

## TIME, CAPITAL AND THE STRUCTURE OF PRODUCTION

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### **Abstract**

*The doctrinal monopolizing of the modern economic theory by supporters of Monetarism and Keynesism deprived it by one of its essential components- the capital theory. Emphasising the role of monetary and fiscal policies has diverted the concerns for real economy and its productive structures. It was constantly overlooked that any fluctuation in the monetary economy is soon translated into fluctuations in the real economy, in its structure of production. This reality requires the inclusion, in any serious analysis of the cyclical fluctuations, of the capital theory and of the role of time in the processes of production. The paper aims to highlight how the structure of production responds to interest rate cuts by extending, simultaneous, investment and consumption. We obtain the picture of an economy that works beyond the limits imposed by its resources, which justifies the emergence of economic crises and depressions.*

**Key words:** capital, time, Hayek's triangle, structure of production

**JEL Classification:** E23, E32,

### **1. Introduction**

This paper aims to handle a subject neglected by mainstream macroeconomic theory, namely the role of capital and time in running the business processes. We cannot talk about capital without reference to time, which is considered, sometimes, the fourth factor of production. Capital is an obtained factor of production from combining the original ones, labor and land. Raising capital is, however, conditioned by completing a certain period of time, by the existence of a certain period of accumulation. The relationship between capital and time is meaningful represented by the structure of production of an economy; its analysis being necessary because of the changes in the productive processes, as responses to the monetary fluctuations.

The capital theory is part of a broader theory of economic crisis and depressions, offered by Austrian School of Economics. The Austrian business cycle theory is based on the discrepancy between the interest rate determined by banks and the natural rate on interest, that express the individuals' position about time, the relationship between their preferences for consumption and for saving. A low interest rate, which has been determined by the artificial expansion of credit, causes distortions in the allocation of capital in the economy. Reducing interest rate increases the number of "time consuming" productive activities, reported to the temporal pattern of individual preference for consumption [5] When this discrepancy is revealed, the markets of capital goods and consumer goods react to correct the erroneous allocation of resources. The Austrian business cycle theory is simply an objective diagnosis of the: economic expansion, based on artificially raising credit, given that limited resources and the time preference expressed by the natural rate of interest do not support this process; crisis, that appears when it becomes obvious that the longer productive processes are not supported by the individual preferences for consumption and, ultimately, depression, the process of readjustment of the structure of production and sterilization of malinvestments. From this outlining of the Austrian business cycle theory, arise its main pillars – time, limited resources, interest rate and capital. We will refer here, mainly, to capital and time.

### **2. Capital and time**

The monetary fluctuations are responsible for the cyclical boom-burst type evolution of the economy. There are, thus, monetary causes that produce effects in the real economy. The cyclical duality or the financial cycle/real cycle dichotomy is a recognition that the monetary economy' elements are combined with the real economy' ones, forming a unitary whole economy. Any friction produced in one of these two sides of the economy is transmitted to the other. The financial market' fluctuations are transmitted to the real market, in the structure of production. Huerta de Soto talks about a "time market", consisting of a general sector of the structure of production and a particular sector of the credit market, which operates according to the principle of communicating vessels [11]. The same idea

is found in Rothbard [9] and according to it, we can split the present / future (time) market into two divisions - the structure of production and the consumer credit market.

If labor and land are original factors of production and consumer goods are nothing but their finality, the capital place is an intermediate one, both in terms of logical sequence and of time aspects. The connection between the factors of production and the final goods is achieved through a variety of entrepreneurial activities. This interaction requires the completion of a period of investment, therefore, a certain time. We can, therefore, talk about the resources/time/results connection in terms of inter-temporal structure of capital.

Time is a central element, relative to every aspect of economic life. In the Austrian School of Economics' perspective, the time element is most strongly found into the temporal structure of production. Distortions in the structure of production of an economy, due to the monetary supply changes, make the temporal relationship between money and capital to become particularly thorny. The problem of time in economic theory is correct seized by R. Solow [10], as: "one major weakness in the core of macroeconomics is the lack of real coupling between the short-run picture and the long-run picture". Indeed, to the short term vision of Keynes ("in the long run we're all dead"), based on demand, is opposed the classical approach, with emphasis on the supply issues. To this decoupling between the short term and the long-term is addressing the Austrian School and "the real coupling" [7] takes the form of capital theory. Simply stated, the capital theory has as its starting point the structure of production of Carl Menger and the distribution of resources between the factors of production of Eugene von Böhm-Bawerk [1]. To this adds the monetary component developed by Ludwig von Mises and Friedrich von Hayek, which shows that credit expansion causes distortions in the inter-temporal allocation of resources, which is the main cause of business cycles.

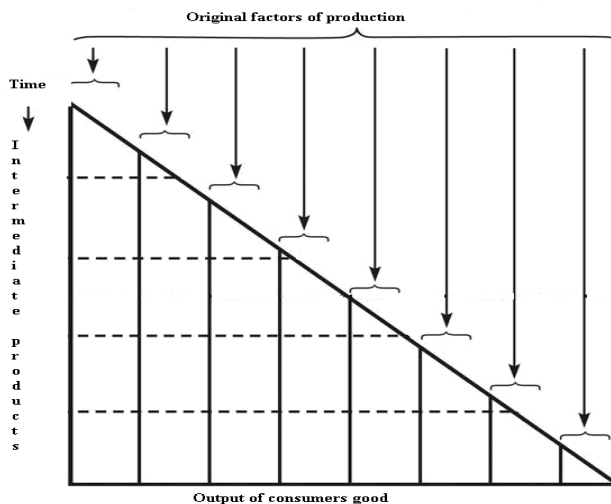
### 3. The structure of production

Any change in the structure and the money supply' level is not, by far, indifferent to the real economy. An additional money flow will be used, in the first instance, to purchase certain goods and services, being propagating, then, into the whole structure of production. However, the fact that some prices will rise before others will affect how entrepreneurs will use their resources, and this translates into changes in the productive structure. It is necessary, here, to provide some guidelines about the concept of productive structure. According to de Soto [12], this is "a set of steps the production process is divided into". Hayek talks about the structure of production in terms of "goods allocated between different branches and stages of production" [4].

The concept of "production structure" is one of the pillars of the Austrian business cycle theory. The structure of production refers to the double, monetary and temporal dimension of capital [6]. The monetary dimension (value) refers to the expression of capital in monetary terms and the temporal dimension indicates the time between engaging factors of production and obtaining the associated consumer goods. This double dimension of capital is also found in the writings of G. Cassel [2], which describe interest as a product between value and time.

The structure of production, in its double dimension, of value and time, was represented graphically for the first time in the 30s of last century. This representation is known as Hayek's triangle and involves a high degree of abstraction of the production processes. The triangle provides, through its sides, a two-dimensional picture of the macro-economy, simultaneously expressing its value and its temporal components. The productive processes described by Hayek capture the temporal dimension of the transformation of capital goods into consumer goods. Different capital goods (machinery, equipment, etc..) are used in various stages of production. Thus, the structure of production can be defined in terms of "temporal arrangement of heterogeneous capital goods".[8]

Fig. 1 The simultaneous processes of production in a stationary economy [3]

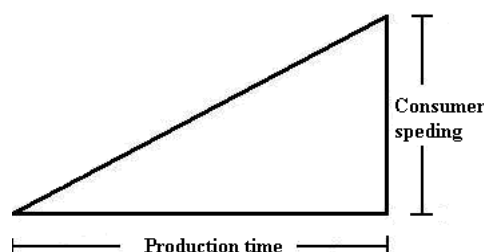


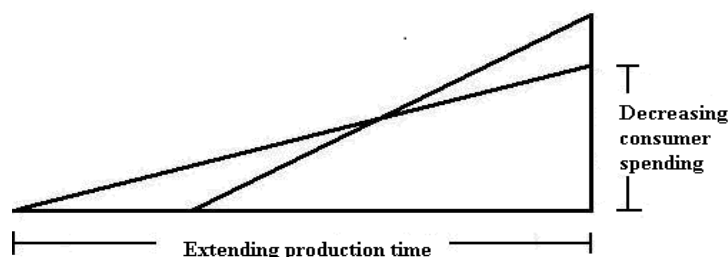
The hypotenuse of the triangle transposes graphically the successive using of the original means of production (labor and land) to obtain consumer goods. The horizontal projection of the hypotenuse indicates the value of the factors of production and the vertical lines (followed by top-down) are the expression of necessary time of transformation of the means of production into consumer goods. The triangle base is the expression of the value of production of the consumer goods. The triangle area shows all the steps through which the means of production become consumption goods. The structure of production is divided, in this way, by Hayek, into several stages, the result of each being the input of the next stage of production. Thus, each production process can be analyzed as a multitude of intermediate stages. In the early stages of production are obtained capital goods that will contribute to obtain others goods which, ultimately, will be used to produce the consumer goods requested by the market. More developed an economy is, more complex is its structure of production, including more intermediate productive stages. The common characteristic of each of these stages of production is the time. And as the time elapsed from the original factors of production incorporation to the final goods obtained is longer, the production is more capital intensive.

Using Hayek's triangle to express the relationship between production and consumption processes from one economy, despite the numerous accepted omissions (the structure of production exposed through this graphic does not take into account the existence of durable capital goods and consumer goods for a longer use or the input-output circularity) represent a constant of the Austrian macroeconomics. Although considered too simplistic, this graphics exposure has the great merit to incorporate the time element in the structure of production, continuing the line drawn by Menger and Böhm-Bawerk. A major role in supporting the Hayekian vision was played by Roger Garrison, who proposed a "turning" of the triangle, its base being the expression of the time of production. The individuals time preference changing means lower appetite for consumption, in the favor of future consumption, provided by various entrepreneurial projects initiated. Because of the limited available resources in society, starting new processes of production (investment) implies the existence of the accumulating processes, of savings. The new investments involves engaging new resources (the productive means) in a time-consuming process of production [5], resulting in extending the temporal dimension of the existing structure of production, as can be seen from the figures below. Additional investments involve restricting current consumption and, through market mechanisms, there is an increasing demand for inferior goods, ie goods from the early stages of production. Overall, due to changes in individuals' time preference, do not result an absolute reduction in demand but a change in consumption pattern. Expenditure on consumer goods is reduced to allow increased spending on goods from the initial stages of production, which, in turn, will help to supplement future consumption. This is graphically represented by a reduction of the triangle base (current consuming spending) and an extension of the production time side, due to increased demand for goods from the initial stages of production, respectively the increase of the number of intermediate stages.

Reducing individuals' time preference, expressed through lower interest rate, is visible graphically by decreasing slope of the hypotenuse. Also, as a result of time preference changes, there is a redistribution of resources inside the structure of production, from the final stages of production to the initial ones. This inter-temporal allocation of resources in the productive structure of an economy, depending on the relationship between consuming preference and saving preference, works as long as the interest rate keeps its role of expression of the individuals' time preference and entrepreneurs can make accurate forecasts on its base.

Fig. 2 The relationship between investment expansion and consumption [6]





In other words, the changes in the structure of production, due to changed time preferences, cause economic growth, while changes due to macroeconomic policies (such as credit expansion) are responsible for boom/bust fluctuations in the economy.

Market forces are those which adjust production to the needs of consumers. But productive activities require the completion of a certain period of time, until the consumers can access the goods they want. For this reason, the role of time cannot be neglected when analyzing an economy's productive structures. The temporal factor is expressed by the interest rate, its role being no other than to allocate resources over time. For this reason, the interest rate has a key function in the processes of economic expansion and depression. When the interest rate expresses the real relationship between the preference for consumption and the preference for saving (the time preference, in other words), then market processes work naturally. But, when this inter-temporal mechanism is disrupted (due to the *decision* of the authorities to *boost* the economy, let's say), the market cannot work normally anymore, and the artificial growth will be interrupted as soon as the limited resources will become evident, requiring a correction in the form of depression.

#### 4. Conclusions

The capital theory omission and the analysis in income - consumption terms are the main features of current, mainstream economic theory. Investments are considered vital to stimulate employment and demand, and investment decisions are mainly explained by psychological theories. Expansion and depression are put on optimism and pessimism, hence, the perceived need for stimulation from the central authorities. Political activism and optimism seem to be the recipes for prosperity and economic growth. Obviously, this vision is more comfortable for decision-makers, compared to understanding the inter-temporal capital structure, which provides a clear advantage to Keynesians in front of the Austrians. The easy to administer recipes are always preferred to complex treatment schemes, even if the long-term results clearly incline in favor of the latter. But let us not forget about the generations who have been trained that in the long run we are all dead.

Not considering the time element is responsible, partly, by the lack of clear evidence on the relationship between credit growth (with its benefic effects on the economy, in the short term) and economic crisis occurrence. The time of production, inherently when analyzing a multi-stage productive structure, is causing a dissipation of the causality between the monetary interventions in the credit market and the effects of these interventions. Every single thing is subject to the law of cause and effect, and credit expansion affects the inter-temporal allocation in the economy structure of production. Changes in interest rates result in capital restructuring, which, through the graphical representation, change the shape of the triangle proposed by Hayek. The problem created is related to the reallocation of resources during the intermediate stages of production, in the absence of a change in individuals' time preferences. Credit expansion is reflected in reducing the interest rate which, in its turn, makes entrepreneurial actions to be more future-oriented, while consumption is oriented mainly to present goods. These inter-temporal perturbations caused by monetary policies on the productive structures form the basis of economic crisis.

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