boehm-Bawerk's Capital Market

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Abstract

The capital market in Böhm-Bawerk's *Positive Theory of Capital* appears at several places. The last chapter of the book provides the complete exposition of Böhm's view of this market where present goods are exchanged for future goods. Studying this exposition leads to understand that many variables, prices as well as quantities, are determined together in this "enormous market". The capital market is a *macroeconomic system*, the nature of which we try to assess.

Böhm-Bawerk's real error – his cardinal error, as Bortkiewicz calls it – is that at this point of his exposition he seeks to solve the problem of the *existence* of interest – as distinct from its actual rate – without referring to the market of capital and labour. This error has already been pointed out by Walras and is, indeed, the only one of major importance which can be attributed to Böhm-Bawerk. In a subsequent part of his work, Böhm-Bawerk himself completely rectified this error. ((Wicksell 1967, page 171))

Introduction

Interest is at the center of Böhm-Bawerk's approach of economics; more specifically, Böhm-Bawerk's aim regarding interest was mainly to explain the phenomenon. It is not always clear in his work, however, whether interest is to be considered as the *market price* of some good or service.

Indeed, the economic laws concerning interest (mainly the existence of interest, the capital and the more or less roundaboutness of production processes) do not always clearly appear as being explicitly the laws of some market.

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In the *Positive Theory of Capital* (hereafter *PTK*), two chapters contain descriptions of the macroeconomic rôle of interest, and these chapters offer different – and in a way diverging – approaches to the question of a capital market.

The first of these chapters is Chapter V, Book III, *Capital as a Tool of Production* of *PTK*, a part of the book which is mainly devoted to the study of roundaboutness and the nature of capital.

The “subsequent part” (Wicksell’s term) is the final chapter of the book *The Rate of Interest*, (book IV, chapter III in the last edition), where Böhm-Bawerk studies the capital market, which at first glance is not a financial market but some sort of market for goods¹; and it is soon stated that this market has a very common behaviour:

The exchange of present goods for future goods, which constitutes the source of the phenomenon of interest, is merely one special instance under the rubric of the exchange of goods in general. And so it follows as a matter of course that determination of price in this field cannot proceed under any laws other than those which govern determination of price in all economic exchange.((Böhm-Bawerk 1959-1921*b*, page 347))

While interest appears to find its source in mechanisms of exchange, this matter is not widely discussed by Böhm-Bawerk, who instead focuses on the macroeconomic dimension of the question of interest.

In this chapter we first show how Böhm-Bawerk describes the conditions of interest determination in Book III of *PTK* (section 1), then recall some basic features of technological laws as seen by Böhm-Bawerk (section 2). In section 3 the full description of the capital market is examined; the final section (4) is an attempt to assess the nature of the böhmian macroeconomic system.

1 The problem of saving

In *PTK* ², Böhm-Bawerk deals with two main questions:

- What are the technical conditions of the quantity of capital in an economy? What is needed for a material increase of the capital stock?
- What are the laws (if any) leading to the appropriate decisions about capital size being taken in a decentralized economy?

¹The same definition is again stated a few pages after:

... the character of the market where present goods are exchanged for future goods.((Böhm-Bawerk 1959-1921*b*, page 351))

²Book III, Chapter V: *Capital as a Tool of Production*

Let us concentrate on the second question, which is stated as follows by Böhm-Bawerk:

So far we have discussed the formation of a nation's capital as if that nation were carrying on a unified economy governed by a single will. Of course that is not the case. We therefore still have to show how, under the actual system of diversified and multiple control of our economy, the dispositions which lead to the formation of capital are actually carried out. And it still remains to be proven, whether those dispositions presuppose "saving" as I maintained above. ((Böhm-Bawerk 1959-1921*b*, page 111))

According to Böhm-Bawerk, it would be easy in a socialist economy with centralized decisions to allocate labour in the desired activities; after showing how this happens in a socialist economy, he rapidly describes the "working of a market economy":

The procedure is somewhat more complicated in an individualistically organized society such as is represented by the actual conditions prevailing today. And yet its underlying principles can be recognized. Here the prime factor in the control over the assignment of the annually accruing productive forces and over the direction given to the national production is the entrepreneur. But he does not exercise this control as his own desires dictate. On the contrary, he is subject to the influence exerted by the prices of the products. Where lively demand promises profitable prices, the entrepreneur expands his production; where diminishing demand no longer keeps pace with the supply and certain goods no longer command sufficiently profitable prices, the entrepreneur restricts production of those kinds of goods. Expansion and restriction of supply continue to alternate until for the individual classes of merchandise a balance has been established between production and demand. In the last analysis, then, it is not the entrepreneur who determines the direction the national production shall take, but the consumer – the "public". Everything depends on what "Mr. Public" wants to spend his income for.((Böhm-Bawerk 1959-1921*b*, page 112)).

The respective rôles of entrepreneurs and "the public" are, in this chapter, as follows.

The public (income spenders) makes decisions about how much he will spend; strangely enough, in this chapter³ Böhm-Bawerk sees the public as having some rough quantitative saving function:

³The picture will be refined in the last chapter of the book.

If [...] each individual consumes, on the average, only three-quarters of his income and saves the other quarter...((Böhm-Bawerk 1959-1921*b*, page 112))

By these quantitative choices, income spenders compel entrepreneurs to take decisions about the production structure. The channel of transmission between the public and the producers lies in the price system, which may seem quite trivial, but *only the prices of goods are relevant*.

... an economically advanced nation [...] invests its savings. It buys securities, it deposits its money at interest [...], etc. In this way it is added to the nation's productive credit, increases the producer's purchasing power for production purposes [...], and so becomes the cause of an increase in the demand for production goods, which is to say intermediate products. And that demand is, in the last analysis, what induces the managers [...].

... if individuals do save, then the change in demand, once more through the agency of price, forces the entrepreneurs into a changed disposition of productive forces.((Böhm-Bawerk 1959-1921*b*, page 113))

Several points can be made here:

- The working of markets for goods and services, where the entrepreneurs act as producers, explains how savings by individuals compel producers to adopt the good “disposition of productive forces”. No money or financial market is active in this process.
- These markets are mainly influenced by the demand side; the income-spenders seem to have more power than the producers. In each market demand has an effect on price, and suppliers are mechanically responding to price incentives.
- Savings are not forgotten in Böhm-Bawerk's description; he shows where they go when individuals save, and through which channels the eventually reach the productive sphere. But savings are not dealt with on a marketplace; they are passively transported from the banking system to markets for goods or services.
- As a consequence, the interest rate does not appear in the whole process of bringing savings where they are needed.

So Wicksell – in the quotation at the head of this chapter – was right when stating that market(s) for capital and labor do not have the explanatory rôle they deserve.

But to speak of “a real error” may be too strong a statement (if not self-contradictory: Wicksell acknowledges a “rectification”), as Böhm-Bawerk in

the last part of his book gave a full treatment of the “capital market”. This treatment doesn’t imply any kind of denial of what had been written before.

2 Basic laws of productivity and roundaboutness

Let us now turn to the last chapter of *PTK*, where a more elaborated view of the capital market is offered.

While this market “is merely one special instance under the rubric of the exchange of goods in general (*supra*)”, its workings need some special study – a task of “completion”, which will be fulfilled by the study of the “concrete factors”; this need arises partly because Böhm-Bawerk’s main aim is to explain interest, and partly because the interest market has a more complex behaviour than, for instance, the horse market which Böhm-Bawerk, after Menger, takes as an example when describing market mechanisms.

A first point in this chapter is to show – or rather summarize – the basic determinants of the productivity of capital.

The main law of productivity is here ⁴, that the highest interest a producer will offer to pay for a given production operation is determined by the productivity of capital.

Böhm-Bawerk makes several assumptions to show that:

1. The technical choice facing the producer can be expressed in terms of the roundaboutness of production, measured in years. A non-capitalistic production process is one in which the product is completely ready within one year, and the longer the production the more capitalistic it is.
2. More roundabout methods lead to more productivity, as measured by the product of one year’s labor.
3. The productivity displays decreasing returns (in the time dimension), as measured by the “surplus product”.

Here is Böhm-Bawerk’s own example:

Production period in years	Product of one year’s labor	Surplus product
1 Without capital	750	—
1 With capital	1750	1000
2 –	2250	500
3 –	2650	400
4 –	2900	250
5 –	3100	200
6 –	3250	150
7 –	3350	100
8 –	3425	75
9 –	3475	50
10 –	3500	25

⁴This might seem very trivial for us, but it was not so at Böhm-Bawerk’s time.

It is then easy to show that it is in the interest of a producer to borrow capital provided that the rate of interest is not higher than the ratio of surplus to borrowed capital. As returns are decreasing, the agio to be paid diminishes when roundaboutness is increased:

And so we arrive at the following important proposition. *The value to the intending producer of a present loan varies inversely with the length of the production period for which he is already equipped without benefit of such loan.* ((Böhm-Bawerk 1959-1921*b*, page 350))⁵

The road is now open to study the outcome of the capital market.

3 Interest as a market determined price

After explaining these “basic laws”, Böhm-Bawerk endeavours to describe the actual determination of the interest rate, firstly “under market conditions”, then “under the fully developed market for capital”. These two headings simply indicate that he will build his exposition starting from a simple framework and gradually will take more and more factors into account.

As a first approximation, capital supply is taken to be given, while demand is limited to what is necessary to pay wages (other sources of demand being subsistence for the entrepreneurs themselves and consumer credit). We enter into a very elementary model of the capital market, where producers borrow capital (present goods) to pay wages in order to produce future goods, a part of which (or maybe the whole) is due to the lenders.

To consider the demand for capital in order to pay wages implies a theory of the labor market. Böhm-Bawerk’s view of this market is at first view very simple. There is a fixed number of labor suppliers; and competition in this market always leads to clearing prices:

The workers are in urgent need of present goods and there is little or no possibility of their accomplishing anything by working for their own account. To the last man they will prefer to sell their labor cheaply rather than not at all. ((Böhm-Bawerk 1959-1921*b*, page 354))

One would expect from such an assumption, given a fixed supply of capital, that wage determination is very simple; if F is the amount of capital offered to buy labor, L is the quantity of labor, then the wage rate should be

$$w = \frac{F}{L}$$

⁵Italics in this and later quotations are in the original.

But for Böhm-Bawerk there is a difficulty with wages, because their productivity cannot be known until one knows what the roundaboutness of production is, and roundaboutness cannot be determined until the wage rate is known!

At this point it is not easy to understand Böhm-Bawerk; a link must be established between the wage rate and roundaboutness; here is how it is done.

For him it is always possible to give jobs to all labor suppliers, but what will be determined is not the wage, it is the length of employment, that is the production period:

...any given total of present goods, be it large or small, is sufficient to purchase and remunerate the total supply of labor existent in a given economy. All that is required is to bring about a corresponding contraction or extension of the production period. ((Böhm-Bawerk 1959-1921*b*, page 354))

This view can be expressed in terms of the preceding formula, provided we take care to write for the quantity of labor L :

$$L = ND$$

where N is the number of laborers and D is the duration for which they are hired.

The first formula becomes

$$D = \frac{F}{wN}$$

expressing that with a certain quantity of present goods and a given wage, the labor force can be employed during a period D .

This duration D has a strong status in Böhm-Bawerk's theory of the capital market, because there is an *assumption that if capital can employ laborers for this duration, then this will be the production period*:

The very establishment of this point introduces a certain definiteness into the length of the production period and thereby into the magnitude of the product that the entrepreneur can turn out with the purchased labor. For a *production period must necessarily be adopted of such length that over the period of its duration the whole disposable subsistence fund must all be requisite and at the same time only just adequate to pay the wage of the whole available supply of labor*. ((Böhm-Bawerk 1959-1921*b*, page 355))

This is a quite strong assumption. If we try to guess what economic behavior lies behind this supposed association of the duration of the supply of

present goods with the length of the production period, we soon arrive at the conclusion that producers are borrowing at the beginning of their production operations all the present goods they need for the whole duration of these operations.

This assumption might well induce very serious material problems, e.g. for subsistence goods. But economic questions arise too. Why should an entrepreneur not be able to exchange present goods for future goods every month, when it is time to pay the laborers, or twice a year? Why should he be constrained by the volume of capital **today** when he wants to launch a production process lasting, say, five years? New savings will certainly accrue and so new capital will be offered.⁶

Böhm-Bawerk doesn't give an answer to that; rather, he next wonders what determines the wage rate.

The formula $D = \frac{F}{wN}$ does not imply that wage is exogenous; it indicates there is a trade-off between wage and duration. How is it working? It is necessary to introduce entrepreneur's profit to understand that. Böhm-Bawerk shows then what happens when w takes several values, using the figures of the former table. For example, if the wage is $w = 1500$, the working population 10 million persons and the capital fund $75bn$, one shows that the maximum of profit implies a production period of three years employing 33,5 million workers, which is inconsistent. Then by varying the wage rate, Böhm-Bawerk can show there is one wage (with his figures, $w^* = 2500$) permitting full employment of capital and labor.

In this situation, the maximum agio (interest rate) which producers will accept to pay is easy to identify, according to the laws of productivity (supra). This leads Böhm-Bawerk to a general statement of interest determination:

The rate of interest under the foregoing assumptions is limited and determined by the productivity of the last prolongation of the production period which is still economically permissible and that of the next prolongation which is not so permissible. ((Böhm-Bawerk 1959-1921b, page 360))

While general conditions for equilibrium interest rate are thus stated, it remains for Böhm-Bawerk

⁶One might argue that the result for production would be roughly identical, whether capital is borrowed for only the "fresh" processes – to use John Hicks' terminology (Hicks 1973) – during their whole lifetime or for all processes, "stale" and "fresh"; but Böhm-Bawerk's strong opposition to John Bates Clark's concept of *synchronization* shows that, at least for Böhm-Bawerk, this issue is important : ((Clark 1907), (Böhm-Bawerk 1906), (Böhm-Bawerk 1907b), (Böhm-Bawerk 1907a)). It is rather intuitive that only in a stationary state would this question disappear. Note also that abandoning this assumption opens the way to the Mises-Hayek business cycle theory.

to expose the *concrete causes* which themselves determine the determinant – the degree of productivity attained by the last prolongation.((Böhm-Bawerk 1959-1921*b*, page 361))

The last part of this chapter is devoted to examine how the many factors of the problem can interact. These factors are:

1. “The magnitude of the subsistence fund” (interest varies inversely);
2. “The number of the producing members [...] for whom it is to provide”; these may be workers and self-employed entrepreneurs (interest is positively related);
3. “The composition of the graduated scale of surplus returns”, that is, the nature and shape of returns;
4. “Extensiveness and intensiveness of the desire for consumer loans” (interest is positively related);
5. “The existence and rate of land rent” (interest is positively related);
6. “The existence of a numerous class of capitalist who live on their income” (interest is positively related);
7. “[T]he economic sense of the population”; that is, the propensity to save.((Böhm-Bawerk 1959-1921*b*, page 372))

With the last factor the subsistence fund loses its fixed character and Böhm-Bawerk shows in the last pages how savings are determined:

As far as utilization of current *income* is concerned, due regard to the basic rules of harmonious satisfaction of present and future wants still governs, but will call for behavior that varies widely from one individual case to another.((Böhm-Bawerk 1959-1921*b*, page 374))

This can be understood as meaning that the relative price of future to present goods determines the supply of savings, but Böhm-Bawerk does not write that; at this point the theme of the underestimation of future wants is proposed to state that it is nearly impossible for men to follow “with mathematical precision” the “demands of the principle of economic behavior.” ((Böhm-Bawerk 1959-1921*b*, page 375))

4 Böhm-Bawerk’s macroeconomic system: model or theory?

The capital market, in its results, is what one expects from a marginalist writer, in the sense that equilibrium prices are equal (or very near) to

marginal productivities⁷.

What Böhm-Bawerk describes with this “market” is obviously – for us, since at his time the word did not even exist – a complete macroeconomic system.

The capital market is a place where present goods are exchanged for future goods; there is no limitative list of the kinds of goods which may be so exchanged. This means that the capital market is likely to encompass the whole economy. What is called the capital market is the whole of all the individual markets which actually contribute to the final value of the interest rate.

The rate of interest is not the only price which is settled on the capital market. The wage rate cannot be determined without interest being fixed, and vice-versa. Interdependence implies for Böhm-Bawerk a determination on one same market, at the conceptual level at least. Only at the very end of *PTK* does he define clearly what his capital market is:

Hitherto we have been imagining the entire supply of present goods and the whole demand for them as being *concentrated in one single enormous market*. Instead, trading for present and future goods is scattered over an innumerable multitude of partial markets. To begin with, the diversification shows certain large groups, namely, the loan market, the labor market, the market for uses of land, the market for capital goods. And each of these markets undergoes further division and subdivision ... ((Böhm-Bawerk 1959-1921*b*, page 378-79))

Goods and services included in the “one single enormous market” can be split into the more usual broad categories appearing in this statement, and then split again and again to find the “many separate local markets” (ibid). The single enormous market, the four big subdivisions – loan market, labor market, land market and capital goods market – and the separate local markets are different levels of analysis which can all be useful, but Böhm-Bawerk makes it quite clear that the separate local markets are the “real” markets:

Since there is not only *one market* for present commodities...((Böhm-Bawerk 1959-1921*b*, page 379))

But all these markets are interacting with one another, and this explains why it is necessary to go to the higher levels of aggregation:

Within a single economy therefore, there may at one and the same moment be a hundred different agios on present goods and

⁷This of course is not a denial of Böhm-Bawerk’s originality (good or bad) concerning the time-dimension of capital.

hence a hundred different rates of interest. But those hundreds or thousands of partial markets are not hermetically sealed against one another. They is communication among them through lively and incessant arbitrage. If in one market there is, temporarily, an abnormally high agio on present goods, new capital will crowd in to that favorable market very rapidly and thereby cause the advantage it possesses to disappear. Conversely, if in some market the agio is, temporarily, abnormally low, the fact will suffice to discourage any further influx of capital and will probably also induce a part of the capital present there to hie itself to other more favourable partial markets. And that will go until the disadvantageous difference in price is again erased.(ibid.)

Interactions between the (real) markets at the most disintegrated level are clearly *microeconomic* ones, driven by maximizing behaviour. But it is at the higher level, when all interactions have produced their results, that the final interest rate emerges.

So while there is a macroeconomic system in Böhm-Bawerk's, it relies on microeconomic laws, in obvious contrast with keynesian macroeconomics, and also, to my understanding, with the idea of a macroeconomic theory with microeconomic foundations, since here we start – as the only reality – from the microeconomic level, and macroeconomic propositions *stem from it*.

When Böhm-Bawerk wrote his *PTK*, the concept of *methodological individualism* was still to be defined just as was macroeconomics, but it seems fair to say that his description of the macroeconomic system is fully in accordance with it.

Now what exactly is this macroeconomic system? Klaus Hennings ((Hennings 1997, page 155)) writes of it as “a macroeconomic model of general equilibrium”. Böhm-Bawerk's description undoubtedly is general equilibrium, as many prices are set together, and market interactions are present and play an important rôle. But it seems difficult to agree with the term *model*; Böhm-Bawerk's description is a macroeconomic *theory*.

The distinction between theory and model is taken in the following usual sense. A **theory** is a set of *laws* describing the world, these may be laws of causality (the strong sense of theory) or laws of interdependence. A **model** is a set of *assumptions* drawn from a larger theory, seizing a small subset of reality, usually with a formal apparatus permitting a mathematical treatment. A model is often designed to test a theory, but models with very thin theoretical content are known to exist and survive. A model usually provides one (or several) determinate solution(s).

Böhm-Bawerk's macroeconomics is a theory:

- His aim was to describe the working of the economic system in all its complexity, not just to give a tractable image of it.

- His macroeconomic system is made of laws of causality, interacting in a complex way.
- The equilibrium is described as end result, but no way to find or calculate it is investigated.

Note that this is exactly what Wicksell said in the opening quotation of the present chapter, when contrasting “the problem of the *existence* of interest – as distinct from its actual rate” (to be sure, the world “existence” here means to Wicksell the *reason of the phenomenon*, and must not be taken in the mathematical – and more usual in the field of general equilibrium – sense of the presence of at least one solution to a set of equations). Existence in this sense can be dealt with without using any modelisation, the calculation of the rate could not. What Wicksell himself did to improve the understanding of the austrian view of capital theory is in this respect more than a new, more convenient and clearer exposition of Böhm-Bawerk’s theory: it is a qualitative jump from theory to model ⁸.

A two-level theory

To further qualify Böhm-Bawerk’s general equilibrium theory, I would suggest a two-level reading: at the first level we find a theory showing how various concrete mechanisms in various markets lead to a definite (but not calculated) result. But there is a deeper level in this construct, one that does not appear explicitly but matters at least as much.

It was very important to Böhm-Bawerk to show that the *economic laws* at work, which he claims are the true laws of economic life, are *mutually consistent*; Böhm-Bawerk’s *History* ((Böhm-Bawerk 1959-1921*a*)) is mostly dedicated to show that rival theories of interest are inconsistent and he will show at length, some years after writing his *PTK* ((Böhm-Bawerk 1962)), that Marx’s rival interest theory, the “exploitation theory”, cannot pass the test of consistency. That his own theory is able to pass the test could only be proven at the macroscopic level, which is, for an economic theory, the macroeconomic level.

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⁸A qualitative jump that Böhm-Bawerk was most certainly neither technically likely to perform nor wishing to do.

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