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The Global Economy
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Final Examination

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You have 120 minutes to complete this exam. Please answer each question in the space provided and show all of your work. You may consult one page of notes and a calculator, but devices capable of wireless transmission are prohibited.

I understand that the honor code applies: I will not lie, cheat, or steal to gain an academic advantage, or tolerate those who do.

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(Name and Signature)

1. *Monetary policy in Brazil (35 points).* On December 3, Brazil's central bank (the Banco Central do Brasil or BCB) raised its target Selic interest rate from 11.25 to 11.75%. BCB president Alexandre Tombini attributed the move to an ongoing effort to control inflation. When asked about the impact on the Brazilian currency's value, he commented: "We're keeping the Brazilian real as a flexible currency." Analysts noted that inflation has crept up to 6.6% over the past year, while economic growth has been stagnant, with the latest numbers showing GDP growth of –0.2% for the year.

   Brazil has a history of high inflation, including annual inflation rates well above a thousand percent in the early 1990s. Since 2000, inflation has averaged a more modest 6.5%. Despite lower inflation, interest rates have stayed high, with an average Selic rate of 14% over the same period.

   (a) What target rate for the Selic is suggested by the Taylor rule if we use US parameter values? (10 points)

   (b) What parameter values would you change to adapt the Taylor rule to Brazilian experience? How would these changes affect current monetary policy? (10 points)

   (c) How relevant is Mr Tombini's statement that the currency will remain flexible? (10 points)

   (d) Overall, do you think Brazilian monetary policy is appropriate right now? (5 points)

Solution:

(a) The Taylor rule is

$$i \;=\; r^* + \pi + 0.5(\pi - \pi^*) + 0.5(g - g^*).$$

For the US we use $r^* = 2$, $\pi^* = 2$ and $g^* = 3$. Using the same numbers, we get

$$i \;=\; 2 + 6.6 + 0.5(6.6 - 2) + 0.5(-0.2 - 3) \;=\; 9.3.$$

Grading: 5 points for the Taylor rule, 5 for the calculation.

(b) What would we change to adapt it to Brazil? First, the average real rate for the Selic over this period has been $14 - 6.5 = 7.5$, which suggests we use 7.5 rather than 3 for r^*. That would raise the target rate to 14.8. Second, we might change the inflation target. It's not clear what the BCB has in mind, but a number like 5 seems more appropriate. That would reduce the target to 13.3.

Grading: 10 points for something like this.

(c) This is an implicit reference to the trilemma: if the BCB paid more attention to the exchange rate, that would undercut the independence of domestic monetary policy.

Grading: 10 points for mentioning the trilemma and its relevance here.

(d) Grading: 5 points for any sensible commentary, less if your answer includes irrelevant things.

	2013	2014	2015
GDP growth (%)	1.3	0.6	0.0
Inflation (%)	6.8	7.5	7.2
Interest rate paid on debt (%)	6.2	6.9	9.0
Government deficit (% of GDP)	0.5	–0.3	0.9
Government primary deficit (% of GDP)	0.0	–0.8	0.4
Government debt (% of GDP)	8.1	7.3	

Table 1. Economic indicators for Russia. Data from the Economist Intelligence Unit and the IMF's World Economic Outlook. Numbers for 2014 and 2015 are forecasts.

2. *Red flags over Russia (35 points).* You are a new recruit at a hedge fund that targets high risk international investments in search of high returns. As you look

for a way to make your mark, you wonder whether the stress on the Russian economy over the last six months has led markets to overreact and created an opportunity.

Certainly economic conditions have worsened. Russia's primary export, crude oil, has dropped in price since July from 110 to 65 US dollars per barrel. Sanctions have made it difficult for banks and firms to raise money in international markets. The ruble has fallen nearly 50% against the dollar. On Tuesday, after the ruble fell 10% in a day, the Russian Central Bank (RCB) raised its target interest rate from 10.5 to 17%.

Your first step is to collect the economic indicators reported in Table 1. The Economist Intelligence Unit and other sources add context:

- Economic growth. Oil prices remain a key factor. Some expect the economy to shrink 4.5% in 2015 if oil prices remain in the neighborhood of $60 a barrel.
- The ruble. In recent years, the RCB has moved away from managing the exchange rate, using intervention only to prevent excess currency volatility. With the ruble in free fall, the RCB has avoided massive intervention despite having an estimated $400 billion in foreign exchange reserves.
- Banking system. Analysts expect higher interest rates and weak economic conditions to put pressure on bank balance sheets and asset quality. One noted: "[Tuesday's rate hike] symbolizes the surrender of economic growth for the sake of preserving the financial system." Another added: "While [this] will inflict more pain on the economy, [it is intended to avoid] full-scale financial turmoil." President Vladimir Putin announced earlier in the month that sovereign wealth fund assets — now close to $200 billion — would be used, if needed, to recapitalise leading domestic banks.
- Public finance. The government is aggressively cutting spending as tax revenue crashes. Observers speculate that any budget shortfall will be met by borrowing from Russia's sovereign wealth fund.
- Politics and international relations. Russia's actions in Ukraine created tensions with the West, but consolidated Putin's popularity. The potential for major political change in the near term appears low.

With this information at hand, you:

(a) Estimate the government debt (as a percentage of GDP) for 2015. What factors are most important to your answer? (10 points)

(b) Assess Russia's overall crisis risk. What are the red flags (signs of trouble)? (20 points)

(c) Summarize your research. Do you see Russia as an opportunity for your firm? (5 points)

Solution:

(a) This is a traditional debt dynamics calculation. Based on the numbers given, we have

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

or, if we break it down,

$$\begin{aligned}(i_t - \pi_t)(B_{t-1}/Y_{t-1}) &= (0.090 - 0.072)(7.3) = 0.13\\ -g_t(B_{t-1}/Y_{t-1}) &= -(0)(7.3) = 0\\ D_t/Y_t &= 0.4.\end{aligned}$$

The net effect is an increase in B/Y of 0.53 percent of GDP. Basically roundoff error — given these numbers.

Grading: 5 points for the equation, 5 for the calculation.

(b) The checklist is

- Debt and deficits. The numbers computed above suggest no problem, primarily because the debt is low. Things could worsen if revenue falls (as it will if the economy tanks) or interest rates on debt go up, but the numbers aren't big enough to be the central issue here. More than that, they can sell debt to the wealth fund, which gives them some flexibility.
- Banks. This is a major weak link. If the economy goes under, the banks could go, too, since loans tend to default in bad times. Analysts will be looking carefully at bank balance sheets for signs of weakness — exposure to weak firms or foreign currency. Putin's announcement of help from the wealth fund reduces the chances of a complete collapse.
- Exchange rate and reserves. The ruble is collapsing despite having several hundred billion in foreign exchange reserves. Since it's floating, the classic answer (good enough for here) is that it's not a problem. But a collapse of this magnitude will inflict damage on banks and firms with foreign-denominated liabilities.
- Politics. The word is that nothing will change: Putin has a stranglehold on power, no one expects that to change.

Grading: 5 points for the list, 15 for something like the answers above.

Something we didn't cover in class (the bonus topic on the outline) is capital flows. An enormous amount of money has been leaving Russia, partly from fear of the currency collapsing, as it has, but more (I think) because economic conditions have deteriorated and there's a lot of uncertainty about whether the government will resort to stealing money in some form.

3. *Short answers (50 points).*
   (a) What are the classic inputs to a hyperinflation? (10 points)
   (b) Draw the cross-correlation function for a countercyclical leading indicator. (10 points)
   (c) In the aggregate supply and demand model, what is the short-term impact of an increase in government spending? The long-term impact? (10 points)
   (d) Use a representative central bank balance sheet to illustrate (i) a central bank's sale of foreign exchange reserves and (ii) its sterilization. (10 points)
   (e) Why did we argue that tax exemptions reduce economic welfare? (10 points)

Solution:

(a) The classic inputs are (i) a government deficit (ii) financed by printing money (ie, money growth).

Grading: 5 points each.

(b) An example in the book (chapter 11 on business-cycle indicators) is new claims for unemployment insurance. What we see is that the largest correlation is negative (that makes it countercyclical) and to the left of zero (that makes it leading).

What we're talking about: $\text{ccf}(k) = \text{Corr}(x_t, y_{t-k})$ where y is the growth rate of industrial production or similar measure of economic growth and x is an indicator (here new claims).

Grading: 5 points for each feature of the graph.

(c) Short run impact: Y and P both rise. Long run: P rises (more), Y doesn't change.

Grading: 5 points for each.

(d) Here's an example. Let's say the central bank (CB) has the balance sheet

Assets		Liabilities	
FX Reserves	100	Money	200
Bonds	100		

If it sells 20 in foreign exchange, taking 20 in local currency in return, we have

Assets		Liabilities	
FX Reserves	80	Money	180
Bonds	100		

Note that (the supply of) money has gone down. Sterilization in this case consists of buying 20 of bonds to return the money supply to its previous level:

Assets		Liabilities	
FX Reserves	80	Money	200
Bonds	120		

Grading: 5 points for each transaction illustrated with a balance sheet.

(e) The idea is that a low tax rate on a broad base maximizes social welfare. Exemptions work the other way: if something is exempt from tax, other things must be taxed at higher rates to raise the same revenue, which reduces welfare.

Grading: 10 points for expressing this idea clearly, either in words or graphs (welfare triangles).