

# Cyclical Fluctuations and the Structure of Production

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# **Cyclical Fluctuations and the Structure of Production**

## **Abstract**

During the second half of 2006, Giampaolo Garzarelli was researching the yet unsorted Ludwig Moritz Lachmann Archives at the University of the Witwatersrand, Johannesburg, South Africa, to see if there was something of interest to consider for what eventually became Foss and Garzarelli (2007). To the best of his recollections the archival material at the time was contained in six or seven drawers of two old and rusty metal file cabinets of four drawers each. One the most intriguing finds, in addition to Lachmann's eyeglasses, was an Italian offprint from *Annali di statistica e di economia*. The offprint is of a brief 1936 article co-authored with A. M. Neuman entitled “Le fluttuazioni cicliche e la struttura della produzione.” The title of the present paper is the English translation of the title of this Italian article. This Neuman-Lachmann article does not appear in the Appendix compiled by Tulloh that lists the bibliography of works by Lachmann in the edited volume by Lavoie (1994). Thus we seem to be in the presence of a work that is at least unknown to English readers. This paper serves three purposes. First, to offer some background on the authors, their situation and their work at that time; second, to put the article into context by relating it to Lachmann's broader work on capital; and, third, to offer a translation of this article from Italian to English.

## **JEL Codes**

B20, B25, B31, B53, D24, E30, E32.

## **Keywords**

Austrian Business Cycle Theory, Average Period of Production, Ludwig M. Lachmann, Lachmann Archives, A. M. Neuman, Structure of Production, Time.

## Introduction

During the second half of 2006 – beginning almost certainly towards the end of May-early June – Giampaolo Garzarelli spent quite some time conducting research at the (time still unsorted) Ludwig Moritz Lachmann Archives at the University of the Witwatersrand, Johannesburg, South Africa.<sup>1</sup> The motivation for the archival research was to see if there was something of interest about institutional analysis to consider for what eventually became Foss and Garzarelli (2007).

Garzarelli made a surprising find that had little to do with the original purpose of the archival research about institutional analysis in Lachmann: an offprint of a 1936 article that Lachmann coauthored with A. M. Neuman [Andrzej Marcin Neuman aka Andrzej Marcin de Neuman aka Andrew Martin de Neuman (1907-1964)], an economist Garzarelli had never heard of.<sup>2</sup> The article is in Italian, published in *Annali di statistica e di economia*, a journal of the Faculty of Economic and Commercial Sciences of the (at the time Royal) University of Genoa, Italy. See the scanned title page of the offprint, where we also learn that we are in year XIV of the Fascist Era and that the publisher is Tipografia C. Morando.<sup>3</sup>

As we point out in the pages that follow, the article is related to another research program of Lachmann: the theory of capital. Indeed, the title of the present paper is the English translation of the Italian title of the Neuman and Lachmann article – henceforth NL.

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<sup>1</sup> The Lachmann Archives have since been sorted by the University of the Witwatersrand (Wits), and later also scanned by the Institutions and Political Group (IPEG) thanks to generous support of SPARC funds from Wits and the efforts of Dr. Nobantu Mbeki and Mr. Jason S. Hartford, now a PhD student at the University of British Columbia. The scanned archives are available at both the Wits Archives and at IPEG. However, they are not openly available online at present.

<sup>2</sup> In 2011-2012 Roger Koppl helped Garzarelli track down some first information on Neuman.

<sup>3</sup> Year XIV of the Fascist Era runs from October 28, 1935 to October 27, 1936.

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NL does not appear in the Appendix compiled by Tulloh that lists the bibliography of works by Lachmann in the edited volume by Lavoie (1994). Thus, we seem to be in the presence of a work whose contents are at best not well known to English readers.<sup>4</sup>

The purpose of the present paper is threefold. First, to offer some background on the authors, their situation and their work at that time; second, to put NL into broader context by relating it to Lachmann's broader work on capital; and, third, to offer a translation of NL from Italian to English.

### **Historical Context**

Lachmann arrived at the London School of Economics in April, 1933, leaving Berlin shortly after Hitler took power. Despite having received a doctorate from the Friedrich-Wilhelms-University of Berlin in 1930, he enrolled at the LSE, pursuing a Master's degree under Friedrich Hayek. Lachmann completed his Master's thesis on *Capital Structure and Depression* in 1935.

The LSE from 1933 to 1936 was an electric place, with students from all parts of Europe (and elsewhere) engaged in advancing a common theoretical approach out of the diverse strands of the Austrian, Lausanne, and Marshallian traditions. The leading figures in this endeavor were Lionel Robbins and Hayek, especially through their jointly-run seminar. As Howson (2011, p. 250) notes, “1933-1936 were the peak years of the seminar for its intellectual excitement and its contribution to the development of economic theory.”

Hayek ran a separate seminar on capital theory for his own students, starting in 1934-1935 (Howson 2011, p. 250) – a seminar that Lachmann seems likely to have

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<sup>4</sup> An English summary of the content of the article, and indeed of the entire issue of *Annali* where it appears, can be found in *Economic Journal* (1936, p. 784).

attended. Hayek's influence is evident in two of Lachmann's articles from this period, one published in German, the other, our main concern, in Italian.

On December 7, 1933, Hayek (1939) delivered his famous Copenhagen lecture where he responded to Gunnar Myrdal's criticism of his neglect of expectations. At issue was Hayek's concept of intertemporal equilibrium, the role of expectations, and assumptions about foresight. Lachmann (1937) waded into this debate with “Preiserwartungen und intertemporales Gleichgewicht” [Price Expectations and Intertemporal Equilibrium].

NL, the second article, reflects Hayek's ongoing efforts to develop his theory of the business cycle. As noted, Lachmann's co-author on this article was Neuman, a Polish economist and fellow student at LSE.

Neuman, who had arrived at LSE earlier than Lachmann (at least by 1932), had completed a dissertation on the British Coal Industry (Neuman 1934). But he, too, became interested in Hayek's work on capital and cycle theory, publishing several articles on the topic in English (Neuman 1937), Italian (Neuman 1933, 1937a), and Polish (Neuman 1937b) during the 1930s.

Neuman's works today seem largely forgotten, at least he was unknown to us, and what biographical and bibliographical information we have been able to find is incomplete and scattered. He fled Poland to England for good in 1939, became a Lecturer in Economics at University College in the South West of England, in Exeter, after the war, before leaving academia to work as a government economist.<sup>5</sup>

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<sup>5</sup> “Undoubtedly the chief vehicle for graduate student interaction was the round-robin London–Oxford–Cambridge (L–O–C) seminars, organized at the London end by the painstaking Andrew de Neuman. He read widely but his expertise was on the Polish coal industry and, after a scary wartime escape in peasant disguise from Poland, he aided the British ministries with his accumulated knowledge. Andrew was to become a prolific art collector until a premature death” (Weintraub 1983, p. 221).

In their joint paper, Neuman and Lachmann are critical of the work of the Italian economists Marco Fanno and Francesco Vito. Both Fanno and Vito were part of an active Italian language contribution to the interwar debates over business cycle theories developing along Austrian and Wicksellian lines.<sup>6</sup> At the core NL's criticism is the confusion introduced by treating the structure of production as several separate cycles, instead of treating it as a single cycle.

As Neuman (1936, p. 88) writes in a contemporary contribution in English:

What is the relation between the average length of the structure of production and the liquidity of assets and units? I do not think that a greater or smaller liquidity of assets, or their greater specificity to a particular stage has any direct connection with the duration of the period of production. The whole discussion cannot be applied to the liquidity of a coordinating unit and to the length of the structure without falling into the dangerous trap of regarding the structure of production as a series of productive cycles instead of as one cycle. This trap includes already several Italian economists (Prof. Marco Fanno [1931], Prof. Francesco Vito [1935], etc.).

As we will see, NL is in part an elaboration of this statement.

### **Capital and the Structure of Production, and the Average Period of Production: Analysis of the Translated Article**

NL is a warning not to neglect “the essentially economic aspect, that of time, on which the structure of production rests.” It reports that in recent correspondence between Professors Vito and Fanno, the latter had questioned the usefulness of the concept of “structure of production” for the discussion of short-term changes and especially for business cycles.

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<sup>6</sup> Gustavo Del Vecchio and Costantino Bresciani Turrone were also active in this debate. See Davanzati and Realfonzo (2001), Spiller (2010), and Nerozzi and Parisi (2011).

As noted earlier, both Lachmann and Neuman were graduate students at the LSE where Hayek had risen to prominence because of his work repackaging the Austrian Business Cycle Theory (ABCT) – the chief rival to the emerging Keynesian paradigm for explaining the Depression in the midst of which they found themselves (Hayek 1935). The ABCT, as originally conceived by Mises in 1912 (Mises 1971),<sup>7</sup> and as presented with some variation by Hayek at the LSE in the early 1930s, emphasized the role of time in production and in informing production decisions.

Mises and Hayek made use of the Austrian Theory of Capital – originated by Carl Menger (1876), but greatly expanded and formalized by Böhm-Bawerk (1899). Böhm-Bawerk introduced the concept of the average period of production (APP) to capture the average amount of time taken in a production process (project or set of projects), and Hayek had used a very simplified and stylized version of this idea in the form of a triangle in his presentation.

The ABCT suggests that many modern business cycles are induced by an expansion of the supply of money (money-credit) in the banking system that drives the rate of interest (or the interest-rate structure) down below its sustainable (variously equilibrium, natural) level. The rate of interest is both the cost of borrowing money and the rate at which future investment returns are discounted to yield the present-value of investment (production) projects. Thus, this unsustainable reduction in the interest-rate, unsustainable because it is produced by the expansion of credit and not by an increase in real savings, artificially inflates “longer” investments relative to “shorter” investments, and thus causes malinvestment. Because longer investments appear relatively more attractive, productive resources are moved towards them and away from shorter investments. When it becomes apparent that this production

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<sup>7</sup> Mises borrowed heavily from the monetary theory of Wicksell.

structure cannot be sustained, the value of these unsustainable investments falls. Yet, being that they are, at least in part, composed of specific durable equipment, these production resources cannot simply be relocated to the production of shorter sustainable projects. This underlying adjustment and readjustment process manifests in a credit-induced boom-bust cycle.

The designation of projects as longer or shorter refers to the APP. So when Fanno is questioning the usefulness of this concept, indeed of the more general concept of “structure of production,” NL are weighing in in the context of Hayek's theory. What is interesting is what this seems to reveal about Lachmann's views at this time concerning the capital structure in general and the APP more particularly. Together with Neuman, Lachmann appears to be defending both the ABCT and the APP against the different criticisms of both Vito and Fanno. Moreover, it seems that in considering these different criticisms Lachmann may have been alerted to the difficulties surrounding the concepts of aggregate capital and of the APP that he so decisively articulated in his later work (Lachmann 1947, 1956).

According to NL, Fanno objects to the use of APP as an aggregate concept and points out that, from a microeconomic perspective, there are many such average periods of production. In discussing this, NL are led to a consideration of the technical conditions of production and the claim that in the short run, since these technical conditions are fixed, the average periods of production will not vary. NL point out that, even assuming that this is true, it still does not follow that the aggregate APP cannot vary, being that the aggregate is a weighted average of the components. When the weights change the aggregate changes and when the interest rate falls, the weights shift towards projects of longer duration. Notably projects of longer duration include both longer duration production-goods and consumption-goods, like houses and

automobiles. In this description, NL make use of the notion of stages of production characteristic of Hayek's triangle, where a move toward earlier stages of production is synonymous with the move toward longer duration investment projects.<sup>8</sup>

NL downplay the importance of the “technical rigidity” of individual production projects in suggesting that they may not be as fixed as might be thought. For one thing, non-specialized labor can move freely between many different types of projects.<sup>9</sup> For another, some production goods are more specific in their possible uses than others, that is to say, the production structure is characterized by what Lachmann later called “multiple-specificity” (better termed “multi-specificity”) regarding production goods. Could this be one of the triggers for the development of Lachmann's later description of the capital structure as being composed of many multi-specific, heterogeneous production goods? And we also find NL considering the advent of both new production goods and techniques and new consumption goods, a hint of conceptions of a truly dynamic economy.

So NL defend Vito against Fanno's criticisms regarding the microeconomics of the capital structure and argue that Vito is correct in suggesting that it is the production structure as a whole that is both relevant and useful in discussing business cycles. And they take issue with Vito's suggestion that the APP may be difficult to construct as an aggregate of all the micro periods of production, saying that the monetary values of these projects can be used, specifically that in a monetary economy there exists “the possibility to reduce all our results to a common monetary denominator” and that doing so would be “scientifically correct.” This and other related statements throughout the article suggest the ubiquitous confusion that has

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<sup>8</sup> An equivalence recently disputed (Lewin and Cachanosky forthcoming a).

<sup>9</sup> This observation is noteworthy for its recognition of the fact that labor, just like capital, can be specific to certain production tasks, a point that Lachmann did not use in his later capital theory, but perhaps should have.

plagued discussions of capital theory over the years, namely the attempt to measure quantities in terms of monetary values. Lachmann later realized that the APP was a hopelessly logically inconsistent concept in the form that it was inherited from Böhm-Bawerk, and even more so as recast by Hayek. In both treatments, there is a confounding of quantities and values starting with the fact that the concept of interest is inescapably a value concept. Both Böhm-Bawerk and Hayek, for this reason, were reduced to using only simple interest, and not, as would be correct, compound interest. Furthermore, the attempt to construct an APP in terms of physically weighted units of time is doomed to fail because the significance of those physical weights can only be gauged in value terms. (So, for example, Hayek's triangle makes use of physical units of labor to weigh the time involved in any production project. But those physical units of labor will not, in the general case, be homogeneous. This ironically pushed Hayek's rendition of the ABCT into an uncomfortable Ricardian-type labor-theory-of-value format.) This is something that Lachmann forcefully exposed in later years in his published work and in his university lectures. So it is surprising to find him here, together with Neuman, committing those basic errors that he was later to expose in the work of the neo-Ricardians and neoclassicals. It is, again, perhaps here that these errors first began to be seen by him for what they were.

Finally, it may be worthwhile to note that three years after this article was published, John Hicks, in his *Value and Capital* (1939), clearly articulated the problems with Böhm-Bawerk's APP and, astoundingly, offered a solution in the form of a money-value-weighted APP. He called this construct the average period (AP), being the average amount of time for which one has to wait to earn a dollar from the investment in question. The identical concept was discovered by the financial actuary Frederick Macaulay in 1938, and has been used by financial practitioners ever since.

In finance, it is called Duration. Neither the Austrians, nor later Hicks himself, picked up on this concept, and the persistent and futile attempt to use money values to measure physical quantities of capital became the root of much vigorous and acrimonious debate, most particularly evident in the debate of the Cambridges from the 1950s to the 1980s, a debate with echoes still to this day. When NL refer in this article to a “common monetary denominator” as a means of rendering the APP consistent and intelligible, they could not have foreseen Hicks's contribution along those lines, but if Lachmann had taken note of it when it appeared he surely could have incorporated it into the significant contributions of his capital theory.<sup>10</sup>

For these reasons, this newly discovered article is a fascinating window into Lachman's possible mindset before the ingredients of his most significant contributions had taken form.

**Translation:**  
**“Cyclical Fluctuations and the Structure of Production”**  
**by A. M. Neuman and L. M. Lachmann<sup>11</sup>**

In the discussions on the theory of capital, there is a grave danger from the intrinsic seduction of overestimating the purely technical aspect of the problem and of, simultaneously, neglecting the essentially economic aspect, that of time, on which the structure of production rests.

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<sup>10</sup> For more on AP and Duration, see Cachanosky and Lewin (2014, 2016) and Lewin and Cachanosky (forthcoming a, forthcoming b). Also, note that, alone among the post-Böhm-Bawerkian Austrians, Mises had a financial conception of capital, and, as a result, never participated in any “controversies.” See Braun, Lewin and Cachanosky (2016). Perhaps also interesting to note is that Lachmann in his later work was skeptical of the ABCT, whereas here NL defend it.

<sup>11</sup> For consistency in citation style, the original footnotes of NL have been converted into parenthetical citations, but in square brackets. It is also worth noting that not always is the Italian of the original text correct.

In a recent article, “La teoria pura della moneta e i cicli economici” [The Pure Theory of Money and Economic Cycles] Prof. Vito [1935] cites correspondence that he had with Prof. Marco Fanno [Vito 1935, p. 108] in which the latter raises serious doubts about the usefulness of the concept of “structure of production” for the study of short-term changes, and, particularly, about its applicability to the study of cyclical fluctuations. He denies that upturns and downturns are expressions of the tendency to lengthen or shorten the structure of production. He asserts that the phenomena, which in reality are observed during the industrial cycle, give us no right to draw such conclusions, because the changes in the process of production are determined by progress in productive technique, which in reality changes very slowly. Since Prof. Vito reports Prof. Fanno's opinion without any critical comment, it is legitimate to think that he shares that opinion. However, it can be shown that while Prof. Fanno's argument is, within the limits of its premises, completely logical and is in accord with his entire theory, Prof. Vito's adherence seems, at least in part, to contradict the rest of his article.

As Prof. Vito [1935, p. 106 ff.] himself has noted, Prof. Fanno [1931] speaks of many production cycles: “the production cycles of the various goods.” On the other hand, it appears that Prof. Vito is perfectly aware of the essential difference between this conception and that of the Austrian School when he writes that “the notion of the length of the productive cycle is not, as in Fanno's theory, applied to the different processes of production of the various goods that reach the consumer, but to the entire productive apparatus, as considered in its vertical structure” [Vito 1935, p. 107]. The essential difference between the two authors' conceptions clearly emerges in such a fashion, and while we are in complete agreement with Vito on this point, we cannot but find it somewhat strange that, notwithstanding the fundamental difference in their

premises, both authors reach identical conclusions and that Prof. Vito approves of Prof. Fanno's verdict on the Austrian theory of the industrial cycle.

It can never be stressed enough that there is an enormous difference between considering the problems of the cycle by studying the structure of production as a whole or by limiting ourselves to investigating the distinct cycles of the various goods. This latter procedure forces us to confront the frictions and technical difficulties that one finds when trying to adapt individual methods of production to the changed requirements that emerge during the cycle. Considering the nature of the technical rigidity connected to each process of production once started, that is, the fact that the coefficients of production are fixed and that the factors are specialized within the short-term, it follows that the possibility of readjustment during such periods is in such a way made impossible. And it is completely legitimate to conclude that all that one can say is that during the upturn of the cycle we observe “an expansion of the plants to increase production of many goods, but with production processes of the same length as the previous ones. In the downturn, the creation of new plants stops” [Vito 1935, p. 108].

The perspective is, however, completely different if we consider the problem from the point of view of the structure of production as a *whole*. What we are interested in considering now is the relationship between the time during which the factors of production are employed, and the amount of production resources available for consumption goods. Moreover, we compare the productivities of different structures of production. Prof. Vito seems to favor negating this possibility when in another article [Vito 1933, p. 677 ff.], while criticizing Böhm-Bawerk, he writes that it is not “scientifically correct” to measure the productivity of the various factors employed to produce not “a unit of production,” but various goods. This is true if Prof. Vito

considers physical units, but since in an economy we always have the possibility to reduce all our results to a common monetary denominator, such procedure would be, in our case, not “devoid of meaning, but rather scientifically correct.”

But let us now examine the connection between the “structure of production as a whole”<sup>12</sup> and the problems of the industrial cycle. The technical rigidities in one *part* have little to do with the possibility of altering the structure as a *whole*, to the extent that it is possible to modify the production of one type of good at the expense of another.

In the case where only a certain number of goods is produced in certain quantities, the production methods, naturally, cannot be changed as one likes; but if completely new goods are produced, then the entire structure of production is altered and the technical difficulties are not a major obstacle, except for the supply of the factors that are already employed. Assuming as given both consumers' tastes and technical knowledge, the interest rate determines the length of the structure. For this reason, we cannot accept the opinion that technical rigidities must constitute a major obstacle to variations in the structure of production, both in the short and in the long periods. Since the same arguments apply in the case where no new goods are produced, but the quantity of the existing goods brought to the market is changed, there seems to be no reason to attribute too much importance to the technical difficulties of moving from one production method to another. And when the composition of total production can be varied in the short term, such difficulties seem to a great extent immaterial.

The same occurs in the business cycle.

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<sup>12</sup> Here NL write “*unica struttura di produzione*,” which literally would translate as the “unique” or, maybe more precisely, “sole” structure of production; we think that by “*unica*” they actually mean structure as a “whole” in juxtaposition to breaking down the structure of production into separate ones.

In fact, it is known that cyclical fluctuations hit different sets of industries with different intensity. Empirical observations corroborate that an increase in the production of all goods is certainly not the only distinctive sign of a boom.<sup>13</sup> This is well known, and it was generally admitted by economists, after the careful research of Professor Spiethoff, that a constant characteristic of a boom is an increase in the production of durable goods and of investment goods (houses, farms, ships, automobiles, iron, steel, coal, etc.). If a house is built or a machine is purchased, one exchanges present income for future income and the structure of production is thus extended. Some factors are invested so that their final products are not used for immediate consumption, but rather for deferred consumption. There is no doubt that this type of development, as a trend that depends on a low (monetary) rate of interest, is normally prevalent at the end of a depression and in the first phases of a recovery. Concerning the trend of production of durable goods and of investment goods, it seems therefore legitimate to us to infer that the high phase of a business cycle and the tendency for the average duration of the structure of production to rise, end up coinciding.

On the other hand, the shortening of the structure, which always accompanies the end of the upturn and the following period, seems in the first instance to offer the possibility of much more serious objections. In fact, one cannot support the claim that the lack of liquid capital, which begins to make itself known at the peak of the upturn, leads to a variation of the technical means of production in existing plants, nor that shorter production processes are substituted in the production of the same goods. But this is not at issue here.

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<sup>13</sup> At the end of this sentence there is “(*boon*),” which we omit since context suggests that it is a typo of “boom.” Could reporting this English word in parentheses in the Italian text imply that NL is a translation from English?

What matters most in this regard is the beginning of new processes or, on the other hand, that the amortizations that are subtracted from some types of production are then destined to different uses. Observation teaches that during a depression the investment activity drops, in relative terms, much more than consumption. The first stages (production of raw materials) suffer considerably more than the last (consumption goods industries), and the stocks of merchandise gradually decrease as the depression continues. From this it follows that, in relative terms, there is a greater number of unemployed factors in the first phases compared to the final ones. This leads, ipso facto, to having, on average, all factors of production employed for less time.

But let us now consider whether there is an advantage to adopting Prof. Fanno's procedure of substituting many cycles of production of various goods with a unique and comprehensive structure of production. It seems to us that, at least as regards the analysis of business cycles, this first attempt is surely less successful. Besides the difficulty of a clear definition of each good distinct from any other, it does not give us a concept of an organic and functional unity of all the goods in the system, nor does it teach us anything about the interconnections of the different parts of production; it includes a great number of average periods that cannot be easily combined into a general period; neither does it indicate any kind of concatenation among the various interest rates and the cycles of the various goods; nor does it permit to account for the variations in the quantities produced of the different goods, in that it does not leave room for the consideration of relative changes.

All the various sectors of production are connected to each other by the flow of free capital, which, in part, flows from savings and in part periodically frees itself in the form of amortization. Such dependence is clearly visible in the representation of a

single structure of production. Yet, when our system is divided into a series of independent cycles of various goods, it is eclipsed by the underlying detail and seems devoid of any explanatory value. In relation to reinvesting the amortization funds, they, certainly, can be channeled into various directions, and it is not necessary for them to substitute for old capital. In many cases, when the technical conditions do not render necessary such substitutions, the old plants are kept and are not replaced; in other cases the capital is changed and the amortization funds are applied to new types of investments, which become part of the *new*, shorter, structure of production inside the entire economic system. All these interrelations among the various sectors of production, even if extremely important for the problem of the business cycle, cannot be explained if one considers separate production cycles for each good.

If we explain in this fashion the phenomenon of interconnectedness that exists among the various sectors of production and that is accomplished through the reintegration of capital, it naturally follows that, in as much as the technical substitution of one method of production with another can present some difficulties, as highlighted by Professors Marco Fanno and Vito, the cycle, in its diverse phases, implies a tendency to substitute the demand for one type of (consumer) good for the demand for another type, as a result of the transfer of free capital from one production sector to another. If this is the case, it does not seem correct to attribute a predominant importance to the lack of technical flexibility of existing plants, which is but one of many elements that determines the position [in the overall length of the structure of production].<sup>14</sup>

Similarly, if the technical adjustments of production of every single good were to be such as to exclude the possibility of variations in the short periods, it would still

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<sup>14</sup> The original sentence ends with “position,” but the meaning is unclear, also in the Italian original, without the words in brackets that we add.

undoubtedly be true that the variations in demand for different categories of goods, which manifest during the business cycle, become concrete in investments for different periods. This obviously presupposes that certain classes of factors can move freely from one industry to another (as for example is the case of non-specialized labor, which can move from industries where investment goods are produced to industries where consumption goods are produced). Thus, if all factors were “non-competing groups” because they are employed in the different industries, the cycle could not originate at all, as recent Swedish contributions on the theory of economic cycles have shown.

When one speaks of the influence of the business cycle on the structure of production one highlights the effect that derives from the period of time during which, on average, the factors are invested: that is, the average period of production expressed in terms of time (years, months, days, hours, etc.). Prof. Vito shows himself rather skeptical about the possibility of comparing the average length of different structures of production and reveals himself to favor considering it as “a purely formal conception, not susceptible to the direct application of concrete economies” [Vito 1933, p. 680]. Without getting ourselves into an additional discussion around the usefulness of the concept of the length of the structure, it must be clearly specified how measurement can occur. In measuring certain quantities, it is always possible to express the relation among different magnitudes, besides with standard numerical measures, in terms of “greater” “lesser” “equal” (just as is done in the “measurement” of utility). In this fashion, it is possible to order various structures of production according to the different *total* length of production during which factors are invested. The longest will be the one whose factors must remain invested for a longer period of time before consumption goods become available. Analogously, if in one case the

length of the structure and the quantity of employed factors is greater than in another case, and if additionally production is greater in the latter case, one will be forced to conclude that the *average* period is in the latter case considerably longer than the first.

If this were to be denied, it would be difficult to understand in what way the concept of periods of production can have any meaning.

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