Suggested Answers

Exam 1: Version A
Spring 2018

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.

Signature

Michal WAUGH

Printed Name

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

1. (3 pts.) An onetime increase in Total Factor Productivity (A) will result in
   A. the marginal product of labor will rise and the marginal product of capital will fall.
   B. both the real wage and the real rental rate of capital will fall.
   C. both the marginal product of labor and the marginal product of capital will fall.
   D. both the real wage and the real rental rate of capital will rise.

2. (3 pts.) Assume that a firm buys all the parts that it puts into a car for 10,000, it pays its workers 10,000 to make the care, and sells the car for 22,000, then
   A. payments to labor are fifty percent of value added.
   B. the value added of the company is 10,000.
   C. the value added of the company is 22,000.
   D. payments to capital equal 2,000.

3. (3 pts.) Sustained economic growth and (in a balanced fashion)
   A. is made possible by technological progress, because it is not subject to diminishing returns like capital or labor.
   B. has not been experienced (at least in the US case).
   C. is made possible by capital accumulation, because returns on capital are roughly constant overtime.
   D. is made possible by accommodative monetary policy.

4. (3 pts.) What determines the level of total production of goods and services in an economy?
   A. consumption, investment, government spending, and net exports.
   B. government budget surplus or deficit.
   C. the quantity of capital, quantity of labor, and the production technology.
   D. the interest rate and the amount of national savings.

5. (3 pts.) If the adult population equals 200 million, 50 million are not in the labor force, and the unemployment rate is 5 percent, then
   A. 7.5 million workers are unemployed.
   B. 10 million workers are unemployed.
   C. unable to determine given the available information.
   D. 5 million workers are unemployed.

$.05 = \frac{X}{150}$

6. (3 pts.) If an increasing proportion of the adult population is retired, then the labor force participation rate:

   A. will increase.

   B. may increase, decrease, or remain constant.

   C. will remain constant.

   D. will decrease.

7. (3 pts.) Real GDP is a better measure of economic well-being than nominal GDP because real GDP:

   A. includes the value of government transfer payments.

   B. measures changes in the quantities of goods and services produced by holding prices fixed.

   C. measures changes in the prices of goods and services produced by holding quantities fixed.

   D. excludes the value of goods and services exported abroad.

8. (3 pts.) The preponderance of evidence supports the hypothesis the economies that are open to trade _____ than comparable closed economies

   A. allocate a larger share of value added to capital.

   B. have faster rates of population growth (n) and technological progress (g).

   C. growth more rapidly.

   D. have lower steady-state levels of income per worker due to foreign competition.

9. (3 pts.) If the GDP deflator in 2015 equals 1.25 and nominal GDP is 15 trillion, the value of real GDP is?

   A. 15 trillion.

   B. 12 trillion.

   C. 18.75 trillion.

   D. can't tell, need to know information about the CPI.

10. (3 pts.) Using the model of Chapter 3, but now assume that consumption decreases when interest rates increase. If there is a technological advance that leads to an increase in investment demand, then:

    A. investment decreases and the interest rate rises.

    B. investment increases and the interest rate rises.

    C. investment is unchanged and the interest rate rises.

    D. investment and the interest rate are both unchanged.

11. (35 pts.) **Trump's Future America ...** This last week President Donald Trump announced that tariffs would be placed on imported steel and aluminum; further trade actions are possible. As an analyst at Goldman Sachs, you have been asked to provide an economic forecast for the US economy.

    A research report by Bain and Company provided the following pieces of data/analysis...

    - "through various mechanisms, we expect these policies to reduce the growth rate of technological progress (g) in the United States by one percentage point" (Hint: This means if g is 10 percent, it is now 9 percent)
    - US GDP (Y) was 15 trillion, USD. Total payments to labor are 10 trillion, USD.
    - The savings rate (s) "has been estimated to be 1/3"
    - "historically, living standards (real wages) have grown at 2 percent per year"
    - Prior to the vote, the United States capital to output ratio (K/Y) was estimated to be about three.

    Working with our model of Balanced Growth, please answer the following questions.

    a. (7 pts.) Provide an (i) estimate of technological progress (g) (prior to Trump's actions) and (ii) what technological progress will be in the future.

I'm going to start with idea we are on a BGP
So then we know $\Delta w/p \,/\, w/p$ or the growth of real wages is g

Then from the information above $\Rightarrow$
Current $g = 2\%$

Then for the future, this $\Rightarrow$
$g = 1\%$ (From Bain's info first bullet)

b. (7 pts.) How would you expect (i) the growth rate of capital per worker and (ii) the growth rate of capital to change. (Hint: simply report the percentage point change).

For (i) we know that $\frac{\Delta K/L}{K/L}$ grows at same rate as $\Delta Y/L / Y/L \sim$

Why? Output and Capital grow at same rate

Thus Output per worker, Capital per worker must grow at same rate.

AND $\Delta Y/L / Y/L$ grows at same rate as

g (Which we estimated to be 1% in the future)

All this means is that $\frac{\Delta K/L}{K/L}$

Will Grow at 1%

(ii)

For (ii)

We know $\Delta k/k = n + g$

Holding n constant (or unrelated to g)

Then a 1% decrease in g will decrease the growth in capital by 1% !!!

(i) $\frac{\Delta K/L}{K/L} = 1\%$

(ii) $\Delta k/k$ ↓ by 1%

c. (7 pts.) Please provide an estimate of the real rental rate of capital (prior to Trump's actions).

Weather on the BGP or not we know

$$\frac{R}{P} = MPK = \alpha \frac{Y}{K}$$

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

Why $\frac{K}{Y} = 3$, from last bullet point, so $\frac{Y}{K} = \frac{1}{3}$

Why labor's share of income is $\frac{10}{15} = \frac{2}{3}$, capital's share is $\frac{1}{3}$ which is an estimate of α

This is my estimate!!!

d. (7 pts.) How would you expect real rental rate of capital change in the future? Please (i) qualitatively argue the direction of the change (if at all) and (ii) provide a quantitative estimate. **Show your work.**

(i) we know also on a BGP that....

$$\frac{R}{P} = \alpha \cdot \frac{(n + g + \delta)}{s}$$

So a decrease in technical progress decreases Returns to capital !!!

(ii) Again, under the idea that $n + \delta$, s don't change we have.....

$$\frac{R}{P} = \frac{\alpha}{s} \cdot (n + g + \delta)$$

$$= \frac{1}{3} \cdot \left(\frac{1}{3}\right)^{-1} \cdot (n + g + \delta)$$

$$= n + g + \delta$$

Befor Tariffs...

$$\frac{1}{9} = 0.02 + \underbrace{(n+\delta)}$$

Note you could solve for $n+\delta$

Then after tariffs.....

$$X = 0.01 + (n+\delta)$$

What is X ???

$$\frac{1}{9} - X = \{0.02 + (n+\delta)\} - \{0.01 + (n+\delta)\}$$

$$\frac{1}{9} - X = 0.01$$

← This is fine... It will decrease by 1 percentage point

$$\frac{1}{9} - 0.01 = X = 0.10\overline{111}$$

e. (7 pts.) Your boss looks are your report and says "Good Job! But can you suggest some policies that we can take to the President to offset the effects of his trade policy on the rental rate of capital?"

Suggest one thing that could be done to return the rental rate of capital to its previous level. **Be sure to clearly explain how your suggestion would affect the return to capital.**

Back to this ....

$$\frac{R}{P} = \alpha \frac{(g + n + \delta)}{s}$$

So (i) increase "n", maybe with Iranian led, child-care policy to incentivize having more children.

(ii) Lower "s", so get people to spend more, reduce savings rate, make capital scarce....

Not through ~ all these things lower the amount of capital on the (BGP) and in turn lower living standards (not the growth rate, the level).

12. (35 pts.) **Thriftiness.** Senator Charles Schumer (D, NY) is concerned that private Americans do not save enough. You are asked to prepare a report on a policy that will discourage consumption and encourage savings. The Congressional Budget Office provided you the following information to use in your report:

    - The proposed policy would decrease the marginal propensity to consume.
    - The marginal propensity to consume is unaffected by real interest rates.
    - The proposed policies will have no overall fiscal effect. That is T and G are unaffected by this policy.

    a. (7 pts.) In several sentences, describe how the policy affect: the savings rate (s), aggregate consumption, private savings.

* We said $C = \beta(Y-T)$ where β is the marginal propensity to consume, then this means $\beta \downarrow$, aggregate consumption $\downarrow$

* The savings rate is just $(1-\beta)$ So this means $s \uparrow$ is going up!!!

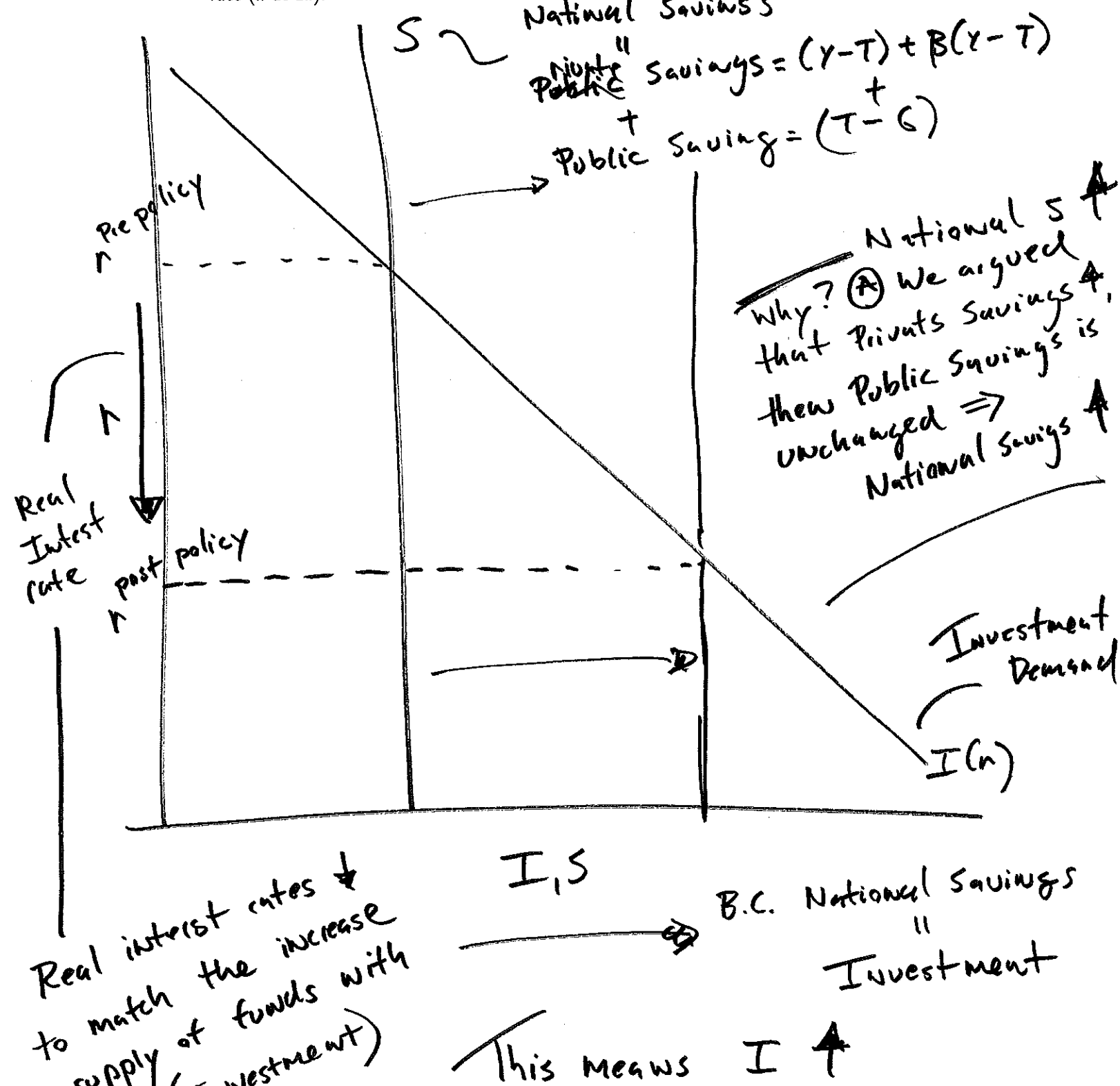
* Private Savings is.... So since T is unchange...

$(Y-T) - \beta(Y-T)$

Private Savings

Then $\Rightarrow$ Private Savings $\uparrow$

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



c. (7 pts.) Carefully explain the impact of this policy on real GDP (within the context of the model of Chapter 3) and the specific expenditure components of GDP. If not, please carefully explain why not.

GDP — No Change !!!

— $Y = A \cdot F(K, L)$

Unless it changes, K or L (or A) then there is no impact on output....

All it does is reallocate activity from consumption (private) to Investment

$Y = C + I + G$

No change by assumption

from (A) from (B)

Then from above we know the decrease in (A) must exactly offset (B) increase.

d. (7 pts.) Later that day during Happy Hour, a fellow intern for Senator Kirsten Gillibrand (D, NY) suggested the following: "A higher savings rate should lead to a _____ capital stock in the future...and this will _____ real GDP". The missing words were inaudible due to music playing in the background.

Please (i) correctly fill in the blanks and (ii) carefully explain the WHY behind your answer.

Larger capital stock, higher GDP

Why? $K_{t+1} = (1-\delta)K_t + I_t$

(K_{t+1}: capital tomorrow; $(1-\delta)K_t$: fixed; I_t: policy pushed this up)

Basic Idea....

More investment NOW increases Stock of Capital (K) in the future

Then we know, more $K \uparrow \Rightarrow$ more $Y \uparrow$

e. (7 pts.) An intern for Senator Elizabeth Warren (D, MA) suggested the following: This will propagate existing inequality in living standards within the United States. In particular, in the future it will

- lower the wages of workers.
- Moreover, the share of income going to the owners of capital will increase at the expense of a lower share of income going to labor.

Carefully evaluate both of these claim.

No ! No !

(1) Lower wages. More capital compliments labor, raising thier productivity, resulting in higher wages ....

In math we said $\frac{W}{P} = \underbrace{(1-\alpha)\frac{Y}{L}}_{MPL}$

If K raises Y, then real wages increase) with this policy.

(2)

Extra Space

Clearly label the question number, and leave a reference to this page near the question.

No we argued in (i) Class
(ii) Saw this in PS1
(iii) Saw this in Kaldor's Facts

That the share of income going to capital / Labor is

(1-α) and α — From the Production Function.

And ARE NOT affected by changes in K (or L or A) etc. Hence, there is little evidence that this is the case...