

Suggested Answers for Mankiw *Questions for Review & Problems*

The answers here will not have graphs, I encourage to refer to the text for graphs. There is a some math, however I don't expect you to replicate these in your exam, but you should understand the intuition.

Chapter 9

Questions for Review

- 1 The price of a magazine is an example of a price that is sticky in the short run and flexible in the long run. Economists do not have a definitive answer as to why magazine prices are sticky in the short run. Perhaps customers would find it inconvenient if the price of a magazine they purchase changed every month.
- 2 Aggregate demand is the relation between the quantity of output demanded and the aggregate price level. To understand why the aggregate demand curve slopes downward, we need to develop a theory of aggregate demand. One simple theory of aggregate demand is based on the quantity theory of money. Write the quantity equation in terms of the supply and demand for real money balances as

$$M/P = (M/P)^d = kY,$$

where $k = 1/V$. This equation tells us that for any fixed money supply M , a negative relationship exists between the price level P and output Y , assuming that velocity V is fixed: the higher the price level, the lower the level of real balances and, therefore, the lower the quantity of goods and services demanded Y . In other words, the aggregate demand curve slopes downward.

One way to understand this negative relationship between the price level and output is to note the link between money and transactions. If we assume that V is constant, then the money supply determines the dollar value of all transactions: $MV = PY$. An increase in the price level implies that each transaction requires more dollars. For the above identity to hold with constant velocity, the quantity of transactions and thus the quantity of goods and services purchased Y must fall.

- 3 If the Fed increases the money supply, then the aggregate demand curve shifts outward. In the short run, prices are sticky, so the economy moves along the short-run aggregate supply curve. Output rises above its natural rate level \bar{Y} : the economy is in a boom. The high demand, however, eventually causes wages and prices to increase. This gradual increase in prices moves the economy along the new aggregate demand curve to the new long-run equilibrium, output is at its natural-rate level, but prices are higher than they were in the initial equilibrium.
- 4 It is easier for the Fed to deal with demand shocks than with supply shocks because the Fed can reduce or even eliminate the impact of demand shocks on output by controlling the money supply. In the case of a supply shock, however, there is no way for the Fed to adjust aggregate demand to maintain both full employment and a stable price level. To understand why this is true, consider the policy options available to the Fed in each case. Suppose that a demand shock (such as the introduction of automatic teller machines, which reduce money demand) shifts the aggregate demand curve outward. Output increases in the short run, but in the long run output returns to the natural-rate level, but at a higher price level.

The Fed can offset this increase in velocity, however, by reducing the money supply; this returns the aggregate demand curve to its initial position. To the extent that the Fed can control the money supply, it can reduce or even eliminate the impact of demand shocks on output. Now consider how an adverse supply shock (such as a crop failure or an increase in union aggressiveness) affects the economy. The short-run aggregate supply curve shifts up. Output falls below the natural rate and prices rise. The Fed has two options.

Its first option is to hold aggregate demand constant, in which case output falls below its natural rate. Eventually prices fall and restore full employment, but the cost is a painful recession. Its second option is to increase aggregate demand by increasing the money supply, bringing the economy back toward the natural rate of output. This policy leads to a permanently higher price level at the new equilibrium.

Thus, in the case of a supply shock, there is no way to adjust aggregate demand to maintain both full employment and a stable price level.

Chapter 10

Questions for Review

- 1 The Keynesian cross tells us that fiscal policy has a multiplied effect on income. The reason is that according to the consumption function, higher income causes higher consumption. For example, an increase in government purchases of ΔG raises expenditure and, therefore, income by ΔG . This increase in income causes consumption to rise by $b \times \Delta G$, where b is the marginal propensity to consume. This increase in consumption raises expenditure and income even further. This feedback from consumption to income continues indefinitely. Therefore, in the Keynesian-cross model, increasing government spending by one dollar causes an increase in income that is greater than one dollar: it increases by $\Delta G/(1 - b)$.
- 2 The theory of liquidity preference explains how the supply and demand for real money balances determine the interest rate. A simple version of this theory assumes that there is a fixed supply of money, which the Fed chooses. The price level P is also fixed in this model, so that the supply of real balances is fixed. The demand for real money balances depends on the interest rate, which is the opportunity cost of holding money. At a high interest rate, people hold less money because the opportunity cost is high. By holding money, they forgo the interest on interest-bearing deposits. In contrast, at a low interest rate, people hold more money because the opportunity cost is low. Figure 101 graphs the supply and demand for real money balances. Based on this theory of liquidity preference, the interest rate adjusts to equilibrate the supply and demand for real money balances.

Why does an increase in the money supply lower the interest rate? Consider what happens when the Fed increases the money supply. Because the price level P is fixed, this increase in the money supply shifts the supply of real money balances M^S/P to the right. The interest rate must adjust to equilibrate supply and demand. At the old interest rate, supply exceeds demand. People holding the excess supply of money try to convert some of it into interest-bearing bank deposits or bonds. Banks and bond issuers, who prefer to pay lower interest rates, respond to this excess supply of money by lowering the interest rate. The interest rate falls until a new equilibrium is reached.

Chapter 11

Questions for Review

- 2 The tax multiplier in the Keynesian-cross model tells us that, for any given interest rate, the tax increase causes income to fall by $-\frac{b}{(1-b)}\Delta T$. The IS curve shifts to the left by this amount. The tax increase reduces the interest rate and national income. Consumption falls because disposable income falls; investment rises because the interest rate falls.

Note that the decrease in income in the $ISLM$ model is smaller than in the Keynesian cross, because the $ISLM$ model takes into account the fact that investment rises when the interest rate falls.

- 4 Falling prices can either increase or decrease equilibrium income. There are two ways in which falling prices can increase income. First, an increase in real money balances shifts the LM curve downward, thereby increasing income. Second, the IS curve shifts to the right because of the Pigou effect: real money balances are part of household wealth, so an increase in real money balances makes consumers feel wealthier and buy more. This shifts the IS curve to the right, also increasing income. There are two ways in which falling prices can reduce income. The first is the debt-deflation theory. An unexpected decrease in the price level redistributes wealth from debtors to creditors. If debtors have a higher propensity to consume than creditors, then this redistribution causes debtors to decrease their spending by more than creditors increase theirs. As a result, aggregate consumption falls, shifting the IS curve to the left and reducing income. The second way in which falling prices can reduce income is through the effects of expected deflation. Recall that the real interest rate r equals the nominal interest rate i minus the expected inflation rate

$\pi^e : r = i - \pi^e$. If everyone expects the price level to fall in the future (i.e., π^e is negative), then for any given nominal interest rate, the real interest rate is higher. A higher real interest rate depresses investment and shifts the *IS* curve to the left, reducing income.

Problems and Applications

- 2 1. The invention of the new high-speed chip increases investment demand, which shifts the *IS* curve out. That is, at every interest rate, firms want to invest more. The increase in the demand for investment goods shifts the *IS* curve out, raising income and employment.

The increase in income from the higher investment demand also raises interest rates. This happens because the higher income raises demand for money; since the supply of money does not change, the interest rate must rise in order to restore equilibrium in the money market. The rise in interest rates partially offsets the increase in investment demand, so that output does not rise by the full amount of the rightward shift in the *IS* curve. Overall, income, interest rates, consumption, and investment all rise.

2. The increased demand for cash shifts the *LM* curve up. This happens because at any given level of income and money supply, the interest rate necessary to equilibrate the money market is higher.

The upward shift in the *LM* curve lowers income and raises the interest rate. Consumption falls because income falls, and investment falls because the interest rate rises.

3. At any given level of income, consumers now wish to save more and consume less. Because of this downward shift in the consumption function, the *IS* curve shifts inward.

Income, interest rates, and consumption all fall, while investment rises. Income falls because at every level of the interest rate, planned expenditure falls. The interest rate falls because the fall in income reduces demand for money; since the supply of money is unchanged, the interest rate must fall to restore money-market equilibrium. Consumption falls both because of the shift in the consumption function and because income falls. Investment rises because of the lower interest rates and partially offsets the effect on output of the fall in consumption.

Chapter 13

Questions for Review

- 1 In this chapter we looked at three models of the short-run aggregate supply curve. All three models attempt to explain why, in the short run, output might deviate from its long-run natural rate the level of output that is consistent with the full employment of labor and capital. All three models result in an aggregate supply function in which output deviates from its natural rate \bar{Y} when the price level deviates from the expected price level:

$$Y = \bar{Y} + a(PP^e).$$

The first model is the sticky-wage model. The market failure is in the labor market, since nominal wages do not adjust immediately to changes in labor demand or supply that is, the labor market does not clear instantaneously. Hence, an unexpected increase in the price level causes a fall in the real wage (W/P). The lower real wage induces firms to hire more labor, and this increases the amount of output they produce. The third model is the sticky-price model. The market imperfection in this model is that prices in the goods market do not adjust immediately to changes in demand conditions the goods market does not clear instantaneously. If the demand for a firm's goods falls, it responds by reducing output, not prices.

- 3 In this chapter, we argued that in the short run, the supply of output depends on the natural rate of output and on the difference between the price level and the expected price level. This relationship is expressed in the aggregate-supply equation:

$$Y = \bar{Y} + a(PP^e).$$

The Phillips curve is an alternative way to express aggregate supply. It provides a simple way to express the tradeoff between inflation and unemployment implied by the short-run aggregate supply curve. The

Phillips curve posits that inflation π depends on the expected inflation rate π^e , on cyclical unemployment $u - u^n$, and on supply shocks ϵ :

$$\pi = \pi^e + \beta(u - u^n) + \epsilon.$$

Both equations tell us the same information in a different way: both imply a connection between real economic activity and *unexpected changes* in prices.

- 3 Inflation is inertial because of the way people form expectations. It is plausible to assume that people's expectations of inflation depend on recently observed inflation. These expectations then influence the wages and prices that people set. For example, if prices have been rising quickly, people will expect them to continue to rise quickly. These expectations will be built into the contracts people set, so that actual wages and prices will rise quickly.
- 6 One way in which a recession might raise the natural rate of unemployment is by affecting the process of job search, increasing the amount of frictional unemployment. For example, workers who are unemployed lose valuable job skills. This reduces their ability to find jobs after the recession ends because they are less desirable to firms. Also, after a long period of unemployment, individuals may lose some of their desire to work, and hence search less hard. Second, a recession may affect the process that determines wages, increasing wait unemployment. Wage negotiations may give a greater voice to insiders, those who actually have jobs. Those who become unemployed become outsiders. If the smaller group of insiders cares more about high real wages and less about high employment, then the recession may permanently push real wages above the equilibrium level and raise the amount of wait unemployment. This permanent impact of a recession on the natural rate of unemployment is called hysteresis.

Chapter 14

Questions for Review

- 2 Both monetary and fiscal policy work with long lags. As a result, in deciding whether policy should expand or contract aggregate demand, we must predict what the state of the economy will be six months to a year in the future. One way economists try to forecast developments in the economy is with the index of leading indicators. It comprises 11 data series that often fluctuate in advance of the economy, such as stock prices, the number of building permits issued, the value of orders for new plants and equipment, and the money supply. A second way forecasters look ahead is with models of the economy. These largescale computer models have many equations, each representing a part of the economy. Once we make assumptions about the path of the exogenous variables taxes, government spending, the money supply, the price of oil, and so forth the models yield predictions about the paths of unemployment, inflation, output, and other endogenous variables.
- 3 The way people respond to economic policies depends on their expectations about the future. These expectations depend on many things, including the economic policies that the government pursues. The Lucas critique of economic policy argues that traditional methods of policy evaluation do not adequately take account of the way policy affects expectations. For example, the sacrifice ratio the number of percentage points of GDP that must be forgone to reduce inflation by 1 percentage point depends on individuals' expectations of inflation. We cannot simply assume that these expectations will remain constant, or will adjust only slowly, no matter what policies the government pursues; instead, these expectations will depend on what the Fed does.
- 5 The problem of time inconsistency arises because expectations of future policies affect how people act today. As a result, policymakers may want to announce today the policy they intend to follow in the future, in order to influence the expectations held by private decision makers. Once these private decision makers have acted on their expectations, the policymakers may be tempted to renege on their announcement. For example, your professor has an incentive to announce that there will be a final exam in your course, so that you study and learn the material. On the morning of the exam, when you have already studied and learned all the material, the professor might be tempted to cancel the exam so that he or she does not

have to grade it. Similarly, the government has an incentive to announce that it will not negotiate with terrorists. If terrorists believe that they have nothing to gain by kidnapping hostages, then they will not do so. However, once hostages are kidnapped, the government faces a strong temptation to negotiate and make concessions. In monetary policy, suppose the Fed announces a policy of low inflation, and everyone believes the announcement. The Fed then has an incentive to raise inflation, because it faces a favorable tradeoff between inflation and unemployment. The problem with situations in which time inconsistency arises is that people are led to distrust policy announcements. Then students do not study for their exams, terrorists kidnap hostages, and the Fed faces an unfavorable tradeoff. In these situations, a rule that commits the policymaker to a particular policy can sometimes help the policymaker achieve his or her goals: students study, terrorists do not take hostages, and inflation remains low.

- 6 One policy rule that the Fed might follow is to allow the money supply to grow at a constant rate. Monetarist economists believe that most large fluctuations in the economy result from fluctuations in the money supply; hence, a rule of steady money growth would prevent these large fluctuations. A second policy rule is a nominal GDP target. Under this rule, the Fed would announce a planned path for nominal GDP. If nominal GDP were below this target, for example, the Fed would increase money growth to stimulate aggregate demand. An advantage of this policy rule is that it would allow monetary policy to adjust to changes in the velocity of money. A third policy rule is a target for the price level. The Fed would announce a planned path for the price level and adjust the money supply when the actual price level deviated from its target. This rule makes sense if one believes that price stability is the primary goal of monetary policy.