Question 9.1
According to the cost functions given by equation (9.3) country 1 (country 2) has a comparative and absolute advantage in sector A (sector B) manufactures. Modify equation (9.3) such that country 1 has an absolute advantage in the production of both sector A and B manufactures, but still only a comparative advantage in the production of sector A manufactures (Hint: introduce 4 types of $\beta$’s in equation (9.3))

Answer 9.1
The specification of the production functions for manufactures in the book (eq. 9.3) is:

\[ l_{A1i} = \alpha + \beta x_{A1i}; \quad l_{B1i} = \alpha + \beta x_{B1i} \]
\[ l_{A2i} = \alpha + \beta x_{A2i}; \quad l_{B2i} = \alpha + \beta x_{B2i}; \quad \pi \equiv \beta / \beta > 1 \]

Since $\beta > \beta$, country 2 requires more labor input to produce a certain amount of type A manufactures than country 1, which therefore has an absolute advantage in the production of type A manufactures. Similarly, country 1 requires more labor input to produce a certain amount of type B manufactures than country 2, which therefore has an absolute advantage in the production of type B manufactures. Obviously, in this case a country’s comparative advantage coincides with a country’s absolute advantage.

Now consider a slightly different specification for the production functions of manufactures in the two sectors and countries (using the fraction $0 < \xi < 1$):

\[ l_{A1i} = \alpha + \xi \beta x_{A1i}; \quad l_{B1i} = \alpha + \xi \beta x_{B1i}; \quad \xi \beta < \beta \]
\[ l_{A2i} = \alpha + \beta x_{A2i}; \quad l_{B2i} = \alpha + \beta x_{B2i}; \quad \pi \equiv \beta / \beta > 1 \]

Since $\xi \beta < \beta$, country 1 uses less labor input to produce a certain amount of type A manufactures than country 2. Similarly, since $\xi \beta < \beta$, country 1 also uses less labor input to produce a certain amount of type B manufactures than country 2. Therefore, country 1 has an absolute advantage in the production of both type A and type B manufactures.
manufactures. However, since \( \left( \frac{\xi}{\beta} \right) = \left( \frac{\xi}{\beta} \right) \) country 1 has a comparative advantage in the production of type A manufactures.

**Question 9.2**

On the website of this book you can find a small user friendly "Ricardo" simulation for the model described in section 9.3. Download the simulation and start it up. Now vary the elasticity of substitution from 2; 3; 4; .. ; to 10, by changing the numbers in red. Describe and explain what happens if the elasticity of substitution increases to:

i) The domestic share of the industry with comparative advantage.

ii) The domestic share of the industry with comparative disadvantage.

iii) Intra-industry trade and the share of GNP imported.

**Answer 9.2**

i) The domestic share of the industry with comparative advantage: for a given extent of comparative advantage the domestic share of the industry with comparative advantage declines as the elasticity of substitution increases.

ii) The domestic share of the industry with comparative disadvantage: for a given extent of comparative advantage the domestic share of the industry with comparative advantage increases as the elasticity of substitution increases.

iii) Intra-industry trade and the share of GNP imported: for a given extent of comparative advantage the level of intra-industry trade increases while the share of GNP imported decreases as the elasticity of substitution increases.

As it becomes easier to substitute between different varieties of manufactures the market power of the firms in the sector with comparative advantage decreases and so does their share in production in both countries.

**Question 9.3**

On the website of this book you can find a small user friendly "Ricardo" simulation for the model described in section 9.3. Download the simulation and start it up. Now vary the transport costs from 1.1; 1.2; 1.3; .. ; to 2, by changing the numbers in red. Describe and explain what happens if the transport costs increase to:
i) The domestic share of the industry with comparative advantage.

ii) The domestic share of the industry with comparative disadvantage.

iii) Intra-industry trade and the share of GNP imported.

**Answer 9.3**

i) The domestic share of the industry with comparative advantage: for a given extent of comparative advantage, the domestic share of the industry with comparative advantage *decreases* as the transport costs increase.

ii) The domestic share of the industry with comparative disadvantage: for a given extent of comparative advantage, the domestic share of the industry with comparative disadvantage *increases* as the transport costs increase.

iii) Intra-industry trade and the share of GNP imported: for a given extent of comparative advantage, the intra-industry trade level *increases* while the share of GNP imported *decreases* as the transport costs increase.

As the transport costs increase it becomes more attractive to provide goods locally, such that the share of the (exporting) sectors with comparative advantage declines as the transport costs increase.

**Question 9.4**

In the core model of Geographical Economics there is international labor mobility. In the Factor Abundance model discussed in this chapter there is no labor mobility between countries. Explain why the introduction of labor mobility is at odds with the analysis underlying the Factor Abundance model. (Hint: remember that labor is the endowment)

**Answer 9.4**

The driving force behind international trade flows in the factor abundance model is the relative availability of factors of production. If the factors of production can move freely between the various countries, there is no a priori reason to assume that there is a difference in the relative availability of factors of production, thus eliminating this basis for international trade flows.
Question 9.5
On the website of this book you can find a small user friendly "Factor Abundance" simulation, comparing the models described in sections 9.3 and 9.4. Download the simulation and start it up. Now vary the elasticity of substitution from 2; 3; 4; .. ; to 10, by changing the numbers in red. Compare, describe and explain what happens if the elasticity of substitution increases to:

v) The share of income spent on imports.
vii) Intra-industry trade.

Answer 9.5
As the elasticity of substitution increases for a given extent of comparative advantage:

i) The share of sector A firms in Country 1 decreases
ii) Domestic spending on sector A in Country 1 decreases
iii) The share of sector B firms in Country 1 increases
iv) Domestic spending on sector B in Country 1 increases
v) The share of income spent on imports decreases
vi) Intra-industry trade increases

As it becomes easier to substitute between different varieties of manufactures the market power of the firms in the sector with comparative advantage decreases and so does their share in production in both countries.

Question 9.6
On the website of this book you can find a small user friendly "Factor Abundance" simulation, comparing the models described in sections 9.3 and 9.4. Download the simulation and start it up. Now vary the transport costs from 1.1; 1.2; 1.3; .. ; to 2, by changing the numbers in red. Compare, describe and explain what happens if the transport costs increase to:
v) The share of income spent on imports.
vi) Intra-industry trade.

\textit{Answer 9.6}

As the transport costs increase for a given extent of comparative advantage:

i) The share of sector A firms in Country 1 decreases

ii) Domestic spending on sector A in Country 1 decreases

iii) The share of sector B firms in Country 1 increases

iv) Domestic spending on sector B in Country 1 increases

v) The share of income spent on imports decreases

vi) Intra-industry trade increases

As the transport costs increase it becomes more attractive to provide goods locally, such that the share of the (exporting) sectors with comparative advantage declines as the transport costs increase.

\textit{Question 9.7*}

According to Alan Deardorff (1998) the gravity equation (9.12) can also be founded on neo-classical trade theory (see section 2.2 for the neo-classical trade theory). Try to think of a neo-classical trade story that could result in a gravity equation and the kind of empirical results shown in Table 9.4

\textit{Answer 9.7*}

In a neo-classical model with homogenous goods and frictionless trade, the absence of impediments to trade makes producers and consumers indifferent to trading partners. Using identical homothetic preferences and imposing a simple rule to determine the trade flows across the world (compare also the discussion on the food flows in the simulations at p. 269 of the book), namely consumption of each good from country $i$ in country $j$
proportional to country $i$’s production of the good and country $j$’s income, it is fairly easy to show that the total trade flow $T_{ij}$ from country $i$ to country $j$ is ($Y = \text{income}$):

$$T_{ij} = \frac{YY_i}{Y_{\text{world}}}$$

This is a rudimentary ‘gravity’ equation, but without distance playing a role. Deardorff continues to develop the gravity equation itself, including distance, by assuming that each country is completely specialized in the set of goods it produces and distinguishing between free on board export prices and cost insurance and freight import prices. If $t_{ij}$ is the iceberg transport costs between countries $i$ and $j$, we get (for Cobb-Douglas):

$$T_{ij}^{f.o.b.} = \frac{YY_i}{t_{ij}Y_{\text{world}}}$$

Thus, if transport costs are related to distance, than so are the free on board trade flows, see Deardorff for further details.

**Question 9.8**

In the core model of Geographical Economics (see equation (3.25) manufacturing workers migrate if there are real wage differentials between regions, the speed at which they react to inter-regional real wage differences is given by the parameter $\eta$. A low (high) value for this parameter implies a weak (strong) reaction by manufacturing workers to real wage differences. Given the information in section 9.5 why do you think that $\eta$ is low for most countries? How could the reluctance of people to migrate, even if real wage differences are significant, be modeled?

**Answer 9.8**

Although the migration flows between countries are substantial in numbers of people, they are still relatively small as a percentage of the population. It is fair to say that migration flows are limited and do not lead to equal real wages in a strict ‘economic’ sense as measured here, not even within a country. There are many reasons why a person may not want to migrate to another city or region even if the real wage in that other city or region is higher. Someone may think the costs of moving outweigh the benefits, or someone may prefer the natural surroundings of a location, the climate, the friends and
relatives located there (or not located there), the city atmosphere, the history associated
with a location, etc. All these considerations should be part of the utility function in a true
economic sense, but are hard to model explicitly. What we could do instead is introduce a
threshold level of income differences, say $\chi$, below people will not find it worthwhile to
move between locations. In this case, if $w_1$ is the real wage in region 1, a long-run
equilibrium is reached in a two-region model as long as the real wage $w_2$ in region 2 does
not deviate more than the threshold level, that is for $w_2 \in (w_1 - \chi, w_1 + \chi)$. 