Midterm Examination

October 2014

You have 90 minutes to complete this exam. Please answer each question in the space provided. 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)

Year	Y/POP	Y/L	K/L	K/Y
2002	8,029	26,108	128,625	4.93
2011	13,323	35,512	135,909	3.83

Table 1. Economic indicators for Argentina. Numbers are 2005 US dollars. Source: Penn World Table 8.0.

1. _Bust and boom in Argentina (30 points)._ Argentina's economy has experienced booms and busts since the 1920s. During the 1990s the economy grew rapidly, but between 1998 and 2002 real GDP fell roughly 20%. In December 2001, the government defaulted on over $100b of debt, much of it denominated in foreign currency and held outside the country. Nevertheless, the economy recovered quickly, growing close to 8% a year over the next few years. Most analysts attribute this success, in part, to favorable commodity prices and strong global demand for Argentina's commodity exports. In 2005, Argentina came to an agreement with most of its creditors, restructuring the debt to pay roughly 30% of its face value.

   The current government of President Cristina Fernandez de Kirchner continues to befuddle outside observers, including: taking over private pension funds, restricting imports and purchases of foreign currency, attacking the press, nationalizing the Spanish-owned oil company YPF, imposing price controls on utilities and public transportation, and subsidizing energy consumption.

   The question is how this mish-mash of policies affects the performance of the economy. With a Doing Business trip to Argentina scheduled for January, you decide to get a head start calculate the contributions to Argentine growth.

(a) Compute continuously-compounded annual growth rates of GDP per capita (Y/POP) and GDP per worker (Y/L). Why do they differ? (10 points)

(b) What is productivity in 2002 and 2011? (5 points)

(c) What are the sources of growth in GDP per worker? In GDP per capita? (10 points)

(d) How do these numbers tie in with what you know about Argentina? (5 points)

Solution: See the spreadsheet for calculations; download this file, open in Adobe Reader or the equivalent, and click on the pushpin:

(a) The usual continuously-compounded growth rates are

$$\gamma_{Y/POP} = \ln(13,323/8,029)/(2011-2002) = 5.63\%$$
$$\gamma_{Y/L} = \ln(35,512/26,108)/(2011-2002) = 3.42\%$$

The difference between them must reflect the denominators. More precisely, the ratio L/POP, which we compute as the ratio of Y/POP to Y/L, has a growth rate over the same period of 2.21%, which is the difference between the two numbers above.

Grading: 3 points each for the growth rates of GDP per capita and GDP per worker, 2 points for connecting the difference to employment and population, and 2 points for calculating the growth rate of L/POP.

(b) Productivity is computed as a ratio: $A = (Y/L)/(K/L)^{1/3}$. The numbers were 517 in 2002 and 691 in 2011.

Grading: 2 points for describing the calculation, 2 points for one correct number, one more point for a second correct number.

(c) The usual decomposition of the growth rate of output per worker is

$$\gamma_{Y/L} = \gamma_A + \alpha\gamma_{K/L}$$

with (of course) $\alpha = 1/3$. The numbers here are $3.42 = 3.21 + 0.20$ (expressed as annual percentages). Evidently most of the growth comes from productivity A; capital contributed very little.

GDP per capita adds another term:

$$\gamma_{Y/POP} = \gamma_{L/POP} + \gamma_{Y/L}.$$

Here the numbers are, as we saw earlier, $5.63 = 2.21 + 3.42$. This tells us that a big part of the increased growth in GDP per capita comes from employment.

Grading: 7 points for the first set of calculations and its interpretation, 3 for the second.

(d) Answers may differ, here's one. One thing that stands out is the tiny contribution of capital. It's not hard to imagine that default and the takeovers of pension funds and YPF would discourage investment. Another thing is the large contribution of the employment rate, which we might view as a byproduct of recovering from a steep recession that threw lots of people out of work.

Grading: 3 points for connecting the capital number to default, 2 points for noting employment rose. Similar grades for other coherent answers.

2. *Business analytics in the EU (30 points).* As a graduating MBA at the prestigious ecole des Hautes Etudes Commerciales (HEC) de Paris, you face a daunting job market. Together with two classmates, you start developing plans for a business analytics startup. The idea is to provide data insights to a broad range of businesses located throughout the European Union. The beauty of the plan, you think, is that you can do it anywhere. The three of you have begun to compare the pros and cons of Paris, Barcelona, and Stockholm, your respective home bases. You collect the data in Table 2 and begin to sketch out a plan.

Country Indicators	France	Spain	Sweden
Ease of doing business (rank)	38	52	14
Ease of starting a business (rank)	41	142	61
Protecting investors (rank)	80	98	34
Getting electricity (rank)	42	62	9
Resolving insolvency (rank)	46	22	20
Minimum wage (USD/month)	778	1009	none
Mandatory severance (weeks of pay)	4	14	none
Unemployment rate	10.5	24.4	7.4
Employment rate	64.3	55.8	74.7
Difficulty of dismissals (index, 1-6)	2.6	2.0	2.5
Education of workers aged 25-34 (years)	12.6	11.5	12.5
Internet quality (Ookla, index)	81.3	84.0	86.9
City Indicators	Paris	Barcelona	Stockholm
Quality of life (rank, Mercer)	34	44	20
Cost of living (index)	226	223	157

Table 2. Business indicators for three cities and countries.

(a) What features do you need in a city to make it attractive to you and your business? (10 points)

(b) What are the pros and cons of each city along these dimensions? (10 points)

(c) Which city do you think best fits your plans? (10 points)

Solution: This question is less black and white, here is one possible answer.

(a) You need, among other things: an environment friendly to startups, access to the internet and related infrastructure, and possibly a pool of well-educated talent. There are other things, but these seem like the important ones.

Grading: 10 points for something along these lines.

(b) How do they stack up?

- Paris: looks good on ease of starting a business, as well as ease of doing business in general; ditto education; questions/concerns about getting electricity and internet quality; the same for cost of living.

- Barcelona: huge red flag over ease of starting a business; concerns with getting electricity.

- Stockholm: looks good on overall ease of doing business, getting electricity; solid on ease of starting a business; highest internet quality of the three; and lowest cost of living.

Grading: 10 points for something along these lines. 2 points off for arguing low employment or high unemployment are opportunities without mentioning the possibility that they may reflect, in part, unattractive labor market conditions.

(c) Stockholm looks to me to be the clear choice. It would take a good argument to suggest otherwise. Also highly rated for quality of life, which is something you definitely want to consider.

The World Economic Forum has a similar take: "Sweden has managed to create the right conditions for innovation and the knowledge-based economy. The education system is of high quality and seems to deliver the right skills. But it should address its labor market regulations and high tax rate, which are considered the two most problematic factors for doing business."

Grading: 10 points for something along these lines. 2 off if you don't mention quality of life.

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3. *Short answers (50 points).*

   (a) *Real and nominal.* Over the past year, real GDP in the US has gone up 2.2 percent and nominal GDP has gone up 3.7 percent. What do the two numbers mean? Why are they different? (10 points)

(b) *Contributions to GDP.* A small firm in Brooklyn imports flavored vodka from Poland, bottles it attractively, and sells it to hipster bars. Over the past year, its numbers include: sales 2.0m, imported vodka 1.2m, bottle costs 0.3m, and rent 0.1m. What did the firm add to US GDP? (10 points)

(c) *Unemployment.* What does a decline in the unemployment rate tell us about employment? (10 points)

(d) *Dumping.* You are considering a dumping suit against one of your competitors. What two things do you need to make a case? (10 points)

(e) *Trade.* Comment on the statement: "In Ricardo's model, trade is good because it drives down the price of labor, making countries more competitive." (10 points)

Solution:

(a) Real GDP is (roughly) an index of quantities produced valued at base-year prices. Any change reflects changes in the quantities, since we are using the same prices at all dates. Nominal GDP is the current value of good produced: the sum of current price times current quantity. Changes thus reflect changes in both prices and quantities. The difference in their growth rates is therefore (approximately) the growth crate of prices, which we call inflation.

Grading: 8 points for defining the two concepts, 2 for noting that inflation is the difference.

(b) The contribution is value added: sales minus cost of materials. Here we have $2.0 - 1.2 - 0.3 = 0.5$.

Grading: 10 points for this answer.

(c) We put adults in three labor market categories: working, unemployed, and not in the labor force. If unemployment falls, the question is where those people go. If they start working, then employment rises. If they leave the labor force, then employment doesn't change.

Grading: 10 points for this answer.

(d) Dumping requires us to demonstrate (1) foreign producers are pricing "unfairly" (some version of this) and (2) we (a domestic producer) has been harmed. You'll find similar statements in the slides and in the answers to Practice Problems B.

Grading: 5 points for each component.

(e) The price of labor is ambiguous here. What we might mean is the wage in terms of the standard of living it supports. In Ricardo's model, this is

higher with trade, not lower. Workers aren't keeping jobs by underpricing foreign firms, they're doing the jobs that generate at which they're most productive, hence generate the highest living standards.

Grading: 10 points for something along these lines.