QUESTIONs - CHAPTer 16 TRADE AND GROWTH

Question 16.1
Section 16.4 discusses the Solow model, which forms the starting point of economic growth theory. The central equation of the model is given by: \( sA k^\alpha = (\mu + n)k \). This equation defines the steady-state equilibrium of the model.

**16.1A** What is a steady-state equilibrium?

**16.1B** What happens to output per capita if the capital-labour ratio is constant in the Solow model for a constant level of technology?

The graph above depicts the left-hand side and the right-hand side of equation 16.3.

**16.1C** What is measured on the vertical axis of the diagram?

**16.1D** Draw the effect of an increase in the population growth rate \( n \) in the graph. What happens to the steady-state equilibrium and why?

**16.1E** Draw the effect of an increase in the savings rate \( s \) in the graph. What happens to the steady-state equilibrium and why?

Question 16.2
Section 16.6 of the book discusses the structure and implications of the endogenous growth model.
16.2A What is the main difference between this growth theory and that of Solow?

16.2B What seems to be the key factor for a growing income per capita if you look at these two classes of growth models?

In the endogenous growth model, the rate of innovation in the economy is determined within the model. The explicit solution, derived in the appendix of Chapter 16, is:

\[
1 + g = \frac{F}{(1 + \theta)(F - L/\varepsilon)},
\]

where \( g \) is the rate of innovation, \( F \) is a parameter for the fixed cost of inventing a new variety, \( L \) is the labour force, \( \theta \) is the rate of time preference, and \( \varepsilon \) is the elasticity of substitution between varieties.

16.2C Based on the equation above, determine what happens to the rate of innovation if:
- \( F \), the fixed cost of inventing a new variety, increases
- \( L \), the labour force, increases
- \( \theta \), the rate of time preference, increases

16.2D Based on your knowledge of the structure of the endogenous growth model, explain intuitively why each of the effects in question 16.3C arises.

The United States government has launched a series of investigations into the abuse of market power by Microsoft, a producer of computer software. The company claims that its market power actually benefits its customers, as it is the best way to fulfill their needs.

16.2E Explain how the endogenous growth model is related to the discussion of the Microsoft case.

Question 16.3

Section 16.7 of the book evaluates the outcome of a number of computer simulations for the racetrack economy of the geographical economics model, introducing congestion costs to mitigate the economic incentives for agglomeration.

16.3A Explain why the endogenous growth model and the Solow model cannot explain the empirically observed large swings in prosperity.

16.3B Explain how the experiment in section 16.7 results in large swings in prosperity.

16.3C If we use the simulation results on the distribution of income for the world today, with very high transport costs in earlier times and rapidly dropping transport cost now, what does this imply for the future?
The simulations of section 16.7 illustrate the snowball effect of economic forces, for example by showing that the clustering of firms in a region as a result of increasing returns to scale make this region attractive for other firms in surrounding regions.

**16.3D** What does the above comment imply for the development of Africa? Do you think that there is a link with the 'brain drain' phenomenon?

**Question 16.4**

The theory of economic growth increasingly focuses on technological development and knowledge but how do we measure these? One approach is to look at the number of patents filed over a certain time period. The Excel file for question 16.4 contains data on the number of patents applied for at the European patent office, ranging from 1977 to 2004 and subdivided according to the country of origin.

**16.4A** Which countries apply most for European patents? Make a ranking for both 1977 and 2004.

**16.4B** Plot the number of patent applications from Norway and Finland from 1977 to 2004 in a graph. Can you explain the different developments?

**16.4C** Plot the total number of patent applications from 1977 to 2004. Can you explain the developments?

**16.4D** Do you believe registered patents are a good indicator of innovation in an economy?

**Question 16.5**

Try to find the paper "It's not factor accumulation: Stylised facts and growth models" by W. Easterly and R. Levine on the web or in your library. The paper uses the term total factor productivity (TFP) for the technology parameter A in the book.

**16.5A** Which stylised facts do the authors extract from their empirical research?

**16.5B** What is the role of capital accumulation for growth according to the authors?

**16.5C** What role does TFP play in explaining differences in growth rates across nations?

**16.5D** Do you see a role for the geographical economics model to better understand the differences in economic growth detected by the authors? Explain.

**Question 16.6**
A large part of Chapter 16 focuses economic growth theory, which started with the Solow model of economic growth. As described in section 16.4, the Solow model eventually evolves towards a steady state, where the economy follows a so-called balanced growth path.

**16.6A** At the balanced growth path, what is the growth rate of capital? And of output per capita?

**16.6B** Determine the steady state value of the capital-labor ratio, and of output per capita.

**16.6C** Now define \( k = \frac{K}{AL} \), \( y = \frac{Y}{AL} \) and let \( A \) grow at a constant rate \( g \). How does this affect your answers to questions 16.6A and 16.6B?

**Question 16.7**

An American tractor producer considers introducing a new type of tractor in Kenya. It costs 1 million Kenyan shilling to produce and transport one tractor to Kenya. However, before the tractor can be introduced the Kenyan dealer needs to stock spare parts and train new personnel to sell and repair the new machine. These fixed costs amount to 10 million Kenyan shilling.

At the request of the American tractor producer, a consultant has estimated the demand curve for the new type of tractor in Kenya. The figure below shows this demand curve. Furthermore the consultant notes that Kenya is currently levying an import tariff of 20 per cent over the value of tractors (both production and transportation).

*Figure: Tractor demand curve in Kenya*
16.7A If the fixed costs are ignored, what is the optimal price the American tractor producer will charge on the Kenyan market? Remember that the American producer is a monopolist.

16.7B Indicate in the figure what the consumer surplus, producer surplus and government revenue is at this optimal price.

16.7C Explain why the American tractor producer will not introduce the new tractor on the Kenyan market. What is the welfare loss for the Kenyan economy?

16.7D How can the tractor producer convince the Kenyan government that action is needed? What kind of action should the tractor producer recommend?

**Question 16.8**

In March 2001 some of the world’s largest pharmaceutical companies brought the South African government before the High Court in Pretoria. Their complaint was that the Medicines Act, which had not come into effect at that time, would undermine the patent rules of the World Trade Organization. An important part of the dispute was the provision that allowed for the parallel imports of patented AIDS medicines from other countries where these medicines are sold at a lower price. We analyse this court case using the following data for the market of AIDS medicines in South Africa.

Table: Market data on AIDS medicine in South Africa
<table>
<thead>
<tr>
<th>Number of medicines currently sold in South Africa</th>
<th>1,000,000</th>
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</thead>
<tbody>
<tr>
<td>Current price of the medicine in South Africa</td>
<td>US$ 9.34</td>
</tr>
<tr>
<td>Price of the medicine in Thailand</td>
<td>US$ 0.60</td>
</tr>
</tbody>
</table>

Initially, the South African AIDS patients have to buy their medicines from the large pharmaceutical companies for US$9.34. If the Medicine Act is activated cheaper medicines can be imported from Thailand, such that the price drops to US$0.60. Assume that the demand for AIDS medicines in South Africa is given by:

\[ p = a - bQ, \]

where \( p \) is the price for the medicine, \( Q \) the quantity demanded, and \( a \) and \( b \) are parameter constants. Normally, when conducting a policy study, one has to estimate this demand function. As this is beyond the scope of this question we quantify the demand function in a non-rigorous way.

16.8A What would be a reasonable value for the constant "\( b \)"? Explain your choice.

16.8B Using the value for "\( b \)" from question 16.8A, what is the value of the constant "\( a \)" in the demand function?

16.8C Draw the demand function for AIDS medicines in South Africa. Draw the change in welfare if the South African government passes the Medicines Act in the same figure.

16.8D What are the dynamic problems arising from the introduction of the Medicines Act?

16.8E Do you advise the South African government to introduce the Medicines Act or not? Why?