"Escaping from a Liquidity Trap and Deflation" (Svensson, *JEP*, 2003)

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Lecture 11
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1 Asset Price Bubbles

If you had bought a home in New York City in January 2004, you might have been able to finance that purchase at a (nominal) interest rate of 5.74 percent[1]. If you had sold that same home one year later (i.e. in January 2005), it would have appreciated 13.41 percent[2]. That's a nominal rate of return of 7.67 percent.

For comparison, consumer prices only rose 2.91 percent over the same period[3] and the S&P 500 index only rose 4.23 percent over the same period.

Now suppose that you had bought a home in New York City in January 2007. At the time, the interest rate on a 30-year fixed-rate conventional mortgage was 6.22 percent. If you had sold the home one year later, the home would have lost 5.98 percent of its value, leaving you with a nominal loss of 12.20 percent on your investment.

Consumer prices rose 4.31 percent over the same period, so – in real terms – you would have lost 16.51 percent of your purchasing power.

For comparison, the S&P 500 index "only" lost 3.24 percent between January 2007 and January 2008.

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[1] Source: "Contract rate on 30-year, fixed-rate conventional home mortgage commitments," Federal Reserve, H.15.
[2] Source: Case-Shiller Home Price Index
[3] Source: US Bureau of Labor Statistics, Consumer Price Index, All Urban Consumers

1.1 "Why Are You Talking About This?"

"OK, Doviak. We promise not to flip houses. So why are you talking about this?"

The real interest rate is the difference between the nominal interest rate and the public's expectation of the inflation rate:

$$r = i - \pi^e \qquad (1)$$

and the inflation rate is defined as the percentage change in the overall price level:

$$\pi = \frac{\dot{P}}{P} \qquad (2)$$

but the real interest rate that *you* pay is equal to the difference between the nominal interest rate and the percentage change in the price of *your* product, so the policies that Svensson (2003) discusses will have different effects on different groups of people.

This also has implications for the political feasibility of the proposals that Svensson outlines. Politically powerful people will lobby vigorously against policies that will adversely affect them.

2   What is a Liquidity Trap?

Suppose that a central bank determines that the optimal monetary policy is to keep the real interest rate at 2 percent during economic expansions and at 1 percent during economic recessions.

Scenario 1: If the economy is experiencing an expansion and the public's expectation of the inflation rate was 4 percent, then the central bank would set the nominal interest rate to 6 percent (so that the real interest rate is 2 percent).

Should there be a contraction of aggregate demand that causes a recession and reduces the expected inflation rate to 2 percent, then the central bank would reduce the nominal interest rate to 3 percent (so that the real interest rate is 1 percent).

If the recession was so deep that the expected inflation rate fell all the way to zero, then the central bank would set the nominal interest rate to 1 percent (so that the real interest rate is 1 percent).

Scenario 2: If the economy is experiencing an expansion and the public's expectation of the inflation rate was 0 percent, then the central bank would set the nominal interest rate to 2 percent (so that the real interest rate is 2 percent).

Should there be a contraction of aggregate demand that causes a recession and reduces the expected inflation rate to –2 percent (i.e. 2 percent deflation), then the central bank would only be able to reduce the

Table 1: The Rate of Inflation Over the Past Year

CPI-U less food and energy											
(monthly percentage changes at annual rates)											
Apr. 2008	May 2008	June 2008	July 2008	Aug. 2008	Sep. 2008	Oct. 2008	Nov. 2008	Dec. 2008	Jan. 2009	Feb. 2009	Mar. 2009
1.37	2.54	3.48	3.26	2.06	1.38	–0.14	0.61	0.08	2.12	2.23	2.05
Source: US Bureau of Labor Statistics											

nominal interest rate to 0 percent. Consequently, the real interest rate would be 2 percent, which is above the optimal level of 1 percent.

If the recession was so deep that the expected inflation rate fell to –4 percent (i.e. 4 percent deflation), then the real interest rate would ***rise*** to 4 percent because it cannot set the nominal interest rate below 0 percent. Consequently, monetary policy would effectively become more contractionary in the face of a steep economic recession – precisely the opposite of conventional macroeconomic prescriptions for an ailing economy. This is called a "liquidity trap."

2.1   What Are the Problems Associated with a Liquidity Trap?

Once the nominal interest rate has reached zero, the opportunity cost of holding money is zero. So (in principal) individuals are indifferent to holding $100 in money and buying a bond for $100 that pays $100 after a period of time.

The central bank could, of course, expand the money supply by buying such a bond for a price of $105, but no banker will lend $105 and only ask to be repaid $100, so such expansions of the money supply will not affect the interest rate that businesses must pay when they undertake an investment project.

Importantly, consider the case of a firm that has borrowed $100 at a 5 percent nominal interest rate. If the price of its product falls (due to deflation), the real interest rate that it must pay rises. If this causes the firm to go bankrupt, then the bank will take the firm's collateral, but the collateral may also have lost value (due to deflation) and the bank takes a loss.

Deflation may also increase real wages if nominal wages are "rigid downward" (i.e. if workers are unwilling to accept a lower nominal wage). Since a firm's demand for labor is $p \cdot MPL$, a decrease in the price of the firm's product will reduce the quantity of labor it demands (at a given wage). Consequently, unemployment will rise.

3   Could a Liquidity Trap Occur Today?

Svensson (2003) points out that the average annual rate of inflation in industrial countries has fallen from a high of 8.2 percent in the 1970s, to 5.6 percent in the 1980s, to 2.7 percent in the 1990s, to 1.8 percent in the period 2000-2003.

More recently, we have seen dangerously low rates of inflation. A particularly important measure is the consumer price index without volatile food and energy prices. As Table 1 shows, annualized inflation rates were less than 1 percent in the last quarter of 2008. Prices even fell in October 2008.

4   How to Escape from a Liquidity Trap?

By now, it should be fairly obvious that the best way to avoid a liquidity trap is to allow prices to grow at a rate that is high enough to provide a margin against deflation risk, but there is less agreement on how central banks can avoid a liquidity trap. Svensson (2003) describes a large number of methods. We'll examine a few of them here.

Since the real interest rate is the difference between the nominal interest rate and the public's expectation of the inflation rate, the central bank has two means of reducing the real interest rate. One is to reduce the nominal interest rate. If the nominal interest rate is already zero however, then the central bank can only reduce the real interest rate if it can convince the public that the inflation rate will rise.

The trouble with the latter policy however is that the public may expect the central bank to "cheat." That is, the central bank may promise higher inflation to get out of the liquiity trap, but then break its promise and keep inflation low once the recession (and the associated deflation) has ended.

One way a central bank can increase credibility is to announce a target path for the price level, as opposed to announcing a target inflation rate. The former is preferable because if prices do not reach the target level in one year, even higher inflation is needed in subsequent years to reach the price-level target. By contrast, an inflation target does not require offsettingly higher inflation rates in subsequent years (so it's less credible).

Similarly, large-scale purchases of short-term Treasury bills (which would increase the money supply) would only reduce the real interest rate if it were seen as a permanent expansion. To understand why, remember that the demand for money is very elastic at an interest rate of zero, so once the deflation ends and nominal interest rates rise, the quantity of money demanded will drop sharply.

If the public believes that the central bank will accomodate the reduced demand by contracting the money supply, then expectations of inflation will be low. The central bank wants the public to believe the opposite however, so it would have to convince the public that it will allow a hyperinflation to follow the deflation (which is not credible).

Another alternative is to buy long-term bonds, which would reduce their yield, thus lowering long-term real interest rates. Svensson (2003) asserts that such a policy would not be credible if rates on long-term bonds are tied to rates on short-term bills however because the public would have to believe that the central bank will allow short-term rates to remain at zero after the deflation ends (thus allowing a period of high inflation to follow the deflation).

4.1   Currency Depreciation

Svensson (2003) argues strongly in favor of depreciating the currency as a means of escape from a liqidity trap. For reasons that I will outline below, I am skeptical of the feasibility of such a plan however.

It currently costs approximately \$1.33 to buy one euro. If the US dollar were to depreciate 12.5 percent, then it would cost \$1.50 to buy one euro, so an *increase* in the dollar/euro exchange rate implies a *depreciation* of the dollar.

Importantly, a depreciation would benefit US exporters and US producers of goods that compete with European goods. To understand why, suppose that it costs a European firm 100 euros to produce a widget. At an exchange rate of \$1.33 per euro, they could recover their costs by selling the widget in the US for \$133. If the dollar depreciates to \$1.50 per euro however, they would have to recover their costs by selling it for \$150.

The increase in dollar price would unambigously benefit US producers of goods that compete with European goods. Suppose that it costs a US producer \$133 to produce a widget. After a depreciation of the dollar, the US producer could still recover its cost by selling it in the US for \$133 or by selling it in Europe for 89 euros.

Consequently, US widget producers would benefit at the expense of their European competitors.

The trouble with currency depreciation however is that US manufacturers that use European goods as an input into the production of their good would suffer because an input that once cost \$133 would cost \$150 after the depreciation.

Such manufacturers would lobby vigorously against currency depreciation and that is one reason why I doubt the political feasibility of Svensson's proposals.

More importantly however, Svensson's currency depreciation proposals would only to the extent that they stimulate aggregate demand. To the extent that currency depreciation causes "cost-push inflation" (i.e. a contraction of aggregate supply), his proposals would deepen the recession.

Also, Svensson himself points out that if the US and Europe both fell into a liquidity trap simultaneously (a possibility in the current crisis), they both could not use currency depreciation as a means of escape.

Nonetheless, let's consider Svensson's argument. He starts with the assumption of "uncovered interest rate parity," which means that after adjusting for expected currency appreciation/depreciation, the nominal interest rates in two countries must be equal. To see why, consider the following example.

Suppose that you have $100 to invest. You can get a 1 percent nominal interest rate in the United States or a 2 percent nominal interest rate in Europe. If you expected the exchange rate to remain unchanged, then it would make sense to invest in Europe (because you get a higher return there). Such a situation could never arise in practice however because everyone would want to invest in Europe, thus appreciating the euro and depreciating the dollar until the rates of return are the same in both countries.

Mathematically, we can express the uncovered interest rate parity condition as:

$$i_{t+1} = i^*_{t+1} + E_t[e_{t+1}] - e_t \tag{3}$$

where i_{t+1} is the "domestic" nominal interest rate (on an investment held until time $t+1$), i^*_{t+1} is the "foreign" interest rate, e_t is the log of the current exchange rate and $E_t[e_{t+1}]$ is the expectation of the log of the exchange rate at time $t+1$. The log of the exchange rate is equal to the log difference between the domestic and foreign price levels:

$$e_t = p_t - p^*_t \tag{4}$$
$$E_t[e_{t+1}] = E_t[p_{t+1}] - E_t[p^*_{t+1}] \tag{5}$$

where p_t is the domestic price level and p^*_t is the foreign price level.

Since a country's currency depreciates when its expected rate of inflation rises (i.e. if the dollar's purchasing power is expected to fall, then people will sell the dollar), movements of the exchange rate reveal people's expectation of inflation. Svensson argues that the degree of currency depreciation can be used as a metric of the central bank's success in escaping from the liquidity trap.

Specifically, he proposes that the central bank announce a depreciation of the domestic currency (implemented by open-market purchases of foreign currency) to cause the domestic price level to rise over time. To see how this would work, substitute equation (5) into equation (3), assume that $i_{t+1} = 0$ and rearrange terms:

$$i^*_{t+1} - E_t[p^*_{t+1}] = e_t - E_t[p_{t+1}] \tag{6}$$

Equation (6) shows that an immediate depreciation of the domestic currency (i.e. an increase in e_t) must be matched by an increase in the expectation of the domestic price level (i.e. an increase in $E_t[p_{t+1}]$) if the foreign interest rate, i^*_{t+1}, and the expectation of the foreign price level, $E_t[p^*_{t+1}]$, remain unchanged.

Svensson argues that such a policy would be credible because it is easier to defend a currency against appreciation than it is to defend a currency against depreciation. To defend against appreciation, the central bank simply has to purchase more of the foreign currency. This is easy because the central bank can issue its own currency. To defend against depreciation, the central bank has to sell its holdings of the foreign currency. This is more difficult because the central bank has a limited supply of the foreign currency.

Svensson also argues that the central bank should "overshoot" in its initial depreciation and let the currency appreciate slightly as the price level moves towards its target level. If the currency revalues at a

rate faster than the one the central bank desires, it is easy to move the exchange rate back to the desired path by purchasing more foreign currency.

Finally, Svensson states that three elements are necessary to escape from a liquidity trap:

1. The central bank must commit itself to a higher future price level.

2. The central bank must demonstrate its commitment to a higher future price level.

3. The central bank must have an "exit strategy" that specifies when the central bank wants the price-level target path to be reached and how monetary policy will be conducted once it does.

As we have seen, he argues that the first two can be achieved by announcing a target path for the price level (as opposed to a target inflation rate) and by depreciating the currency. The third simply specifies the time interval over which the central bank plans to target the exchange rate and whether the central bank will pursue price-level targeting or inflation targeting once it stops intervening in foreign exchange markets.

He calls these proposals his "Foolproof Way" and he argues that the currency depreciation and lower real interest rate will "jumpstart the economy" by increasing aggregate demand.

I have no doubt that his proposals, if implemented, would increase the domestic price level. My concern is that they would not reduce the real interest rate that *some* domestic producers pay for the reasons outlined in section 1.1. Namely, domestic firms that use imported goods as an input into the production of their goods would see an increase in costs (due to the currency depreciation).

To the extent that they are unable to pass this increase in cost onto consumers (in the form of higher prices), then the real interest rate that *they* pay would not fall. Instead, the higher costs would increase their marginal cost of production, which (all else equal) would contract aggregate supply.

On the other hand, domestic exporters and domestic producers of import-competing goods would be able to charge higher prices, so the the real interest rate that *they* pay would fall, thus increasing investment and aggregate demand.

So the question of whether Svensson's proposals would end the recession depend on whether the stimulus to aggregate demand outweighs the contraction of aggregate supply.

References

L. E. Svensson. "Escaping from a Liquidity Trap and Deflation: The Foolproof Way and Others". *Journal of Economic Perspectives*, 17(4):145–166, Fall 2003.