

# UNCERTAINTY, MONEY AND UNDEREMPLOYMENT

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## Abstract

This paper presents a restatement of Keynes's underemployment equilibrium as a center-equilibrium system. The authors present their central-equilibrium underemployment model with the income-balancing mechanism. The authors postulate the existence of a causal link between the fundamental uncertainty and the center-equilibrium underemployment. Two channels of fundamental uncertainty are suggested here to capture this causal link, the capital channel and the money channel. Drawing upon Davidson (2009, p. 333; 1991, p. 138), the authors identify the capital channel of fundamental uncertainty with the entrepreneurial risk and the money channel of fundamental uncertainty with the cash-flow-managerial risk of asset-liability mismatch. From this, the author infer a conclusion that the economic policy of flexible liquidity supply cannot be mixed up with an economic policy of governmental spending under a highly ambiguous term "money pumping".

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**Keywords:** General equilibrium, underemployment equilibrium, fundamental uncertainty, liquidity preference, natural rate of interest

## Introduction

The post-keynesian economics has been showing a long-run interest in the issues of equilibria of dynamic systems. In this direction of expansion, the post-keynesian research program could not have avoided a head-on confrontation with the natural-rate hypothesis which represents one of building blocks of neoclassical economics. Davidson refers to the "fundamental neoclassical article of faith" (Davidson, 1993, p. 312) in this context. In the capital market, the natural-rate hypothesis finds its manifestation in the natural rate of interest. As long as the money rate of interest falls short of the natural rate, the inflation rate is going to increase. This two-rate theory of Knut Wicksell (1898, pp. 102-121) became a theoretical foundation of the New Consensus monetary policy of inflation targeting. What if the capital market is not getting cleared by changes in the

interest rate, though? What if both the desire to invest and the desire to save are independent of the interest rate? (Keynes, 1936, p. 97, 135; 1937, p. 250). An introduction of such an assumption would inevitably explode the whole concept of the natural rate of interest and, in effect, the general-equilibrium paradigm of permanent market clearing.

In this paper, we are going to examine the causal links interconnecting the most significant building blocks of post-keynesian monetary economics. These building blocks are fundamental uncertainty, liquidity preference, criticism of the general-equilibrium assumption and criticism of Say's law. We are going to discuss these elements with respect to Keynes's underemployment equilibrium such as expounded in *The General Theory* (1936). We will put forward our restatement of Keynes's underemployment equilibrium as a center-equilibrium system. Next, we will postulate the existence of a causal link between the fundamental uncertainty and this center-equilibrium underemployment. Drawing upon the research of Davidson (1991, 2009, 2012), we will distinguish two channels – the capital channel and the money channel – through which the fundamental uncertainty results in the central-equilibrium underemployment. We will base our effort to describe the differences between these two channels on the distinction between the notion of negative net worth on the one hand and the bankruptcy (/insolvency) on the other hand. Drawing upon Davidson's notions of "maintenance of one's liquid status" (Davidson, 2009, p. 333) and "certainty of cash flows (but not necessarily real outcomes) over time" (Davidson, 1991, p. 138), we will identify the capital channel of fundamental uncertainty with the entrepreneurial risk and the money of fundamental uncertainty with the cash-flow-managerial risk of asset-liability mismatch. Finally, based on our hypothesis of two channels, we will show that an economic policy of flexible liquidity supply cannot be mixed up with an economic policy of governmental spending under a highly ambiguous term "money pumping".

The first section of the paper provides an introduction of two theoretical foundations of neoclassical economics, the general-equilibrium theorem and Say's law. In the second section, we present our two center-equilibrium underemployment models, with the assumption of the natural-interest-rate-clearing capital market and, in the other case, with the assumption of the income-balancing mechanism of the capital market. The third section focuses on Keynes/post-keynesian criticism of Say's law through the income-balancing mechanism and from the liquidity-preference theoretical position. Our hypothesis of two channels of fundamental uncertainty is expounded at this place and the conclusions are drawn from it.

## Say's Law and General Equilibrium

Neoclassical economics is based on Say's law. This principle, described by Jean-Baptist Say in the 18<sup>th</sup> century, explains why the idea of insufficient aggregate demand is erroneous. Whenever a good is produced, the factors of production used to produce this good are paid their remuneration, and so the aggregate value of all goods produced in an economy must be equal to the aggregate value of remunerations of factors of production which stand for the sum of all incomes. So, even though there may be markets with excess supply (the quantity produced exceeds the quantity demanded), there must be other markets with excess demand (the quantity demanded exceeds the quantity produced). Why? Because the system is closed.

This set-up changes substantially at the moment we accept the assumption that the subject can shift today's consumption into future, in other words, if we built the possibility of saving into the model<sup>50</sup>. On the assumption that there are no intra-temporal exchanges and the money supply is constant, the condition of an inter-temporal closedness of a system consisting of n inter-temporal markets (actually, capital markets) can be expressed as follows:

$$(Y^A)^{\text{today}^+} + (Y^B)^{\text{today}^+} + (Y^A)^{\text{tomorrow}^+}/(1+r) + (Y^B)^{\text{tomorrow}^+}/(1+r) = \\ = (Y^A)^{\text{today}^*} + (Y^B)^{\text{today}^*} + (Y^A)^{\text{tomorrow}^*}/(1+r) + (Y^B)^{\text{tomorrow}^*}/(1+r) \quad (1)$$

or

$$[(Y^A)^{\text{today}^+} - (Y^A)^{\text{today}^*}] + [(Y^B)^{\text{today}^+} - (Y^B)^{\text{today}^*}] = \\ = [(Y^A)^{\text{tomorrow}^*}/(1+r) - (Y^A)^{\text{tomorrow}^+}/(1+r)] + [(Y^B)^{\text{tomorrow}^*}/(1+r) - (Y^B)^{\text{tomorrow}^+}/(1+r)] \quad (2)$$

In other words, the sum of today's incomes and tomorrow's incomes that the subjects A and B are endowed with has to be equal to the sum of today's incomes and tomorrow's incomes of the subjects A and B after the exchange. The exchange consists in that A saves a portion of his today's income and lends it to B, so that B can increase his today's consumption. But B will have to repay this loan to A with interest tomorrow.

What is the practical result of the above said? The practical consequence of the assumption of the inter-temporal closedness of a system is, as we could see, that all savings are consumed in the future. Or, vice versa, that all debts are repaid by future savings. However, since the future can be located to infinity, this assumption is more of theoretical than practical consequences. And, above all, this model does not incorporate the supply side of the economy. A's savings are used by B to increase his today's consumption. B's willingness to pay an interest rate to A is co-

<sup>50</sup> We assume a simple two-period model as introduced by Fisher, 1930, pp. 38-45.

determined by his time preference. But what if B used these savings to increase the productive capacities which would make possible for him to repay the interest to A without being forced to reduce his consumption in the future period? What would be the interest rate he would be willing to pay to A? Definitely, any interest rate lower than the net rate of return from this investment. In that case, the assumption we made that the goods do not “grow” is not valid any more. Increased productivity resulting from the investment means that the amount of (some) goods tomorrow will be higher than today

$$(Y^A)^{today+} + (Y^B)^{today+} + (Y^A)^{tomorrow+}/(1+r) + (Y^B)^{tomorrow+}/(1+r) < < (Y^A)^{today*} + (Y^B)^{today*} + (Y^A)^{tomorrow*}/(1+r) + (Y^B)^{tomorrow*}/(1+r) \quad (3)$$

or

$$[(Y^A)^{today+} - (Y^A)^{today*}] + [(Y^B)^{today+} - (Y^B)^{today*}] < < [(Y^A)^{tomorrow*}/(1+r) - (Y^A)^{tomorrow+}/(1+r)] + [(Y^B)^{tomorrow*}/(1+r) - (Y^B)^{tomorrow+}/(1+r)] \quad (4)$$

where

$$(Y^B)^{tomorrow*}/(1+r) = (Y^B)^{tomorrow+}/(1+r) + I \cdot (1+\eta)/(1+r) - (\Delta Y^A)^{tomorrow}/(1+r) \quad (5)$$

where  $\eta$  is the productivity growth, which means that as for  $\eta > r$  (productivity growth rate higher than the interest rate paid to A), B’s future income will be higher thanks to the investment made.

The conclusion is that there is such interest rate  $r$  – provided the productivity growth rate  $\eta$  is known (!) - at which A will be willing to abstain from consumption of the value  $I$  which will make it possible to B to increase productivity  $(1+\eta)$ -times which ensures repayment of the interest to A and which ensures that B not only does not have to decrease his consumption in the future but he can even consume more (that is the meaning of the last inequality). On the other hand, the above said inequalities (3) and (4) be a question about the alleged closedness of this system. As long as a system is not described by equations, the problem of non-existence of a unique equilibrium prevails. How could this fly in the ointment be disposed of? Let us consider following. In retrospect, B knows that his investment lead to productivity growth and to increase of his income. Also, all of this had been expected by him before he did the investment, even though the precise numbers (namely,  $\eta$ ) were not known to him. However, in a probabilistic sense, they were. Let us say that the risk of a bankruptcy had been estimated by him as a probability  $P$ . Then, though, we could incorporate the present value of this expected future income (with respect to the probability of a failure) and we could write from the ex post view:

$$(Y^A)^{today+} + (Y^B)^{today+} + (Y^A)^{tomorrow+}/(1+r) + (Y^B)^{tomorrow+}/(1+r) + I \cdot \eta/(1+r) =$$

$$= (Y^A)^{\text{today}*} + (Y^B)^{\text{today}*} + (Y^A)^{\text{tomorrow}*}/(1+r) + (Y^B)^{\text{tomorrow}*}/(1+r). \quad (6)$$

Inserting the member  $I \cdot \eta / (1+r)$  turned the inequality into an equality. On the other hand, the interpretation of such a step is inevitably that the exchange (A providing savings to B for interest, B doing an investment) does not change the real product. In other words, for a system to be closed, no operation can affect this size of the Edgeworth box. This closedness is not reached by assuming that the real output cannot increase – that would contradict both the facts and common sense – but, vice versa, by assuming that the real output had increased already. Any change affecting the size of the Edgeworth box is reflected before it happens. Any investment which will be done in the future is discounted to the present. This is more or less what the *complete markets theory* is about which is so strongly criticized by Davidson (2009, pp. 326-328).<sup>51</sup>

### **General Equilibrium Revised**

#### ***A Center-Equilibrium Underemployment Model With the Natural Rate of Interest***

The theory of general equilibrium (GE) sounds so plausible that it is very uneasy to escape it. All disequilibria will disappear through the process of market clearing. There is always a configuration of prices which will dispose of all excess demands and excess supplies. Yet, the cases of prevailing involuntary unemployment in many labor markets beg the question about the realism of the GE theory, nonetheless: “It is not surprising, therefore, that unemployment still plagues most 20th century economies, since neoclassical economists still formulate policy guidelines which are only applicable to a limited domain where agents choose “as if” they had specific and completely ordered knowledge about the future outcomes of their actions.” (Davidson, 1991, p. 137). The question to be asked here, is, then, what prevents the markets from getting cleared? Keynes noticed the wage rigidities but, unlike his followers who became called Keynesians, he did not regard these rigidities as the primary cause of unemployment.<sup>52</sup> A second possible cause of malfunctioning of the market-clearing mechanism is imperfect information. Imperfect information is just a special case of transaction costs. Except for imperfect information, another example can be transportation costs, legal costs and other bargaining costs.

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<sup>51</sup> “To some an assumption that the future is already known may seem preposterous. Nevertheless this idea underlies the Greenspan belief [...] that the self interest of lending institutions in a free market should lead management to undertake transactions that protect shareholder’s equity.” (Davidson, 2009, p. 326).

<sup>52</sup> For the misperceived role of nominal-wage rigidities see the whole chapter 19 of The General Theory.

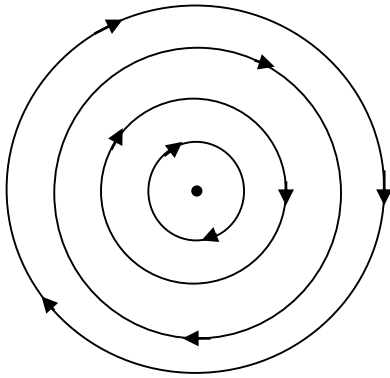
However, flow of time, technological progress and institutional progress eliminate these obstacles to the market-clearing process.

All these factors may slow down the market-clearing process but they do not present a fundamental obstacle to the theory of general equilibrium in the long run. However, this theory stands and falls on the assumption of *the existence* of a unique **and** stable equilibrium. A distinction must be kept in mind between uniqueness of an equilibrium, which regards the very existence of a single gravitational center, and its stability, which regards the question whether the system can reach its equilibrium automatically, or not (Jespersen, 2009, pp. 164-165).<sup>53</sup> A dynamic system which possesses both a unique **and** stable equilibrium is a system of traditional equilibrium.<sup>54</sup> If such a system is deviated from its equilibrium configuration, there is no external influence necessary for such a system to restore its equilibrium. The equilibrium of this system gets restored by operation of the system's own endogenous dynamics. A system which possesses a unique but unstable equilibrium does not display such a characteristic. A dynamic system with a unique but unstable equilibrium – or a knife-edge equilibrium - only stays in its equilibrium configuration if (and as long as) it is not diverted from this position. As soon as the system gets diverted from this position – even infinitesimally – a slight balance gets disturbed and the system starts a process of divergence. There is another type of a dynamic system, though, which possesses a unique equilibrium which the system cannot reach by its own but, at the same time, when it reaches it, it stays in this position. This is a center-equilibrium system. As long as the system's parameters do not acquire the “right” values, the system will circulate along concentric orbits, unable to reach the equilibrium configuration by a mere operation of its own endogenous dynamics. To make the system reach its unique (but unreachable by endogenous forces) equilibrium, there has to be an exogenous force which helps the system get over the barriers of concentric orbits and brings it to its equilibrium.

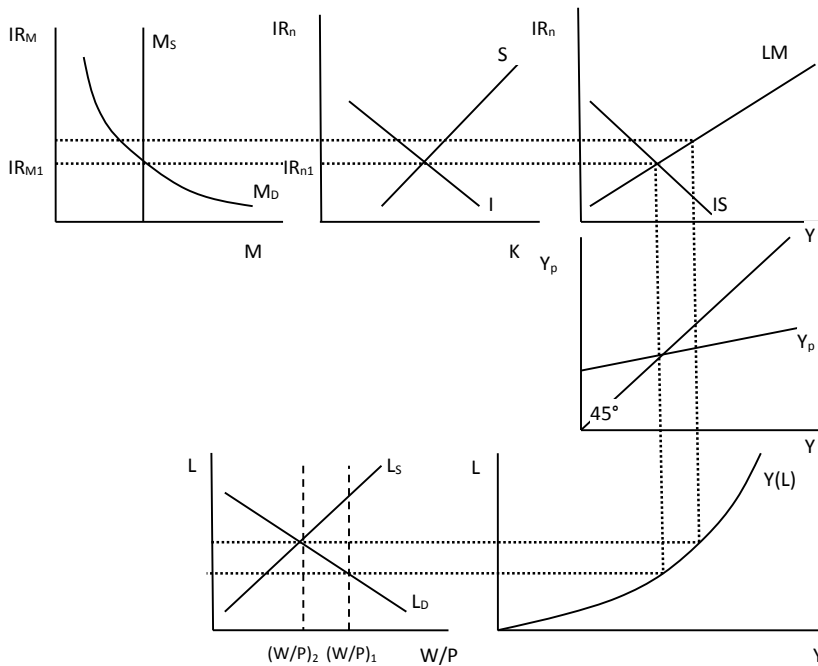
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<sup>53</sup> To the problem of (non-)uniqueness in post-keynesian literature see e. g. Kaldor, 1934; Davidson, 1993; Setterfield, 1995, 1998a, 2008; Berger, 2009 and to the problem of (in)stability in post-keynesian literature see e. g. Kaldor, 1972; Amable, 1993; Setterfield, 1997, 2005a.

<sup>54</sup> Setterfield, 1997, p. 52ff.; 2008.



**Fig. 1. A Center-Equilibrium System (own source)**



**Fig. 2. A Center-Equilibrium Underemployment Model With the Natural Rate of Interest (own source)**

In the graph, we can see that despite the money market (M) and capital market (K) are in equilibrium at  $IR_{M1}$  and  $IR_{n1}$ , respectively, the labor market is not at the real wage  $(W/P)_1$ . We also can see that if the labor market gets cleared by a decrease in the real wages from  $(W/P)_1$  to  $(W/P)_2$ , this will only lead to increase in the product which will move both the capital market and money market out of equilibrium.

### ***A Central-Equilibrium Underemployment Model Without the Natural Rate of Interest***

What Keynes was criticizing, though, what not the mere fact that the economic system does not have to be a system with a unique stable equilibrium. Keynes's critique of the neoclassical paradigm was substantially more profound. Take notice what the capital market is modeled like in the graph. Savings are a positive function of the interest rate and investments are a negative function of the interest rate. The equilibrium interest rate at which the subjects are willing to save and lend exactly the same amount which the firms are willing to borrow and invest is the equilibrium natural rate of interest  $IR_n^*$ . As a result, it is not possible that the willingness to save exceeds the willingness to invest in the long run. Excess supply of savings pushes the natural interest rate down. Analogically, excess demand for savings drives the natural rate up. Keynes put forward a radical revision of this model of a capital market. In his conception, the savings do not depend positively on the interest rate but depend positively on the income (Keynes, 1936, p. 97). At the same time, the investment does not depend on the current interest rate but on the expected interest rate. The investment function itself is identical with a function of expected net marginal rate of return<sup>55</sup> (Keynes, 1936, p. 136). Both the expected net marginal rate of return and the interest rate, to which the former one is compared, are subjects of fundamental uncertainty<sup>56</sup>. That means that they cannot be known even in the actuarial sense. However, if there is no relation either of the savings or the investment to the natural interest rate (whatever it is), then a change in the natural interest rate cannot be the mechanism of equilibrium restoration (Keynes, 1936, p. 165). As a matter of fact, there is nothing such as a natural rate of interest, then<sup>57</sup>. The neoclassical capital market scheme will then look like this:

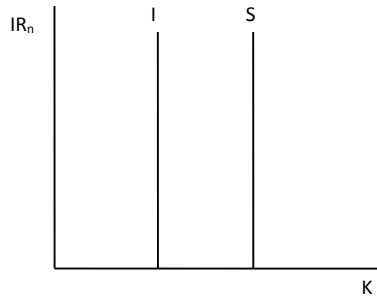
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<sup>55</sup> Keynes uses a term “the marginal efficiency of capital”.

<sup>56</sup> Keynes talks just about certainty. The term “fundamental uncertainty” was probably introduced by Paul Davidson (see Jespersen, 2009, p. 178).

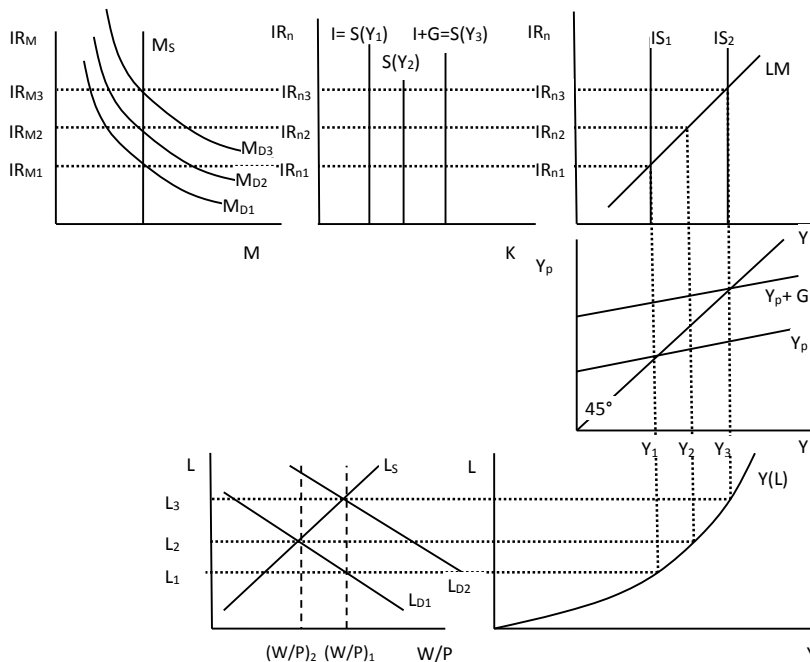
<sup>57</sup> Arestis (2009, pp. 16-18) points out a development in Keynes's position as regards the natural rate of interest from *The Treatise on Money* – where he still subscribed to this concept – to *The General Theory* – where he rejected it. See Keynes, 1936, pp. 242-244.





**Fig. 3. Absenting Natural-Interest-Rate Balancing Mechanism in the Capital Market (own source)**

Is there any mechanism which can bring the willingness to save and the willingness to invest into balance? Since the savings depend positively on the income, the amount of savings generated and supplied would decrease with lower income to exactly the amount which corresponds to the willingness of firms to invest (which itself is given by animal spirits, i. e. fundamentally uncertain expectations). The general-equilibrium problem can be looked at like this, then:



**Fig. 4. A Center-Equilibrium Underemployment Model Without the Natural Rate of Interest: An Economy With the Fundamental Uncertainty (own source)**

At the level of output  $Y_1$ , both the capital market and the money market are in their respective equilibria but the labor market is out of equilibrium at the level of employment  $L_1$  and the real wage level  $(W/P)_1$ . However, if the real wage decreases to  $(W/P)_2$ , the labor market restores its equilibrium at the level of employment  $L_2$  but this level of employment will increase the output to  $Y_2$ . At this level of output, though, the capital market will be out of its equilibrium. Excess savings in the labor market will motivate the firms to decrease their production back to  $Y_1$  which brings down the aggregate demand. However, the insufficient aggregate demand pushes down the prices which increases the real wages back to  $(W/P)_1$ . At the higher wage level  $(W/P)_1$  the labor market is out of its equilibrium, again. A vicious cycle of falling nominal and real wages, falling prices, increasing real wages and again falling nominal and real wages, falling prices, increasing real wages etc. etc. with the product unable to provide the economy with a permanent full employment.

It is thus not the nominal wage rigidities which prevents the economy to reach full employment permanently but the fact that willingness of households to save is not accompanied by an equivalent willingness of firms to invest (Keynes, 1936, p. 262). In other words, the real culprit is an insufficient aggregate demand.<sup>58</sup> Could a stimulation to aggregate demand ensure a permanently full employment, i. e. such a level of product which simultaneously restores the equilibrium in the labor market, the capital market and the money market? Let us assume the initial level of product  $Y_1$ , again, at the level of employment  $L_1$  and the capital market being in a state of equilibrium at the level  $I=S(Y_1)$ . Now, the government increases the aggregate investment by  $G$  to the level  $I+G$ . The governmental investments increase the product directly from  $Y_1$  to  $Y_3$  and this increase is accompanied by an increase of labor demand. The shift in the labor demand increases the employment level from  $L_1$  to  $L_3$  at the unchanged real wage level  $(W/P)_1$ . The full employment is restored and, at the same time, higher product increases the amount of savings generated to  $S(Y_3)$  which is now equal to the level of the total of private desired and the governmental investments. The capital market restored its equilibrium. The money market equilibrium has not been affected. Thus, the full employment level is going to be permanent.

### **Say's Law Revised**

Say's law suggests the impossibility of a problem of deficient aggregate demand. Any production, as Say's law implies, generates an equivalent flow of incomes to the factors of production, and – since the

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<sup>58</sup> For the misperceived role of nominal-wage rigidities see the whole chapter 19 of The General Theory.

system is closed – these incomes must either be consumed in the present (intra-temporal closedness) or saved to be consumed in the future (inter-temporal closedness). If the incomes are saved to be consumed in the future, then, they must be invested in the present. In any case, the aggregate supply will equal the aggregate demand. This is the logic of a closed system which is an underlying principle of the Say's law. The capital market can never face a situation of long-run excess savings because this would push the natural interest rate down. If we abandon this model of a capital market, the situation of excess savings may be a permanent problem. The system does not have a unique stable equilibrium and the markets don't get cleared. As a matter of fact, not only the excess savings are not automatically accompanied by an equal desire to invest – which is a result we get in a classical model of a capital market thanks to a decrease in the natural interest rate to the market clearing level  $IR_n^*$  which guarantees this equality – but, the very opposite is true: the excess desire to invest will always find adequate savings. Keynes's approach has obviously reversed this causality. According to his conception of a capital market, the savings are always generated automatically along with the investment made (Keynes, 1936, p. 184).

The reason why Keynes rejects a simple functional dependence of investments on the current interest rate is the existence of fundamental uncertainty. It is precisely the fundamentally uncertain characteristic of the world which is Keynes's ultimate argument against the Say's-law-based general-equilibrium economics describing the neoclassical world of permanently clearing markets. That a *potential existence* of a unique stable equilibrium is a general case being in opposition the special case of its *guaranteed existence* is a strong argument of Keynes. Such a theoretical standpoint would still remain a black box, though. There would still be missing a theory explaining why the absence of a unique stable equilibrium may be a more probable case. Besides, such a standpoint could be reconcilable with a world characterized by a fundamental certainty, as well. However, it is the fundamental uncertainty by which Keynes explains the non-existence of interest-rate balancing mechanism of the capital market. And it is the latter which serves as his theoretical explanation of his assertion that the non-existence of a unique stable equilibrium is the cause why the permanently full employment cannot be reached via a process of market clearing.

To sum up: the fundamental uncertainty of the world eliminates the natural-interest-rate balancing mechanism of the capital market and replaces this mechanism by the income balancing mechanism<sup>59</sup>; the income balancing

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<sup>59</sup> As soon as in *The Treatise on Money*, Keynes points out that the decision making of entrepreneurs to invest into fixed capital is separated from the decision making of

mechanism implies that a desire to save may permanently exceed a desire to invest; this is a situation of insufficient aggregate demand which underlies the center-equilibrium underemployment model. We refer to this causal sequence as *the capital channel* of fundamental uncertainty. As mentioned above, the center-equilibrium nature of underemployment state is characterized by its feature of potential permanency. Unless the economy is affected by an exogenous force, it will not get out of the underemployment state. This implies, though, that such a system does not fulfill the condition of inter-temporal closedness such as defined above. The thing is that a certain amount of savings can stay not invested in the long run (!). The closedness of the system is then impaired:

$$(Y^A)^{\text{today}^+} + (Y^B)^{\text{today}^+} + (Y^A)^{\text{tomorrow}^+}/(1+r) + (Y^B)^{\text{tomorrow}^+}/(1+r) + I\eta/(1+r) > \\ > (Y^A)^{\text{today}^*} + (Y^B)^{\text{today}^*} + (Y^A)^{\text{tomorrow}^*}/(1+r) + (Y^B)^{\text{tomorrow}^*}/(1+r). \\ (7)$$

In other words, A saves a portion  $I$  of his today's income  
 $(Y^B)^{\text{today}^*} = (Y^A)^{\text{today}^+} - I, (8)$

but B does not invest this sum. The aggregate demand falls short of the aggregate supply, a result contradicting the Say's law.

What link inter-relates the reversal of the Say's law resulting from the fundamentally uncertain nature of the world with money? Economic schools drawing upon the quantity theory of money regard money as a mere medium of exchange whose primary and, in effect, only function is reduction of transaction costs. As mentioned above, transaction costs are one of the sources of short-run frictions which prevent the economic system from reaching its state of general equilibrium via the process of market clearing. Money is one of the most powerful institutional devices which helps to reduce these obstacles to market clearing and to make the short run during which the frictions prevail as short as possible. However, the problem of transaction costs disappears in the long run. At that moment, though, the existence of money cannot be either justified or explained in the framework of neoclassical economics (Davidson, 1991, p. 137). Neoclassical models, then, express quantities in monetary values but, in their nature, they describe a barter economy where money is just a classical veil with neither long-run nor short-run effect on the real processes. It is only in the real world characterized by existence of fundamental uncertainty where the uncertainty cannot be expressed in terms of a probabilistic risk (non-ergodic world) where the money is of any meaning.<sup>60</sup>

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households to save (Keynes, 1930, p. 123) but the income balancing mechanism appears as late as in *The General Theory*.

<sup>60</sup> For the post-keynesian perspective of the phenomenon of fundamental uncertainty see e. g. Lawson, 1988; Davidson, 1991; Setterfield, 1996; Deprez, 2001; O'Donnell, 2011; Jespersen, 2009; Dequech, 2008.

Even though the future is fundamentally uncertain in most cases, the existence of money can reduce this uncertainty to a substantial degree. To understand this, it is necessary to distinguish between two kinds of financial failures, bankruptcy (or insolvency)<sup>61</sup> and negative net worth. *Negative net worth* is a situation when the total of your liabilities exceeds the total of your assets. *Bankruptcy (insolvency)*, to the contrary, is perfectly compatible with positive net worth, i. e. it can affect a subject which is completely sound and fit financially. However, an insolvent subject suffers from the so called *asset-liability mismatch*<sup>62</sup>, that is, the time structure of the subject's assets is unfavorably matched to the time structure of his liabilities. Plainly speaking, such a subject suffers from insufficient liquidity, i. e. reduced "ability to meet [their] nominal contractual obligations when they come due" (Davidson, 1991, p. 138). As regards the uncertainty concerning the risk of *negative net worth* – which is a result of an entrepreneurial failure - there is not much the existence of money as such could do. But as regards the uncertainty resulting from the risk of becoming a victim of an asset-liability mismatch – which is a result of a failure in the cash-flow management, not an entrepreneurial failure - the money provides economic subjects with a powerful instrument of reducing this uncertainty substantially.<sup>63</sup> A real tragedy of every financial end economic crisis is the amount of fundamentally solid firms which are unable to meet their commitments just because of adverse development of the time structure of their balance sheets.<sup>64</sup> Despite their prosperity, such firms get in troubles because of lack of liquidity, they can't pay wages because their customer, who also is short of liquidity, has not paid them yet. The employees who don't get their wages in time cannot meet their commitments etc. What is a mere cash-flow problem, at the beginning, causes shut-down and lay-offs which implies a decrease in the real product and aggregate demand. These fluctuations intensify the already existing unavoidable uncertainty even more. Yet, this uncertainty could be pushed down considerably by providing the markets with sufficient liquidity (Davidson, 2012). Ironically, though, the asset-

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<sup>61</sup> As a matter of fact, bankruptcy and insolvency are not synonyms, strictly speaking. While insolvency is a financial state of being, bankruptcy is a legal process. Even though insolvency does not have to imply bankruptcy, we do not regard it necessary to distinguish between these two terms, at this moment.

<sup>62</sup> A classic model is Diamond, Dybvig, 1983.

<sup>63</sup> "The social institution of money and the civil law of contracts enables entrepreneurs and households to form sensible expectations regarding the certainty of cash flows (but not necessarily real outcomes) over time." (Davidson, 1991, p. 138).

<sup>64</sup> "For business firms and households the maintenance of one's liquid status is of prime importance if bankruptcy is to be avoided. In our world, bankruptcy is the economic equivalent of a walk to the gallows. Maintaining one's liquidity permits a person or business firm to avoid the gallows of bankruptcy." (Davidson, 2009, p. 333).

liability mismatch (and uncertainty and fluctuations resulting from it) should not exist at all, in a general-equilibrium world ruled by market-clearing processes.<sup>65</sup> Except that there are some markets which consist of a supply and a demand which are not inter-related via a price-changing balancing mechanism. As the example of the capital market above demonstrates, even one such market may undermine and explode the whole market-clearing structure of a general-equilibrium building.

To sum up: the fundamentally uncertain nature of the world implies that the risk of asset-liability mismatch is a phenomenon which does not disappear in the long run – unlike phenomena such as price rigidities, imperfect information or transaction costs, which can be neglected in the long run. The long-run nature of the asset-liability mismatch problem implies that entrepreneurs – under certain conditions – start to prefer liquidity to real investments. In that case a desire to invest (i. e. real investments) falls short of the desire to save which is tantamount to the aggregate demand falling short of the aggregate supply. The ultimate consequence is the center-equilibrium underemployment model, again. We refer to this causal sequence as *the money channel* of the fundamental uncertainty. While the capital channel operates with the notion of excess savings, the money channel points out the notion of deficient real investment. At the first glance, the difference is but verbal. However, beyond this superficial identity, there is a substantial difference. Let us denote the amount of investment that the entrepreneurs are willing to make  $I_p$ . This level is given by the entrepreneurs' expectations of the future rate of return. If the households wish to save more than this amount, then the capital market faces an excess supply of savings. The cause of the capital market imbalance does not go down to worsening expectations of the entrepreneurs but to increasing desire to save of households. A capital market disequilibrium can result from pessimistic expectations of the entrepreneurs regarding their respective future capability to meet their respective payment obligations. Notice that it is not a higher level of subjectively perceived risk of *entrepreneurial failure* which decreases the willingness of entrepreneurs to make real investments here. It is a risk of *cash-flow managerial failure* what they perceive now with a

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<sup>65</sup> Since any good has its own market which get cleared by a price change, so does any risk which is a good, too. A risk is traded in an insurance market where the demand side buys the insurance – willingness to pay being a function of individual expected losses – and the supply side, disposing of knowledge of the probability distribution of the event, sells it – the cost being a function of aggregate expected losses. Such market gets cleared by a change in the insurance premium. An asset-liability mismatch is an event the risk of which can be evaluated by an insurance market as any other risk. Davidson ads: “[The] need for check book balancing and desire for an additional liquidity cushion is an irrelevant concept for the people who inhabit the artificial world of classical economic theory where the future is risky but reliably predictable.” (Davidson, 2009, p. 333).

higher intensity. A reaction of entrepreneurs is an increased demand for liquidity and decreased demand for real investments, then. Could this perception of cash-flow managerial failure, i. e. asset-liability mismatch, be reduced or eliminated? Well, if the entrepreneurs knew that there is an orderly market which makes it possible for them to liquify their real investments for a price very close to that at which the last transaction was made at this market (definition of an orderly market), then their perception of the risk of cash-flow problems would be substantially reduced or eliminated. On the other hand, though, a willingness of the entrepreneurs to make real investments cannot be increased above the level of expected future rate of return by any degree of market orderliness.<sup>66</sup> It is thus obvious, that an insufficient liquidity supply can be a severe catalyst of the fundamental uncertainty and bring about the center-equilibrium underemployment situation. Elimination of this uncertainty-catalyst via flexible liquidity supply cannot be mixed up with the governmental-spending way out of the center-equilibrium underemployment caused by the excess desire to save under a highly ambiguous common term “money pumping”<sup>67</sup>. The former solution focuses on the problem of pessimistic expectations regarding the cash-flow (asset-liability mismatch), while the latter focuses on the problem of pessimistic expectations regarding the rate of return. While the former represents a cash-flow managerial risk, the latter represents an entrepreneurial risk.

## Conclusion

We made a short exposition of the neoclassical general-equilibrium framework by means of an intra-temporal and inter-temporal n-dimensional Edgeworth box apparatus. We demonstrated the closedness of a system, separately for a non-productive and a productive economy. In the next section, we pointed out differences between three types of dynamic systems as to the nature of their respective equilibria: traditional-equilibrium system, knife-edge-equilibrium system and center-equilibrium system. Drawing upon the well-known fact that Keynes did not consider nominal-wage rigidities as the primary shortcoming in the general market-clearing process but the insufficient aggregate demand, we presented our restatement of Keynes’s underemployment equilibrium as a center-equilibrium system.

We continued our case by designing our center-equilibrium underemployment model that would be compatible with the existence of the natural rate of interest. Next, we presented our center-equilibrium underemployment model where the natural-interest-rate balancing

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<sup>66</sup> A possible objection of moral hazard will be discussed in another paper.

<sup>67</sup> E. g. Mui, 2014.

mechanism is replaced by the income-balancing mechanism. We expressed our conviction that Keynes's elimination of the natural interest rate in its capacity as the balancing mechanism of the capital market was a direct logical consequence of Keynes's postulate of the fundamentally uncertain nature of the world. Since the elimination of the natural-interest-rate mechanism resulted in the insufficient aggregate demand as a general case and, in effect, lead to the center-equilibrium underemployment, we postulated the existence of a causal link between the fundamental uncertainty and the center-equilibrium underemployment. We call this particular causality *the capital channel* of the fundamental uncertainty. At the same time, we presented an alternative way how the fundamental uncertainty results in the state of center-equilibrium underemployment. We call this alternative way *the money channel* of the fundamental uncertainty and we see its modus operandi in the liquidity preference of entrepreneurs. If the world were fundamentally certain, there would be no money needed in the long run (Davidson, 1991, p. 137; 2009, p. 333). The existence of money in the long run cannot be explained in terms of reduction of transaction costs. The money is demanded even in the long run because of their liquidity since possession of liquidity reduces the risk of bankruptcy (Davidson, 1991, p. 138; 2012). We claim that what Davidson means by "maintenance of one's liquid status" (Davidson, 2009, p. 333) and "certainty of cash flows (but not necessarily real outcomes) over time" (Davidson, 1991, p. 138) is an effort to avoid the asset-liability mismatch and to reduce the risk thereof. This risk does not disappear in the long run because it is a logical consequence of the existence of fundamental uncertainty. In case of a strongly perceived uncertainty regarding the future cash-flows, the demand for liquidity increases and the demand for investments into real capital decreases (Davidson, 1991, p. 139). This situation can prevail even in the long run. So, fundamental uncertainty leads to insufficient aggregate demand and, as a result, to the underemployment equilibrium.

From this hypothesis of two channels of fundamental uncertainty we draw the following conclusions: 1) both the capital channel and the money channel imply a breach of the inter-temporal closedness assumption because a certain amount of savings can stay not invested in the long run which implies that the aggregate demand falls short of the aggregate supply, a result contradicting the Say's law; 2) while in the *capital channel* the insufficient real investment goes down to the risk of *entrepreneurial failure*, the former results from the *cash-flow-managerial failure* in the *money channel*; 3) an insufficient liquidity supply can be a severe catalyst of the fundamental uncertainty and bring about the center-equilibrium underemployment situation; 4) while the flexible liquidity supply tackles the problem of pessimistic expectations regarding the cash-flow (asset-liability mismatch) –



i. e. the cash-flow-managerial failure – the governmental spending tackles the problem of pessimistic expectations regarding the rate of return – i. e. the entrepreneurial failure.

### References:

- Arestis, P. 2009. New Consensus Macroeconomics: A Critical Appraisal. The Levy Economics Institute Working Paper No. 564
- Berger, Sebastian. 2009. *The Foundations of Non-Equilibrium Economics. The Principle of Circular and Cumulative Causation*. Routledge, 2009. ISBN 0-203-87373-4
- Davidson, P. 1982-1983. Rational Expectations: A Fallacious Foundation For Studying Crucial Decision-Making Processes. *Journal of Post Keynesian Economics*. Winter 1982-1983, Vol. V, No. 2, pp. 182-198
- Davidson, P. 1991. Is Probability Theory Relevant for Uncertainty? A Post Keynesian Perspective. *The Journal of Economic Perspectives*, Vol. 5, No. 1. (Winter, 1991), pp. 129-143
- Davidson, P. 1993. The Elephant and the Butterfly Or Hysteresis and Post Keynesian Economics. *Journal of Post Keynesian Economics*. Spring 1993, Vol. 15, No. 3, pp. 309-322
- Davidson, P. 2009. Can Future Systemic Financial Risks Be Quantified? Ergodic vs. Nonergodic Stochastic Processes. *Brazilian Journal of Political Economy*, vol. 29, n° 4 (116), pp. 324-340, October-December/2009
- Davidson, P. 2012. Is Economics A Science? Should Economics Be Rigorous? *Real-World Economics Review*, No. 59, 2012. Available at WWW: <http://www.paecon.net/PAERReview/issue59/Davidson59.pdf>
- Deprez, J. 2001. Risk, Uncertainty and Nonergodicity in the Determination of Investment-Backed Expectations: A Post Keynesian Alternative to Posnerian Doctrine in the Analysis of Regulatory Takings. *Loyola of Los Angeles Law Review*, 4-1-2001, pp. 1221-1254
- Dequech, David. 2008. Varieties of Uncertainty: A Survey of the Economic Literature. *Anais do XXXVI Encontro Nacional de Economia* [Proceedings of the 36th Brazilian Economics Meeting] 200807211223070, ANPEC - Associação Nacional dos Centros de Pósgraduação em Economia [Brazilian Association of Graduate Programs in Economics]. WWW: <http://www.anpec.org.br/encontro2008/artigos/200807211223070-.pdf>
- Diamond, Douglas W.; Dybvig, Philip H. 1983. Bank Runs, Deposit Insurance, And Liquidity. *Journal of Political Economy*, Vol. 91, No. 3, June 1983. pp. 401-419.
- Fisher, Irving. 1930. *The Theory of Interest, As Determined by Impatience to Spend Income and Opportunity to Invest It*. Electronic Book, The Online Library of Liberty, WWW: [http://files.libertyfund.org/files/1416/Fisher\\_0219.pdf](http://files.libertyfund.org/files/1416/Fisher_0219.pdf)

- Jespersen, J. 2009. *Macroeconomic Methodology. A Post-Keynesian Perspective*. Edward Elgar, 2009, ISBN 978 1 84542 736 8
- Kaldor, N. 1934. A Classificatory Note on the Determinateness of Equilibrium. *The Review of Economic Studies*, Vol. 1, No. 2, pp. 122-135
- Kaldor, N. 1972. The Irrelevance of Equilibrium in Economics. *The Economic Journal*, December 1972, 82, pp. 1237-1255
- Keynes, John M. 1936. *The General Theory of Employment, Interest and Money*. Collected Writings of John Maynard Keynes, Volume VII. Royal Economic Society, Cambridge University Press, 1978. ISBN 0 333 10729 2.
- Keynes, John Maynard. 1937. Alternative Theories of the Rate of Interest. *The Economic Journal*, Vol. 47, No. 186. (Jun., 1937), pp. 241-252.
- Lawson, Tony. 1988. Probability And Uncertainty In Economic Analysis. *Journal of Post Keynesian Economics*, Fall 1988, Vol. 11, No. 1, pp. 38-65.
- Mui, Ylan Q. 2014. The Federal Reserve's experiment in quantitative easing is coming to an end. The Washington Post, October 28, 2014. WWW: <http://www.washingtonpost.com/blogs/wonkblog/wp/2014/10/28/the-federal-reserves-experiment-in-quantitative-easing-is-coming-to-an-end/>
- O'Donnell, R. 2011. Two Post-Keynesian Approaches to Uncertainty and Irreducible Uncertainty. Paper presented to 2011 Society Heterodox Economists Conference, UNSW. Available at WWW: [http://www.ier.hit-u.ac.jp/extra/doc/ODonnell\\_p.pdf](http://www.ier.hit-u.ac.jp/extra/doc/ODonnell_p.pdf)
- Setterfield, M. 1995. Historical Time and Economic Theory. *Review of Political Economy*. 7.1 (1995), pp. 1-27)
- Setterfield, M. 1996. Hysteresis and Uncertainty: Complementary Or Competing Visions of Evolving Economic Systems, in Pressman, S. (ed.): *Interactions in Political Economy: Malvern After Ten Years*, London, Routledge, ISBN 0-415-13393-9, pp. 133-148
- Setterfield, M. 1997. Should Economists Dispense With The Notion of Equilibrium? *Journal of Post Keynesian Economics*. Vol. 20, No. 1, pp. 47-76
- Setterfield, M. 1998a. Adjustment Asymmetries and Hysteresis in Simple Dynamic Models. *The Manchester School*. Vol. 66, No. 3, pp. 283-301
- Setterfield, M. 2005a. Central Bank Behaviour and the Stability of Macroeconomic Equilibrium: A Critical Examination of the "New Consensus". *The New Monetary Policy: Implications and Relevance*, pp. 23-49, ISBN ISBN 1 84376 954 9
- Setterfield, M. 2005b. Is Inflation Targeting Compatible With Post Keynesian Economics? WWW: <http://tmypfunam.files.wordpress.com/2012/09/is-inflation-targeting-compatible-with-post-keynesian-economics.pdf>

Setterfield, M. 2008. Path Dependency, Hysteresis and Macroeconomics.  
Available at WWW:  
<http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.150.1785&rep=rep1&type=pdf>  
Wicksell, K. G. 1898. *Interest and Prices*. London: Macmillan and Co., 1936