

Economics 602
Macroeconomic Theory and Policy
Problem Set 8
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 Fall 2009

1. **Unpleasant Monetarist Arithmetic**¹. Consider a **finite** period economy, the final period of which is period T (so that there is no period $T + 1$) – every agent in the economy knows that period T is the final period of the economy. In this economy, the government conducts both fiscal policy (engaging in government spending and collecting taxes) and monetary policy (expanding or contracting the money supply). **The timing of fiscal policy and monetary policy will be described further below.** The economy has now arrived at the very beginning of period T , and the period- T consolidated government budget constraint is

$$M_T - M_{T-1} + B_T + P_T t_T = (1 + i_{T-1})B_{T-1} + P_T g_T,$$

where the notation is as follows:

- M_t is the **nominal** money supply at the end of period t ;
- B_t is the **nominal** quantity of government debt outstanding at the end of period t (i.e., a **positive** value of B_t here means that the government is in **debt** at the end of period t);
- t_t is the **real** amount of lump-sum taxes the government collects in period t (and there are no distortionary taxes);
- i_{t-1} is the **nominal** interest rate on government assets held between period $t-1$ and t , and it is **known with certainty in period $t-1$** ;
- g_t is the **real** amount of government spending in period t ;
- P_t is the nominal price level of the economy in period t .

Thus, once period T begins, the economic objects yet to be determined are t_T , g_T , M_T , and B_T . How P_T is set is described more fully below.

- a. Compute the numerical value of B_T ? Show any important steps in your computations/logic.

The remainder of this question is independent of part a. **For the remainder of this question, suppose that for some reason $B_T = 0$ -- the fiscal authority is committed to this decision about bonds and will never deviate from it.** Also suppose for the remainder of this question that $i_{T-1} = 0.10$, $B_{T-1} = 10$ (i.e., the government is in **debt** at the beginning of period T , given the definition of B_t), $P_{T-1} = 1$ (notice the time subscript here), and $M_{T-1} = 10$.

¹ This problem is based on a classic work in macroeconomic theory by Thomas Sargent and Neil Wallace ("Some Unpleasant Monetarist Arithmetic," Federal Reserve Bank of Minneapolis *Quarterly Review*, Vol. 5, 1981).

The timing of fiscal policy and monetary policy is as follows. At the beginning of any period t , the monetary authority and the fiscal authority **independently** decide on monetary policy (the choice of M_t) and fiscal policy (the choices of t_t and g_t), respectively.

Finally, in parts b and c, suppose that the nominal price level is flexible (i.e., it is not at all “sticky”).

- b. Suppose the fiscal side of the government decides to run a **primary real fiscal surplus of $t_T - g_T = 9$** in period T . Also suppose that the monetary authority chooses a value for M_T which when coupled with this fiscal policy implies that there is **zero inflation** between period $T-1$ and period T . Compute numerically **the real value of seignorage revenue** the government earns in period T , clearly explaining the key steps in your computations/logic. Also provide brief economic intuition for **why** the government needs to generate this amount of seignorage revenue in period T ?
- c. Suppose the monetary authority sticks to its monetary policy (i.e., its choice of M_T) you found in part b above. However, the fiscal authority decides instead to run a primary real fiscal surplus of $t_T - g_T = 8$. Compute numerically **the real value of seignorage revenue** the government must earn in period T **as well as the inflation rate between period $T-1$ and period T** . Clearly explain the key steps in your computations/logic. **In particular, why is real seignorage revenue here different or not different from what you computed in part b?**

In part d, assume the nominal price level is “completely sticky” – that is, the nominal price level never varies from one period to the next.

- d. With “complete stickiness” of the price level, is a monetary policy that sets the level of M_T you found in part b consistent with a fiscal policy that sets a real fiscal surplus of $t_T - g_T = 8$ as in part c? In other words, can those policies work simultaneously? Explain carefully why or why not, using any appropriate mathematical or logical arguments.
- e. Reviewing the scenarios posed in parts b, c, and d, address the following question in a brief discussion: what is the role of fiscal policy in determining the inflation rate and/or the nominal price level in the economy? If possible, connect your remarks to the debate between the RBC view and the New Keynesian view. (Note: there is no single correct answer here, but if you conducted the analysis above correctly, there is a generally correct theme that emerges. Also note that you are **not** simply being asked to summarize the results above, but rather to try to draw some bigger-picture insight.)

2. **The Dynamics of Fiscal Policy.** President Obama and his primary economic advisers have planned to put in place large fiscal stimuli over the next few years. The precise details of the fiscal stimulus are still to be worked out, but they include **both tax cuts as well as increased government spending in the next few years.**

It is early 2009, and the new administration has just recently been seated. At the beginning of 2009, the lifetime consolidated budget constraint of the government is:

$$\frac{B_{2008}}{P_{2009}} = (t_{2009} - g_{2009}) + \frac{t_{2010} - g_{2010}}{1 + r_{2010}} + \frac{t_{2011} - g_{2011}}{(1 + r_{2010})(1 + r_{2011})} + \frac{t_{2012} - g_{2012}}{(1 + r_{2010})(1 + r_{2011})(1 + r_{2012})} + \dots$$

Line 1: PDV of fiscal deficits

$$+ sr_{2009} + \frac{sr_{2010}}{1 + r_{2010}} + \frac{sr_{2011}}{(1 + r_{2010})(1 + r_{2011})} + \frac{sr_{2012}}{(1 + r_{2010})(1 + r_{2011})(1 + r_{2012})} + \dots$$

Line 2: PDV of seignorage

The notation here is as in Chapter 15: t denotes real lump-sum tax collections, g denotes real government spending, sr denotes real seignorage revenue, r denotes the real interest rate, B denotes nominal (one-period) government bonds, and P denotes the nominal price level of the economy (i.e., the nominal price of one basket of consumption). Subscripts indicate time periods, which we will consider to be calendar years. Note, of course, the ellipsis (...) in each line of the above equation.

As indicated above, the first line of the right-hand-side is the present discounted value of all fiscal deficits the government will ever run starting from 2009 onwards, and the second line of the right-hand-side is the present-discounted value of all seignorage revenue that will ever result from the monetary policy actions of the Federal Reserve starting from 2009 onwards.

The primary economic advisers to President Obama are Treasury Secretary Timothy Geithner, National Economic Council Chairman Lawrence Summers, and Council of Economic Advisers Chairwoman Christina Romer.

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In addressing each of the following issues, no quantitative work is required at all; the following questions all require only conceptual analysis. Each issue should be addressed in no more than three or four sentences.

- a. Geithner, because of his background as President of the New York Federal Reserve, implicitly advocates that no matter what fiscal policy actions the new administration takes, they should be designed in such a way as to have no effects on the conduct of monetary policy whatsoever. If this is so, what type of fiscal policy – a Ricardian fiscal policy or a non-Ricardian fiscal policy – does Geithner advocate? **Briefly explain.**
- b. The less even-keeled that he is, Summers' comments sometimes seem to imply that the fiscal stimulus measures should **not** take into account any consequences they may have for the conduct of monetary policy. If the combination of tax cuts and government spending that ultimately pan out over the next few years follow Summers' advice, what are likely to be the consequences for the Federal Reserve's monetary policy in 2009 and beyond? **In particular, will the Fed likely have to expand or contract the nominal money supply? Briefly explain.**
- c. The objective academic macroeconomist that she is, Romer typically points out in her remarks that because fiscal policy plans (for both taxes and government spending) will almost surely be revised as the years unfold (that is, fiscal policy plans adopted in 2009 can be revised in later years), it may be impossible to know beforehand what the eventual consequences for monetary policy of a particular fiscal policy action adopted at the start of 2009 might be. Use the government budget constraint presented above to interpret what Romer's statements mean.
- d. If, later this year after the new fiscal plans are (supposedly) clarified further, the nominal price level of the economy behaves as shown in the following diagram on the next page (the price level, P , is plotted on the vertical axis), which of the following is the most relevant explanation: the fiscal theory of the price level, the fiscal theory of inflation, or the financial accelerator mechanism? **Briefly justify your answer.**

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