NYU STERN

The Global Economy
Professor David Backus

Problem Set #4: Monetary & Fiscal Policy

Revised: December 13, 2014

You may do this assignment in a group. Whatever you hand in should be the work of your group and include the names of all of the contributors.

1. *The Taylor rule in the Euro Area (50 points).* You are a trader on Deutsche Bank's fixed income desk and have just been transferred from New York to London. You realize, among other things, that you must come to terms quickly with differences between American and European monetary policy. You wonder, given the chaos right now in the Euro Area, whether the Taylor rule is a reasonable guide. You review your Global Economy class notes and do the following:

   (a) Using data from FRED (see data guide below), you plot inflation and GDP growth for the Euro Area. (10 points)

   (b) You also plot the Euro Area interbank rate (a representative short-term interest rate) and the interest rate implied by the Taylor rule for the period 1999-present. Since it's not clear what "potential output" is right now, you use the growth rate version of the rule:

   $$i_t \;=\; r^* + \pi_t + 0.5(\pi_t - \pi^*) + 0.5(g_t - g^*),$$

   where g_t is the growth rate of real GDP. As usual, you use year-on-year inflation and growth rates and set $r^* = \pi^* = 2$. You also set $g^* = 2$, but wonder whether another value would be appropriate. (10 points)

   (c) How does the policy rate compare to the Taylor rule in 2009? Do you think the ECB's policy was appropriate? (10 points)

   (d) How does the policy rate compare to the rule now? What justification does ECB President Mario Draghi give in his most recent press conference? (And note the European dates: day/month/year.) Do you think the policy is appropriate? (20 points)

   Data guide. To implement the Taylor rule, you will need quarterly data for

   - Real GDP (FRED code NAEXKP01EZQ661S): use year-on-year growth rate.
   - Consumer prices (FRED code CP0000EZ17M086NEST): use year-on-year growth rate.
   - Euro area interbank rate (FRED code IR3TIB01EZQ156N): use as is.

   You can download all of them from FRED or generate the graph(s) directly in FRED.

Solution:

(a) The graph is at

http://research.stlouisfed.org/fred2/graph/?g=TpX.

Right now, inflation (year-on-year) is about 0.4% and GDP growth is about –0.3%. Inflation has been declining steadily for 3 years.

(b) The interest rate and the Taylor rule are pictured together at

http://research.stlouisfed.org/fred2/graph/?g=pQ4.

In the figure, the blue line is the interbank rate and the red line is the Taylor rule. The link includes a description of how it was computed. Note that the two lines are (roughly) similar between 2000 and 2008; in this respect, the Taylor rule was not a bad guide to ECB interest rate policy over this period.

(c) In early 2009, the Taylor rule points to a negative interest rate, which of course isn't feasible. The ECB reduced the interbank rate below 1% in 2009, but not much below, which was a less aggressive response than we saw from the Fed over the same period.

Would another policy have worked better? Both the Taylor rule and US policy suggest that a more aggressive stance might have been appropriate. On the other hand, the ECB might argue that its primary mission is inflation, which passed 2 percent in 2010.

(d) Right now, the policy rate is close to zero and the Taylor rule is close to 2%, so there's a significant gap. Inflation, however, continues to fall, so it's hard to argue (as the Taylor rule does implicitly) that the ECB has been too aggressive. Many now argue the opposite, that they should be increasing the money supply further.

From Draghi's December statement:

> The latest euro area macroeconomic projections indicate lower inflation, accompanied by weaker real GDP growth. ... We decided to keep the key ECB interest rates unchanged. As regards our non-standard monetary policy measures, we have started purchasing [a broad range of assets]. These purchase programmes will last for at least two years. Next week, we will conduct the second targeted longer-term refinancing operation, to be followed by six further operations until June 2016. Taken together, our measures will have a sizeable impact on our balance sheet. ... In the coming months, our measures will further ease the monetary policy stance.

Markets see this as too little. The Euro Stoxx 50 index dropped 2% on the announcement. Comments include:

- Quartz: Traders hoped ECB president Mario Draghi would just do what other central banks have done: buy government bonds. [Given disagreement on its board], what chance does the ECB have of launching bona fide QE?"
- Bloomberg: After refraining from quantitative easing for the euro area in yesterdays Governing Council meeting, the European Central Bank president has pledged to reassess the situation early next year. The council expects to consider a proposal for broad-based asset purchases including sovereign debt at the next monetary-policy meeting. [After the December meeting], Draghi strengthened his language on possible stimulus by saying that policy makers "intend" rather then "expect" the ECB's balance sheet to grow.

Others speculated that German opposition to government bond purchases was holding back more aggressive policy.

2. *Fiscal policy in Brazil (50 points).* Brazil is the giant of Latin America, with a population of 200 million and a GDP over two trillion US dollars. It's a country of contrasts: enormous ethnic diversity, great music, better soccer, a functioning democracy, significant poverty and inequality, and a challenging regulatory environment. In the recent past it has enjoyed modest economic success, but no more, with per capita GDP growth from 1990 to 2013 of 1.6%. The most recent numbers show the economy in recession, with a second quarter growth rate of -2.4% (annualized).

   One of the longstanding economic policy concerns in Brazil has been the large size of the public sector: government spending of 40% of GDP puts it well above most other countries at similar levels of development. Government programs target a number of issues, including poverty and education, but there has been widespread public dissatisfaction with the quality of government services and perceptions of corruption.

   With recent budget deficits coming in above government forecasts, Standard and Poor's downgraded Brazilian government debt in March. The Economist summarizes: "S&P cited fiscal deficits in recent years, measly growth prospects, and the use of accounting tricks, state-owned banks and one-off revenues (like the sale of a concession for the exploitation of a big oil field) to flatter the budget balance."

   Your mission is to examine the budget yourself and assess the fiscal policy risks to the economy. Having some experience with such situations, you go to the IMF's WEO Database (entries for 2014 and 2015 are forecasts) and find:

	2012	2013	2014	2015
Real GDP growth (percent)	1.03	2.28	1.82	2.65
Inflation (percent)	5.84	5.91	5.85	5.40
Interest rate on debt (percent)	7.98	8.31	8.54	9.12
Govt expenditures (percent of GDP)	40.45	40.48	40.47	39.65
Government deficit (percent of GDP)	7.20	4.44	5.32	4.53
Government primary deficit (percent of GDP)	2.33	–0.71	0.08	–1.11
Government debt (percent of GDP)	68.18			

(You may see different data elsewhere — debt and deficit numbers are notoriously quirky — but ignore it.)

You also check the EIU's Country Report and other sources, where you discover:

- There is a hotly contested election for President in October in which incumbent Dilma Rousseff faces challenger Marina Silva, who entered the race when another candidate died unexpectedly.
- Large government transfers to the state development bank and other public banks form a parallel budget that is not reflected in the government's quoted debt numbers.
- Petrobras, the state-owned oil company, continues to be a magnet for corruption. A former executive alleges that a massive kickback scheme involved a cabinet minister, three state governors, six senators, and dozens of congressmen. The company has also had difficulty extracting oil from so-called "pre-salt" deep-water oil reserves, but expects oil and revenue to come online shortly.

With this information in hand, you start to sketch out your report:

(a) What is the difference between the government's deficit and primary deficit? Why is the latter smaller? (10 points)

(b) Compute the debt-to-GDP ratio for the period in the table. Over the period 2012-2015, what factors account for the change in the ratio? (20 points)

(c) How would your estimate change of the debt-to-GDP ratio at year-end 2014 if (i) the interest rate paid on debt rose by 2% or (ii) the growth rate fell by 2%? (10 points)

(d) After skimming the EIU's Country Risk Report — and using your own good judgement — how would you rate the risk from government debt and deficits to the Brazilian economy? What specific concerns would you point to? (10 points)

Accessing the EIU's Country Risk Reports. Go to NYU's Virtual Business Library and click on, in order: Country Information, EIU Country Risk Service (login as requested if off-campus), Country Risk Service (again), and (in this case) Brazil. Choose the latest report.

Suggestion. If you have Brazilian friends or classmates, ask them what they think.

Solution:

Answers follow, but see also the attached spreadsheet. Download this pdf file, open it with the Adobe Reader or the equivalent, and click on the pushpin:

(a) The difference between the primary and total budget balances reflects interest payments on government debt. In 2012, the (total) government deficit was 7.20 percent of GDP and the primary deficit was 2.33 percent. The difference of 4.87 percent was interest payments on the debt expressed as a percent of GDP.

(b) This is a call to apply our debt dynamics tool. The equation is

$$\Delta(B_t/Y_t) \;=\; (i_t - \pi_t)(B_{t-1}/Y_{t-1}) - g_t(B_{t-1}/Y_{t-1}) + (D_t/Y_t).$$

We'll label the terms on the right (A), (B), and (C) as we did in class.

The results of these calculations are listed below (see the spreadsheet for details):

	2012	2013	2014	2015	Total
Real GDP growth	1.03	2.28	1.82	2.65	
Inflation	5.84	5.91	5.85	5.40	
Interest rate on debt	7.98	8.31	8.54	9.12	
Govt expenditures	40.45	40.48	40.47	39.65	
Government deficit	7.20	4.44	5.32	4.53	
Government primary deficit	2.33	–0.71	0.08	–1.11	
Government debt	68.18				
(A) real interest		1.64	1.82	2.54	5.99
(B) growth		–1.56	–1.23	0.00	–4.60
(C) primary deficit		–0.71	0.08	-1.11	–1.73
Total (A) + (B) + (C)		–0.63	0.67	–0.38	–0.34
Ratio of debt to GDP	68.18	67.55	68.22	67.84	

Overall, we see that debt isn't expected to change much. Betweeen year-end 2012 and 2015, we calculate that the debt to GDP ratio will fall from 68.18 percent to 67.84, a change of –0.34. We see in the far right column that this modest amount reflects offsetting effects: the real interest paid on the debt raises it by 5.99, but the primary surplus and (especially) GDP growth reduce it by a combined 6.33.

[A few brave souls noted that our debt dynamics equation is an approximation. It's not necessary to go beyond that, but if you did, you get a point or two for bravery, however foolish it might have been.]

(c) You may notice that the effect of these changes is the same: both add $0.02 * B_{t-1}/Y_{t-1}$ to the change in B/Y. Over the three years, this adds a little over 4% to the change, with the effect that the ratio of debt to GDP rises by 3.74%. The point is that modest changes in conditions can change the debt situation in a noticeable way. Details in the spreadsheet.

(d) Your call. See also the comments in the slides.