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TOWARDS HOLISTIC THEORY OF MONEY: OVERCOMING TWENTIETH CENTURY NEOCLASSICAL MONETARY PARADIGM

The present paper is about rethinking and reformulating conventional assumptions concerning monetary economics. The money homogeneity and neutrality are rejected. New formulation of money market is suggested. It is demonstrated that money market is entangled with all the other markets and that the system of markets, including money, does not converge to equilibrium. Only under the gold standard some kind of self-regulation may be observed. Appropriate monetary and fiscal policies do not distort, but increase the efficiency of market forces. The introduction of internal money issued by private banking sector does not improve the situation and does not guarantee stability. Further, if we institute external value (exchange rate) of money, the basic conclusions are not altered. Flexible exchange rates require autonomous monetary policy and also rule out automatic equilibrium convergence. Prevailing floating exchange rate monetary regimes imply in addition dominance of internationally cooperative equilibrium based on mutually consistent macroeconomic policies. This implicit macroeconomic coordination precedes the international liberalization and deregulation, so, paradoxically the driving force behind globalization is the broadening of the scope of macroeconomic regulation. Finally, money uncertainty principle is introduced and connection between maximum entropy rule, economic uncertainty and money is established. The conclusions of the paper are related to certain basic Keynesian postulates about money.
JEL: E31; E40; E50; E60; F31; F60

1. Introduction

The beginning of the 21st century is marked by the global financial crisis of 2007-2008, considered by many economists as the worst economic upheaval since the Great Depression. The world economy is still unstable, both inflation and deflation are possible threats. The causes and the consequences of this turmoil are still not well understood and explained. The problem is exacerbated by the fact, that in many cases issues, the economic science is trying to resolve, are not clearly defined (Piketty, 2013). Yet it is not possible to

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surmount the contemporary challenges to the economic theory without reconsidering old paradigms.

In spite of the Keynesian revolution, the development of the economic theory in the 20th century is dominated by the neoclassical thought and the general equilibrium approach in particular. The progress in the field of decentralized optimization and equilibrium convergence are among the biggest achievements of economic thinking of all times. These accomplishments however came at a high price. In order to demonstrate that the competitive decentralized market exchange allows for optimal coordination of economic agents objectives, the neoclassical theory had to reduce the role of money to unit of account, thus losing its ability to deal with disequilibrium and to explain economic cycles. In particular, the traditional neoclassical-monetarist approach is not able to clarify why under loose monetary policies and excessive government debts the world economy is on the brink of deflation and not inflation, at least in foreseeable future.

Without explicit introduction of all functions of money, namely medium of exchange, numéraire, standard of differed payments and store of value, it is not possible to create realistic theory of contemporary decentralized money intermediated economies. So the objective of the present paper is to broaden and reformulate the general equilibrium approach in order to include explicitly monetary intermediation and to redefine the role of money in accordance with some general Keynesian assumptions. The main result is that decentralized monetary economies are still self-regulating via inflation-deflation cycles, but not converging to equilibrium. Stabilization monetary and fiscal policies are necessary, though not sufficient, for general equilibrium convergence and optimal resource allocation.

1. The Holistic Nature of the Basic Functions of Money

The history of economic thinking in the twentieth century is marked, as mentioned, by the domination of the neoclassical theory, including the field of money. The neoclassical approach has one strategic objective- to demonstrate that decentralized economic exchange based on monetary intermediation can guarantee equilibrium convergence and optimal allocation of resources. Neoclassical analysis however had never been able or willing to introduce effectively money and money market in the exchange system. Instead it is focused on subjects, such as homogeneity postulate (see for example Takayama, 1990) and money neutrality (Lucas, 1995).

The neutrality and homogeneity are interrelated. The homogeneity hypothesis in particular takes for granted that if we multiply all prices by factor k ($k>0$) then supply and demand functions as well as the general equilibrium parameters are unaltered. However if all prices include the price (exchange value) of money, then it is simply impossible to multiply every single price by the same factor. This is true, because if the price level increases by say 10 times, then the price of money will decline 10 times. Therefore homogeneity of degree zero is just not possible in a monetary economy. However if homogeneity does not hold, neutrality is also under question.

The more sophisticated adepts of the neoclassical school acknowledge that homogeneity can be applied to all goods, except money (Modigliani, 1944). But several authors (Lange, 1942; Patinkin, 1947; 1949) object that if homogeneity is applied to all but one price then according to Walras Low equilibrium on non-money markets, combined with the Cambridge money demand equation, would imply that money market is also homogenous of degree zero. The latter is impossible, so inconsistency is evident.

We can further combine homogeneity of degree zero of all excess demand functions apart from money with say unit elasticity of the demand for money. Such a system would be consistent, but does not describe any meaningful decentralized money intermediated exchange process because it would imply that the quantity of money varies automatically with the price level without the introduction of any explicit economic behavior behind this type of regularity.

The role of money should not be reduced to the artificial conjectures about homogeneity and neutrality. As Aristotle once admitted its money that makes human society possible (Aristotle, Nicomachean Ethics). Money integrates economic systems based on decentralized exchange. On the other hand centrally planned economies also need money and central banks. So the role of money is not limited to disperse economic systems. Whatever the economic arrangement, it is generally assumed that money fulfils four basic functions- medium of exchange, unit of account (numéraire), standard of differed payments and store of value.

These functions are not as obvious as they may seem. For example, the function of medium of exchange implies not only elimination of the double coincidence of wants (Jevons, 1875), as commonly supposed, but that money completes closed cycles incorporating all markets and economic agents. The existence of such cycles is not evident and is strongly dependent upon the parameters of the respective economic system (Ganchev, 2013; see also about similar ideas Nenovsky, 2002). In other words the function of the medium of exchange has complex systemic nature.

The medium of exchange implies also elements of short term financing. Under money intermediated exchange the seller does not obtain immediately the goods or services he needs, but respective some of money. In other words the seller lends to his counterpart what he trades, money being instrument of financing. Thus money is a kind of reverse promissory note, i.e. it is a collective obligation not to pay, but to accept pecuniary payment from any bearer. For the seller the exchange is completed and the lending is reimbursed only after he buys the goods he wants, though this does not close the circuit. On the contrary, the next seller is taking the relay. Consequently the exchange process must be infinite since otherwise the last seller will remain unsatisfied. There are just too possibilities for infinite process- existence of endless number of participants or formation of closed paths (cycles). Only the second variant is workable. The monetary circulation is a never ending closed succession of short term lending and refunding. Thus any finite theory of money is inconsistent. This line of thinking has another unexpected consequence. Theory of pure exchange excludes money since such exchange is finite unless economic agents dispose with unlimited endowments. The source of such endowments can only be continuous production and re-production. So money is fundamentally linked to production

what is demonstrated with somewhat different arguments by money circuit theorists (see for example Rochon, Rossi, 2006).

The unit of account role would be the most obvious and natural function of money if it was not typically analyzed without any connection with the price or the value of money. In terms of numéraire we are free to choose any quantity of money as unit of account without loss of generality. But it does not mean that we can randomly fix the price of money in theoretical economic models. The price of money or "the exchange value of a unit of money" is nothing but an expression of the inverse of the sum of the prices of all exchanged goods in terms of money (Pigou, 1917). This price can be determined either by market forces or via central bank monetary policy. We can see again that the value (price) of money is determined by the system as a whole or "the money market" is a kind of global market were we exchange money against all other goods. This market operates by way of all the other individual goods markets.

In addition we should take into account that any change in the value of money is simultaneously a change in the purchasing power of the monetary unit. The converse is also true- if we modify the monetary unit we change ceteris paribus its' purchasing power. So in terms of exchange proportions we cannot distinguish between exchange value and unit of account variations. A good example can be the calculation of the SDR value. The exchange rate of the latter depends on both current market rates and weights of the basket currencies. The weights are not fixed, but regularly changed to reflect the relative importance of respective currency. If we observe only the exchange rate of SDR we cannot distinguish between market induced and composition changes. The equivalence between unit and exchange value changes can be illustrated also by the Irving Fisher "compensated dollar" proposal. The idea was to stabilize the purchasing power of the dollar by increasing the gold content of the American currency when the prices were going up and by diminishing the amount of gold per dollar when prices fall (JEC, 2004).

The basic postulate of the neoclassical and monetarist approaches to money is that unit of account variations are neutral, at least in the long run. Such a conclusion however ignores the fact that the function of the unit of account cannot be analyzed independently of the monetary circulation and the exchange of money against goods. Any change of the purchasing power of the monetary unit is a modification of the unit definition; it is a shift from one unit to another. So the normalized price systems do not contain information about the price of the numéraire itself and are incomplete. The classical dichotomy, as a consequence, cannot be a reliable basis of the economic analysis. Monetary economies are neither homogenous nor neutral.

There is another particularity of monetary unit as a kind of measure of market prices. The value or scale of this measure is determined after the measurement had already taken place, because the value of money is a function of all prices and quantities. As a result we face uncertainty, inherent to decentralized exchange. The reason for this is the interaction between the instrument of measurement (money) and the subject of measurement (goods and services).

The homogeneity of degree zero of relative prices is justified by the need to exclude money illusion. The elimination of this illusion is based however on the introduction of another

one, namely the misapprehension that money does not have an exchange value and is simply a financial asset. The variations of the price of money affect all the other prices by definition. In particular, any change of the value of money affects its functions (means of exchange, store of value and so on) and the demand for money respectively. In money intermediated economy the demand for money is related to supply of goods on all markets, so any shift of the price of money has real effects. The elimination of money illusion requires much more complicated behavior than simple homogeneity of degree zero.

The two remaining basic functions of money are also surprisingly holistic. Standard of differed payments simply means that all debts and other payments due in the future should be paid in nominal terms if the contracts do not include some kind of indexing. This implies that future variations of the exchange value of money affect the real burden of debts. As a result the nominal level of all existing financial obligations is not neutral. In line with current trends of the exchange value of money (inflation or deflation) income is redistributed between net lenders and borrowers.

If the nominal amount of money and the other financial assets is indexed to inflation, then they can be considered neutral (but not homogenous). The other side of the coin however is the fact that in the case of indexing, the real quantity of money cannot adjust to the variations of the exchange value of money, so the system does not possess a stable equilibrium.

The function of store of value is a mirror image of the mission of standard of differed payments. The money as a store of value is also non neutral vis-à-vis the alterations of the exchange value of money. What's more, this role is necessary from the point of view of the medium of exchange function. Money transmits provisionally purchasing power from one market to another.

Money has both micro and macroeconomic foundations. The elimination of double coincidence of wants and the store of value are two functions that have predominantly micro economic nature. The roles of medium of exchange, unit of account and standard of differed payments are defined at the level of the economy as whole. The nature of money can be understood if both micro and macro underpinning is considered concomitantly. Such an approach is in contrast with the neoclassical view, based on reductionist principle, postulating, that macroeconomic features must be derived just from microeconomic assumptions (Janssen, 2008). The latter is clearly not possible in the case of money.

2. Fixed Exchange Value of Money Neoclassical Fallacy

The main problem of the neoclassical theory of money is the definition of the money market. First of all, the money market is not the market for short term funds. The latter is an additional market, related but not identical with the money market, as defined in this paper.

It is generally assumed that money market equalizes demand and supply of money, but it is not clear how this market is structured.

Let's assume some initial (outside) money endowment for every economic agent. Then the effective demand for money, given that money fulfills the function of the medium of exchange, can only come from agents selling goods and services. The buyers consequently supply money. If we take into account capital markets, then the effective demand for money includes the borrowers and supply of money- the lenders respectively (provided that money intermediates financial transactions). The outstanding monetary balances that are not involved in the intermediation do not alter the effective demand for money. This understanding of the money market is similar to the definition of foreign exchange market. The latter is not accidental since the exchange rate is nothing but the external price of money.

Such a definition of demand and supply of money differs from the traditional formulation, identifying the supply of money with the quantity of money in the economy and the demand with the desired sum of money. The connection between our definition and the conventional one is that if there is disequilibrium in the traditional sense, then this imbalance can be eliminated only via adjustments of the effective demand. For example, in the absence of central bank monetary policy, an oversupply of money in the conventional sense can be eliminated only by spending it. This will result in inflation, increased production or both.

The conventional understanding of demand, supply and equilibrium on money market is build on stocks, while effective money demand implies flows. The variations of the exchange value of money trigger stock-flow adjustments, money has both stock and flow dimensions. The flow dimension of money (the effective demand for money) has as counterpart the income generation (or redistribution) process in the real economy. The flow feature is an intersection between the real and the monetary sectors. Therefore money is neither neutral (since monetary stock-flow adjustments take place via income generation process) nor homogenous (monetary corrections are triggered by exchange value of money variations). Unfortunately the flow component of money market adjustment is usually omitted from the neoclassical economic analysis. This is serious shortcoming since no stock adjustment is possible without flow variation. Reducing money to stock is in the origin of the classical dichotomy misapprehension.

The loanable funds theory is an exception to this rule. However this flow approach to money is limited to saving-investment relationship (Mankiw, 2010). It does not define the exchange value of money and introduces the interest rate as a price of money (loanable funds).

In our formulation the money market is nothing, but a balance between aggregate supply (demand for money) and aggregate demand (supply of money). This definition can be augmented to include financial markets (investors supply and issuers demand money). The price is related to the inverse of the sum of the prices of all exchanged goods in terms of money, as already mentioned. In such a system the equilibrium on all individual markets depends directly on the aggregate equilibrium. The money market is thus entangled with all the other markets, it's the link between micro and macro level. This line of thinking corresponds to Keynesian idea that the theory of money should be "a theory of the output as whole" (Keynes, 1936).

However this is not the way the money market is brought in the neoclassical models. According to Fisher (1963), the process includes two steps. First the real sector determines equilibrium relative prices and quantities, exchanged at equilibrium, usually via some variant of tâtonnement process. Then money market is introduced and the equilibrium price level is derived. In other words, the relative prices are established without any relation to the circulation of currency. Moreover, the price of money is artificially fixed at arbitrary level, usually unity.

This can be done in two ways. The first variant is simply to fix the price of money to unity (Walras, 1874). This is wrong, because we can randomly choose only the monetary unit, but not its price. The second alternative is to fix the price level (the index of all prices) at unity. The second variant is obviously equivalent to the first (Takayama, 1990), so it is equally incorrect. Fixing the price of money however means that we can analyze only $n-1$ equations were n is the number of markets. Without money it is relatively easy to prove that equilibrium is possible and since all markets with the exception of that of money are in equilibrium, then according to Walras Low the money market should also be in balance.

In other words, in spite of deriving the equilibrium price level of money from the system of equations, we arbitrary postulate that money market retains fixed price, derive the equilibrium on the other markets from this assumption and finally "prove" the equilibrium on money market from the conjecture that the price of money is fixed! The only consistent conclusion we can draw from this circular inference is that general equilibrium can be assured if and only if some external institution (central bank) keeps the exchange value of money (the inverse of the price level) fixed, and not that decentralized exchange with monetary intermediation automatically converges to equilibrium!

Therefore we should not normalize price systems. Normalized systems replace "money illusion" with the illusion that money posses by some unexplained natural low fixed exchange value.

It must be emphasized, that the most part of the neoclassical models cannot even explain the nature of money market. Market is device that allows for exchange of goods against other goods or against money. If we separate the process of formation of relative and money prices it is not clear what the money market is all about and what is exactly the meaning of the term "price of money". The latter can be defined only in respect to all other goods. Defining the price of money on an isolated market, balancing the supply and demand for money, does not make sense- the money market is, as mentioned, entangled with all the other markets.

Some neoclassical authors diverge from this scheme. They assume that relative prices can be money intermediated. In this case the system starts at some price level determined by the optimizing behavior of economic agents (utility and profit maximization) and gradually converges to equilibrium. Initially transactions take place at non-equilibrium prices. The proof of equilibrium convergence however is also based on the inconsistent hypothesis of fixed price of money (see for example Friedman, 1979; Arrow and Hahn, 1972).

The analysis of normalized price systems however cannot ignore the fact, that the swings of value of money influence the real economy. Scitovsky (1941), Haberler (1946), Pigou (1943) and later Patinkin (1965) claim that the change of price level affects the purchasing power of money stock and thus provokes the so called real balance or wealth effect. The interesting thing about this concept is that in spite of investigating the impact of the value of money variations on the demand for money via the money market, the neoclassical authors concentrate their intellectual efforts on the role of money as store of value. In other words, they take into account only effects related to money as stock ignoring the flow dimensions of equilibrium convergence.

The real balance effect simply means, that if price level goes up, the real money balances decline, so economic agents cut their purchases of goods and services. The underlying idea is that this type of behavior is self-regulating, that is in the case of inflation the wealth effect will help to decelerate the price level escalation and in case of deflation it will relieve the restoration of demand.

The real balance effect is criticized from two standpoints. First, it is assumed that wealth effect is too weak to affect the economy in a noteworthy way and second it does not take into account the so called inter-temporal substitution effect (Grandmont, 1985). The latter just indicates that the expected future rate of inflation affects the current demand and can either strengthen or abate the wealth effect. So the equilibrium convergence is not certain. Both wealth and inter-temporal substitution effects however do not opt for the most natural way of dealing with the problem, namely to take into account the response of the economic agents to the variations of the exchange value of money, as it's carried out with all the other markets.

This can be done with the help of a very simple heuristic economic model, proposed by the author of the present article.

We assume economy with external money M. Money comprises two parts. M_e is the Keynesian transaction demand for money, including money in motion. The second fraction is M_v, or money performing the function of store of value in the long run. Economic agents are motivated to store money by different reasons- precaution, speculation and so on. Obviously we have:

(1) $$M = M_e + M_v.$$

The shares of the two fractions are not fixed and depend on the economic circumstances.

We presuppose the existence of monetary economy with Clower rule- "money buys goods and goods buy money; but goods do not buy goods" (Clower, 1967), hence we exclude any barter exchange. The interaction between monetary and real sector is described by the equation of exchange, namely $Mv = PY$, were v is the income velocity of money, P is the price level and Y is the real GDP. Further we define:

(2) $$p_m = 1/P = Y/Mv$$

Were p_m is the exchange value of one unit of money. As follows from (2) the price of money is a non-linear inverse function of the price level. The physical volume of output (or the quantity of sales) in the numerator of (2) means that in order to keep the exchange value of one unit of money constant under increasing production, either the quantity of money or the velocity should expand. If by money we understand broad money and $M = \mu M_0$ were μ is the multiplier and M_0 is the monetary base, equation (2) obviously transforms into $p_m = Y/\mu M_0 v$. Therefore the exchange value of the monetary unit is a complex measure that depends on the real and monetary sectors parameters and reflects the state of the economy as whole.

In addition we take for granted that our economy is characterized by the usual features that guarantee the existence of general competitive equilibrium. In particular this means that consumers' consumption sets are convex, closed, bounded and totally quasi ordered. The assumptions about the aggregate production set are similar- the set is supposed to be closed convex cone (Takayma, 1990). Under normalized price system and with the assumption that all final production is consumed, we can prove that general equilibrium exists (McKenzie, 1959). Our task is to investigate whether this economy with added Clower rule and external money can still converge to such an equilibrium.

Reformulating Grandmont (1985) we assume that the system obeys Walras Law of the following form:

(3) $$\frac{1}{2}p|z(p)| + M_v = M$$

Where p is the n vector of prices, including the price (exchange value) of money and $z(p)$ is the n vector of different markets excess demands. From (1) and (3) it follows that $\frac{1}{2}p|z(p)| = M_e$, or the absolute value of the aggregate excess demand divided by two equals the transaction demand for money. This follows from the assumption that the value of the negative excess demand equals in absolute terms the value of the positive excess demand and that both equal the transaction demand for money- obviously the transaction demand for money is nothing but a negative excess demand for goods and services and the negative excess demand equals the positive excess demand as a consequence of the Walras Low. This means that a system with money intermediated exchange can never reach perfect equilibrium with zero excess demand. We can write also $M_e = M_e(p) = M_e(p_m)$ if we ignore the effect of the relative prices.

The reductionist approach of the neoclassical school is based on the idea that we can derive macroeconomic parameters of the economy directly from the maximizing behavior of economic agents. This is not true in a monetary economy. We divide the maximizing procedures into two interdependent facets. The first is income maximization and the second is utility maximization. We assume that the first is related to the value of money and the second depends on the relative prices. Since the greater the real income the greater the

utility, we can assume that income maximization takes place simultaneously with relative prices adjustment.

Further, every economic agent disposes with some money endowment. He can use his monetary resources either for buying goods and services or alternatively for storing monetary reserves. From the equation of exchange it follows that if the quantity of money is fixed, the real income depends on price level and velocity. So the question is what is the optimal reaction of economic agents to price level variations, taking into account the expected impact of velocity?

In our economy the long term monetary balances can generate return if the price of money is going up (declining price level). So if the price of money declines (in the case of inflation), the economic agents are interested in decreasing money holdings M_v. This can be done in our simplified economy only by exchanging money for goods and services. Such a move creates additional demand. If we assume that the income of economic agents is additive we can write:

(4) $$Y = \sum_{j=1}^{m} y_j\ (p_m, v)$$

Were y_j is the income of the agent j and m is the number of agents. Note that there is no full employment and capacities are underutilized. Our analysis is focused on the short run, so we assume that the productive capacity remains constant. The economic agents consist of consumers and firms. Both types of agents are maximizing real income (net value added). The real income may be affected by changing the shares of M_e and M_v in agents' monetary holdings. At the macroeconomic equilibrium point we have:

(5) $$\partial y_i / \partial M_e^i = \partial y_j / \partial M_v^j$$

for all economic agents. The optimal shares of M_e and M_v depend on p_m and v, so we can assume that the optimal expected income as expressed by (4) depends on the price of money and velocity. M_e is affecting income directly via aggregate demand. M_v influences expected income flows accommodating random price shocks and allowing for speculative financing.

The key problem is the economic impact of the increased (decreased) transaction demand for money. First observe that transaction demand for money depends on the synchronicity between purchases and sales of individual economic agents. Under perfect synchronicity the transaction demand for money shrinks to the net sum of items in transition in the balance sheets of the economic agents. The synchronization is clearly related to macroeconomic velocity of money. Superior level of synchronization means higher velocity. Synchronization involves costs, the so called bunching costs (see Clower and Howitt, 1978). On macro level the relationship between bunching costs and real income can be expressed by the term $\partial y / \partial v$ or the marginal product of the income velocity of money. This product is positive in the case of capacities underutilization and zero under macroeconomic equilibrium. So in macro equilibrium we have:

(6) $\partial y/\partial v = 0$

Now we are ready to discuss the role of the exchange value of money in the equilibrium convergence. Let's suppose that as a result of some external shock the price level increases and the exchange value of the monetary unit declines. Since the price of money is a non linear function of price level, even small changes of the latter trigger large variations of the unit price of money. In the case of money, the usual assumptions about the utility functions are not valid, so we should proceed directly to the effect of price decrease on the supply and demand for money.

Falling unit price of money means that attractiveness of money as store of value declines. Economic agents are interested in increasing of their holdings of storable goods with escalating prices, what can be done only by rising the share of M_s in M. This results in increased supply of money (augmented aggregate demand) and further acceleration of inflation. What follows is further positive impulse to aggregate effective supply and demand for money. The outcome from the point of view of the equation (2) is amplified excess demand and further divergence from equilibrium.

In terms of the equation of exchange we should observe both rise of the price level and GDP in real terms. The real growth is explained by the fact that economic agents cannot distinguish between relative price shifts and inflation (Lucas, 1973). The raise of the right hand side of the equation of exchange provokes acceleration of money velocity, given the fixed volume of money. The process will continue up to the point were $\partial y/\partial v = 0$. Alternatively we can assume, in accordance with Wicksell (1898), that there exists some upper limit to the velocity of money, physically determined by the exchange conditions. In both cases the process of inflationary overheating of the economy has its boundaries. At the extreme point the real output should exceed the optimum neoclassical level since we do not assume that all final production is consumed and allow for speculative accumulation of inventories. The markets do not clear as a consequence of the greater than ever excess demand. This upper point is not stable- any negative external event can provoke reverse process.

We should emphasize that the economy attains some kind of macroeconomic equilibrium characterized by the conditions (5) and (6). This macro equilibrium however is not a general equilibrium in the neoclassical sense since it does not imply zero excess demand on all markets.

In the case of negative shock, characterized by a decline of price level, we should observe opposite sequence of events. First, increasing price of money encourages accumulation of money holdings as store of value with positive return and reduces the volume of transaction money. As a result the excess demand declines and the velocity of money decelerates. Declining price level reduces aggregate supply and production. Since the quantity of money in motion has some natural minimum, the process has certain limit. This lower point is also neither optimal (output is depressed because of deflation) nor stable.

The behavior of our simple model is quite unusual compared to the conduct of its neoclassical analogs. First of all, there is no general equilibrium convergence. The system

is still self-regulating, but oscillates between inflationary overheating and deflationary recession. The ultimate reason for this is the elimination of the fixed exchange value of money, the core postulation of the neoclassical school.

Another interpretation involves the gross substitutability principle. It is well known that gross substitutability between all exchanged goods is necessary and sufficient condition for general equilibrium convergence (Arrow, K.J., Block, H. D., Hurwicz, L., 1959). In the case of money this would imply $\partial x_i / \partial p_m > 0$ for all goods, were x_i is the volume of demand for the good i. This condition is clearly not satisfied in the case of the reaction of the demand for normal goods to the changes of the price of money (an increase of the price of money implies decrease of demand for all the other items and vice versa- the decline of the price of money means rise of the demand on the rest of the markets, or to put it differently $\partial x_i / \partial p_m < 0$). Money is not substitute to any product (we cannot replace the consumption of any good with money), it's rather a complement to all goods in exchange and production (everything is obtained via money). So, decentralized money intermediated equilibrium convergence is not possible.

Another attempt to avoid the problem of equilibrium convergence in a monetary economy and to justify the presence of money under neoclassical setting is the transaction costs approach. The basic idea is that money emerges spontaneously as an instrument to reduce transaction costs (Niehans, 1969). While we can agree that money reduce frictions, we must emphasize that transaction costs are complementary to the circulation of money and are therefore incompatible with general equilibrium convergence.

3. Commodity Money Systems

The model discussed above is based on the assumption of fixed quantity of money and of price level, not related to any particular commodity. Commodity money regimes and the gold standard in particular are interesting, because they may be viewed as closed self-regulating market systems in the sense of Karl Polanyi (1944). This follows from the fact that market generated prices, including the price (exchange value) of gold, determine, control and direct all economic activities. In the same time, in the case of commodity money systems we have the possibility to choose a particular quantity of gold or other goods as monetary unit. This creates the illusion that we can fix the exchange value of money and thus the price level. Recently some economists argue that returning to gold standard (White, 2008) or introducing some kind of pegging of the price of money to a particular commodity index (Kaldor, 1964; Ussher, 2009) can fix the global monetary system and bring price stability.

In fact commodity money regimes do not change our conclusions about the instability of the exchange value of money. There are only two substantial differences in comparison with the fiduciary money. The first is the impact of the money price variations on the production of gold or other metals fulfilling the functions of money. The second is the relatively weaker role of the central bank or government monetary and fiscal policies. Only

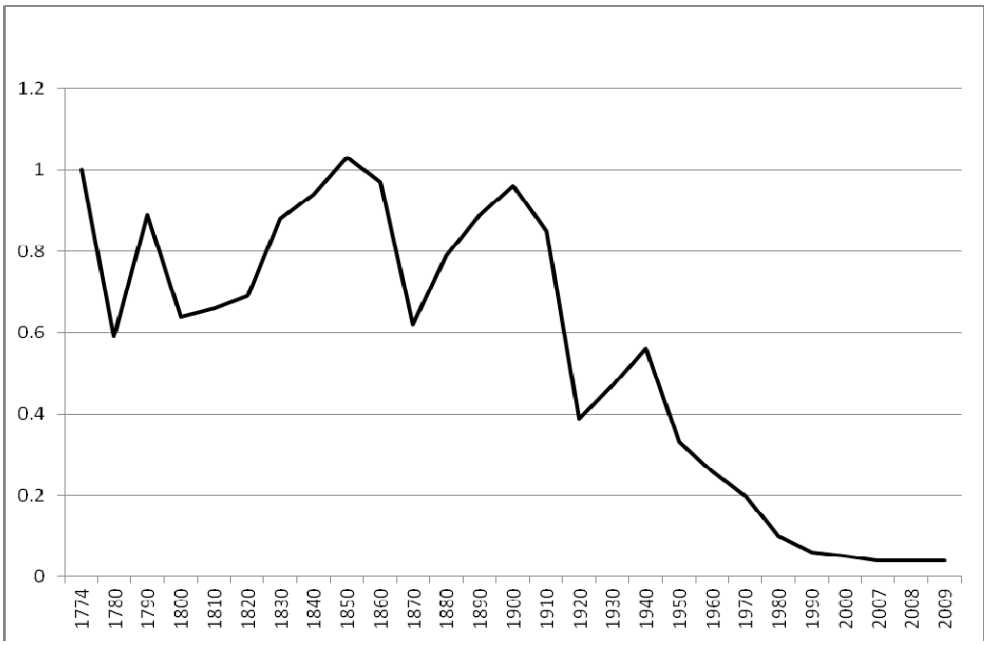
the first particularity of the commodity money systems could theoretically stabilize the exchange value of money.

We can expect that in periods of inflation the production of gold declines. In the same time the non-monetary demand for gold should increase. However the existence of gold reserves and convertible paper money substituting for gold in circulation, will postpone the gold price adjustment. In the case of deflation the decline of the non-monetary demand for gold and the expansion of supply will not lead to immediate price adjustment due to the same constraints, related to the monetary functions of gold. So the very fact that gold fulfils the functions of money will slow down the market adjustment of its price in the usual sense. Prolonged periods of inflation and deflation should be expected. This predisposition for persisting alternating declines and increases in prices is a basic characteristic of a commodity standard (Cagan, 1984). At an earlier time the instability of the exchange value of gold was discussed by Marshall (1886) and Jevons (1875), who supported the so called "tabular standard", a predecessor of the modern monetary targeting.

On fig. 1 the CPI based purchasing power since 1774 of the USD under different monetary regimes is plotted.

Figure 1

Purchasing power of USD, 1774 = 1



Source: http://www.rpmex.com/value-of-the-dollar.html.

As we can see, the periods of commodity money based systems in US did not guarantee stability of the US currency price level. From 1774 to the beginning of the forties of the 20th

century, the prevailing dynamics of the purchasing power of the USD was the alternation of inflation and deflation periods. The final abandonment of the gold standard by US in 1971 (in 1976 by IMF) led to steep depreciation of the American dollar, but the short-run price stability increased after the replacement of commodity money self-regulation by central bank monetary policy as the only anchor of the monetary system. This is particularly distinctive for the so called Great Moderation era (1984-2007).

Theoretical simulations, based on dynamic stochastic general equilibrium model, including gold sector (see Bordo, Dittmar and Gavin, 2007), generally confirm these observations. Both inflation and price level targeting provide more short-run price stability than does the gold standard. In addition, the long-run inflation uncertainty related to Taylor rule can be largely removed by introducing an additional policy response to the deviation of the price level from a prescribed path, conclude the authors. A weak point of the above paper is the fixing of the price of money to unity, what contradicts both the explicit assumption of the authors about the price level variability and the evidence from fig. 1.

4. Central Bank Fiat Money Case and Related Issues

The general equilibrium convergence is not a genuine property of the decentralized money intermediated economic systems. The simple aggregation of individual optimizing behavior does not guarantee optimal outcome for the system as whole. Decentralized coordination can bring about only self-regulation, but not optimization. The general equilibrium and the optimal allocation of resources are external concepts (in the sense that no individual economic agent is looking for general equilibrium or for socially optimal allocation), desired features of the economic systems. For itself, this attribute requires intelligent design, purposeful formation of institutions, securing particular economic outcomes. As far as the regulating institutions are Pareto improving, they do not contradict decentralized exchange objectives, but a decentralized competitive monetary equilibrium itself is a counterfactual.

We can view the price stability as a kind of public good (both non-rival and non-excludable), supplied by state institutions (central banks, governments). In a competitive market economy everybody benefits from the price stability since the fixed value of money is a necessary prerequisite for an equilibrium convergence and optimal allocation of resources.

Let's assume an economy with money issued by a central bank. Money enters the liabilities' side of the bank balance sheet and government bonds are incorporated in the assets' side. The central bank is managing the government debt and government bonds are the only interest bearing financial instrument. Interests on government debt are paid via general income tax on all economic agents and not only on those owning bonds. So unlike Barro's (1974) case where the bond holders are the same who pay all of the taxes that would eventually be used to retire the debt, the government bonds are a source of private sector wealth.

In the case of inflation the central bank sells fraction of its bond portfolio at lower price (guaranteeing higher return), thus withdrawing money from circulation. Under deflation the central bank buys bonds and increases the money supply. Central bank profits are transferred to central government budget and losses are covered either by additional taxes or by extra debt issue. This type of reasoning is not new (see for example Gurley and Show, 1960), but here it is applied in general equilibrium context. Using similar technique the central bank, in coordination with the government fiscal policy, can target inflation rate and keep price stability.

The question remains however whether private banks issued inside money can also guarantee price stability. The proponents of free banking assert that the creation of inside money in terms banknotes and checkable deposits is automatically restricted to the needs of the real economy. Central role in this self adjusting mechanism plays "the rule of excess reserve" and the more general "principle of adverse clearings" (Selgin, 1988). The excess reserve tenet assumes that a private bank can increase its lending (the new loan is created via a new checkable deposit to the borrower) only if it disposes with excess reserves (in terms of central bank or commodity money). In the same time the bank clients use the borrowed money only to pay their suppliers and not to increase the demand for inside money balances. Since the suppliers are in general served by other banks, then any new loan generates clearing drain equal to the amount of the new credit. The principle of adverse clearing simply generalizes the excess reserve rule to private bank note issue. It is assumed that this mechanism keeps the private banks money creation in line with real sector requirements and warrants monetary equilibrium.

In practice however we can doubt that this type of self adjustment can really take place. First of all, the borrowers need additional money not only to pay for purchases, but also to increase inside money balances in line with the increased activities. Secondly, if the excess reserves of a particular bank are exhausted as a result of supplying additional lending, the excess reserves do not disappear, but are merely transferred to other banks, so the process of increased lending will continue. In addition, if the banking system with clearing mechanism consists not only of small banks, but of universal banks with developed and diversified branch structure, the clearing drain will not be equal to the new lending, but will be substantially less. If we take into account also that that free banking in its pure form should rely on commodity money as reserve asset, then it is clear that free banking cannot guarantee the stability of the price level and we should expect alternating inflation-deflation periods.

There is another flaw of the free banking system. It is related to the reaction of the money supply to the changes in the frequency of clearing payments (Selgin, 1988). When, for example, the frequency declines, then, ceteris paribus (with the same volume of payments), the demand for inside money increases. The supply however declines, because it is positively correlated with the frequency. This may happen in the case of reduced synchronization of payments in the real economy due to increased bunching costs. The problem may be resolved only by using the central bank lender of last resort function to support interbank clearing mechanism as a part of the more general policy of securing money market equilibrium.

In broader terms we should take into account not only the banking system, but also the financial markets as whole. The fundamental problem here is whether financial markets react to the price changes in the same way as the other market do, or we can observe a violation of gross substitutability as in the case of money market. The existence of financial markets bubbles indicates a serious problem in this respect. As Shiller (2000) admits, the so called "feedback loops" play important role in the propagation of bubbles. Essentially these loops are based on the observation that asset price increase lead to greater investor enthusiasm and subsequently to higher demand and further price escalation. Such a behavior clearly violates gross substitutability conditions and is incompatible with general equilibrium convergence.

The final conclusion is that complex economies that combine real sector, bank intermediation and financial markets, require central bank and fiscal policy based regulation even to higher extent than economies without financial intermediation. In particular, the central bank policy response to economy's deviation from equilibrium path should combine stabilization and macroprudential measures. On the other hand monetary policy must be coordinated with fiscal and structural policies and take into account tensions between inflation targeting and the competing objectives (Eichengreen et all, 2011).

5. Internal and External Exchange Value of Money, Globalization

The global economy is extremely complex, so the functions of money are fulfilled locally and individual national currencies are necessarily exchanged against each other. This implies the existence of two different exchange values of money – internal (in terms of inverse of the price level) and external (against the other currencies).

In our formulation the money market is nothing, but a balance between aggregate supply (demand for money) and aggregate demand (supply of money) with augmented inclusion of financial markets (investors supply and issuers demand money). In open economy the supply and demand for money is divided in two fractions- demand and supply of domestic money and demand and supply of foreign money in exchange for domestic money (foreign currency demand comes from importers and capital outflow and supply depends on exports and foreign investors). The situation can be changed if the national currency is used as international reserve asset. Anyway we have two different markets with two different prices. The domestic price of money is nothing but the price of money in terms of goods exchanged in the respective economy while the external price of money is simply the number of domestic currency units per one unit of foreign currency (price quotation). Since the internal price of foreign currency is determined by the respective price level, the exchange rate is finally reflecting some kind of relationship between two price levels.

Under gold standard we observe the paradoxical situation of fixed external exchange value and variable internal price level. The external adjustment is carried out via kind of price-specie-flow mechanism. In the case of floating exchange rate regimes, the situation is reversed. In fact, floating exchange rates can only exist with central bank monetary policy fulfilling the role of single nominal anchor. As a result, the inflationary targeting guarantees

the stability of the internal price level, but the exchange rate fluctuates to ensure external equilibrium.

The question remains though what is the relationship between the external and internal exchange value of money from the point of view of the neoclassical theory. The purchasing power parity hypothesis is an attempt to measure up these two different manifestations of the exchange value of money and to validate the low of the one price. In most cases however the econometric tests tend to reject the strong form (nominal exchange rates and aggregate price ratios move one to one) of PPP (Carlsson, Lyhagen and Österholm, 2007).

The external and internal exchange values of money interfere in the process of determining external and internal equilibrium of individual national economies. Here the central role is played by the so called real exchange rate. According to traditional neoclassical trade theory, developed predominantly in the period of gold standard and fixed exchange rates, the real exchange rate is determined by the bilateral relative prices of traded to non-traded goods (see Cassel, 1918 and Pigou, 1923). This theoretical approach, like PPP, is also based on the neoclassical low of the one price- since the prices of traded goods should be equal on all markets then the only variable that can guarantee external equilibrium is the bilateral comparative price of traded to non traded goods. This is obvious from the equation of the Real Exchange Rate (RER):

(7) $$RER = e\frac{P^*}{P} = \frac{eP^{T*}}{P^T} \times \frac{\left(\frac{P^{N*}}{P^{T*}}\right)^{\zeta}}{\left(\frac{P^N}{P^T}\right)^{\zeta}} = RER^T \times RER^N$$

Where e is the nominal exchange rate in terms of domestic monetary units per unit of foreign currency, P^T is the domestic traded goods price, P^{T*} is the foreign traded goods price, P^N is domestic non-traded goods price, P^{N*} is foreign country non-traded goods price, ζ is non-tradable weight, RER^T is tradable goods bilateral real exchange rate and RER^N is the non-tradable goods real exchange rate (see for example Betts and Kehoe, 2008).

However, the empirical studies show that both tradable and non-tradable real exchange rate affect RER movements (see Engel, 1995 and Betts and Kehoe, 2008). This implies that the low of the one price is violated. According to the New Open Economy Macroeconomics this can be explained by the segmentation of the traded goods markets and by the existence of price rigidities. In such a case the movements of the nominal exchange rate can cause persistent fluctuations in the relative common currency price of traded goods (Betts and Devereux, 2000).

The central neoclassical-monetarist theory, concerning balance of payments equilibrium and exchange rate formation, is the so called Monetary Approach to the Balance of Payments. The crucial point of this way of thinking is that the balance of payments (BOP) is monetary phenomenon, what is true by definition and that in addition, the BOP is self-adjusting both under fixed and flexible exchange rates (Kemp, 1975; Johnson, 1977). As in

the case of domestic neoclassical monetary equilibrium, the BOP behavior is assumed to be predominantly stock adjustment driven.

We can agree that under gold standard the price-specie-flow mechanism represents a kind of external self-adjustment as a part of inflation-deflation cycles. The case of floating exchange rates is however more complicated. First of all, the flexible rates are a logical consequence of the replacement of gold standard by managed fiat money systems. Internal money, free banking type of monetary systems, not related to gold as reserve asset, are prone to instability and credit bubbles, as already mentioned. Such systems do not posses any basis not only for equilibrium convergence but even for self-adjustment. Conversely, under prevailing central banks regulated monetary systems, the exchange rates are finally determined by monetary and fiscal policies. This also precludes automatic self-adjustment- as we can see from the equation (7) that the RER, the nominal exchange rate and the price levels of domestic and foreign country are interrelated, so under inflation targeting the nominal exchange rate is not independent of monetary policy. The only exceptions are the currency board rule type monetary systems, based on a modified price-specie-flow mechanism (see for example Chobanov and Nenovsky, 2004), but these regimes are not autonomous in the sense that they require pegging of the exchange rate to another currency subject to central bank monetary policy.

The floating exchange rate regimes allow for a completely different interpretation of the pretended neo-liberal financial liberalization and deregulation driven global economic growth after the Big Bang (1986). First of all, according to Mundell-Fleming theorem, the combination of autonomous monetary policy and free movement of capital is possible only under flexible exchange rates. Under gold standard, including Bretton-Woods monetary system, both capital controls and limited scope of monetary policy coexisted. The final abandonment of gold standard in 1976 had two direct and one circumlocutory consequence. The first was obvious- introduction of managed fiat money systems and flexible exchange rate regimes. The second consequence was the financial liberalization and deregulation.

The core of financial deregulation was the abolition of different forms of capital controls what allowed for free international movement of capital- under the system of flexible exchange rates it became possible to attain external equilibrium without artificial administrative constraints. Paradoxically enough it was just the increased macroeconomic regulation that improved the global market forces efficiency. So the driving force of the process of globalization is not the financial liberalization per se, as usually taken for granted, but the preceding globalization of macroeconomic regulation.

The globalization of macroeconomic regulation has its particularities. It is not performed via some kind of common monetary and fiscal policy, but by means of implicit or explicit international policy coordination. The basic results of international monetary policy coordination literature tell us that if every country follows its own policy aiming output and price stability, then under floating exchange rate and free capital movement, the global economy will operate near an internationally cooperative equilibrium (Taylor, 2013).

These conclusions however ignore the fact that some national currencies perform the function of international reserve asset. In such a case the monetary policy in the reserve country has strong impact on its partners (Kemp, 1975). Nevertheless explicit international

monetary policy coordination can still be avoided if we take into account the so called redundancy problem. It reduces to the obvious fact that if one country leaves its external position to be a result of the policies of rest of the world, we can attain international equilibrium much easier. In practice such country can only be a reserve currency one. In this case the losses from the highly probable negative current account drift can be compensated by the privilege of financing foreign deficits via issuing national currency and government bonds. Since the World War II such a country was the USA. This situation was mutually acceptable for both USA and its main trade partners.

Yet, the subsequent development of twin deficit in USA increased substantially the share of foreign financing of the American public debt and the overall dependence of the US economy on external funding. Under the new circumstances after the global financial crisis of 2007-2008, the USA can no more accept an external balance resulting from the macroeconomic policies of its partners. The consequences are three- first, the USA need some policy targeting oriented towards external balance, second this implies increased international coordination and third, the first two aspects involve reserve currencies' structure reshuffling and danger of currency wars.

6. Conclusions

The main conclusion from this brief critical overview of the main results of the ne neoclassical approach to the decentralized exchange in a monetary economy is that such economic systems do not posses equilibrium convergence feature. Under gold standard elements of self regulation in terms of alternation of inflation and deflation periods maybe observed, but not steady equilibrium convergence. This conclusion concerns both internal and external equilibrium. In particular, the flexible exchange rate regimes also exclude automatic equilibrium convergence. Equilibrium convergence and optimal allocation of resources are elements of collective intelligence, introduced in the economic system via monetary and fiscal policy. Macroeconomic policies do not necessarily distort market exchange, but, on the contrary, they are a necessary precondition for attaining equilibrium. This naturally does not preclude the fact that inappropriate policies may be harmful.

In addition, we can make a case of replacing the main neoclassical concept of neutrality of money by the Money Uncertainty Principle (MUP). This uncertainty, similar to quantum mechanics uncertainty principle, cannot be circumvented. The substance of this assumption is that money is used to make the exchanged goods commensurate, as Aristotle once admitted. The result of the process of quantifying exchange values are the prices of respective goods in monetary terms. However, as already stated, the unit of measurement (the exchange value of money or the inverse of the index of all prices) is defined ***after*** the assessment. This fundamental dichotomy between the unit own exchange value and the results of evaluation is inbuilt for all types of decentralized money intermediated exchange.

Under self-regulating commodity money regimes this dichotomy leads to inflation-deflation cycles. There is no way of eliminating money uncertainty on a purely decentralized basis. Only via implementation of some kind of monetary targeting (in terms

of inflation or price level), based on purposeful monetary and fiscal policies, one can reduce the uncertainty to acceptable levels. The substitution of neutrality for uncertainty implies that the process of price formation, including the stabilization of the exchange value of money, has an impact on the real economy.

Another aspect of this fundamental uncertainty inherent to monetary economies is the Keynesian liquidity preference theory. For Keynes (1936) the primary problem economic agents face is the dilemma whether or not to "convert deferred command over specific goods into immediate command over goods in general". This is clearly related to the MUP. This Keynesian problem is nothing, but a particular formulation of the maximum entropy principle. The latter reflects behavior "maximally noncommittal with regard to missing information" (Jaynes, 1957) and represents a rational response to situations with unknown probabilities.

Accumulation of liquidity implies exactly no commitment to missing information and takes the form of "command over goods in general". Money allows individuals to take advantage of viable events with indefinite likelihood- if the probabilities are known specific investments in storable goods or individualized financial instruments are preferable to liquidity accumulation. Note that here we relate liquidity not to risk, as usual (see for example Tobin, 1958), but to uncertainty. All Keynesian motives of holding money (transactional, precautionary, speculative and finance) indicate such faltering states. Thus financial portfolios of all economic agents should necessarily include liquidity. Specific uncertain circumstances given (liquidity trap), all financial resources should be in monetary form. Ultimately, money may be defined as the most liquid financial asset allowing for flexible decentralized exchange intermediation under uncertainty.

The traditional neoclassical conclusion that decentralized monetary economies converge to equilibrium and guarantee optimal allocation of resources is not only at odds with facts, but also theoretically puzzled.

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