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As a condition of being allowed to take this exam and having it graded, you must not communicate during the exam in any way—including electronic communication—with another person, except the person who administers the exam.

‘Sign’ this honor pledge by typing your name in the space provided.

I did my own work on this exam. I did not receive help during the exam, and I did not give help to anyone else. I understand that if I ‘sign’ this pledge falsely, I will not qualify for a passing grade on the exam and I will not qualify for course credit.

→
signature (above)

You may consult your notes or your models during the exam. However, you will not be required to do any modeling, and you will not need to simulate any computer model. All the diagrams and equations you need will be displayed on the exam pages.

When finished, attach this exam to an email addressed to:

david.wheat@uib.no

and either novikaj@ukma.edu.ua **or** olisk@ukr.net

On the following pages, there are 5 questions worth 25 points each. You are required to answer 4 of them. Some questions have more than one part (a, b, c, etc.).

- Question 1 has five parts (a – e)
- Question 2 has four parts (a – d)
- Question 3 has four parts (a – d)
- Question 4 has two parts (a – b)
- Question 5 has two parts (a – b)

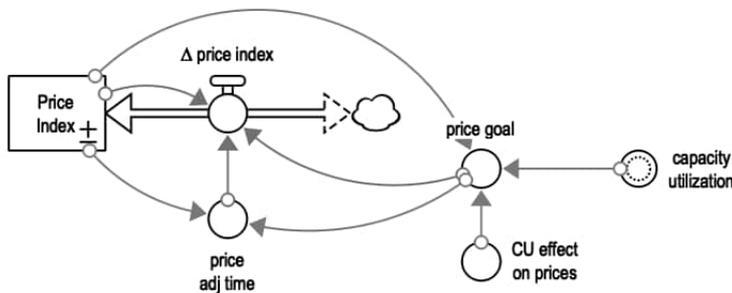
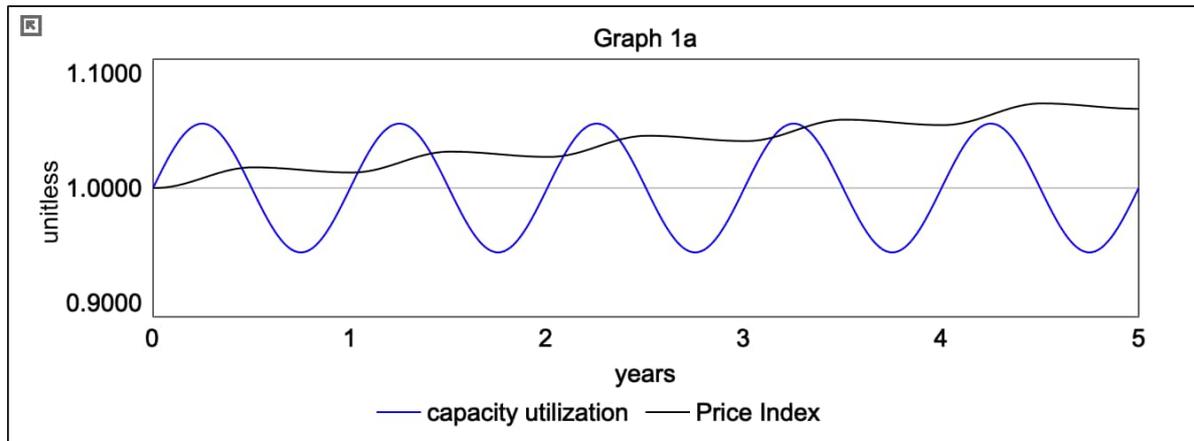
If you want to try answering all 5 questions, one will be counted as ‘extra credit’ and you will receive additional points depending on the quality of your answer. If you decide to answer all five questions, indicate which one should be counted as ‘extra credit.’ Otherwise, #5 will be considered your extra-credit question.

Type your answers in the text boxes provided under each question.

An extra blank page is available if you need more space for your answers. If you use the extra page, be sure to indicate which question you are answering (i.e., write the question #).

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1(a). In Graph 1a, capacity utilization is rising and falling by equal amounts each year. In other words, average capacity utilization over the five-year period is constant: 1.0 (100%). Study the model below the graph and explain why the price index is rising over the five-year period.



$$\text{Price Index}(t) = \text{Price Index}(t - dt) + (\Delta \text{ price index}) * dt$$

$$\Delta \text{ price index} = (\text{price goal} - \text{Price Index}) / \text{price adj time}$$

$$\text{CU effect on prices} = 1$$

$$\text{price adj time} = \text{IF}(\text{price goal} < \text{Price Index}) \text{ THEN}(4) \text{ ELSE}(1)$$

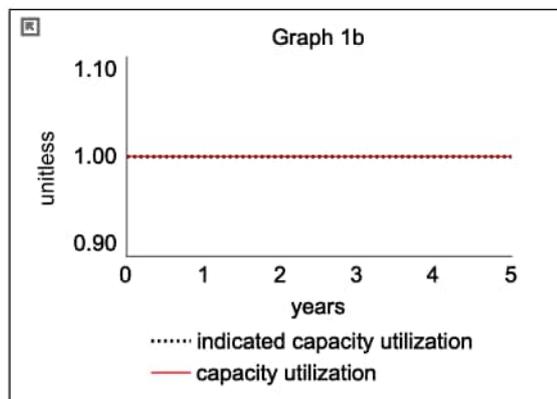
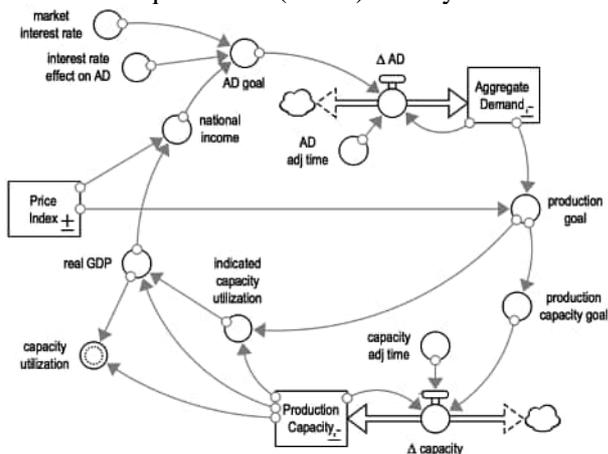
$$\text{price goal} = \text{Price Index} * \text{capacity utilization} ^{\text{CU_effect_on_prices}}$$

1(a) Why is the price index rising over the 5-year period when capacity utilization is above-and-below its constant average value by an equal amount each year?

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1(b) This simple model is part of the supply side in the model developed in the ED course. (The link from capacity utilization to the price index has been deleted to simplify the diagram.) Graph 1(b) displays the initial equilibrium conditions, with both ‘indicated capacity utilization’ and ‘capacity utilization’ equal to 1.0 (100%). Study the structure of this model and answer the questions below.



$Aggregate\ Demand(t) = Aggregate\ Demand(t - dt) + (\Delta AD) * dt$
 $Production\ Capacity(t) = Production\ Capacity(t - dt) + (\Delta capacity) * dt$
 $\Delta capacity = (production\ capacity\ goal - Production\ Capacity) / capacity\ adj\ time$
 $capacity\ adj\ time = 3$
 $indicated\ capacity\ utilization = production\ goal / Production\ Capacity$
 $indicated\ capacity\ utilization = 5$
 $production\ capacity\ goal = SMTH3(production\ goal, .25)$
 $real\ GDP = Production\ Capacity * indicated\ capacity\ utilization$
 $AD\ goal = national\ income * (market\ interest\ rate / INIT(market\ interest\ rate))^{interest_rate_effect_on_AD}$

$Price\ Index(t) = Price\ Index(t - dt)$
 $\Delta AD = (AD\ goal - Aggregate\ Demand) / AD\ adj\ time$
 $AD\ adj\ time = 1$
 $capacity\ utilization = real\ GDP / Production\ Capacity$
 $interest\ rate\ effect\ on\ AD = -.04$
 $national\ income = real\ GDP * Price\ Index$
 $production\ goal = Aggregate\ Demand / Price\ Index$

1(b) What will happen to ‘capacity utilization’ if market interest rates fall? Explain why.
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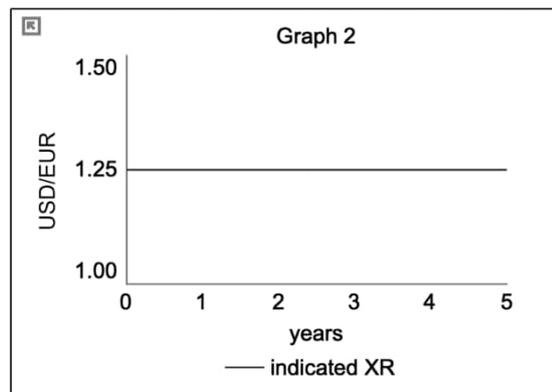
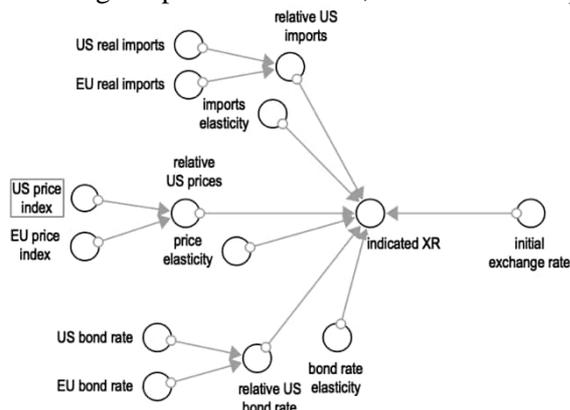
1(c) If it were possible to change Production Capacity faster, how would that affect capacity utilization (and inflation) after the interest rate increase? Explain why.
→

In this model, ‘indicated capacity utilization’ and ‘capacity utilization’ are always equal.
1(d) Give an example of some situation in real life that might cause them to have different values.
→

1(e) Describe in words how you might change the equation for ‘real GDP’ or the equation for ‘capacity utilization’ (or both) to reflect the behavior you suggested above. No need to write any equations, but you can if that will help clarify your answer.
→

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2. Below is a very simple model of exchange rates (XR). Graph 2 displays the initial equilibrium condition when ‘indicated XR’ is equal to 1.25 USD/EUR. Study the structure of the model, including the parameter values, and answer the questions below.



initial exchange rate = 1.25

indicated XR = initial exchange rate * (relative US imports ^ imports_elasticity) * (relative US prices ^ price elasticity) * (relative US bond rate ^ bond rate elasticity)

US real imports = 4e+12 EU real imports = 3.2e+12 imports elasticity = -1
relative US imports = (US real imports / EU real imports) / INIT(US real imports / EU real imports)

US price index = 1 EU price index = 1 price elasticity = -1
relative US prices = (US price index / EU price index) / INIT(US price index/ EU price index)

US bond rate = 4 EU bond rate = 4 bond rate elasticity = 1
relative US bond rate = (US bond rate / EU bond rate) / INIT(US bond rate / EU bond rate)

2(a) What happens to ‘indicated XR’ when US real imports increase by 10% ? Explain why.
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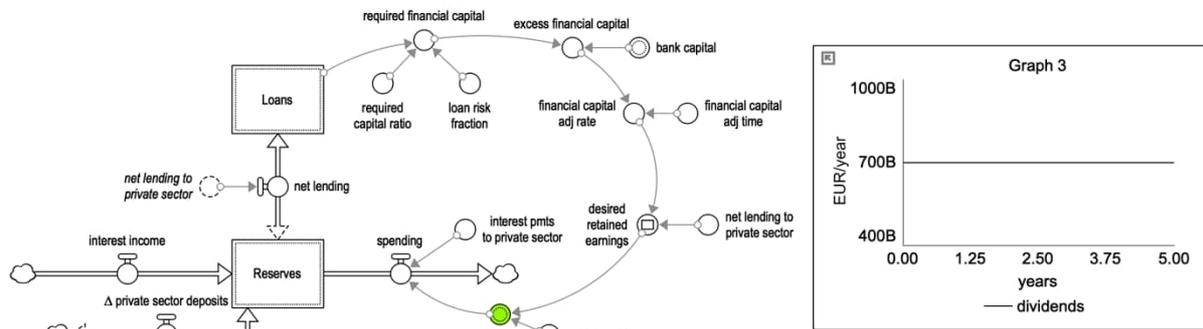
2(b) What happens to ‘indicated XR’ when the EU price index increases by 10% ? Explain why.
 →

2(c) What happens to ‘indicated XR’ when US bond rates increase by 10% ? Explain why.
 →

2(d) What happens to ‘indicated XR’ when both EU prices & bond rates rise by 10% ? Explain why.
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3. This is a simple model of financial capital regulation of banks. Graph 3 displays the behavior of ‘dividends’ when the model is initially in equilibrium. Study the structure of the model, including equations and parameter values, and answer the questions below.



- Loans(t) = 16e+12
 - Reserves(t) = .320e+12
 - financial capital adj time = .25
 - interest income = 1e+12
 - bank capital = .64e+12
 - interest income = 1e+12
 - Δ private sector deposits = 0
 - net interest income = .7e+12
 - required capital ratio = 0.10
 - desired retained earnings = SMTH1(net lending to private sector - financial capital adj rate, .25, 0)
- required financial capital = Loans * loan risk fraction * required capital ratio
 - financial capital adj rate = excess financial capital / financial capital adj time
 - excess financial capital = bank capital - required financial capital
 - spending = interest pmts to private sector +dividends
 - net lending = net lending to private sector
 - dividends = MAX(0, (net interest income - desired retained earnings)
 - net lending to private sector = lending - repayments
 - interest pmts to private sector = .3e+12
 - loan risk fraction = 0.40

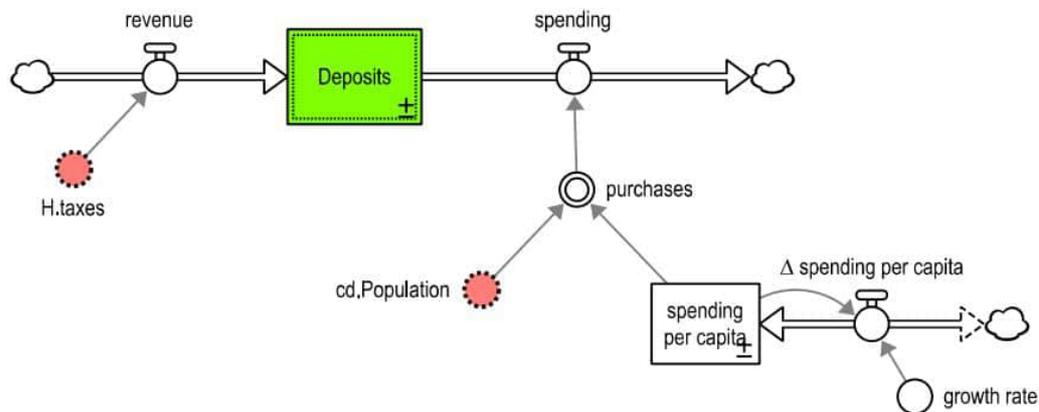
3(a) What happens to dividends if regulators raise the required capital ratio from 10% to 11%? Explain why.
→

3(b) What happens to Reserves if the required capital ratio is raised? Why?
→

3(c) Think about the links between the Banks sub-model and the Household sub-model. What is the effect on consumption when the required capital ratio is raised? Why?
→

3(d) Assume the economy weakens after the required capital ratio is raised: net lending falls and Loans decline. Also, assume more Loans are considered risky, and regulators raise the ‘loan risk fraction.’ Will the ‘required financial capital’ increase or decrease? Explain.
→

5. The Government sub-model is the simplest part of the model developed in Economic Dynamics this year. Here it is:



Let's assume you wanted to improve the structure of this sub-model.

5(a) What would be the most important thing you would add or delete? Why?

→

5(b) Describe generally how you would change the sub-model. Equations or diagrams are not necessary; a clear written description will be fine. But if you prefer to include some equations or diagrams (using another app to create them and pasting here) that would also be fine.

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[If you use this extra page, be sure to indicate which question you are answering.]