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Eugen Ritter von Böhm-Bawerk

Eugen Ritter von Böhm-Bawerk is best known to us for his theory of capital and interest. It will also be the main topic of this article. Nevertheless, there are other relevant contributions of Böhm-Bawerk to economic theory and policy.

Böhm-Bawerk was born on 12 February 1851 in Brünn (Brno) in the Czech part of the Austrian-Hungarian Empire. His father was a high civil servant. Eugen von Böhm-Bawerk studied law in Vienna and then entered the civil service. He soon took leave to become an economist by studying in Heidelberg, Leipzig and Jena. In 1880 he obtained his Habilitation at the faculty of law in Vienna as a student of Carl Menger. His habilitation thesis "Rights and Relations from the Viewpoint of the Theory of Economic Goods" was published in 1881. There he deals with the question whether immaterial property like patent rights or goodwill positions in markets could be seen as part of net national wealth. In opposition to earlier writers like Schäffle and also to his own mentor Carl Menger he gave a negative answer by emphasising the similarity with loans which also could not be seen as part of net national wealth. The private value of such immaterial property rested on the fact that other people in the future will pay more for material goods than their cost of production. If one considers these margins to be paid above cost as a future burden of consumers their capitalised value just cancels the capital value of the immaterial property.

In 1880 Böhm-Bawerk was appointed professor of economics in Innsbruck. During his Innsbruck years he wrote his most important work on the theory of capital and interest. It was published in two volumes, the first in 1885, the second in 1889. In 1889 he went back to the Imperial Ministry of Finance. His job was first to design a reform of the Austrian income tax and then to head a commission studying the question whether Austria-Hungary should return to the gold standard. He then was appointed Minister of Finance in a caretaker cabinet; after the resignation of the cabinet he became president of a high court of administrative law. For several years, depending on the actual politics in Vienna, he shuttled between the position of Minister of Finance and president of a high court of administrative law. In 1904 he resigned as Minister of Finance in protest against large increases of military expenditure. Having declined the well paid position of Governor of the Imperial Central Bank he went back to academic life, this time as a professor at the University of Vienna. He was appointed a member of the Austrian upper house. Böhm-Bawerk died in 1914.

Apart from his great work on capital theory and his "Habilitation" book mentioned above Böhm-Bawerk wrote three other important pieces: first and foremost his 1896 evaluation of Karl Marx` Capital after the posthumous appearance of Volumes II and III of that great work; then, not long before he died, his incisive critique of Schumpeter´s "dynamic theory of capital" and, third, a policy oriented newspaper article on the balance of payments in which in a very clear manner he laid down the (full employment) theory of foreign trade: that capital exports and imports drove the balance of trade rather than the other way round (1914).

In the first volume on the theory of interest (1885) Böhm-Bawerk surveys and criticises the whole history of theories which try to explain the positive rate of interest. In the second volume (1889), the "Positive Theory", he gives his own explanation. We best understand his theory as a general equilibrium theory of the stationary state – and it was of course that theory which then in his "Theory of Economic Development" (1911) Schumpeter tried to replace. Böhm-Bawerk writes (1889): "As a rule goods available now have a higher subjective value

than future goods of the same kind and quantity. And, since the result of subjective valuations determines the objective exchange value, present goods, as a rule, have a higher exchange value and price than future goods of the same kind and quantity." This kind of reasoning was new at the time and was an extension of Carl Menger´s subjective value theory to an inter-temporal calculus.

Böhm-Bawerk gives three causes for this lower valuation of future goods.

The first cause is the potential or real discrepancy between the inter-temporal structure of wants to be satisfied by material goods and the inter-temporal structure of the availability of those goods. Thus, there is a desire to shift goods through time. But future goods cannot physically be shifted backward towards the present, whereas present goods can be shifted forward in time by storing them. This induces superior value of present goods. Bortkiewicz and others have criticised this argument by pointing to the costs of storage. To this Böhm-Bawerk replied that in a market economy operating with money people only need to store money which has a storage cost of zero.

The second cause is impatience of individuals, basically what then later has been termed "time preference" by Irving Fisher.

The third cause is what Böhm-Bawerk called the "incremental productivity of greater roundaboutness of production". This general law implies that earlier availability of inputs allows a greater roundaboutness of production and thus a greater labour productivity in the provision of consumption goods for a given future point in time. As this third cause is expressed in comparative or quantitative terms of "more roundaboutness" Böhm-Bawerk had to offer a measure for the degree of roundaboutness of production. This was, what later would be called the average period of production, or for short, the period of production. It can be understood as the average time distance between the labour inputs and the consumption good output produced by these labour inputs. Böhm-Bawerk essentially argues in terms a vertically fully integrated virtual factory which only buys labour inputs and only sells final consumption goods. All intermediate goods, including machinery, buildings etc. are made and used internally by the virtual factory itself.

Due to these three causes the real rate of interest is positive in a stationary general equilibrium.

Many economists then were impressed by Böhm-Bawerk´s achivements, but at the same time were critical of the details. Of the great economists of the time nobody accepted Böhm-Bawerk´s theory fully. Neither Wicksell, nor Irving Fisher, nor John Bates Clark, nor Gustav Cassel, nor even Carl Menger - Böhm-Bawerk´s teacher – accepted the concept of the average period of production as a good measure for the roundaboutness of production and the corresponding capital requirements of the economy.

Later the Austrians, in particular Hayek and Mises used Böhm-Bawerkian concepts to develop their severe criticism of an easy money policy. According to them such policy would first lead to overinvestment and then later on to a slump due to the excess capacities thereby generated. To show this they built on Böhm-Bawerk´s temporal capital theory. Eucken further developed the Böhm-Bawerk theory by generalising the input flows which were allowed in the model. Throughout the first half of the twentieth century many economists commented on Böhm-Bawerk´s theory.

After the introduction of the Solow model and thus after the beginning of neoclassical growth theory in 1956 Böhm-Bawerk´s temporal capital theory basically was discarded. Whereas the idea of the roundaboutness of production continued to be used as a "façon de parler" the analytical tool of the average period of production was replaced by the Solow macro-economic production function. The severe criticism of the Solow approach by the Cambridge school (Sraffa, Joan Robinson, Kaldor, Pasinetti, Garegnani, Harcourt, Schefold and others) did not lead them back to Böhm-Bawerk, rather to Karl Marx. In his "Capital and Time –A Neo-Austrian Approach (1973) John Hicks came back to Böhm-Bawerk. He argued that a temporal theory of capital was more suitable for a dynamic analysis than was the Solowian production function approach. Already in his much earlier "classic" Value and Capital (1938) he gave reasons why a period of production might better be defined in terms of present values of labour inputs rather than in terms of raw physical quantities, as Böhm-Bawerk had defined it. But in both books Hicks considered the period of production to be a useless concept for an economy with fixed capital like buildings or machinery.

What do we make of the three causes for a lower valuation of future goods today? In analysing Böhm-Bawerk´s reasoning we can admire his sharp intellect, yet we may feel sorry for him that he did not know the mathematical- axiomatic method which has allowed modern theory substantially greater clarity in the concepts used to do economic theory. Like Ricardo, like Marx he worked with numerical examples; and this probably also was a reason that he used simple interest rather than the compound interest calculus.

The first Böhm-Bawerkian cause, the incongruence of the inter-temporal structure of wants with the inter-temporal structure of the availability of goods is not generally valid. Storage costs *are* a problem, notwithstanding the availability of money as a store of value. Money as "inside money", for example in the form of bank deposits of constant purchasing power, presupposes the existence of a sufficient number of borrowers who provide collateral which is real capital like buildings, equipment and inventories. All of these forms of real capital imply storage costs or costs in the form of wear and tear. And outside money, like gold, is not able, without substantial effort involving again inside money, to guarantee constant purchasing power. Moreover, today, with the high life expectancy of people, the desire to hold wealth for consumption purposes in old age may be larger than the availability of real capital even at a real rate of interest of zero.

The second cause, time preference, is valid, but may be quantitatively constrained. No doubt, other things equal, a greater degree of time preference implies a higher real rate of interest. But this does not necessarily mean that with the empirically observed time preference the real rate of interest is positive.

The third cause, greater productivity of greater roundaboutness of production, is not valid beyond any limits. This is basically admitted by Böhm-Bawerk in the first part of his "Exkurs I". Exkurs I, as were the other "Exkurses", was written in answer to criticisms raised against his theory by several authors including Irving Fisher, Bortkiewicz, Gustav Cassel, Taussig and others. But Böhm-Bawerk maintains that in the real world of his time the potential for exploiting incremental productivity of greater roundaboutness had not yet been fully used. He continues in this "Exkurs I" to give quite a bit of evidence, why he concludes that this is so. Given the substantial changes in technology and wealth which have occurred in a century after Böhm-Bawerk finished his work we no longer can be sure whether there still are unexploited opportunities for a higher productivity of greater roundaboutness.

The best way to find out whether today the three causes are sufficient to generate a positive real rate of interest is to use very Böhm-Bawerkian analytical tools: the "modernised" period of production and an analogous "waiting period". Both are defined in terms of present values. We may look at the price p_i of consumption good i in a competitive economy with a given nominal wage rate w and a given rate of interest r; thus $p_i = f_i(w;r)$. It then can be shown that $\frac{\partial f_i}{\partial r} = T_i f_i w;r)$ where T_i the "modernised" Böhm-Bawerkian period or production as applied to consumption good i. Thus the percentage increase of the price of consumption good i, as the rate of interest rises one percentage point equals the period of production of the labour inputs which directly and indirectly (via intermediate products) enter into the production of that good. This is a quite general result which does include models with fixed and variable capital and as many capital goods and consumption goods as you like. It has a forerunner in Hicks´ Value and Capital Chapter XVII.

The result has consequences which very much vindicate Böhm- Bawerk´s idea of measuring capital intensity and roundaboutness by means of the average period of production. The first observation is that as the rate of interest rises techniques with a higher period of production induce a faster price rise than techniques with a lower period of production. Thus there is a tendency to switch to techniques with lower periods of production as the rate of interest rises. This can be called the substitution theorem of capital theory. The second observation is marginal productivity. Böhm-Bawerk claimed that at the equilibrium period of production the percentage increment in productivity resulting from a lengthening of the period of production by a (small) time unit will be equal to the equilibrium rate of interest. Indeed, as the period of production rises by one unit the cost of the product directly and indirectly produced by one hour of labour rises by r in percentage terms. But since the period of production at the prevailing interest rate has been selected so as to minimise unit costs this must mean that the labour productivity in the production of good i must have risen by exactly the same percentage, which is r. Hence the private and social marginal productivity of roundaboutness is reflected in the rate of interest, as Böhm-Bawerk said. But we must remember that in comparison to Böhm-Bawerk the period of production is somewhat "modernised".

The third vindication of Böhm-Bawerk is the fact that the aggregate period of production serves as a good aggregate measure of roundaboutness and capital intensity. For this we observe that – beyond Böhm-Bawerk – we can define a parallel concept on the side of private households. It is the waiting period. Any given rate of interest ρ used to compute the present values induces a particular system of weights by which the weighted labour inputs along the time axis and the weighted consumption good outputs are used to find the period of production and the waiting period of consumers/savers. The waiting period is the average time distance between wage income and consumption good expenditures. For a steady state economy growing at a constant rate of growth g one then can show that a general equilibrium of that economy exhibits an endogenously determined equilibrium real rate of interest r with the following property: There exists a notional rate of interest ρ which lies between g and r such that with present value weights induced by ρ the period of production T and the waiting period Z are equal. We may then speak of T as an aggregate measure of the demand for capital and speak of Z as an aggregate measure of the supply of capital. Thus, for a steady state economy, these modernized Böhm-Bawerkian concepts serve as a useful aggregation device for millions of different capital goods.

On these three results see von Weizsäcker 1971, Part IV. They are also quite useful for actual policy issues like, for example, public debt. We should not at all discard Böhm-Bawerk´s important contributions to economic theory.

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