Solutions

Exam 1: Version B
Fall 2016

Do not open this exam until instructed to do so.

- You have 75 minutes to complete this exam
- You may use a calculator; you may **not** use any other device (cell phone, etc.)
- You may consult one page of notes (both sides); you may not use books, notebooks, etc.
- Show your work

I understand that the honor code applies: I will not lie, cheat, or steal to gain an academic advantage, nor tolerate those who do.

WAUGH

Signature

Printed Name

A version

For each question below, **write the letter of the most correct answer to the left of the question.**

1. (3 pts.) A woman marries her butler. Before they were married, she paid him 60,000 per year. After marriage, she no longer pays him. However, he continues to provide the same services as before but as a husband, not a wage earner. Her earnings are unchanged before and after the marriage. The marriage:

D

   A. increases GDP by 60,000.
   B. increases GDP by more than 60,000.
   C. does ~~not change GDP.~~
   D. decreases GDP by 60,000.

2. (3 pts.) The property of diminishing marginal product means that when additional quantities of

B

   A. a single factor are added, output diminishes.
   B. as a single factor is added, holding fixed all other factors, the marginal product of the first factor diminishes.
   C. both labor and capital are added, output diminishes.
   D. both labor and capital are doubled, output increases but at a rate of less than double.

3. (3 pts.) All of the following are measures of GDP **except** the total:

B

   A. expenditures on all final goods and services produced.
   B. expenditures of all business in the economy.
   C. income from all production in the economy.
   D. value of all final production.

4. (3 pts.) Institutions that economists believe foster economic growth include:

C

   A. governments that do not tolerate corruption.
   B. courts that uphold legal protections for shareholders and creditors.
   C. all of the answers are correct.
   D. capital markets that facilitate borrowing and lending.

5. (3 pts.) If 5 million workers are unemployed, the adult population equals 200 million, and 50 million are not in the labor force, then the unemployment rate equals approximately

B

   A. 25 percent.
   B. 3.3 percent.
   C. 2.5 percent.
   D. unable to determine given the available information.

The following table reports some information on a hypothetical economy. All values are continuously compounded, annualized growth rates, in percent. Furthermore, all payments to capital are one third of total GDP.

	Y	A	αK	$(1-\alpha)L$
1950–2015			2.0	

Growth in Real Wages (1950–2015): 3.0

Growth in Real Rental Rate of Capital (1950–2015): 0.0

6. (3 pts.) Using the information provided in the table above, your best estimate of growth in L is
   A. 6 percent.
   B. not enough information provided to provide an estimate.
   C. 2 percent.
   D. 3 percent.

D

7. (3 pts.) Using the information provided in the table above, your best estimate of growth in capital per worker K/L is
   A. 3 percent.
   B. 2 percent.
   C. 6 percent.
   D. not enough information provided to provide an estimate.

A

8. (3 pts.) Using the information provided in the table above, your best estimate of growth in investment I is
   A. 6 percent.
   B. 2 percent.
   C. 3 percent.
   D. not enough information provided to provide an estimate.

A

9. (3 pts.) In the national income accounts, all of the following are classified as government purchases **except**:

B

A. purchases of military hardware.
B. payments made to social security recipients.
C. services provided by US senators.
D. services provided by police officers.

10. (3 pts.) Prices of items included in the CPI are:

C

A. chained to the base year by year-to-year growth rate of the item.
B. averaged with the price of every item weighted equally.
C. weighted according to quantity of the item purchased by the typical household.
D. weighted according to amount of the item produced in GDP.

11. (35 pts.) **Brexit.** In June 2016, the British voted to withdraw from the European Union—an integrated market of goods, labor, and capital amongst many of Europe's countries. This last week Prime Minister Theresa May announced that the formal negation process would start in 2017, with an exit from the Union by 2019.

    A research report by McKinsey provided the following pieces of data/analysis...

    - "we expect the United Kingdom to experience a onetime 10 percent loss in productivity (TFP)."
    - "historical returns on capital (i.e. the real rental rate on capital) have been equalized in the UK and rest of the European Union."
    - UK GDP (Y) was 3 trillion, USD. Total payments to labor are 2 trillion, USD.
    - Prior to the vote, the United Kingdom's capital to output ratio (K/Y) was estimated to be about three.

    Working with our model developed in Chapter 3, please analyze the impact of Brexit on the UK economy.

    a. (7 pts.) Prior to the Brexit vote, please provide an estimate of the real rental rate of capital. **Show your work.**

So $\frac{R}{P} = MPK =$ (with Cobb-Douglas)

$$= \alpha \cdot \frac{Y}{K}$$

$\alpha = 1 - \frac{N \cdot L}{Y}$

4th bullet tells us $\frac{K}{Y} = 3$,

The share of payments to Capital,

$$= 1 - \frac{2}{3} = \frac{1}{3}$$

$$= \frac{1}{3} \cdot \frac{1}{3} = \boxed{\frac{1}{9}}$$

b. (7 pts.) After the Brexit vote (and using McKinsey's forecast), please provide an estimate of the real rental rate of capital. Do you think the owners of capital were for or against Brexit? **Show your work.**

This just builds on (a). The first bullet tells us TFP = A_1 will decrease by 10 percent.

GDP = $AK^{\alpha}L^{1-\alpha}$. Thus GDP or Y will decrease by 10 percent. So....

$$\text{NEW } \frac{R}{P} = \alpha \cdot \frac{Y}{K} \cdot \underbrace{\frac{9}{10}}$$

Due to the decrease in TFP

$$= \frac{1}{3} \cdot \frac{1}{3} \cdot \frac{9}{10} = \boxed{\frac{1}{10}}$$

c. (7 pts.) How would you expect capital to flow (if at all) between the United Kingdom and the rest of the European Union after the Brexit vote (but prior to the finalization of Brexit in 2019). **Please carefully explain why or why not.**

Second bullet tells us that

$$\frac{R^{EU}}{P} = \frac{R^{UK}}{P}, \text{ prior to brexit.}$$

After brexit....

$$\frac{R^{EU}}{P} > \frac{R^{UK}}{P}$$

Why, (b) just told us that the rental rate on capital will fall.

Thus owners of capital in UK will move their capital to where returns are highest...

Thus we should expect capital to <u>flow out</u> of the UK, into EU due to brexit.

d. (7 pts.) How would you expect real wages to change (if at all)? In particular, would they: decrease; no change; fall by 10 percent or less; fall by more than 10 percent. **Please carefully explain why or why not.**

More than 10 percent

Why???

$$Y = A K^{\alpha} L^{1-\alpha}$$

$\downarrow$ by 10 percent

$\downarrow$

Decreasing as well, as capital flees UK, into higher return EU

Together, this $\Rightarrow$ Y $\downarrow$ by more than 10 percent.

e. (7 pts.) One of the issues associated with Brexit (and the negotiation process) is the role of immigration. In particular, many workers in the European Union viewed the United Kingdom as an attractive place to work leading to large influxes of foreign workers. Do your answers in Part **c.** and Part **d.** have any implications for the flow of workers between the UK and the European Union? **Please carefully explain why or why not.**

This is interesting . . . .

$$\frac{W}{P}^{UK} = MPL^{UK} = (1-\alpha)\frac{Y}{L}$$

In c − d we argued $Y \downarrow$. Thus $\frac{W}{P}$ or Real Wages will decrease by more than 10 percent. Then one should expect that working in the UK will be less attractive as real wages are now lower. Thus we should expect the flow of workers into the UK to slow, or perhaps reverse!!! !

11. (35 pts.) **Investment Tax Credit.** As an intern to Senator Charles Schumer (D, NY) you are asked to prepare a report on a proposed tax credit for residential investment. The Congressional Budget Office provided you the following information to use in your report:

- The marginal propensity to consume is unaffected by real interest rates.
- The tax credit would "effectively lower the cost" of purchasing residential investment.
- There is no overall fiscal effect of a tax credit to residential investment. That is T and G are unaffected by this policy.
- Total investment (I) is the sum of residential investment and business investment.

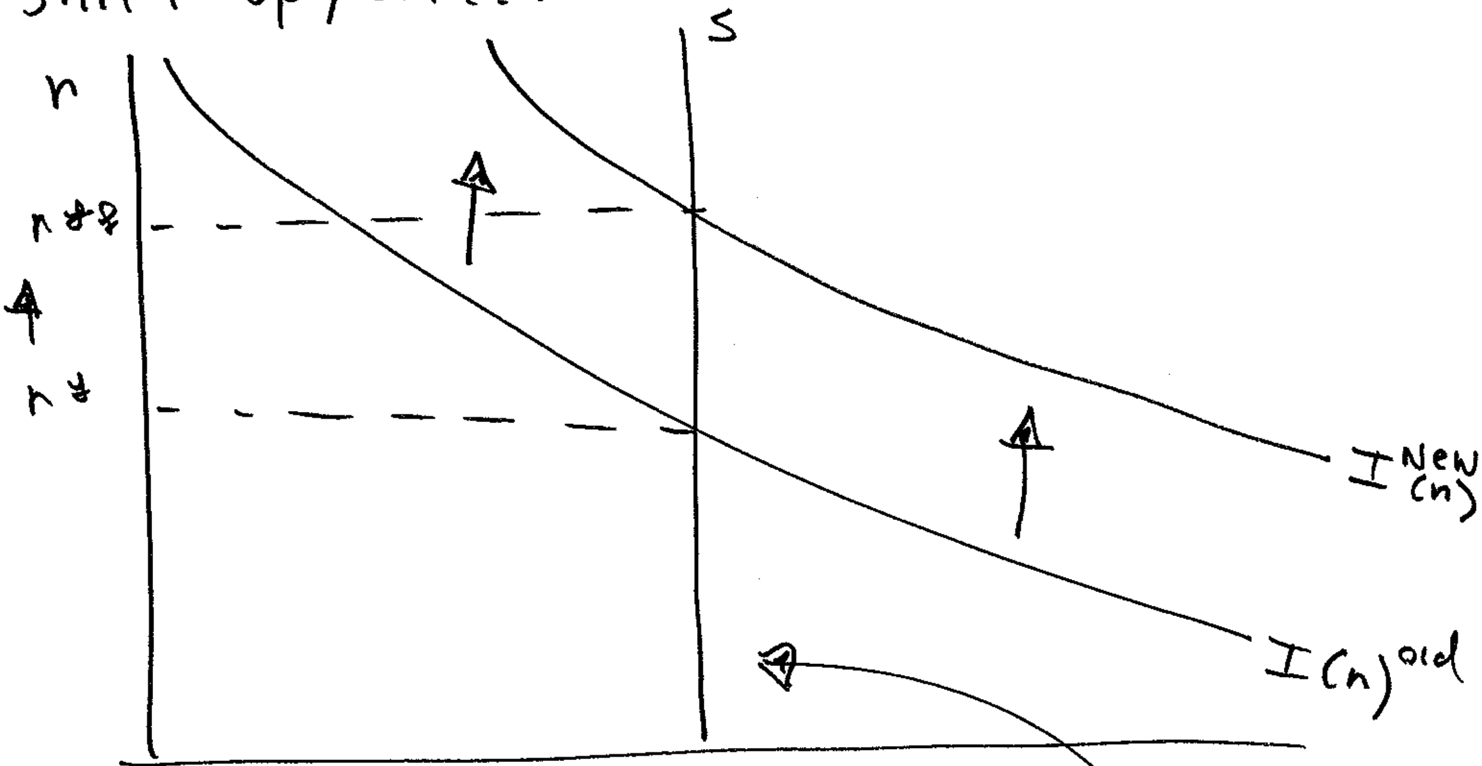
a. (7 pts.) In several sentences, describe how a tax credit to residential investment would affect (i) the demand for residential investment and (ii) the demand for total investment.

Really basic idea, if the price/cost of buying something $\downarrow$, then we should expect the quantity demanded $\uparrow$ — This is just law of demand.

~ So residential investment demand should increase, then because total investment = ~~investment~~ sum of res. investment and bus. investmet ~ total investment demand should $\uparrow$!!!

b. (7 pts.) Within the supply and demand diagram for loanable funds, illustrate and carefully explain how your answer in Part **a.** would affect aggregate savings, total investment, and the real interest rate (if at all).

So (a) taught us that investment demand ↑,
Graphically, this => the I(r) curve should shift up/out....



① So savings... No Change.

This does not change. Why T, G Y, are not changing.

② Investmet... No Change...
Why, yes quantity demanded ↑ from the tax credit, but in equilibrium I = S. ~~since~~ ~~~~

③ Real Interest Rate ↑ ... Why, no change in savings, but more demand for I, thus r ↑ so that supply of funds " demd of fund

c. (7 pts.) Given your answers in Part **a.** and Part **b.** carefully explain the effect of the tax credit on business investment. Recall, there is **no** change in policy with respect to business investment, only a tax credit to residential investment.

So (b) $\Rightarrow$ No change in investment, I.

But demand for residential Investment $\uparrow$.

So you would expect...

$$I = I^{RES} + I^{BUS}$$

I: Fixed

I^{RES}: Demand is Increasing

I^{BUS}: So one would suspect that this would $\downarrow$

To summarize... the tax credit on residential investment is <u>crowding out</u> business investment.

d. (7 pts.) Carefully explain the impact of this tax credit on real GDP (within the context of the model of Chapter 3). If not, please carefully explain why not.

No change !!!

$$Y = F(K, L)$$

Not affecting K (at least today)

Not affecting L

All the tax credit does (today) is to reallocate investment towards residential activities, away from business investment.

e. (7 pts.) Suppose that there two types of capital: residential capital which is accumulated through residential investment and business capital which is accumulated through business investments. Furthermore, different sectors of the economy have different production functions that depend upon the type of capital employed.
The question: as new investments are made overtime, speculate on the effects of this policy on workers in sectors (a) which use residential capital intensively and (b) that use business capital intensively. Specifically, how would you expect wages and employment to change, if at all? Please carefully explain.

Really basic idea, if a sector gets more capital, then we should expect...

MPL ↑ (Why capital makes workers more productive)

$\frac{W}{P}$ ↑ (Why, the MPL = W/P in competitive mkts).

Thus we should expect wages to increase (rel to business capital sector) more as capital is being accumulated at a faster rate.

Next if wages are high, we should expect workers to <u>flow</u> towards the high wages.

Thus employment exands in sector with residential capital, contracts in sector with business capital.

B version

For each question below, **write the letter of the most correct answer to the left of the question.**

D

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   B. services provided by police officers.
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TRENDS IN B

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