Macro module 22: Price misperceptions model: practice problems

*Practice problems and illustrative test questions for the final exam*

(The attached PDF file has better formatting.)

This posting gives sample final exam problems. Other topics from the textbook are asked as well; these problems are just examples. All final exam problems are multiple choice; some practice problems are not multiple choice so that the solutions can be better explained.

** Exercise 22.1: Price misperceptions model

The price misperceptions model presumes that some economic actors mis-interpret prices and wage rates.

A. How can prices and wage rates be mis-interpreted? A price or a wage rate is a dollar figure; how can one mis-interpret the figure?
B. Who mis-interprets prices: households (consumers and workers) or businesses?

*Part A:* The dollar figure is the nominal price or the nominal wage rate. The mis-interpretation is whether a higher or lower nominal price or wage rate is also a higher or lower relative price or real wage rate.

*Illustration:* A person's wage changes from $10 an hour in 20X2 to $11 an hour in 20X3.

- If inflation is 10%, the real wage rate has not changed.
- If inflation is 5%, the real wage rate has increased.
- If inflation is 15%, the real wage rate has decreased.

*Part B:* Consumers and workers know the prices of goods which they buy and the wage rates they receive. They have limited information about prices of other goods in the economy or wage rates of other workers. If one's wage rises from $10 an hour to $11 an hour, one tends to think one is being paid more. Similarly, if an item costs $10 in 20X2 and $11 in 20X3, one tends to think its price has risen. It is hard to convert all prices and wages to real terms if one does not know how other prices and wages are changing.

Businesses hire many workers, sell many products, and buy many materials and supplies. They generally have good knowledge of the real costs of each item, and they do not misinterpret prices or wages.

** Question 22.2: Price misperceptions model vs equilibrium business cycle model

The price misperceptions model differs from the equilibrium business cycle model in all but which of the following ways?

A. Households sometimes misinterpret changes in nominal prices as changes in relative prices.
B. Households sometimes misinterpret changes in nominal wages as changes in real wage rates.
C. Households have incomplete current information about prices in the economy.
D. Wage rates do not adjust rapidly to clear labor markets.
E. All of A, B, C, and D are true.

Answer 22.2: D

*Statements A and C:* Ordinary people know the prices of goods they buy, not the prices of other goods in the economy. If the prices of the goods they buy increase, they often interpret this as changes in the real prices of these goods, not as general inflation.

*Statement B:* Business raise nominal wage rates if the price level increases. If inflation rises but workers are not aware of this rise, they receive higher nominal wage rates which they interpret as higher real wage rates.

*Statement D:* Business pay real wage rates equal to the marginal product of labor. If they paid less, workers would shift to other firms that paid the proper amount. If monetary inflation increases, businesses must raise nominal wage rates to maintain the same real wage rates. Wage rates do adjust to clear labor markets.

See Barro, chapter 15, page 274, column 1, “Price misperceptions model,” first paragraph and column 2, top paragraph

** Question 22.3: Price misperceptions model

In 20X1, the inflation rate is 10% per annum. On January 1, 20X2, the monetary authorities say they will keep the same quantity of money as in the past year, so inflation rate should be zero.

Households believe inflation will still be 10%, but the monetary authorities keep the money supply the same as in the previous year and real inflation is zero.

According to the price misperceptions model, which of the following is not true?

A. If the real wage rate does not change, the demand for labor will not change.
B. If the nominal wage rate does not change, the quantity of labor supplied will decrease.
C. In the short run, the real wage rate will increase.
D. In the short run, real GDP will increase.
E. In the long-run, the quantity of labor supplied will return to its initial level

Answer 22.3: D

*Statement A:* Business know the true price level, so if the real wage rate does not change, business know that it has not changed, and the demand for labor does not change.

*Statement B:* If the price level does not change, the nominal wage rate is not expected to change. Workers expect the price level to increase, so the same nominal wage rate is a lower real wage rate, and the quantity of labor supplied will decrease.

*Statement C:* The quantity of labor supplied decreases and the quantity of labor demanded does not change, so the real wage rate must increase to clear the labor markets.

*Statement D:* If people work less, real GDP decreases.

*Statement E:* In the long-run, the doctrine of rational expectations says that workers correctly estimate the price level, so they know the true real wage rate and the quantity of labor supplied returns to its initial level.

See Barro, *Macroeconomics*, Chapter 15, “Price misperceptions model,” page 275, column 2

** Question 22.4: Price misperceptions model

All but which of the following correctly reflect Barro's comments on the price misperceptions model?

A. If monetary policy is systematic, people learn the expected actions of monetary authorities, so money is neutral even in the short run.
B. High marginal tax rates may cause people to work less than monetary authorities believe is optimal.
C. Generous social welfare programs may cause people to work less than monetary authorities believe is optimal.
D. There is no reason for the monetary authorities to fool people into working more or less than they want to work.
E. Systematically fooling the public for long periods may not be feasible.

Answer 22.4: D

*Statements A and E:* If the monetary authorities are rational and monetary policy is systematic, people learn the expected actions of monetary authorities, and money is neutral even in the short run. Fooling the public might be possible in unusual cases, but it may not be feasible as a general policy.

*Statements B, C, D:* Most western countries have high tax rates and generous social welfare programs, which cause people to work less than is socially optimal from the government's perspective. In western Europe, tax rates are high and unemployment benefits are generous, so unemployed workers are in no rush to find new jobs. To give people more incentive to work, the monetary authorities may try to fool them into thinking the real wage rate is higher than it actually is.

See Barro, *Macroeconomics*, Chapter 15, "Price misperceptions model," page 277, column 2

** Question 22.5: Money and the equilibrium business cycle model

For Barro's equilibrium business cycle model, which of the following is true?

A. Empirically, M is a-cyclical; in theory M does not affect real GDP.
B. Empirically, M is pro-cyclical; in theory M causes a higher labor supply and higher real GDP.
C. Empirically, M is pro-cyclical; in theory, the higher M is endogenous
D. Empirically, M is anti-cyclical; in theory, the lower M is endogenous, as the monetary authorities try to restrain the higher real GDP
E. Empirically, M is anti-cyclical; in theory, the higher M causes higher inflation, which reduces real GDP

Answer 22.5: C

See Barro, *Macroeconomics*, Chapter 15, "Price misperceptions model," page 279, Figure 15-1

*Question:* Barro says that money is neutral, so M does not affect real variables, such as real GDP.

*Answer:* Empirically, M is pro-cyclical: it is positively correlated with real GDP. Barro believes the higher M in years with high real GDP is endogenous. The monetary authorities realize that real GDP is high, so they issue more money.

*Question:* If higher M results from money creation after real GDP grows, shouldn't this be obvious?

*Answer:* The monetary authorities anticipate real GDP growth and adjust M accordingly. If they think real GDP will grow new quarter, they issue new money over the course of the quarter. Even though M stems from the monetary authorities' expectations of real GDP growth, it does not lag behind real GDP growth.

**Exercise 22.6: Supply and demand curves for labor

Let L = worker-hours and W = real wage rate in dollars per hour

- The demand curve for labor is $L^d$ = 100 workers – 5 W
- The supply curve for labor is $L^s$ = 5 W

The coefficient 5 in the equations above is in units of worker-hours per dollar.

A. What is the equilibrium real wage rate?
B. What is the equilibrium quantity of labor supplied?

Suppose the monetary authorities increase the money supply 40%, the price misperceptions model holds, employers know the true price level, and workers are not aware that the price level has changed.

C. What is the new demand curve for labor?
D. What is the new supply curve for labor?
E. What is the new equilibrium real wage rate?
F. What is the new equilibrium nominal wage rate?
G. What is the new equilibrium quantity of labor supplied?

*Part A:* At the equilibrium real wage rate, the quantity of labor supplied = the quantity of labor demanded:

100 – 5W = 5W ⇛ W = 10 ⇛ the real wage rate = $10 per hour

*Question:* This exercise has linear supply and demand curves. The exhibits in the textbook have convex supply and demand curves. Which are correct?

*Answer:* Suppose workers provide 8 hours of labor a day at $10 an hour and 10 hours of labor a day at $12 an hour. If the supply curve were linear, workers would provide 24 hours of labor a day at $26 an hour. But labor is limited; if an extra $2 an hour increases labor from 8 hour to 10 hours, it may require an extra $5 an hour to increase labor from 10 hours to 12 hours and an extra $20 to increase labor from 12 hours to 14 hours. This exercise uses linear curves to make the mathematics easier.

*Part B:* Solve for the equilibrium quantity of labor from either the supply or demand curve:

100 – 5 × 10 = 5 × 10 = 50

*Part C:* The demand curve for labor does not change, since employers know the true price level.

*Part D:* The supply curve for labor changes, since workers do not know the true price level. If the real wage rate is W, they think the real wage rate is 1.4 × W. The new supply curve for labor is 1.4 × 5 × W = 7 × W.

*Part E:* At the equilibrium real wage rate, the quantity of labor supplied = the quantity of labor demanded:

100 – 5W = 7W ⇛ 12W = 100 ⇛ W = 100/12 = 8.333 ⇛ the real wage rate = $8.33 per hour

*Part F:* The new nominal wage rate is $8.33 × 1.4 = $11.67 per hour.

*Part G:* The new equilibrium quantity of labor supplied is 8.333 × 7 = 58.333.

Note the effects of the price misperceptions model. If workers underestimate the price level:

- The real wage rate decreases.
- The quantity of labor supplied increases.
- Real GDP increases.

These are short term effects. In the long-run, workers learn the true price level and the real wage rate reverts to its original level.

One long-term effect may persist. If the short-term is long enough, firms increase investments in capital. The new capital remains even after workers learn the true price level, and real GDP is higher than before.

Barro mentions this effect on capital because other economists discuss it. In truth, the short-term is short, and the effect on capital is slight. The effect is probably not material, so Barro does not much discuss it.

** Exercise 22.7: Friedman and Schwartz's *Monetary History*

A. What do Friedman and Schwartz conclude in their *Monetary History* (noted in Barro's text)?
B. Do these conclusions support the equilibrium business cycle model or the price misperceptions model?
C. How does Barro resolve the difficulty?

*Part A:* Friedman and Schwartz conclude in their *Monetary History* that

1. Changes in the behavior of the money stock have been closely associated with changes in economic activity, money income, and prices.
2. The relation between monetary and economic changes is highly stable.
3. Monetary changes have often had an independent origin; they do not just reflect economic activity.

*Part B:* The equilibrium business cycle model says that money is neutral. Money growth affects inflation and prices, not real GDP. The money supply should be acyclical: uncorrelated with real GDP, not pro-cyclical.

The price misperceptions model shows how money may affect real GDP. Barro supports the equilibrium business cycle model, not the price misperceptions model, which has more serious problems.

*Part C:* Barro assumes the money supply is an endogenous effect of business cycles. When the monetary authorities anticipate a boom, they expand the money supply; when they foresee a recession, they contract the money supply. Barro does not give a lengthy explanation of endogenous money. He believes money is neutral, and he does not think the empirical data contradict this view.

** Exercise 22.8: Rules vs discretion

Barro discusses the advantages and drawbacks of rules vs discretion for the monetary authorities.

A. What is meant by a rule?
B. Why might the monetary authorities choose to give up their discretion?

*Part A:* The central bank commits itself to a designated mode of conducting policy.

*Part B:* Discretion sounds good, since the monetary authorities can adjust money growth to optimize the real economy. But discretion has drawbacks as well. The monetary authorities might continually try to fool the public by raising the money supply more than previously announced. But people catch on quickly, and the higher money supply has little effect on the real economy but drives up inflation (which hurts the economy). In addition, the monetary authorities need to have strong reputations for their intentions to be believed. Unless the monetary authorities are believed by the public, their intentions have less effect. To make sure the public believes their policies, they set rules that they can not easily change.

Barro contrasts Argentina and Brazil with the United States. The central banks in Argentina and Brazil often printed money to reduce government debt, despite the ill effects on the private economy. If the central bank says it will not increase the money supply and the public sees a rise in the price level the next month, they assume the central bank is lying. In the United States, people are more likely to believes what the Federal Reserve Board says.