

Macroeconomics | Activity 8, Lecture 9

Shocks, the Zero Lower Bound and the Deflation Trap

Worked solutions

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Lesson of the day. Demand and supply shocks move output and inflation through the AS/AD model. When the central bank's interest rate hits zero it can no longer cut, and if prices start to fall, deflation raises the real interest rate and deepens the slump. At the zero lower bound, falling prices are a trap, not relief.

Phase 1 – Concept checks

ANSWERS

ConceptTest 1. **Answer.** (b), stagflation. A supply shock pushes production costs up, so inflation rises while output falls. It is the hard case for policy, because acting on one side worsens the other.

ConceptTest 2. **Answer.** (c), -3 per cent. By the Fisher relation $R = i - \pi^e = 0 - 3 = -3$ per cent. Even with the nominal rate at zero, expected inflation makes the real rate negative, which supports spending.

ConceptTest 3. **Answer.** (c), $+2$ per cent. $R = i - \pi^e = 0 - (-2) = +2$ per cent. Deflation raises the real rate exactly when the economy needs it lower, which is why deflation at the zero bound is dangerous.

ConceptTest 4. **Answer.** (b). At the zero bound the usual tool is exhausted, so central banks turn to quantitative easing, buying longer-term assets to push down long rates, and to guiding expectations.

Phase 2 – The desk problem

FULL WORKING

(a) **A helpful case (worked for you).** With $i = 0$ and expected inflation $+3$ per cent, $R = 0 - 3 = -3$ per cent. A negative real rate encourages borrowing and spending.

(b) **Deflation arrives.** With $i = 0$ and expected inflation -2 per cent,

$$R = 0 - (-2) = +2 \text{ per cent.}$$

(c) **The swing.** The real rate moves from -3 per cent to $+2$ per cent, a rise of **5 percentage points**, even though the central bank has not touched its nominal rate. The whole swing comes from the switch between expected inflation and expected deflation.

(d) **The spiral.** A slump lowers inflation and can tip it into deflation. With the nominal rate already at zero, falling expected inflation raises the real rate $R = i - \pi^e$, which discourages spending and investment and deepens the slump; the deeper slump pushes prices down further, raising the real rate again. The central bank cannot cut its way out, because the nominal rate is already at zero. That self-feeding loop is the liquidity trap.

A five-point swing in the real rate, with the central bank frozen at zero, and all of it driven by the switch from expected inflation to deflation. At the zero bound, falling prices are not relief but a trap.

Phase 3 – The case

WORKED ANSWERS

The episode is the Great Depression in the United States, 1929–33.

1. With the nominal rate near zero and prices falling by, say, 6 to 10 per cent a year, expected inflation was strongly negative, so the real rate $R = i - \pi^e$ was high and positive, on the order of +6 to +10 per cent. Borrowers faced a steep real cost of credit precisely when the economy was collapsing. Policy that looked loose in nominal terms was in fact very tight.
2. What matters for spending and investment is the real rate, not the nominal one. When prices fall, a dollar borrowed must be repaid in dollars worth more, so the real burden of borrowing rises even if the nominal rate is zero. Deflation therefore turns a zero nominal rate into a high real rate, choking off exactly the spending the economy needs.
3. The turn came from a change in the price regime, not a further rate cut. In 1933 the United States left the gold standard and the government committed to reflation, to stopping and reversing the fall in prices. That shifted expectations from deflation to rising prices, which pulled the real interest rate down sharply and let recovery begin. The nominal rate had little room left; it was expectations about prices that moved.
4. Once the nominal rate is at zero, the danger is deflation, because it raises the real rate the central bank can no longer lower. The way out is to change what people expect about prices: to commit credibly to reflation, to raising the price level, so that expected inflation rises and the real rate falls. Modern tools for this are asset purchases and clear guidance that policy will stay easy until prices recover.

Rates near zero looked easy, but with prices falling a quarter the real cost of borrowing was punishing. The Depression only turned when the country promised to reflate and expectations flipped. At the zero bound, the fight is over expected inflation.

End of solutions. Sources: Jones, *Macroeconomics* 6e, Ch. 13–14; standard accounts of the Great Depression and the 1933 US departure from the gold standard. All figures verified.