THE ILLIQUIDITY TRAP

Gerald Epstein
University of Massachusetts at Amherst

INTRODUCTION

The "liquidity trap," an infinitely elastic demand for money resulting from the common expectation that interest rates will rise, has played a central and contentious role in the history of Keynesian analysis. For the neo-Keynesians, starting with Hicks' reformulation and embodied in countless textbooks, the liquidity trap has been seen as the "special case" preventing interest rates from falling sufficiently to revive a depressed capitalist economy. However, it is a special case whose force, Pigou argued, was vitiated by the expansionary effects of falling prices on real wealth and consumption. So, the liquidity trap is not much of a trap after all. And the debate over Keynesian economics has shifted to other grounds.

While the debate over the liquidity trap supposedly concerned a key point in Keynesian economics, Keynes himself thought that the liquidity trap was unimportant, at least in practical terms. Writing in Chapter 15 of the General Theory, Keynes says,

There is the possibility... that after the rate of interest has fallen to a certain level, liquidity preference may become virtually absolute. I know of no example of it hitherto. Indeed, owing to the unwillingness of most monetary authorities to deal boldly in debts of long term there has not been much opportunity for a test. [VII, 207]

Though he did not imbue the liquidity trap with the importance attributed it by later writers, Keynes did have another explanation of why interest rates might not fall sufficiently in a depression to revive the economy.

There is finally the difficulty of bringing the effective interest rate below a certain level which may prove important in the era of low interest rates; namely the intermediate costs of bringing borrower and ultimate lender together, which the lender requires over and above the pure rate of interest. Thus the rate of interest which the typical borrower has to pay may decline more slowly than the pure rate of interest, and may be incapable of being brought by the methods of the existing banking and financial organization, below a certain minimum figure. It is also important in the case of short-term loans (e.g. bank loans) where the expenses are heavy, a bank may have to charge its customers 1.5 to 2% even if the pure rate of interest to the lender is nil. [Ibid, 208]
This paper investigates the effects of the illiquidity trap on two simple models of the economy and raises doubts about Pigou’s argument for the salutary effects of falling prices and wages in a depression. I suggest that when the bank cost constraint and endogenous monetary policy are taken into account, Pigou’s “neoclassical” claim that falling prices will increase income will not necessarily hold, even in a very neoclassical world. In addition, considering the possibility that, at very low levels of output, banks’ costs of intermediation are likely to rise, the Pigou effect is even less likely to work to restore full employment.

The next section briefly lays the foundation for the illiquidity trap by indicating how falling interest rates may reduce bank profits. The following section discusses the effects of the illiquidity trap in a simple IS-LM model with constant costs in banking. The final section extends the model to include mark-up pricing and declining costs in banking.

THE EFFECTS OF INTEREST RATE CHANGES ON BANK PROFITS

The standard approach to analyzing the effects of interest rate changes on bank profits originated with Samuelson [1945] who developed the notion of "duration" independently of Hicks and Macaulay and first applied it to financial intermediaries. Duration analysis suggests that declines in interest rates will lower the net worth of a bank if the (weighted) duration of the bank’s liabilities is longer than the (weighted) duration of the bank’s assets, where the weights are the percentage of assets and liabilities maturing at each moment in time. The intuition behind this result is that if liabilities are of longer duration, when interest rates decline returns on assets will fall before costs do.

Recent analyses of bank runs imply that the duration approach to bank profits is inadequate because it does not take into account that causation might run not only from duration to returns, but also from returns to duration. Moreover the duration analysis only concerns the effects of interest rate changes on net worth in a steady state and does not take into account the interest rate effects on solvency in the short run.

For example Diamond and Dybvig [1983] develop a model of banks with two equilibria, one of which involves a bank run that drives the bank into insolvency. This equilibrium is a self-fulfilling prophecy in which anything that leads depository to expect a run will actually generate one. In the context of this paper, a reduction in interest rates might produce such a run if depositors think that costs cannot adjust rapidly enough and bank profits will fall below the solvency point. Thus even if the duration of the liabilities is shorter than that of assets, lowering interest rates may not increase bank profits. Falling rates may simply drive the bank into insolvency.

If such a run occurs, a bank crisis might ensue which would reduce banker and possibly depositor wealth. To avoid such an event, the central bank may choose not to allow interest rates to fall substantially in a depression. Here enters the illiquidity trap.
THE ILLIQUIDITY TRAP: CONSTANT COSTS

Here I present a simple model of the macroeconomy in which the illiquidity trap is integrated into a standard IS-LM model. When the monetary authority attempts to prevent falling interest rates from reducing bank profits, it pegs the interest rate at a level at which banks can cover costs. In this case, the monetary authority attempts to peg the interest rate at

\[ i = i^* \]

where \( i^* \) embodies the per unit costs of intermediation which have been squeezed to some minimum level. To see the effects of such an interest rate floor, integrate equation (1) into a simple IS-LM model:

\[ y = \alpha y (M + aB)/(P) + I(i) \]  
-(goods)

\[ M = P L(d) \]  
-(money)

\[ W = (M + aB)/P \]  
-(wealth definition)

where \( y = real \) income,
\( c = consumption \)
\( M = outside \) money,
\( B = value \) of government bonds,
\( a = discount \) at which bondholders discount wealth of government bonds, \((1 = no \) discount; \(completely \) discount \(0 < a < 1\)),
\( i = interest \) rate,
\( i^* = target \) interest rate,
\( I = investment \)
\( P = price \) level,
\( L = demand \) for money (liquidity),
\( W = real \) wealth.

The term, \( a \), the degree to which government bonds are discounted, may require further discussion. Barro [1974] argued that because of their perfect foresight, taxpayers would view current government debt as a future tax liability and therefore would not count government debt as net wealth. In this case, \( a = 0 \). Barro's argument is far from universally accepted, even by neoclassical economists. Hence, it is more widely believed that, in general, \( a > 0 \). The comparative statics of IS-LM models typically assume \( i \) and \( M \) are endogenous and \( P \) is exogenous. However, in the illiquidity trap model, \( i \) is exogenous, and monetary policy (the high-powered money supply) is endogenous. Through open market operations, the central bank adjusts \( M \) to maintain \( i \) at \( i^* \) by trading money for bonds:

\[ dM = dB. \]
VARIABLE COSTS IN BANKING

So far I have assumed that per unit costs of intermediation are constant, independent of the scale of banking. In eras of low interest rates and a depressed economy this is not likely to be true. If banks set interest rates on loans by marking up over costs, then they are likely to mark up per unit variable and fixed costs. In a depression, economic activity and therefore banking activity will go down. In this case, per unit fixed costs for banking will increase and the costs of intermediation and bank loan rates will go up, all other things equal. Moreover, in a depression, loan losses are also likely to go up substantially as prices fall (Kalecki, 1944; Fisher, 1933; Tobin, 1950). To cover costs in an era of bad loans, banks are likely to increase rates as well.\footnote{9}

\[ i = UVC + UPC + m, \]

where \( UVC = \) unit variable costs, \\
\( UPC = \) unit fixed costs, \\
\( m = \) mark-up.

If unit variable costs (consisting primarily of interest costs) are practically nil in the depression and the mark-up is squeezed to a minimum or constant, changes in unit fixed costs dominate changes in the interest rate. Moreover, unit fixed costs will be a negative function of economic activity and prices.\footnote{10}

\[ UPC = U_P(y) \text{ where } U_P < 0 \text{ and } U_y < 0 \]

Combining equation (10) with the assumption of the illiquidity trap model that the central bank adjusts the money supply to keep interest rates in line with costs (equation 9), yields the following equation for the interest rate:

\[ i = A_P(y) \text{ where } A_P < 0, \text{ and } A_y < 0. \]

In this case, the LM curve is downward sloping. As income falls, interest rates which are already at low levels, will increase. Bank costs increase as income goes down (by equation 10) and the central bank reduces the money supply to increase rates on bonds and to support the increase in loan rates.\footnote{11} (See Figure 1). For stability the IS curve must be more steeply sloped than the LM curve. (That implies that the denominator in the expressions below must be positive.)

To analyze the effects of price changes on real output, totally differentiate the system of equations (2), (3), (4), and (11). For the purposes of this analysis, the price level is exogenous and output, interest rates, and the money supply are endogenous.\footnote{12}

The new comparative statics of the model are:

\[ \begin{bmatrix} 1 & -A_p & 0 \\ -I_l & 1 - C_p & -C_l(1 - a) \\ -I_l & -I_l & 1 \end{bmatrix} \begin{bmatrix} di \\ dy \\ dM \end{bmatrix} = \begin{bmatrix} A_p dp \\ -C_l(1 + a) dP \\ dP \end{bmatrix} \]

Let \( a = 1 \), so that government bonds are entirely not worth. The determinant is

\[ D = (1 - C_l) - A_p I_l > 0 \text{ for stability.} \]

In that case, the effect of falling prices on income is given by

\[ dy/dp = (A_p I_l - C_l(1 + B))/D. \]

Since \( D \) is assumed to be positive, the sign of equation (13) will be the same as the sign of the numerator. The sign of the numerator, however, is indeterminate. The first two terms in the numerator are negative, which makes their product positive. These two terms represent the effects of a change in the price level on interest rates and therefore on investment. From the first two terms, when prices fall, the costs of intermediation go up. This leads the central bank to reduce the money supply to increase interest rates so that the commercial banks are able to cover their costs of intermediation. These increased interest rates reduce investment and output. This first term captures the "illiquidity trap."
The second term represents the "Pigou effect." It is also positive. When prices fall, wealth, represented by nominal government bonds, also increase. As a result, consumption rises which increases output, all else equal. The net effect of falling prices on output depends on the strength of the Pigou effect relative to the illiquidity trap. In the terms of the IS-LM diagram, falling prices shift up the LM curve and shift out the IS curve. The outcome depends on the relative strength of those two movements.6

In the previous section, the absence of bond discounting is a sufficient condition for falling prices to increase income in a simple IS-LM model. Here, where the costs of intermediation increase with price and output decline, even if government bonds are entirely net worth, the Pigou effect may not work in the illiquidity trap.

NOTES

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3. The liquidity trap was not a central part of Keynes' argument in theoretical terms either. Keynes was concerned with showing two things: first, that a capitalist economy would not self-adjust to a full employment equilibrium and second, that money is not neutral. Since, in the standard exposition of the liquidity trap, money is neutral in the sense that money has no effect on "real" variables, the liquidity trap would provide a particularly weak basis for Keynes' argument. I thank an anonymous referee for this observation. Also see Regal [1988] for a good discussion.
4. Keynes' case of the earlier argument for a floor to the interest rate. In Chapter 17 of The General Theory, he argued that the nominal rate of interest could not fall below zero, the rate of return on money itself (liquidity, 1930, 602; Tobin, 1980, S). Keynes' argument, and the argument of this paper, is that bank costs and monetary policy might keep the rate of interest above this floor in a depression.
5. I am indebted to Carlo Panico for directing me to this quote.
6. I am concerned here with whether there exists an interest rate low enough to bring about full employment. I am only concerned with the existence of an effective rate floor above zero. See Ekelund and Milgate [1983] for a discussion of these issues.
7. I am not supposing that Keynes' case for an unemployment equilibrium in an capitalist economy "depends" on the existence of an "illiquidity trap." I am simply suggesting that the illiquidity trap is an additional, but largely ignored, argument that Keynes himself considered important in the particular context of the 1920s. This illiquidity trap may be of wider interest.
9. In this model, bonds do not have deposit insurance, the situation in the 1930s.
10. This focus on the relationship between interest rates and price levels is made difficult by the fact that government bonds increase the supply of money and the (nominal) money supply equation of the form S = (H) where (H) is integrated into the model.
11. For simplicity, I assume all government bonds are short term which avoids valuation issues arising out of changes in interest rates. In fact, during the great depression of the 1930s bank portfolios were increasingly filled with short-term bonds (Einstein and Ferguson, 1984).

REFERENCES


LABOR MARKETS, UNEMPLOYMENT, AND MINIMUM WAGES:
A NEW VIEW

Thomas I. Palley
New School for Social Research

INTRODUCTION

The standard approach to labor markets is illustrated in Figure 1, which shows labor demand as a negative function and labor supply as a positive function of the wage. If the market is competitive and wages are flexible, outcomes will be characterized by full employment at $w^*$, with an equilibrium wage of $w^*$. Unemployment emerges only if wages exceed $w^*$.

According to this view, "high and rigid" wages are the cause of unemployment, a view that has come to dominate both microeconomic and macroeconomic explanations of unemployment. This paper presents an alternative theory of unemployment that redirects attention away from "wage rigidity" toward the "structural characteristics" of labor exchange. The model emphasizes the distinction between employment (number of jobs) and hours and shows that minimum-wage regulations can actually increase employment.

UNEMPLOYMENT IN A "JOBS" ECONOMY

This section presents a theoretical model of a jobs economy based on Pleasner and Yitzhaki (1983). Its key is the distinction between employment (jobs) and hours. Firms can change the level of labor input either by increasing the level of employment holding hours constant, or the converse. This introduces a margin of choice for the firm, over hours and jobs, largely ignored in the literature. Initially, the model is explored with a single type of worker, and this assumption is subsequently relaxed to explore the effects of heterogeneity among workers.

The Demand for Jobs and the Supply of Hours

Worker behavior is characterized by two behavioral functions determining each individual worker's supply of hours and the number of workers participating in the labor market:

1. $h^* = 0 \quad w < w_{min}$
2. $h(w) \quad w > w_{min}, h > 0$