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# **SERIE RESEARCH MEMORANDA**

**NEO-AUSTRIAN BUSINESS CYCLE THEORY**

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## Neo-Austrian Business Cycle Theory

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### 1. Introduction

The Neo-Austrian business cycle theory rests on two other Austrian theories. In fact, one of its main characteristics is the linkage between the Austrian theory of money and the Austrian theory of capital. In order to appreciate the business cycle theory, these underlying theories must be discussed first. Furthermore, Neo-Austrians refer to some equilibrium situation. This equilibrium serves as a benchmark in their analysis and must be studied in order to comprehend their business cycle theory.

### 2. The theory of money

One of the two underlying theories is the theory of money, which aims at explaining the existence of money and the function it plays in the economy. It explains the value of money in terms of its demand and supply. This makes clear why changes in the demand and supply conditions of money have disturbing effects. As will be shown later, it is these disturbances that set the business cycle in motion.

#### 2.1. Money and its value

Mises's theory of money applies the marginal principle to money. According to Mises, the sole function of money is to be exchanged.<sup>1</sup> Money as a means of exchange enables individuals to cope with the dispersion of knowledge in an uncertain and changing world.<sup>2</sup> As money is scarce, it must be considered an economic good and like all economic goods it has a price.<sup>3</sup> This price will depend on demand for and supply of it. These depend in turn on the individuals' valuations.<sup>4</sup>

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<sup>1</sup> Mises, 1949 (1963), p. 401.

<sup>2</sup> Yeager, 1989, p. 92.

<sup>3</sup> Of course, in order to give this price any meaning, one has to choose a numéraire other than money itself. It is clear that money has as many prices as there are other goods.

<sup>4</sup> Mises, 1912 (1924), pp. 85 - 6.

In discussing the theory of money, I shall concentrate on the demand for money, because the Neo-Austrians regard the money supply as largely determined by the monetary authorities (i.e., the government and the central bank) and the private banks.

Money does not satisfy wants directly, it merely facilitates exchange. If one type of money is more readily accepted by the individuals than another, they will demand more of that type.<sup>5</sup> According to Mises the utility individuals derive from using money is equal to the expected utility derived from using the goods bought by it.<sup>6</sup> A problem now arises. If money does not 'yield' utility by its own, how do the individuals determine the amount of it that they are willing to sacrifice in exchange? In order to solve this problem an individual needs to know what quantities of other goods one unit of money may buy, i.e. its purchasing power. This purchasing power forms a bridge between the utility derived from consumption on the one hand, and the 'inutile' money, on the other.<sup>7</sup> However, there is a problem with regard to measuring the purchasing power. For if the demand for money depends on its quality as a medium of exchange, and if this quality depends on its purchasing power, how can we determine the latter? Or, in other words, if the demand for money depends on its price, and if the price of money depends on its demand, how can we determine both? According to Mises,

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<sup>5</sup> In fact, this desirability of money as a means of exchange is the very cause of its existence. According to Menger in his Grundsätze (1871 (1968), pp. 250 - 60), money is an evolved social institution in the same sense as language is. In a barter economy individuals consider it advantageous to exchange their supply of goods against more easily exchangeable goods. As an unintended consequence of such human action, money comes into existence. (In a footnote of almost one page, Menger even gave some etymological views on the origin of the words used in different languages to denote the medium of exchange)

<sup>6</sup> Mises (1912 (1924), p. 85): "Nun ist aber ... der subjektive Gebrauchswert des Geldes, der mit seinem subjektiven Tauschwert zusammenfällt, nichts anderes als der antizipierte Gebrauchswert der für das Geld anzuschaffenden Dinge; seine Größe ist zu bemessen am Grenznutzen der für das Geld einzutauschenden Güter."

<sup>7</sup> Mises (1912 (1924), pp. 85 - 6): "Da dem Geld als solchem jede direkte Beziehung zu einem menschlichen Bedürfnis fehlt, kann das Individuum sich eine Vorstellung von seinem Nutzen und mithin von seinem Werte nicht anders bilden, als indem es von einer bestimmten Kaufkraft ausgeht."

there was a problem of circularity in his theory of money.<sup>8</sup> He tackles this problem by referring to the notion of time. Individuals determine their demand for money on the basis of its value as determined in the market yesterday. Obviously this leads to a problem of infinite regress. The question then remains what determined the objective value of money at first. Mises solves this problem by indicating that a good can only become money if it already possesses exchange value based on some other productive or consumptive function it performs.<sup>9</sup> Thus Mises explains the value of money by referring to the non-monetary purposes which the money good used to have in the past. Money must be or must have been useful for productive or consumptive purposes other than as medium of exchange.

Of course, the demand for money is just one side of the coin. The other side is constituted by its supply. As already stated, Neo-Austrians regard this as largely determined by the monetary authorities (notably, the government). However, this does not mean that these authorities can manipulate the money supply as they like without causing damage to the economy. This may be explained by the Austrian view that money is not 'neutral', i.e., that monetary changes have effects on real variables. The reasons for this nonneutrality of money will be considered next.

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<sup>8</sup> Butler, 1988, p. 267. However, Yeager (1989) argues that Patinkin (1956) has shown that this circularity problem is only apparent. According to Moss (1976, p. 27), Mises confused 'the utility of (holding) money' and 'the utility of services provided by money'. Patinkin (1956, p. 63), on the other hand, clearly distinguishes these different utilities and incorporated real balances directly into the individual's utility function by counting real cash balances as a part of the individual's wealth. Unfortunately, in Patinkin's economy any good can perform the function of money (by assumption it is the n-th good). According to Hahn (1965), Patinkin's model does not do justice to the fundamental role played by money in a money economy. This means that it does not do justice to the difference between a barter and a money economy. Such difference may be obtained by incorporating money's productive contributions in exchange.

<sup>9</sup> Mises (1912 (1924), p. 87): "Aus der Tatsache, daß der objektive Tauschwert des Geldes stets einer Anknüpfung an ein auf dem Markte zwischen dem Geld und den übrigen wirtschaftlichen Gütern bereits bestehendes Austauschverhältnis bedarf, da das wirtschaftende Individuum anders nicht in der Lage wäre, ein Werturteil über das Geld abzugeben, folgt weiter, daß als Geld nur ein Objekt in Verwendung genommen werden kann, das in dem Augenblick des Beginnes seiner Tauschmittelfunktion bereits auf Grund anderweitiger Verwendung objektiven Tauschwert besessen hat."

## 2.2. The nonneutrality of money

One of the basic tenets of 'mechanical versions' of the quantity theory of money is that, whenever the supply of money changes, the purchasing power of money changes proportionally, given the demand for it. Money only influences the absolute level of prices but does not change relative prices. Monetary changes are therefore presumed to leave real variables unaffected. One of the major contestants of this view was R.G. Hawtrey. In his opinion changes in the supply of money were the root cause of business cycles by altering the rate of interest. Because he assumed that this rate largely determined business inventories, the latter would also change. In turn this led to a business cycle.<sup>10</sup>

Neo-Austrians also argue that monetary changes cause business cycles. But in their view cycles are constituted by real phenomena. Therefore they criticize the mechanical version of the quantity theory of money for different reasons than Hawtrey did. They hold that the supply of money cannot be altered simultaneously and uniformly for all individuals.<sup>11</sup> As a result the additional money will not be spent in the same manner as the money which already existed. The real effects caused by a change in the nominal supply of money will alter relative prices and the distribution of income and wealth in the economy.<sup>12</sup> These changes cannot be studied by using a price index, because different individuals in fact purchase different baskets of goods and so may face different degrees of change in the purchasing power of their income when relative prices change.<sup>13</sup> With regard to policy, this

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<sup>10</sup> Cf. Hawtrey, 1913 (1970), pp. 61 - 3. Hawtrey's business cycle theory is a purely monetary one, in the sense that changes in the supply of money and in the market rate of interest do not influence the structure of production. In Schumpeter's (1954 (1982), p. 1121) opinion, Hawtrey held that "... fluctuations in the flow of money income, themselves caused by exclusively monetary factors, are the only cause of general cyclical fluctuations in trade and employment."

<sup>11</sup> Mises, 1912 (1924), pp. 119 - 120; Hayek, 1929 (1976), p. 16.

<sup>12</sup> Cantillon (1775 (1931), especially pp. 158 - 99) already studies these real effects. According to Cantillon they may change the velocity of circulation, which leads him to conclude "... that by doubling the quantity of money in a State the prices of products and merchandise are not always doubled" (p. 177). The effect that a change in the money supply may change the velocity of circulation, is called the 'Cantillon effect'. See also Schumpeter, 1954 (1982), p. 317.

<sup>13</sup> Mises, 1912 (1924), pp. 172 - 7.

means that "[m]onetary policy, ... does not affect everyone to the same degree."<sup>14</sup> The proposition that changes in the demand for and the supply of money affect relative prices is called the 'nonneutrality' of money.<sup>15</sup> It will prove to be indispensable for Neo-Austrian business cycle theory.

The nonneutrality has important implications for monetary policy. It implies that governments and central banks cannot ensure that the demand for real capital is equal to its supply, while at the same time stabilising the price level.<sup>16</sup> This leads Hayek to reject the stabilization of the price level as a policy aim. In his view the monetary authorities must refrain from credit expansion in order to make the equalization of demand for and supply of real capital possible.

As already argued, there are two theories underlying the Neo-Austrian business cycle theory. The theory of money has been expounded above, because money is considered the cause of the business cycle. It was already at the Neo-Austrian position that the phenomena which constitute the business cycle are real phenomena, which concern the structure of production. Before expounding the business cycle theory itself some attention must be paid to the meaning of this structure.

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<sup>14</sup> Butler, 1988, p. 283.

<sup>15</sup> Visser (1971, pp. 409, 429, 432 - 3) argues that pre-war economists defined neutrality of money in terms of the maintenance of monetary equilibrium. By contrast, post-war economists study the restoration of this equilibrium, following a monetary disturbance. For a list of preconditions for neutrality of money in the post-war sense, cf. Aschheim and Hsieh, 1969, pp. 213 - 5.

<sup>16</sup> Hayek, 1931 (1935), p. 27. Suppose a specific firm is broken up into two firms, i.e. differentiation takes place. Then, the volume of trade (T in Fisher's Equation of Exchange  $MV = PT$ ) increases. Suppose now that the government (or central bank) wants to stabilize the price level P. Then, it must increase the money supply M, given the velocity of money V. This will lead to changes in real variables, due to the nonneutrality of money. In fact, the accompanying distribution (or Cantillon) effects will distort the so-called 'structure of production' (cf. section 3 and 5). Conversely, suppose the government or the central bank wants to equate the demand for and the supply of real capital. It will then maintain monetary equilibrium despite the change in T, i.e., MV is held constant and does not influence PT. As Fisher's Equation of Exchange always holds, prices will fall in the situation under consideration because of the rise in T.

### 3. (Neo-)Austrian capital theory

The Austrian theory is one of the most elaborated capital theories in economics. It emphasizes the 'capital structure' (or 'structure of production'), the 'raisons d'être' for a positive rate of interest, and the distinction between the natural and the market rate of interest. These three central issues will be addressed successively.

#### 3.1. The capital structure

Austrians consider 'capital' as a set of heterogeneous, highly specific goods. In their opinion it is possible to categorize these heterogeneous capital goods according to their remoteness from consumption. Consumer goods are called 'goods of the first order'. Capital goods which are used in the production of these first-order goods are called second-order goods; capital goods which produce second-order goods are called third-order goods, and so forth. It is then possible to distinguish stages of production which can be categorized in a manner similar to that of capital goods, and which use capital goods of the same order. Taken together, these stages form the 'capital structure'. The capital goods used in a particular stage are assumed to be highly specific.<sup>17</sup> Furthermore, once capital goods have been produced, bought and installed, the investment is irreversible. This irreversibility of investments has as a corollary that during the business cycle the adjustment of the capital structure to its equilibrium position is hampered. The readjustment process will take a fairly long time and will involve great losses. This irreversibility is one of the factors which make the business cycle a phenomenon with undesired consequences.

The capital structure is determined by the market rate of interest. To some extent Austrians differ among each other with regard to the reasons why there must be a rate of interest and why this rate must be positive.

#### 3.2. The 'raisons d'être' of interest

Austrian views with regard to rates of interest may be divided into two currents, namely a 'subjectivistic' and a 'productivistic' one. Whereas

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<sup>17</sup> O'Driscoll, 1977, p. 197.



the former stresses the importance of time-preference, the latter also emphasizes the productivity of capital. Eugen von Böhm-Bawerk distinguished three reasons for a positive rate of interest: (1) people overestimate the future satisfaction of their wants (or rather, their future means to satisfy their future wants), (2) people systematically underestimate their future wants, and (3) capital is productive. Böhm-Bawerk was criticized by Carl Menger for not adhering to a purely subjectivistic approach and for making concessions to the 'productivists'.<sup>18</sup> Menger's directions as to the content of the 'correct', subjectivistic theory of capital were elaborated by Mises.<sup>19</sup> Mises considered the Böhm-Bawerkian explanation of interest as wrong.<sup>20</sup> He argued that "[i]t was a blunder to explain interest as an income derived from the productivity of capital."<sup>21</sup> Time-preference was the sole reason for the existence of a positive rate of interest, as "... a categorical requisite of human action."<sup>22</sup> Human action would not be possible without time-preference.<sup>23</sup>

By contrast Hayek seems to agree much more with Böhm-Bawerk, allowing for productivity to be a 'raison d'être' for a positive rate of interest.<sup>24</sup> However, later he also seems to have changed his mind somewhat by putting more emphasis on time-preference: "... so long as we consider solely an evenly progressing economy, the marginal productivity of investment will depend almost exclusively on the investment demand schedule with the supply of capital adapting itself

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<sup>18</sup> Cf. Zuidema, 1989, pp. 69 - 70.

<sup>19</sup> In the first edition of his Theorie des Geldes und der Umlaufmittel (1912) Mises confined himself to a representation of the Böhm-Bawerkian theory. By 1924 he had, however, turned away from this. As Zuidema (1989, p. 70 - 1) argues, much of Misesian capital theory "... may be considered an articulation of what had already been said in Menger's Zur Theorie des Kapitals".

<sup>20</sup> Mises, 1949 (1963), p. 526.

<sup>21</sup> Mises, 1949 (1963), p. 263.

<sup>22</sup> Mises, 1949 (1963), p. 484.

<sup>23</sup> If there were no time-preference, people would not be able to act, because they could not decide when to act. Rational human action is an expression of time-preference.

<sup>24</sup> Hayek, 1936a, p. 53.

to the newly constant rate of productivity. But as soon as this even progress is held up, and the supply of capital turns out to be less than had been expected, 'time-preference' takes charge - ...."<sup>25</sup> Thus, Hayek argues that productivity is the main reason for the existence of a positive rate of interest in an evenly rotating economy, while time-preference is the principal reason in a disequilibrium situation.

In conclusion, Neo-Austrian capital theory distinguishes two reasons why there should be a positive rate of interest, namely, time-preference and productivity (although the latter takes a less prominent place). This positive rate determines the capital structure. According to the Neo-Austrians this structure can be distorted, which implies that there must be a 'correct' capital structure. This 'correct' structure is also determined by a rate of interest, to wit, the natural rate of interest. Thus, Austrian capital theory distinguishes between two rates of interest.

### 3.3. Two rates of interest

In 1898 Knut Wicksell defined the natural rate of interest as "Jene Rate des Darlehenszinses, bei welcher dieser sich gegenüber den Güternpreisen durchaus neutral verhält und sie weder zu erhöhen noch zu erniedrigen die Tendenz hat, kann nun keine andere sein als eben diejenige, welche durch Angebot und Nachfrage festgestellt werden würde, falls man sich überhaupt keiner Geldtransaktionen bediente, sondern die Realkapitalien in natura dargeliehen würden - oder was etwa auf dasselbe hinauskommt, als der jeweilige Stand des natürlichen Kapitalzinses."<sup>26</sup> Like Wicksell, Mises considers the natural rate of interest (or, in his own terminology, the 'originary' rate of interest) as determined by the valuation of present to future goods.<sup>27</sup> The natural rate measures the time-preference of individuals. It expresses the rate at which individuals are prepared to exchange present-period consumption for consumption in future periods. The natural rate of interest is not determined on the loan market: it is a 'mental construct'. Apart from this rate there also exists a rate of interest

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<sup>25</sup> Hayek, 1945, pp. 24 - 5.

<sup>26</sup> Wicksell, 1898, p. 93 (italics in original).

<sup>27</sup> Mises, 1949 (1963), p. 526.

which is determined on the loan market. This 'market' rate of interest (or, in Mises's words, the 'gross money rate of interest')<sup>28</sup> is the rate at which the supply of loanable funds equals the demand for loans. It is a price, namely the price to be paid for loans.

The market rate of interest need not equal the natural rate. In the Austrian terminology the market rate of interest may be 'distorted'. In that case the market rate does not reflect the individual time preferences. This is what the natural rate does, so we might expect that this rate governs the individuals' decisions concerning present and future consumption, and therefore their actions on the loan market. This means that we might expect a tendency towards the equalization of the market rate and the natural rate of interest. As Wicksell already observed, this tendency does not imply that such equalization will in fact occur.<sup>29</sup> It will depend on the time it takes for the market rate to adjust and on the number and severity of the distortions which caused the divergence in the first place.

One of the main characteristics of equilibrium (in this case the situation in which the capital structure is not distorted) is that the market rate of interest equals the natural rate.<sup>30</sup> As seen above, the latter determines which capital structure is in accordance with the desires of individuals concerning their consuming and saving activities. The natural rate is determined by the length of time individuals are willing to postpone consumption. By contrast, the market rate of interest reflects the actual length of time in which individuals will indeed abstain from consumption. Whereas the natural rate determines how long the period of production of consumer goods should be in order to agree with the preferences of individuals, the market rate reflects how long this period in fact is.

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<sup>28</sup> Mises, 1949 (1963), p. 538.

<sup>29</sup> Wicksell (1898, p. 108): "[m]an kann ... mit Sicherheit erwarten, dass der Bankzins oder, allgemeiner gesprochen, der Geldzins sich schliesslich immer dem Stande des natürlichen Kapitalzinses anschliessen wird oder vielmehr - da ja neue Veränderungen des natürlichen Zinsfusses unterdessen eingetreten sein können - immer die Tendenz hat, sich demselben anzuschliessen. Ob aber dies auch mit hinreichender Schnelligkeit geschieht ... erscheint von vornherein sehr fraglich." (italics in original)

<sup>30</sup> Mises, 1949 (1963), p. 538.

### 3.4. Linking the theory of money with the theory of capital

Mises's contribution to the Austrian theory of the business cycle is that he linked the Austrian capital theory with their theory of money. In his opinion, the demand for (and supply of) capital makes itself felt in the demand for (and supply of) money.<sup>31</sup> Entrepreneurs must have money in order to buy the capital goods required for production. They may either use their own money or they can borrow it on the loan market. In either case the market rate of interest determines how much money the entrepreneurs will invest in capital goods, and, therefore, the length of the period of production.<sup>32</sup> This period need not be the same as the length of time for which individuals are prepared to postpone their consumption. A business cycle comes into being if both periods differ in length. Before considering the Neo-Austrian business cycle theory in more detail, we must first consider its point of reference.

### **4. The Austrian business cycle theory: static or dynamic, exogenous or endogenous?**

Both Mises and Hayek refer to some sort of equilibrium situation as a kind of benchmark. However, their respective benchmarks differ. Whereas Mises referred to a static concept which he called the 'evenly rotating economy', Hayek defined a dynamic equilibrium concept in which change is possible.

#### 4.1. The benchmarks: static or dynamic equilibrium?

Mises's theory of the business cycle identifies a situation which he termed the 'evenly rotating economy.' It is a static equilibrium situation as it implies that all actions of all individuals remain the

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<sup>31</sup> Mises (1912 (1924), p. 348): "Die Kapitalsnachfrage tritt in der Form der Geldnachfrage auf; der Kapitalbedarf ist scheinbar ein Geldbedarf. Das darf uns über das Wesen der Erscheinung nicht tauschen. Das, was man Geldüberfluß und Geldknappheit zu nennen pflegt, ist in Wahrheit Kapitalüberfluß und Kapitalknappheit."

<sup>32</sup> The 'length of the period of production' reflects the 'capital intensity' of the production processes used. The same applies to the so-called 'roundaboutness' of production. In fact, 'roundaboutness', 'length of the period of production', and 'capital intensity' may be regarded as synonyms. Thus, when the period of production is lengthened, production becomes more roundabout, i.e., more capital-intensive.

same in each period. However, Mises stresses that this is a highly unrealistic condition.<sup>33</sup> It "... is merely a tool for our thinking."<sup>34</sup> In Mises's view, we must analyze the tendency towards such an 'evenly rotating economy' and not this situation itself, because it can never be reached.<sup>35</sup> Thus, Mises's analysis is dynamic in nature, although his point of reference is a static one.

In contrast, Hayek explicitly says that his monetary business cycle theory must be placed in a Walrasian general equilibrium framework.<sup>36</sup> This benchmark means that the theory must use the logic of comparative-static general equilibrium theories. Then the business cycle theory can only demonstrate disturbances to be exogenous: the system will always react by creating a new equilibrium.<sup>37</sup> The exogenous disturbance(s) must return time after time in order to explain the recurrence of the cyclical movement. Hayek argued that this is a unsatisfactory feature of such theories. In his view, business cycles must be explained by endogenous disturbances.<sup>38</sup> In order to render such an explanation possible, one must introduce time. This urged Hayek to expand his framework. Therefore, he defined a dynamic general equilibrium.

#### 4.2. Individual and general equilibrium: the coordination problem

According to the Hayek, the actions of individuals are based on plans. Individuals are said to be in equilibrium when they cannot improve their actions, given their knowledge. Thus, in equilibrium, individual actions are optimal (with regard to the plan upon which they are based). This optimality is called individual equilibrium. On the other hand, one cannot distinguish a plan for society as a whole. Therefore,

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<sup>33</sup> Mises, 1949 (1963), p. 247.

<sup>34</sup> Mises, 1949 (1963), p. 248.

<sup>35</sup> Mises (1949 (1963), p. 248): "It (i.e., the 'evenly rotating economy', RvZ) is not the description of a possible and realizable state of affairs."

<sup>36</sup> Hayek, 1933a (1976), p. 42n.

<sup>37</sup> Hayek, 1933a (1976), pp. 42 - 43.

<sup>38</sup> I shall use the term 'endogenous' in the Schumpeterian sense. Schumpeter (1954 (1982), p. 745) considers 'endogenous' business cycle theories to imply that "... each phase of the cyclical process is induced by the conditions prevailing in the preceding one." 'Exogenous' means then that each 'cycle' is caused by a disturbance from outside the system.

general equilibrium must refer to individual plans, or rather, to the multitude of individual equilibria.<sup>39</sup> Optimality for the system as a whole is characterized by optimality for all individuals. Such a general equilibrium presupposes that no individual plan is frustrated, i.e., that they are all coordinated. Then there is no coordination problem.<sup>40</sup> In contrast, disequilibrium implies that this problem does exist: some individuals' plans are frustrated. These individuals will face unexpected consequences<sup>41</sup> of their actions and will have to adapt their actions in order to avoid further frustrations in future periods. This brings us to the intertemporal characteristic of Hayek's equilibrium concept.

#### 4.3. Intertemporal equilibrium

Suppose that at the end of period 1 individual A changes his preferences, and that all other data remain unchanged. If all other individuals (say B and C) recognize this change immediately (that is, before period 2 has begun and they already have acted), they will change their actions (compared with period 1). If individual A's new actions already anticipate the new actions of B and C, none of our three individuals will be disappointed.<sup>42</sup> General dynamic equilibrium in the Hayekian sense implies that individuals must have perfect foresight, because they would otherwise be confronted with unexpected circumstances, leading to the frustration of the fulfilment of their plans.<sup>43</sup> Hayek's general dynamic equilibrium concept implies that all individuals act optimal, and that the changes in their actions are optimal as well. A precondition then is that all individuals know how to change their actions. For equilibrium to be maintained, all individuals must know the external data and how the other individuals

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<sup>39</sup> Butos, 1986, p. 334.

<sup>40</sup> O'Driscoll, 1977, pp. 26 - 8.

<sup>41</sup> Notice that unexpected consequences of actions is not a synonym for unintended consequences. Unexpected consequences may be intended, and unintended consequences may be expected.

<sup>42</sup> If A did not anticipate the change in actions of B and C, he will be disappointed in period 2. He will then start the process of revising actions all over again.

<sup>43</sup> Hayek, 1933c (1939), pp. 139 - 41. Hayek elaborated the relation between equilibrium and knowledge further in his 1937-article 'Economics and Knowledge'.

will (re)act. Perfect knowledge is therefore a defining characteristic of the Hayekian general dynamic equilibrium.

#### 4.4. The business cycle as a disequilibrium phenomenon

It may be possible that the plans and actions of the individuals are discoordinated. In this situation knowledge cannot be perfect, for if it were, nobody's plans would have been frustrated. Hayek considers knowledge in fact to be dispersed among all the individuals. This means that the economy will not be in general equilibrium. He interprets the business cycle as a discoordination (and therefore disequilibrium) phenomenon in which individuals are confronted with unexpected outcomes of their actions.

During a business cycle individuals are faced with unexpected outcomes. In other words, they make expectational errors. But more importantly, they do not make these errors randomly. Empirical evidence shows that these errors are similar across the various markets. This means that many individuals make similar mistakes. Hayek must therefore explain why individuals make expectational errors and, moreover, why different individuals make similar mistakes.<sup>44</sup> According to him, there are two reasons why individuals, and more specifically entrepreneurs, should make similar expectational errors. The first and exogenous reason refers to some psychological state of mind (e.g., Pareto's 'waves of optimism or pessimism', Keynes's 'animal spirits'). However, Hayek considers it more likely that the entrepreneurs are misled by following guides and symptoms which as a rule prove reliable. One of these rules (and undoubtedly the most important one) is the price system: "... it may be that the prices existing when they (i.e., the entrepreneurs, RvZ) made their decisions and on which they had to base their views about the future have created expectations which must necessarily be disappointed."<sup>45</sup> The prices (including the market rate of interest) on which entrepreneurs base their actions may be distorted. This causes expectational errors on the part of the entrepreneurs, which leads to the creation of a business cycle.

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<sup>44</sup> Hayek, 1933c (1939), p. 141.

<sup>45</sup> Hayek, 1933c (1939), p. 141.

## 5. Neo-Austrian business cycle theory

### 5.1. The causes: credit expansion and expectational errors

Neo-Austrian business cycle theory starts by adopting a Wicksellian framework, in which - for analytical purposes - one may distinguish between the natural rate of interest (the 'ordinary rate') and the market rate of interest.<sup>46</sup> This framework attaches much importance to the monetary side of the economy. In fact, the Neo-Austrians think the cause of business cycles to be of a monetary nature. On the other hand, the phenomena which constitute the business cycle, are not monetary but real.<sup>47</sup>

As already stated, the demand for and supply of capital manifest themselves in the demand for and supply of money on the loan market. Suppose that the demand for loans remains constant whilst an expansion of credit, whether caused by the government or by the private banks, increases the supply of loanable funds on the loan market.<sup>48</sup> Mises assumes 'for the sake of simplicity' that the additional money "... flows into the loan market and reaches the rest of the market only via the loans granted."<sup>49</sup> Given the unchanged demand for loans, the market rate of interest will be lowered, if the entrepreneurs expect that "... the supply of capital (and thus the market rate of interest,  $RvZ$ ) will for some time continue at the present level. The entrepreneurs regard the present supply of capital and the present rate of interest as a

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<sup>46</sup> Mises, 1949 (1963), p. 538; Hayek, 1931 (1935), p. 27.

<sup>47</sup> Hayek's Geldtheorie und Konjunkturtheorie (1929, English translation Monetary Theory and the Trade Cycle (1933a)) may be regarded as an account of the monetary causes of the business cycle, while Prices and Production (1931) deals with the real phenomena which constitute it (cf. Hayek, 1931, p. xiii, note 1; Machlup, 1977, p. 23). Profits, Interest and Investment (1939) is a refinement and an elaboration of Prices and Production (cf. Hayek, 1939, p. vii; Machlup, 1977, p. 28).

<sup>48</sup> As Butler (1988, pp. 289 - 290) pointed out, "[c]hanges in both the supply of money and in the demand for it might initiate roughly similar disturbances ..., but Mises's main attention goes on changes in supply, which he suggests are more pronounced. Whatever its origin, the point is that changes in the money relation, that is, the interplay between the supply of money and the demand for it, bring about changes in prices and wages."

<sup>49</sup> Mises, 1949 (1963), p. 551.



signal that approximately the same situation will continue to exist for some time. It is only some such assumption that will justify the employment of additional capital to start new roundabout methods of production which, if they are to be completed, will require continued investment over a further period of time."<sup>50</sup> Note that the 'distorted' market rate of interest leads the entrepreneurs to make expectational errors. (The absence of these errors (or the absence of the distortion in the market rate of interest) would mean that the entrepreneurs have perfect knowledge, which was the defining characteristic of general equilibrium. The entrepreneurs must have imperfect knowledge and make expectational errors for a business cycle to get under way.

The natural rate of interest (as determined by the time-preferences of individuals) will however not be altered directly by the credit expansion.<sup>51</sup> This means that the market rate becomes lower than the natural rate, and that planned savings are not large enough to cover planned investments.

### 5.2. The boom

O'Driscoll and Rizzo have elaborated the onset of the boom by distinguishing three effects, namely (1) a discount effect, (2) derived-demand effects, and (3) cost effects.<sup>52</sup> Consider the following standard present value (PV) formula<sup>53</sup>:

$$PV = S_1 / (1+r) + S_2 / (1+r)^2 + \dots + S_n / (1+r)^n,$$

with  $S_i$  = expected stream of quasi-rents in period  $i$ ,

and  $r$  = market rate of interest.

The three effect may now be explained in the following manner:

<sup>50</sup> Hayek, 1933c (1939), p. 142.

<sup>51</sup> Mises admits, however, that some indirect influence will exist. Because of the nonneutrality of money, the credit expansion changes the distribution of income and wealth among the individuals who have different time-preferences. Therefore, the distributional changes lead to a change in the natural rate of interest. Note that this reasoning may lead to the same result as the 'Lucas' critique'. If the monetary authorities want to equate the natural and the market rate of interest by expanding credit, the natural rate will be altered indirectly because of the distributional effects caused by the nonneutrality of money. The policy aim will then not be attained.

<sup>52</sup> O'Driscoll and Rizzo, 1985, p. 205.

<sup>53</sup> O'Driscoll and Rizzo, 1985, p. 205.

(1) The discount effect arises because the market rate of interest is used by entrepreneurs as a discount rate. A fall in this rate raises the present value of the expected stream of quasi-rents, making it more profitable to invest more.

(2) The cost effects may be explained by observing that the market rate of interest is also the price to be paid for loans. Thus borrowing money becomes cheaper, which makes some hitherto-unprofitable projects profitable, given the present value of the quasi-rents. Both the discount and the cost effects will increase the profitability of investment in all capital goods.

(3) The derived-demand effect, by contrast, makes investment in some capital goods more profitable, while at the same time reducing the profitability of investment in others. Suppose that there are two types of capital goods: capital goods of type 1, yielding consumption output in the more distant future, and type 2, yielding consumption goods in the present. The demand for type 2 capital goods will depend more on the current demand for consumption goods than that of type 1. If the market rate of interest falls, entrepreneurs are inclined to assume that the individuals are prepared to postpone their consumption longer. Producers of capital goods of type 1 will hire production factors currently employed in the production of consumption goods and capital goods of type 2. Consumption will be replaced by investment and will become available in the more distant future. The period of production is lengthened, i.e. the production processes have become more capital-intensive.

During the expansion process entrepreneurs compete for the factors of production. This will tend to raise their prices and those of producer goods. Those individuals who see their incomes rise as a consequence of the increases in factor prices (e.g. increases in their wage rates), are able to exert a higher demand for consumer goods. But the supply of these goods has declined, because production factors have been transferred from the consumer to the producer goods industries. Then the prices of the consumer goods will rise, forcing individuals who have not experienced a rise in income to curb their consumption.<sup>54</sup>

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<sup>54</sup> Hayek (1931, p. 18) refers to this phenomenon as 'forced saving'. (For a discussion of different views on the 'doctrine of forced savings', see Hayek, 1931, pp. 17 - 19, and 1932 (1939), pp. 183 - 97). It rather seems to be a forced reduction in real income.

These price increases, combined with spreading optimism, will induce entrepreneurs to continue to invest. However, in order to make these increasing investments possible more credit is necessary, because of the consequent rises in product and factor prices. "The boom can last only as long as the credit expansion progresses at an ever-accelerated pace."<sup>55</sup> For if the credit expansion ceases, the market rate of interest will rise.

### 5.3. The crisis

According to Mises, the boom comes to an end when the credit expansion is insufficient to keep up with the accelerating demand for more loanable funds. "The boom comes to an end as soon as additional quantities of fiduciary media are no longer thrown upon the loan market."<sup>56</sup> It then seems possible to avoid the crisis by continuing and accelerating credit expansion. However, this will lead to ever-accelerating (hyper-)inflation and ultimately to the collapse of the monetary system.<sup>57</sup> As governments, monetary authorities and private banks do not want such a breakdown, they will sooner or later stop the credit expansion. The demand for money will continue to rise for some time (due to inflationary expectations) and the supply of money will not. This results in a rise in the market rate of interest. Borrowing money becomes more expensive, which means that some of the projects started during the boom will prove to be unprofitable. Entrepreneurs will not be able to obtain the funds they need for continuing their boom projects. Those investments which prove to be wrong must then be liquidated. It turns out that too many capital goods of type 1 have been produced, and too little capital goods of type 2. We may therefore speak of 'malinvestments'. The entrepreneurs retrench their activities: the depression (or contraction process) sets in, leaving unfinished investment projects in its wake.

Hayek discerned another way in which the boom must end. In his article 'Profits, Interest and Investment'<sup>58</sup>, he assumed the market rate of

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<sup>55</sup> Mises, 1949 (1963), p. 555.

<sup>56</sup> Mises, 1949 (1963), p. 555.

<sup>57</sup> For an empirical study of hyperinflation, cf. Cagan, 1956.

<sup>58</sup> Hayek, 1939 (1950), pp. 3 - 72.

interest constant. Despite this, the end of the boom will also be inevitable. In order to derive this conclusion, he made changes in the rate of interest equivalent to changes in the rate of profit.<sup>59</sup> Now, changes in the level of profits cause the crisis.<sup>60</sup>

Hayek assumes that during the first phase of the boom the real wage rate ( $w$ ) (defined as the nominal wage rate of particular labour divided by the product which that labour produced) is high compared with the market interest rate ( $r$ ). This means that the ratio  $r/w$  is low. This leads entrepreneurs to switch to more capital-intensive production processes. However, the prices of consumer goods as well as of production factors rise during the boom. Hayek assumes that during the first phase of the boom the real wage rate increases. Later, during the second phase, this rate will decrease. This decrease will lead to a rise in  $r/w$ . Employing labour then becomes relatively less expensive. The entrepreneurs realize that they have invested in too capital-intensive methods of production. They will start substituting labour for capital, thereby reducing the demand for capital goods and causing the depression. This is called the 'Ricardo effect'. As the ratio  $r/w$  changes over the cycle like an accordeon (or concertina) the effect is also called the 'Concertina effect'. Central in the argument of the 'Ricardo effect' is that at the beginning of the boom  $r/w$  is low, whilst it is high at the end of this period. Hayek never explains why this must be so. As Blaug notes, "Hayek takes for granted that commodity prices typically rise faster than money wages in the upswing of the business cycle: real wages fall in the boom."<sup>61</sup>

The Ricardo effect endogenizes the cycle by making its recurrence dependent on the circumstances in the previous period. It reinforces the depressing effect of cessation of the credit expansion. During the process of recovery credit flows back to the banks, laying the foundation for a new cycle.

#### 5.4. The depression

The depression is characterized by the reverse process as occurred during the boom. According to Mises the economy returns to its

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<sup>59</sup> Machlup, 1977, p. 22.

<sup>60</sup> Estey, 1956, p.220.

<sup>61</sup> Blaug, 1962 (1977), p. 543.

equilibrium position, which will be maintained if no further credit expansion occurs. In Hayek's view, however, credit flows back to the banks and lays the foundation for a new boom. Furthermore, there will be a reversed 'Ricardo effect', which will make the use of too labour-intensive production processes profitable.

According to Neo-Austrians the depression is a process which one should not try to avoid. On the contrary, it "... is in fact the process of readjustment, of putting production activities anew in agreement with the given state of the market data: the available supply of factors of production, the evaluations of the consumers, and particularly also the state of ordinary interest as manifested in the public's valuations."<sup>62</sup> The depression is a necessary and inevitable consequence of the boom. One should try to avoid starting a boom, not the ensuing depression.

According to Mises the net result of the business cycle is impoverishment. In his view some people have increased their wealth, but "... the immense majority must foot the bill for the malinvestments and the overconsumption of the boom episode."<sup>63</sup> It must be noted that when Mises speaks about impoverishment, he means a relative and not an absolute impoverishment: the economy could have performed better in the absence of the credit expansion and the consequent boom. Unfortunately, the criteria he used for this judgment are rather obscure.<sup>64</sup>

Hayek, on the other hand, considers the business cycle an inevitable process. It is inherent to decentralized market economies. The 'Ricardo effect' will make entrepreneurs use too capital-intensive production processes during the boom, whereas they will be too labour-intensive during the depression. One of the main reasons for this is the dispersion of knowledge, which makes it impossible for entrepreneurs to avoid expectational errors. These are inherent to a capitalistic,

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<sup>62</sup> Mises, 1949 (1963), p. 563.

<sup>63</sup> Mises, 1949 (1963), p. 564.

<sup>64</sup> Mises claims that an economy could have performed better if it did not have experienced a business cycle. At the same time he admits that some people are better off because of the cycle, while the position of others has become worse. Mises's assessment then implies that in his opinion the loss of utility of the latter is larger than the gain of utility of the former. However, this presupposes the meaningfulness of interpersonal utility comparison. It might be better to speak of 'potential impoverishment'.

decentralized market economy. Therefore, it is meaningless to speak of the business cycle as a relative impoverishment: the cycle is unavoidable.

### 5.5. The revival

Like the boom, the depression will not last forever. The process of credit contraction, which forms the essence of the depression, raises the market rate of interest above the natural rate. Malinvestments are eradicated and the market rate of interest will equal the natural rate again. But just as the boom could not continue forever, the depression will also come to a halt. During the credit contraction process, credit flows back to the private banks, which obtain a high liquidity.<sup>65</sup> This makes them increase the supply of loanable funds on the loan market. This lowers the market rate of interest and a new boom gets under way. Mises and Rothbard, on the other hand, do not think this is unavoidable. In their view the recurrence of the cycle must be explained by recurring credit expansion by the government and the central bank. These monetary authorities deliberately expand credit for their own purposes, spurred by the call of some individuals for such an expansion.<sup>66</sup>

Analogous to the Ricardo effect at the end of the boom, Hayek discerns a reverse effect at the end of the depression. The relation  $r/w$  has fallen, which will induce investment in capital-intensive processes of production. Entrepreneurs will substitute capital for labour. This increases the demand for capital goods, triggering off a new boom.

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<sup>65</sup> Cf. Hawtrey, 1913 (1970), pp. 189 - 203. Hawtrey's business cycle theory is a purely monetary theory. He argued that credit expansion by the banks is the main cause for the business cycle. During the depression credit flows back to the banks, improving their liquidity. This will enable the banks to expand credit again, which will lead to another business cycle.

<sup>66</sup> Mises, 1949 (1963), p. 578: "People are the more discouraged the greater their optimism was in the days of the upswing. They have for the moment lost self-confidence and the spirit to enterprise to such an extent that they even fail to take advantage of good opportunities. But the worst is that people are incorrigible. After a few years they embark anew upon credit expansion, and the old story repeats itself." This explanation of the recurrence of the cycle is rather psychologistic, leaving the changes in mental attitude unexplained.

### 5.6. The 'cure' for the business cycle

Considering the views expounded above, it will not come as a surprise that the Austrians reject policies of credit expansion. In their view the best cure for the business cycle is to prevent it altogether. And this can be done best by abstaining from credit expansion.

According to Mises the best way to prevent the occurrence of a business cycle is to render expansionary credit creation impossible. The best institutional way to do this is the combination of the gold standard with the system of free banking, in which every bank is allowed to create its own currency and is free to compete with other banks with regard to attracting lenders and borrowers. As Mises stated: "... under free banking it would have been impossible for credit expansion with all its inevitable consequences to have developed into a regular - ... - feature of the economic system."<sup>67</sup> He even goes so far as to claim that "[o]nly free banking would have rendered the market economy secure against crises and depressions."<sup>68</sup> In his opinion the government and the central bank, and not private enterprise, make the fault of causing the business cycle. As Haberler observes, Mises believes that without the support of the government and the central bank, the commercial banks can never produce a dangerous credit expansion, because they would immediately lose cash and become insolvent.<sup>69</sup>

Hayek also advocated the free banking system. Already in 1937 he mentioned this idea,<sup>70</sup> although his major work on the subject was published in the 1970s. In his 1976-pamphlet 'Denationalization of Money' he concluded that "[t]he abolition of the government monopoly of money was conceived to prevent the bouts of acute inflation and

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<sup>67</sup> Mises, 1949 (1963), p. 443.

<sup>68</sup> Mises, 1949 (1963), p. 443.

<sup>69</sup> Haberler, 1937 (1946), p. 65. Mises himself speaks also about insolvency (1949 (1963), p. 447). This seems rather strange, because a bank will only become insolvent if it gives money away, or if it lends money to debtors who are not creditworthy. This is far from in agreement with general banking practice. Therefore, the word 'insolvent' might better be replaced by 'illiquid'. It leads to the conclusion that banks will not go bankrupt. Nevertheless, a check on credit expansion under free banking will remain, because the government will not act as 'lender of the last resort'.

<sup>70</sup> Hayek, 1937b (1971), p. 77; see also Visser, 1989, p. 3.

deflation which have plagued the world for the past 60 years. It proves on examination to be also the much needed cure for a more deep-seated disease: the recurrent waves of depression and unemployment that have been represented as an inherent and deadly defect of capitalism."<sup>71</sup> 'Currency competition' is seen as the best way to prevent credit expansion and therefore business cycles. Thus the conclusion seems to be justified that Neo-Austrianism propounds free banking as a means to prevent business cycles.

Although Neo-Austrians are highly sceptical towards stabilization policies, some argue that certain types of depressions should be prevented by taking policy measures. In Profits, Interest and Investment Hayek makes an important distinction between an ordinary mild depression and a 'secondary depression'.<sup>72</sup> Whereas in the 1930s his views on the policy measures to be taken against a secondary depression are not easy to disentangle<sup>73</sup>, in 1978 he stated that "[s]uch a 'secondary depression' caused by an induced deflation should of course be prevented by appropriate monetary counter-measures."<sup>74</sup> These measures must be directed against a further shortening of the period of production. This leads Hayek to suggest that the new credit must become available to the producers, because they will invest, stop the shortening of the period of production and therefore end the secondary depression.<sup>75</sup> As knowledge is dispersed throughout the economy, however, two problems arise<sup>76</sup>: (1) it is difficult to ascertain whether the market rate of interest in fact is equal to the natural rate; (2) it seems almost impossible to know the extent to which credit must be expanded.

Mises does not address the problem of a secondary depression. However, one may expect him to oppose credit expansion in order to end such a depression, given his vehement attacks on 'interventionism'.<sup>77</sup>

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<sup>71</sup> Hayek, 1976, p. 99.

<sup>72</sup> Hayek, 1939 (1950), pp. 176 - 7.

<sup>73</sup> Barry, 1979, p. 165.

<sup>74</sup> Hayek, 1978, p. 210.

<sup>75</sup> Estey, 1956, p. 218.

<sup>76</sup> Cf. also Machlup, 1977, pp. 23 - 4.

<sup>77</sup> Mises, 1949 (1963), especially Chapter XXXVI, pp. 855 - 61.



Thus, Mises and Hayek differ in their views on the appropriate measures against a secondary depression. Mises's recommendation may best be interpreted as an extreme form of 'therapeutic nihilism', whereas Hayek's position in this respect is more moderate.<sup>78</sup>

## 6. Comments by latter-day Neo-Austrians

This section will be limited to the comments given by some of the most important Neo-Austrians, notably Murray Rothbard and Ludwig Lachmann.<sup>79</sup>

### 6.1. Rothbard

Rothbard in principle adheres to Mises's analysis. But whilst Mises held that both changes in the demand for and the supply of money may cause similar disturbances (although admittedly he emphasized the latter), Rothbard neglects the changes in the demand for money and claims that "[t]he Austrian view holds that persistent inflation is brought about by continuing and chronic increases in the supply of money, engineered by the federal government."<sup>80</sup> Government directly or indirectly causes inflation and therefore the boom. As the depression is a necessary consequence of the boom, governments are responsible for the relative impoverishment of the economy. The recurrence of the boom "... stems from the fact that banks will always try to inflate credit if they can, and government will almost always back them up and spur them on."<sup>81</sup> The only way to prevent business cycles is to render credit expansion impossible. This can be done by enacting a law against credit

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<sup>78</sup> The term 'therapeutic nihilism' was used by William Johnston (1972, p. 223) to typify the Neo-Austrian intellectual position which concentrated on diagnosis to the neglect of therapy. However, Hayek is clearly willing to prevent the secondary depression, although he argues that such prevention must be carried out very carefully (cf. Hayek, 1978, pp. 210 - 1).

<sup>79</sup> I would have liked to discuss Israel M. Kirzner's views on business cycle theory, but (to the best of my knowledge) he has been remarkably silent on this subject.

<sup>80</sup> Rothbard, 1963 (1975), in Introduction to the third edition.

<sup>81</sup> Rothbard, 1963 (1975), p. 37.

expansion, i.e. against fractional-reserve banking.<sup>82</sup> But a more fundamental alternative is the establishment of a system of free banking, combined with the return to a commodity standard.<sup>83</sup> Therefore Rothbard agrees with Mises and Hayek on free banking as the best prevention of credit expansion.

There is another point of agreement between Mises and Rothbard. As we have seen, Mises was criticized by Hayek for not having developed an endogenous theory of the business cycle. Rothbard, as an essentialist,<sup>84</sup> denies the validity of this criticism by asserting that "[p]rocesses are either analyzed correctly or incorrectly; the only test of any analysis is its truth, not whether it is exogenous or endogenous. If the process (of credit expansion, RvZ) is really exogenous, then the analysis should reveal this fact; the same holds true for endogenous processes. No particular virtue attaches to a theory because it is one or the other."<sup>85</sup> Again Rothbard agrees with Mises and argues that credit expansion by the government (or the government-backed central bank) causes the business cycle.

With regard to secondary depressions Rothbard's position is quite clear. In his view depressions in general constitute adjustment processes which eradicate malinvestments. It is possible that in the course of such an adjustment process this dismantling of malinvestments overshoots the 'free-market equilibrium point'. However, Rothbard does not consider this to be serious, because a credit contraction cannot create malinvestments, and therefore will not lead to another business cycle.<sup>86</sup> In the secondary depression the market rate of interest is

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<sup>82</sup> If fractional-reserve banking is abolished, private banks are not able to increase their lending potential by lending to each other. Friedman (1948, p. 247) agrees with the Neo-Austrians on this point: "The private creation of money can perhaps best be eliminated by adopting the 100 per cent reserve proposal, thereby separating the depositary from the lending function of the banking system."

<sup>83</sup> Rothbard, 1963 (1975), pp. 31 - 32.

<sup>84</sup> Rothbard describes himself as an Aristotelian and neo-Thomist; cf. Rothbard, in Dolan, 1976, p. 24. This Aristotelianism leads him to claim that it is possible to understand the 'essences' of the (social) world around us.

<sup>85</sup> Rothbard, 1963 (1975), p. 36; emphasis in original.

<sup>86</sup> Rothbard, 1962, p. 865; cf. also note 113 (p. 940).

lower than the natural rate. Planned savings are larger than planned investment. Therefore production does not take place in a sufficiently capital-intensive manner. The production processes would be more capital-intensive if the entrepreneurs would not make expectational errors concerning the 'true' (natural) rate of interest. Rothbard does not consider this insufficient capital-intensity a problem, because it is his firm belief that the market will correct the entrepreneurial expectational errors rapidly.<sup>87</sup> However, just as the economy could have performed better in the absence of a business cycle, one could argue that the individuals in the economy under consideration could have had higher standards of living if the overshooting had not occurred. This may provide a reason for preventing the secondary depression, as Hayek already indicated. Yet Rothbard would probably reject such a prevention (1) because of the inability of the monetary authorities to determine whether the free-market equilibrium point has been reached, and (2) because (even if this point could be determined) it is impossible to stabilize the economy by credit expansion because of the nonneutrality of money. It will be noticed that the rejection on grounds of principle (i.e. on the assumption that the market will correct the overshooting rapidly) then has been replaced by a rejection for more pragmatic reasons.

#### 6.2. Lachmann

Lachmann starts from the proposition that there is no such thing as the theory of business cycles.<sup>88</sup> In his opinion the task of business cycle theory is to list all their possible causes and therefore his approach may be characterized as 'eclecticist'.<sup>89</sup> He believes that it is quite possible that business cycles are caused by other factors than credit expansion. He regards malinvestment and underconsumption theories not as mutually exclusive, but rather as complementary.<sup>90</sup> Using Hicks's

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<sup>87</sup> Rothbard, 1962, p. 865.

<sup>88</sup> Lachmann, 1978, p. 100, 113.

<sup>89</sup> Lachmann, 1978, p. 101, 113.

<sup>90</sup> Lachmann, 1978, pp. 100 - 1.

distinction between weak and strong booms<sup>91</sup>, he argues that "... an underconsumption theory, which might account for the end of a weak boom, is not exactly a suitable instrument for analyzing strong booms. And there is now good historical evidence to show that strong booms (as explained by the Austrian theory, RvZ) were a more or less regular feature of the expanding world economy in its 'normal' conditions from 1870 to 1914."<sup>92</sup> In Lachmann's opinion the Austrian theory is just one explanation of the business cycle, explaining the more frequently occurring booms.

The above shows that Lachmann is not uncritical towards the Austrian theory. Egger even argues that Lachmann rejects the equilibrium approach of Hayek's Prices and Production.<sup>93</sup> But we have seen that Mises and Hayek used general equilibrium as a benchmark, not as the starting point of their analysis. Moreover, Lachmann in fact also implicitly recognises a general equilibrium, because he refers to the interpersonal inconsistency<sup>94</sup> of individual plans. This presupposes the notion of interpersonal consistency, i.e. general equilibrium. On the other hand, he has a different opinion concerning the existence of a tendency towards equilibrium. Whereas Mises and Hayek are convinced that such a tendency exists, Lachmann claims that "... in process analysis ... we need no such assumption."<sup>95</sup> Therefore his position regarding a tendency towards general equilibrium is much more sceptical than those of Mises, Hayek and Rothbard.

Lachmann argues that the Austrian business cycle theory is essentially dynamic, by referring to non-reversibility of investments. Static equilibrium is timeless, whereas in the (Neo-)Austrian analysis

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<sup>91</sup> Hicks (1950, p. 107) distinguishes between weak booms "which die of their own accord" and strong booms "which are killed by hitting the ceiling". Or, again in his own words, "[t]he main reason for the collapse of a weak boom is the insufficiency of its accelerator; the main reason for the collapse of a strong boom is the insufficiency of real resources to sustain it."(Hicks, 1950, p. 133).

<sup>92</sup> Lachmann, 1978, p. 113.

<sup>93</sup> Egger, 1986, p. 62.

<sup>94</sup> Lachmann, 1978, p. 40.

<sup>95</sup> Lachmann, 1978, p. 40.

historical time plays an important role. According to the Neo-Austrians, 'what's done is done', and needs time to be undone.<sup>96</sup> Moreover, Lachmann (like his fellow-Austrians) stresses that capital is a set of heterogeneous goods.<sup>97</sup> This heterogeneity and the specificity of capital goods reinforce the non-reversibility of investments, which makes the adjustment process more time-consuming and more costly.

With regard to the secondary depression, Lachmann strongly defends the need to avoid such a process. He even adheres to the view that the prevention of such a depression "... must always be the primary aim of monetary policy in a recession."<sup>98</sup> This again shows his scepticism towards (Neo-)Austrian theory.

Lachmann's eclecticism not only becomes apparent when he argues that underconsumptionist and malinvestment theories of the business cycle are complementary, but also when he considers technological change as a possible cause of the business cycle.<sup>99</sup> Schumpeter had already developed a business cycle theory which treated technological development as the most important cause of the cycle.<sup>100</sup> In this theory the monetary system does not constitute the main disturbing factor of

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<sup>96</sup> Lachmann, 1978, p. 118.

<sup>97</sup> Lachmann, 1978, p. 102.

<sup>98</sup> Lachmann, 1978, p. 120.

<sup>99</sup> Lachmann's fellow-Neo-Austrians did not consider technological change in this respect, although Hayek did address the question whether a central planning authority could more adequately use the opportunities for increasing 'general wealth' made available by technical development than individual entrepreneurs; cf. Hayek, 1936b (1984).

<sup>100</sup> In Schumpeter's view, 'innovation' means combining factors of production in new ways which were not known before (1939, p. 88), which means that new knowledge has been 'created'. An innovation leads to increased consumer and producer spending. Spreading through the economy from the point where they originated, these increases create the boom. However, this process will not go on indefinitely, because when completely spread out, the effects of the innovation will cease. On the other hand, according to Schumpeter, "... many people will act on the assumption that the rates of change they observe will continue indefinitely, and enter into transactions which will result in losses as soon as facts fail to verify that assumption" (1939, p. 145). This will also apply to transactions on the loan market. As we have seen in section 5.3., the credit expansion must come to an end, otherwise the monetary system will ultimately collapse.

the business cycle.<sup>101</sup> It nevertheless plays an important role during the boom, because it enables it to start and to continue. Lachmann also develops a business cycle theory which identifies technological change as the main cause of the cycle. He assumes that labour is homogeneous, that there is no labour mobility between industries and that there is a fairly rapid inter-cyclical increase in labour productivity as a result of technological progress.<sup>102</sup> Furthermore, he presumes that the consumer goods industry, the capital goods industry, and the raw materials industry are complementary, in the sense that an increase in the demand for consumer (C-) goods will raise the demand for equipment (E-goods) and raw materials (R-goods).<sup>103</sup> The output of a fourth sector, of the 'dynamic key (K-) industry' which is highly sensitive to innovations, may be complementary to or competitive with the output of C, E and R. This will depend on two effects, namely the 'Lundberg effect' and the 'Ricardo effect'. The former is a cost effect and concerns the relationship between present costs and expected future yields.<sup>104</sup> It presupposes the market rate of interest as given. A rise in costs will then lower the inducement to invest.<sup>105</sup> The Ricardo effect, which is identical to that of Hayek, is a substitution effect. It also applies when the market rate of interest is constant. It checks the boom by raising the real wage, thereby inducing the substitution of labour by capital goods. In this way it creates capital shortages and thus checks the boom, even if the market rate of interest would be constant.

Given these assumptions Lachmann shows that a business cycle may come

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<sup>101</sup> Leijonhufvud (1984, pp. 187) created a taxonomy which defined four types of business cycles. These types are defined in terms of (1) the nature of the cause of the cycle, and (2) the nature of the phenomena which constitute it. Both 'natures' may be real (R) or nominal (N) (although 'monetary' is perhaps a better term). This approach leads to a two-way taxonomy: N/N, N/R, R/N, and R/R. The Neo-Austrian theory belongs then to the N/R category while that of Schumpeter and Lachmann may be characterized as R/R. Cf. also Garrison, 1989, p. 5.

<sup>102</sup> Lachmann, 1977, p. 272.

<sup>103</sup> Lachmann, 1977, p. 273.

<sup>104</sup> Erik Lundberg (1937, p. 230) related receipts to the rate of interest. Lachmann argues that the theorem may be extended so as to cover other costs than interest. Cf. Lachmann, 1977, note 6 on p. 285.

<sup>105</sup> Lachmann, 1977, p. 273.

about because of the introduction of an innovation. His theory may be regarded as an extension of (or better, a supplement to) the Hayekian theory. Moreover it incorporates Schumpeter's analysis into the Neo-Austrian framework.

### 7. An assessment

The criticism against the (Neo-Austrian) theory of money is twofold. Firstly, as Moss pointed out, Mises insisted on the relative unimportance of the speculative demand for money, thereby cutting short a line of development in Austrian thought that could have proved useful in explaining business cycles.<sup>106</sup> Secondly, Mises implicitly assumes that people when planning the optimum size of their cash holdings, form expectations about future price behaviour on the basis of past price experience. This, as Moss remarks, is a rather bold empirical statement.<sup>107</sup> It seems very likely that other factors will also influence price expectations.

The theory of capital plays an important role in the Neo-Austrian business cycle theory. Heterogeneous capital goods are arranged in stages of production. These stages are vertically related to each other. However, there are cross-linkages between the stages of production which possibly render the (Neo-)Austrian scheme of thought incapable of describing an economy's capital structure adequately.

Apart from criticisms against the theories underlying the business cycle theory, the latter itself has also been criticized. Four lines of such criticism may be distinguished.

Firstly, Mises treats credit expansion as an exogenous cause of the cycle. It would completely disappear if the monetary authorities would refrain from credit expansion. In his view the cycle is not a regular and unavoidable phenomenon, but entirely due to the distorting influence of credit expansion. As Haberler concludes, the cause of its recurrence is a political or ideological one.<sup>108</sup> Hayek explains the

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<sup>106</sup> Moss, 1976, p. 14. As already argued in section 2.1 (note 6), Mises confused 'the utility of (holding) money' with 'the utility of the services provided by money'.

<sup>107</sup> Moss, 1976, p. 21.

<sup>108</sup> Haberler, 1937 (1946), p. 65.

cycle in a different way. He distinguishes between individual and general equilibrium, and interprets the cycle as a discoordination phenomenon, which is inherent in the market system as we know it.<sup>109</sup> The 'Ricardo effect' (or 'Concertina effect') endogenizes the explanation of the business cycle. Moreover, Hayek treats the monetary system endogenously, i.e. as part of the competitive system. The depression remains the inevitable readjustment process, made necessary by the boom.

Secondly, Neo-Austrian business cycle theory attributes great significance to changes in the market rate of interest. With regard to investments, however, other influences (such as the expected prices of output and input) may play a larger role. Again, Hayek tries to repair this possible deficiency by holding the market rate of interest constant. The role formerly played by this rate is then taken over by the rate of profit. According to Hayek, even with a constant market rate of interest the boom will come to an end because of the 'Ricardo effect'. The workings of this effect, however, depend on his assumption that the ratio  $r/w$  is low at the beginning of the boom and high at the end of this phase. It is not clear if Hayek's assumption with regard to the  $r/w$ -ratio is correct.

Thirdly, the inevitability of an 'ordinary' depression does not lead to the conclusion that a secondary depression is necessary as well. If the readjustment process is completed, but pessimism and the effects of a deceleration principle cause some 'overshooting', it does not necessarily follow that governments and central banks must abstain from intervention to prevent a secondary depression. According to Rothbard on the other hand, secondary depressions do not cause malinvestments and therefore cannot lead to another business cycle. Certain profit opportunities will arise, which indicate that the economy has not reached equilibrium. He does not consider this a problem and trusts that the market will soon fulfil these opportunities. However, the secondary depression does mean a relative impoverishment of the economy, because the arising profit opportunities indicate a movement away from general equilibrium. Furthermore, as overshooting means that people consume more (save less) than they want to, secondary depressions imply undesirabilities for the individuals. Hayek and Lachmann therefore argue that there are reasons to expand credit, so as

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<sup>109</sup> Hayek, 1933a (1976), pp. 143 - 4.



to prevent a secondary depression. According to Estey Hayek's position is that "[i]f any credit is to be granted at all, it should be to the producers, to encourage them to lengthen the process of production; and this only because the effects of deflation have caused the structure of production to shrink more than the voluntary distribution of saving and spending will eventually justify. But a very precise knowledge of the amount of stimulus to be given and very careful arrangements to withdraw the credit at the precise time necessary to avoid overexpansion of producers' goods, and so another boom and crisis, would be needed."<sup>110</sup> Given their methodologically individualist and subjectivist views, Neo-Austrians cannot but advise to refrain from, or at least be very reserved concerning, intervention in the loan market.

Technological progress did not play an important part in the Austrian theory of the trade cycle. Lachmann introduced this subject by combining Schumpeterian and Austrian business cycle theories. Moreover, he made clear that the Austrian business cycle theory supplies only one of the possible explanations of the phenomenon of industrial fluctuations. In his view the major theories are complementary, in the sense that each explains a different type of business cycle. This is of course completely at odds with Rothbard's opinion that the Austrian theory is the only correct one.

#### 8. Conclusions and final remarks

According to O'Driscoll and Rizzo the main difference between schools of thought lies in the questions they pose, and not so much in the answers they give.<sup>111</sup> (Neo-)Austrians are individualists and subjectivists. This implies that they will pay much attention to the individual subjects and specifically to the imperfect knowledge and the plans of these individuals. Furthermore, they will try to explain 'macroeconomic' (or 'aggregative') phenomena in terms of the plans of individuals. Hayek's distinction between individual and general equilibrium is therefore of great importance as a benchmark.

Neo-Austrian business cycle theory identifies unexpected monetary

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<sup>110</sup> Estey, 1956, p. 218.

<sup>111</sup> O'Driscoll and Rizzo, 1985, p. 229.

disturbances as causing the business cycle. These disturbances may be either exogenous (Mises, Rothbard) or endogenous (Hayek). The boom gets under way because of the nonneutrality of money, the dispersion of knowledge, entrepreneurial expectational errors, and the non-reversibility of (mal)investments. The non-reversibility is caused by the Neo-Austrian (historical) time concept and the heterogeneity and specificity of capital goods in their analysis. Although caused by monetary disturbances, the boom itself is constituted by real phenomena.

According to Neo-Austrians a boom cannot be sustained by increasingly expanding credit because this would lead to hyperinflation and the collapse of the monetary system. Furthermore, the dispersion of knowledge (and therefore the incomplete knowledge on the part of the policy-makers) and the nonneutrality of money render it impossible to pursue a contra-cyclical monetary policy. The primary or 'ordinary' depression is a necessary consequence of the boom. This does not apply to the secondary depression. But if this does occur, the Neo-Austrians differ with regard to the policy measures to be taken. Rothbard and presumably Mises would resist a credit expansion; Hayek and Lachmann, on the other hand, propose to lend additional money to producers in order to prevent a further shortening of the period of production, and if necessary to lengthen it again. But they caution the policy-makers not to overshoot the necessary credit expansion, as otherwise another business cycle would occur. These two Neo-Austrian positions regarding the policy measures to be taken in order to divert a secondary depression may be considered two forms of 'therapeutic nihilism', an extreme and a moderate one.<sup>112</sup>

In conclusion, the main characteristics of the Neo-Austrian business cycle theory are: (1) some perfect-knowledge point of reference (or benchmark), be it a static or dynamic one; (2) a dynamic disequilibrium analysis; (3) a monetary cause of the cycle (combined with the nonneutrality of money, leading to real disturbances); (4) the dispersion of knowledge (giving rise to entrepreneurial expectational

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<sup>112</sup> The notion of 'therapeutic nihilism', of course, implies radicalism with regard to policy. By the standards of the Neo-Classical Synthesis it is in fact a very extreme position. This even applies to its moderate version.

errors and disequilibrium phenomena); (5) real disequilibrium phenomena, notably non-reversible malinvestments, which constitute the cycle; (6) some form of 'therapeutical nihilism'. Furthermore, the theory explains business cycles either exogenously or endogenously (with the help of the 'Ricardo effect').

## References

Aschheim, J., and C.-Y. Hsieh, Macroeconomics, Income and Monetary Theory, Columbus: Merrill, 1969.

Barry, N.P., Hayek's Social and Economic Philosophy, London, 1979.

Butler, E., Ludwig von Mises, Aldershot: Gower, 1988.

Butos, W., 'Hayek and General Equilibrium Analysis', Southern Economic Journal, vol. 52 (1986), 332 - 43.

Cagan, Ph., 'The monetary dynamics of hyperinflation', in M. Friedman, (ed.), Studies in the Quantity Theory of Money, Chicago: University of Chicago Press, 1956, pp. 25 - 117.

Caldwell, B., 'Hayek's Transformation', History of Political Economy, vol. 20 (1988), pp. 513 - 41.

Cantillon, R., Essai sur la Nature du Commerce en Général (1775), with an English translation, edited by Henry Higgs, London: MacMillan for the Royal Economic Society, 1931.

Dolan, E.G., (ed.), The Foundations of Modern Austrian Economics, Kansas City: Sheed and Ward, 1976.

Egger, J.B., 'A sympathetic critic of the Austrian business-cycle theory', in I.M. Kirzner, (ed.), 1986, pp. 56 - 71.

Estey, J.A., Business Cycles, Englewood Cliffs, N.J.: Prentice-Hall, 1956.

Friedman, M., 'A monetary and fiscal framework for economic stability', American Economic Review, vol. 38 (1948), pp. 245 - 64.

Garrison, R., 'Austrian economics: a diagrammatical exposition', in L.M. Spadaro, (ed.), New Directions in Austrian Economics, Kansas City: Sheed and Ward, 1978, pp. 167 - 204.

Garrison, R., 'Austrian Economics as the Middle Ground: Comment on Loasby', in I.M. Kirzner, (ed.), 1982, pp. 131 - 138.

Garrison, R., 'A subjectivist view of a capital-using economy', in G.P. O'Driscoll, Jr., and M.J. Rizzo, (eds.), 1985, pp. 160 - 87.

Garrison, R., 'The Austrian theory of the business cycle in the light of modern macroeconomics', Review of Austrian Economics, vol. 3 (1989), pp. 3 - 29.

Haberler, G., Prosperity and Depression, New York: League of Nations, 1937 (reprint 1943-edition United Nations, 1946).

Haberler, G., 'The World Economy, Money, and the Great Depression 1919-1939', Washington, D.C.: American Enterprise Institute for Public Policy Research, 1976.

Hahn, F., 'On Some Problems of Proving the Existence of Equilibrium in a Monetary Equilibrium', in F.H. Hahn and F.B.R., Brechling, (eds.), The Theory of Interest Rates, London: MacMillan, 1965, pp. 126 - 35.

Hawtrey, R.G., Good and Bad Trade, New York: Kelley, 1913 (1970).

Hawtrey, R.G., 'The trade cycle and capital intensity', Economica, vol. VII (1940), pp. 1 - 22.

Hayek, F.A. von, 'Intertemporal Price Equilibrium and Movements in the Value of Money', 1928, in F.A. von Hayek, 1984.

Hayek, F.A. von, Geldtheorie und Konjunkturtheorie, Wien: Hölder-Pichler-Tempski, 1929 (reprint Salzburg: Wolfgang Neugebauer, 1976); English translation Monetary Theory and the Trade Cycle, London, 1933a (New York, 1971).

Hayek, F.A. von, Prices and Production, London: Routledge & Kegan Paul, 1931 (1935, 2nd. ed.).

Hayek, F.A. von, 'The Present State and Immediate Prospects of the Study of Industrial Fluctuations', 1933b, in Hayek, 1939 (1950), pp.

171 - 82.

Hayek, F.A. von, 'Price Expectations, Monetary Disturbances and Malinvestments', 1933c, in F.A. von Hayek, 1939 (1950), pp. 135 - 56.

Hayek, F.A. von, 'Über 'neutrales Geld'', Zeitschrift für Nationalökonomie, vol. 4 (1933d), pp. 659 - 61.

Hayek, F.A. von, 'Utility Analysis and Interest', Economic Journal, vol. 46 (1936a), pp. 44 - 60.

Hayek, F.A. von, 'Technical progress and excess capacity', 1936b, in F.A. von Hayek, 1984, first published as 'Technischer Fortschritt und Überkapazität' in Österreichische Zeitschrift für Bankwesen, vol. 1 (1936), pp. 9 - 23.

Hayek, F.A. von, 'Economics and Knowledge', Economica, vol. 4 (1937a), pp. 33 - 54.

Hayek, F.A. von, Monetary Nationalism and Institutional Stability, London: Longmans, Green, 1937b, reprinted by A.M. Kelley, New York, 1971.

Hayek, F.A. von, Profits, Interest and Investment, London: Routledge & Kegan Paul, 1939 (1950).

Hayek, F.A. von, 'The Ricardo effect', Economica, vol. IX (1942a), pp. 127 - 52.

Hayek, F.A. von, 'A comment', Economica, vol. IX (1942b), pp. 383 - 5.

Hayek, F.A. von, 'Time-Preference and Productivity: A Reconsideration', Economica, vol. 12 (1945), pp. 22 - 5.

Hayek, F.A. von, 'Three elucidations of the Ricardo effect', Journal of Political Economy, vol. 77 (1969), pp. 274 - 85.

Hayek, F.A. von, (ed.), Toward Liberty: Essays in honor of Ludwig von Mises, Menlo Park: Institute for Humane Studies, 1973.

Hayek, F.A. von, Denationalization of Money, London: Institute of Economic Affairs, 1976.

Hayek, F.A. von, New Studies in Philosophy, Politics, Economics and the History of Ideas, London: Routledge & Kegan Paul, 1978.

Hayek, F.A. von, Money, Capital & Fluctuations, edited by R. McCloughry, London: Routledge & Kegan Paul, 1984.

Hicks, J.R., A Contribution to the Theory of the Trade Cycle, Oxford: Clarendon Press, 1950.

Hicks, J.R., 'The Hayek story', in J.R. Hicks, Critical Essays in Monetary Theory, Oxford: Clarendon Press, 1967, pp. 203 - 15.

Johnston, W.M., The Austrian Mind, Berkeley: University of California Press, 1972.

Kaldor, N., 'Capital intensity and the trade cycle', Economica, vol. VI (1939), pp. 40 - 66.

Kaldor, N., 'Professor Hayek and the Concertina effect', Economica, vol. IX (1942), pp. 359 - 82.

Kirzner, I.M., (ed.), Method, Process, and Austrian Economics, Lexington, Mass.: Lexington Books, 1982.

Kirzner, I.M., (ed.), Subjectivism, Intelligibility and Economic Understanding, London: MacMillan, 1986.

Krabbe, J.J., A. Nentjes and H. Visser, (eds.), Austrian Economics: Roots and Ramifications Reconsidered, Rochester (Kent): MCB University Press, 1989.

Lachmann, L.M., 'On crisis and adjustment', Review of Economics and Statistics, vol. 21 (1939), pp. 62 - 8.

Lachmann, L.M., Capital, Expectations, and the Market Process, ed. by

W.E. Grinder, Kansas City: Sheed Andrews and McMeel, 1977.

Lachmann, L.M., Capital and its Structure, Kansas City: Sheed Andrews and McMeel, 1978, pp. 100 - 27.

Leijonhufvud, A., 'What would Keynes have thought about rational expectations', in D. Worswick and J. Trevithick, (eds.), Keynes and the Modern World, Cambridge: Cambridge University Press, 1984, pp. 179-221.

Loasby, B., 'Economics of Dispersed and Incomplete Information', in I.M. Kirzner, (ed.), 1982, pp. 111 - 130.

Lundberg, E., Studies in the Theory of Economic Expansion, Stockholm Economic Series, 1937.

Lutz, F.A., and V. Lutz, 'Capital intensity and the trade cycle', in F.A. Lutz and V. Lutz, The Theory of Investment of the Firm, Princeton: Princeton University Press, 1951, Chapter XI, pp. 137 - 42.

Machlup, F., (ed.), Essays on Hayek, London, 1977.

Menger, C., Grundsätze der Volkswirtschaftslehre, Wien, 1871, Gesammelte Werke, Band I, Tübingen: J.C.B. Mohr (Paul Siebeck, 1968.

Mises, L. von, Theorie des Geldes und der Umlaufsmittel, München und Leipzig: Von Duncker & Humblot, 1912 (1924).

Mises, L. von, Human Action, Chicago: Contemporary Books, 1949 (1963).

Moss, L.S., (ed.), The Economics of Ludwig von Mises, Kansas City: Sheed and Ward, 1976.

Moss, L.S., and K.I. Vaughn, 'Hayek's Ricardo effect: a second look', History of Political Economy, vol. 18 (1986), pp. 545 - 65.

O'Driscoll, G.P., Economics as a Coordination Problem, Kansas City: Sheed Andrews and Mcmeel, 1977.



- O'Driscoll, G.P., Jr., and M.J. Rizzo, The Economics of Time and Ignorance, Oxford: Blackwell, 1985.
- Patinkin, D., Money, Interest, and Prices, Evanston (Ill.): Row, Peterson and Company, 1956.
- Rothbard, M.N., Man, Economy, and State, vol. I and II, Princeton, N.J.: D. Van Nostrand, 1962.
- Rothbard, M.N., America's Great Depression, Kansas City: Sheed and Ward, 1963 (1975).
- Schumpeter, J.A., History of Economic Analysis, London: Allen & Unwin, 1954 (1982).
- Tullock, G. 'Why the Austrians Are Wrong About Depressions', Review of Austrian Economics vol. 2 (1988), pp. 73 - 78.
- Visser, H., 'Neutraal Geld, een overzicht', De Economist, vol. 119 (1971), nr. 4, pp. 393 - 439.
- Visser, H., 'The monetary order', Research Memorandum no. 1989-3, Amsterdam: Free University, 1989.
- Wicksell, K., Geldzins und Güterpreise, Jena: Gustav Fischer, 1898.
- Wilson, T., 'Capital theory and the trade cycle', Review of Economic Studies, 1940, pp. 169 - 79.
- Yeager, L.B., 'The Austrian School on Money and Gold', in J.J. Krabbe, et al., 1989, pp., 92 - 105.
- Zuidema, R.P., 'On the Austrian Contribution to Capital Theory', in J.J. Krabbe, et al., 1989, pp. 64 - 78.

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