

On the Development of Böhm-Bawerk's Interest Theory from 'Fisherian' to 'Wicksellian'

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Introduction

Böhm-Bawerk's ideas on capital and interest theory have been mathematically reformulated at least twice by leading economists Knut Wicksell and Irving Fisher. The historical order of their publications is clear and well-known. The former's *Über Wert, Kapital und Rente* was published as early as 1893, while the latter's *The Rate of Interest* of 1907 and its revised version, *Theory of Interest* was published in 1930 and dedicated to Böhm-Bawerk as well as John Rae. Needless to say, their reformulations placed Böhm-Bawerk in an eminent position in the history of modern economics, and several illustrious refinements followed them later on. (For example, Fetter (1914) and Hirshleifer (1970) along Fisherian lines and Stigler (1941), Dorfman (1959), Kuenne (1971), and Gay (1973) along Wicksellian lines.)

These two reformulations are attributed to Böhm-Bawerk, because their original ideas can be found in his masterpiece, *Positive Theorie des Kapitals* (= *PTK*).¹ To the numerical example in the last chapter of *PTK*, Wicksell gave mathematical and graphical expressions, while the literal explanation of the agio theory in the foregoing chapters of *PTK* was translated by Fisher, into a graphical exposition.² Though they have origins in the same work, their theoretical structures are quite different with respect to treatment of the time element. In Wicksellian mode, it is transformed into one dimension, viz. the concept of the average period of production,³ while the present-future (two dimensional) intertemporality is perceptively preserved in the Fisherian model.

The aim of this paper is to illustrate through several recently reproduced materials how Böhm-Bawerk's own ideas developed in reverse order: from what was later known as a Fisherian approach to one which was to become symptomatic of the Wicksellian line.⁴ By careful documentation I will also clarify the origin of the dual aspect of *PTK*, or the co-existence of two theoretically idiosyncratic streams of thought in *PTK*.⁵ Furthermore, this historical illustration will also shed light upon the reason for Böhm-Bawerk's famous confession, which was later heard directly by Schumpeter:

"What is before us to read is not the finished work that Böhm-Bawerk had in mind - parts of the published performance were written in a hurry, the consequences of which Böhm-Bawerk never had the opportunity to remedy."⁶

Ex ante and *Ex post* Questions of a Loan

After obtaining the doctoral degree of law on 23 March 1875, Böhm-Bawerk received a scholarship to make further scientific researches under the leading scholar of the historical school, Karl Gustav Adolf Knies of Heidelberg University.⁷ Interestingly enough, it was by Carl Menger himself, the later critic of that school, that Böhm-Bawerk was selected with three other students (including Friedrich von Wieser).⁸ This selection can be explained from the purpose of this scholarship, granted by the Ministry of Culture and Education. It lies not

specifically in educating economists, but more widely in training university teachers of the Habsburg Monarchy.⁹ At that time, Knies as a professor of State Sciences (*Staatswissenschaften*) comprehensively lectured not only on economics (*Nationalökonomie*) as one branch of this field, but also on economic policy or theory of administration (*Verwaltungslehre*).¹⁰ He had been expected to give some established knowledge of state sciences to the younger generation. In fact the wide historical knowledge of his supervisor played a crucial role in orienting and inspiring the 25-year old Böhm-Bawerk to economic thinking. The results were presented at Knies' seminar held in February of 1876.¹¹

Through the 18th-century controversy between Turgot and Pothier on interest prohibition, which was described in Knies' just then prepared *Der Credit* (1876), Böhm-Bawerk became interested in the long-lasting debates about interest, which would be the theme of his future theoretical pursuits, and more importantly he encountered the two fundamental questions of a loan:

"The interest-bearing loan is one of free contracts. The creditor demands the interest, and the debtor consents to it. Why? It's clear, not because the law allows it, but because it is favourable to both parties. The favourability for the creditor is clear. But how about the debtor? Why does the debtor decide to give his consent to the interest claim on the loan? Why can he agree to it?"¹²

The last two sentences of this passage can be interpreted as the two fundamental questions of the loan. The first may be called the "*ex ante* problem", because the debtor's decision to pay interest is made before the period of the loan, while the second the "*ex post* problem", for the actual payment comes after the period of the loan.

To answer the *ex ante* problem, Böhm-Bawerk borrowed one of Turgot's defending arguments on the interest-taking contracts, the prohibition of which Pothier, as a canon-law theorist, asserted. It was summarized as follows:

"Thus the nature of the loan lies in the disposal of a quantity of the present goods for a quantity of the future goods of the same kind. Since the future goods have less value than the present ones *ceteris paribus*, if the same sum of money was only repaid, there comes a difference of value between the renting and its repayment, which puts the creditor at a disadvantage. Therefore, in order to equalize the value of renting with that of compensation, the quantity of compensation should be increased. This quantitative increment is the interest. The interest has therefore, its origin, reason and justification in the economic nature of the loan."¹³

After this quantitative increment was stipulated to be paid, where and when will it actually come from? This leads Böhm-Bawerk to the *ex post* problem: after the period of the loan, why can the debtor actually pay the stipulatory interest? He noticed that the answer is hidden in the concept of the productivity of capital. "The answer is as follows: the debtor müß and can produce the interest. This leads us once again to the problem of the productivity of capital."¹⁴ This distinction tells us that Böhm-Bawerk was then aware of the two dimensional property of interest phenomena. Of course this was neither multiple period nor general equilibrium modelling. But it was fundamentally what was later to become the hallmark of the Fisherian approach, because the propensity to evaluate the present goods higher than others corresponds to Fisher's "willingness principle", while the productivity of capital corresponds to his "Investment Opportunity."

Advances Beyond the 'Fisherian' Approach

We can also appreciate Böhm-Bawerk's endeavours to theorize about the productivity of capital by taking the time element into account and by extending the viewpoint from money market loans to production in the last part of the 1876 paper. He characterizes production as "a process, which is completed through time."¹⁵ Then he proposes that the future utility that production would yield becomes the present actual utility as time goes by. "If we can eventually complete production, we see that actual utility after completion of production, which had been a utility consumable only in the future and is now consumable in the present."¹⁶ Here we find that Böhm-Bawerk went far beyond 'Fisherian' preoccupations because of his recognition of the fundamental property of time. Time is always passing, or the future is coming nearer and nearer to the present. Or in other words, he tried to compare the *ex ante* with the *ex post* situation of economic phenomena: loan, or capital transaction and production etc..

The 1876 seminar paper, sent to Carl Menger with a letter of 1 July of that year,¹⁷ afforded Böhm-Bawerk one more year to stay at Jena and Leipzig Universities. He did not take advantage of this opportunity to make progress in his economic studies. Also after returning to Vienna in the summer of 1877, he didn't have enough time to investigate the concept of capital productivity through a study of classical works, because he was involved in several new and important jobs as a civil servant of the financial authority.¹⁸

In parallel with these practical jobs, he started to prepare for his habilitation paper in 1879. Without enough time to refer to his forerunners' ideas, Böhm-Bawerk was obliged to choose the rather abstract method of critical investigation of fundamental concepts in economics such as goods and their use. The thesis, entitled *Kritische Beiträge zur volkswirtschaftlichen Lehre vom Gute und von der Güternutzung*, was accepted on 27 February 1880 by two full professors at Vienna University, Lorenz von Stein and Carl Menger, who awarded Böhm-Bawerk a lectureship (*Privatdozent*).¹⁹ Just at that time, Karl Theodor von Inama-Sternegg moved from Innsbruck to Prague University. To fill the vacancy, Böhm-Bawerk was appointed by the Education Minister as a temporary lecturer (*Supplent*) on 22 March 1880.

After moving to Innsbruck in April 1880, Böhm-Bawerk was requested by Menger to publish his habilitation paper. For this purpose, he had to pick the original from Innsbruck University on 10 July 1880, because he had submitted it to the Faculty for Law and State Sciences of the University to assure that his lectureship would be acknowledged also at Innsbruck University.²⁰ The original remained in Böhm-Bawerk's possession, but is now lost. The exact contents are, therefore, unknown. If one wants to infer the contents through its published version of 1881, *Rechte und Verhältnisse vom Standpunkte der volkswirtschaftlichen Güterlehre (=RV)*, one should be careful, because Böhm-Bawerk wrote to Carl Menger that he changed its form completely and its contents essentially.²¹

At least from the contents of *RV*, we can see that Böhm-Bawerk did not ostensibly choose as the theme for his habilitation paper the *ex ante* problem of the loan directly but the problem, nevertheless, did not escape his mind. The latter point can be confirmed by the fact that Böhm-Bawerk reasons in objectivist terms in *RV*.²²

In *RV* Böhm-Bawerk tried to limit the category of economic goods within physically tangible thing. The intangibles, for example, the right to use something, should be excluded from the category of economic goods, because, if it existed as an independent economic good, then its value could also exist independently of that of the things itself and this amounted to a double counting of the value of one thing. The value of usage of one thing should be regarded as included in that of the thing itself. This is why Böhm-Bawerk referred to the practical

calculation of properties. It appeared to reflect his concern with the connection between economic theory and practice, but his main intention lay in another direction.

Böhm-Bawerk wanted to show a contradiction following from the hypothesis behind the use theory of interest supported by Knies, Menger and other 19th-century German scholars that interest is paid for use of money or capital during the period of a loan. Without assuming use of money as an independent economic good, he thought, one could explain from the intertemporal difference in subjective valuation the reason why the debtor agrees to the future payment of interest for borrowed money. Of course, we cannot find in *RV* any critical statements by Böhm-Bawerk against the use theory of interest, but one can see *RV* as a preparation for future disagreement with the supervisor of his habilitation, Carl Menger.

On the Productivity of Capital

Just before completing the draft for the publication of his habilitation paper, on 4 November 1880, Böhm-Bawerk declared, from Innsbruck, to Carl Menger that it is important for an explanation of the interest phenomenon not to simply state the productivity of capital but to further explain it.²³ Thus he returned to the 5-year-old open question: the *ex post* question of a loan. To solve this problem he started an intensive inquiry into the meaning of the ambiguous proposition that capital is productive. This forms his main motive for preparation of *Geschichte und Kritik der Kapitalzinstheorien (=GKK²⁴)* and explains its fundamental structure: the first half devoted to the theories presuming the existence of the productivity of capital and the second to those, especially socialists, recognising it only in living labour.

One of the main points of view in his critical survey of classical works, dealt with in the first half of *GKK*, was to distinguish four meanings of capital productivity.

- "1. Capital has the capacity of serving towards the production of goods.
2. Capital has the power of serving towards the production of more goods than could be produced without it.
3. Capital has the power of serving towards the production of more value than could be produced without it.
4. Capital has the power of producing more value than it has in itself."²⁵

The first two propositions related to physical productivity and the last two related to value productivity. The second had been illustrated by the well-known example of the fisher given by Wilhelm Roscher as follows: "[the fisher] first catches three fish a day by hand, then saves up a stock of 100 fish, makes a boat and net while living on his stock, and thereafter catches thirty fish a day by the assistance of capital."²⁶ Böhm-Bawerk regarded this physical productivity as a natural experience. "I grant at once", he wrote, "that capital actually possesses the physical productivity ascribed to it - that is to say, by its assistance more goods can actually be produced than without it."²⁷ He stressed also in commenting on Lauderdale's theory: "No fault can be found with the starting-point that he takes for his argument. It is - to continue Lauderdale's own illustration - quite correct to say that one man with a knitting loom may turn out as many stockings in a day as six hand knitters."²⁸ This is repeated when commenting on Thünen, "Labour supported by capital can obtain a greater amount of products. This assumption is undoubtedly correct."²⁹

Thus Böhm-Bawerk asserted that the physical productivity of capital should be assumed to explain interest. With this starting assumption, he parted with the socialist theory of surplus value, which sees productivity only in live labour, and established the profitability of roundaboutness as a physical productivity of capital with a time element. Under this

assumption, "the theorist, who professes to explain interest must explain the emergence of Surplus Value", viz. the value productivity.

"The problem, more exactly stated, will therefore run thus: Why is the gross return to capital invariably of more value than the portions of capital consumed in its attainment? Or, in other words, Why is there a constant difference in value between the capital expended and its return?"³⁰

Thus the physical-value distinction in capital productivity was basically needed for Böhm-Bawerk to formulate the interest problem. How did he arrive at this distinction? It might be through his practical experiences at the Ministry of Finance in 1879. As a secretary of the commission for direct tax reform he had to learn principles supporting it and one of these principles was based on the distinction between physical and economic ability to pay tax. The older system had not reflected the economic ability because of it was based on the physical standard.³¹

Toward the Period-of-Production Model

Already before publication of *GKK*, the name of its second Part, *Positive Theorie des Kapitaless*, had been determined and it was planned to be published a year after December of 1884.³² But it did not come to fruition. Its actual appearance was at the beginning of 1889. The reason for this postponement may probably be explained partly through several routine works of Böhm-Bawerk as full professor or dean of the Faculty from October of 1884 to July of 1885, and partly through his reformulation and republication of the Mengerian subjective theory of value and price in 1886, entitled "Grundzüge des volkswirtschaftlichen Güterwertes," whose contents would be almost completely contained in the first two chapters of Book III of *PTK*.³³

After the Stein Affair in the summer of 1887,³⁴ he devoted himself to finishing *PTK*. Even these two years weren't enough for Böhm-Bawerk to complete his last model for the determination of interest rates. As shown in the letter to Léon Walras on 7 August 1888,³⁵ Böhm-Bawerk was urged to send one after another of his completed proofs of *PTK* to the printer in order to publish it as soon as possible, because he had decided to devote himself to widening the scope of the Finance Ministry's Plan for direct-tax reform.³⁶

To finish the last chapter of *PTK*, Böhm-Bawerk provisionally compromised by gathering parts from his earlier researches found in his lecture notes: the profitability function of roundabout production (*Mehrergerbigkeit des Produktionsunwegs*: $V=f(t)$: where V = the value of product, t = the average period of production),³⁷ the long-run equilibrium ("Kostengesetz": $V=\text{wages} + \text{interest}(\text{profit})$),³⁸ the subsistence fund theory ($K=wt$: where K = the amount of subsistence in this economy, w = the rate of wages)³⁹ and optimization under constraints,⁴⁰ which are the basic components of the period-of-production model, can all be found in his earlier lecture notes on economics prepared by 6 December 1882 at the latest.⁴¹ This compromising return to the subsistence fund or classical Ricardian elements may be interpreted as one of the reasons for criticism alleged by Menger, as "one of the greatest errors ever committed".⁴²

Böhm-Bawerk was also not satisfied with his period-of-production model, developed more fully along what was later known as the Wicksellian line. If he had been satisfied, it would not have been necessary to put off the publication of *PTK*. In fact, he gave no explanation of this compromised model in introducing his new positive theory in a French Journal.⁴³ Also, on a later occasion after 19 February 1892, when the tax-reform bill of the government was placed by his own initiative before the Lower House of the Imperial

Parliament, Böhm-Bawerk wrote to Wicksell that he would revise his *PTK*, because his practical jobs had almost been completed.⁴⁴ But this plan could not be fulfilled, not only because of his practical work as Finance Minister (1895, 1897 - 98 and 1900 - 1904), but also because he was distracted by the third volume of Marx's *Capital*, posthumously published by Friedrich Engels in 1894. Böhm-Bawerk poured his time and energy into the critical assessment of this work.

Therefore, it can safely be said that the postponement of *PTK* resulted from Böhm-Bawerk's struggle with another problem from 1885 to 1889. According to our investigation into the 1876 paper, he might have been trying to theorize about the fundamental property of time: its 'historical' passage (*der Ablauf der Zeit*) instead of the key concept for his last model, the average period of production. The latter concept was surely one operational method for measuring the amount of capital and caused debates in the 1930s because of its limited assumption of the one-point-output structure of production. For Böhm-Bawerk the 'average period of production' had a more severe limitation: the disregard for intertemporality by summing up amounts of labour existing at different periods of time. In criticising Marx's exploitation theory as well as Menger's use theory of interest in *GKK*, Böhm-Bawerk strictly relied on the basic concept that economic goods of physically the same quantity and quality should be regarded as different according to the period of their existence.⁴⁵

In terms of this 'neoclassical' way of thinking, Böhm-Bawerk might have been further trying to find a way of comparing the *ex ante* and the *ex post* situations to explain the phenomenon of capital value-productivity, because it would come to completion after the future became the present. We can find some fragments suggesting Böhm-Bawerk's endeavour in this direction in his Chapter on "Present and Future in Economy" in *PTK*. For example: "Let's compare one result of some labour with another of the same amount of labour, which will become available only after one year..."⁴⁶ Of course, Böhm-Bawerk failed to formulate this point of view into a coherent model during the rest of his life; even today it seems to remain problematic.⁴⁷

Concluding Remarks

Böhm-Bawerk started to study the loan interest theory along what was later to become a 'Fisherian' approach, at the beginning of 1876. To take a step beyond it, he tried to define the concept of capital productivity in the production process with the fundamental property of time: its passage. In Innsbruck from April of 1880 to at latest December 1882, he devoted himself to making critical investigations into capital productivity through an intensive reading of classical works, which was prompted by preparing his introductory course on economics, and provided him as a by-product with almost all the elements of what was later to become known as the 'Wicksellian' approach. He continued to try to theorize on the passage of time with a model for the determination of interest rates until the end of 1888, but he ran out of time because of the invitation from the Financial Ministry to work on tax reform for the Hapsburg Monarchy. He was obliged to backslide to the 'Wicksellian' approach, viz. the period-of-production model, which ironically made him famous in the history of economic thought later on because of the popularity of mathematical models in twentieth-century neoclassical economics.

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Notes

- ¹ The first edition was published at the end of 1888 and reproduced (with commentary) by Professor Schefold in 1991.
- ² See *IV. Kapitalzins und Arbeitslohn in der stationären Volkswirtschaft* in Wicksell (1893) p. 95 ff.; *III. Abschnitt Gegenwart und Zukunft in der Wirtschaft, IV. Abschnitt Der Ursprung des Kapitalzinses* in Böhm-Bawerk (1889) Book III; at p. 387 of Fisher (1907) and p. 231 of Fisher (1930); Chap. X. First Approximation in Geometrical Terms.
- ³ That is why it is named "the period-of-production model" by Ferguson (1969).
- ⁴ See Yagi ed. (1983), Tomo ed. (1987) and Tomo (1994). A recent article by Robert Dorfman (1995) should be referred to on the cultural differences between Böhm-Bawerk's and Fisher's theories of capital and interest.
- ⁵ It was pointed out by Wicksell: "But more important is the fact that Böhm-Bawerk has not succeeded in unifying his presentation completely. Two or even three threads may be distinguished, differing from each other in some respects, and woven together in a somewhat confusing manner - almost like the ancient writings of the Pentateuch." Wicksell in Lindahl ed. (1958 p. 178).
- ⁶ Schumpeter (1954 p. 844). Also Hutchison wrote: "Böhm-Bawerk's capital theory is surely more accurately described as Böhm-Bawerkian than as Austrian, since it was apparently repudiated fundamentally by Menger, and is also today rejected by such a leading neo-Austrian capital theorist as Ludwig Lachmann." Hutchison (1988 p. 8).
- ⁷ Böhm-Bawerk (1880) 2/.
- ⁸ Described by Karl Menger, in a sketch of his father's life, preserved at the Menger Papers (=MP) at the Perkins Library of Duke University.
- ⁹ See the Ordinance issued by the Ministry of Culture and Education (Z. 3916/CUM 1875) Kelle & Beck ed. (1906) *Universitätsgesetz* No. 226. This was also pointed out in Tomo (1994).
- ¹⁰ On the teaching activities of Knies at that time, see Hentschel (1988).
- ¹¹ See Yagi ed. (1983).
- ¹² Böhm-Bawerk (1876) - Yagi ed. (1983, p. 20).
- ¹³ Böhm-Bawerk (1876) - Yagi ed. (1983, p. 32).
- ¹⁴ *ibid.*
- ¹⁵ Böhm-Bawerk (1876) - Yagi ed. (1983, p. 33).
- ¹⁶ *ibid.*
- ¹⁷ Böhm-Bawerk (1876) 7/1.
- ¹⁸ On this matter see Tomo (1992).
- ¹⁹ Böhm-Bawerk (1889) 7/8.
- ²⁰ See the document (UAI 372/1880), preserved at the archive of Innsbruck university.
- ²¹ Böhm-Bawerk (1880) 11/4.
- ²² See Streissler (1972), and Endres (1988).
- ²³ Böhm-Bawerk (1884) - Smart tr. (1890, p. 132).
- ²⁴ The first edition was published in 1884, and its facsimile edition by Schefold (1994).
- ²⁵ Böhm-Bawerk (1884) - Smart tr. (1890, p. 114).
- ²⁶ *ibid.*, p. 129.
- ²⁷ *ibid.*, p. 138.
- ²⁸ *ibid.*, p. 145.
- ²⁹ *ibid.*, p. 168.
- ³⁰ *ibid.*, pp. 116 - 117.
- ³¹ Detailed in Tomo (1995).
- ³² See Böhm-Bawerk (1883) 9/28 and Böhm-Bawerk (1889) 12/29.
- ³³ Böhm-Bawerk (1889) Book III "I. Abschnitt Wert. II. Abschnitt Preis".
- ³⁴ On the "Stein Affair" see Tomo (1992) and (1994) Chapter. F - 2.
- ³⁵ See Jaffé ed. (1965) No. 841.
- ³⁶ On Böhm-Bawerk's contributions to tax reform, see Tomo (1992) and Tomo (1994) Chapter. F - 3.

- ³⁷ Böhm-Bawerk (1882) - Tomo ed. (1987, par. 23).
³⁸ *ibid.*, par. 64.
³⁹ *ibid.*, par. 108.
⁴⁰ *ibid.*, par. 50.
⁴¹ Tomo (1987, p. 7)
⁴² Schumpeter (1954, p. 847). This interpretation was also given by Vaughn (1994, p. 35).
⁴³ Böhm-Bawerk (1889-a).
⁴⁴ Böhm-Bawerk (1892) 10/27. Three theoretical reasons for Böhm-Bawerk's dissatisfaction with the period-of-production model are detailed in Tomo (1994). The most important point is that this compromise requires an integration of two time dimensions, present and future, into a logical one, the average period of production, so that it ignores the fundamental property of real historical time.
⁴⁵ Böhm-Bawerk (1884, p. 306 and p. 391).
⁴⁶ Böhm-Bawerk (1889, p. 275).
⁴⁷ It seems that some recent discussions on the pure time preference theory of interest depart from this point of view. A good survey of them can be found in Pellengahr (1996).

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