

Economics 101b Final Exam

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100b students: Here is a practice final. It is the final exam that I gave in 101b last year. I've modified the problems somewhat to make them more consistent with what we've covered this year. The third problem is especially hard for 100b, I would think.

This is a closed book exam. You may not refer to any books, notes, or other material and may not use a calculator.

The exam consists of four parts, and each part contains 45 minutes worth of questions.

Remember that your readers are trained macroeconomists. Whenever possible, use math and diagrams and the terminology we used in class to make your answers precise. Our main interest is in seeing how well you apply the analysis taught in the course to the exact problems we have posed.

Good luck!

1. **Business cycles around the world.** (45 points)

In the year 2010, there is a “small” nuclear war that (sadly) obliterates the country of Ndupdeadistan and all its citizens. Suppose you get to play the role of the intelligent central banker in three neighboring countries. Using the Short Run Model, explain the effects on the real interest rate, the output gap, and inflation in the following other three countries. Assume the Central Bank in these countries responds to the shock in an intelligent way that you choose.

- (a) Lostitsdebtistan was a neighbor of Ndupdeadistan that had a large outstanding national debt, although it had recently been running balanced budgets. Half of this debt was held by the citizens of Ndupdeadistan.
- (b) Lotsatradeistan had a large trade surplus with Ndupdeadistan.
- (c) Ironically, Ndupdeadistan was the world’s major producer of the high grade uranium which is well-suited for nuclear reactors. Sadistan relies primarily on nuclear power for its energy needs.

2. **Building a new Short-Run Model.** (45 points)

Consider the following setup for a new version of the Short-Run Model. For the “IS” side of the model, assume

$$Y_t = C_t + I_t + G_t + NX_t$$

$$C_t/\bar{Y}_t = \bar{a}_c - \bar{b}_c(R_t - \bar{r})$$

$$I_t = \bar{a}_i \bar{Y}_t$$

$$G_t = \bar{a}_g \bar{Y}_t$$

$$EX_t = \bar{a}_x \bar{Y}_t$$

$$IM_t/\bar{Y}_t = \bar{a}_m + \bar{z} \text{Gap}_t$$

As a monetary policy rule, suppose that the Federal Reserve sets the real interest rate according to

$$R_t - \bar{r} = \bar{m}(\pi_t - \bar{\pi}) + \bar{n} \text{Gap}_t.$$

- (a) (5 points) Provide a brief explanation of the economics behind the consumption equation and the import equation in the IS part of the model.
- (b) (20 points) Derive the IS curve for this economy. Explain how and why \bar{z} enters the IS curve.
- (c) (5 points) Provide a brief explanation of the monetary policy rule, and comment on its likely effectiveness.
- (d) (15 points) Derive the Aggregate Demand curve for this economy.

3. A Human Capital Driven Model of Growth. (45 points)

100b: This one is hard.

Consider the following growth model:

$$Y_t = K_t^{1/3}(h_t L_t)^{2/3}$$

$$\Delta K_t = \bar{s}Y_t - \bar{d}K_t$$

$$\frac{\Delta h_t}{h_t} = \bar{x}u_t$$

$$L_t = (1 - u_t)\bar{N}$$

$$u_t = \bar{u}$$

Much of the notation in this model is familiar. The first equation describes the production of output as a function of physical capital K , human capital per person h , and labor L . The second equation is a standard capital accumulation equation.

The third equation describes how human capital accumulates over time. In this setup, people spend a fraction of time u_t in school (e.g. this could be the morning) and the fraction $1 - u_t$ working (e.g. in the afternoon). Here, time spent in school affects the growth rate of the stock of human capital.

We assume agents in the model save a constant fraction \bar{s} of their income and spend a constant fraction \bar{u} of their time in school (both between zero and one). The exogenous parameters in this setup also include \bar{x} , \bar{d} , and \bar{N} . In addition, the economy is endowed with \bar{K}_0 units of physical capital and \bar{h}_0 units of human capital per person at the start.

- (a) (5 points) Given this setup, interpret the next-to-last equation in the model.
- (b) (20 points) Derive the growth rate of output per capita in the steady state of this model. HINT: You have seen a model very similar to this one before, where h_t was replaced by some other concept. That can help you figure out the answer, but be sure to derive it using the equations.
- (c) (20 points) Solve for the level of output per capita (not per worker) along the balanced growth path. Make sure your final solution includes only exogenously-given terms on the right-hand side.

4. Multiple Choice (45 points total, 3 points each)

Please write the appropriate answer in your bluebook. No partial credit will be given on these questions. Make your writing clear: if it cannot be read, you will not be given credit.

Note: You are allowed to write "Opt Out" for one of these questions instead of answering it; you will then receive full credit on this question.

1. Which of the following does NOT cause a change in the NIPA measure of GDP?
 - (a) The government increases unemployment insurance payments by 100 dollars per person per week.
 - (b) A professor hires (legally) a nanny to help care for her kids.
 - (c) A lawyer sends his daughter to a private school and pays \$15k in tuition.
 - (d) The Department of Defense purchases 1 million dollars of new military equipment.

2. An increase in the skilled-wage premium in developing countries can be explained by standard models of
 - (a) Skill-biased technical change in all countries.
 - (b) Globalization.
 - (c) Both (a) and (b).
 - (d) Neither (a) nor (b).

3. Suppose an economy over the course over 20 years is characterized by the following average annual rates: an inflation rate of 15 percent, a money growth rate of 20 percent, and a growth rate of real GDP equal to 2 percent. The growth rate of velocity over this period must then be
 - (a) -3 percent
 - (b) +3 percent
 - (c) -7 percent
 - (d) +7 percent

4. If the interest rate is 5 percent, an annual payment of 100 dollars per year starting one year from now has a present discounted value of
 - (a) 500 dollars
 - (b) 1000 dollars
 - (c) 1500 dollars
 - (d) 2000 dollars

5. Consider trying to understand short-run economic fluctuations and business cycles using the Solow model. Which of the following is NOT necessarily a prediction of such a framework?
 - (a) A negative technology shock will cause GDP to decline immediately on impact.
 - (b) A temporary increase in the depreciation rate will cause GDP to decline immediately on impact.
 - (c) A positive shock to the investment rate will leave GDP unchanged immediately but will cause GDP to increase in the short run.
 - (d) A positive technology shock will cause GDP to increase in the short run.

6. Which of the following is false?
 - (a) The Classical Dichotomy implies that the long-run rate of inflation depends only on nominal variables.
 - (b) Sticky inflation implies that changes in nominal interest rates can affect real variables in the short run.
 - (c) Open market operations could, in principle, be carried out using government bonds with maturities of 10 years or more.
 - (d) Central banks in advanced countries in recent years have tended to use short-term interest rates as their main policy instruments.

7. Kydland and Prescott won this year's Nobel Prize in economics for, among other things,
 - (a) Seeking to understand economic fluctuations using a framework similar to our Long-Run Model (e.g. Solow).
 - (b) Showing how the slope parameter of the Phillips curve depends on expectations.
 - (c) Both (a) and (b).
 - (d) Neither (a) nor (b).

8. The rising trade deficit in the United States
 - (a) Reflects the fact that exports are growing faster than imports.
 - (b) Is puzzling in standard theories because economic growth in the United States is expected to be no larger than the world growth rate in coming decades.
 - (c) Is puzzling because China is also running a large trade deficit.
 - (d) Reflects the large deficit in the Social Security trust fund.

9. Which of the following is NOT a part of standard theories of international trade?
 - (a) Trade allows countries to insure against idiosyncratic risks.

- (b) Differences in wages across countries signify that there are gains to be had from trade.
 - (c) Trade allows countries to focus production on goods that are relatively cheap domestically.
 - (d) Trade can reduce welfare in poor countries in some recent models, but most economists feel the assumptions in those models are extreme.
10. A high real exchange rate can be caused by
- (a) A recent loosening of domestic monetary policy.
 - (b) An increase domestically in the demand for foreign goods.
 - (c) High real interest rates in the rest of the world.
 - (d) Tariffs on imports.
11. In the Solow model with natural resources and a Cobb-Douglas production function, the fraction of GDP paid to natural resources is
- (a) growing over time.
 - (b) constant over time.
 - (c) falling over time.
 - (d) none of the above.
12. An example of a good that is rivalrous and excludable is
- (a) the fundamental theorem of calculus.
 - (b) Evans Hall.
 - (c) fish in the middle of the ocean.
 - (d) an MP3 music file.
13. Chain indexing allows economists to
- (a) Create measures of real GDP that can be compared over time.
 - (b) Create measures of real GDP that can be compared across countries.
 - (c) Create measures of nominal GDP that can be compared over time.
 - (d) Create measures of nominal GDP that can be compared across countries.
14. Which of the following is true?
- (a) Currency crises often occur when governments are forced to finance an important part of their spending with the inflation tax.
 - (b) A balanced budget requires zero seignorage.
 - (c) Revenue collected from the inflation tax rises with the rate of inflation.
 - (d) Seignorage revenue as a share of total tax revenue is more than 3 percent in the United States.

15. A good social infrastructure contributes to an economy's success in the following ways, except which one?
- (a) Providing property rights that encourage investment.
 - (b) Providing public transportation systems to encourage trade.
 - (c) Allowing entrepreneurs to capture the returns to their efforts.
 - (d) Discouraging theft and corruption.