

Skeleton Answers Problem Set 9

"Macroeconomics 1"

ECON 1102/7074

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1 Question

Consider the following changes in the macroeconomy. Show how to think about them using the IS curve, and explain how and why GDP is affected in the short run.

(a) The government offers a temporary investment tax credit: for each dollar of investment that firms undertake, they receive a credit that reduces the taxes they pay on corporate income.

(b) A booming economy in Europe this year leads to an unexpected increase in the demand by European consumers for Australian goods.

(c) Australian consumers develop an infatuation with all things made in Indonesia and sharply increase their imports from that country.

(d) A housing bubble bursts so that housing prices fall by 20% and new home sales drop sharply.

Answer (a) This is an increase in \bar{a}_i : If the government is offering temporary tax breaks for investment goods, then, regardless of the interest rate, firms want to buy more investment goods. OVERALL, THIS SHIFTS THE IS CURVE TO THE RIGHT, boosting the aggregate demand for goods and services in the short run.

(b) This is an increase in \bar{a}_{ex} . Foreigners want to buy more Australian-produced goods: THIS SHIFTS THE IS CURVE TO THE RIGHT.

(c) An increase in \bar{a}_{im} . This raises imports which, holding everything else on the demand side equal, means GDP will fall. (THE IS CURVE SHIFTS TO THE LEFT.)

(d) A fall in \bar{a}_i . Remember, new homes are part of I , investment purchases. THIS SHIFTS THE IS CURVE TO THE LEFT.

2 Question

Suppose the government decides to increase government purchases today, say on bridges, to stimulate the economy. Explain how this affects the IS curve. How does your answer depend on the way in which the spending is financed and on the extent to which Ricardian equivalence holds?

Answer To keep things simple, let us focus on the case where the rise in government purchases is temporary. Also, in this answer use the simplest version of the IS model, that of Section 11.3, to answer the question. (That means that short-run consumer spending depends only on potential GDP, not on actual GDP.)

In a world *without Ricardian equivalence*, where consumers spend based on each year's income, the following happens. If the hike in government purchases is financed with a tax increase, then \bar{a}_g rises while \bar{a}_c falls. The government purchases more, but consumers (who have to pay the tax increase out of this year's pay) purchase less. (See first panel in Figure 1.) The effects come close to canceling each other out. The IS curve probably does not shift much, perhaps it still shifts slightly to the right.

If, instead, the new government purchases are financed with new government borrowing, then that means consumers need not pay higher taxes until later in the future. That means consumers have the same pay as before, so their consumer spending is the same as before. (See second panel in Figure 1.) So, now, \bar{a}_g increases, but \bar{a}_c does not change: The IS curve shifts to the right. More government spending adds up to more overall demand for goods and services. This is a common view of government spending and closely associated with the economics of Keynes.

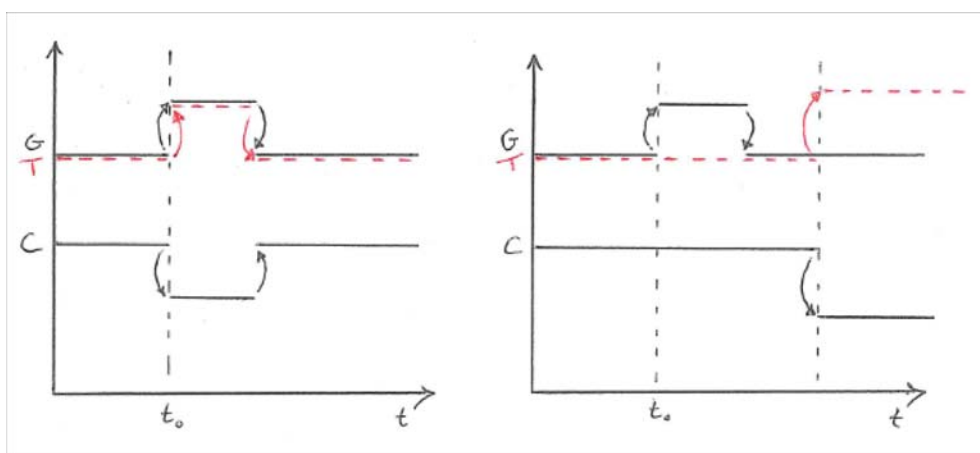


Figure 1: Without Ricardian Equivalence

In a world *with Ricardian equivalence*, where consumers make today's spending decisions based on their lifetime income (present and future), the answer is different.

(See Figure 2.) The answer turns out to be about the same as in the previous paragraph: IS shifts right, but for a different reason. As before, \bar{a}_g surely increases. But, regardless of when the government raises taxes, now or later, consumers know that they have to foot the bill. They know that the total tax bill in their lifetime will be higher. As a result they will have less disposable income when considering their entire lifetime. Hence, consumers reduce their consumption a little as soon as they realize that their lifetime disposable income falls, which happens at time t_0 , the point in time when government purchases increase. This is the big story behind Ricardian equivalence: How the government pays for its spending does not matter to rational consumers as consumers only consider total lifetime disposable income. That's Ricardian equivalence. (That is why I did not include the tax profile in figure 2 because it doesn't matter, e.g. whether taxes increase right away to pay for government expenditures, whether they increase in the distant future, or whether they increase a little now and a little more in the future, it's all the same to the rational, forward-looking consumer.)

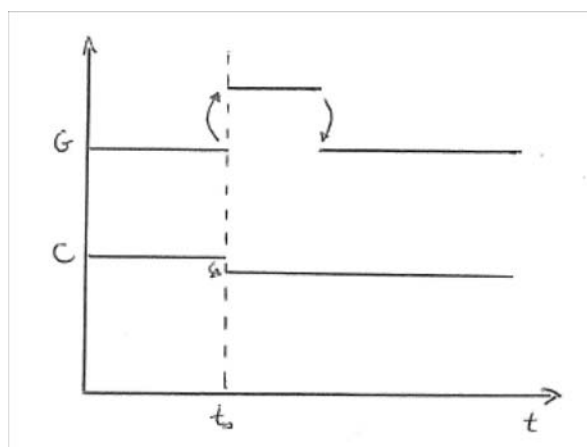


Figure 2: With Ricardian Equivalence

Let me explain again: when a rational consumer knows she has to pay some debt off, she probably pays a little of it off every month, not all at once. The rational consumer wants to keep her consumption smooth from year to year, if possible; she does not want feast or famine. This is the basic story behind the Life Cycle Hypothesis underlying Ricardian equivalence.

If the government decides to borrow to pay for the temporary boost in G and raises taxes slightly over the next few decades to repay the debt, then it is doing just what rational consumers would do themselves, paying a small price each year to pay for a big onetime purchase.

If, instead, the government decides to raise taxes immediately to pay for the temporary boost in G , then even though consumers have a temporarily higher tax bill, they still have a choice about how much money to spend on consumer goods.

They can just borrow some money today to consume some more today, then repay the money slowly over the next few years.

So, whether the government raises taxes a lot now or slightly in the future, the effect on consumer spending is exactly the same under Ricardian equivalence. (Hence, the word equivalence.) The effect on \bar{a}_g should be small: \bar{a}_c falls slightly for years to come when government raises G temporarily. OVERALL, THE IS CURVE SHIFTS TO THE RIGHT.

There's one more important message in this story. With rational expectations, e.g. when agents are forward-looking, they adjust their behavior as soon as they find out about any change in their economic environment. Suppose the government announces at time t_0 that it will increase government spending in the future, say at time t_1 . The consumer knows at time t_0 that its lifetime disposable income will fall because the government will eventually increase taxes in order to pay for the higher (future) government expenditures. As a consequence the consumer immediately reduces consumption, namely at point t_0 , even though neither government spending nor taxes have yet increased. That is what forward-looking behavior is all about!

3 Question

Suppose a large cyclone destroys many houses and buildings in Queensland but fortunately results in little loss of life. Show how to think about this event using the IS curve. Explain how actual output, potential output, and short-run output are affected in the short run and why.

Answer After a cyclone, potential GDP falls. Think about the supply side: You have less capital stock, with the same number of workers and ideas. That adds up to less output in the production function. The production function reminds us that, when capital is scarce, the rental rate of capital (the marginal product of capital, \bar{r}) rises.

What happens to short-run output, which is driven by demand? Let us ignore G and NX and just assume that the government and foreigners do not change their behavior after the cyclone (you can imagine that G would increase after a cyclone, but that is a political decision, outside the scope of this model).

As for I , with a high marginal product of capital, the demand for investment goods increases. The easiest way to see this is to look at the investment equation,

$$\frac{I_t}{\bar{Y}_t} = \bar{a}_i - \bar{b}(R_t - \bar{r}),$$

the investment demand curve. If \bar{r} rises, the investment share of output rises as well (two negatives make a positive). It works just like an increase in the intercept term (\bar{a}_i). And as the investment demand curve goes, so goes the entire IS curve. THIS PUSHES THE IS CURVE TO THE RIGHT.

As for C , consumption's share of potential output, C/\bar{Y} , stays the same, so while consumer spending falls, it does not fall as a fraction of potential output. In other words, \bar{a}_c is fixed. Thus, the cyclone's overall impact on short-run output is positive.

Actual GDP is the sum of the potential output and short-run output, so the cyclone's impact on actual GDP is ambiguous, falling potential output plus rising short-run output. In practice, you might expect that, if the cyclone is small, then the country would want to rebuild quickly and people are not so poor that they have to cut back on consumer spending, so the overall effect might be positive.

But a devastating cyclone—destroying, say, half the capital stock—makes the average person so poor that consumer spending plummets and even strong rebuilding efforts do not go that far. Then actual GDP falls.

Just think of the case of Europe's "cyclone" known as World War II. Even a country like France, which lost relatively few soldiers during the war, had low GDP for a few years. It took strong rebuilding efforts just to get GDP back up to where it was before the war.

4 Question

The amount of goods the Australian economy imports might depend on the current state of the economy as well as one potential GDP: for example, when the economy is booming, imports usually rise. To incorporate this channel into the model, suppose the import equation is given by

$$\frac{IM_t}{\bar{Y}_t} = \bar{a}_{im} + \bar{n}\tilde{Y}_t.$$

Assume the remainder of the model is unchanged from the original setup, as in table 10.1 in the Jones textbook.

(a) Derive the IS curve for this new specification.

(b) What happens when there is an aggregate demand shock that increases \bar{a} by 1 percentage point? Explain!

Answer Consider the national income identity, divided by \bar{Y} :

$$\begin{aligned} \frac{Y}{\bar{Y}} &= \frac{C}{\bar{Y}} + \frac{I}{\bar{Y}} + \frac{G}{\bar{Y}} + \frac{NX}{\bar{Y}} \\ &= \bar{a}_c + \bar{a}_i - \bar{b}(R - \bar{r}) + \bar{a}_g + \bar{a}_{ex} - (\bar{a}_{im} + \bar{n}\tilde{Y}). \end{aligned}$$

Subtract 1 from both sides and collect all the a 's (minus one) into one a :

$$\begin{aligned} \tilde{Y} &= \frac{Y}{\bar{Y}} - 1 = \bar{a} - \bar{b}(R - \bar{r}) - \bar{n}\tilde{Y} \\ &= \frac{1}{1 + \bar{n}} (\bar{a} - \bar{b}(R - \bar{r})). \end{aligned}$$

(b) So this “multiplier” actually is a “reducer” (or negative multiplier). When interest rates are cut, businesses want to buy more investment goods, but some of those investment goods are manufactured in foreign countries and imported to the home country. Those imported investment goods do not count in home country GDP.

Note: Sometimes economists (and in particular journalists) refer to spending on imports as “leakage”. When some of the extra investment spending (or extra spending caused by a shock to \bar{a}) is produced overseas, it “leaks out” into the global economy.

This phenomenon is not just a theoretical curiosity but of considerable policy relevance. During the global financial crisis many countries called for a large coordinated fiscal stimulus. The reason politicians and many economists were calling for a simultaneous, coordinated fiscal stimulus was the concern about leakage. If the Australian government engages in fiscal stimulus alone, some of the stimulus will benefit foreign countries as a fraction of the demand will go towards imports. If, however, all countries engage in fiscal stimulus simultaneously, then everyone benefits from the other countries’ leakages.

If you re-read the media coverage of the Australian cash bonuses in April 2009 you will encounter repeated criticism that the bonuses will merely be spent on flat screen TVs produced in Asia, thus not benefiting Australian producers and the Australian economy more generally.