CHAPTER 6

The Hayek–Keynes–Sraffa controversy reconsidered

Heinz D. Kurz

1 Introduction

Piero Sraffa's debate with Friedrich August von Hayek subsequent to the publication of Hayek's *Prices and Production* in 1931 (Hayek, 1931b) has met with serious difficulties of understanding and was subject to vastly diverging interpretations. In a letter to Oskar Morgenstern, Frank Knight wrote: 'I wish he [Hayek] or someone would try to tell me in a plain grammatical sentence what the controversy between Sraffa and Hayek is about. I haven't been able to find anyone on this side who has the least idea' (quoted in Lawlor and Horn, 1992, p. 319, fn.). This view is echoed in the introduction to Vol. 9 of *The Collected Works of F. A. Hayek*, entitled *Contra Keynes and Cambridge*, in which the editor maintains that 'the Hayek–Sraffa duel lacks clarity' (Caldwell, 1995, p. 37).[1] Other

This paper draws partly on Kurz (1995). Earlier versions of the paper were given in a seminar at the University of Graz, at a meeting of the post-Keynesian study group at University College, London, during the 'European Summer School on Structural Change and Economic Dynamics', 8–14 July 1995, at Selwyn College, Cambridge, in a workshop at Malvern (UK) and in seminars at the École Normale Supérieure de Fontenay-Saint-Cloud, Paris, the University of Paris II – Panthéon, the University of Nice and the University of Rome III. I should like to thank the participants for useful discussions. I am particularly grateful to Christian Gehrke, Piero Garegnani, Edward J. Nell, Neri Salvadori and Ian Steedman for detailed comments and suggestions. It goes without saying that any remaining errors or misinterpretations are entirely my responsibility.

[1] To this he adds the observation that *Prices of Production* 'is not an easy book to read', and then draws a parallel to Sraffa's *Production of Commodities by Means of Commodities* – in Caldwell's opinion 'a paradigmatic example of concisely obscure academic writing'. He continues to speculate that 'Sraffa's own treatise... is apt to produce in the reader of today a reaction not unlike that caused by reading *Prices and Production* without benefit of Hayek's earlier work' (ibid., p. 37 and p. 37, fn.).

interpreters opined that despite the heat that emanated from the controversy, the positions advocated by the adversaries, far from being the two sides of a debate, passed each other without touching, like ships in the night (cf. for example, McCloughry, 1982). Since Sraffa's critique of Hayek's monetary theory of overinvestment was formulated at an important stage of his investigations in the theory of value and distribution, it is perhaps useful to reconsider this debate. His contribution may be expected to reveal his understanding of traditional marginalist doctrines and bear witness to his remarkable analytical skills and impeccable logic. As will be seen, this expectation is indeed met.

The structure of the paper is as follows. Section 2 summarizes Hayek's argument in *Prices and Production*. Section 3 deals briefly with the controversy between Keynes and Hayek subsequent to the latter's publication of the first part of a critical review of Keynes' *Treatise on Money*. Section 4 turns to the debate between Sraffa and Hayek which brought, in the words of Ludwig Lachmann, 'the opening shots in a battle between two rival schools of economic thought' (Lachmann, 1986, p. 226). Section 5 outlines the subsequent debates, first in the 1930s and then in more recent times after Hayek had been awarded the Nobel prize in economics in 1974. Section 6 draws some conclusions.

2 Hayek's *Prices and Production*

When Hayek was invited to give four lectures at the London School of Economics during the session 1930–31, he devoted them to the theory of industrial fluctuations, placing special emphasis on the role of money and the banking system.[2] In 1927, Hayek had been appointed to the position of the Director of the Austrian Institute of Business Cycle Research (Österreichisches Institut für Konjunkturforschung). Most of his earlier work in economics was in the fields of monetary and business cycle theory. For example, in 1928 he had published an essay on 'Das intertemporale Gleichgewichtssystem der Preise und die Bewegungen des

[2] Lionel Robbins, the newly appointed and ambitious head of the Department of Economics, was keen to establish the LSE as a centre for economic theory. He was also looking for allies to support him in the recently established Economic Advisory Council to which Keynes had invited him, but in which he had assumed, to Keynes' disappointment, a dissenting minority position. In these conditions the rising Austrian economist seemed to be the perfect choice to challenge Keynes and his followers in Cambridge. As Joan Robinson (1978, pp. 2–3) put it: 'Professor Robbins sent to Vienna for a member of the Austrian school to provide a counter-attraction to Keynes.' See on this also Lachmann (1986), Caldwell (1995) and Dahrendortf (1995).

"Geldwertes"' (Hayek, 1928), and one year later a book entitled *Geldtheorie und Konjunkturtheorie* (Hayek, 1929).[3] Therefore, and given the little time he had to prepare his LSE lectures, it was quite natural for him to have developed some ideas along the lines of his previous work. Hayek's lectures were published in 1931 under the title *Prices and Production* (Hayek, 1931b).

Prices and Production had two aims: one constructive, the other critical. The constructive aim consisted of a further elaboration of Hayek's own theory of the trade cycle, and especially of the crisis. According to this theory, the crisis has its origin in a lack of capital, which in turn is the result of a preceding inflation and the 'misdirections of production' caused by it. The critical task consisted of refuting alternative theories of the business cycle. The main targets of Hayek's criticism were those theories which explained the crisis in terms of a deficient effective demand and the ensuing deflationary tendencies. The four lectures deal with the following subjects. Lecture I, 'Theories of the Influence of Money on Prices', is devoted to a brief history of attempts to come to grips with the role of money and the banking system for the volume and the direction of production; Sraffa, in his otherwise acerbic and uncompromising review of Hayek's book, calls the introductory lecture 'excellent' and 'a model of clearness' (Sraffa, 1932a, p. 42). Lecture II, 'The Conditions of Equilibrium Between the Production of Consumers' Goods and the Production of Producers' Goods', expounds the foundation on which Hayek's construction is erected: the Austrian theory of production and distribution. The emphasis is on Böhm-Bawerk's concept of the 'average period of production' as an expression of the capital intensity of production, and the idea of an inverse relationship between the money rate of interest and the length of the production period chosen by cost-minimizing producers. Lecture III, 'The Working of the Price Mechanism in the Course of the Credit Cycle', contains Hayek's explanation of the trade cycle which revolves around the impact of changes in the money rate of interest on relative prices and the adjustment process triggered by such changes. Lecture IV, 'The Case For and Against an "Elastic" Currency', draws some conclusions for economic policy. In what follows I shall briefly summarize the argument in the first three lectures.

[3] An English translation of a revised version of his book was published in 1933 under the title *Monetary Theory and the Trade Cycle* (Hayek, 1933).

2.1 *Tracing the sources of his own doctrine in the history of economic thought*

Hayek discerns four stages in the development of the analysis of the impact of money on prices and production. In the first stage we encounter the more 'mechanistic' forms of the quantity theory of money, one of which was advocated towards the end of the 17th century by John Locke. These mechanistic forms are said to have been resuscitated at the beginning of the 20th century by Irving Fisher's 'equation of exchange'. To Hayek, any reasoning in terms of *aggregate* magnitudes such as the total quantity of money, the general price level and the total amount of production is ill-conceived, 'For none of these magnitudes *as such* ever exerts an influence on the decisions of individuals; yet it is on the assumption of a knowledge of the decisions of individuals that the main propositions of non-monetary economic theory are based.'[4] Monetary theory therefore ought to adopt the 'individualistic' method, which 'the modern "subjective" theory has advanced beyond the classical school in its consistent use' (1931b, p. 4). It follows that attention should focus on *relative* prices rather than on the general price level.

In the second stage we witness attempts to integrate monetary theory and general economic theory, and 'to trace the actual chain of cause and effect between the amount of money and prices' (ibid., p. 8). A start was made by Richard Cantillon in a 'brilliant' chapter of his *Essai sur le Commerce*, published in 1755, in which he clearly spelled out that an increase in the quantity of money may have distributive effects, which need not be neutral with respect to the volume and composition of production. For example, if consequent upon an increase in money supply the incomes of those with a high propensity to save and invest rise first, then the increase may have an impact on productive activity and growth.[5] This type of analysis was refined by David Hume and, more recently, by J. E. Cairnes. The most advanced versions in this tradition are said to be

[4] It comes as a surprise that despite his negative assessment of the quantity theory of money, Hayek is 'ready to concede that so far as it goes it is true, and that, from a practical point of view, it would be one of the worst things which could befall us if the general public should ever again cease to believe in the elementary propositions of the quantity theory' (Hayek, 1931b, p. 3). The passage immediately following reads: 'What I complain of is not only that this theory in its various forms has unduly usurped the central place in monetary theory, but that the point of view from which it springs is a positive hindrance to further progress. Not the least harmful effect of this particular theory is the present isolation of the theory of money from the main body of general economic theory' (ibid., pp. 3–4).

[5] We shall see below that Hayek should have remembered Cantillon's argument when developing his own doctrine.

the 'income theories' of the value of money of Friedrich von Wieser, Albert Aftalion and Ludwig von Mises. 'In the form it has received at the hands of Professor Mises, it belongs already to the third and fourth of our main stages of development' (ibid., p. 10). The reference is to Mises' *Theorie des Geldes und der Umlaufsmittel*, published in 1912 (Mises, 1912).[6] While their achievements relative to the first stage are obvious, in Hayek's opinion these theories 'suffer from a not unimportant defect', that is,

> they do not help us to make any *general* statements about the effects which any change in the amount of money must have. For, as I shall show later, everything depends on the point where the additional money is injected into circulation (or where money is withdrawn from circulation), and the effects may be quite opposite according as the additional money comes first into the hands of traders and manufacturers or directly into the hands of salaried people employed by the State. (Hayek, 1931b, p. 11).[7]

It is Hayek's aim to overcome this defect and to develop a general analysis of the effects of changes in monetary policy, emphasizing especially the difference between producers' credits and consumers' credits.

The third stage is characterized by a study of the impact of the quantity of money on the rate of interest and, via the rate of interest, on the composition of demand for consumption goods and capital goods, respectively. In Hayek's judgement, two particular ideas are developed in this stage. The first comes from Henry Thornton, who, in the famous *Bullionist Controversy* in England at the beginning of the last century, advocated the view that if the Bank of England would keep its interest rate low enough, the circulation of paper money might expand beyond all limits. Thornton thus rejected the idea that natural forces would regulate the circulation of the Bank and ward off the danger of a sudden and swift depreciation of the currency.[8] The second is due to Thomas Robert Malthus, and concerns an early version of the concept of 'forced' or

[6] Hayek's indebtedness to Mises is expressed in various ways. Most importantly perhaps, Lecture III, which contains Hayek's own theory of the credit cycle, is headed by the following quotation from Mises' book (cf. Hayek, 1931b, p. 65). 'The first effect of the increase of productive activity, initiated by the policy of the banks to lend below the natural rate of interest is... to raise the prices of producers' goods while the prices of consumers' goods rise only moderately.... But soon a reverse movement sets in: prices of consumers' goods rise and prices of producers' goods fall, i.e. the loan rate rises and approaches again the natural rate of interest' (Mises, 1912, p. 431; Hayek's translation).

[7] Unless otherwise stated, emphases in quotations are by the authors' quoted.

[8] A low interest rate was taken to lead to an expansion of investment, hence to a high demand for loans, and so to a supply that exceeds what can be supported by bank capital.

'compulsory' saving which plays a central role in Hayek's own analysis. Malthus had admitted that an increase in money supply might stimulate capital accumulation. The additional money would lead to a rise in prices from which the 'industrious classes' would benefit to the detriment of the 'unproductive classes'. This redistribution of income may entail a problem of effective demand. For, Malthus argued, if capital accumulated too rapidly, the increase in production would tend to exceed the increase in effective demand and thus a general glut of commodities would obtain.[9] Hayek comments on this: 'The recognition of this tendency of an increased issue of notes to increase the national capital does not blind Malthus to the dangers and manifest injustice connected with it' (ibid., p. 19).

It was only with Knut Wicksell's *Geldzins und Güterpreise* (Wicksell, [1898] 1936), a contribution of 'signal importance', that Thornton's analysis was rediscovered and combined with a theory of the influence of money supply on capital formation (ibid., p. 20). Wicksell's success in this regard, Hayek contends, was essentially due to 'the fact that his attempt was based on a modern and highly developed theory of interest, that of Böhm-Bawerk'. He adds:

> But by a curious irony of fate, Wicksell has become famous, not for his real improvements on the old doctrine, but for the one point in his exposition in which he definitely erred: namely, for his attempt to establish a rigid connection between the rate of interest and the changes in the general price level. (ibid., p. 20).

If there was no money, Wicksell's 'natural' rate of interest – Hayek prefers the term 'equilibrium' rate – would assume a level such that the *in natura* demand for capital, i.e. investment, would be equal to the *in natura* supply of capital, i.e. savings. In a money economy, the money rate may differ from the equilibrium rate because demand and supply do not meet in their 'natural form', but in the form of money, 'the quantity of which available for capital purposes may be arbitrarily changed by the banks' (ibid., p. 21). With the money rate falling short of (exceeding) the natural rate, there will be a process of inflation (deflation). Wicksell also coined the term 'forced saving'. Von Mises built on the foundations laid out by Wicksell, emphasizing the different influences which a divergence between the two rates has on the prices of consumption and of capital

[9] Since Malthus held the view that any act of saving would lead to an act of investment of the same size, Ricardo was at a loss to understand how Malthus could ever arrive at the opinion that aggregate effective demand may fall short of aggregate productive capacity. See Ricardo's *Notes on Malthus* (Ricardo, *Works*, Vol. II).

goods, respectively. In this way, Hayek concludes, Mises 'has succeeded in transforming the Wicksellian theory into an explanation of the credit cycle which is *logically satisfactory*' (ibid., p. 22; emphasis added).

As yet there is little to be said about the fourth stage, which is only just coming into being, with Hayek as its main creator. Therefore, the question is not what *is*, but what *ought to be and what not*. A negative determination should start from Wicksell's theory. In Hayek's opinion, his main error was to assume that the natural rate of interest 'was a rate which simultaneously restricted the demand for real capital to the amount of savings available *and* secured stability of the price level' (ibid., p. 23). From this perspective, a money rate that equals the equilibrium rate means that money is 'neutral'. Hayek objects: other than in a stationary state, banks can *either* equilibrate the demand for and the supply of capital *or* they can keep the price level stable, but they cannot do both at the same time (cf. ibid., p. 24). Thus, in times of a growing (shrinking) production, the equality between the two interest rates would imply falling (rising) prices. Wicksell's analysis, Hayek concludes, has led into a dead end. A fresh start is needed. This brings us to Hayek's positive determination of the project under consideration. We begin with an investigation of his method of analysis and the notion of equilibrium he adopts, and then turn to the theory of production and capital that underlies his approach.

2.2 *Hayek's method and his notion of equilibrium*

Hayek starts from two propositions which in his opinion cannot sensibly be questioned. First, while a change in the quantity of money may, or may not, have an impact on the price *level*, it will most certainly have an impact on *relative* prices. Second, the volume and direction of production depends on relative prices. A constant price level must therefore not be mistaken to imply constant conditions in the real sphere of the economy. Hayek pleads for the abandonment of the 'useless' and 'superfluous' concept of a general value of money. Monetary theory of the fourth stage will rather be characterized by an investigation of '*how the relative values of goods as sources of income or as means of satisfaction of wants are affected by money*' (ibid., p. 27). In this context Hayek introduces the notion of 'intertemporal equilibrium', which he had developed three years earlier (cf. Hayek, 1928):

> This view of the probable future of the theory of money becomes less startling if we consider that the concept of relative prices includes the prices of goods of the same kind at different moments, and that here, as in the case of interspatial price

relationships, only one relation between the two prices can correspond to a condition of 'intertemporal' equilibrium, and that this need not, *a priori*, be a relation of identity or the one which would exist under a stable price level (Hayek, 1931b, p. 26).

This passage has been interpreted as implying that along with the old *theory*, Hayek also jettisoned the received long-period *method* of analysis, centred around the notion of a competitive equilibrium characterized by a uniform rate of interest on the capital invested in the different industries and uniform rates of remuneration for all homogeneous primary factors of production. Scrutiny shows, however, that apart from the passage just quoted, the new notion of intertemporal equilibrium, developed almost simultaneously by Hayek and Erik Lindahl, a student of Wicksell's, plays hardly any role in *Prices and Production*.[10] Hayek's analysis in that book is indeed quite traditional, that is, firmly entrenched in contemporary long-period neoclassical and Austrian modes of thought centred around the notion of *the* 'equilibrium rate of interest'.

In 1926, Adolph Löwe (later Lowe) had published an article asking the question (and answering in the affirmative) whether, in order to do business cycle theory, one has to dispense with what was then called the 'static theory' and the notion of *long-period equilibrium* characterized by full employment of labour and full capacity utilization (Löwe, 1926). In *Geldtheorie und Konjunkturtheorie*, Hayek discussed in great detail Löwe's radical position. In *Prices and Production* there is not a single reference to the controversy or to Löwe, but Hayek's point of view is unaltered: an explanation of fluctuations in production that claims to be complete must start 'where general economic theory stops; that is to say at a condition of equilibrium when no unused resources exist' (Hayek, 1931b, p. 31). This starting point is also said to draw attention to an important aspect which might otherwise tend to get overlooked, namely 'changes in the methods of using *existing* resources'. Hayek expounds: 'Changes in the direction given to the existing productive forces are not only the main cause of fluctuations of the output of individual industries; the output of industry as a whole may also be increased or decreased to an enormous extent by changes in the use made of existing resources' (ibid., p. 32; emphasis added).[11] Yet Hayek chooses a long-period equili-

[10] In one other place Hayek addresses the problem of the influences of a change in relative prices on interest rate differentials (ibid., p. 60) without, however, employing the notion of intertemporal equilibrium. One rather gets the impression that in view of the highly complicated nature of these influences, that notion would be of little or no use.

[11] It remains unclear how these 'enormous' changes in output of industry as a whole would come about.

brium not only as the starting point of his analysis; he also sees reasons to think that any disturbance of such an equilibrium would call into action self-interested agents whose activities would gradually bring the system back to a long-period equilibrium. Hence, the business or credit cycle discussed by Hayek is nothing but a sequence of transitional processes between long-period equilibria. In conditions of free competition, as assumed by Hayek, each of these equilibria is defined by a full adjustment of the size and composition of production and the social capital stock to the other data of the system, such that a uniform rate of interest obtains. The notion of equilibrium adopted by Hayek both in *Geldtheorie und Konjunkturtheorie* and in *Prices and Production* is that of traditional marginalist theory.[12] The latter determines all dependent variables of the system, that is, all prices and quantities produced, in terms of supply and demand, conceived of as functional relationships between the price of a commodity and its quantity. In *Geldtheorie und Konjunkturtheorie*, Hayek made it clear that his point of reference was the Lausanne theory of Walras and Pareto.[13] That theory commonly starts from the following three sets of data:

(i) the (intertemporal) tastes of consumers;
(ii) the technical alternatives of production;
(iii) the endowment of the economy with goods of all kinds, in particular its endowment with labour, land and 'capital', and the distribution of property rights amongst agents.

For obvious reasons, in order to be compatible with a long-period equilibrium, the 'quantity of capital' in given supply could only be specified as a sum of *value* expressed in some standard of value (cf, for example, Kurz and Salvadori, 1995, Chap. 14).

Should any one of these data change, then in general the equilibrium allocation of goods and the corresponding system of normal prices and

[12] The notion of long-period equilibrium surfaces repeatedly in *Prices and Production*. For example, we read about the equalization of the rate of interest: 'It is clear that producers' goods which are in different stages of production cannot, for any length of time, bring in different returns or obtain different prices in these different stages. On the other hand, it is no less clear that temporary differences between the prices offered in the different stages of production are the only means of bringing about a shift of producers' goods from one stage to another' (ibid., p. 67). Hayek also refers to the classical concept of 'gravitation' (ibid., p. 73; see also pp. 68–9 and 71).

[13] Ludwig Lachmann (1986, p. 227) characterized Hayek's approach succinctly as follows: 'For Hayek Paretian general equilibrium was the pivot of economic theory, the centre of gravity towards which all major forces tended. For him the task of trade cycle theory was to show how it came about that these major forces were temporarily impeded and their effects delayed'.

income distribution would also change. We shall see that Hayek conceives the problem of economic fluctuations as a change or 'disturbance' in one of these data and the adjustment processes triggered by it until the economy reaches a new equilibrium. In this context it is worth mentioning that Ludwig von Mises advocated basically the same idea. On the occasion of a conference organized by the Verein für Socialpolitik, the German association of economists, on 'Probleme der Wertlehre' (problems of value theory) in Dresden in 1932, which was also attended by Hayek, Mises stressed:

> One must not commit the error of believing that the static method can only be used to explain the stationary state of an economy, which, by the way, does not and never can exist in real life; and that the moving and changing economy can only be dealt with in terms of a dynamic theory. The static method is a method which is aimed at studying changes; it is designed to investigate the consequences of a change in *one* datum in an otherwise unchanged system. This is a procedure which we cannot dispense with. (Mises in Mises and Spiethoff, 1933, p. 117)

This description also applies to Hayek's method in *Prices and Production* (and in his previous book). The consequences of a change in one datum, for example consumers' time preferences, are ascertained in terms of the static method. These consequences are considered to be *independent* of the process of transition, which can only be studied in terms of a dynamic analysis. In this view dynamic analysis is seen to be mainly at the service of static analysis. Against Löwe's radical program, Hayek puts forward a conservative one. The opinion to be found in the literature (e.g. McCloughry, 1982) that in *Prices and Production* Hayek had abandoned the traditional notion of equilibrium finds no support in Hayek's book.

As to the changes in data and their effects contemplated by Hayek in *Prices and Production*, it should be noted that he restricts his attention to a small subset of all possible cases. While in *Geldtheorie und Konjunkturtheorie* Hayek, following Wicksell's lead in *Geldzins und Güterpreise*, had expressed the opinion that the main elements causing economic fluctuations are improved expectations of entrepreneurs as regards the profitability of investment due to technological and organizational inventions (cf, for example, Hayek, 1929, pp. 80–81), this aspect is altogether absent in *Prices and Production*. Hayek explicitly rules out changes in data (ii):

> What I have here in mind are *not* changes in the methods of production made possible by the progress of technical knowledge, but the increase of output made possible by a transition to more capitalistic methods of production, or, what is the same thing, by organising production so that, at any given moment, the available

resources are employed for the satisfaction of the needs of a future more distant than before. It is to this effect of a transition to more or less 'round-about' methods of production that I wish particularly to direct your attention. For, in my opinion, it is only [!] by an analysis of this phenomenon that in the end we can show how a situation can be created in which it is temporarily impossible to employ all available resources. (Hayek, 1931b, pp. 32–3; see also p. 67)[14]

There remain changes in data (i) and (iii). We shall see that Hayek focused attention exclusively on changes in tastes, that is, in time preferences, expressed in a change in the propensity to save. It will turn out to be a major shortcoming of his analysis that he tended to neglect how monetary policy, via affecting data set (iii), thereby affects equilibrium, and how the sets of data (i) and (iii) are interrelated. It should also be mentioned that Hayek assumes a labour supply which is given and constant, that is, independent of the money wage rate and prices on one hand and intertemporal preferences on the other. One could say that the 'subjective method', which Hayek praised at the beginning of his book, is suspended with regard to significant parts of his analysis.

2.3 *Austrian capital theory*

Hayek based his construction on Böhm-Bawerk's theory of capital and interest (cf Böhm-Bawerk, [1889] 1921). Before we briefly summarize this theory, as presented by Hayek, it should be mentioned that this part of his analysis met with substantial difficulties of understanding in large parts of the English and the American profession. Two example suffice to illustrate this. In a letter to Keynes of 4 October 1931 on the ongoing debate about saving and investment, D. H. Robertson lamented: 'This 3-cornered debate [Robertson meant Keynes, Hayek and himself], all of us talking different dialects, has become so complicated', requiring one to know all three dialects, including 'the "goods of higher and lower orders" tongue of Vienna!' (Robertson in Keynes, *CW*, Vol. XIII, p. 271). Hawtrey also attacked Hayek for having entangled his argument 'with the intolerably cumbersome theory of capital derived from Jevons and Böhm-Bawerk', which is said to be 'singularly ill-adapted for use in monetary theory' (Hawtrey, 1932, p. 125).[15]

[14] Hayek's neglect of the role of technical progress in the theory of economic fluctuations met with severe criticism; see, for example, Hawtrey (1932, pp. 121–2). It may also explain why Schumpeter did not think highly of Hayek's construction.

[15] What to some people was a source of toil and trouble, to others was a source of 'fascination' (see Kaldor, 1942, p. 359). On Böhm-Bawerk's theory of capital and interest, see, for example, Kurz (1994).

In the Austrian view, the process of production is a time-consuming, unidirectional process leading from the services of the 'original' factors of production, labour and land, via one or several 'intermediate products' to consumption goods. Scrutiny shows that Hayek's argument is based on the following assumptions, most of which are implicit: (a) there is only a single consumption good (or basket of consumption goods with fixed proportions); (b) there is essentially only a single original factor of production, homogeneous labour, i.e. land is taken to be a free good; (c) there is only single production, i.e. joint production and fixed capital are set aside;[16] (d) there are constant returns to scale with regard to each production process; (e) the amount of labour per unit of time is constant with regard to each process, i.e. there is a steady flow of labour inputs from the beginning of a process to its end, when the consumption good becomes available, and hence the processes contemplated are of the *steady flow input–point output* type. In addition he assumed: (f) that labour and 'non-specific' intermediate products are transferable between processes of production at negligible cost;[17] (g) throughout Lecture II that the rate of interest is zero; (h) that the total labour supply is given and constant; (i) that there is free competition, i.e. there are no barriers to entry to or exit from any one of the markets. Hayek appears to have been of the opinion that each of the assumptions (a)–(e) could be removed without endangering the basic message of the Austrian theory of production and capital. In one place he writes: 'It would be open to us to deal with the difficulties by the aid of higher mathematics. But I, personally, prefer to make it amenable to a simpler method' (ibid., p. 39). His illustration of the theory in terms of his (in)famous triangles has caused many readers headaches, and Hayek himself discloses one of the potential reasons for it. He stresses: 'it should be noticed that ... the figure[s] represent values and not physical production' (ibid., p. 38).

[16] Hayek pointed out that there is 'some difficulty in regard to the way in which durable goods ... are to be taken account of in our schematic representation'. In these circumstances he felt it was 'more convenient to regard only that part of these durable goods which is currently used up and renewed as entering into the total of intermediate products existing at any moment' (Hayek, 1931b, p. 37, fn.). He left it at that and did not discuss how that 'part' was determined. The neglect of fixed capital implies that an important aspect of the business cycle, and the main reason for the elasticity of the industrial system, was missed by Hayek: the variability of the degree of capital utilization. In Hayek there are only the following extremes: either capital goods are used or they are superfluous and thus lost.

[17] This assumption is clearly in the tradition of Walras and not of Marshall. As is well known, Keynes followed the latter in assuming that the transfer of most durable capital goods between firms is generally prohibited by high costs.

On the basis of assumptions (a)–(e), the technical alternatives available to cost-minimizing producers can be ordered as follows. For a given amount of labour, which Hayek equated with full employment of labour, the input flow can be more or less long and correspondingly more or less narrow. The longer it is, the larger is the average time a unit of labour is invested in the production process. This leads to Böhm-Bawerk's concept of the 'average period of production'. It is defined as the weighted average of the periods of time over which the amounts of labour remain invested until the output of the consumption good is obtained, with the respective amounts of labour serving as weights. By means of this device the Austrian capital theorists thought it possible to replace a vector of physically heterogeneous intermediate products with a scalar, the average period of production, τ, which is supposed to be independent of distribution and prices. 'Capital' was thus taken to be reducible to a single variable dimension: the length of time. The available technical alternatives could now be unambiguously ordered according to their 'capitalistic' character, or capital intensity: 'As the average time interval between the application of the original means of production and the completion of the consumers' goods increases, production becomes more capitalistic, and *vice versa*' (ibid., p. 38). This order of the technical alternatives is said to be subject to what Böhm-Bawerk called the 'law of the superiority of more round-about processes of production' (cf. Böhm-Bawerk, [1889] 1921, pp. 338–62): the longer the average period of production, the larger the consumption output per unit of labour, with the increase in output becoming smaller for longer average periods. In Hayek's words:

> We must therefore be content to accept it as one of the definite conclusions of this theory that – other things remaining the same – these margins must grow smaller as the roundabout processes of production increase in length and *vice versa*. (ibid., p. 69)[18]

Assuming that there is a continuum of non-dominated processes of production, and setting aside all problems related to the heterogeneity of

[18] Recently Thalenhorst and Wenig (1984) attempted to translate Hayek's theory of the business cycle in *Prices and Production* into 'mathematical economics'. According to their own statement they were keen to effectuate this translation 'in the spirit and tradition of Hayek and the Austrian School' (ibid., p. 214). In this light it is all the more surprising that they assume 'that the marginal productivity of the duration of a process is not only positive but also increasing' (ibid., p. 216). This assumption is not only not 'Austrian', it also does not make sense economically. Even in the case in which the marginal product is constrained from above there are only two possibilities: either the money rate of interest is equal to or larger than this upper limit, and then the optimal

continued

capital goods and the presence of compound interest, let y be consumption output per unit of labour employed and τ the average period of production; then the technical alternatives given in data set (ii) may conveniently be summarized by the following *temporal production function*

$$y = f(\tau) \qquad \text{where } \frac{dy}{d\tau} > 0 \text{ and } \frac{d^2y}{d\tau^2} < 0 \tag{1}$$

Figure 1(a) illustrates the postulated relationship. The possibility of 'non-capitalistic' production involves $f(0) = y_{\min} > 0$, i.e. a positive value on the ordinate from which the function starts. As is well known, implicit in the production function (Equation 1) is an inverse relationship between the real wage rate, w, that is the amount of the consumption good paid to workers per unit of labour, and the 'equilibrium' rate of interest, r,

$$r = r(w), \qquad \text{where } \frac{dr}{dw} < 0 \tag{2}$$

The w–r frontier, or wage–interest frontier, is illustrated in Figure 1(b). It is convex to the origin; the minimum wage rate, $w_{\min}$, equals $y_{\min}$ and defines the maximum rate of interest, $r_{\max}$, compatible with the technical conditions under consideration.[19] With a rise (fall) in the wage rate, to which corresponds a fall (rise) in the natural rate of interest, cost-minimizing producers would lengthen (shorten) the average period of production.

As we have seen (cf the passage from *Prices and Production* quoted towards the end of Subsection 2.2), this inverse relationship between τ and r is at the heart of Hayek's theory of economic fluctuations. In his view, a transition between processes of production characterized by

average period of production is nil, that is, the 'non–capitalistic' production prevails, or the money rate of interest is smaller, and then the 'average' period is infinite. (It is not clear how the second constellation could represent a sensible economic equilibrium.) Therefore, the money rate of interest plays the role attributed to it by Hayek in an extreme way: changes in its level have either no impact at all, which is the case when the money rate stays in the interval between zero and the upper limit of the marginal product, or they prompt agents to shift from a production with no intermediate products to one with an infinite number of such products.

[19] On the assumption that $f(0)$ is large enough for the upkeep of the worker and his family, it gives the reservation price of *wage* labour: if firms offered a wage rate below it, no worker would be willing to sell his labour power but would rather use it in a self-employed way producing the consumption good without produced means of productions. Hayek, however, doubts that $f(0)$ is large enough: 'as a general rule the single workman will not be able to produce enough for a living without the help of capital and he may, therefore, temporarily become unemployable' (ibid., p. 84).

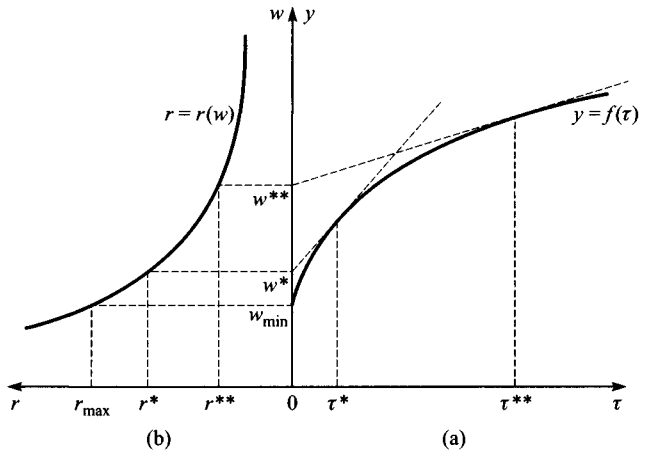

Figure 1

different lengths necessitates certain changes in what Hayek calls the 'structure of production' (ibid., p. 35). Whichever cause prompts a change in the adopted technique, it perturbates the going intertemporal coordination of the different stages of production, and forces upon the economy a more or less costly adjustment process until a new equilibrium structure of production is obtained. The main question Hayek raises is: When does the *process substitution* under consideration converge to a new equilibrium, and when not? The problem of the business cycle is thus reduced to a very narrow question: Starting from the results of the 'static' Austrian theory of the choice of technique of cost-minimizing producers, Hayek is concerned with the transition between alternative techniques and the causes or 'disturbances' that prompt these transitions. In one place he writes that business cycles are 'nothing but contrary fluctuations in the capitalistic structure of production' (Hayek, 1931c, pp. 91–2, fn.) – an opinion which must have come as a surprise to many people at a time when several countries still suffered from the Great Depression.

2.4 *'Natural' and 'artificial' disturbances*

Hayek distinguishes between two categories of causes that may bring about a change in the processes of production: 'natural' and 'artificial' ones. The first category concerns changes in what he calls the 'fundamental' data of the economic system. As we have seen, in the Lausanne

theory of general equilibrium this can mean in principle changes in (i) preferences, (ii) technical alternatives and (iii) endowments and their distribution amongst the members of society. Hayek restricts his attention to (i): the emphasis is on variations in intertemporal consumption, that is, using the Austrian terminology, changes in the preference of present goods over future goods, and thus in 'voluntary saving'. The second category concerns interventions into the 'voluntary decisions of individuals', that is, their 'freedom of action'. The emphasis is on the *negative* impact of an 'elastic money circulation' on that freedom. Hayek stresses: 'Though I believe that recurring business depressions can only be explained by the operation of our monetary institutions, I do not believe that it is possible to explain in this way every stagnation of business' (Hayek, 1931b, p. 111). It is indeed the banking system on which he puts all the blame.[20]

His investigation focuses on the following two cases, which, from a 'practical' point of view, he considers to be the most important ones: an increase in savings, given the amount of money in circulation, on the one hand, and an increase in the amount of money due to the creation of new producers' credits, given the amount of 'voluntary' savings, on the other. In the first case a new and stable equilibrium is taken to result, reflecting the changed preferences of agents and characterized by a different structure of production with a longer average period of production. Things are different in the second case, in which a money rate of interest below the equilibrium rate leads to a change in demand in favour of intermediate products relative to consumption goods. However, since the fundamental data of the system are said to be the same as before, after a shorter or longer period of derangement and assuming that the banking system will eventually correct its error, the system will return to the old equilibrium. Let us look at Hayek's discussion of the two cases more carefully.

'Voluntary' saving

In the literature, there is some uncertainty about what Hayek meant when he talked about an increase in 'voluntary' saving. What is clear, though, is that he meant the decision to forgo present for future consumption. Hence Hayek's conception of 'saving' implies a definite, known, increase in future consumer demand to the detriment of present

[20] In this context it deserves to be mentioned that Hayek does not include money among the endowments of individual agents. His approach differs markedly from the more recent analyses of, for example, Patinkin or Ostroy and Ross, who reckon cash balances among endowments. As Sraffa was to object, in Hayek money is not considered a store of value.

consumer demand, but did he mean *gross* or *net* saving? In the first case, the equilibria contemplated by him would be stationary states, in the second case, the equilibria of systems growing at different speeds. While some of Hayek's formulations seem to point in the second direction, there is sufficient evidence that he means only transitions from one stationary state of the economy to another one. In fact, in systems with a constant labour supply and no technical progress there can be no growth (at a non-diminishing rate): instead the system is approaching asymptotically a stationary state characterized by a higher consumption per capita. An increase in savings therefore means a changed proportion in which income will be spent on consumption goods and on capital goods, which involves a change in *gross* savings. Net savings will be positive only during the transitory phase, that is, until the larger capital intensity has been built up which allows for a larger consumption output per worker.[21,22] In the new equilibrium, the real income and the value of the periodically worn out capital goods, both expressed in units of the consumption good, will be larger. To replace the capital goods, gross investment and gross savings must also be larger than in the initial situation. This transition between two stationary equilibria is illustrated in Figure 2.

Other things being equal, higher savings imply a lower equilibrium rate of interest. $S_0^b(i, K)$ gives the gross saving function in the initial situation, and $S_0(i, K)$ the corresponding net saving function; $S_1^b(i, K)$ and $S_1(i, K)$ refer to the situation after the increase in the propensity to save. (In what follows, attention will focus on net saving.) Savings are accordingly seen to depend on the money rate of interest, i, and the size of the existing capital stock (in value terms), K. For a given rate of time preference of consumers, π^*, they are the more prepared to abstain from present consumption, the more future consumption they can

[21] The interpretation that Hayek had in mind a growing system was put forward by Hicks, who argued that Hayek's analysis 'does not belong to the theory of business cycles, which was in the centre of attention of economists in the 1930s, but is a forerunner of the growth theory of more recent years' (Hicks, 1967, pp. 210–11). Streissler radicalized Hicks's idea and maintained that here is a 'close relationship' between Hayek's model and the von Neumann model (Streissler, 1969, p. 246). There is, however, no evidence in support of this claim. For an interpretation of the von Neumann model and how it probably relates to the work on general equilibrium carried out in Vienna in the 1930s, see Kurz and Salvadori (1993).

[22] As indirect evidence that Hayek was concerned with once and for all changes in gross rather than net magnitudes, it may be noted that in his *Pure Theory of Capital* Hayek was very dismissive of 'net' saving and investment concepts; cf Hayek (1941). I am grateful to Ian Steedman for having drawn my attention to this fact.

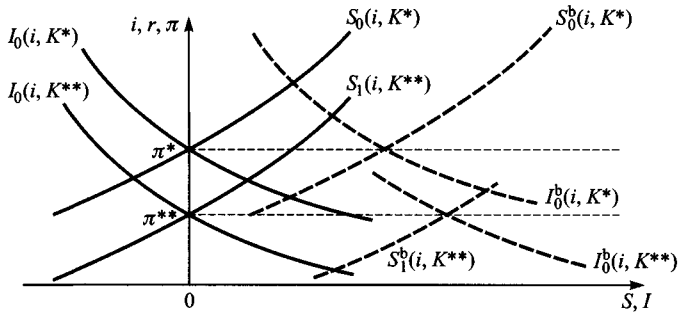

Figure 2

expect, that is, the larger is the interest paid on savings: $\partial S/\partial i > 0$.[23] In the initial situation, net savings are positive (negative) if the money rate of interest, i, is above (below) the rate of time preference, π^*. In stationary equilibrium money rate, time discount rate and natural rate are all equal, that is, $i = r = \pi^*$; the corresponding value of social capital is K^*. Hayek first assumes that the people that save are the same people that invest. This implies that there is no distinction between a saving and an investment function and hence no market for liquid funds. If now the rate of time preference falls to a level π^{**}, then there will be positive net savings, since $\pi^{**} < r = \pi^*$. Investing these savings entails a more 'capitalistic' structure of production and, due to a falling marginal product of lengthening the average period or production, *pari passu* a falling equilibrium rate of interest. This process continues until at a value of social capital $K^{**} > K^*$, a new equilibrium obtains, where $r = \pi^{**}$. In the case in which savers and investors are different people, investment behaviour must be dealt with. From the given assumptions about production and distribution, Hayek, in the conventional marginalist manner, derives functions for gross and net investment, $I^b(i, K)$ and $I(i, K)$, in which investment is elastic with respect to the money rate of interest and the size of the capital stock in existence, that is, focusing attention on net investment, $\partial I/\partial i < 0$ and $\partial I/\partial K < 0$ (cf. Hayek, 1931b, pp. 75–81; see also Milgate, 1988). With a fall in the rate of time preference and the consequent increase in saving, there will be an excess supply in the market for liquid funds. This pushes the

[23] Since according to Hayek the rate of time preference can safely be assumed to differ amongst agents, the diagram represents only the aggregate situation, *given the distribution of income*: π^* is that rate of discount at which net savings at this distribution of income are nil.

money rate of interest down and stimulates investment. With a growing value of social capital and a correspondingly decreasing marginal productivity of capital, the investment function moves towards the origin, until voluntary net saving and planned net investment reach a new equilibrium, both being equal to zero, at a lower equilibrium rate of interest which is equal to π^{**}.

For a given quantity of money in circulation and a given velocity of circulation, the change contemplated in the two cases consists 'in a stretching of the money stream flowing from the consumers' goods to the original means of production. It has, so to speak, become longer and narrower' (ibid., p. 48). This reflects the prolongation of the 'average period of production'. To the new equilibrium corresponds a new system of relative prices, that is, the prices of the intermediate products that are now being produced, expressed in terms of the consumption good. This new price system, or 'price fan' as Hayek calls it (ibid., p. 73), reflects both the now adopted technique of production and the associated distribution of income. On the assumption that in the old equilibrium Y^* units of the consumption good were produced by L units of labour uniformly spread over t periods of time (of uniform length), whereas in the new equilibrium Y^{**} units of the consumption good are produced by the same amount of labour uniformly spread over T periods, we obtain, assuming that wages are paid at the end of each time period, the following two reduction equations:

$$Y^* = l_0 w^* + l_0 w^*(1+r^*) + l_0 w^*(1+r^*)^2 + \ldots + l_0 w^*(1+r^*)^t$$

$$= l_0 w^* \frac{(1+r^*)^t - 1}{r^*} \tag{3}$$

$$Y^{**} = l_1 w^{**} + l_1 w^{**}(1+r^{**}) + l_1 w^{**}(1+r^{**})^2 + \ldots + l_1 w^{**}(1+r^{**})^T$$

$$= l_1 w^{**} \frac{(1+r^{**})^T - 1}{r^{**}} \tag{4}$$

with $l_0 = L/t$ and $l_1 = L/T$. The wage rate clearing the labour market in the initial (new) equilibrium is w^* (w^{**}); the corresponding equilibrium rate of interest is r^* (r^{**}). According to the logic of the Austrian approach: $T > t$; $Y^{**} > Y^*$; $w^{**} > w^*$; $r^{**} < r^*$. The price of the first (second, ...) intermediate product in the old equilibrium, expressed in terms of the consumption good, is equal to the first term (the first two terms, ...) on the right-hand side of Equation (3), divided by Y^*. Similarly for the price of the first (second ...) intermediate product in the new equilibrium,

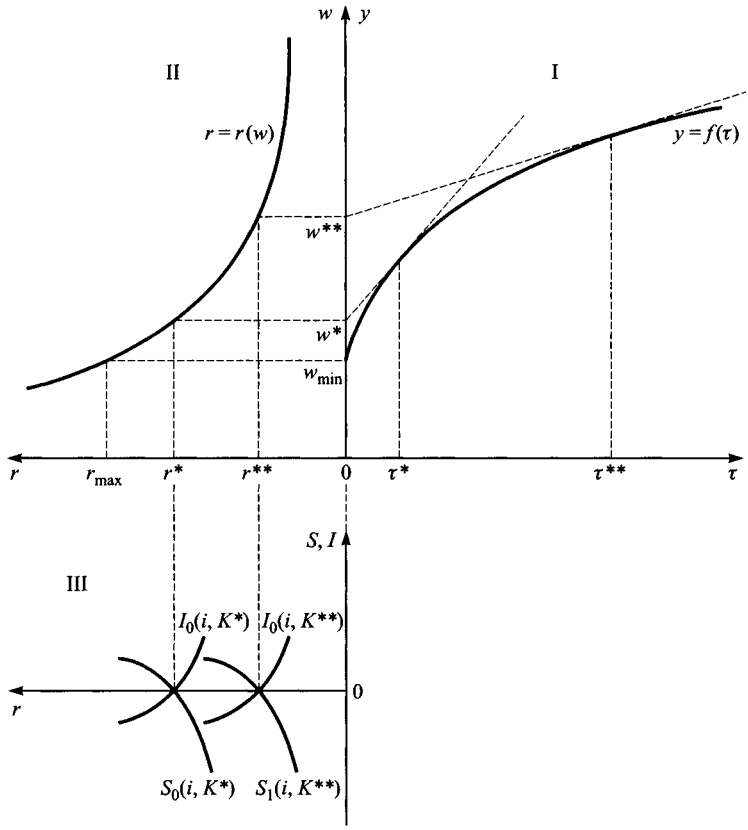

Figure 3

where the reference is now to Equation (4), of course. Each of these two equations therefore contains a complete system of equilibrium prices, or 'price fan'.

We may finally illustrate the relationships under discussion in terms of a single diagram: quadrant I of Figure 3 gives the production function, quadrant II the wage–interest frontier, and quadrant III the (net) saving and (net) investment functions. The values of the variables representing the old equilibrium have a single asterisk, while those of the new equilibrium have two asterisks.

During the transition between the old and the new equilibria the old equilibrium price fan no longer holds, but the new one has not yet become established. Hence there is, in Hayek's words, a 'disequilibrium'.

An increase in the propensity to save shifts demand away from consumption and towards intermediate products. Consequently, the prices of intermediate products will rise relative to the consumption good. On the assumption that the wage rate is independent of the stage of production in which labour is employed, an assumption which is implicit in Hayek, the disequilibrium is reflected in interest rate differentials.[24] In the case under consideration, the change in relative prices increases profitability in the early stages of production and depresses it in the later ones. This provides an incentive to the restructuring of the process of production which continues until a new equilibrium characterized by an interest rate that is again uniform is reached via a reallocation of labour (and of non-specific capital goods) across the different and now more numerous stages of production.

'Forced' saving

The second case is meant to illustrate Hayek's belief 'that recurring business depressions can only be explained by the operation of our monetary institutions' (ibid., p. 111). The story starts again with a shift in demand towards means of production, but this time that shift is 'artificially' brought about by means of more favourable terms at which banks are willing to lend money to producers. Hayek's comparison of the two cases reads:

> When a change in the structure of production was brought about by saving, we were justified in assuming that the changed distribution of demand between consumers' goods and producers' goods would remain permanent, since it was the effect of voluntary decisions on the part of individuals. . . . But now this sacrifice is not voluntary, and is not made by those who will reap the benefit from the new investments. It is made by consumers in general who, because of the increased competition from the entrepreneurs who have received the additional money, are forced to forgo part of what they used to consume. (ibid., pp. 52-3)

It is now the totality of consumers that are taken to be subject to 'forced saving'. Figure 4 illustrates the case. In the initial stationary state of the economy, net savings and net investment are equal to one another and are equal to zero, since $i = r = \pi^*$. With the money

[24] Otherwise, wage differentials would also have to be taken into account. They appear in fact to be quite important, since the increase in the demand for intermediate products involves an increase in the demand for labour employed in the early stages of production relative to that in stages that are close to the completion of the consumption good. An increase in the wages of labour in the former stages relative to the later ones attracts workers from the latter and thus contributes to a 'restructuring of production'.

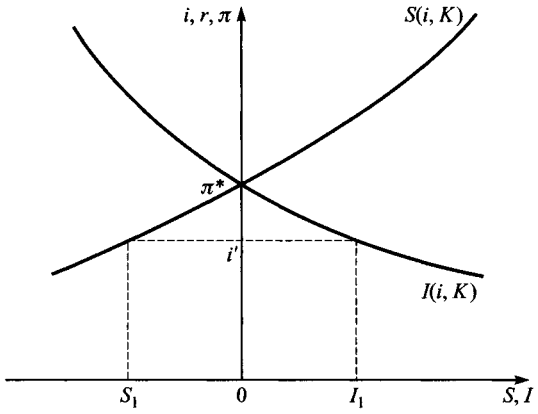

Figure 4

rate of interest reduced by banks to i' there will be a net investment of I_1 and an excess demand for investment goods equal to $I_1 - S_1$. This excess demand is financed by the creation of new credit. At the lower money rate of interest, profit maximizing firms are prompted to adopt more 'round-about' processes of production. The excess demand for means of production exerts an upward pressure on their prices. Profitability in the early stages of production rises and thus attracts primary and non-specific intermediate factors presently employed in stages of a lower order, that is, closer to the maturing of the consumption good. However, 'this application of the original means of production and non-specific intermediate products to longer processes of production will be effected without any preceding reduction of consumption' (ibid., p. 78). Rather, the rate of output of consumables is bound to fall *as a consequence* of all this, involving an 'involuntary' curtailment of consumption. At the same time the competition amongst producers for the original factor of production, labour, intensifies, pulling up wages. The result is a 'crisis' which puts into sharp relief the 'misdirections of production' (ibid., p. 89). With their increased money incomes the consumers, whose intertemporal preferences have not changed, will increase the demand for consumption goods, thereby bidding up the price(s) of the consumer good(s) relative to the prices of the means of production. This, in turn, signals the entrepreneurs that a less 'capitalistic' production is optimal. The development may be precipitated by an alteration in the policy of the central bank to curb inflation. As a consequence, 'production will become less capitalistic,

and that part of the new capital which was sunk in equipment adapted only to the more capitalistic processes will be lost' (ibid., p. 53). In the German version of his book Hayek concluded:

> The existence of unused productive capacity is therefore nothing less than a proof that capital is available in abundance, whereas consumption is insufficient: Quite on the contrary, it is a sign that these productive capacities cannot be used, because the current demand for consumption goods is too urgent to allow us to invest the available productive resources in time consuming processes of production, for which we do not have the necessary equipment (due to 'misdirections of capital'). (Hayek, 1931c, p. 94)

In terms of Figure 4, this means that in the medium or long run the unchanged 'fundamental' forces will prevail: after a costly round trip the system will return to the original equilibrium with both the money rate and the equilibrium rate equal to π^*.

These considerations provide Hayek with a foil against which he criticizes alternative conceptualizations of the business cycle and a policy of an elastic money supply. Against the view that a crisis could effectively be fought by the creation of 'artificial demand', he objects that this would aggravate the difficulties rather than mitigate them, because a part of the available resources 'is again led into a wrong direction and a definite and lasting adjustment is again postponed'. He concludes:

> The only way permanently to 'mobilise' all available resources is, therefore, not to use artificial stimulants – whether during a crisis or thereafter – but to leave it to time to effect a permanent cure by the slow process of adapting the structure of production to the means available for capital purposes. (Hayek, 1931b, p. 87)

3 The controversy between Keynes and Hayek

Hayek's book caused a considerable stir: immediately its author was involved in several controversies, which were themselves part of a larger debate about saving and investment and, somewhat later, about capital theory. The debate on saving and investment centred around the following contributions: Dennis Robertson's *Banking Policy and the Price Level* (Robertson, 1926), Keynes' *Treatise on Money* (1930; *CW*, Vols. V and VI) and his *General Theory of Employment, Interest and Money* (1936; *CW*, Vol. VII), and Hayek's *Prices and Production* (1931b) and his *Monetary Theory and the Trade Cycle* (1933). Numerous economists participated in the debate, some of whom had already made a name for themselves, while others were about to do so. The quest for truth competed with other motives, including the desire to win out against

alternative schools of economic thought and establish a dominant position in the field of economics.[25]

The steady rise of Keynes and his group in Cambridge to intellectual and academic dominance in economics was not accepted without resistance. Some economists at the London School of Economics especially, with Lionel Robbins as the main driving force, took up the challenge. Robbins asked Hayek to join their forces and to enter the 'battlefield'. In August 1931 and February 1932 Hayek published a highly critical review article of Keynes' *Treatise on Money* (Hayek, 1931a, 1932a) in two instalments in *Economica*, the LSE journal. In Hayek's view, Keynes' analysis was unclear, muddled, contradictory and devoid of any solid capital theoretic foundations, indeed any such foundations at all. Apparently, Keynes was embarassed when he saw the first part of the review. At the end of his copy of the review he noted: 'Hayek has not read my book with that measure of "good will" which an author is entitled to expect of a reader. Until he can do so, he will not see what I mean or know whether I am right. He evidently has a passion which leads him to pick on me, but I am left wondering what that passion is' (Keynes, *CW*, Vol. XIII, p. 243).[26] Keynes answered the first part of Hayek's attack in the same issue of *Economica* with a piece entitled 'The Pure Theory of Money. A Reply to Dr Hayek' (Keynes, [1931] *CW*, Vol. XIII, pp. 243–56), followed by a reply by Hayek (1931d).

3.1 Keynes: attack is the best defence

Before we turn to Keynes' anti-critique, it should be recalled that at the time of the *Treatise* Keynes still moved essentially within the confines of that variant of traditional marginalist theory which had Marshall's long-period analysis as its backbone. Characteristic features of this theory were the assumed dichotomy between a 'real' and a 'monetary' sphere of the economy and a concept of equilibrium which is exclusively determined by real factors. Put in a nutshell, Keynes tried to enlarge the framework of this analysis by allowing monetary factors a larger role

[25] For accounts of the different aspects of the debate, see, for example, Colonna (1990a,b), Klausinger (1991), Foss (1994) and Kurz (1995).

[26] An indirect answer to this question is contained in a letter by O. Meredith to Keynes of 8 December 1931. He calls Hayek 'a pedant trained in Austrian economics and eager to show (not without some encouragement from London) that "Codlin is the friend, not Short"! I.e. that your work was spoiled by being cast in the mould of Marshall instead of in that of Böhm-Bawerk' (cf. Keynes, *CW*, Vol. XIII, p. 267). (The reference is to Charles Dickens's *The Old Curiosity Shop*, Chapter XIX.)

to play. In accordance with the conventional point of view, he was of the opinion that these factors prevented the 'perfect' functioning of the market mechanism. However, while deviations from long-period equilibrium were commonly considered to be short-run phenomena, Keynes argued that they could persist for longer periods of time, with the 'natural' rate of interest therefore differing from the money rate more permanently. Therefore, it was hardly surprising that his critics found it difficult to see much of a novelty in the *Treatise*. Keynes himself appears to have felt this. In his reply to Hayek he opined that 'those who are sufficiently steeped in the old point of view simply cannot bring themselves to believe that I am asking them to step into a new pair of trousers, and will insist on regarding it as nothing but an embroidered version of the old pair which they have been wearing for years' (*CW*, Vol. XIII, p. 247).

This was essentially also the view of Hayek, who in his review tried to nail down Keynes to the old doctrine and displayed a lack of understanding for the new elements in his analysis. Keynes, on the other hand, was at a loss to understand how Hayek could fail to grasp what he was trying to do. The Austrian, we read in one place, 'has seriously misapprehended the character of my conclusions. He thinks that my central contention is something different from what it really is' (ibid., p. 244). In order to clarify the differences of opinion between himself and Hayek, Keynes decided to enter into a discussion of Hayek's recently published *Prices and Production*, in which his critic's own point of view is said to become much clearer than in the review article. In this way Keynes' reply to Hayek's criticism of the *Treatise* is swiftly transformed into a criticism of *Prices and Production*: from the second page onwards, Keynes' answer aims exclusively at pointing out differences between him and Hayek and putting into sharp relief what he considered Hayek's main errors and misconceptions. Keynes' argument can be summarized as follows. The quantity of money can, under certain circumstances, vary without disturbing the equality between saving and investment. Therefore, it cannot be excluded that Wicksell was right in maintaining that the banking system is simultaneously able to guarantee a stable price level and that equality. An increase in the quantity of money is not a necessary condition for investment to exceed saving, and the addition to that quantity is not a measure of the difference between the two magnitudes. 'In my view', Keynes wrote, 'saving and investment (as I define them) can get out of gear without any change on the part of the banking system from "neutrality" as defined by Dr Hayek, merely as a result of the public changing their rate of saving or the entrepreneurs changing their rate of investment, there being no automatic mechanism in the economic system (as Dr Hayek's view would imply there must be)

to keep the two rates equal, provided that the effective quantity of money is unchanged' (*CW*, Vol. XIII, p. 251). Hayek's book is said to be 'one of the most frightful muddles I have ever read, with scarcely a sound proposition in it beginning with page 45.... It is an extraordinary example of how, starting with a mistake, a remorseless logician can end up in Bedlam'. Keynes admitted that he had not built his own analysis on a satisfactory theory of capital and interest, simply because 'there is no such theory at present'. Hayek's own statement of such a theory in Lecture II is dismissed on the ground that it contains nothing but 'a series of baffling *non-sequiturs*'. Keynes added: 'If I am wrong, I hope that some authority, such as Professor Robbins, who is confident that he understands what Dr Hayek means in pages 45–64 of his book, will act as an interpreter' (ibid., pp. 252–3).

3.2 Hayek's reply

In his rejoinder, Hayek did not hide his embarassment at Keynes' response: rather than answering his objections, Keynes is said to have chosen to denounce his adversary. Hayek indicated, however, that this was perhaps the only sort of defence open to 'an author who has been shown that almost all his fundamental concepts are ambiguous, and that some are even defined in several flatly contradictory ways' (Hayek, 1931d, p. 399). Hayek reiterated the objection that Keynes' analysis was devoid of a proper capital theoretic foundation, and added:

> Mr. Keynes seems never to have been concerned to study the fundamental non-monetary problems of capitalistic production. He now contends that we have no satisfactory theory of capital.... [T]he obvious answer, of course, is that even if we have no quite satisfactory theory we do at least possess a far better one than that on which he is content to rely, namely that of Böhm-Bawerk and Wicksell. That he neglects this theory, not because he thinks it is wrong, but simply because he has never bothered to make himself acquainted with it, is amply proved by the fact that he finds unintelligible my attempts to develop certain corollaries of this theory – corollaries which are not only essential for the very problem we are discussing, but which, as experience has shown me, are immediately intelligible to every student who has ever studied Böhm-Bawerk or Wicksell seriously. (ibid., pp. 401–2)

After the polemics in *Economica*, Keynes and Hayek exchanged several letters in which most of the discussion centred around the problem of how to define saving and investment. In the course of this correspondence, Keynes increasingly showed signs of tiredness. In a note to Piero Sraffa and Richard Kahn of 1 February 1932, he wrote: 'What is the next move? I feel that the abyss yawns – and so do I.' To this he added: 'Yet I

can't help feeling that there is something interesting in it' (*CW*, Vol. XIII, p. 265). This remark reflects once more the difficulties he had in coming to grips with Hayek's approach.

To conclude, Keynes was not able to effectively counter Hayek's attack, and he himself appears to have clearly felt his ineptness. Another Cantabrigian had to take on the task of freeing Keynes from the impasse: invited by Keynes, who then edited the *Economic Journal*, Piero Sraffa published a paper entitled 'Dr. Hayek on Money and Capital' in the March issue of 1932 of that journal (Sraffa, 1932a). The June issue carried Hayek's reply (Hayek, 1932b) and Sraffa's rejoinder (Sraffa, 1932b).

4 The debate between Sraffa and Hayek

Before we enter into a discussion of the debate between Sraffa and Hayek, a few words should be said about the state of the development of Sraffa's own analysis of value and distribution at the time of his criticism of Hayek's book. As Sraffa wrote – and as his papers in the Wren Library of Trinity College, Cambridge, confirm – 'central propositions' of his later book *Production of Commodities by Means of Commodities* had been already worked out in the late 1920s (Sraffa, 1960, p. vi). The production equations he then studied showed that both the classical labour theory of value and the marginalist supply and demand theory were generally unable to explain 'normal', long-period prices. Both theories relied on what Sraffa was then to call 'metaphysical' concepts – 'labour' in one case and 'utility' in the other – and suffered from a logical defect stemming from an inadequate treatment of the problem of distribution. We also know that Sraffa, unlike several of his Anglo-Saxon and American colleagues, including Keynes, was familiar with both Vilfredo Pareto's theory of general equilibrium and the Austrian theory of capital and interest of Böhm-Bawerk and Wicksell. Sraffa may indeed have been one of the few scholars in Britain who was not taken by surprise by Hayek's book because of the sources it tapped. It is the working hypothesis of what follows that Sraffa knew perfectly well what Hayek was talking about.

4.1 Sraffa's attack

In Sraffa's review article there is next to nothing on his own theoretical position at that time. Sraffa did not use the article as a welcome oppor-

tunity to expound his findings in the theory of value and distribution or to apply them to the problem under consideration. This abstinence on Sraffa's part is also reflected in Hayek's complaint at the beginning of his reply that Sraffa failed to make 'his own position' clear (Hayek, 1932b, p. 237). Sraffa, in fact, defines his task as a critic as 'the somewhat monotonous one of discovering, for each step of Dr. Hayek's parallel analyses [reference is to the two cases of "voluntary" and "forced" saving, or rather, a barter and a monetary economy], which is the error or irrelevancy which causes the difference' (Sraffa, 1932a, p. 45). Sraffa's criticism is therefore purely internal: he scrutinizes the consistency of Hayek's argument in the context of the latter's own approach. This is clearly expressed by Sraffa's main objection to Hayek: 'Dr. Hayek as it were builds up a terrific steam-hammer in order to crack a nut – and then he does not crack it. Since we are primarily concerned in this review with the nut that is not cracked, we need not spend time criticising the hammer' (ibid.). The 'steam-hammer' Sraffa talks of is, of course, the Austrian theory of capital and interest. The demonstration that it cannot be sustained was postponed to Sraffa's book (cf Sraffa, 1960, p. 38).[27]

According to Sraffa, Hayek's project to integrate monetary theory with general economic theory was laudable. It was also right to focus attention on the impact of money on relative prices. Hayek's execution of his project was, however, a complete failure, as seen by Sraffa. Rather than clearing up the muddle in the existing literature, the book is said to add to it. The difficulties begin with Hayek's concept of money 'neutrality'. Money is taken to be 'neutral' if it leaves undisturbed production, relative prices, and thus also the natural rate of interest as it would obtain in a barter economy. Yet instead of investigating under which monetary system the neutrality as specified would obtain, Hayek addresses 'the wholly different problem of proving that only one particular banking policy (that which maintains constant under all circumstances the quantity of money multiplied by its velocity of circulation) succeeds in giving full effect to the "voluntary decisions of individuals," especially in regard to saving, whilst under any other policy these decisions are "distorted" by the "artificial" interference of banks' (Sraffa, 1932a, p. 43). Hayek thus implicitly assumes – wrongly, as Sraffa was to argue – that the kind of distortions contemplated by him cannot occur in a barter economy.

[27] Sraffa contents himself with the following aside. Hayek's discussion of the relationship between the quantity of capital and the length of the (average) period of production obscures rather than clarifies the main issue: 'a maze of contradictions makes the reader so completely dizzy, that when he reaches the discussion of money he may out of despair be prepared to believe anything' (Sraffa, 1932a, p. 45).

In Hayek's construction, Sraffa points out, money has only a single function: that of a *means of exchange*. Every introductory textbook in monetary economics tells one that in addition money performs the functions of a unit of account and, more importantly, of a *store of value*. Not so in Hayek's story: 'There are no debts, no money-contracts, no wage-agreements, no sticky prices in his suppositions. Thus he is able to neglect altogether the most obvious effects of a general fall, or rise, of prices' (ibid., p. 44). His objection to the vague concept of 'the general price level' misleads him into throwing the baby out with the bathwater and ignoring altogether the role of money as a store of value, that is, that money is itself one of the commodities. 'Having thus reduced money to utter insignificance', Sraffa remarks, 'amounts to assuming away the very object of the inquiry' (ibid., p. 44). This then leads Sraffa to ask: How is it possible that an economy with 'emasculated' money can behave differently from an economy without money, i.e. a barter economy? What is wrong with Hayek's argument, or which element that is extraneous to the discussion does he introduce that causes the difference? At this point Sraffa emphasizes again the purely internal nature of his criticism: 'But from the beginning it is clear that a methodological criticism [which Sraffa does not provide] could not leave a brick standing on the logical structure built up by Dr. Hayek' (ibid., p. 45).

After this criticism of Hayek's stage set, Sraffa turns to the *dramatis personae* of the play. Here his objection is that there is great confusion about which role is ascribed to which actor. For example, in one act the 'consumers' are the same individuals as the 'entrepreneurs', while in another act they are distinct from them (ibid., p. 45 fn.). At one time the decisions to save are taken by the 'consumers', at another by the 'entrepreneurs', and at still another even by the 'industries' (cf Hayek, 1931b, p. 58). In this last case Hayek seems to have forgotten what he praised in the 'subjective' method, namely, that the theory must not rely on relationships between aggregates. Clearly, only if consumers and entrepreneurs are *identical* can the consumers' decisions to save *uno actu* involve a decision about the proportions in which the total gross income is divided between the purchase of consumers' goods and that of producers' goods, and only if they are *distinct* is Hayek's distinction between consumers' credits and producers' credits, which plays a crucial role in his reasoning, sensible (cf. Sraffa, 1932a, p. 45 fn.).

Sraffa then scrutinizes Hayek's polar cases of 'voluntary' and 'forced' saving. At first sight the two seem to be similar: entrepreneurs will be engaged in lengthening the average period of production, capital will be accumulated and relative prices will change. There appears to be only a single difference: while in the former case money prices will fall, in the

case in which the process is triggered by banks expanding circulation they will rise. This prompts Sraffa's comment: 'It would appear that the parallelism is due to our having ignored the secondary effects of a general fall or rise of prices. But Dr. Hayek has undertaken to avoid the concept of "value of money"; and at the same time he must impress us with the benefits of voluntary saving, and the evils of inflation' (ibid., p. 47).

Yet, as we have seen, this is not the end of Hayek's story. According to him, in the former case a *new* equilibrium will be established, characterized by a larger 'quantity of capital' per unit of labour and a higher consumption output per unit of labour, whereas in the latter case the economic system is bound to return to the *old* equilibrium. The change in economic conditions due to 'forced saving' cannot be permanent. Eventually, the money receipts of consumers will rise again, which will allow them to expand consumption 'to the usual proportion'. This implies that capital has to be reduced to its former quantity – a process that 'necessarily takes the form of an economic crisis' (Hayek, 1931b, p. 53). To this reasoning Sraffa objects that Hayek failed to show that the damage done to those whose real income was curbed during the inflation will be made good. This is a necessary, albeit not sufficient, condition in order for the system to return to the original equilibrium:[28]

> One class has, for a time, robbed another class of a part of their incomes; and has saved the plunder. When the robbery comes to an end, it is clear that the victims cannot possibly consume the capital which is now well out of their reach. If they are wage-earners, who have all the time consumed every penny of their income, they have no wherewithal to expand their consumption. And if they are capitalists, who have not shared in the plunder, they may indeed be induced to consume now a part of their capital by the fall in the rate of interest; but not more so than if the rate had been lowered by the 'voluntary savings' of other people. (Sraffa, 1932a, p. 48).

Seen from the vantage point of Paretian general equilibrium theory, which Hayek had endorsed, Sraffa's criticism amounts to the objection that the process of inflation (as well as that of deflation) is commonly associated with a change in agents' endowments, that is, it affects one of the fundamental data determining general equilibrium: even with preferences and the set of technological alternatives remaining the same, the system will end up in a different equilibrium due to the redistribution of resources.[29] To this is added a further objection which shows that Hayek's attempt to identify his two cases as pure cases is ill-conceived. Since it can safely be

[28] In addition, it is required that the banking system increases the money rate of interest to its former level.

[29] Hayek could have avoided this slip had he remembered the reasons for his praise of Cantillon in the first lecture.

assumed that those who gained during the inflation will carry out 'voluntary saving', the picture gets blurred. For example, on the assumption that the rate of time preference of those that gain from inflation is smaller than the rate of time preference of those that lose, and on the Hayekian premise that in the long run the preferences of agents will prevail, the system will gravitate to a *new* equilibrium just as the system did in Hayek's case of saving that was allegedly exclusively 'voluntary'.[30] In short, Hayek discusses processes of transition between equilibria, where the final state is taken to be known prior to, and independently of, the path the system takes after it has been removed from its old equilibrium position. He thus ignores the possibility that *en route* various events may occur that push the system to a final state that is different from the initial one.[31] This demonstrates at the same time that Hayek's sharp distinction between the case of 'voluntary' and 'forced' saving breaks down, and with it the main thrust of his argument. 'Dr. Hayek', Sraffa writes in one place, 'who extols the imaginary achievements of the "subjective method" in economics, often succeeds in making patent nonsense of it' (ibid., p. 47 fn.). In the present context Hayek is said to ignore the effect of the redistribution of wealth due to an expansion of circulation and its implications for the long-run equilibrium to which the system will gravitate.

So far the discussion concerned the 'artificial stimulant' of inflation in the shape of producers' credits. Now, what about consumers' credits? Are they, in Hayek's view, equally incapable of moving the system to an

[30] A closer look at that case would show, however, that elements of 'forced saving' can be avoided only at the cost of singularly bold assumptions concerning each agent's capacity to anticipate the impact of a change in other agents' intertemporal preferences. In order for his case of 'voluntary saving' to preserve its purity, it would seem that Hayek is forced to suppose a very strong form of rational expectations (cf. Hayek, 1931b, p. 75). This appears to have been overlooked by some of the people who attempted to defend Hayek against the interpretation of his doctrine as foreshadowing rational expectations (see, for example, Butos, 1986).

[31] Caldwell (1995, p. 38) claims that 'what was really at issue between them [i.e. Hayek and Sraffa] here is the self-adjusting nature of the market system. Hayek assumed that the adjustment mechanism, formally described in what he called "equilibrium theory", works faultlessly in a world in which money is absent.... Sraffa questioned the initial and crucial premise of a self-adjusting system. This is the bedrock-level conflict that underlies their arcane dispute about how best to model a monetary economy'. This interpretation is at best misleading, if not wrong. As will also be seen below, nowhere in his criticism of Hayek's approach did Sraffa question the equilibrating tendencies at work, as Caldwell maintains. Rather, he saw reason to question Hayek's view as to how these tendencies would make themselves felt and to which equilibrium position they would push the economic system. In short, the 'bedrock-level conflict' was not whether or not the system was self-adjusting, but to which state the system would converge. Only the latter question was in dispute between the two.

equilibrium that is different from the original one? Interestingly, to Hayek the two cases are not analogous. He sees reason to assume that an increase in consumers' money as opposed to an increase in producers' money has a permanent effect, because it tends 'to frustrate the effect of saving' (Hayek, 1931b, p. 57). Accordingly, inflation through consumers' credits would effectively decrease capital and thus push the system to a new final state with a lower consumption output per capita. Sraffa's dry comment reads: 'Thus Dr. Hayek will have it both ways' (Sraffa, 1932a, p. 48). Hayek's claim that the two cases are not analogous finally reveals the 'error or irrelevancy' which is responsible for the fact that, contrary to what one would expect, a rise or fall in the quantity of 'emasculated' money can make a difference. As Sraffa stresses: 'an extraneous element, in the shape of the supposed power of the banks to settle the way in which money is spent, has crept into the argument and has done all the work. As Voltaire says, you can kill a flock of sheep by incantations, plus a little poison' (ibid., p. 49).

Sraffa's next main criticism concerns Hayek's view, which he took from Wicksell, that the difference between the actual rate and the 'natural' or 'equilibrium' rate is a characteristic of a money economy. This is said to be a confusion. To see this one ought to recall Wicksell's definition according to which the rate of interest measures the excess in real terms yielded in an exchange of physically homogeneous goods over time:

> If money did not exist, and loans were made in terms of all sorts of commodities, there would be a single rate which satisfies the conditions of equilibrium, but there might be at any moment as many 'natural' rates of interest as there are commodities, though they would not be 'equilibrium' rates. The 'arbitrary' action of the banks is by no means a necessary condition for the divergence; if loans were made in wheat and farmers (or for that matter the weather) 'arbitrarily changed' the quantity of wheat produced, the actual rate of interest on loans in terms of wheat would diverge from the rate on other commodities and there would be no single equilibrium rate. (ibid., p. 49)

Sraffa illustrates his argument in terms of two economies, one with and the other without money, and introduces in this context the concept of the *own-rate of interest*, or, as he prefers to call it, the 'commodity rate of interest'.[32] In both economies, loans are made in terms of all commod-

[32] The concept of own-rates of interest can be traced back to Irving Fisher's *Appreciation and Interest*, published in 1896 (cf Fisher, 1991). It was then dealt with in Fisher's 1907 book *The Rate of Interest* (cf Fisher, 1907). Keynes made use of Sraffa's concept in Chapter 17 of the *General Theory* (*CW*, Vol. VII), in which he tried to put forward an argument in terms of a preference for liquidity on the part of economic agents that was

continued

ities for which there are forward markets. Assume that in the money economy a cotton spinner borrows at time t a sum of money for θ periods (months) and uses the sum to purchase on the spot market a quantity of raw cotton at price p^t, which he simultaneously sells θ periods forward at price $p^{t+\theta}$. This means that the cotton spinner 'is actually "borrowing cotton"' for the given time span of θ periods. Sraffa expounds: 'The rate of interest which he pays, per hundred bales of cotton, is the number of bales that can be purchased with the following sum of money: the interest on the money required to buy spot 100 bales, plus the excess (or minus the deficiency) of the spot over the forward prices of the 100 bales' (ibid., p. 50). Let $i_{t,\theta}$ designate the money rate of interest for θ periods, then the sum of money, M, referred to is given as

$$M = (1 + i_{t,\theta})p^t - p^{t+\theta}$$

The own-rate of interest of cotton between t and $t + \theta$, $\rho_{t,\theta}$, is then defined as the quantity of cotton which can be purchased with that sum of money at the given forward price, that is,

$$\rho_{t,\theta} = \frac{M}{p^{t+\theta}} = \frac{(1 + i_{t,\theta})p^t - p^{t+\theta}}{p^{t+\theta}} = \frac{(1 + i_{t,\theta})p^t}{p^{t+\theta}} - 1$$

Sraffa adds:

> In equilibrium the spot and forward price coincide, for cotton as for any other commodity; and all the 'natural' or commodity rates are equal to one another, and to the money rate. But if, for any reason, the supply and the demand for a commodity are not in equilibrium (i.e. its market price exceeds or falls short of its cost of production), its spot and forward prices diverge, and the 'natural' rate of interest on that commodity diverges from the 'natural' rates on other commodities. (ibid., p. 50)

Essentially the same can be said of a non-money economy: out of equilibrium, 'natural' rates of interest will be different for at least some commodities. Hayek's opinion that in a 'disequilibrium' caused by a sudden increase in money supply (or in the propensity to save) the natural rate of interest would be above (below) the money rate does not make

meant to explain a downward rigidity of the money rate of interest. The 'liquidity premium' is taken to prevent the money rate of interest from falling to that level at which a volume of investment would be forthcoming, which, via the multiplier, would lead the system to full employment. Sraffa, as we know from his yet unpublished papers, did not think highly of Keynes' argument. His main criticism was that the benefits involved in *holding* a commodity (including money) have no relation to its own-rate of interest, and that no properties of that commodity – apart from an expected price change – have any relations to the difference between its rate and other rates.

sense, because out of equilibrium there is no such thing as *the* 'natural' rate; there may be 'as many "natural" rates as there are commodities' (ibid.).

This observation then leads to the question of how the system gets re-equilibrated. Sraffa stresses 'that, under free competition, this divergence of rates is as essential to the effecting of the transition as is the divergence of prices from the costs of production; it is, in fact, another aspect of the same thing'. As to the gravitation of market prices to costs of production (inclusive of interest), Sraffa addresses Hayek's case in which

> there is a change in the distribution of demand between various commodities; immediately some will rise in price, and others will fall; the market will expect that, after a certain time, the supply of the former will increase, and the supply of the latter fall, and accordingly the forward price, for the date on which equilibrium is expected to be restored, will be below the spot price in the case of the former and above it in the case of the latter; in other words the rate of interest on the former will be higher than on the latter. (ibid., p. 50)

This will prompt profit-seeking producers of the former commodities to expand output and of the latter commodities to reduce it. In this way production will adjust to demand until a new equilibrium obtains in which all commodity rates of interest are uniform and, in the case of a money economy, equal to the money rate of interest. The concept of equilibrium under discussion is the traditional long-period concept as it was informed by the earlier classical economists and advocated by all marginalist authors until the late 1920s, including Walras, Böhm-Bawerk and Wicksell. More important, it is precisely the concept adopted by Hayek in *Prices and Production*. Therefore, the view to be found in the literature that Sraffa's criticism of Hayek was not pertinent because his notion of equilibrium was different from that used by Hayek cannot be sustained.[33]

Sraffa refutes Hayek's opinion that there will only be a destruction of capital in the case of 'forced', but not in that of 'voluntary', saving: 'With or without money, if investment and saving have not been planned to match, an increase of saving must prove to a large extent "abortive"'. That is, both a sudden relative increase and a sudden relative decrease in the demand for consumption goods may cause a derangement of the system and dissipate some of the existing plant and equipment. Moreover, Sraffa objects, using a distinction of Robertson's, that savings

[33] This view is reiterated by Caldwell (1995, p. 39): 'Ludwig Lachmann later remarked sagely [?]... that Hayek and Sraffa were operating with two very different notions of equilibrium.' The reference is to Lachmann (1986). However, no evidence is given in support of this view. Similarly, McCloughry (1982).

may be seen as an 'inducement' to investment, but cannot in general be considered its 'source', which raises, among other things, the problem of effective demand, which is totally ignored by Hayek in his analysis (cf. ibid., p. 52).

Sraffa also defends Wicksell's concept of 'neutral' money against the criticism levelled at it by Hayek. Since Wicksell was concerned with the stabilization of the price-level – the price of a composite commodity – his idea of adjusting the bank rate to the 'natural' rate can be given the following interpretation: the reference is not to a single 'natural' rate, but to a weighted average of the 'natural' rates of the commodities entering into the price index, with the weights used in constructing this index applied to the interest rates. 'What can be objected to Wicksell is that such a price-level is not unique, and for *any* composite commodity arbitrarily selected there is a corresponding rate that will equalise the purchasing power, in terms of that composite commodity, of the money saved and of the additional money borrowed for investment' (ibid., p. 51).

4.2 *Hayek's reply and Sraffa's rejoinder*

Hayek's reply is of similar length to Sraffa's review (cf Hayek, 1932b). He accuses Sraffa of not 'making his own position quite clear' and characterizes his attitude as

> a curious mixture of, on the one hand, an extreme theoretical nihilism which denies that existing theories of equilibrium provide any useful description of the non-monetary forces at work; and, on the other hand, of an ultra-conservatism which resents any attempt to show that the differences between a monetary and a non-monetary economy are not only, and not even mainly, 'those characteristics which are set forth at the beginning of every textbook on money'. (ibid., p. 238)

Hayek summarizes his theory in the following two statements, the former of which is in full harmony with the then received doctrine: first, 'so long as we neglect monetary factors, there is an inherent tendency towards an *equilibrium* of the economic system'; second, 'monetary factors may bring about a kind of *disequilibrium* in the economic system – which could not be explained without recourse to these monetary factors' (ibid., p. 238; emphases added). He then addresses Sraffa's objections against 'two cardinal points in my theory': (i) the notion of a money rate of interest which differs from the 'equilibrium' rate; and (ii) 'the tendency for capital accumulated by "forced saving" to be, at least partly, dissipated as soon as the cause of the "forced saving" disappears'. Hayek adds that 'it is upon the truth of this [latter] point that my theory stands or falls' (ibid., p. 239). He deals with these points in reverse order.

As regards the question how much additional demand for capital goods will result from the injection of producers' credits, Hayek admits that it all depends on how quickly the incomes of primary factors, i.e. wages, tend to rise.[34] He implicitly concedes that his argument in the book was based on the assumption that wages do not rise immediately: 'But they will rise to the full extent only when the new money has passed backwards through the successive stages of production until it is finally paid out to the factors' (ibid., p. 242). In addition, he accepts Sraffa's criticism that the share of profits need not rise with an increase in the capital–output ratio (ibid., pp. 242–3). Most importantly, he admits that the system need not return to its old equilibrium position, since 'entrepreneurs may not consume part of the extra profit made during that [inflationary] period, but may invest it. In such a case, the shift of incomes from a class less inclined to save to a class more so inclined will ultimately have produced some real saving' (ibid., p. 242). Hence, he is forced to abandon his previous opinion that the 'artificial stimulant' of inflation cannot do any good and cause an accumulation of capital. He tries, however, to play down the importance of this concession by contending that the dissipation of capital during the crisis will eventually lead 'to something approaching the former state' (ibid., p. 243). Given this concession, it comes somewhat as a surprise that he can call Sraffa's respective criticism (cf. 'one class has, for a time, robbed another class of a part of their incomes; and has saved the plunder') 'a surprisingly superficial objection', and add: 'Is Mr. Sraffa really unfamiliar with the fact that capital sometimes falls in value because the running costs of the plant have risen...? And would he really deny that, by a sudden relative increase in the demand for consumers' goods, capital may be destroyed against the will of its owners?' (ibid., p. 244). As Sraffa's review shows, his answer to both questions is 'No'.

As regards the first 'cardinal point', Hayek cannot but accept Sraffa's argument that generally there will be a multiplicity of 'natural' or own-rates of interest. This observation must have hit Hayek very hard, since it meant either or both of two things: that he had not properly understood the concept of 'intertemporal prices' developed by himself (Hayek, 1928), or that he was unable to apply it to the questions dealt with in *Prices and Production*. To be told by someone who could not be expected to have known Hayek's earlier paper[35] what the implications of this paper were

[34] On the problem of various time lags in Hayek's approach, see Hicks (1967) and Cottrell (1994).

[35] To the best of my knowledge, there is indeed no evidence in Sraffa's papers in the Wren Library of Trinity College, Cambridge, that he was familiar with Hayek's 1928 article.

for his own analysis in *Prices and Production* must have been utterly frustrating to Hayek – all the more so, since the lesson taught totally undermined his concept of 'neutral' money, as we shall see in a moment. In these circumstances, Hayek's response to Sraffa's criticism is of particular interest. He does not attempt to do away with it by referring to his paper and pointing out that all this was well known to him when writing the book. Rather, he avoids admitting his neglect by not mentioning his paper at all. Instead he chooses a forward strategy, maintaining 'that, in this situation, there would be *no single rate* which, applied to all commodities, would satisfy the conditions of equilibrium rates, but there might, at any moment, be as many "natural" rates of interest as there are commodities, *all* of which would be *equilibrium rates*' (Hayek, 1932b, p. 245). This is a surprising statement in the light of Hayek's earlier insistence that a credit expansion is bound to bring about a *disequilibrium* in the economy.[36] Yet, rather than explaining the meaning of this statement, Hayek contents himself with the following remark: 'The inter-relation between these different rates of interest is far too complicated to allow of detailed discussion within the compass of this reply' (ibid., pp. 245–6). The obvious reference to his 1928 paper is missing.

In the concluding section of his rejoinder, Hayek addresses what he calls Sraffa's 'absurd suggestion' (ibid., p. 248) that with the new definition of savings in the German edition of his book (cf. Hayek, 1931c) he 'has landed himself right in the middle of Mr. Keynes' theory' (Sraffa, 1932b, p. 53). He writes: 'That Mr. Sraffa should have made such a suggestion, indeed, seems to me only to indicate the new and rather unexpected fact that he has understood Mr. Keynes' theory even less than he has my own' (Hayek, 1932b, p. 249). It is remarkable that to this the editor of the *Economic Journal* added a footnote, in square brackets, saying: 'With Prof. Hayek's permission I should like to say that, to the best of my comprehension, Mr. Sraffa has understood my theory accurately. – J. M. KEYNES' (ibid.).

Sraffa's rejoinder is short and acerbic (Sraffa, 1932b). As regards point (ii) he repeats his previous objection, calling 'forced saving' a 'misnomer for spoliation', since those who had gained by the inflation and chose to save the spoils had no reason at a later stage to revise the decision, whereas those on whom forced saving had been inflicted would have no say in the

[36] Hayek's response, it could be argued, shows that he was prepared to abandon the long-period notion of equilibrium, but only in the face of criticism which could not be answered. Hence, rather than having adopted the notion of intertemporal equilibrium at the very beginning of his enterprise, Hayek had recourse to it only when no other possibility was open to him.

matter. 'This appeal to common sense has not shaken Dr. Hayek: he describes it as "surprisingly superficial", though unfortunately he forgets to tell me where it is wrong' (ibid., p. 249). According to Sraffa, 'the point of the dispute' is Hayek's assumption, reiterated in his reply, that incomes will eventually rise *in proportion* to the additional money which has become available for investment. 'I contend that this will not happen.' Sraffa adds: 'Once more Dr. Hayek himself provides me with the argument against his theory' (ibid., p. 250). This assumption is said to contradict the following assumptions of his analysis: capital will be accumulated in proportion to the quantity of money issued in the form of loans to producers, the number of stages of production will increase in proportion to the quantity of capital, and the quantity of payments to be made will increase in proportion to the number of stages. Sraffa concludes that 'as a result, the quantity of payments to be made increases in proportion to the quantity of money, and the whole of the additional money is absorbed in cash holdings for performing such payments' (ibid.). Again, what is at stake is the internal coherence of Hayek's argument; in this context it is of no import whatsoever 'what I "really believe"' (ibid.).

As regards the other cardinal question (i), Sraffa notes with satisfaction that Hayek 'now acknowledges the multiplicity of the "natural" rates'. However, he should then also draw the consequences for his ideal maxim for monetary policy. On his proposition that they '*all*... would be equilibrium rates' Sraffa comments: 'The only meaning (if it be a meaning) I can attach to this is that his maxim of policy now requires that the money rate should be equal to all these divergent natural rates' (ibid., p. 251).

In view of this devastating final judgement passed on Hayek's concept of 'neutral money', it is hardly surprising that even authors who were broadly sympathetic to Hayek's analysis felt that, in the debate with Sraffa, Hayek's stature as an economic theorist had been seriously damaged (see, for example, Lachmann, 1986).

The attacks of Keynes and Sraffa on Hayek initially contributed to the latter's prestige in the scientific community, because if someone was able to challenge Keynes he had to be taken seriously. However, in the medium run they proved detrimental to his stature as an economic theorist. It was particularly Sraffa's attack which, according to the gradually emerging view, had dealt a serious blow to Hayek's doctrine. Former followers of Hayek turned away from him, others even became adversaries to his ideas.[37] Joseph Alois Schumpeter wrote to Sraffa

[37] On the erosion of the 'Robbins Circle' at the LSE, see Hicks (1982, p. 3) (see also Kaldor, 1942, p. 359).

after the publication of his debate with Hayek: 'I am fully in agreement with you'; and on the occasion of the publication of Sraffa's 1960 book (cf. Sraffa, 1960), George Shackle, in a letter to Sraffa, called the latter's criticism of Hayek 'a milestone' in economic analysis.

Hayek undertook another single greater effort to turn the defeat into a victory. About his *Pure Theory of Capital*, published in 1941 (Hayek, 1941), he says that it may perhaps have been more aptly called 'Introduction to the Dynamics of Capitalist Production'. He expounds: 'The whole of the present discussion is essentially preparatory to a more comprehensive and more realistic study of the phenomena of capitalistic production' (ibid., p. 3). One might say that the *Pure Theory* compares to the planned study as the first two chapters of *Prices and Production* compare to the subsequent two. This study was never completed by Hayek, and a reading of the *Pure Theory* shows why. Hayek clearly understood that he had erred in assuming that the problem of the business cycle could be tackled in terms of Böhn-Bawerk's theory of capital. His attempt to save that theory had turned out to be enormously difficult, and in the end futile: the theory was beyond remedy and the alternative construction that he sought to put in its place was too complex to allow one to derive simple and clear-cut results.[38] The 'steam-hammer', to use Sraffa's expression, was no longer at Hayek's disposal: a new attempt at 'cracking the nut' was illusory.

5 The subsequent debates

Hayek's book produced a considerable stir. In the years following its publication it was reviewed in all leading economic journals by leading experts on capital theory, trade cycle theory or monetary theory. Reviews came from, among others, Ralph G. Hawtrey (1932), Arthur W. Marget (1932), George L. Shackle (1933–34), Alvin Hansen and Herbert Tout (1934), Gustav Åkerman (1934), Otto Conrad (1934), Costantino Bresciani-Turroni (1934), Hans Neisser (1934) and Ragnar Nurkse (1934–35); Hayek's approach was also dealt with in the monographs on alternative theories of business cycles by Wilhelm Röpke (1936) and

[38] In this connection, see also the assessments of the *Pure Theory of Capital* by Lutz (1967, Chap. 4), Shackle (1981) and Steedman (1994). In Caldwell's opinion, Hayek with his *Pure Theory* 'had been able to clear away Böhm-Bawerk's "average period of production" and replace it with the far more complex notion of a structure of production, thereby securing the capital-theoretic foundation of Austrian theory' (Caldwell, 1995, p. 42); it is, however, not clear how the capital-theoretic foundation of Austrian theory could have been 'secured' by demolishing Austrian capital theory.

Gustav Haberler ([1937] 1958). While Sraffa's criticism at first met with considerable difficulties of understanding, as time went on major elements of it were explicitly or implicitly accepted in the relevant literature.[39] With the publication of Keynes' *General Theory* in 1936, the interest in Hayek's approach to the theory of money and crises lost momentum as rapidly as it had gained it at the beginning of the decade. It was only after Hayek had been awarded the Nobel prize in economics in 1974 that his early work on monetary theory and the trade cycle received renewed attention. Lucas (1981, p. 216) thought he could see in Hayek a precursor of the theory of 'rational expectations', and with the rise of Austrian ideas in some circles of economists the Hayek–Sraffa debate was scrutinized again. In what follows, I shall briefly deal with the controversy between Desai and McCloughry on that debate (cf. Desai, 1982; McCloughry, 1982).

Desai correctly argues that Hayek failed to develop a satisfactory notion of a monetary equilibrium; his concept of a 'neutral' money represents but a 'utopian ideal' (Desai, 1982, p. 164). In his comment on Desai's paper, McCloughry confirms this view. McCloughry, on the other hand, once again contends that Hayek and Sraffa, while obviously discussing the same model, 'are in fact not thinking within the same framework' (McCloughry, 1982, p. 172). Since it is intrinsically difficult, if not impossible, to know what and how people think, we must rely on the observable results of their acts of thinking. McCloughry provides the following cases in support of his view. First, there is the problem of the notion of 'inflation' in the two authors. While Sraffa is said to conceive of inflation as a problem of the 'distribution of income', Hayek sees it as a problem of the 'allocation of resources' (ibid., p. 173). In fact, it is both. Hayek in his reply to Sraffa admits that inflation has the distributive effects pointed out by Sraffa. Hence, the case mentioned by McCloughry does not indicate any difference in perspective, or 'vision', but simply an omission on Hayek's part which he, Hayek, would readily concede to his critic. Second, there is the problem of the notion of 'equilibrium'. McCloughry maintains: 'Hayek is thinking not in the traditional long-period framework, *but in terms of intertemporal equilibrium*' (ibid., p. 174). However, as we have seen there is no evidence in support of this opinion except that Hayek is forced into that position when confronted

[39] For a summary statement of the opinions expressed in the works mentioned, see Kurz (1995, Part 5); for a historical study of the impact of Hayek's book, see also Colonna (1990a) and the book edited by Colonna and Hagemann (1994). (It is a shortcoming of the latter contribution that the debate between Sraffa and Hayek and its impact on the subsequent discussion is not dealt with in detail.)

with Sraffa's critique. Instead, Hayek adopted the conventional long-period notion of equilibrium, centred around the uniformity of the rate of interest, as he had found it in such authors as Böhm-Bawerk and Wicksell. It may be conjectured that had he himself felt the need to point out a difference between the notion of equilibrium adopted by him and that used in Sraffa's criticism, he would in all probability have said so. The best opportunity to have done so was perhaps when Sraffa introduced the concept of own-rates of interest in the debate. The fact that Hayek did not take issue with Sraffa's interpretation as regards the supposed notion of equilibrium might be sufficient to dispel the opinion that the two disagreed fundamentally on this matter. Finally, McCloughry contends that the Hayek–Sraffa debate saw a clash of two different '*Weltanschauungen*' (visions of the world), which is said to have prevented a fruitful communication (ibid., p. 181). This interpretation is no more acceptable than the previous two. Only a single 'Weltanschauung' (to retain McCloughry's term) was under consideration, namely Hayek's. It did not pass Sraffa's test of logical coherence and consistency. Sraffa did not confront Hayek with a different 'Weltanschauung', but with the logical implications of the latter's own 'Weltanschauung' which he had overlooked. Sraffa was able to show that Hayek was not standing firm on his own gound. That was all.

6 Conclusion

While the execution of Hayek's bold project must be considered a failure, the project itself deserves to be praised, as even Hayek's most uncompromising critic, Sraffa, admitted. To date, several economists have attempted, without much success, to integrate monetary theory and the theory of value and distribution. A start was made by Knut Wicksell in *Interest and Prices* (Wicksell, [1898] 1936). Hayek's contribution consisted essentially of a development of Wicksell's analysis by way of its criticism and further elaboration. None of the existing traditions in economics has so far succeeded in accomplishing the task. Hayek's problem is therefore still on the agenda.

In the debate Sraffa demonstrated anew, after his criticism of Marshallian partial equilibrium analysis in the mid-1920s, his extraordinary analytical skills and impeccable logic. In addition, he displayed a thorough understanding of different traditions of economic thought, including contemporary general equilibrium theory, Austrian capital theory and Wicksellian price and interest theory. The debate with Hayek appears to have left its traces on Sraffa's mature work: *Production of Commodities by Means of Commodities* (Sraffa, 1960). It may be

contended that the famous passage in which he argued that the rate of profits is 'susceptible of being determined from outside the system of production, in particular by the level of the money rates of interest' (ibid., p. 33) echoes this debate. Seen from this vantage point, the passage implies, contrary to Hayek's argument in *Prices and Production*, that monetary policy will generally have a lasting impact on income distribution and the 'real' system at large, not least by influencing the choice of technique of cost-minimizing producers. Hence, the 'real' and the 'monetary' sphere are seen as intimately intertwined. At the same time, Sraffa clarified that there is no presumption that a fall (rise) in the rate of interest will lead to the adoption of more (less) 'round-about' or 'capital-intensive' methods of production, as Hayek had claimed. It appears to be an interesting task to investigate whether following up Sraffa's above remark leads us any further in the direction of the long-sought integration of monetary theory and the theory of value and distribution.

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