

HE1002 Macroeconomics I

Problem Sheet 7 – Problems & Solutions

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Problem 7-1

Is each of the following policies an example of expansionary or contractionary fiscal policy? Explain your answers in terms of the effect on aggregate demand.

- (a) The government slashes funding for the Environmental Protection Agency, without changing any other spending.

Solution:

Contractionary fiscal policy. Decreasing government spending on EPA operations reduces G , a component of aggregate demand. Lower aggregate demand may lead to lower prices and reduced economic output.

- (b) The government raises taxes on households making more than \$250,000.

Solution:

Contractionary fiscal policy. Higher taxes reduce disposable income, which decreases consumption C , a component of aggregate demand. Lower aggregate demand may lead to lower prices and reduced economic output.

- (c) The government decides to fill gaps in Medicare by making it available to more people.

Solution:

Expansionary fiscal policy. Expanding Medicare increases government spending G , a component of aggregate demand. Higher aggregate demand may lead to higher prices and increased economic output.

Problem 7-2

The economy is growing far too quickly, as high aggregate demand is causing inflation. What fiscal policy should be pursued in this instance—expansionary or contractionary? What will be the effect of the appropriate policy on aggregate demand?

Solution:

Contractionary fiscal policy should be pursued. To reduce inflation from an overheating economy, the government should reduce spending or raise taxes to lower aggregate demand. The appropriate policy will shift the aggregate demand curve to the left, reducing output and prices.

Problem 7-3

Assuming that unemployment is high and spending is low, answer the following questions.

- (a) Should the government pursue expansionary or contractionary fiscal policy?

Solution:

Expansionary fiscal policy. When unemployment is high and spending is low, the economy requires stimulation to increase aggregate demand and move toward full employment. Contractionary policy would exacerbate the downturn.

- (b) What will the appropriate policy do to the aggregate demand curve? Will the curve shift to the right or to the left?

Solution:

Shift to the right. Expansionary fiscal policy will cause the aggregate demand curve to shift to the right, reflecting an increase in total spending at each price level.

- (c) Through which component(s) of aggregate demand (C, I, G, or NX, or some combination) will the change occur?

Solution:

The primary change occurs through the **G (Government Spending)** component. Direct government purchases increase G , while tax cuts or transfer payments raise disposable income, boosting **C (Consumption)**. Improved economic outlook may also encourage **I (Investment)** through the multiplier effect.

Problem 7-4

The diagram in Figure 13P-1 shows aggregate demand for New Caprica last year (AD1) and this year (AD2). If you were to advise the president of New Caprica on economic policy, how would you answer the following?

- (a) How large is current output? How large is potential output? What is the difference, if any, between the two?

Solution:

[Note: Specific values require analysis of Figure 13P-1, which shows graphical equilibria. Typical response:] Current output is determined by the intersection of AD2 and SRAS. Potential output is determined by the LRAS curve. If current output exceeds potential output, there is a positive output gap (boom).

- (b) Is New Caprica in a recession or a boom?

Solution:

If current output \downarrow potential output: **Recession**

If current output \downarrow potential output: **Boom**

If current output = potential output: **Equilibrium (no gap)**

- (c) Given your findings, should the president enact expansionary or contractionary fiscal policy, or no policy at all?

Solution:

In a recession: Expansionary policy to increase aggregate demand and output.

In a boom: Contractionary policy to reduce aggregate demand and prevent inflation.

At equilibrium: No policy needed.

- (d) Which direction would the aggregate demand curve shift if the president used contractionary fiscal policy?

Solution:

Leftward (to the left). Contractionary fiscal policy decreases aggregate demand.

Problem 7-5

“Our fiscal policy was unsuccessful,” an economic analyst says, “due to partisan bickering in Congress that delayed the passing of the appropriate measures and our failure to realize we were headed into recession until it was too late.” What type of lags is the analyst describing?

Solution:

The analyst is describing two types of lags:

- **Recognition lag:** The failure to realize the recession was coming delayed recognition of the need for policy.
- **Implementation lag:** Partisan bickering in Congress delayed passage of appropriate measures, delaying the implementation of fiscal policy.

Both types of lags reduced the policy’s effectiveness.

Problem 7-6

Assume that the government in some nation intended to respond to low employment via fiscal policy. What type of policy would this require? Assume that this policy ended up having an undesirable outcome. How could this happen in terms of formulation and implementation lags?

Solution:

Policy type: Expansionary fiscal policy would be required (increased government spending or decreased taxes).

Undesirable outcome due to lags:

If there are long formulation and implementation lags, by the time the expansionary policy takes effect, the economy may have recovered on its own. The policy stimulus arriving during an expansion (rather than recession) can cause:

- Overheating and inflation
- Excessive asset price bubbles
- Crowding out of private investment

This is an example of **pro-cyclical fiscal policy** (moving in the same direction as the cycle rather than counter-cyclical).

Problem 7-7

Saabira earns \$68,000 a year and pays an average tax rate of 15 percent.

- (a) Calculate Saabira's disposable income and the amount of tax she pays to the government.

Solution:

$$\text{Taxes paid} = \$68,000 \times 0.15 = \$10,200$$

$$\text{Disposable income} = \$68,000 - \$10,200 = \$57,800$$

- (b) Suppose a recession hits the economy and Saabira's income falls to \$60,000 per year due to the fact that she is earning a smaller annual bonus. If she now pays an average tax rate of 12 percent, what is her disposable income and the amount of tax she pays to the government?

Solution:

$$\text{Taxes paid} = \$60,000 \times 0.12 = \$7,200$$

$$\text{Disposable income} = \$60,000 - \$7,200 = \$52,800$$

- (c) Calculate how much Saabira's annual salary and disposable income fell by due to the recession.

Solution:

$$\text{Salary reduction} = \$68,000 - \$60,000 = \$8,000$$

$$\text{Disposable income reduction} = \$57,800 - \$52,800 = \$5,000$$

Note: The disposable income fell by only \$5,000 (62.5% of the salary reduction) because taxes also fell.

- (d) Explain how income taxes are an automatic stabilizer in this example.

Solution:

Income taxes act as an **automatic stabilizer** because:

- When income falls, taxes paid automatically fall from \$10,200 to \$7,200 (a \$3,200 decrease).
- This automatic tax reduction partially offsets the income decline.
- Without this automatic stabilizer, disposable income would have fallen by the full \$8,000.
- The reduced tax burden helps maintain consumer spending and aggregate demand.

Problem 7-8

True or false? If the amount of time a person is eligible for unemployment compensation is reduced from 26 weeks to 4 weeks, people will have an incentive to quickly find a new job. This occurs because unemployment compensation is an important automatic stabilizer for the economy.

Solution:

Partially True, but the reasoning is incomplete.

True: Reducing unemployment compensation eligibility from 26 weeks to 4 weeks does give people incentive to find jobs quickly (no need to extend job search when benefits run out).

False reasoning: While unemployment compensation IS an important automatic stabilizer, reducing it actually **makes it a weaker stabilizer**, not a stronger one. A weaker automatic stabilizer leads to:

- Less consumption support for unemployed workers

- Lower aggregate demand during recessions
- Potentially prolonged recessions

The statement conflates incentives with the stabilization function.

Problem 7-9

Consider three countries. The first country runs small budget surpluses each year. The other two countries run large budget deficits each year. In one of the deficit countries, the national debt-to-GDP ratio has been steady, whereas in the other deficit country, the national debt-to-GDP ratio has been rising. Suppose each of these countries decides to reduce income taxes. Is Ricardian equivalence likely to hold in all of these countries? Why or why not?

Solution:

Ricardian equivalence holds when consumers fully internalize the government's intertemporal budget constraint, anticipating that a tax cut financed by debt implies future tax increases of equal present value.

Country 1 (Small Surpluses):

A history of small budget surpluses implies a sustainable debt path. A tax cut would shift toward a smaller surplus or mild deficit, but consumers expect future tax adjustments to restore the surplus trajectory. They will save the additional disposable income to offset anticipated future tax hikes. **Ricardian equivalence is likely to hold.**

Country 2 (Large Deficits, Stable Debt/GDP):

A stable debt-to-GDP ratio means primary budget balances adjust to keep debt on a steady path. A tax cut increases debt temporarily, but consumers foresee that future surpluses will rise to stabilize debt. They will therefore save the tax cut. **Ricardian equivalence is likely to hold.**

Country 3 (Large Deficits, Rising Debt/GDP):

A rising debt-to-GDP ratio indicates an unsustainable fiscal path. Consumers doubt the government can raise future revenues enough to fully offset the debt increase. Liquidity constraints and uncertainty undermine equivalence. Consumers are more likely to spend at least part of the tax cut. **Ricardian equivalence is unlikely to hold.**

Problem 7-10

A country is in the midst of a recession with real GDP estimated to be \$2.7 billion below potential GDP. The government's policy analysts believe the current value of the marginal propensity to consume (MPC) is 0.90.

- If the government wants real GDP to equal potential GDP, by how much should it increase government spending? Alternatively, by how much should it reduce taxes?

Solution:

Spending multiplier:

$$\text{Multiplier} = \frac{1}{1 - \text{MPC}} = \frac{1}{1 - 0.90} = \frac{1}{0.10} = 10$$

To close a \$2.7 billion output gap:

$$\Delta Y = \text{Multiplier} \times \Delta G$$

$$\$2.7 \text{ billion} = 10 \times \Delta G$$

$$\Delta G = \$0.27 \text{ billion} = \$270 \text{ million}$$

Tax cut alternative: The tax multiplier is smaller by a factor of 1:

$$\text{Tax multiplier} = \frac{-\text{MPC}}{1 - \text{MPC}} = \frac{-0.90}{0.10} = -9$$

$$\$2.7 \text{ billion} = 9 \times \Delta T$$

$$\Delta T = \$0.30 \text{ billion} = \$300 \text{ million}$$

- (b) Suppose that during the recession people have become less confident and decide they will spend only 50 percent of any additional income. In this case, if the government increases spending by the amount calculated in part a, will real GDP end up less than, greater than, or equal to potential GDP? By how much?

Solution:

$$\text{New MPC} = 0.50$$

$$\text{New multiplier} = \frac{1}{1 - 0.50} = 2$$

$$\Delta Y = 2 \times \$270 \text{ million} = \$540 \text{ million}$$

Since \$540 million > \$2.7 billion, real GDP will end up **less than potential GDP** by:

$$\$2.7 \text{ billion} - \$0.54 \text{ billion} = \$2.16 \text{ billion}$$

- (c) With the same decrease in consumer spending described in part b, if the government decreases taxes by the amount calculated in part a, will real GDP end up less than, greater than, or equal to potential GDP? By how much?

Solution:

$$\text{New tax multiplier} = \frac{-0.50}{1 - 0.50} = -1$$

$$\Delta Y = 1 \times \$300 \text{ million} = \$300 \text{ million}$$

Since \$300 million < \$2.7 billion, real GDP will end up **less than potential GDP** by:

$$\$2.7 \text{ billion} - \$0.30 \text{ billion} = \$2.40 \text{ billion}$$

Note: Tax cuts are even less effective when MPC declines.

- (d) Why is it difficult for the government to predict exactly how a change in spending or taxes will affect GDP?

Solution:

It is difficult because:

- **MPC uncertainty:** The MPC is not directly observable and can change with economic conditions and consumer confidence.
- **Crowding out:** Private investment may be reduced if government borrowing raises interest rates.
- **Supply-side effects:** Fiscal policy can affect aggregate supply through labor supply, capital accumulation, etc.
- **International effects:** Trade patterns and exchange rates may change in response to fiscal policy.
- **Expectations effects:** Forward-looking behavior by households and firms may differ from simple multiplier models.
- **Time lags:** The multiplier effects unfold gradually over time.

Problem 7-11

If in some year a nation's budget deficit is \$9.49 trillion and government spending is \$12.26 trillion, how much must it have earned in tax revenue this year?

Solution:

$$\text{Budget Deficit} = \text{Government Spending} - \text{Tax Revenue}$$

$$\text{Tax Revenue} = \text{Government Spending} - \text{Budget Deficit}$$

$$\text{Tax Revenue} = \$12.26 - \$9.49 = \$2.77 \text{ trillion}$$

Problem 7-12

“The government shouldn't borrow so much,” your uncle claims. “Look at that national debt! It's no different from someone borrowing on credit cards they can't pay.”

- (a) Is your uncle right?

Solution:

Partially right, but with important caveats. While government debt can become unsustainable, it is not exactly the same as personal credit card debt.

(b) How is government debt spending like someone borrowing on a credit card?

Solution:

- Both involve borrowing to finance current spending
- Both can become unsustainable if interest payments grow too large relative to income/revenue
- Both can crowd out other spending (consumption vs. investment)
- Both can lead to a debt spiral if not controlled

(c) How is government debt spending different from someone borrowing on a credit card?

Solution:

- Government can print currency and tax citizens (individuals cannot)
- Government debt has much longer maturity structures and lower interest rates
- Government borrowing can stimulate economic growth, generating future tax revenue
- Government debt is denominated in the country's own currency (lower default risk)
- Citizens may view government bonds as safe assets (holding them willingly)
- Intergenerational considerations differ (citizens and their descendants both pay taxes)

Problem 7-13

Econo Nation started 2015 with no national budget debt or surplus. By the end of 2015, it had a budget surplus of \$304 million; in 2016, it had a budget deficit of \$452 million; in 2017, it had a budget surplus of \$109 million. The amount of its budget deficit or surplus in 2018 is unknown. If at the end of 2018 Econo Nation's national debt totaled \$50 million, did it run a deficit or surplus in 2018? How much?

Solution:

Track the national debt:

Starting 2015: \$0

End 2015: $\$0 + \$304M$ surplus = $\$0$ (surplus reduces debt)

Wait, let me recalculate. A **surplus** means more revenue than spending, reducing debt:

End 2015 debt: $\$0 - \$304 = -\$304M$ (negative debt = credit position)

Actually, a surplus reduces debt, so:

End 2015: $\$0 - \$304M = -\$304M$ (or \$0 if starting at zero with surplus)

Let me reconsider: Starting at \$0 with no debt:

2015 surplus of \$304M reduces any debt, so at end: \$0

2016 deficit of \$452M increases debt: \$452M

2017 surplus of \$109M reduces debt: \$452M - \$109M = \$343M

2018: \$343M + X = \$50M (where X is the 2018 deficit/surplus)

$$X = \$50M - \$343M = -\$293M$$

A negative value means a **surplus of \$293 million**.

Problem 7-14

“Though the national debt has increased, don’t worry,” the president says in a televised speech. “We will not have to pay these funds back to bond buyers.” How is this possible? How must the government have financed its debt in this case?

Solution:

How it’s possible: The government doesn’t need to “pay back” bonds in the traditional sense because it can **roll over** the debt by issuing new bonds to pay off maturing ones.

Financing method: The government must have financed its debt through:

- **Printing money** (monetary financing by the central bank)
- **Inflation** (reducing real debt burden)
- **Economic growth** (increasing tax revenue to service debt)
- **Rolling over debt** (issuing new bonds to pay old bonds)

The most direct interpretation is that the central bank **monetized** the debt, creating money to finance government spending rather than borrowing from the public.

Problem 7-15

You buy a Treasury note for \$950. Every 6 months you receive a payment of \$40.

- (a) What is the annual rate of return?

Solution:

Semiannual payment = \$40

Annual coupon payment = $2 \times 40 = \$80$

$$\text{Annual rate of return} = \frac{80}{950} \approx 0.08421 = \mathbf{8.421\%}$$

- (b) What would be the annual rate of return if the payment was instead \$30?

Solution:

$$\text{Annual coupon payment} = 2 \times 30 = \$60$$

$$\text{Annual rate of return} = \frac{60}{950} \approx 0.06316 = \mathbf{6.316\%}$$

- (c) What would be the annual rate of return if the payment was instead \$45?

Solution:

$$\text{Annual coupon payment} = 2 \times 45 = \$90$$

$$\text{Annual rate of return} = \frac{90}{950} \approx 0.09474 = \mathbf{9.474\%}$$

Problem 7-16

Your friend believes buying Treasury bills or Treasury notes will offer protection against rising inflation in comparison to buying stocks or mutual funds, because the rate of return on the Treasury bills and notes is known at the time of purchase. Do you agree? Why or why not?

Solution:

Disagree. While the nominal rate of return is known, this provides **no protection against inflation**.

Explanation:

- **Real returns matter:** What matters is the real return (**nominal return - inflation**).
- **Inflation risk:** If inflation rises above the known nominal return, real returns become negative.
- **Fixed nominal payments:** Treasuries pay fixed nominal amounts, but unexpected inflation erodes their purchasing power.
- **Stocks as inflation hedge:** Stocks can provide better inflation protection because companies can raise prices to maintain profitability as inflation rises.

Example: If you buy a Treasury note with 2% annual return but inflation rises to 5%, your real return is -3%. Your purchasing power actually declines.

Problem 7-17

Which of the following are examples of the negative effects associated with government debt?

- (a) Increased interest rates.

Yes. Large government borrowing can increase demand for loanable funds, raising interest rates and crowding out private investment.

- (b) Increased taxes or lower spending in the future.

Yes. High debt requires future governments to either increase taxes or reduce spending to service the debt.

- (c) Increased investment in the economy.

No. This is not a negative effect; it's potentially positive. However, if government borrowing crowds out private investment, this could be viewed as negative in that sense.

Problem 7-18

If the government could borrow as much as it liked with a 0 percent interest rate, would the government debt be cost-free? Explain your answer.

Solution:

No, government debt would still not be cost-free.

Even with 0% interest rates, there are still opportunity costs:

- **Real resource costs:** Borrowing still means the government purchases goods and services that are unavailable to the private sector, even if financing is free.
- **Crowding out:** Government borrowing and spending can still reduce private investment and consumption through crowding out effects and portfolio substitution.
- **Inflation risk:** Large government borrowing and spending can lead to inflation, eroding real values and purchasing power.
- **Distortionary taxes:** If future generations must pay back debt through taxation, those taxes distort incentives and reduce economic efficiency.
- **Principal repayment:** The government still must eventually repay the principal, reducing future resources available for other uses.

Therefore, even at 0% interest, government debt represents a real cost to the economy through forgone private activity and distortions.