Practice Problems: Fiscal [Key]

1. Can a country run a fiscal deficit forever? Why or why not?

   The present value of future primary surpluses has to equal the current debt. Thus past deficits must be balanced by future surpluses – you can't run a *primary* deficit forever. The key word is primary: you *can* run a primary surplus and an overall deficit at the same time.

2. True or false (explain why): To minimize the burden of taxation, it is always better to levy large taxes on a small number of goods and services, than small taxes more universally.

   FALSE. Taxes create an economic efficiency through the loss of consumer and producer surplus, so an optimal taxation scheme would minimize the deadweight loss. Since the loss grows faster than the rate of tax revenue collected, more inefficiency results from levying large taxes on a small number of goods, than from implementing a small tax more universally.

3. True or false (explain why): When a country must make an unusually large one-time outlay – say, for the cost of conducting a war – it is optimal from the perspective of tax efficiency to spread that cost over many years by running deficits and borrowing.

   TRUE. This is an application of the principle of applying small taxes universally. Goods available for consumption at time t and at time t+1 are different goods. Taxing them both equally at a low rate reduces the deadweight loss. The caveat is that the deficits must eventually be offset by future primary surpluses or the debt would rise unsustainably.

4. Many countries in the euro area are now paying high rates of interest (i) on their debt compared to the interest rate paid by Germany. At the same time, their prospective trend rates of nominal GDP growth (g) have slowed sharply.

   a. Explain what these countries must do in order to avoid a rise of their public debt ratios. Show an equation that backs up your answer.

      The gap (i-g) is key for debt sustainability. The wider the gap, the larger the primary surplus that a country must run to steady its debt ratio. Consequently, these countries must raise their primary surpluses if they are to steady their public debt ratios.

      Consider the following description of debt dynamics:

$$\frac{B_{t+1}}{Y_{t+1}} = \frac{1+i}{1+g}\frac{B_t}{Y_t} + \frac{D_t}{(1+g)Y_t}$$

      where B_t is public debt, Y_t is nominal GDP and D_t is the primary deficit (the budget deficit excluding interest payments).

If we want the debt ratios to stop rising we need $B_t / Y_t = B_{t+1} / Y_{t+1}$. After some algebra,

$$-\frac{D_t}{Y_t} = (i-g)\frac{B_t}{Y_t}.$$

Consequently, in order to halt the rise of the public debt ratio, the primary surplus (which is the negative of the primary deficit) must rise proportionally to the debt ratio, with (i-g) as the proportionality factor.

b. Why are the interest spreads (compared to German debt) of these euro-area governments' debts rising?

The rising spreads partly reflect an increased probability of default compared to Germany.

Why is the probability of default rising? One reason may be that the prospective slowdown in growth will make it more difficult to achieve fiscal stability (see again the equation for debt dynamics above). Another might be evidence that the governments are unable to impose the needed fiscal tightening without damaging their economies and their financial sectors severely further. Euro-area proposals to compel investors to take losses if euro-area governments default or restructure their debt may have focused investor attention on pre-existing risks and the possibility that a bailout will not occur in the future. Finally, concerns about the potential for one or more countries to depart from the euro area and to introduce a weaker currency may be adding a currency risk premium to the yield spreads in some instances.

5. Consider the following data for Australia (all in percent):

	2010	**2011**
Real GDP growth rate	2.6	2.9
Inflation rate	5.2	4.8
Interest rate	5.3	4.9
Gov't budget deficit (primary, % GDP)	2.9	0.7
Gov't budget deficit (total, %GDP))	4.1	2.2
Gov't debt (end of period, % GDP)	25.3	

a. Why are the primary and total government deficits different?

The difference is interest payments by the government. The numbers tell us that this was 1.5% of GDP in 2011.

b. What you would estimate for the government debt ratio at the end of 2011?

The debt-to-GDP ratio evolves as:

$$\frac{B_{t+1}}{Y_{t+1}} = \frac{1+i}{1+g}\frac{B_t}{Y_t} + \frac{D_t}{(1+g)Y_t}$$

Given i=4.9%, g= 2.9+4.8 = 7.7%, B_t in 2010 was 25.3%, and a primary deficit of 0.7%, then the equation points to B_{t+1} of 25.29% at the end of 2011.

Note that i and g are both measured nominally.

c. Suppose the real GDP growth rate, the inflation rate, and the interest rate are the same in 2012 as in 2011. What would the primary budget deficit have to be in 2012 to keep the debt to GDP ratio in 2012 the same as it is in 2011?

Using our result from 4a., we need

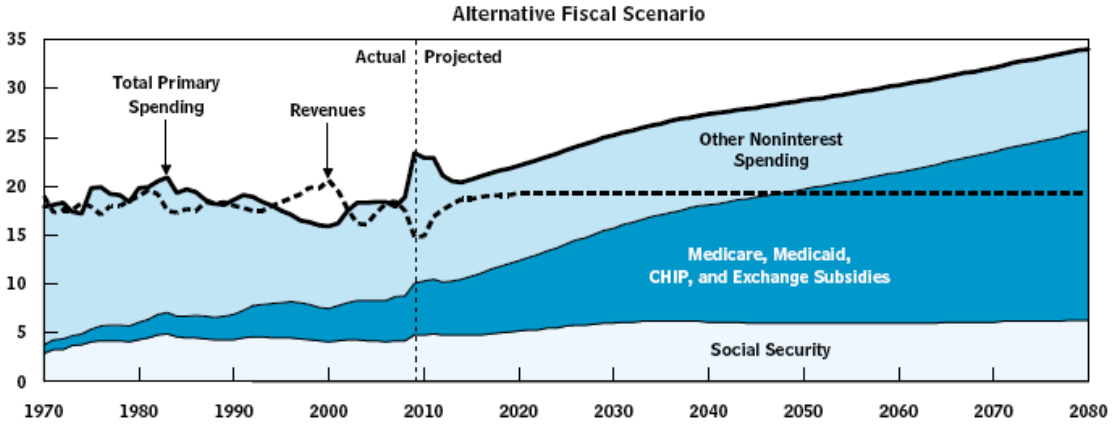
$$\frac{D_t}{Y_t} = -(i-g)\frac{B_t}{Y_t}$$

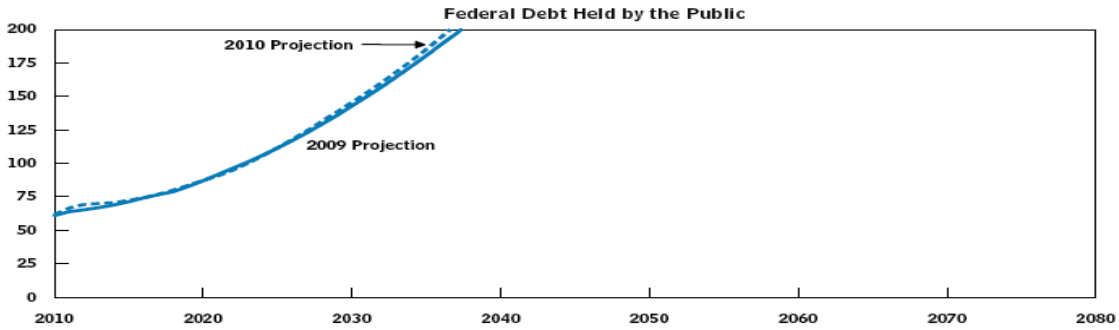
so the primary deficit should be

$$\frac{D_t}{Y_t} = -(0.049 - 0.077) \times 25.29 = 0.71\%$$

in other words, for the Australian government to keep its debt-GDP ratio constant, it needs to run a primary budget deficit very similar to the 0.7% deficit-to-GDP ratio that it ran in 2011.

6. Consider the following two figures from the Congressional Budget Office (CBO) that show the long-term outlook of Federal spending, revenues, and debt (all as a share of GDP) based on reasonable judgments about current law and Congressional actions as of 2010.





a. Do you think that this long-run CBO forecast is likely to be realized? Why or why not?

It may be difficult (if not impossible) for the US federal government to borrow at the pace implied by this forecast. Presumably, investors would charge a risk premium for a government on such a debt trajectory. At some stage, the government may find (like some euro-area countries today) that it cannot borrow in private markets. At that stage, if not before, the government would be compelled to alter the paths of revenues and outlays to promote a more sustainable borrowing path.

b. If Congress does not change the rules affecting entitlements (social security and Medicare) and does not attempt to raise revenues, explain in one or two sentences what impact the rising US debt might have over time on the economy?

Government borrowing will drive up the risk premium on government debt. Rising interest rates on "riskless" government debt will tend to "crowd out" private use of credit, thereby depressing private investment. If that shifts resources away from their most productive use, it also depresses economic growth.

c. According to the 2010 reports of the Trustees of the Social Security and Medicare systems, the present value of the unfunded liabilities of these two programs is $16 trillion and $36 trillion, respectively. These figures compare with 2010 nominal GDP of $15 trillion and the Trustees' estimate of the present value of future GDP of $1,400 trillion. They also compare with existing Federal debt held by the public of $9 trillion.

Do you think these unfunded liabilities reflected in the current cost of Federal borrowing today (30-year yield of about 3%)? Explain your answer.

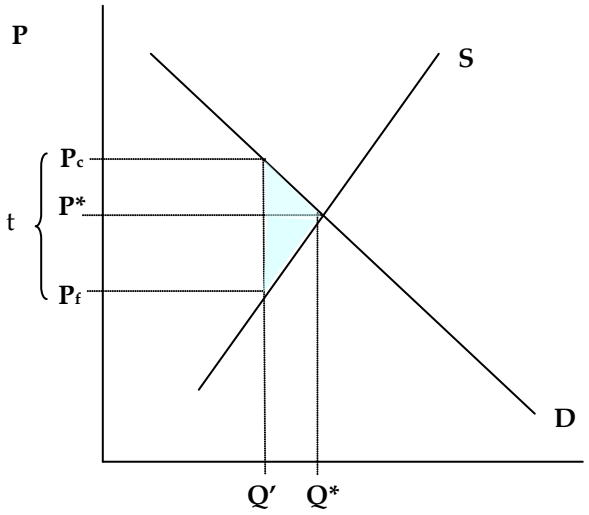
It is questionable whether bond market participants expect these shortfalls to be realized. While the information is easy to obtain, investors may expect the government to alter the paths of entitlement spending and revenues before these "infinite horizon" projections make a difference for the government debt. Over the long run, if the government fails to act, the cost of its funding likely would increase and eventually compel a change in policy.

7. Some governments issue inflation-indexed bonds that compensate investors for any inflation surprises. Do you think that this raises or lowers the risk of hyperinflation?

The claims of inflation-indexed bondholders rise when inflation rises sharply, so a government that issues inflation-indexed debt probably has less incentive to compel its central bank to print money. Consequently, when a large share of government financing is achieved by issuing inflation-indexed bonds, the probability of a hyperinflation should be lower.

8. Use a supply and demand diagram (like the one in the note on taxes) to address the following questions.

   a. Draw a supply and demand diagram for electricity in the United States. Clearly label the equilibrium quantity and price of electricity.



   b. Suppose the Congress – seeking to reduce energy use – places a tax of t dollars per kilowatt on all users of electricity. Show how this tax affects the market for electricity on your graph from part a. Clearly label the new price paid by users and the new price received by electrical utilities.

   c. Carefully shade in the deadweight loss of the tax.

   d. In words, describe why there is a deadweight loss.
   The deadweight loss occurs because less electricity (Q*-Q′, to be specific) is consumed. The consumer and producer surplus lost on the electricity is not made up for by tax revenues.

   e. Is electricity a good thing to tax? Why or why not?
   Over time, the demand for electricity is reasonably elastic, so the tax may have a significant effect on electricity use. In this sense, the tax imposes a welfare loss. In addition, taxing electricity does not reduce (and may even promote) other forms of energy use. However, this broad-based tax raises revenues that Congress could use to reduce other taxes that impose similar or greater welfare losses. In addition, reduced use of energy could lower costs related to national security and the environment. These considerations make it clear that deciding what to tax involves picking winners and losers and will be highly political.