

Paul Krugman’s “Liquidity Trap” and Other Misadventures with Keynes

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In many recent blog posts, Paul Krugman proposes a heuristic model to analyze the advanced country macroeconomic situation circa 2013. An earlier version focusing on Japan (Krugman 1998) is much more formalized, with perfect foresight, Euler equations, Ricardian equivalence, and all the usual paraphernalia. Here we concentrate on his recent graphical analysis, with the Japan paper as background. The gist is that despite Krugman’s claims to the contrary, the analysis is not really Keynesian, at least in comparison to *The General Theory*, or *GT*. It does hark back to the world of the turn of the 20th century Swedish economist Knut Wicksell and contemporaries and followers such as Irving Fisher, James Tobin, and Robert Mundell.

After a discussion of finance and expectations, two graphical models are presented to illustrate Krugman’s ideas. Then come observations on the history of economic thought and policy implications.

The Financial Side and Expectations

Assume as in contemporary literature that the central bank sets a “policy” interest rate i by intervening in markets for *stocks* of money and securities – this is a Keynesian liquidity preference element in the analysis (see below). Let P be the current price level. If $\hat{P} = \frac{dP/dt}{P}$ is the “expected” inflation rate (which has to be

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computed using some hypothesis about the ongoing price change dP/dt which can only be observed *ex post*) then $r = i - \hat{P}$ is a “real” interest rate. There are two immediate observations.

First, if the nominal interest rate is to emerge from money and securities markets, then P has to be fixed to “close” the financial model by making the accounting determinate. Criticizing the idea that money wage cuts would stimulate employment, Keynes recognized this requirement in chapter 18 of the *GT*. He argued that (in contemporary terminology) the price level will follow from a cost function based on the money wage rate w . In the Japan paper Krugman treats a fixed value of P as a “nominal rigidity” and leaves it at that, ignoring Keynes’s emphasis on distribution and employment.

Second, there is an enormous literature on what Keynes meant by “expectation.” Rosser (2000) presents a good summary: “Keynes viewed probability as a fundamentally subjective concept that depends on the logical relations between possible events. Given that people base their expectations on the weightier of probable events that they foresee as possible, and that those perceptions depend greatly on what other people expect, expectations can change very suddenly and the state of long term expectation is fundamentally uncertain.”

Throughout the *GT*, Keynes insisted that relying on probabilistic expected values of future events is misleading and worse than useless. Krugman, on the other hand, implicitly adheres to the mainstream view that “expected inflation” is the mean of a universally shared probability distribution of future price changes. In Rosser’s words, “the concept of uncertainty as developed by Keynes was largely hijacked by James Tobin (1959) and turned into a concept of quantifiable risk.” Despite Tobin’s doubts, the next mainstream step made the shared expectations model-consistent or “rational.” Krugman takes this path.

Model I

To understand how the real side of Krugman’s analysis works, it is helpful to think in terms of demand “injections” and “leakages.” Injections are:

$$\mathcal{I}(Y, r) = I(Y, r) + G + E(e)$$

with investment I as a function of income Y and r , government spending G as a policy variable, and exports E as a function of the exchange rate e (units of local currency per unit of foreign). The usual assumption is that a higher r will attract capital inflows which will cause a floating rate to appreciate (or *fall*). So exports, like investment, are supposed to be a decreasing function of r .

Leakages are:

$$\mathcal{L}(Y, r) = S(Y, r) + T + eM(e)$$

Saving S depends on Y and r , taxes T are a policy variable, and the value of imports in local currency is $eM(e)$. A higher r will reduce e but will increase $eM(e)$ if imports are an elastic function of the exchange rate.

The macro balance condition, pioneered by Keynes, is:

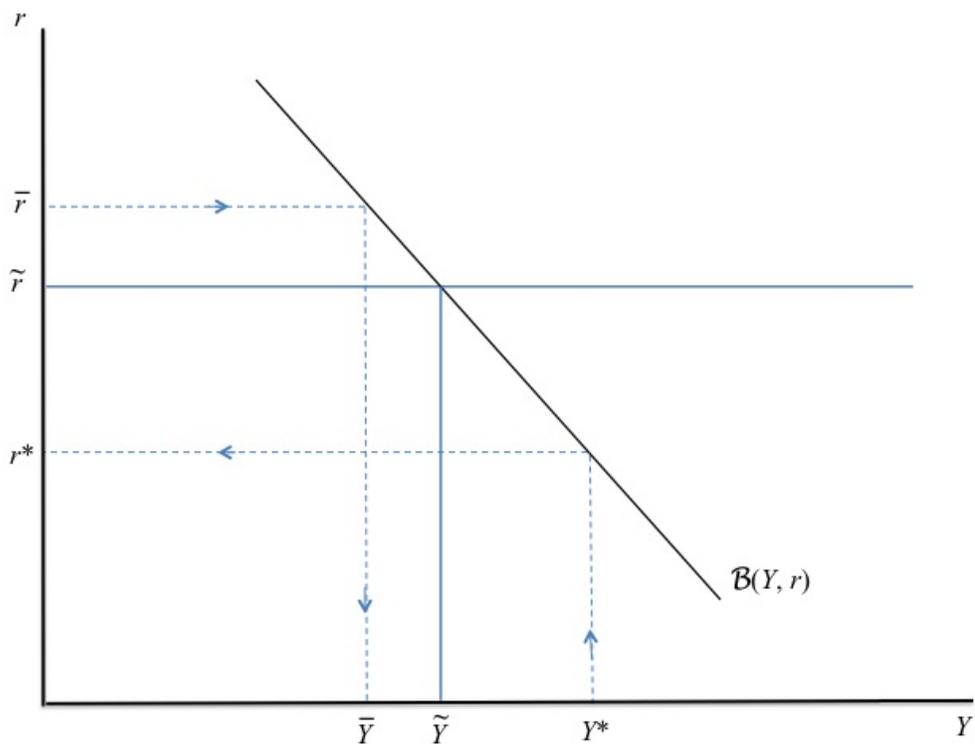
$$\mathcal{B}(Y, r) = \mathcal{I}(Y, r) - \mathcal{L}(Y, r) = 0.$$

Flows of injections and leakages adjust to support macro equilibrium.

There are two ways to “close” or solve this model. One method is to assume that Y is fixed (Krugman uses a “full employment” level Y^*) and use r as the variable that adjusts to drive $\mathcal{B}(Y, r)$ to zero by equilibrating the flow supply of funds from leakages to demand from injections. This approach is in the Wicksellian tradition. On the usual assumptions about signs of responses (\mathcal{I} and \mathcal{L} respectively respond negatively and positively to an increase in r), there will be stable adjustment around equilibrium. See Figure 1 in which the negative slope of the schedule for $\mathcal{B}(Y, r) = 0$ captures the positive effect of looser monetary policy on economic activity. As indicated by the arrows, full employment output Y^* determines a “natural” real rate

of interest r^* .

Figure 1: Natural Rate Model with Demand-Driven Alternative Closure



This closure has somewhat peculiar properties. It must be true that $\hat{P} = i - r^*$ so that an increase in the policy rate of interest, which “should” reduce aggregate demand, ends up increasing the inflation rate. With a given policy rate, if $r^* = i - \hat{P}$ happens to be negative because factors contributing to effective demand are weak, then inflation will be high enough to drive r^* below zero.

Krugman wants to determine the inflation rate via expectations – P has already been set so \hat{P} has to influence the current situation. The way to allow \hat{P} to play a role is to change the closure. Suppose that the central bank sets the policy rate and inflation has its own dynamics. As a consequence there is an observed real rate

\bar{r} which determines an output level \bar{Y} (as shown by the arrows). A lower level of \bar{r} would allow output to rise. This adjustment will go through if a “Keynesian stability condition” proposed more than 70 years ago by Paul Samuelson (1939) applies – both leakages and injections respond positively to an increase in output but the former effect is stronger.

It is possible, however, that there is a lower bound \tilde{r} on \bar{r} . If $\bar{r} = \tilde{r}$ then there will still be unemployment with $\tilde{Y} < Y^*$. Krugman treats \tilde{r} as a small positive or negative number because the policy rate is already low and inflation is close to zero. He calls this situation a “liquidity trap”, and argues that the only way to circumvent it is to stoke up inflation. This argument is New Keynesian. A “distortion” is imposed on a system that otherwise could support full employment. To attain that goal, something must be done to offset the distortion. Inducing inflation and reducing the real interest rate is Krugman’s proposal.

In his Japan paper, he switches closure of the model between the present and the “future,” postulating permanent full employment in the latter. Determination of the interest rate by liquidity preference with a fixed P is dropped in favor of the equation of exchange: $P^* = \frac{M^*}{Y^*}$ with P^* and M^* as future levels of the price and money supply. Expected inflation becomes $\hat{P} \approx \frac{P^* - P}{P}$. (This maneuver reverses Keynes’s shift in closure from the quantity theory in his *Tract on Monetary Reform* in 1923 to liquidity preference in the *GT* in 1936. It also recalls the famous “... in the long run we are all dead” passage in the *Tract* – it is part of a warning against thinking that the economy will necessarily arrive at a situation like Krugman’s “future”.)

The future money wage rate w^* presumably tags along willy-nilly from the macro cost-price relationship to this change in determination of P^* . The real interest rate r^* is positive, and with zero expected inflation $i^* = r^*$. The economy has emerged from its trap – one clever switch in model closure does the trick. Just why it should happen is left unexplained. Beyond the model (who can guarantee full employment in the future?), for Japan Krugman recommended “bootstrapping” expectations by having the central bank announce high future inflation targets, and fiscal expansion.

It is also interesting to observe that in this set-up there will be a low current level of economic activity if P (and implicitly w) is high in comparison to P^* . There will

be expected deflation ($\hat{P} < 0$), a high value of r , and recession. We are not far from the old neoclassical synthesis refrain that unemployment occurs when “... money wages are *too high* relative to the quantity of money” (Modigliani 1944). Five or six decades of mainstream macro theory basically added dodgy expectations around a hypothetical full employment future money supply M^* to Modigliani’s dubious assertion.

Model II

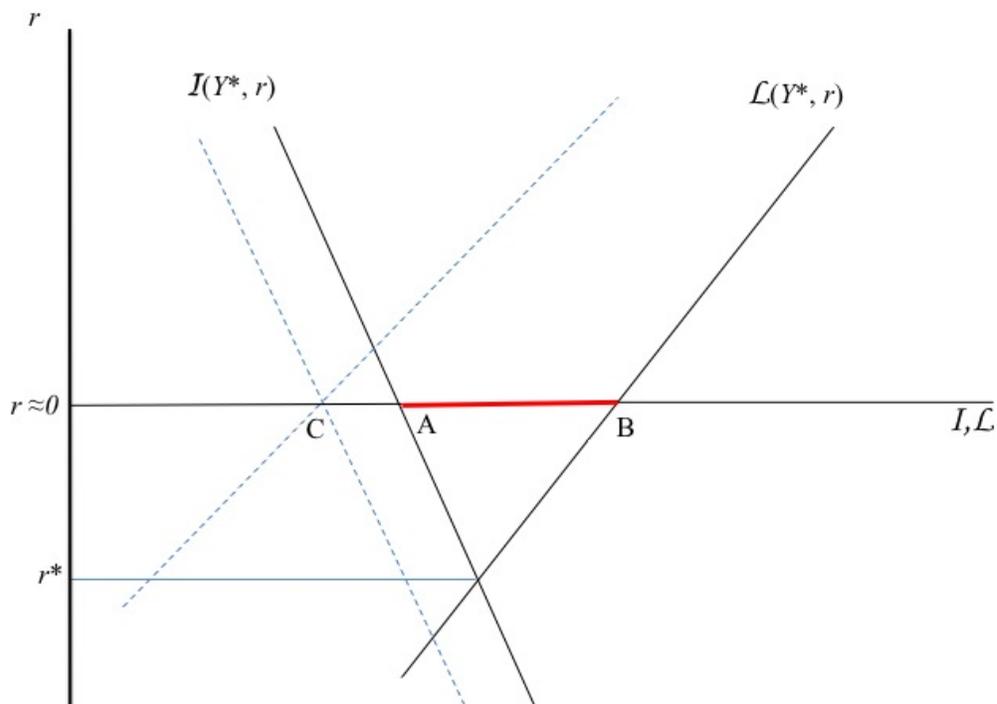
Krugman himself sets up the heuristic model in another diagram. For a given level of output, say Y^* , injections and leakages can be expressed as functions of the real interest rate only, as shown in Figure 2. At the lower bound with $\bar{r} = \tilde{r} \approx 0$, there is excess aggregate supply (leakages exceed injections). If \bar{r} were to fall to the natural rate $r^* < 0$, the disequilibrium would disappear and there would be full employment.

Along the $\bar{r} = \tilde{r} \approx 0$ axis, potential excess supply will force both injections and leakages to decline from full employment levels, i.e. both curves will have to shift “down” or to the left of their positions. If the Keynesian stability condition applies, investment responds less strongly than saving to Krugman’s gap between points A and B. The economy will find macroeconomic equilibrium where the dashed lines cross at C, corresponding to the output level \tilde{Y} in Figure 1.

History of Thought

There are not many new macroeconomic ideas under the sun. One emerged in a robust debate in the 1930s between proponents of “loanable funds” and “liquidity preference” theories of the interest rate. By the time he wrote his *General Theory* during the first part of the decade Keynes had broken from the prevailing loanable funds doctrine (which he still more or less accepted in the *Treatise on Money* in 1930) and proposed liquidity preference as a novel theory of interest. As noted above, liquidity preference is used by Krugman to set the nominal interest rate in the current period. But he is Wicksellian in assuming that the real rate determines

Figure 2: Macroeconomic Flows with Bounded Real Interest Rate



Note: Adjustment from *ex ante* “full employment” disequilibrium between A and B at a near-zero real interest rate to *ex post* macro balance at C.

the balance between injections and leakages.

Krugman likens Figure 2 to the IS/LM model proposed by John Hicks (1937) to “explain” Keynes. That construct was Keynesian in the sense that its positively sloped LM curve was based on the notion that higher economic activity will increase the demand for money, and bid up interest rates in asset markets.

Krugman breaks from this LM, dropping the curve to focus on financial flows. The supply of loanable funds is generated by saving, taxes, and imports and demand for funds by investment, government spending, and exports. If the solid curves in Figure 2 were functions of actual Y and r , and intersected at a positive interest rate they would determine both variables.

Hicks, in contrast, treated the interest rate as an independent variable along the IS curve, with Y adjusting to equilibrate injections and leakages. Output becomes a decreasing function of the interest rate because of lower investment demand or fiscal spending and higher saving or taxes. IS and LM together determine macro equilibrium between a flow of output over time and an interest rate balancing supply and demand for financial assets.

The loanable funds formulation dates to the early 19th century, and was pulled together by Wicksell around the turn of the 20th century. He assumed that any initial excess of injections over leakages would be erased by an increase of saving due to an “inflation tax” driven by credit creation. That is, faster inflation reduces the real value of money in your pocket, so you save more. (Keynes adopted a similar point of view in the *Treatise*, before he repudiated loanable funds.) Krugman’s move toward Keynes is to switch from inflation- to output-adjustment satisfying Samuelson’s condition but the underlying model is the same.

Wicksell’s work was extended by Irving Fisher in the following decades. Already in the 1890s he had invented the distinction between the real (r) and nominal (i) rates. Whether the real rate as defined by Fisher is “natural” is quite another question. How to estimate “the” business profit rate, say ρ , is controversial but it is clear that the “Fisher arbitrage” condition $\rho = r = i - \bar{P}$ does not hold. Indeed, ρ and r tend to move in opposite directions over the business cycle (Taylor 2010).

James Tobin (1965) and Robert Mundell (1963) carried Fisher arbitrage over into investment theory. They argued that capital formation should respond negatively to r (or perhaps positively to the difference $\rho - i$), thereby making investment a positive function of inflation \hat{P} . Around half-a-dozen investment theories crop up in the *GT*, but Tobin-Mundell is not one of them.

What Krugman calls a liquidity trap is the low level of \tilde{r} in Figures 1 and 2. Although the logic of the model applies for any level of \tilde{r} , slow inflation and the fact that the policy rate i cannot be forced (very far) below zero are the sources of Krugman’s vexation. Keynes thought that the nominal rate might be stuck at a low level because of a strong desire for safe assets or “liquidity” due to widely held conventional opinions about present and future market rates. Hicks said much the

same thing – that demand for money is highly elastic when animal spirits are weak and i is low. (By way of contrast, Hyman Minsky (1975, 2008) bootstrapped a stable interest rate to the *peak* of an asset price cycle because robust demand for securities would shift the “speculative demand” for money downward.)

Policy

So we have a disequilibrium loanable funds model with Keynesian twists. What does it tell us about economic policy? Perhaps not very much.

Empirical analysis suggests that saving is largely insensitive to the interest rate, and that the investment response is weak at most. The implication is that the injection and leakage schedules in Figure 2 will both be steep, and the Krugman gap between them correspondingly small. A percent or two of full employment output would be a plausible guess, not huge but still significant if the economy ends up at a point like C in the diagram, fairly far toward the left.

With $\bar{r} = \tilde{r} \approx 0$, expansionary fiscal policy in the form of higher G will push the injections curve to the right, pulling output up from point C. Lower taxes T will shift the leakages schedule to the left, with similar effect. Krugman has effectively used such shifts to argue against austerity. If the adjustments just discussed are reversed in an austerity program, no “confidence fairy” is likely to appear to stimulate consumption spending or investment demand when the policy package kicks in. But one does not need Krugman’s apparatus to say the same thing. It follows directly from traditional Keynesian analysis dating from the 1930s.

Finally, evidence in support of the Mundell-Tobin effect is weak. If anything, faster inflation stokes fears in financial markets and can derail capital formation. Moreover, Wicksell’s inflation tax could bid up saving, offsetting any increase in investment demand. Nevertheless Krugman argues that the central bank should somehow intervene to increase expected inflation, reduce the real interest rate, and drive up capital formation. Here he is following contemporary ideas about “inflation targeting”, whereby the central bank is supposed to set an inflation target and then manipulate the interest rate to try to hit it. At a zero interest rate floor, this sort of

maneuver is impossible, so the central bank is supposed to talk up expectations about rising prices. The observed inflation will then presumably speed up. Whether such incantations will work is by no means clear. Absent a miraculous shift in model closure as in the Japan paper, supply-side interventions such as raising nominal wages, devaluation, or even FDR's 1933 pig slaughter program would be more effective.

A round of price increases might well do the US economy some good, especially if it is driven by money wage increases at the bottom of the income distribution. Still, there is no reason to believe that the inflationist confidence fairy's powers to cure recession will be stronger than those of her austere colleague. Expansionary fiscal policy and progressive income redistribution would do a lot more good.

Coda

Krugman's model is ingenious, but it is neither beast nor fish nor fowl. Natural rate theory and current ideas about inflation targeting and the formation of rational expectations of price increases squeeze out central ideas from Keynes about how the macroeconomy functions under fundamental uncertainty. A pity.

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