Problem Set 2: Economic Development

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Section 1: Exchange Rates

Based on Lecture 4.

a) Go to [www.xe.com](http://www.xe.com) and look up the exchange rates in terms of US dollars today for each of these country in the table below (how many of each does 1 US$ buy).

<table>
<thead>
<tr>
<th>Country</th>
<th>Euro</th>
<th>South Korea</th>
<th>Mexico</th>
<th>Russia</th>
<th>Canada</th>
<th>India</th>
<th>Japan</th>
<th>South Africa</th>
<th>Switzerland</th>
<th>Brazil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Today’s Date:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

b) Using the information in this table, how many US dollars would I be able to buy with 100 Mexican pesos? ________________

c) How many Japanese yen would I be able to buy with 100 Swiss francs? ______

d) Fill in the last column below (CNY/USD is the nominal exchange rate).

<table>
<thead>
<tr>
<th>Year</th>
<th>US Price Level</th>
<th>China Price Level</th>
<th>CNY/USD</th>
<th>Real Exchange Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>100</td>
<td>100</td>
<td>6.00</td>
<td>6</td>
</tr>
<tr>
<td>2001</td>
<td>100</td>
<td>110</td>
<td>6.38</td>
<td>5.8</td>
</tr>
</tbody>
</table>

e) In 2001, did the Chinese yuan appreciate or depreciate against the USD in nominal terms? (circle) APPRECIATE DEPRECIATE

f) In 2001, did the Chinese yuan appreciate or depreciate against the USD in real terms? (circle) APPRECIATE DEPRECIATE

Note: A currency “appreciates” when it buys more of (or relative to) another currency.
Section 2: Solow Growth Model

Based on Lecture 5.

Consider the simple version of the Solow Growth Model discussed in class summarized by these four equations:

- Consumers save a fraction $s$ of output: $I = s \ Y$
- Capital grows as follows: $K' = I + (1-\delta)K$
- Firms use capital to make output: $Y = A \ K^{0.3}$
- There is no government or trade: $Y = C + I$

where $Y$ is GDP, $I$ is investment, $C$ is consumption, $s$ is the savings rate, $K$ is the capital stock this year, $K'$ is the capital stock next year, $A$ is productivity and $\delta$ is the rate of depreciation.

a. Use these four equations to give an equation for $K'$ that only depends on $K$, $A$, $s$ and $\delta$. $K' = s \ A \ K^{0.3} + (1-\delta)K$

b. In the following space, draw a graph that illustrates the relationship between $K$, the capital stock this year, and $K'$, the capital stock next year:

![45 degree line](image)

c. Suppose the economy starts with a low level of capital $K_0$. Label this on the graph, and show how to find the following period’s capital stock $K_1$.

d. Label the steady state level of capital $K^*$. 

e. Suppose the savings rate $s$ goes up. Label the new steady state capital $K^{NEW}$. 
f. How does the change in $s$ affect consumption $C$ in the “short run”? That is, suppose the economy is in the steady state at $K^*$, then $s$ increases. In that period, is consumption higher or lower than it was at the steady state with the original level of $s$? **Lower**

g. Is consumption higher or lower at the new steady state $K_{NEW}$ with the higher savings rate than it was at the old steady state $K^*$ with the original savings rates? **It could be higher or lower, depending on how large the increase in capital is relative to the decline in the fraction of output that is consumed.**

h. In the space below, redraw the graph that illustrates the relationship between $K'$ and $K$ as in part b above, and illustrate the steady state capital level $K^*$.

![Graph](image)

i. Now suppose that productivity $A$ increases. Illustrate the shift in the curve above, and label the new steady state capital $K_{NEW}$.

j. As in part f, how does the change in $A$ affect consumption $C$ in the short run? **Higher**

k. What about in the long run? **Even higher than in the short run, since there is both the direct effect of higher output from higher productivity, plus there’s more capital.**

l. What is the difference between how increases in the savings rate and increases in productivity affect consumption? **Productivity has an unambiguously positive effect on consumption in both the short run and the long run. Increases in savings definitely decreases consumption in the short run, and an ambiguous effect in the long run.**
Section 3: Present Value of Bonds

Based on the reading from Chapter 14 and Lecture 7.

Compute the price of each of these bonds:

a) A bond pays off $1000 one year from now. The market interest rate is 5%.
   \[ \frac{1000}{1.05} = 952 \]

b) A bond pays off $1000 three years from now. The market interest rate is 5%.
   \[ \frac{1000}{1.05^3} = 864 \]

c) A bond pays off $1000 three years from now. The market interest rate is 15%.
   \[ \frac{1000}{1.15^3} = 658 \]

d) A bond pays off $1000 three years from now, and pays $50 at the end of each of those three years. The market interest rate is 5%.
   \[ \frac{50}{1.05} + \frac{50}{1.05^2} + \frac{1050}{1.05^3} = 1000 \]

A bond pays off $1000 one year from now, but there is a 20% chance the firm goes bankrupt and pays nothing. The market interest rate is 5%.
   \[ 0.8 \times \frac{1000}{1.05} = 762 \]

A bond pays off $1000 one year from now, but there is a 40% chance the firm goes bankrupt and pays nothing. The market interest rate is 5%.
   \[ 0.6 \times \frac{1000}{1.05} = 571 \]

e) A bond pays off $1000 three years from now. Every year there is a 23% chance the firm will go bankrupt. If the firm is bankrupt by the end of year three, the bond pays nothing. The market interest rate is 10%.
   \[ 0.77^3 \times \frac{1000}{1.10^3} = 394 \]

A bond pays off $1000 three years from now, and pays $50 at the end of each of those three years. In addition, each year there is a 12% chance the firm goes bankrupt and pays nothing in that year or after. The market interest rate is 10%.
   \[ 0.88 \times \frac{50}{1.10} + 0.88^2 \times \frac{50}{1.10^2} + 0.88^3 \times \frac{1050}{1.10^3} = 609.60 \]

f) Do borrowers prefer that the price of their bonds be high or low? **High**

g) How do higher market interest rates affect the prices of bonds? **Decrease**

h) How does greater risk affect the prices of bonds? **Decrease**
Section 4: Growth Experience of South Korea

Please read the following short paper: www.nd.edu/~wbrooks/Korea_Paper.pdf

Based on the reading, please answer the following:

a) Give one example of a government policy enacted by the Korean government that benefited the economy, and one example of a policy that harmed the economy.
   Beneficial: Stability of interest rates and prices, small fiscal deficits, stable real exchange rates
   Harmful: “Big Push”, price controls, import restrictions and regulations distorting the financial markets
b) What does the author mean by “breathing space” for reform? Steady capital inflows allowed South Korea to be protected from internal and external shocks.
c) What are three lessons for other countries from Korea’s growth experience?
   Stability, breathing space and the accumulation of physical and human capital

d) What is your assigned country of study? ________________________
   Briefly discuss whether or not you think that the types of reforms enacted in South Korea would be effective in your country of study. What are the differences and similarities between the two countries that may affect the effectiveness of reforms?
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Section 5: The Market for Loanable Funds

Based on the reading from Chapter 13.

In each of the following cases, using a graph demonstrate in the space provided (a) which curve shifts, (b) which direction it shifts, (c) how the quantity of loanable funds changes, and (d) how the interest rate changes.

1) The government decides to remove the tax on income from interest on savings and checking accounts.

Increase in savings ⇒ shift supply right, higher LF and lower interest rate

2) A state offers a big package of tax incentives to encourage Toyota to expand their factories in their state.

Increase in investment ⇒ shift demand right, higher LF and higher interest rate

3) After many years of budget deficits, the government manages to balance its budget.

Increase in savings ⇒ shift supply right, higher LF and lower interest rate

4) A technological breakthrough means that many firms wish to expand their operations.

Increase in investment ⇒ shift demand right, higher LF and higher interest rate
Section 6: Changes over Time for your Assigned Country

What country were you assigned to study? ______________________________

For this section, you will need access to a printer, and a computer that has Microsoft Excel, or another spreadsheet program that can make graphs.

In this section, we will see how the economy of your assigned country has changed over time by looking at historical data (from the last 50-60 years) for your country.

1) Go to the following website to access the Penn World Tables:
   https://pwt.sas.upenn.edu/php_site/pwt71/pwt71_form.php

2) Find your country in the list of countries in the Step 1 box, then click “Add”, and verify that it shows up in the Step 2 box.

3) In the Step 3 box, check all of the following: POP, XRAT, RGDPL, CC, CG, CI, OPENC.

4) In the Step 4 box, click the “Add All” button, then verify that all years show up in the Step 5 box.

5) For the output format, select “html table”, then click the “Send” button.
   Note: From here I will give instructions for Excel, but you can use any spreadsheet program.

6) Copy and paste the whole table into Excel.

7) Make four separate line graphs consisting of the following for the years you have available in the data:
   a. POP (Population)
   b. RGDPL (Real GDP per capita)
   c. XRAT (Exchange rate)
   d. CC (Consumption), CI (Investment), CG (Government Purchases) and OPENC (Openness) [Note: Openness is (Imports + Exports)/GDP]
For example, to do the first one, select the data in the POP column, then go to the Insert menu, and select Line. The same instructions apply to the second and third. For the fourth, do the same thing, but with all the data in those four columns highlighted at the same time.

8) Print these graphs.

9) Look at the graphs that you now have printed out. Are movements in these things related to important historical events in the recent history of your country (for example, changes in government, crises, wars, ethnic violence, etc.)? Indicate these events by writing them on the graph, then briefly explain below.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

10) How has the amount that your country invests as a fraction of GDP (CI) changed over time?

________________________________________________________________________
________________________________________________________________________

11) What do your answer to question 10 and the Solow Growth Model say about what your country’s GDP will be in the future?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________