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The IS-MP-model and the difference between neoclassical and Keynesian economics²

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Summary: Romers IS-MP-modell provides a convenient framework that, with a few extensions, allows to compare neoclassical and Keynesian economics within the context of the same model. This might facilitate discussions between proponents of the different paradigms. It turns out that the neoclassical version depends on the assumption of a rather special class of IS curves. The scepticism of Keynesians against the automatic attainment of an equilibrium is thus generally justified, as is the argument in favour of fiscal policy. The paper closes with a short exposition of a monetary Keynesian approach.

The IS-MP-model and the difference between neoclassical and Keynesian economics

Krugman (2009; 2011) argues that the main difference between neoclassical and Keynesian economics is founded on differing degrees of stability optimism. He more or less identifies the Keynesian position with saltwater economists and the neoclassical approach with freshwater economists. While there is no basic difference between the two schools about the equilibrium of the system, the former would be far less optimistic about the stability of financial markets and about the speed with which an adjustment to shocks would take place if markets are left to themselves.

However, saltwater is just freshwater with an addition of about 3.5% salt. So, while Krugman's distinction surely is in line with Milton Friedman's common model, it is doubtful whether it really catches the fundamental difference between "Mr. Keynes and the classics". Keynes after all doubted the very existence of a full employment equilibrium (Keynes (1936) p. 377ff). In this article I would like to show that the argument for such a scepticism can easily be reproduced within the IS-MP-framework suggested by David Romer. Adding a few quite trivial standard textbook concepts to the basic model - a conventional labour market, and a factor-price frontier - leads to the conclusion that a neoclassical full employment equilibrium will only exist in a special case.

As a result one may either reject the equilibrium concept. But in the German literature there is also a strand of Post-Keynesian thinking, namely monetary Keynesianism, which asks whether an equilibrium with (involuntary) unemployment can be derived.

While the individual concepts used are well known, putting them together might provide a useful framework for discussing the difference between the neoclassical and the Keynesian paradigm.

The basic IS-MP-model

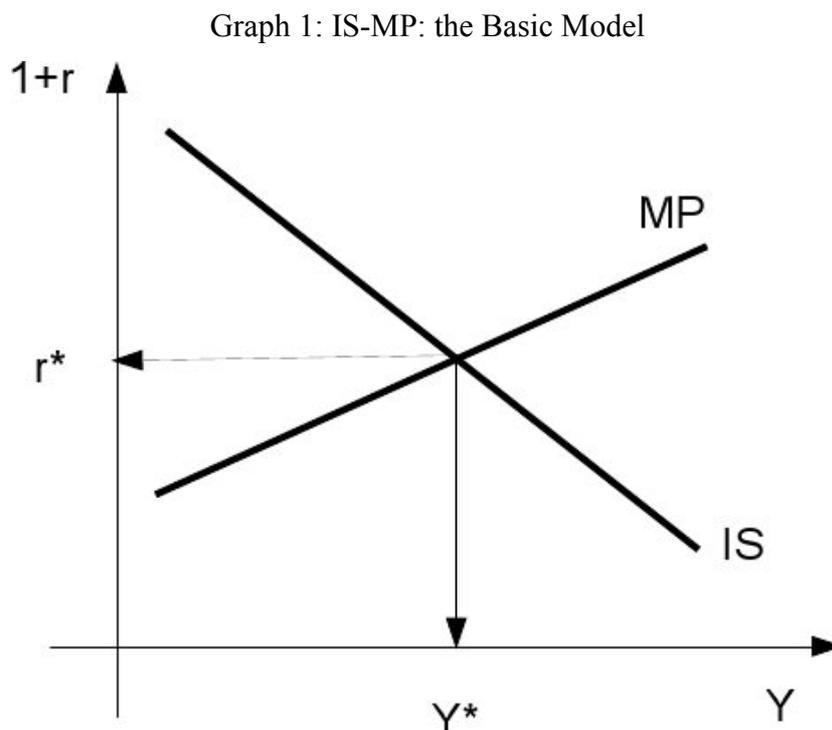
Romer (2000, 2012) replaces the LM-curve of the IS-LM-model with an MP-curve. While the LM-curve determines the interest rate with an interest elastic money demand and an exogenously given (real) money stock, the MP-curve describes the interest rate setting of the monetary authority (MP stands for monetary policy). It assumes that the central bank sets the real rate of interest according to a Taylor-rule (Taylor, 1993)

$$r = r_0 + a \cdot (\pi - \pi^T) + b \cdot (Y - Y^*)$$

according to which the real rate of interest (r) depends on the difference between the actual inflation rate (π) and the inflation target (π^T) and on the difference between the actual (Y) and the equilibrium output (Y^*).

r_0 is interpreted as the Wicksellian natural rate of interest (as the Taylor rule is the result of a multiple regression, it actually is just the constant coefficient of the regression) and Y^* would be the equilibrium, or full employment, output. I will address this issue below.

The following graph depicts the model.



Two important advantages of the IS-MP-model over the IS-LM-model are as follows:

First both IS and MP are functions of the real rate of interest, so the model does not share the pitfall of the IS-LM-model, in which IS depends on the real rate of interest, while LM is a function of the nominal rate.

Second, it is more realistic, as it reflects actual monetary policy in which the central bank sets the rate of interest and money supply is endogenous. This is the substantive meaning of the Taylor rule, as it was derived as a formalization of the actual reaction function of the FED.³

However, there is arguably a further advantage of the IS-MP model not seen by Romer. As I will

³ See for example Bernanke et al. (2001) for an early study which tests the Taylor-Rule for further central banks

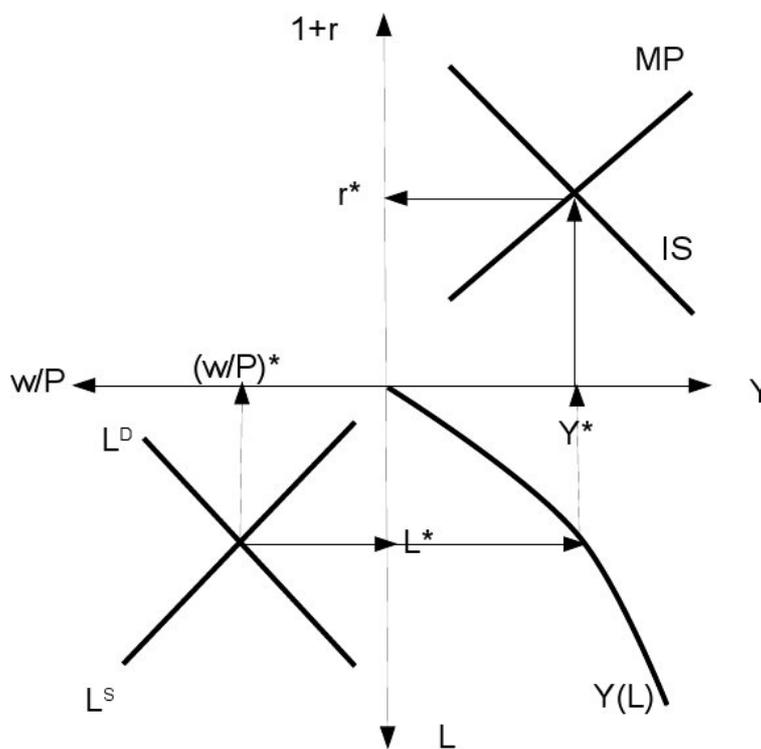
show, the IS-MP-model allows the comparison of a Keynesian and a neoclassical solution by merely adding some non-controversial extensions.

Incorporating the labour market

It is straight-forward to incorporate the labour market into the model, as is done in Graph 2.

The upper right hand section displays the standard IS-MP-model. The lower right hand section, depending on the direction in which it is read, gives either the (partial) production function or the employment function, and on the lower left I have included a conventional labour market with the real wage rate (w/P) and the amount of employment (L).⁴

Graph 2: IS-MP and the Labour Market



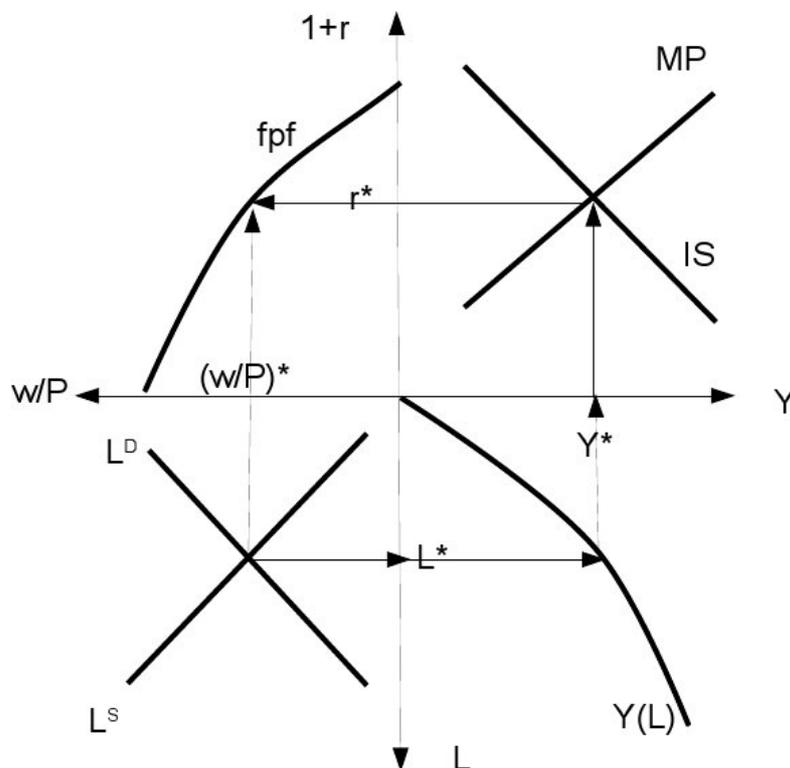
4 The New Keynesian labour market models are of course a bit more sophisticated, as they allow for imperfect competition on the supply as well as on the demand side which leads to wage and price setting and generates structural unemployment. But as they still have a unique equilibrium solution, in the context of this argument the textbook variety of the labour market model leads to the same conclusion.

As can easily be seen, the central bank can attain full employment by choosing a monetary policy stance, in which its MP-curve intersects with the IS-curve at full-employment output. Adhering to a Taylor rule would force the central bank to do exactly that, as an MP-curve, which intersects with IS below r^* , would imply a positive output gap, that leads to surplus demand on the labour market. This would generate inflation by driving wages (and prices) up, forcing the central bank to shift its MP-curve upward (because of $(\pi - \pi^T) < 0$). The reverse would happen for $r > r^*$, so that only an MP-curve which intersects at (r^*, Y^*) is in line with the policy of following a Taylor rule.

The whole process is driven by the shift parameter $(\pi - \pi^T)$, which underlines that in principle inflation targeting alone is sufficient to insure full employment. The steepness of the curve determined by the coefficient related to $(Y - Y^*)$ has no bearing on the outcome. It just determines how strongly the central bank reacts to supply and demand shocks and how far it allows the economy to be driven out of its equilibrium position should any such shock occur.

Adding the factor price frontier

Graph 3: Extended IS-MP plus fpf



As will have been noted, the model extended by the labour market determines the equilibrium output, employment, the real rate of interest and the real wage rate simultaneously.

There, however, is a second relationship between the the real wage rate and the real rate of interest,⁵ the factor price frontier (fpf), which became prominent in the course of the discussion of the production price model. And it remains necessary to check whether not only quantities (income, employment) but also prices (the real rate of interest and the real wage rate) are compatible with an equilibrium. The factor price frontier therefore is included in Graph 3.

This fpf does not add anything if the r^* , $(w/P)^*$ solution generated by the IS-MP-model happens to lie on the factor price frontier, as is the case in Graph 3. The central bank still chooses an MP-curve which intersects with IS at full employment and at the equilibrium real rate of interest, which corresponds to the equilibrium real wage-rate $(w/P)^*$.

There is, however, nothing in the income-expenditure-model, from which the IS-curve is derived, to guarantee this outcome. The assumption that goods are allocated via sale and purchase ensures that notional demand can not exceed notional income (because people cannot plan to spend more than they plan to earn), implying that the IS-curve cannot lie above the neoclassical IS-curve (IS_N). But notional demand can fall short of notional supply, so there is nothing to prevent IS from running below IS_N , as does IS_K in Graph 4.

The real balance effects don't work here: the Pigou-effect does not apply as (a) there is no outside money and, following on from that (b), money being endogenous, a lower price level induces a lower money supply instead of an increase in real wealth. Finally the "Keynes"-effect does not work either, because - again - the supply of money is endogenous: a lower price level leads to a lower supply of money, not to a lower rate of interest. The IS_K -curve thus depicts Keynes' insight that

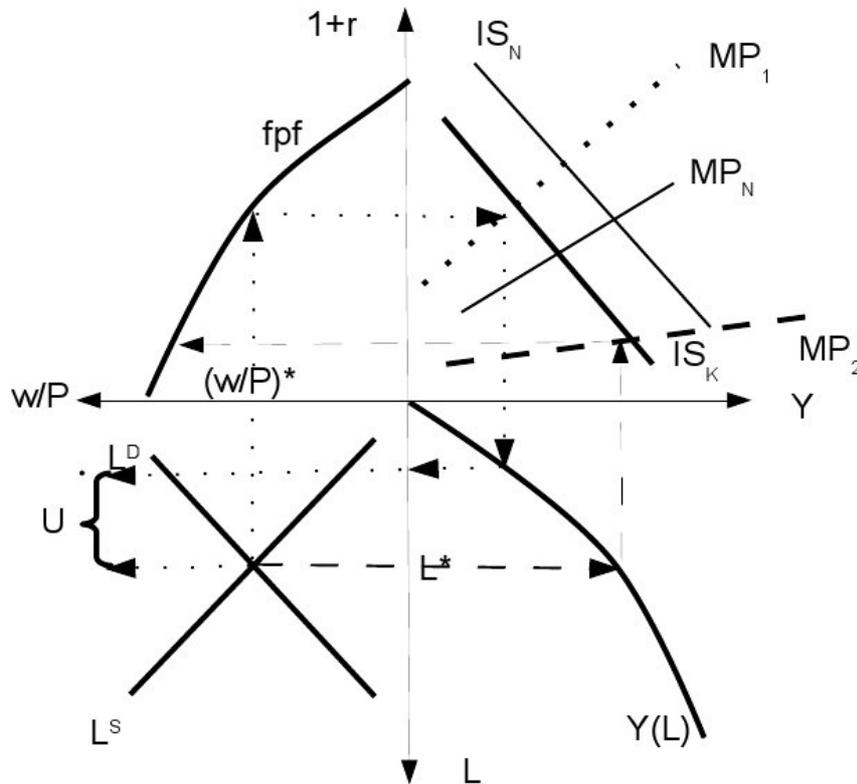
“[i]f the quantity of money is itself a function of the wage- and price level, there is indeed, nothing to hope in this direction.” (Keynes (1936) p. 266)

Or, to make the same point in a different way: If there is no outside money, net money balances must add up to zero on aggregate. There is, however, nothing to prevent the public from planning to hold positive money balances on aggregate at full employment income. As prices fail to coordinate plans, the burden of adjustment falls on income – due to the fact that for inside money aggregate

5 Actually between the real wage and the rate of return. But as the real rate of interest has to be a function of the real rate of return (in the simplest case it is equal to the real rate of return minus 1), this difference is of no substance to my argument.

money balances are always zero and that therefore at any price level their real value is zero too.

Graph 4: Keynesian IS-curve



This simple extension allows to demonstrate three features of ‘old’ Keynesian economics with slight modifications:

Firstly, it turns out that the neoclassical version of the model depends on the assumption of a special class of IS-curves (IS_N) which run through r^* , Y^* , or, to state it differently: It depends on the assumption that people plan to spend all of their income at full employment.

This, however, is no longer assured: With no outside money net monetary assets always add up to zero. So this constitutes a further constraint on the equilibrium solution. If households plan to hold a positive amount of monetary assets on aggregate with income at full employment level, prices cannot equate aggregate demand and supply for monetary assets in notional plans. Therefore the only equilibrium possible is a Keynesian equilibrium in effective plans with involuntary unemployment.

Secondly, for IS_K curves situated below r^* , Y^* , the assertion of Post-Keynesians can be

reproduced: By themselves markets do not generate an equilibrium. There are two extreme positions:

(1) The central bank sets its interest rate at r^* , that is at the real rate of interest which corresponds to the real wage rate at full employment. This would be represented by the dotted MP-curve in Graph 4. Here the economy is in a state of unemployment, as the effective demand forthcoming at that real rate lies below full employment output, so that the level U of unemployment would result. $(w/P)^*$ would still be realized, because at a lower level of real wages firms would earn pure profits, so that new entrants would enter the market and reduce the price level thus raising the level of real wages to $(w/P)^*$. This situation can only be stable if nominal (not real) wages are rigid. Otherwise a deflationary spiral looms.

(2) In order to reach full employment, the central bank sets a rate of interest below r^* , a policy represented by the dashed MP-curve in Graph 4. Here the market rate of interest falls short of r^* . It intersects with the fpf at a point below r^* , implying real wages in excess of $(w/P)^*$. With the real rate of interest lying below the rate of profit at $(w/P)^*$ firms would be induced to increase their capacity in excess of full employment supply. So nominal wages would rise while at the same time notional supply exceeds effective demand. Thus firms would make losses as goods would have to be sold below cost.

Thirdly, the standard assertion of Keynesianism that fiscal policy is crucial for reaching a high level of employment can be reproduced. Government spending can shift the IS-curve, moving IS_K in the direction of IS_N and thus, together with monetary policy, raise employment.

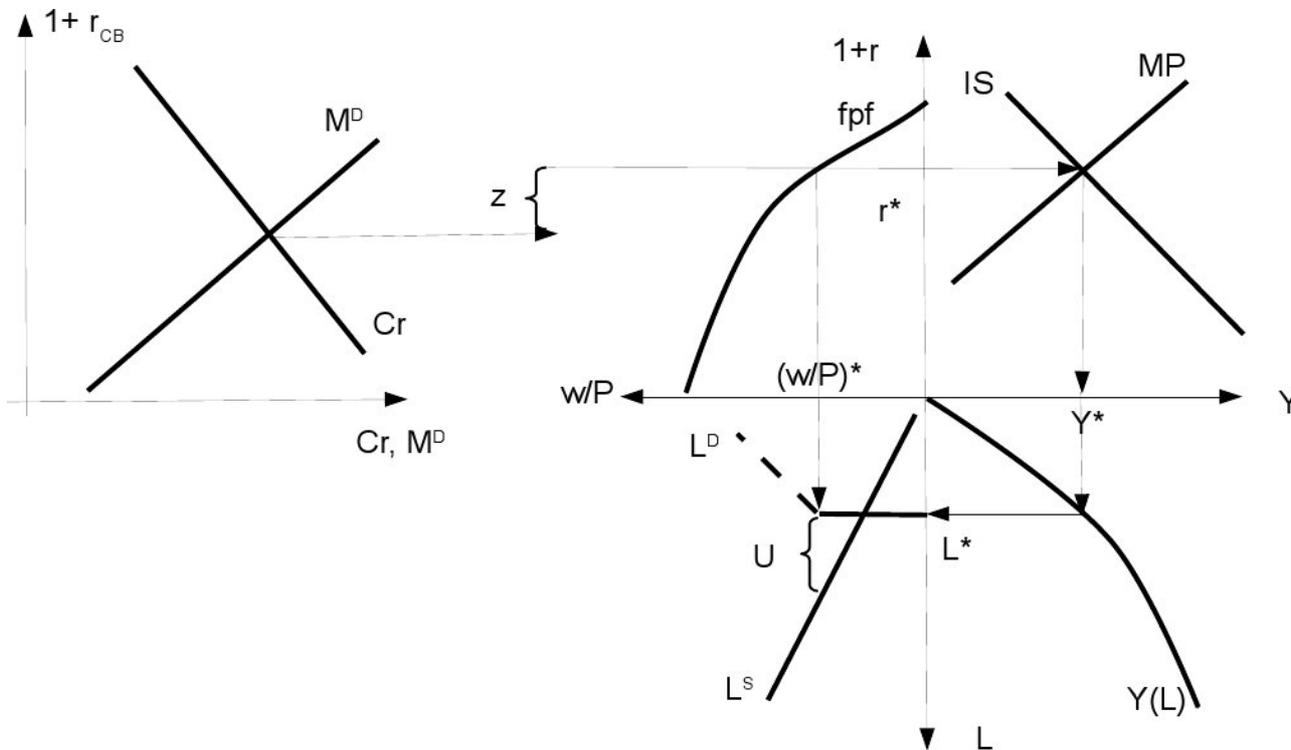
Note, however, that we are talking about a policy stance in equilibrium, not about the desirability of deficit spending in recessions. Therefore the additional government spending would have to be financed in a sustainable way - preferably by taxes (using the balanced budget multiplier), or, only if the average growth rate is expected to be high enough to make a primary deficit sustainable, by some amount of budget deficit.

Introducing the monetary Keynesian solution

The preceding results seem to suggest that a Keynesian IS-curve renders a market equilibrium impossible. There is, however, a strand of Post-Keynesian literature, the monetary Keynesian approach in the tradition of Hajo Riese (e.g. Riese, 1986), which tries to model an equilibrium with unemployment. It sets out from the idea of a hierarchy of markets, in which the asset and credit markets determine the rate of interest, which is then fed into the goods- and labour market.

There are several ways to model this basic concept.⁶ In what follows I'll outline the one which works best for me (Betz, 2001), but I do not claim that this is the only possible way to do this.

Graph 5: A monetary Keynesian model



The bank rate is the marginal cost of refinance for banks. Therefore, the real rate of interest set by the central bank influences at the same time the volume of credit (Cr) denominated in its currency, which constitutes the supply of assets and the demand for those assets (M^D), assuming that the rate of interest offered on deposits increases with an increasing bank rate.

A higher bank rate makes credit more expensive, so that the volume of credit will be smaller. Therefore the supply of real monetary balances is downward sloping in the real bank rate.

The demand curve is upward sloping: Assets denominated in the currency provided by the central bank have to compete with other types of assets in the portfolio of wealth owners. In the open economy these other assets typically would consist of other currencies, in the closed economy case the relevant alternatives would be land or stocks of raw materials. If the supply of money balances exceeds demand, this implies a surplus demand for other types of assets, which means their prices will rise. Thus on aggregate the optimal portfolio structure will come about by

6 A number of other propositions can be found in Riese (2001)

devaluation (in the open economy case) and/or by rising prices of raw materials and land, inflating the surplus money away.

In order to avoid inflation, the central bank has to set its real rate of interest at a level which equates supply of and demand for (assets denominated in) its currency. This argument is reflected in graph 5 in the left hand diagram of the asset market. As the relevant rate of interest for the IS-part is the interest rate on credit, the risk premium demanded by banks (z) has to be added to the central bank rate of interest (i_{CB}) to derive the MP-curve.⁷

In equilibrium, the asset and credit markets determine the real wage rate, the real rate of interest, income and employment. Involuntary unemployment (U) is the difference between employment and the amount of labour offered at $(w/P)^*$. The first part of the labour demand curve depends on demand only - as labour employed for goods which cannot be sold reduces profits no matter how low the wage level, while it has a kink at $(L^*, (w/P)^*)$, as the entrepreneurs would not be able to earn the interest on their investments.

As in Post-Keynesianism, rigid nominal wages are required to allow equilibrium. But note that here rigid nominal wages protect against deflation. It is not a case of rigid real wages which cause unemployment, because the value of the “wage unit” is determined outside the labour market. It is just a case of nominal wages anchoring the price level.

Finally, z allows to include the Minsky-part of the argument into the model: In expansionary episodes z falls, MP shifts downward, thus increasing income and employment, and the build up of debt eventually leads to an increase in z and a contraction. With the nominal rate of interest bound from below and falling inflation expectations an increase in z may well be higher than r_{CB} , thus making it impossible for the central bank to defend an equilibrium position.

Conclusion

Romers IS-MP-model provides a convenient framework which, with a few extensions, allows to compare neoclassical and Keynesian economics. It turns out that the neoclassical version depends

⁷ The crucial difference to Keynes' theory of interest (in Keynes, 1936, Chapter 17) is that the rate of interest is not explained by hoarding - by people wanting a compensation *for not holding money*, but because they require a compensation *for holding it* (instead of other types of assets). If hoarding was the problem no positive nominal interest rate could be explained, as the central bank could simply set its rate of interest to zero and supply the amount of money demanded at that rate. So the coincidence of a positive (nominal) rate of interest and unemployment cannot be explained - or has to be assessed as a policy failure of the central bank. But this gentle death of the rentier cannot be engineered if the rentier can simply shift to alternative assets.

on the assumption of a special class of IS-curves. It has to assume that notional aggregate demand for goods and services at full employment equates notional aggregate supply. This assumption is not automatically justified by the construction of the IS-curve from the income-expenditure-model, nor is there any reason to expect it to hold in a world with endogenous money.

Without this assumption the scepticism of Post-Keynesians against the automatic attainment of an equilibrium can be justified as is the argument in favour of fiscal policy.

But this result does not automatically call for a rejection of equilibrium models, as is illustrated by referring to the monetary Keynesian approach, which tries to preserve an equilibrium concept. But the equilibrium it derives is an unemployment equilibrium.

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