

Macro modules 16 and 17: Government expenditures: 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; practice problems are not multiple choice so that the solutions can be better explained.

\*\* Exercise 17.1: Public services

Barro has three scenarios for government spending:

- A. Government spending has no value to households.
- B. Government spending has a positive value less than private consumption.
- C. Government spending has a positive value more than private consumption.

How do these three scenarios affect the relations between government spending and other macroeconomic variables?

Solution 17.1: One is tempted to reason that if government spending has no value, then households would not reduce their own consumption, whereas if government spending has much value, then households need to spend less of their own money. This reasoning is not correct. Household spending is not set to meet pre-set needs; rather, households spend based on their income. Since household income does not depend on the value of the government spending, private consumption does not depend on this value.

Barro expresses this logic slightly differently. If each dollar of government spending is worth  $\delta$  of private consumption, then income rises by  $\delta \times$  government spending and consumption rises by  $\delta \times$  government spending. The two increments cancel out.

In sum: Barro does not consider the value of government spending for the effects on private consumption, gross private domestic investment, and real GDP. He says, however, that people's happiness depends on the value of government spending.

\*\* Exercise 17.2: Permanent government spending

The government raises spending by \$1 billion each year; the new spending is permanent, not temporary.

For simplicity, assume the following:

- The government issues no new money; it does *not* pay for the spending by printing money.
- The government does *not* borrow to pay for spending (it issues no bonds).
- All taxes are lump sum; no taxes are levied as a percentage of wages and have *no* substitution effect.
- The supply of labor  $L$  is *fixed* in the short run.
- The capital stock  $K$  and the technology level  $A$  are *fixed* in the short run.

- A. What is the government budget constraint?
- B. What is the *marginal propensity to consume* from permanent income?
- C. What is the effect of the new government spending on *disposable personal income*?
- D. What is the short run effect of the new government spending on *private consumption*  $C$ ?
- E. What is the short run effect of the new government spending on the *quantity of capital services*  $\kappa K$ ?
- F. What is the short run effect of the new government spending on *real GDP* ?
- G. What is the short run effect of the new government spending on the *real interest rate*?
- H. What is the short run effect of the new government spending on the *gross private investment*?
- I. What is the short run effect of the new government spending on the *real wage rate*?

*Part A:* If the government does not print money or issue bonds, then government spending + transfers = taxes:  
 $G = V - T$ .

*Part B:* The marginal propensity to consume from permanent income is close to one. If people expect a dollar more (or less) every year, they spend a dollar more (or less) every year.

*Part C:* If government spending increases,  $V - T$  (transfers minus taxes) decreases. Consumers' disposable income decreases by the amount of new government spending.

*Part D:* The marginal propensity to consume from a permanent change in income is close to one, so private consumption declines by the amount of new government spending.

*Part E:* The equilibrium quantity of capital services depends on the supply and demand curves for capital services. The capital stock does not change in the short run. The demand curve for the capital utilization rate  $\kappa$  depends on the marginal product of capital, and the supply curve for the capital utilization rate  $\kappa$  depends on the real rental price. The labor supply is assumed fixed, so the marginal product of capital does not change, and the real rental price is the marginal product of capital. The supply and demand curves for capital services do not change, and the equilibrium quantity of capital services does not change.

*Question:* Is it reasonable to assume that the labor supply is fixed?

*Answer:* Most countries pay for spending with taxes, which they levy on labor. The substitution effect causes the labor supply to decrease, which lowers the marginal product of capital. The demand curve for capital services shifts left, the real rental price decreases, the equilibrium level of capital services decreases, and real GDP decreases. One sees this most clearly in western Europe, where high government spending and high marginal tax rates cause the labor supply, the level of capital services, and real GDP to decline.

*Part F:* Real GDP depends on the production function, which has three inputs: the technology level  $A$ , the labor supply  $L$ , and the capital services  $\kappa K$ . None of these three items change, so real GDP does not change.

*Part G:* The real interest rate is the real rental price minus the depreciation rate, so it does not change.

*Part H:* Capital does not change, so the marginal product of labor does not change and the demand for labor does not change. The labor supply curve is assumed fixed, so the real wage rate does not change.

*Part I:* Consumption plus gross private domestic investment equals real GDP. Since consumption offsets the change in real GDP, gross private domestic investment does not change.

*Question:* If we labor, capital, and the technology level do not change, then real GDP does not change, so why do governments often increase spending to “jump-start” the economy? If permanent government spending has no effect on real GDP, why does Barro go through these extended arguments?

*Answer:* Barro emphasizes this section because many other economists say that government spending has strong effects on real GDP (see Chapter 15 of the textbook)

*Question:* What evidence does Barro have for this?

*Answer:* The empirical correlation between real GDP and government spending is close to zero. That is, the correlation between the deviation of real GDP from its trend and government spending from its trend are close to zero.

**\*\* Exercise 17.3: Temporary government spending**

The government raises spending by \$1 billion each year; the new spending is temporary, not permanent.

For simplicity, assume the following:

- The government issues no new money; it does *not* pay for the spending by printing money.
- The government does *not* borrow to pay for spending (it issues no bonds).
- All taxes are lump sum; no taxes are levied as a percentage of wages and have *no* substitution effect.
- The supply of labor  $L$  is *fixed* in the short run.
- The capital stock  $K$  and the technology level  $A$  are *fixed* in the short run.

This exercise focuses on the differences of temporary government spending from permanent spending.

- A. What is the short run effect of the new government spending on *private consumption*  $C$ ?
- B. What is the short run effect of the new government spending on the *quantity of capital services*  $\kappa K$ , *real GDP*, the *real interest rate*, and the *real wage rate*?
- C. What is the short run effect of the new government spending on the *gross private investment*?

*Part A:* Households consider their long-term (lifetime) income and expenditures. They reduce their lifetime consumption to match the drop in lifetime income (from the higher taxes to fund government spending). The consumption in each year (including the current year) decreases by a small amount.

*Part B:* Temporary government spending does not affect these items, just as permanent government spending does not affect them.

*Part E:* If real GDP stays the same and consumption drops by only a portion of real GDP, gross private domestic investment must decrease by the remaining portion. Barro does not give figures, but he says that consumption drops a small amount and gross private domestic investment drops a large amount.

*Question:* What is the net effect of temporary government spending?

*Answer:* Some economists believe that temporary government spending can “jump-start” the economy, end recessions, and promote growth. Barro says that temporary government spending reduces gross private investment, which reduces long-term economic growth.