

Alterations in the Length of the Structure of Production
and Complications Therein

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Abstract:

This paper focuses on the ideas and concepts involved with the lengthening of the structure of production in the Austrian tradition laid out by the Viennese economist Eugen Bohm-Bawerk. Bohm-Bawerk's main contribution to economic thought, *Capital and Interest*, offers many significant findings for economic theory but this is not the case for all the concepts present in the literature. The concept of average periods of production is analyzed in this paper and how it applies to the subjective theory of value. It will logically conclude that in order to speak of economic phenomena, it must always be approached first by a *marginal* analysis rather than a average or aggregate analysis.

The ideas of Knut Wicksell in *Interest and Prices* will be heavily used in this paper to illustrate the concepts behind Austrian capital and interest theory and the existence of the natural rate of interest. This will be directly applicable due to the affect this phenomenon has on the present capital structure.

Value and Capital by Sir John R. Hicks will be one of the main focuses of this paper. In this book, Hicks brings forth an argument that supposedly refutes Austrian capital theory, mainly that the concept of average periods of production is incorrect. This will mainly be a rebuttal to Hicks' supposed refutation of Bohm-Bawerk's concept of average periods of production.

An historical analysis of average periods of production will also take a major role in this paper. Murray N. Rothbard in *Man, Economy, and State* and Ludwig von Mises in *Human Action* will be consulted heavily on this topic. The historical role of average periods of production lies in the failed concept of what I call "capital stacking" over time. Von Mises correctly refutes this point in stating that production processes begin at the entrepreneur and the vision of an end, not before the process was even conceived in thought.

Alterations in the Structure of Production and Complications Therein

By Alexander Villacampa

The importance of the marginal revolution is one that cannot be side-stepped when speaking of serious contributions to economic analysis. William Stanley Jevons¹, Leon Walras² and Carl Menger³ are three of the greatest marginal economists, the last being the father of the Austrian School of economics. Carl Menger in his epic *Principles of Economics*⁴ explained the origin of value, namely its subjectivity with respect to the differing valuations of individuals, and the importance of marginality when dealing with economic phenomenon. Menger set into motion an entire school of thought devoted to the subjective theory of value and all that could be deduced from this approach to economic analysis. Bohm-Bawerk in his opus magnum *Capital and Interest* sought to link the subjective theory of value of the Austrian school of economics with capital theory and develop a clear reason for the existence of capital rent and interest. The theory found in *Capital and Interest* soon caught the attention of a famous Swedish economist by the name of Knut Wicksell who then went on to incorporate Walrasian mathematical approach to economics with Austrian theory. Wicksell deduced in his *Interest and Prices* that there are in fact two connecting, yet fundamentally differing, rates of interest present in the market economy at any given time. One Wicksell labeled the *natural* rate of interest and the other being the *market* rate of interest. These are all accounts of incredible strides in economic analysis and thought that came as a direct result of the marginal revolution.

Though the marginal revolution may have altered much of economic theory and analysis for the better, there still have been less than optimal adherences to the importance of marginality by both old and new economists. Many economists disregard what they have learned from the marginal revolution and think in terms of aggregates or averages; this is true when dealing with Keynesian and neoclassical economics. It is the marginal value of a good, not its average value, that determines its use and importance in production or consumption. When an individual consumes a product they are using it to fulfill their marginal desires, not their aggregate or average desire. This is something that is taught in many microeconomic classrooms and is adhered to by the Austrian school of economics. Though this may seem elementary, certain economists overlook the simplicity of this theory and consequently deal in averages. It is only by understanding marginal values can economist begin to understand the concepts associated with trade cycle theory and the impacts of marginal cost, marginal product, and marginal profit with respect to changes in the *market* rate of interest. Problems in dealing with averages is applicable even to the most productive follower of Carl Menger, Eugen von Bohm-Bawerk author of *Capital and Interest*.

1. Both *Theory of Political Economy* and *Money and the Mechanism of Exchange* by Jevons are attributed to having sparked the marginal revolution. Jevons, William S. *The Theory of Political Economy*. MacMillan and Co., Ltd., 1911 and Jevons, William S. *Money and the Mechanism of Exchange*. D. Appleton and Co., 1898.

2. Walras' monumental *Elements of Pure Economics* is one of the fundamental pieces of the marginal revolution. Walras, Leon. *Elements of Pure Economics*. Richard D. Irwin, Inc., 1954.

3. The doctrines of these major contributors to the marginal revolution are not completely compatible with one another. Walras' strength was in the incorporation of mathematical techniques with economic theory while Menger did not use such approaches in his works. Simply because these individuals agreed in certain fundamental ideas, such as the importance of marginality, does not signify that they were members of the same train of thought and in fact had differing opinions as to the future conduct of economic analysis.

4. Menger, Carl. *Principles of Economics*. Libertarian Press, Inc., 1994.

I) Time-Preference and the Elongation of the Structure of Production

The theory of capital and rent is one that is largely debated throughout the field of economics and is one of the more complex subjects in the study. It is by understanding capital and interest theory that economists can truly comprehend the workings of the business cycle and those functions which regulate the market from a macroeconomic perspective. Austrian capital theory was developed by Eugen von Bohm-Bawerk in his *opus magnum*, *Capital and Interest*. With *Capital and Interest*, Bohm-Bawerk set out to uncover the main element that decides the rent of capital or interest. Bohm-Bawerk isolated time-preference as the factor that determines the existence and extent of the rate of interest and is, therefore, a determinant of capital value. The social rate of time preference is a *ratio*⁵ between consumption and saving that is adhered to by individuals. If individuals begin to save more, it is said that their time-preference is *falling*; that is they value present goods *less with respect to* future goods. If individuals begin to save less it is said that their time-preference is *rising* and that they value present goods *more relative to* future goods. A decrease in the social rate of time-preference allows for an increase in saving and these savings are invested in various production processes. A rightward shift in the amount of loanable funds present in a market economy brings down the rate of interest lenders demand as compensation for foregone use of the lent funds.⁶ This leads to an increase in the profit margins in the production processes of higher order goods and a decrease in the profit margins of the production processes of lower order goods. Higher order goods are those production goods that are furthest away from the end good or consumption good while lower order goods are those production goods that are closest to consumption goods. The increase in the profit margins of these higher order production processes allow entrepreneurs to engage in riskier ventures and increase the value of their output at a later date. In essence, there is a shifting of capital from lower to higher order processes when there is a decrease in the social rate of time preference. As Fetter writes in *The Principles of Economics* that “if the rate of interest has been five per cent and falls to four per cent many permanent improvements before unwise become economical.”⁷ It is this fall in the rate of interest that increase the plausability of ventures once thought not productive.⁸

Knut Wicksell in *Interest and Prices* deduced the existence of a natural rate of interest that differs from the outstanding market rate of interest. The natural rate of interest is connected to the social rate of time-preference and is the rate of interest that would exist if the money supply were *neutral*.⁹ The market rate of interest accounts for a dynamic money supply in which

5. It is important to note that the social rate of time-preference is a ratio between consumption and saving and not a phenomenon that can be measured *per se*. The clearest measurement of the social rate of time-preference would be the natural rate of interest but as Wicksell states in *Interest and Prices* such a rate is difficult to uncover with the existence of inflationary banking institutions.

6. Cantillon notes this in his *Essai Sur la Nature du Commerce* by writing that interest on money “in a state is settled by the proportionate number of lenders and borrowers.” Cantillon, Richard. *Essai Sur la Nature du Commerce*. MacMillan and Co., Ltd., 1931. pg. 199.

7. Fetter, Frank A. *The Principles of Economics*. The Century Co., 1904. pg. 168- 169

8. The use of five and four percents by Fetter was arbitrary and not an indication of what the market rate of interest should be. It should also be noted that Fetter did not necessarily call for a fall in the *market* rate of interest in this passage.

9. This point is emphasized by F. A. von Hayek in *Prices and Production* pg. 31 when speaking of the differences between a neutral money supply and a stable money value. Only a neutral money supply is necessary when speaking of the natural rate of interest and not a stable money value. That may be changes in the value of money but as long

case money is either being injected or removed from the economy due to central banking monetary policy. Wicksell states that voluntary saving on the part of economic actors "would bring about a certain rate of interest that would have to be paid to the capitalists in the form of some commodity or other. The amount of this rate of interest would be determined by the supply and demand for capital." This Wicksell labels as the *natural* rate of interest which is fundamentally different from the *market* rate of interest and that central banking through an inflation of the money supply "can to some degree force the necessary real capital out of the public" to what is called *forced saving*.¹⁰ This increase or decrease in the market rate of interest when compared against the natural rate of interest has the ability to artificially increase the profitability of certain production processes of lower or higher order goods and could bring about shifts in the general level of prices¹¹. Wicksell writes in *Interest and Prices* that

"if, for any reason whatever the average rate of interest is set and maintained below this normal level, no matter how small the gap, prices will rise and will go on rising...If, on the other hand, the rate of interest is maintained no matter how little above the current level of the natural rate, prices will fall continuously and without limit."¹²

As stated above it is this artificial change in the market rate of interest by banking institutions above or below the natural rate of interest that brings about a seemingly unending trend of increasing or decreasing prices.

Bohm-Bawerk understood that there is a virtual *lengthening* of the structure of production or the "roundabout methods of production"¹³ as there is a decrease in the time-preferences of individuals and *vice-versa* with respect to an increase in the social rate of time-preference. By an alteration in the time-preferences of individuals there is a shift in the length of capitalist production processes. It is this increase in the amount of capital present in higher order production processes, due to a fall in the social rate of time-preference, that brings about this lengthening in the structure of production and the subsequent rise in the prices of higher order

as the supply of money is unchanging, the doctrine of the natural rate of interest found in Wicksell's *Interest and Prices* is valid. Hayek later states in *Economic Freedom* that he had second thoughts about using the term *neutral money* because "no real money can ever be neutral... and that we must be content with a system that rapidly corrects the inevitable errors."

10. This is a term often used by the Austrian economist Friedrich A. von Hayek to indicate the fundamental difference between a decrease in the social rate of time-preference that leads to an increase in voluntary saving and a lower of the market rate of interest by banking institutions without a decrease in the social rate of time-preference. What manifests itself from this increase in the amount of loanable funds due to an inflation of the money supply by banking institutions is what would have come to be if individuals would have saved by an equal amount. In essence, because the market rate of interest has been forcefully driven downward, this causes the phenomenon of forced saving that has dire consequences in the long-run due to the unchanged status of the social rate of time-preference. This will be discussed in later sections.

11. It is common to Austrian capital and business cycle theory that the general level of prices does not indicate that an inflation of the money supply has occurred or that capital has been misallocated. Individual prices play a greater role in Austrian theory but for the sake of simplification individual prices will not be discussed here. For an in depth discussion of general price levels vs. individual prices please refer to Friedrich A. von Hayek's *Prices and Production* pg. 29.

12. Wicksell, Knut. *Interest and Prices*. MacMillan and Co., Limited, 1936. pg. 120.

13. Richard von Strigl use this term quite often to signify the production of capital and the increase in length of the structure of production. Von Strigl, Richard. *Capital & Production*. The Ludwig von Mises Institute, 2000. Mark Skousen also has an interesting note in his book *The Structure of Production* stating that "by roundabout, [Bohm-Bawerk] meant the indirect use of capital goods in order to make consumption goods." Skousen, Mark. *The Structure of Production*. New York University Press, 1990. pg. 23.

goods in light of the increased demand for such goods.¹⁴ Both Wicksell and von Hayek use this

14. Price changes in higher order goods may not always be due to a change in the natural rate of interest and may in fact may be sparked by an increase in the quantity of money due to central banking policy. Changes in the prices of higher order goods will always be a result of the demand and supply of those factors but this increased demand for the goods may be facilitated and, in many respects, initiated by a shift of the market rate of interest below the natural rate of interest.

It may be vital to take note of a figure in the history of economic thought that influenced much of the field with respect to business cycles and prices movements due to changes in the quantity of money; that individual is Richard Cantillon. Richard Cantillon is regarded by many economists such as Murray N. Rothbard and William Stanley Jevons as having written the first modern concise treatise on economics. Jevons stated that Cantillon had developed a “systematic and connected treatise, going over in a concise manner, nearly the whole field of economics...it is thus.. the first treatise on economics.” Cantillon focused on a wide array of economic phenomena in his treatise *Essai Sur la Nature du Commerce* and drew conclusions from observations he was making at the time. Cantillon understood that an increase in the supply of money would ultimately raise the general price level yet what was not immediately evident was in what manner these prices were rising. Cantillon writes that “everybody agrees that the abundance of money or its increase in exchange, raises the price of everything” yet these individuals “have not considered how it does so.”

To Cantillon, finding a connection between an increase in the supply of money and the general price level lay “in knowing in what way and in what proportion the increase of money raises prices.” *Essai Sur la Nature du Commerce* offers an answer to this fundamental economic problem by analysing the points at which money enters or leaves the economy. Cantillon uses the example of gold and silver mines as being able to essentially extract new money from the ground. With the new gold and silver ore found at the mines, the mine owners melt it into coins or bars in order to use it in daily transactions. These new coins are thus given to workers as compensation for their labor and these individuals proceed to spend this new money in the market. As these individuals spend their money on specific goods, the prices of these goods rise because of the increased demand for them. Therefore, as long as new money is being pumped into the market *via* mines, the prices of those goods that come in contact with the recently extracted ore rise first will continue rising. The rising prices of these specific goods then spread throughout the economy effecting the costs of production processes and the costs of other goods by way of transferred purchasing power. In essence, the individual who receives the new money last has less purchasing power than the individual who first received the new money. Professor de Soto correctly states that Cantillon “produced a highly significant study of the influence an increase in the quantity of money in circulation exerts on prices” and that “variations in the quantity of money mainly affect the relative price structure, rather than the general price level.” This is called the “Cantillon effect” or sometimes called the “new money effect.”

The discussion of Cantillon and the analysis of prices changes due to an increase in the money supply present in *Essai Sur la Nature du Commerce* offers Austrian business cycle theory an important foundation, namely effects on the economy when dealing with changes in the quantity of money. Austrian business cycle theory is heavily steeped in the existence of a natural rate of interest that is directly correlated to the social rate of time-preference. The natural rate of interest falls and rises with respect to increases or decreases in the society's propensity to save. If individuals begin to save more, the amount of loanable funds will increase thus shifting the natural rate of interest downward. This allows entrepreneurs to take hold of the capital and use it on ventures once thought unprofitable. As entrepreneurs use this funding to increase capital, they begin to use more roundabout methods of production to reach their long-term goal and thereby elongate the structure of production. This form of lengthening the structure of production is sustainable in the long-run but not all forms of structure of production elongation is sustainable. If there is an artificial increase in the quantity of money due to the inflationary actions of a bank, this may bring the market rate of interest below the natural rate of interest sparking excess capital creation of a higher order. In essence, individuals in society have not shown that they desire a further elongation of the structure of production which is taking place due to this manipulation of the quantity of money.

This misallocation of resources is not only detrimental to the demands of individuals but also is capable of wasting precious, scarce resources in such unsustainable productions. Ludwig Lachmann proclaims in *Capital and Its Structure* that “not only are there too few resources, but the few are 'scattered' over too wide a field.” Likewise, Dr. Garrison writes in the *Journal of Macroeconomics* that “the resulting malinvestment” after the expansion of the quantity of bank money over specie via open-market operations “consists of an overinvestment of some kinds of capital (typically, long-term capital goods) and an underinvestment of other kinds (typically, short-term capital goods). Not surprisingly, the market process that corrects for this economy wide malinvestment can be a long and

concept of a lengthening of the structure of production *viz-a-viz* a decrease in the rate of interest.¹⁵ Von Hayek wrote that individuals “should be able to speak of change in the period of production’, or the ‘length of the process as a whole’, as a short way of referring to change in the investment periods of the various factors used.”¹⁶ That said, other economists such as von Mises and Rothbard were not as embracing of the term. Rothbard believed that the concept of an elongation of the structure of production takes emphasis away from the true importance of an increase in investment, namely an increase in the productivity of capital. In addition, Rothbard points out that “calling these methods ‘roundabout’ is definitely paradoxical; for do we not know that men strive always to achieve their ends in the most direct and shortest manner possible?” This point highlights the fact that an increase in investment does not automatically mean a lengthening of the productive structure but that entrepreneurs might instead find shorter methods of reaching desired goals. It is not always true that entrepreneurs strive for longer methods of production. That said, Rothbard correctly notes in *Man, Economy and State* that when there is an increase in investment

“the first processes to be used will be those most productive (in value and physically) and shortest. No one has maintained that all long processes are more productive than all short processes. The point is, however, that all short and ultraproductive processes will be the first ones to be invest in and established. Given any present structure of productive, a new investment will not be in a shorter processes because the shorter, more productive process would have been chosen first.”¹⁷

Therefore, it is only understandable that an increase in investment would lead to a lengthening of the structure of production but that is not to say that all productive structures would be elongated due to a decrease in the rate of interest. Certain shorter processes may be available on the market for entrepreneurs to take advantage of but these processes would be soon adopted and thus, any increase in investment for these productive structures can only lend to their elongation. This von Mises also holds when he proclaims that “if one wants to attain ends which are temporally farther away, one must resort to a longer period of production because it is impossible to attain the end sought in a shorter period of production.”¹⁸

painful one.” The correction that Dr. Garrison points out is the all-too-familiar depressions and recessions. In Austrian capital theory, depressions and recessions are positive forces in-so-much that they are the market's natural mechanism of undoing the misallocation of resources present during the “boom” or inflationary phase.

As wage earners and all those who come in contact with the newly created money by the banking system begin to spend their money, this will bid up the prices of certain goods. This is a specific characteristic of price movements in Austrian capital theory. These ideas of business cycle theory were embraced, for a short time, by many economists before the Keynesian revolution such as Sir Lionel Robbins in *The Great Depression* in which he seems to embrace a Misesian-Hayekian view of credit expansion. That said, in later volumes such as *Against Inflation*, it is apparent that Sir Robbins had abandoned, almost completely, Austrian theory. Cantillon, Richard. *Essai Sur la Nature du Commerce*. MacMillan and Co., Ltd., 1931. Jevons, William S. *The Nationality of Political Economy*. *Essai sur la Nature du Commerce*. MacMillan and Co., Ltd., 1931.

15. This understanding was facilitated by Hayek when he introduced the famous Hayekian triangles that depicted a systematic increase in the productive structure with respect to a decrease in the rate of interest. These triangles were independently created by Hayek but Dr. Garrison writes in *Hayekian Triangles and Beyond* that “a half-century before Hayek molded his lectures around those triangles, an essentially equivalent construction not then known by Hayek, had been offered by William Stanley Jevons” in *The Theory of Political Economy*.

16. von Hayek, Friedrich A. *The Pure Theory of Capital*. MacMillan and Co., Limited, 1941. pg. 69

17. Rothbard, Murray N. *Man, Economy, and State*. Ludwig von Mises Institute, 2004. pg. 487

18. von Mises, Ludwig. *Human Action*. Contemporary Books, Inc., 1949. pg. 495

It is acceptable to use the concept of a lengthening of the structure of production when trying to understand the effects on the structure of production by a decrease in the social rate of time-preference. There may not always be a lengthening of the structure of production but it is likely that those productive processes that have been taken up before the increase in investment were the shorter, more productive processes and therefore, any increase in investment will only lengthen the structure of production. That said, the Bohm-Bawerkian concept of average periods of production does not seem to lend a proper explanation of the lengthening or beginnings of a production processes and in fact does not fit within the framework of the subjective theory of value proclaimed by Carl Menger.¹⁹

II) The Hicksian Critique of Bohm-Bawerk's Theory

Though Bohm-Bawerk solved one of the most important problems in economic theory by deducing time-preference, there were still some detrimental strains of the productivity theory of capital valuation still found in his explanation of interest. Rothbard recognizes this in his foreword to Frank Fetter's *Capital, Interest and Rent* and states that Bohm-Bawerk "after coming to the brink of replacing the productivity theory by a time-preference theory of interest...tried to combine the two explanations-an eclecticism that capital and interest theory (in its "real" form) has followed ever since." Ludwig Lachmann also proclaimed in *The Market as an Economic Process* that Bohm-Bawerk "devoted as he was, with one hal of his being, to the new creed of Austrian catacactics, with the other half he remained a Ricardian all his life."²⁰ Bohm-Bawerk, in *Capital and Interest*, did not completely divorce time-preference from the then outstanding explanations of capital valuations and in this way weakened his theory in specific areas.

John R. Hicks, Nobel Laureate in Economics, has an argument worth elaborating on in his volume *Value and Capital*²¹ in which he criticizes the Bohm-Bawerkian concept of the "average period of production." The average period of production is summed up correctly by the Austro-American economist Frank Fetter as being "not an average time in one industry, but an average period during which the value of the total productive force of the community is supposed to be embodied in the total existing body of capital" and "as that period which elapses between the application of productive agents and their reward in the form of satisfaction." This idea is used by Bohm-Bawerk as a way of explaining improvements in the overall productive possibilities of an economy by means of an average. That by taking an average of the length of time of all the productive capacities of industries, the movement or height of an economy's productive yield can be understood. John Hicks has a somewhat different opinion with respect to the Bohm-Bawerkian analysis of the average period of production and views this failure by Bohm-Bawerk as the necessary downfall of his theory. Before moving into the discussions by Hicks on this concept, it must be noted that he does not disagree with Bohm-Bawerk on his time-preference analysis and believes that this is a vital contribution by the Austrian school.²² That said, Hicks does hold that the failure of Bohm-Bawerk's theory lies in the misuse of the concept

19. This point is clearly stated in Mark Skousen's *The Structure of Production* in which he quotes Dr. Garrison noting that Bohm-Bawerk fell from Menger's subjective approach by his embrace of the "average period of production." Skousen, Mark. *The Structure of Production*. New York University Press, 1990.

20. Lachmann, Ludwig. *The Market as an Economic Process*. Basil Blackwell, Ltd., 1986. pg.60.

21. Hicks, John R. *Value and Capital*. Oxford University Press, 1946.

22. Economists such as Syed Ahmad view the average period of production is a concept that is fundamentally Austrian and that it is essential to Austrian capital theory; Hicks also held this view. 1. Ahmad, Syed. *Capital in Economic Theory*. Edward Elgar Publishing Limited, 1991.

of the average period of production.

Value and Capital states that "[Bohm-Bawerk] was quite right to conceive of the process of capitalistic production as being essentially a process in time...there is no objection to this." To Hicks, the Bohm-Bawerkian theory of time-preference as a main determinant of capital value "does not generalize in the sort of way in which it might have been expected to be generalized." By this he means that the theory found in *Capital and Interest* can only go so far in its use and that the theory is only fully applicable to severely rare and limited situations. Hicks clarifies that there is nothing wrong with Bohm-Bawerk's theory when illustrating the fact that a change in the rate of interest either way may induce the entrepreneur to accelerate or postpone production. Yet, when addressing the issue beyond elementary examples, Hicks believes that the theory present in *Capital and Interest* stresses too much the average period of production as a unit of time and not enough on the average period of production as an abstract measurement of capital growth or decay. To Hicks, the "absolute length of the true average period has no significance whatsoever" but instead it is only a *change* in the average period due to an alteration in the rate of interest that is of importance. Where Hicks believes Bohm-Bawerk fails is in his adherence to the average period of production as being a length of time when in actuality it is the measurement of a *crescendo*, as Hicks puts it, of the production process; a difference in the "height" of the production process. In summation, what Hicks seems to be saying is that the actual length in time of the average period of production is not crucial to understanding the extent of overall "social" yield but instead what is important is a change in this average period of production *via* an alteration in the rate of interest. Here Hicks does not seem to realize the problems associated when dealing with averages in economic analysis. Average value does not illustrate the importance of an additional good to a production process and in fact misleads individuals into thinking in terms of averages.

This is a problem caught early on, *circa* 1904, and solved by the Austrian economist Frank Fetter. In analyzing *Capital and Interest* Fetter was taken by Bohm-Bawerk's explanation of capital valuation in terms of time-preference but soon found quarrel with the latter's attachment to strains of the productivity theory. Fetter, along with Wicksell and Fisher, excelled Bohm-Bawerk's theory of interest and produced strains of their own. Fetter went on to explain the totality of capital valuation and rent in terms of time-preference. By use of different essays mostly published in the *Quarterly Journal of Economics* and accumulated by Rothbard in *Capital, Interest, and Rent*, Fetter finally divorced the Bohm-Bawerkian theory of time-preference from any hint of the productivity theory. Frank Fetter's objections to the use of the "average production period" by Bohm-Bawerk lies in the fallacy that the average length of time of the totality of production processes found in an economy has any tie to the productivity of capital and the height of economic yields. Different industries have differing maturities with respect to their production inputs. Some industries may benefit greatly from a marginal increase in capital and some may not. The problem found in *Capital and Interest*, with respect to the average period of production, lies fundamentally with the use of averages as a sampling of productivity or of real and current economic factors. What is important in the discussion of capital theory is an emphasis on the marginal yield of capital or as Fetter states "the marginal application" of capital and not on the average length of time of the totality of roundabout processes. Capital could be shifted from one industry to another to result in a higher yield but in effect lower the average period of production. By shortening the length of one production processes and moving the capital to other processes without an equal increase in the length of roundaboutness will, in turn, result in a decrease in the average production period.

III) Average Periods of Production as an Historical Analysis of Production

Bohm-Bawerk in *Capital and Interest* also seems to use the term "average periods of production" as a historical analysis of the structure of production. Skousen correctly notes in *The Structure of Production* that "Bohm-Bawerk was well aware of the historic fact that the number of stages might be infinite...he therefore opted for an 'average' period of production."²³ In this way, productive capabilities have been *stacked*, if you will, upon one another since the beginning of time. *Capital and Interest* suggests that improvements have been made upon the capital of previous generations. Dr. de Soto states in his *Money, Bank Credit and Economic Cycles* that the concept of average periods of production is an empty one and does not lend any additional knowledge to the Austrian capital theory. De Soto states that economic actors do not look into the past but instead take hold what they may have in the present in order to ease future uneasiness. The process of production does not begin millenia before an entrepreneur commences a production process but instead the process of production can only be traced back to the commencement of the process by the current entrepreneur. De Soto writes that "the first stage of production begins precisely at the moment the entrepreneur conceives of the final stage in the process (a consumer good or a capital good)."²⁴

Rothbard also had problems with this aspect of the "average period of production" stating that "Bohm-Bawerk sowed confusion by giving an historical interpretation to the structure of production" and that this interpretation is "one of the weakest parts of [Bohm-Bawerk's] theory." In *Man, Economy, and State*, Rothbard tackles this aspect of the "average period of production" by expressing the Misesian critique that certain technological advancements, like those since the beginning of time, have been embodied into common knowledge or infused into land. Mises states that the "acting man does not look at his condition with the eyes of an historian" and thus "the length of time expended in the past for the production of capital goods available today does not count at all." Rothbard writes in *Man, Economy, and State* that land may include any alterations that are labeled as permanent or "not [having] to be reproduced or replaced." Under this category, economists can place land that has been altered by adding irrigation canals or trees that have been permanently cut down. These are all alterations to land that are permanent. Human action, as Mises writes, is concerned not with the past but the present and future in order to achieve the highest degree of satisfaction. Therefore, any permanent additions or subtractions from land before the individual has received the factor can be put under the heading of land and not capital. Capital does not socially appreciate over time for the use of later generations. Its value does not appreciate nor does it maintain its value. Capital depreciates as it is being used in production and therefore if an input to the production process does not exhibit this trait, one must be weary in calling it capital or that it necessarily has a rent.

This concept of land and capital can be traced back to one of the greatest followers of Eugen Bohm-Bawerk, Knut Wicksell. Wicksell wrote heavily on this topic in his book *Value, Capital and Rent* and expressed his differences with the Bohm-Bawerkian analysis of land and capital. In *Value, Capital and Rent*, Wicksell states that it is land that is permanent and does not need to be invested into in order to offset its depreciation. Land, as opposed to capital, is a natural resource that must be used properly in the process of production and does not require

23. Skousen, Mark. *The Structure of Production*. New York University Press, 1990. pg. 24.

24. de Soto, Jesus Huerta. *Money, Bank Credit, and Economic Cycles*. The Ludwig von Mises Institute, 2006. pg. 298

investment to replace its faculties. It is capital that requires investment due to its continuous depreciation and use during the production of given outputs. Wicksell believes that under the category of land fall structures that do not depreciate quickly overtime and need very little to no investment within the lifetime of a production process. Such structures can include fortified buildings, railroads, automobile roads, alterations to land such as irrigation, and so on. Wicksell states that in these cases "the original cost of construction no longer has any influence on the present-day level of rent of these buildings or on the freight charges of the railways in question" and that the returns of these seemingly permanent structures have "just as little significance for its present capital-value or profitability." In Wicksell's opinion "it is precisely because of this that goods of greater durability (such as streets, railways, buildings, etc.) cannot be regarded or treated as capital in the narrower sense, but, once they are there must be placed, economically speaking, in the same category as land property itself." According to Wicksell, the value of these factors must be thought of as the value of the land itself and as a secondary phenomenon with respect to any rent earned on capital in a production process or in wage determination. Therefore, to conceive of the permanence of certain efforts expended by previous generations on land can not be categorized as capital nor can its value can be averaged over centuries but instead must be associated with land value. These seemingly permanent structures do not have a rent nor do they lend to the determination of wages but instead are simply another factor and must therefore be added to the totality of costs in the process of production.

IV) Concluding Remarks

In sum, the Hicksian analysis of Bohm-Bawerk is incorrect and embraces the misconception associated with the use of averages. It is not through averages but *marginal usage*, as Fetter explains, that value can be understood. The average of any process, or any change therein, is useless as a measure of economic growth or capital accumulation. As Fetter shows, it is only through looking at present and future yields that an outward growth of production possibilities can be brought to light. The best illustrations of this incorrect Bohm-Bawerkian concept can be found in Jesus Huerta de Soto's *Money, Bank Credit, and Economic Cycles*, von Mises' *Human Action* and Fetter's *Capital, Interest, and Rent*. These are two great analyzes that have been shared in this paper and argue against this mishap in Bohm-Bawerk's theory.

The history of economic thought teaches us much about the importance of those theorists who came before. It is with the help of their originality and genius that we are able to engage in the intellectual discussion of complex economic factors. Bohm-Bawerk paved the way for an abundant amount of research, including many theories of the trade cycle, by successfully deducing the main determinant of rent and the discounted nature of capital valuation. It is time-preference that gives us the discounted value of capital and which is the origin of the *natural* rate of interest. Though Bohm-Bawerk contributed immensely to capital theory, there were still a few minor flaws in his analysis. These flaws may be associated with lessons learned from the marginal revolution and the need to stay away from averages as a means of understanding value. What must be understood from this paper, if nothing else, is that we must celebrate the discoveries of prior theorists and understand, not ridicule, their failures. Only by the comprehension of the flaws of prior economists can modern economists alter theory so as to make it applicable to the present market. Knowledge is only perfected over time with the help of honest and diligent thinkers. Only through reverence for those who paved the way and an

understanding of their flaws can we begin to improve upon our present conditions.

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