An Analytical Framework for the Post-Keynesian Macroeconomic Paradigm

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Abstract

The original Keynesian paradigm differs from the Neoclassical Synthesis and even more so from the New-Keynesian approach. In this paper, a modern framework for the original Keynesian paradigm is presented. It will highlight the key elements of the paradigm. A model is developed to determine output, unemployment and price level changes. Finally, the paper draws policy conclusions based on Keynesian original thinking. The purpose of the paper is not only to give a framework of Keynesian thought, but also to stimulate debate and discussion within the Post-Keynesian camp. The paper is written in a way which allows non-experts in the field to follow the argumentation. However, not all ramifications of the Post-Keynesian paradigm can be covered.

Keywords: Economic paradigm, Keynesian economics, output and employment, inflation, economic policy

JEL Classification: E12, E20, E31, E50, E58,

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1. Introduction

John Maynard Keynes did not intend to modify the neoclassical paradigm which he was confronted with in his time. His primary aim was to develop an alternative paradigm of a "monetary production economy" (Keynes 1933). However, Keynes' work does not present a coherently new paradigm. This is one of the reasons why different Keynesian schools emerged. One of them, the Neoclassical Synthesis, became the dominant Keynesian interpretation after World War II. In the long-run, in this interpretation, the neoclassical paradigm correctly describes the world, while in the short-run distortions are possible, due mainly to rigidities in wages, the interest inelasticity of investment demand (investment trap) and the very high interest elasticity of money demand (liquidity trap). Given these "bad behaviour", monetary and even more importantly, fiscal policy can bring the economy back to the neoclassical long-term equilibrium faster.

From the very beginning, this model, still found in many economic textbooks, was criticised by Milton Friedman (Monetarism I) who became the champion of the debate in the 1970s as the Neoclassical Synthesis began to lose popularity. During the 1970s a more radical neoclassical model evolved. One of the key pillars of the New Classical Model (Monetarism II) became rational expectations. These imply that expectations of the average economic agent are identical with the equilibrium outcome of the model (cp. for example Lucas 1972 and 1981). The implication is that expectations have no real independent influence on economic outcomes. Any model builder simply inserts a footnote which states the assumption of rational expectations so that expectations disappear as an independent variable. Robert Lucas deserved his Nobel prize because he specified analytically the conditions under which endogenous expectations are possible – albeit at the cost of assumptions that make models irrelevant for the real world. In addition, the New Classical model assumes that the analysis of a representative firm, household or other microeconomic unit can be directly transferred to the macroeconomic level. Micro foundations of this type as well as rational expectations were taken over by New-Keynesians who were gaining in popularity throughout the 1990s. The difference between them and the New Classical Model is that a whole bundle of factors on the microeconomic level, from menu costs to monopolistic behaviour and asymmetric information, can prevent the quick equilibrium outcome of the neoclassical world from being achieved. Under this condition, monetary and fiscal policy again can make sense because microeconomic market distortions can - at least partly - be remedied by these policies. The Neoclassical Synthesis includes elements of the Keynesian paradigm, for example the role of

aggregate demand outside the long-term equilibrium given by the neoclassical paradigm. Also, expectations are not considered to be identical with the equilibrium solution of economic models. In the New-Keynesian approach there is nothing left of Keynesian thinking – except the name.

Going beyond the Neoclassical Synthesis and the New-Keynesians, a diversified Post-Keynesian school has developed, which includes economists in the tradition of Michal Kalecki and modern Marxists. The purpose of this paper is to present a framework which covers the basic, original ideas of Keynes and at the same time to modernise his approach where necessary. It can help to clarify different approaches in the Post-Keynesian camp and of course differences between the Post-Keynesians and the Neoclassical Synthesis and the New-Keynesians.

In the next section, basic assumptions of original Keynesian thought are discussed. Then, a Keynesian model is presented which analyses output, employment and at the same time price level changes. The final part summarises and draws policy conclusions. The models are developed in a way which allows non-experts in the field to follow the argumentation. The paper remains on an abstract level which does not cover all ramifications of the Post-Keynesian paradigm.

2. Basic Keynesian assumptions

At the beginning a methodological question has to be discussed (see Kregel 1976). Post-Keynesian models usually use, as do neoclassical models, methodologies originating from Newton's physics (static equilibrium, comparative static equilibrium, equilibrium growth paths, etc.). Given exogenous variables the model determines the endogenous variables like employment or the inflation rate. Post-Keynesians correctly assume that markets do not necessarily tend to an equilibrium where the economy stays in a stable constellation. And even if an equilibrium is reached it does not automatically show an economically or socially desirable situation – it can, for example, be combined with a high level on unemployment. In a world of uncertainty long-term expectations must be considered as one of the most important exogenous variables in Keynesian thinking. Dynamic can be modelled by changing exogenous variables and determining in a comparative-static analysis the new equilibrium.

For example, long-term expectations can be changed and the effects analysed. Driven by changing expectations the economy then jumps from one equilibrium to another one. A lot of

the economic dynamism comes from factors outside the economy (Hahn 1981: 132f.). Keynes (1936: 293) characterised this as "the theory of shifting equilibrium – meaning by the latter the theory of a system in which changing views about the future are capable of influencing the present situation". But even the idea of a sequence of short-term equilibriums is too simple. Reality does not know equilibriums or disequilibriums but only dynamic historical processes. In the rest of the paper a comparative-static methodology is used. It should be clear that under such assumptions only a very restricted picture of dynamic processes can be given. However, a comparative-static approach is important to show causal relationships in a model. It also can become an element of a qualitative analysis of historical developments.

There is the possibility to model dynamic processes by introducing feedback mechanisms into the model. For example, it can be modelled that high profits lead to better expectations and better expectations via higher investment lead to higher profits, etc. Such analyses can sharpen the understanding of dynamic processes, however, they are too mechanical to analyse real historical processes. The conclusion is that historical economic processes cannot be modelled in a satisfactory way. Only qualitative historical analyses based on theoretical understanding are able to do this. But this is beyond the paper presented here.

The asset market

Keynes used variables which are exogenous to the model and which allow the connection with other social sciences and with the development of societies in general. In this way Keynes brought the economy back into social science. Of particular importance are the expectations of economic agents. Analytically there are only two satisfactory possibilities to model expectations. They can be given exogenously or they can be determined endogenously by the economic model, as in the case of rational expectations (Hahn 1981: 132f.). As mentioned above, in the Keynesian paradigm expectations are given outside the economic model and depend on social and political processes which are beyond the scope of economic modelling. In particular, Keynes stressed two variables which depend on expectations: the marginal efficiency of capital and the liquidity premium (see below).

Uncertainty is central to Keynesian thinking which does not only cover uncertainties that exist in all modes of production (for example in the form of bad harvests) but also includes system-specific uncertainties, as for example changes in share prices or the over-indebtedness of firms. The market process itself creates uncertainty which leads to economic behaviour which

can destabilise market processes and further increase uncertainty. An existing level of uncertainty can be expressed as a "state of confidence" (Keynes 1936: 148). For the most important economic activities, for example investment in a new factory, buying a house, granting long-term credit to an innovative company, investing in shares, etc. it is impossible to know all future events – there are unknown unknowns – and even from known future events not all probabilities are known –there are known unknowns (Herr 2011). "We simply do not know" – this is how Keynes (1937: 214) characterised the problem. In a world with uncertainty, money starts to play an important role as a store of value and a standard for credit contracts. In the following, money stands for liquid monetary wealth mainly in the form of bank deposits.[1] Wealth owners keep money as a protection against uncertain developments and to transfer abstract social wealth from the present to the future in a safe way. Of course, they keep money for hoarding purposes only in a currency they trust. If a national currency becomes unstable a more stable foreign currency can substitute the domestic currency.[2] Even other assets like gold or even real estate can take over the function as money as a store of value.[3] To part with money, for example by granting a credit, implies a disadvantageous risk which must be compensated by a pecuniary return.

The uncertainty argument becomes clearer by looking at investment decisions in productive capital made by a firm. Keynes (1936: Chapter 11) called the expected rate of return (expressed as a rate with compound interest) of additional investment in productive capital the "marginal efficiency of capital". He strictly rejected the idea that this rate had anything to do with physical productivity of capital goods. The neoclassical marginal productivity theory "involves difficulties as to the definition of the physical unit of capital, which I believe to be both insoluble and unnecessary" (Keynes 1936: 138). Let us take for example an investment in a steel factory. The marginal efficiency of such an investment depends on the costs it takes to build a steel factory and on the size, the structure and the time span of the cash flows the steel factory generates. It is obvious that there is no reliable information available to form expectations about future cash flows five, ten or twenty years down the road. Consequently, the firm is confronted with uncertainty. For Keynes, an investment decision is based on "animal spirits" (Keynes 1936, 161) or on an approach like "damn the torpedoes, full speed

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[1] Money and liquidity in this paper are used as synonyms. This is not always correct. Bank deposits can become bad assets compared to bank notes, for example in the case of bank runs.

[2] Not all currencies fulfil the requirements to function as safe assets for hoarding. A clear sign of this is dollarisation (euroisation) in many developing countries.

[3] "If by money we mean the standard of value, it is clear that it is not necessarily the money-rate of interest which makes the trouble. (…) For, it now appears that the same difficulties will ensure if there continues to exist a*ny* asset of which the own-rate of interest is reluctant to decline as output increases." (Keynes 1936: 229)

ahead" (Davidson 1991: 130). Schumpeter (1911) had a similar concept when he spoke about entrepreneurship to capture human behaviour which cannot be explained by economic considerations alone. Animal spirit and entrepreneurship are categories which in economic models are given as exogenous variables.

As long as the marginal efficiency of capital is higher than the interest rate, investment projects will be realised as this leads to an increase in the profit of a firm. If under the condition of a given state of confidence (given expectations or given animal spirits) all investment projects which exist in the minds of entrepreneurs in a given period are arranged in a cumulative way, starting with the project that has the highest expected marginal efficiency of capital and ending with projects with an expected marginal efficiency of capital of zero, an investment schedule is the outcome. Starting with a high interest rate and reducing it continuously, investment will move along the schedule of the marginal efficiency of capital as firms will realise all investment projects with a marginal efficiency of capital higher then the interest rate. Such an investment function is drawn on the right side of Diagram 1 and assumes a given state of confidence. This allows us to write the (net) investment function as follows:

(Equation 1) $\qquad I = I(i, \Theta_F)$
$$\qquad\qquad\qquad (-)(+)$$

(Net) investment (I) increases with a falling long-term interest rate (i). This is shown as a movement along the investment function in Diagram 1. An improved state of confidence of firms (better profit expectations expressed by an increase of Θ_F) shifts the investment function to the right (not shown in Diagram 1). Especially models in the tradition of Kalecki (1954) link investment to current profits of firms stating that high profits transform in high investment. Keynes (1936: 145) argued that it a "mistake of regarding the marginal efficiency of capital primarily in terms of the *current* yield of capital equipment." Depending on long-term expectations high current profits can be combined with a poor marginal efficiency of capital and low investment. The credit demand by firms depends on the investment function. As long as investment is totally financed by credit, the investment function is identical with the demand function for additional credit.

In Keynes (1936 and 1937) credit supply comes from wealth owners (mainly private households). As in the neoclassical monetarist approach, in this model the central bank sets

the money supply exogenously. Commercial banks play a completely passive role. Money held by wealth owners earns them a non-pecuniary rate of return - called the liquidity premium - which decreases with increasing money holding.[4] Wealth owners give credit to enterprises as long as the interest rate is higher than the marginal liquidity premium. However, the asset market is modelled not as a credit market but as a relationship between the demand for money holdings and the supply of money.[5] Given money supply, which is controlled by the central bank, the demand for money determines the interest rate.[6] First, money demand for transaction purposes (M_{DTr}) depends on the level of economic activity. In Diagram 1 a certain demand for transaction purposes is assumed as given. The difference between the exogenously given money supply (M_S) and M_{DTR} is available for hoarding (M_{DH}). For hoarding no interest is earned. However, the demand function for hoarding also depends on the interest rate (i) as the opportunity costs of keeping interest free hoards increase with the interest rate. This means that an increasing interest rate reduces the demand for hoards. Demand for hoards also depends on the state of confidence of wealth owners (Θ_H).[7] Now we get:

(Equation 2) $M_{DH} = M_{DH}(i, \Theta_H)$
                                    $(-)(-)$

An increase of the interest rate reduces the demand for hoards (shown as a movement along the demand function of hoarding in Diagram 1); an improved state of confidence (expressed by an increase of Θ_H) reduces money demand (shown as a shift of the demand function for hoards to the low left). A more detailed analysis of Keynesian money demand is possible. Keynes (1936) in his General Theory introduced the precautionary motive and the speculative motive for holding money. A finance motive was introduced in Keynes (1937a and 1937b). These additional demand motives for money make money demand even more unstable. For the sake of simplicity money demand for hoards stands for all demand elements creating an unstable money demand.

[4] This means the marginal liquidity premium decreases with increasing money holding.
[5] Many macroeconomic models use demand and supply for money to model the asset market – from John Maynard Keynes to the Neoclassical Synthesis, to Milton Friedman and monetarism. However, the focus on demand and supply of money easily ignores that the credit market is a very special market where demand and supply functions do not necessarily intersect..
[6] In monetarism demand and supply of money determine the price level.
[7] Other variables such as the stock of wealth can also influence money demand. To simplify the analysis such factors are not explicitly taken into account.

The equilibrium interest rate (i*) is given when the aggregate money demand function $M_D = M_{DTr} + M_{DH}$ cuts the money supply function (Ms). The equilibrium interest rate allows the determination of equilibrium investment (I*). A deterioration of the state of confidence, for example, decreases the value of (Θ_F) and (Θ_H). The money demand for hoarding shifts to the upper right and the investment function shifts to the lower left, both adding to a drop in equilibrium investment.

Diagram 1: The money market and investment in the General Theory
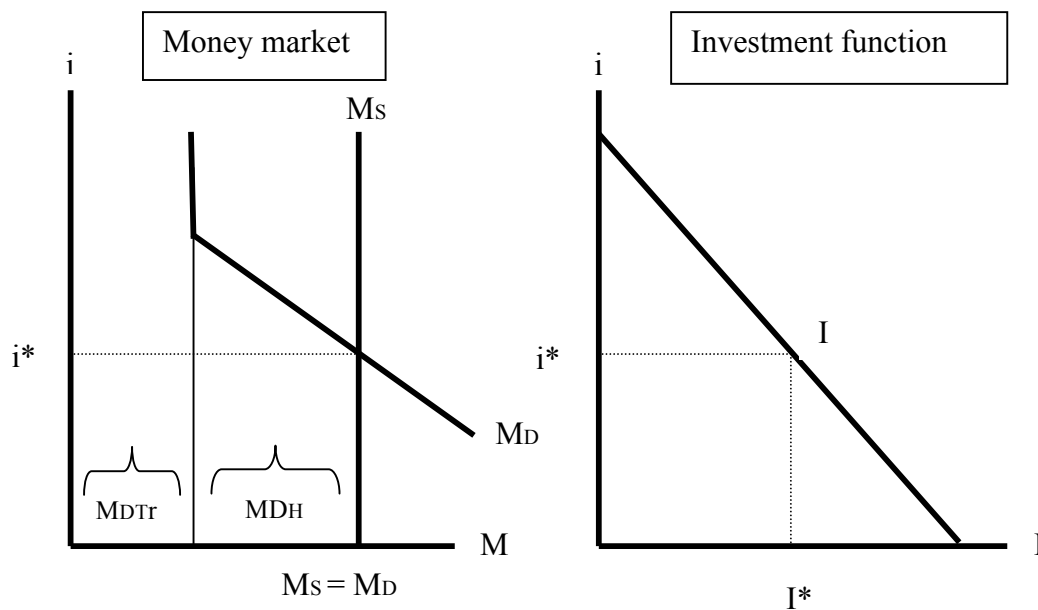
This model of the asset market is not satisfactory. It implicitly assumes that a central bank determines a certain volume of central bank money and, like marionettes, commercial banks create a certain volume of M1, M2 or M3 according to a money multiplier, whereas the latter aggregates are interpreted as exogenous money supply. In contrast to Keynes' assumption, in reality central banks cannot control the money supply and banks play an active, independent role in the supply of credit and thus money creation.[8] A credit expansion of banks increases their deposits automatically. Increasing deposits increase central bank money by two channels. First, depending on the preference of the public, part of monetary wealth is kept in cash. Thus, a fraction of the deposits created will be paid out by banks as central bank money. Second, banks keep a certain percentage of deposits as reserves in central bank money as the public can draw out money at any time. In addition, in many countries minimum reserves are legally required. The key argument for an endogenous money supply is that a central bank has

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[8] In Keynes (1930) money supply is implicitly assumed to be endogenous. However, Keynes did not choose this approach in his General Theory. In Keynes (1937a and 1937b) insufficient elements of an endogenous money supply can be found.

to fulfil the function of lender of last resort. This function is not only vital in crises; the central bank has to guarantee the liquidity of the banking system every day. It can never, nor will it attempt to close the discount window. If commercial banks demand more central bank money, for example as the result of credit expansion or a higher demand for cash holdings of the public, the central bank has to fulfil the demand for central bank money. Imagine cash machines would have no banknotes or commercial banks could not satisfy legal reserves requirements because the central bank provides no central bank money. Even if a central bank chooses a certain monetary aggregate like M2 or M3 it can only indirectly try to reach the target. In the 1970s many central banks switched to monetary targeting. Their success in controlling a monetary aggregate was very limited. Even central banks which tried hard to realise a certain growth rate of M2 or M3 failed and had to accept volatile and destabilising changes in the short-term interest rate.[9] Due to securitisation tendencies it even became difficult to define meaningful monetary aggregates.[10] Starting in the 1980s all central banks in developed countries began to give up monetary targeting and switched to inflation targeting or other monetary policy strategies. Central banks in modern financial systems fix the refinancing rate for banks for central bank money and the credit volume and the volume of central bank money is then determined endogenously by the economic behaviour of banks and firms and legal requirements. Post-Keynesians like Moore (1983), Lavoie (1984 and 2011) or Kaldor (1985) argued long ago in favour of models with an endogenous credit and money supply. As soon as money supply becomes endogenous the debate about the stability and instability of money demand, which dominated the discussion between Monetarists and the Neoclassical Synthesis Keynesians becomes unimportant.

In Diagram 2 the asset market is modelled as a credit market. To keep our analysis simple, credit demand comes only from firms. It is assumed that firms finance all of their productive capital via credit.[11] The credit demand function (K_D) depends on the interest rate, the state of confidence of firms and the old stock of credit (K_{old}).

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[9] Monetary policy of the Fed from the end 1970s until early 1980s is a good example of such a destabilising monetary policy (Herr/Kazandziska 2011).

[10] Based on the quantity theory of money, monetarists stated a stable relationship between changes in exogenous monetary aggregates and changes in the price level (see for example Friedman 1968). But monetary aggregates could not be defined in a satisfactory way, central banks could not realize growth targets of monetary aggregates and there was no stable relationship between growth rates of monetary aggregates and price level changes.

[11] Minsky (1975) complemented Post-Keynesian thinking by adding the dynamic to increasing and decreasing leverage and the problem of over-indebtedness to economic models. Keynes, strange enough, especially in the General Theory largely neglected the problem of the structure of debt and over-indebtedness. Debates in Minsky's tradition are of paramount importance for Keynesian thinking. Due to a lack of space this stream of Keynesian thinking is neglected in this paper.

(Equation 3) $K_D = K_D (i, \Theta_F, K_{old})$,
$\qquad\qquad\qquad$ (-) (+) (+)

Credit demand increases with a falling interest rate as, all other things unchanged, firms increase their investment in this case. The part of the credit demand function in Diagram 2 with a negative slope is identical with the investment function in Diagram 1. The old stock of debt is the credit volume given at the beginning of a period. An increase in the state of confidence and a higher stock of old debt, always other things unchanged, shift the credit demand curve to the right.[12]

Credit supply in a Post-Keynesian approach is largely influenced by banks. A bank has refinancing costs according to the refinancing rate (i_R) in the inter-bank money market.[13] The refinancing rate of banks is almost completely determined by the central bank and is the key monetary policy instrument in an unregulated financial system. Interest rates for bank deposits are closely linked to the refinancing rate in the money market. The refinancing function for banks is shown in Diagram 2 as a horizontal line at the refinancing rate i_{R1}. In addition to the costs of banking and bank profits, the state of confidence of banks (Θ_B) influences the spread between the refinancing interest rate and the lending rate of banks. Of course, the state of confidence also influences which firms demanding credit are served. This point will be discussed in more detail below. The interest spread includes what can be called an uncertainty premium depending on the general situation of the economy.

The central bank can only influence the long-term interest rate (i) indirectly. There is a long debate whether the credit supply function increases with increasing credit volume or not. However, at the level of the present analysis, this debate is of secondary importance. Long-term credit by wealth owners can also modify the aggregate credit supply function.[14] However, as soon as a banking system exists credit supply is not restricted by the pre-existing stock of wealth of wealth owners. If Θ_H symbolizes here the influence of wealth owners on the credit supply function (K_S) one gets:

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[12] Implicitly, it assumed that net investment cannot be negative. In a more differentiated model depreciation of the old capital stock can be introduced. The old stock of debt at the end of the period would then be the old stock of debt at the beginning of the period minus depreciation. The part of the credit demand function with the negative slope would then represent gross investment. Net investment would then be gross investment minus depreciation and could be negative.

[13] In contrast with the money market in Diagram 1, here the reference is to the market for short-term credits among banks and the central bank.

[14] In the Post-Keynesian camp there is a controversy between horizontalists and structuralists (for an overview see Lavoie 2011).

Equation (4) $K_S = K_S (i, i_R, \Theta_B, \Theta_H)$

$$(+) \; (-) \; (+) \; (+)$$

In the simple case shown in Diagram 2 the long-term credit supply function is a horizontal line at the level of the lending rate i*. As soon as the interest rate i* is realised credit supply increases without changes in the interest rate. The other variables in the above equation shift the credit supply function. An improved state of confidence, expressed by Θ_B and Θ_H, leads to a downward shift in the credit supply function. An increasing refinancing rate i_R shifts the credit supply function upwards.[15] In Diagram 2, assuming that all credit demanders are satisfied, the equilibrium in the credit market is given at the credit volume K* and the interest rate i*. Under the condition that firms operate only with credit, the credit volume is identical with the stock of productive capital of the enterprise sector. Net investment is given by I = K* - K_{old}.

Diagram 2: The credit market in modern Keynesian model
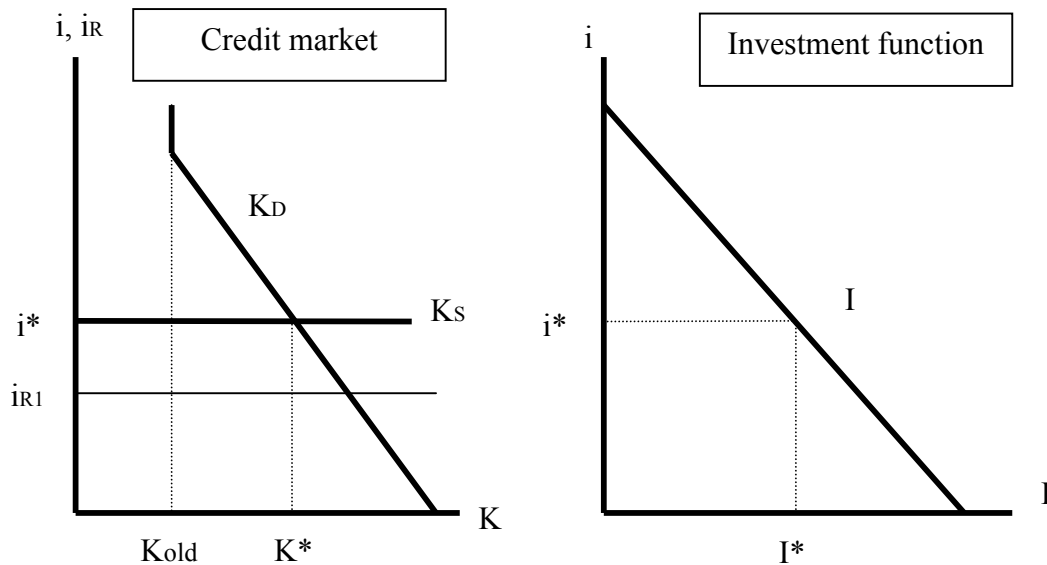

So far it has been assumed that there are no unsatisfied credit demanders and the equilibrium is given by the intersection between the credit supply and credit demand function. However, such an assumption does not reflect reality in credit markets. Keynes (1930: 326f.) already spoke of "unsatisfied borrowers". This means: "The relaxation or contraction of credit by the banking system does not operate, however, merely through a change in the rate charged to

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[15] In the case of an upward sloping function increasing lending rates increase the credit supply whereas increases of Θ_B and Θ_H shift the function downwards right and an increase of i_R upwards.

borrowers; it also functions through a change in the abundance of credits." In a much sharper way Stiglitz/Weiss (1981) argued that credit rationing is the normal case in credit markets in which demand and supply curves almost never intersect and the price does not equalise demand and supply. Such a case is shown in Diagram 3. Equilibrium credit is K* at the equilibrium interest rate i*. The horizontal difference between the credit volume K* and the credit demand at the interest rate i* gives the extent of unsatisfied borrowers. For the credit volume K* creditors could demand a much higher interest rate as i*. But they will not increase the interest rate to the level of i_1 as this would lead to a concentration of bad borrowers who are risk-loving and will not be able to pay back their debt. As a result of a high interest rate, good borrowers would drop out (Stiglitz/Weiss 1981). Not all firms in the credit market with credit rationing can realise their plans. Investment is restricted to I*.

Diagram 3: The credit market with credit rationing in modern Keynesian model
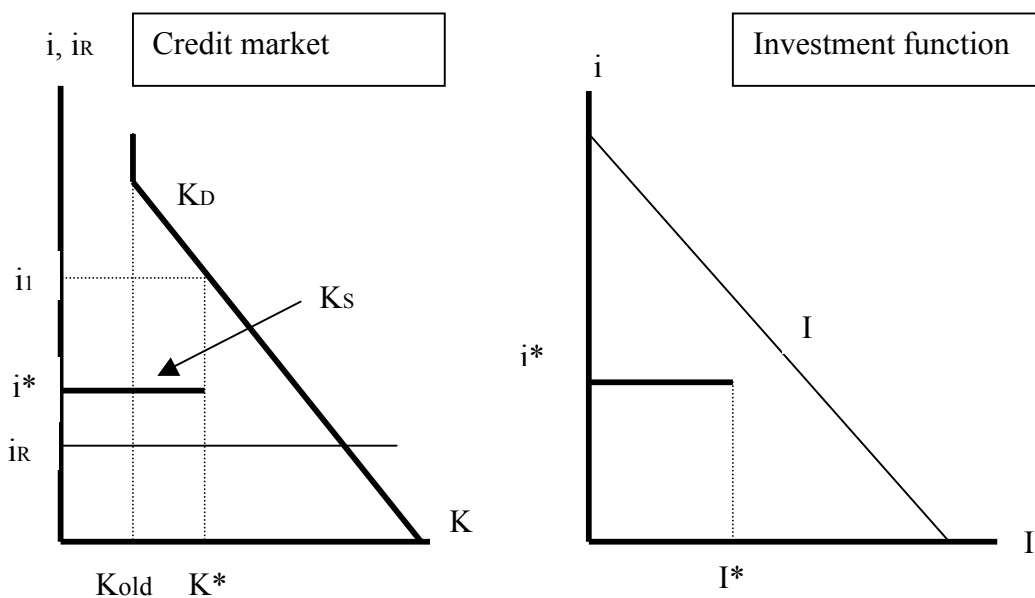
A negative change in the state of confidence affects all economic agents. In Diagram 3 credit rationing intensifies and less credit will be granted. As the interest rate spread increases, the interest rate will most likely increase above i*. The investment function will shift to the left and the demand for credit at any given interest rate decreases. However, it is very unlikely that in the new equilibrium all credit demanders will be satisfied. In any case, equilibrium credit and net investment will be reduced.

When all factors that influence (net-)investment are collected, the following equation can be written:

(Equation 5) $I = I\,(i, i_R, \Theta_F, \Theta_B, \Theta_H)$

                                    $(-)\ (-)\ (+)\ (+)\ \ (+)$

Investment increases when the long-term interest rate decreases (movement along the function). Given the long-term interest rate it increases when the refinancing rate of the central bank decreases and the state of confidence of firms, banks and wealth owners increases (shift of the investment function). To develop a simple model the investment function can be written in the following simplified form:

(Equation 6) $I = Z - di$

Z gives the so called autonomous investment volume in a situation of a zero interest rate. How investment decreases when the interest rates increases is given by the coefficient d. Behind the variables Z and d are the exogenously given variables i_R, Θ_F, Θ_B, and Θ_H.

The product market

For the product market the law of effective demand is central. It states that in a situation of unused capacities and unemployment an increase in aggregate demand increases output without changing the price level. Aggregate demand (AD) in a closed economy is $AD = I + C + G$ with C as consumption demand and G as government demand. The consumption demand is $C = C_{aut} + cY$ with C_{aut} as income independent demand and cY as demand which depends on income, whereas c is the marginal propensity to consume and Y nominal income or nominal net domestic product. Taking the consumption function into account the aggregate demand function becomes $AD = I + C_{aut} + cY + G$. Under the condition of unused capacities and unemployment nominal demand determines real out whereas the price level does not change. Under this condition nominal and real income are the same $(Y = Y_r)$. Thus the equilibrium condition in the product market can be written as $Y_r = I + C_{aut} + c{\cdot}Y_r + G$. Isolating Y_r equilibrium in the Keynesian product market is

(Equation 7) $Y_r = [1/(1-c)]\,(I + C_{aut} + G)$,

with $m = 1/(1-c)$ as the product market multiplier. Autonomous consumption demand and the marginal propensity to consume increase with higher wealth and more optimistic expectations of households, but also with a more equal income distribution (high income households have

a higher saving rate than low income households) and a better social welfare system (uncertainty for households is reduced).

Equation 7 can be written as:

$$Y_r = mC_{aut} + mG + mI$$

Inserting for the investment function (Equation 6) it follows that:

$$Y_r = mC_{aut} + mG + m(Z - di) \qquad \text{or}$$

$$Y_r = m(C_{aut} + G + Z) - mdi.$$

With $A = m(C_{aut} + G + Z)$, the equation becomes:

(Equation 8) $\qquad Y_r = A - mdi$

Equation 8 can be called the interest-rate-production curve. It became known as the IS-curve and was developed by Hicks (1937) in his early Keynes interpretation. Given all the parameters, real production or real income increases when the interest decreases. For example, an improvement of the state of confidence increases A (and potentially also d) and shifts the function to the upper right. The first sub-diagram in Diagram 5 shows graphically an IS-curve.

Inflation, wages and the wage-pressure-curve
The price level in equilibrium is determined by costs (Keynes 1930; Herr 2009). The argument implies mark-up pricing and a direct price-price effect or in the case of wages a direct wage-price effect.[16] Thus Keynes did not subscribe to the idea that in a situation of low capacity utilisation higher nominal wages lead to higher real demand and higher production until full capacity utilisation is reached. If all firms in an industry are confronted with higher costs, all have an incentive and the option to increase prices and will do so, at least in a closed economy. Good examples of this mechanism are higher oil prices or an increase in value-

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[16] Implicitly, monopolistic competition characterised by product differentiation, different locations etc. or oligopolistic and monopolistic markets are assumed. Otherwise it is not possible to explain who should change prices.

added tax. When wage costs increase, these will also be rolled over; falling wages lead to cuts in prices even if markets are not competitive.

The argument can be made clearer by presenting the fundamental equations of the value of money (Keynes 1930). The national accounting of a closed economy gives us $Y = W + Q$ with Y as nominal domestic income (net domestic product), with W as the wage sum and Q as profits. Profits equal physical capital stock (K) multiplied with the price level (P) and the profit rate (q), that means $Q = qPK$. As nominal income is real income multiplied by the price level ($Y = Y_rP$), it follows that $Y_rP = W + qPK$ or $P = \dfrac{W}{Y_r} + \dfrac{qPK}{Y_r}$. The term ($W/Y_r$) expresses unit-labour costs, and the term (qPK /Y_r) gives the profit per unit produced. If in (W/Y_r) both the nominator and denominator are divided by labour input (H) the result is $(W/H)/(Y_r/H)$. Thus, unit-labour costs are given by nominal wages per hour ($w = W/H$) divided by labour productivity ($\pi = Y_r/H$). It follows that:

(Equation 9) $P = \dfrac{w}{\pi} + \dfrac{qPK}{Y_r}$

This equation gives us a simplified definition of the cost structures in an economy; simplified because factors like the price of natural resources or taxes are not covered. When changes are analysed in Equation 9 the following relationship holds (points above the variables indicate percentage changes) $\left(\dfrac{\dot{w}}{\pi}\right) = \dot{P}$.

In a closed economy, there is a long-run proportional relationship between changes in unit-labour costs and changes of the price level. An increase in unit-labour costs increases the price level in the first round as wage costs go up. The output of one industry is the input of other industries. Thus, a second round of price increases is triggered because higher unit-labour costs lead to higher costs for capital inputs. The result is a proportional relationship between unit-labour cost changes and price level changes. As unit-labour cost changes equal nominal wage changes minus productivity changes, price level changes are given by

$\dot{P} = \dot{w} - \dot{\pi}$.

If wage negotiations determine *nominal* wages and, together with productivity, nominal unit-labour costs, nominal wage changes cannot change functional income distribution. Keynes (1936: Chapter 17) argued that a liquidity premium (a non-pecuniary rate calculated by wealth

owners to express the advantage of keeping liquidity in an uncertain world) determines the interest rate and the latter the profit rate.[17] Profit is a type of (opportunity) cost the firm has to earn. With the (marginal) liquidity premium (l) the equilibrium is given by: $l = i = q$.

In a more modern version of Keynesian thinking the central bank fixes its short-term refinancing rate and thus all short-term interest rates. Long-term interest rates depend on short-term interest rates (i_s) plus a liquidity premium (or long-term uncertainty or risk premium) of banks. Short-term interest rates depend on the refinancing rate at the central bank plus a usually small interest spread (or short-term uncertainty or risk premium). In this case, the equilibrium becomes $q = i = i_s + l$. Profit rates are usually higher than interest rates. If b expresses the power of institutions and agents in the financial system to force companies to realise a certain profit margin above the interest rate, the equilibrium becomes $q = i + b$ whereas $i = i_s + l$. The factor b is not based on productivities or any objective factor. It is based on legal regulations and the convention of how high profits should be. If management in all companies is confronted with a higher pressure from owners to increase profitability and get a bonus to do so by all means at all costs the profit rate increases (Boyer 2000; Zalewski/Wahlen 2010). Kalecki (1954) saw a degree of monopoly as an own factor to determine profit shares. This argument can easily be added to the Keynesian argument. Stiglitz (2012: especially Chapter 2) argues that much of the change in income distribution during the last decades has been caused by rent seeking based on the ability to exercise market power – the ability to exploit consumers in product markets through monopoly power or to exploit uneducated borrowers and small private investors in the financial sphere. These developments were based on deregulating financial, labour and product markets in the interest of private companies and the type of globalisation which was triggered by these changes.

There is no doubt that in certain constellations increasing wage costs cannot be (completely) rolled over. An appreciation of the domestic currency and thus harder competition, for example, may make it difficult to increase prices. However, a currency depreciation may allow higher profits per unit produced.

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[17] Piero Sraffa showed that in the Keynesian and classical paradigm functional income distribution has to be known before relative prices can be determined. In the classical paradigm real wages are given exogenously and the profit rate is the depended variable. In contrast, in the Keynesian paradigm: "The rate of profits, as a ratio, has a significance which is independent of any prices, and can well be 'given' before prices are fixed. It is accordingly susceptible of being determined from outside the system of production, in particular by the level of the money rate of interest." (Sraffa 1960:33)

Thus far in the analysis demand and supply driven price level changes were not discussed. However, a lack of product market demand may prevent increasing prices in spite of higher costs. Possible is also the opposite, an increase of product market demand in a constellation of full capacity utilisation. Under this condition demand inflation leads to increasing prices without increasing costs. Such factors can become important in concrete historical analyses, but they are not valid arguments to reject the Keynesian argument that costs and especially wage costs in the end determine prices.

As cumulative inflation and deflation are destructive for monetary production economies, a wage development which stabilises a low inflation rate is essential for the long term development of an economy. While changes of profit rates, natural resources prices, taxes, etc. may lead to changes in the price level, they alone can not create an inflationary or deflationary process. In a closed economy cumulative inflationary processes are almost always connected with a wage-price spiral, even when the wage price spiral is triggered by other forces, for example an increase in food prices or the oil price.[18] To become a nominal anchor for the price level, wages should increase every year according to the wage norm. Given the target inflation rate ($\dot{P}_T$) the wage norm can be stated as $\dot{w}_N = \dot{\pi}_m + \dot{P}_T$ with $\dot{\pi}_m$ as medium-term productivity increases and $\dot{w}_N$ as the desired increase in nominal wages. If wages increase according to the wage norm the inflation rate equals the target inflation rate.

There is no guarantee that wage developments according to the wage norm will lead to higher growth and higher employment. But wage increases that follow the wage norm increase the probability of higher growth and higher employment. First, restrictive monetary policy to fight against wage inflation is not needed. Second, the prevention of wage increases below the wage norm or even wage cuts provides the crucial bulwark against deflation. If the central bank is responsible for preventing inflation, then unions or labour market institutions are responsible for preventing deflation. In this regard, divergence could not be greater with all variations of the neoclassical approach, which stresses the positive employment effects of wage reductions.[19]

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[18] Taking international processes into account, exchange rate movements can become an important factor for cumulative price level changes. This point is not discussed here.
[19] This includes the Neoclassical Synthesis and the New Keynesian models, which in the end are only variants of the neoclassical paradigm and believe in the positive effects of falling wages.

In Keynesian thought there is a conflict between very low or very high unemployment rates and a desired inflation rate. If the unemployment rate becomes very low, there is a danger that wages start to increase above the wage norm, triggering an inflationary wage-price spiral. At the other extreme is a very high unemployment rate. In such a case there is the danger that the wage anchor breaks and nominal wage cuts lead to deflation. The relationship between the unemployment rate (u) and price level changes ($\dot{P}$) can captured by a wage-pressure-curve. Such a curve should not be confused with a Phillips-curve which has the same shape but a completely different theoretical explanation. The Phillips-curve in neoclassical reading is based on money illusion of workers who misinterpret an increase in nominal wages as an increase in real wages. In the Neoclassical Synthesis and in New-Keynesianism nominal wages are considered to be sticky whereas the New-Keynesians give a "rational" microeconomic explanation for the stickiness and economists of the Neoclassical Synthesis simply assumed it. In all cases it is the fall in real wages which brings down unemployment. The wage-pressure-curve in contrast is based on a direct wage-price effect between wage costs and the price level, whereas wage costs depend on the unemployment rate.

The relationship between unit-labour-cost changes and price level changes depends on the specific labour market institutions of a country, including the wage bargaining process and the existence of minimum wages.[20] Empirically a wage-pressure-curve is difficult to calculate and it can also change substantially over time (Stiglitz 1997).[21] Diagram 4 shows different wage-pressure-curves. Wage-pressure-curve I which became the most popular curve in the theoretical debate is very atypical of Keynesian thinking. Given the target inflation rate of the central bank ($\dot{P}_T$) or any inflation rate which is acceptable for a central bank the wage-pressure-curve I curve determines the equilibrium unemployment rate (u*) which is the only one that allows for the realisation of the inflation target. The unemployment rate u* became

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[20] There has been a long-standing debate about labour market institutions and wage development (cp. Calmfors/ Driffill 1988; Soskice 1990; Carlin/Soskice 1990; Layard/Nickel/Jackman 1991; Iversen 1999; Ball/Mankiw 2002). The overall result of this debate is that, at coordinated wage negotiations is the best institutionalisation. Coordination can be achieved by different institutions. Even wage negotiations on a firm level can lead to wage coordination if pattern bargaining and/or extension mechanisms exist. However, industry level and national level negotiations increase the probability of wage coordination. In this debate it is sometimes unclear as to whether developments of real wages or nominal wages are being discussed. In addition, institutions which prevent wage cuts and deflation are not the focus of attention.

[21] In the USA, for example, in the 1990s it was widely believed that a drop in the unemployment rate below six per cent would trigger a wage-price spiral (Blinder/Yellen 2001). When the unemployment rate dropped to six per cent in 1996 no inflationary development could be observed. It was only because Alan Greenspan, President of the Federal Reserve at that time, repeatedly rejected interest rate increases that the unemployment rate dropped below four percent.

known as NAIRU (Non-accelerating-inflation-rate of unemployment).[22] For such a constellation there are two interpretations possible. In the first, the economy tends towards high GDP growth permanently, while the unemployment rate has the permanent tendency to fall below u*. In such a growth economy the central bank has to use its interest rate permanently in order to prevent a drop in the unemployment rate below u*. In such a case, as in the neoclassical model, the labour market determines employment and output – a very strange conclusion for a Keynesian model. The second and more realistic interpretation is that the wage-pressure-curve I curve characterises a very unstable economy with very dysfunctional labour market institutions. As soon as the central bank is not able to realise u* the economy is caught in inflationary and deflationary waves. Central banks are able to prevent a decrease of unemployment below u*, but it may not be possible for them to prevent an increase in unemployment beyond u* and avoid a deflationary development. A wage-pressure-curve I would lead to volatile wage and price level changes and prevent any prosperous development within the economy. For Keynes (1936: 269) it was clear that such a constellation of flexible wages would be very dysfunctional: "To suppose that a flexible wage policy is a right and proper adjunct of a system which on the whole is one of *laissez-faire*, is the opposite of the truth."

Diagram 4: Different wage-pressure-curves
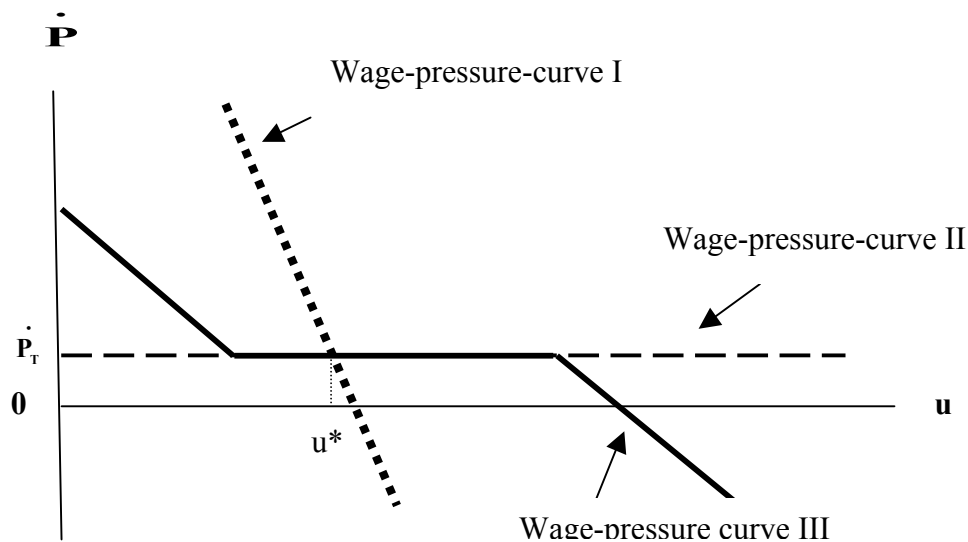
A perfectly functional relationship between the unemployment rate and price level changes is given by the wage-pressure-curve II curve.[23] Wages develop independently from the unemployment rate in such a way that the inflation target of the central bank is always realised. For central banks this implies luxurious constellation because the nominal wage anchor holds in a comprehensive way.[24] Such a horizontal wage-pressure-curve implies very strong labour market institutions including strong unions and strong employers' associations. Countries usually do not have such ideal labour market institutions. This brings us to the wage-pressure-curve III which shows a stable nominal wage anchor for a range of unemployment rates. Only very low unemployment rates lead to wage inflation and very high unemployment rates lead to wage deflation. The wage-pressure-curve III curve must be considered as the most realistic.

3. A comprehensive Keynesian model

The aim of this section is to present a Keynesian model explaining the output level and changes of the price level at the same time. For the sake of simplicity smooth functional relationships between variables are assumed. First a model with no credit rationing as presented in Diagram 2 is presented. The structure of the model is given in Diagram 5. In the first sub-diagram the interest-rate-production curve (IS-curve) from Equation 8 is drawn. If the interest rate is zero output Y_{r1} is produced. As the interest rate increases output falls. A positive expectation shock ceteris paribus increases the value of A and shifts Equation 8 to the right. In the diagram this is shown by 8' with a maximum output of Y_{r2}. Let us come to the next sub-diagram in Diagram 5 which shows the production-unemployment-rate curve.

(Equation 9) $u = E - \lambda Y_r$

At the output Y_{rmax} the unemployment rate is zero. When output decreases the unemployment rate increases. E gives the maximum unemployment rate. The variable λ expresses how the unemployment rate reacts when output changes. The reaction depends on the existing

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[23] For alternative wage-pressure-curves also cp. Hein (2002) and Hein/Stockhammer (2010).
[24] Much of what Keynes wrote in his General Theory (1936) assumed such a perfect wage anchor, but the General Theory and his Treatise on Money (1930) belong together and it would be inaccurate to suggest that Keynes made the general assumption that wages are sticky. He argued that wages *should* be sticky to stabilise the economy.

technology and labour market institutions.[25] The variable Y_r in Equation 9 can be substituted by Equation 8. The interest-rate-unemployment-rate curve follows:

(Equation 10) $u = E – \lambda A + \lambda mdi$

The equation shows that a rising interest rate increases the unemployment rate. Even at an interest rate of zero, unemployment does not necessarily become zero. This is the case when $\lambda A \geq E$, the autonomous demand elements are too low and/or labour productivity is too high for full employment . As shown in Diagram 5, under the condition of an interest rate of zero, the interest-rate-unemployment-rate curve 10 leads to the unemployment rate u_2. A positive expectation shock (an increase in A) shifts the curve to 10' with a lower minimum unemployment rate of u_1. The next sub-diagram in Diagram 5 shows the already known wage-pressure curve I. Equation 11 gives such a curve:

(Equation 11) $\dot{P} = R – eu$

At an unemployment rate of zero the highest inflation rate is given by R. The variable e expresses how strong the inflation rate increases when the unemployment rate decreases. Finally, u in Equation 11 can be substituted by Equation 10 to get a relationship between the inflation rate and the interest rate. It follows that $\dot{P} = R – e(E – \lambda A + \lambda mdi)$ or $\dot{P} = R– eE+e\lambda A – e\lambda mdi$. With $B = R – eE + e\lambda A$ and $a = e\lambda md$ the interest-rate-inflation-rate curve follows as:

(Equation 12) $\dot{P} = B – ai$

This relationship covers the causal link between the interest rate, aggregate demand and output, between output and the unemployment rate, and between the unemployment rate, nominal wage changes and price level changes. The highest inflation rate is given at the interest rate of zero; in the case of Equation 12 this is B_1 in Diagram 5. The coefficient a shows to which extent the inflation rate drops when the interest rate increases. What is missing is the inflation target of the central bank an how it realises its inflation target. In a first step a strict inflation targeting regime of monetary policy is assumed. In such a case the

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[25] Changes in functional income distribution can change this relationship whereas the same rate of profit can lead to a high or low capital intensity of production respectively the same technology (Sraffa 1960). Also new technologies due to inventions can change the relationship.

central bank only follows one target given (the target inflation rate $\dot{P}_T$) and will adjust its refinancing rate in such way to try to realise the target.

(Equation 13) $\dot{P} = \dot{P}_T$

As long as the inflation rate is higher or lower than the target inflation rate the central bank will increase or decrease the interest rate to realise its target. The two independent equations (12) and (13) allow the determination of the two variables looked for, the equilibrium inflation rate $\dot{P}*$ and the equilibrium interest rate i*. In Diagram 5 in the lowest sub-diagram the equilibrium is given by the intersection between the central bank reaction function and the interest-rate-inflation-rate curve. By equalising Equation 12 and 13 the equilibrium interest rate (i*) is determined.
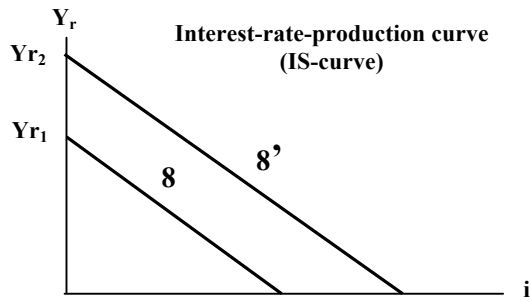
(Equation 14) $i* = (B - \dot{P}_T)/a$

When the equilibrium interest is given equilibrium real output and the equilibrium unemployment rate can easily be calculated with the help of Equation 8 and 10.
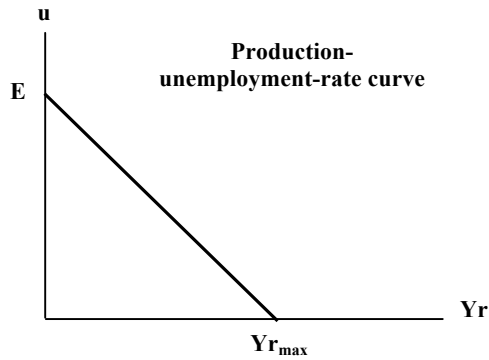
In the lowest sub-diagram of Diagram 5 an improvement of the state of confidence is shown. Such an improvement increases A, and therefore B, and shifts equation 12 to 12'. The new equilibrium interest rate i** is higher than the old one. The increase of the interest rate compensates the positive expectation effect completely, while output does not change.[26] This effect again shows that under the assumption of a wage-pressure-curve I curve the labour market determines employment and output.

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[26] Using Equation 14 to calculate the effect of a change in expectations (ΔA) on the change of the interest rate (Δi) it follows that $\Delta i = \Delta A/md$. When Equation 8 is used to calculate the combined effect of the change in expectations and the change of the interest rate it follows that $\Delta Y_r = \Delta A - md \cdot \Delta i$. As $\Delta i = \Delta A/md$ we get $\Delta Y_r = \Delta A - md\Delta A/md = 0$. This means that output does not change.
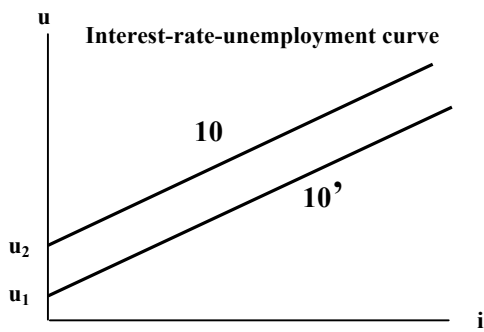
Diagram 5: The interaction of macroeconomic markets with a wage-pressure-curve I
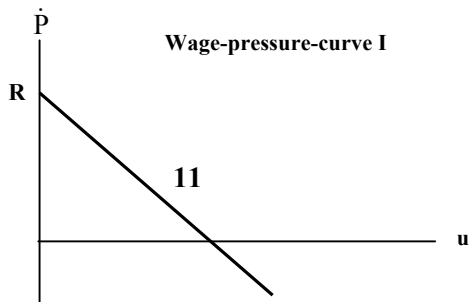
Interest-rate-production curve (IS-curve)

Y_r axis, Yr_2, Yr_1, labels **8**, **8'**, axis **i**

$$(8)\ Y_r = A - mdi$$
with
$$A = m(C_{aut} + G + Z)$$
and
$$m = 1/(1-c)$$

Production-unemployment-rate curve

u axis, E, axis Yr, Yr_{max}

$$(9)\ u = E - \lambda Y_r$$

Interest-rate-unemployment curve

u axis, labels **10**, **10'**, u_2, u_1, axis **i**

$$(10)\ u = E - \lambda A + \lambda mdi$$

Wage-pressure-curve I

$\dot{P}$ axis, R, label **11**, axis **u**

$$(11)\ \dot{P} = R - eu$$
(10) in (11) gives:
$$\dot{P} = R - eE + e\lambda A - e\lambda mdi$$
with $B = R - eE + e\lambda A$
and $a = e\lambda md$ it follows equation (12)

Interest-rate-inflation-rate curve and monetary-policy-reaction function

$\dot{P}$ axis, B_2, B_1, labels **12'**, **12**, **13**, $\dot{P}_T$, i^*, i^{**}, axis **i**
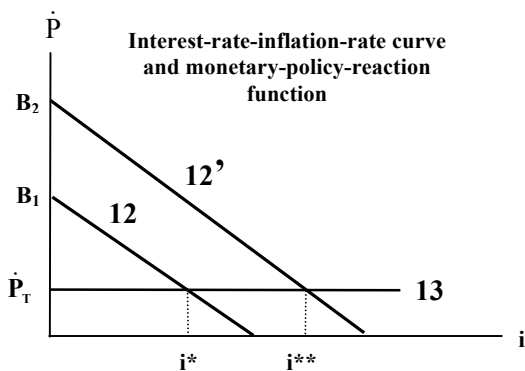
$$(12)\ \dot{P} = B - ai$$
$$(13)\ \dot{P} = \dot{P}_T$$
it follows:
$$(14)\ i^* = (B - \dot{P}_T)/a$$

The wage-pressure-curve I puts the labour market in the centre a macroeconomic analysis which contradicts original Keynesian thinking. A theoretically as well as empirically more realistic model is based on the wage-pressure-curve III. Such a model is shown in Diagram 6. In the first sub-diagram the wage-pressure-curve III is given. This is sufficient as the first three sub-diagrams in Diagram 5 are not affected by the modification. The wage-pressure-curve III (15) has three parts:

Equation 15 f_1 for $u < u_1$ $\dot{P} = R - eu$

               f_2 for $u_1 \geq u \leq u_2$ $\dot{P} = \dot{P}_T$

               f_3 for $u > u_2$ $\dot{P} = L - eu$

The f_1 and f_3 parts of the wage-pressure-curve III express that the price level changes with changes in the unemployment rate comparable with the wage-pressure-curve I. In the middle, f_2, wages develop independently of the unemployment rate and the inflation target is realised. In this part many unemployment rates (NAIRUs) exist which are compatible with the inflation target of the central bank.

In the f_1 and f_3 parts of Equation 15 the interest-rate-unemployment-rate curve from Equation 10 is set in. For f_2 the unemployment rate does not play a role, and we get:

Equation 16 f_1 for $i < i_1$ $\dot{P} = R - e(E - \lambda A + \lambda mdi)$ or

                                   $\dot{P} = B - ai$ with

                                   $B = R - eE + e\lambda A$ and $a = e\lambda md$

            f_2 for $i_1 \leq i \leq i_3$ $\dot{P} = \dot{P}_T$

            f_3 for $i > i_3$ $\dot{P} = L - e(E - \lambda A + \lambda mdi)$ or

                                   $\dot{P} = D - ai$ with

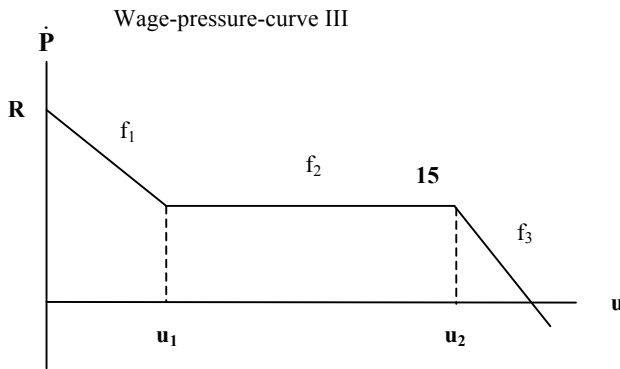 $D = L - eE + e\lambda A$ and $a = e\lambda md$

A positive expectation change, expressed in an increase of A, shifts the wage-pressure-curve III to the right, as B and D respectively increases in value. In Diagram 6 the new curve is shown by 16'.

The bottom sub-diagram in Diagram 6 allows the determination of the overall equilibrium. For this purpose the intersection of the interest rate inflation-rate curve (Equation 16) and the monetary-policy-reaction function (Equation 13) has to be determined.

Between i_1 and i_3 the interest rate is not determined. This means that all interest rates between i_1 and i_3 are possible from the labour market perspective. The labour market has lost its dominating role, as in Diagram 5, to determine the equilibrium interest rate, the equilibrium production and the equilibrium unemployment rate. In fact, many equilibrium constellations are possible. Diagram 6 has the characteristics of a Keynesian model with a key role of effective demand to determine output and employment.
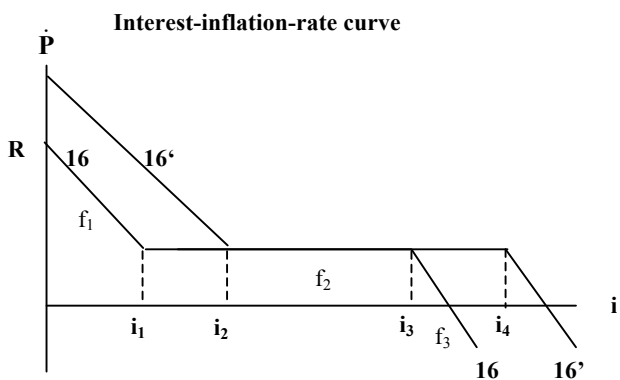
In the bottom sub-diagram of Diagram 6 an improvement of expectations shifts Equation 16 to 16'. Under the condition that the interest rate before the change was i_3, output and employment will increase. This can be seen from $Y_r = A - mdi$ (Equation 8), in which improved expectations increase the value of A and increases Y_r under the condition that the interest rate does not change. Thus, better expectations (under the condition of an unchanged interest rate) will increase Y_r as long the unemployment rate does not drop under a critical level which triggers cost-push inflation. The important point is that – under the conditions assumed – increasing demand increases output without changing the inflation rate. Within a large range of unemployment rates the law of aggregate demand holds! However, increasing aggregate demand can bring unemployment down to such a low level that wage inflation is triggered. In Diagram 6 this point is reached when the unemployment rate drops below u_1 and inflation starts to become a problem.

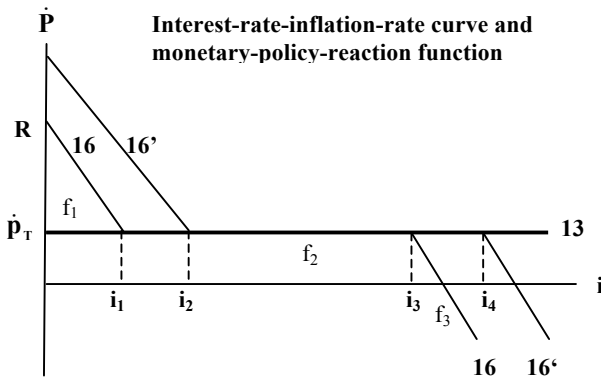**Diagram 6: Interaction of macroeconomic markets with a wage-pressure-curve III**

Wage-pressure-curve III

$\dot{P}$

R

f_1

f_2

15

f_3

u

u_1 u_2

Equation (15)

f_1 for $u < u_1$ $\dot{P} = R - eu$

f_2 for $u_1 \leq u \leq u_2$ $\dot{P} = \dot{P}_T$

f_3 for $u > u_2$ $\dot{P} = L - vu$

Interest-inflation-rate curve

$\dot{P}$

R   **16**   **16'**

f_1

f_2

i_1 i_2 i_3 f_3 i_4

i

16   **16'**

Equation (16)

f_1 for $i < i_1$ $\dot{P} = B - ai$

with $B = R - eE + e\lambda A$

and $a = e\lambda md$

f_2 for $i_1 \leq i \leq i_3$ $\dot{P} = \dot{P}_T$

f_3 for $i > i_3$ $\dot{P} = D - ai$

with $D = L - eE + e\lambda A$

Interest-rate-inflation-rate curve and monetary-policy-reaction function

$\dot{P}$

R   **16**   **16'**

f_1

$\dot{p}_T$ f_2 **13**

i_1 i_2 i_3 f_3 i_4

i

16   **16'**

Equation (16)

f_1 for $i \leq i_1$ $\dot{P} = B - ai$

f_2 for $i_1 \leq i \leq i_3$ $\dot{P} = \dot{P}_T$

f_3 for $i \geq i_3$ $\dot{P} = D - ai$

Equation (13)

$\dot{P} = \dot{P}_T$

It was argued above that credit markets in many circumstances are characterised by credit rationing. In this case banks fix the interest rate at a certain level above the refinancing rate of the central bank and the financial system delivers a certain credit volume, whereas the interest rate spread as well as the credit volume is based on the state of confidence of the agents in the financial system (see Diagram 3). From the credit volume a certain investment volume is financed, which leads to a corresponding real output. In Diagram 7 such a case is presented. The upper sub-diagram shows the interest-rate-production curve (IS-curve) under credit rationing. Given a certain refinancing rate and a certain state of confidence a credit rationing financial system may come to an equilibrium interest rate of i_2 and finances investment which

leads to a real output of Y_{rA}. Better expectations of agents in the financial system lead to a lower equilibrium interest rate, let us assume i_1. At the same time a higher investment volume is financed which leads to a real output of Y_{rB} in Diagram 7. In the lower sub-diagram of Diagram 7 the wage-pressure-curve III is shown. It is assumed that the output Y_{rA} leads to an unemployment rate of u_{YrA}. The higher output Y_{rB} corresponds to the lower unemployment rate u_{YrB}. As both unemployment rates lay on the horizontal part of the wage-pressure-curve III at the level of the inflation target of the central bank the increase in output and the reduction of the unemployment rate takes place without any increase of the inflation rate. As long as the inflation target is realised the central bank has no incentive to change its interest rate.

Diagram 7: Interaction of macroeconomic markets with a wage-pressure-curve III and credit rationing
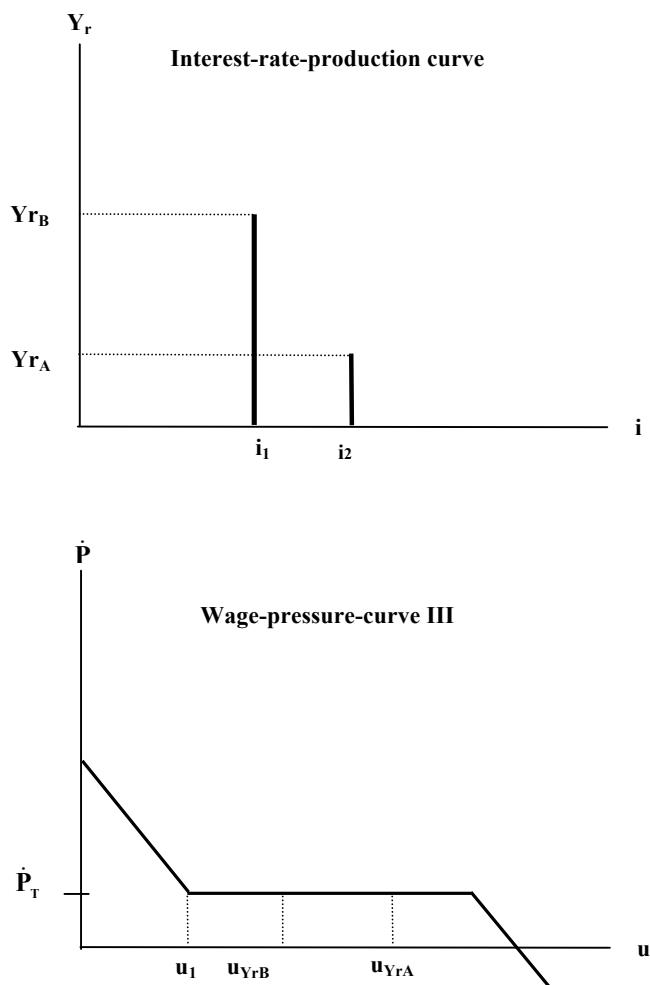
In a constellation where the unemployment rate drops below u_1 the central bank will increase its interest rate to defend its inflation target. This leads to higher lending rates. Even if the

volume of credits given by the financial system does not change (not a very likely case) the higher interest will reduce credit demand. Thus, restrictive monetary policy will also work under credit rationing. Of course expansionary monetary policy can fail.

A whole set of Keynesian topics can now be discussed. In all of the cases presented above constellations can develop in which even a refinancing rate of zero does not lead to sufficiently high employment. Monetary policy after the outbreak of the Great Recession in the US is only one of many historical examples for such a case. The first point is that a refinancing rate of zero cannot prevent a high interest rate spread of banks and a lending rate for firms above zero. The second point is that even a lending rate close to zero can fail to bring down high unemployment. In the case of non-credit rationing negative firm expectations can prevent any investment. (The shift of Equation 16 in Diagram 6 to the left can prevent investment.) In the case of credit rationing even a refinancing rate of zero and a low interest rate can be combined with high unemployment (see Diagram 7). At least for Keynesians it is obvious that monetary policy has asymmetric power. It can always reduce real GDP growth and employment by pushing the interest rate up, but it cannot increase output and employment when banks and other creditors do not want to grant credits and firms do not want to take loans to invest.

It must be expected that central banks which want to increase output and employment reduce their refinancing rates to the lowest level compatible with their inflation target. In Diagram 6 a central bank will choose the interest rate i_1. After the positive expectation shock (Equation 16') the lowest interest rate in harmony with the inflation target increases to i_2. When expectations fall back to the old level, interest rates also fall back to i_1. What we find here is very much Knut Wicksell's (1898) vision of monetary policy: With its refinancing rate a central bank has to follow the permanent exogenously given changes in the economy. The difference between Wicksel and Keynes is, however, that Keynes (1936) completely gave up the idea of a real sphere as any kind of anchor for capitalist economic development. Wicksell had the interaction between a rate of return from a real sphere and the refinancing rate of the central bank in mind, whereas the money interest rate has to follow the rate from the real sphere. In the Keynesian vision of the economy the money interest rate has to follow changes in the state of confidence. Also, endogenous instabilities can force central banks to use their interest rate to try to stabilise economic development.

There is also the possibility of physical constraints for higher production. Firstly, when the unemployment rate reaches zero in the short-term, higher output is physically restricted by a lack of labour. This kind of physical restriction is not typical for capitalist economies as a lack of aggregate demand or inflationary problems prevent a reduction in the unemployment rate to zero. Secondly, the physical capital stock in an economy might become a constraint for high output long before high employment is reached. A long period of low investment can lead to a physical capital stock which is too small for full employment. This means full capacity utilisation is reached long before the unemployment rate drops to low levels. In such a case only increasing investment demand can help to increase labour demand as only investment increases capacities and allows employment to increase.

As a further point, monetary policy strategies can be discussed. Inflation targets are not given objectively. Most central banks in developed countries with an official inflation target aim at inflation rates of about two per cent in the medium-term. This is close to deflation especially taking into account measuring problems of the inflation rate due to quality increases of products and innovations. A group of economists from the International Monetary Fund, for example, recommended an inflation target of four per cent (Blanchard/Dell'Ariccia/ Mauro 2010). The argument is to establish higher nominal interest rates in non-crises times to allow to cut in crises situations short-term real interest to very low or even negative levels to stabilise the economy.

Equally important, a central bank should follow a monetary policy strategy which does not only have an inflation target but also a real GDP or employment target. In specific constellations a central bank should accept a higher inflation rate than strived for. Different scenarios are possible.

a) In the first scenario, inflationary problems are caused by exogenous *cost factors* such as increases in natural resource prices, rising food prices or increases in indirect taxes.[27] Such exogenous increases are by nature not permanent and lead typically to a wave of increasing prices which fade out after some time *if* nominal wages do not react to such price level increases. Without any doubt, a central bank should accept first round effects of such exogenous price level waves. Otherwise a recession is created without any fundamental

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[27] Here, exogenous means independent of wage costs. Changes in natural resource prices or food prices, of course, are not independent of economic development. Natural resource prices, for example, depend among other factors on their scarcity and on speculation.

inflationary dynamic in the economy. The problem of such price level shocks is that they reduce real wages and can destroy the nominal wage anchor. Labour market institutions must be strong to convince workers and unions not to demand nominal wage increases to compensate for lower real wage cuts. The 1970s were destabilised because oil price and other shocks destroyed the nominal wage anchor and led to high inflation rates in a number of countries. In any case, the situation becomes complicated when money wages increase above the wage norm. In such cases, secondary price level effects are triggered in the form of a wage-price spiral which can lead to an eroding monetary system and in the end cannot be accepted by central banks.

b) A similar problem is created by increasing import prices after a depreciation of the domestic currency. A central bank should also accept the first round effects of depreciations. However, real depreciations reduce real domestic income and can, similar to natural resource price hikes, lead to wage-price spirals. In the extreme case any nominal depreciation leads to a proportional increase of the domestic price level and leaves the real exchange rate unchanged. Such a constellation can lead to hyperinflation via cost-push inflation and at the same time to a lack of real aggregate demand. If a depreciation-inflation-spiral is triggered a central bank can hardly accept such a development as sooner or later this leads to capital flight, a stimulation of further depreciation and to the erosion of the domestic monetary system. When a central bank does not want (or is politically unable) to stop an inflationary process it is capital flight and an escalating depreciation that will finally lead to a drastic change towards restrictive monetary policy.

c) A third scenario is a situation in which a central bank wants to reduce unemployment below the critical per cent the nominal wage anchor holds (in the Diagrams 6 and 7 below u_1. Also, in these cases a cumulative inflationary process has to be expected.

d) So far, demand driven price level changes have not been mentioned. In a third scenario, inflation is trigged by *demand inflation*. Increasing demand in the product market in a situation of economic bottlenecks or even full capacity utilisation in all branches leads to a higher price level. If demand inflation is triggered by high investment demand, a central bank should not be worried because the capacity effect of investment will in time increase the supply of products. The capacity effect may lead to a fading out of investment demand driven inflation. "Thus an increase in the rate of interest, as a remedy for the state of affairs arising

out of a prolonged period of abnormally heavy new investment, belongs to the species of remedy which cures the disease by killing the patient." (Keynes 1936: 323) However, as in the case of higher temporary exogenous cost increases a demand inflation can trigger a wage-price spiral and can lead to a cumulative interaction of demand inflation and wage inflation (Keynes 1930). If demand inflation is triggered by demand elements other than investment, the situation for central banks becomes even more complicated as there is no mechanism which will increase capacities in the future.

Finally, why must central banks fight against inflationary processes? In a *monetary* production economy, money plays a crucial role. It has not only to be granted as credit and invested in productive processes to trigger economic dynamics. Money hoarding or at least keeping monetary wealth in a relatively safe form is of paramount importance to protect economic agents from the uncertainty of a capitalist economy. Economic agents must have trust in their money; otherwise they will search for substitutes. Flight out of money in foreign currencies, real estate, gold or other durable goods is the result of the erosion of the monetary system. The ultimate outcome of such a development is a higher and higher inflation rate and a cumulative destabilisation of the economy. This paramount role of money in capitalist economies does not imply that central banks should not have other targets than a low inflation rate. It also does not imply that for a certain period of time the inflation rate can become higher. But it implies that cumulative inflationary processes have to be prevented by central bank – for example when the nominal wage anchor or the exchange rate anchor break. Otherwise the coherence of a monetary production economy erodes. When and with which intensity an inflationary process should be combated depends on the historical situation and makes monetary policy an art which should not follow strict rules.

When the unemployment rate becomes very high or when labour market institutions are weak the nominal wage anchor can easily break and lead to deflation. A deflationary process is extremely destabilising for economic development. Firstly, it increases the real debt burden as nominal interest rates cannot become negative and real interest rates explode during a deflation.[28] Secondly, product market demand breaks down. Investment demand and demand for durable consumption goods will be transferred into the future when products are expected to be cheaper. A deflation leads to a cumulative interaction between a demand deflation and

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[28] Real net monetary wealth increases during a deflation. However, in a closed economy with endogenous money supply net monetary wealth is zero. In any case the so-called Pigou-effect is unimportant and cannot turn the negative effects of a deflation in positive ones.

deflationary wage-price spiral until the economic boat "is not tending to right itself, but is capsizing", as Irving Fisher (1933: 344) expressed it. Central banks are powerless against deflationary developments as monetary policy is not effective in a deflation. If the central bank is of key importance to prevent an inflationary development, then unions and labour market institutions are of key importance to prevent deflation.

Fiscal policy plays an important stabilising role. The previous analysis shows that even an interest rate of zero and/or credit rationing can lead to a situation in which the unemployment rate is high and could be reduced without any inflationary problems. In such a constellation, fiscal policy can stimulate aggregate demand, output and employment. (An increase in government expenditures shifts the IS-curves shown in the diagrams above similar to a positive expectation shock to the right.) Anti-cyclical fiscal policy alone is not sufficient, but rather, a permanent stimulation of aggregate demand in certain constellations. This can take place without increasing the ratio of public debt of GDP when government expenditures are financed by higher government revenues, especially when higher income households are taxed (Haavelmo 1945). However, fiscal policy has its limitations. For example, if the physical capital stock is not big enough to increase employment fiscal policy fails. In the case of a long-term stagnation with no or low investment, expansionary fiscal policy leads to demand inflation and not an increase in output. To stimulate investment becomes the key point in the constellation described.

4. Conclusions

As developed above, in the Keynesian paradigm economic dynamics are not anchored on fundamentals of a real sphere, as an independent sphere of money does not exist. Instead, economic development depends on institutions, on expectations which are based on societal developments and cannot be explained by economic models, on monetary and fiscal policy, on wage development, or on government interventions in many areas. There is no doubt that productivity increases based on new techniques and innovations are also the backbone of improved living standards in capitalist economies. Opportunities to earn extra profits (or quasi-rents) permanently revolutionises techniques and leads to new products. Firms that are not able to engage in this race cease to exist. The capitalist productivity machine works with high or low unemployment, in unstable or more stable macroeconomic environment or in a society with a more equal or unequal income distribution. Also, periods of very deep crisis and long stagnation cannot be excluded. Which development materialises depends on

institutions and economic policy.[29] Of course, extreme macroeconomic instability will suppress the capitalist productivity machine.

Expectations, economic policies and many other important factors that are crucial for economic development depend on history. This implies that there is no long-term trend of economic development based on fundamentals, but that the long-term trend simply is the statistical outcome of short-term phases.[30] Institutions which stabilise monetary production economies are of key importance. Labour market institutions in the form of a coordinated wage bargaining process and statutory minimum wages can, for example, support a functional wage development which follows the target inflation rate of the central bank and medium-term productivity development. Institutions can reduce uncertainty, for example, by shaping a financial system which does not allow real estate bubbles or over-indebtedness of private households. A system with institutionally fixed but adjustable exchange rates including international capital controls can take away a lot of the uncertainty of systems with flexible exchange rates. What is needed is a Keynesian "Ordnungspolitik"[31] meaning the creation and adjustment of institutions with the aim to stabilise capitalist economies (Herr/Kazandziska 2011).

Besides Keynesian institution-building, macroeconomic demand management is needed to guarantee stable and high demand. Otherwise societies may suffer from high instability and long periods of very high unemployment. "This disturbing conclusion depends, of course, on the assumption that the propensity to consume and the rate of investment are not deliberately controlled in the social interest but are mainly left to the influence of *laissez-faire*" (Keynes 1936: 219). Keynes mentions here two factors that are of paramount importance for demand management.

The first one is the propensity to consume which very much depends on the distribution of income. A more equal income distribution allows for a higher propensity to consume which leads to a higher consumption demand. One of the secrets of the overall positive economic

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[29] However, the violent capitalist "productivity machine" develops technology in a very specific way which is potentially very harmful for workers and nature. Also, in the field of technological development the government has to intervene heavily to guarantee sufficient basic research und shape technological development in a way that the reproduction of societies is guaranteed.

[30] Joan Robinson (1962: 74) writes: „Keynes was interested only in very short-period questions (he used to say: 'The long period is a subject for undergraduates')."

[31] „Ordnungspolitik" stems from a conservative stream of German neoclassical economists after World War II who aimed at establishing an institutional framework for a „social market economy" (see for example Müller-Armack 1978).

development during the 1950s and 1960s was a relatively equal income distribution which led to high consumption demand. Also, a low level of economic uncertainty based on a relatively comprehensive social welfare state and low unemployment rates support consumption demand. The market radical globalisation project which started in the 1970s/1980s led to a radical change in income distribution and a structural lack of consumption demand based on income in almost all developed countries. In some of the countries, for example in the USA, Great Britain or Spain, this development was compensated by an unsustainable expansion of consumption credit lending to real estate bubbles. However, this finance-driven consumption model seems to have come to an end with the Great Recession in 2009 and seems to be leading to a long-term period of low growth (Dullien/Herr/Kellermann 2011; Palley 2012, Galbraith 2012).

Several policies can change income distribution: The wage share can be increased by reducing the power of the financial system, changing corporate governance and following policies to reduce rent seeking; wage dispersion can be reduced by labour market institutions including stronger unions; and disposable income can be changed by reforming tax policy, public expenditures and the provision of public goods.

The second factor is to control investment according to the social interest. Investment demand is driven by expectations and is potentially very unstable. The volume of investment, which is the only demand element creating productive capacities, as well as the proportion of investment demand to other demand elements has to be managed on a macroeconomic level. In addition, in times of fundamental ecological problems, the quality of investment used (incl. technologies) is of key importance to restructure production and consumption. In the Keynesian tradition a "somewhat comprehensive socialisation of investment" (Keynes 1936: 378) is the most promising way to control the quantity and quality of investment. Public investment in infrastructure and a big non-profit and state-owned enterprise sector seems to be a precondition for this. There are many possibilities for the investment dynamic to be stabilised _-_ from the supply of public utilities by municipally owned businesses, to building societies, as well as state-owned companies in some industries.

A regulated financial system which does not finance asset price bubbles and unsustainable consumption is a second pillar to stabilise investment. Keynes (1936: 376) argued for "the euthanasia of the renter, and, consequently, the euthanasia of the cumulative oppressive power

of the capitalist to exploit the scarcity-value of capital." Developments over the last 30 years have increased the oppressive power of capital mainly by deregulating the financial system and changing corporate governance towards a shareholder value based system. Thus the regulation of the financial system including the reform of corporate governance has a multiple function. It has to reverse functional income distribution by reducing renter's income; it has to prevent asset price bubbles and over-indebtedness of economic sectors, and finally, it has to offer cheap finance for productive investment.

Monetary policy has to use its room for manoeuvre to support investment and growth. The better the nominal wage anchor holds the easier is it for monetary policy to follow this task. The importance of government demand in the field of public investment and anti-cyclical fiscal policy has already been mentioned. The last demand element, exports minus imports, should not play an important role in the demand management of countries. Mercantilist strategies to stimulate domestic demand at the cost of the rest of the world may work for some countries, but not for the world as a whole. In the ideal case, an international financial and exchange rate system with fixed and adjustable exchange rates and international capital controls should give the world economy a stable umbrella for globalisation (Herr 2011a).

Macroeconomics is not everything, but it contributes to the stabilisation of economic development, creating a society which allows the participation of all groups in progressive economic development. Markets can take over important functions in information and allocation, but they are not the invisible hands guiding the economy to the welfare of nations. Institution-building and process politics in a Keynesian tradition are needed to make economic development a servant for good societies.

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