

Final Exam "International Trade"

February 23, 2011

Corrected Version, 01.03.2011

Question 1 (45%)

Suppose the United States and Cuba both produce sugar and cars. The USA is endowed with 480 units of labor and Cuba with 90 units of labor. The residents (=workers) of both countries maximize their utility by consuming the two goods in the proportion $C_1/C_2 = 2$, irrespective of relative prices (C_1 : consumption of cars; C_2 : consumption of sugar). These goods can be produced in both countries with constant labor coefficients according to the following table:

labor coefficients		
	Cars	Sugar
USA	4	4
Cuba	6	3

- Based on the figures in the table, define absolute and comparative advantage.
- Determine the autarky equilibria in both countries (relative prices, consumption and production).

Now suppose that after the U.S. has lifted its trade ban against Cuba, the two countries engage in free trade with each other.

- In the resulting free-trade equilibrium of the world goods market, will both countries be completely specialized? If so, how?
- What is the equilibrium relative price (p_1/p_2)?
- What are the relative quantities produced (Q_1/Q_2) and consumed (C_1/C_2) in equilibrium?
- What pattern of trade will emerge?
- How large is the growth effect of free trade for the two countries taken together?
- How are the gains from trade distributed between the two countries? Explain.

Question 2 (20%)

Consider a world with two countries (Home, Foreign) and two goods (X, Y). For Home, X is an exportable good whereas Y is import-competing. Assume Home spends 60% of its disposable income on Y and 40% on X. Foreign splits its consumption equally between X and Y.

Home has received a monetary transfer from Foreign over many years. After a severe political crisis, this support is terminated.

- a) What does the termination of the transfer payments imply for the terms of trade and for the living standards in Home and in Foreign?
- b) What would change if Home had the same consumption preferences as Foreign?
- c) What would change if a substantial share of income in both countries were spent on nontradables?

Question 3 (35%)

Consider a small open economy using capital and labor to produce two goods in a free-trade equilibrium. The capital-labor ratio is higher in the export industry than in the import-competing industry. The wage level is higher than abroad.

- a) What can you say about the factor endowment of this economy?
- b) Can the wage differential vis-à-vis foreign economies be reconciled with Heckscher-Ohlin theory?
- c) Assume now that the economy experiences an influx of capital from abroad into the export industry.¹ At unchanged prices of the two goods on the world market, what does this do to output and employment in the two industries and to the wage level in the short run where labor is mobile between industries, but capital is fixed in both industries?
- d) In contrast, what is the effect of the increase in the capital stock in the long run, with both labor and capital mobile between industries?

¹ In the original version, the specification 'into the export industry' slipped the translation. The sentence only read 'Assume now that the economy experiences an influx of capital from abroad.' In grading question 3 c), this omission was fully taken into account.

Abschlussklausur "International Trade"

23. Februar 2011

Aufgabe 1 (45%)

Nehmen Sie an, die USA und Kuba produzieren beide Zucker und Autos. Die Güter werden in den beiden Ländern nur mit Arbeitskraft hergestellt. Die Arbeitskoeffizienten sind konstant und haben folgende Werte:

Arbeitskoeffizienten		
	Autos	Zucker
USA	4	4
Kuba	6	3

Das Arbeitskräftepotenzial der USA beträgt 480, dasjenige Kubas 90. Die Einwohner (=Arbeitskräfte) beider Länder erzielen den höchsten Nutzen, wenn sie die beiden Güter unabhängig von relativen Güterpreisen im Verhältnis $C_1/C_2 = 2$ konsumieren (C_1 : Automobilnachfrage; C_2 : Nachfrage nach Zucker).

- a) Definieren Sie, gestützt auf die Angaben in der Tabelle, absolute and komparative Vorteile.
- b) Bestimmen Sie die Autarkie-Gleichgewichte der beiden Länder (relative Preise, Verbrauch und Produktion).

Nehmen Sie nun an, dass die USA ihr Handelsembargo gegen Kuba aufheben und die beiden Länder miteinander freien Handel aufnehmen.

- c) Werden die beiden Länder in dem resultierenden Freihandelsgleichgewicht vollkommen spezialisiert sein? Falls ja, wie?
- d) Bestimmen Sie den relativen Güterpreis (p_1/p_2) im Gleichgewicht.
- e) Bestimmen Sie die produzierten Mengen (Q_1/Q_2) and die konsumierten Mengen (C_1/C_2) im Gleichgewicht.
- f) Welches Handelsmuster wird sich einstellen?
- g) Wie groß ist der durch Freihandel hervorgerufene Wachstumseffekt für die beiden Länder zusammengekommen?
- h) Wie verteilen sich in diesem Beispiel die Handelsvorteile zwischen den beiden Ländern? Erläutern Sie.

Aufgabe 2 (20%)

Betrachten sie eine Welt mit 2 Ländern (Inland, Ausland) und zwei Gütern (X,Y). Für das Inland ist X das Exportgut und Y das importkonkurrierende Gut. Nehmen Sie an, dass das Inland 60% seines verfügbaren Einkommens für Gut Y ausgibt und 40% für Gut X. Das Ausland teilt seinen Konsum 50:50 zwischen X und Y auf. Das Inland hat über viele Jahre Transferzahlungen vom Ausland erhalten. Nach einer politischen Krise beendet nun das Ausland diese Leistungen.

- a) Wie wirkt sich die Einstellung der Transferzahlungen auf die terms of trade und auf den Lebensstandard in den beiden Ländern aus?
- b) Was würde sich ändern, wenn das Inland dieselben Konsumgewohnheiten wie das Ausland hätte?
- c) Was würde sich ändern, wenn beide Länder einen bedeutenden Teil des Einkommens für nichthandelbare Güter ausgaben?

Aufgabe 3 (35%)

Betrachten Sie eine kleine offene Volkswirtschaft, die mit Hilfe von Kapital und Arbeit zwei Güter produziert und sich in einem Freihandelsgleichgewicht befindet. Die Kapitalintensität der Produktion ist im Exportsektor höher als im importkonkurrierenden Sektor. Das Lohnniveau ist höher als im Ausland.

- a) Was können Sie über die Faktorausstattung dieser Volkswirtschaft sagen?
- b) Ist der Lohnunterschied gegenüber dem Ausland mit der Heckscher-Ohlin-Theorie zu vereinbaren?
- c) Nehmen Sie an, die Volkswirtschaft erfährt durch Kapitalimport einen Zuwachs an Kapital im Exportsektor. Wie wirkt sich dies unter der Annahme unveränderter Güterpreise auf dem Weltmarkt kurzfristig auf Output und Beschäftigung in den beiden Sektoren und auf die Lohnhöhe aus, wenn die Arbeit zwischen den Sektoren mobil ist, das Kapital jedoch in beiden Sektor sektorspezifisch ist?
- d) Wie wirkt sich demgegenüber die Zunahme des Kapitalbestandes langfristig aus, wenn sowohl Arbeit als auch Kapital zwischen den beiden Sektoren mobil sind?

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Outline of solution

Question 1

The assumed utility function implies $C_1 = 2C_2$ for both economies.

Production possibilities are given by

- $Q_2^{US} = 120 - Q_1^{US}$ for the US,
- $Q_2^{Cuba} = 30 - 2Q_1^{Cuba}$ for Cuba,
- $(Q_2^W = 150 - Q_1^W \text{ (for } Q_1^W \leq 120) \text{ and } Q_2^W = 270 - 2Q_1^W \text{ (for } Q_1^W \geq 120) \text{ for the world economy).$

- a) Absolute advantage is determined by comparing labor requirements, comparative advantage by comparing opportunity costs. The USA has an absolute advantage ($4 < 6$) as well as a comparative advantage ($4/4 < 6/3$) in the production of cars. Cuba has an absolute advantage ($3 < 4$) and a comparative advantage ($3/6 < 4/4$) in the production of sugar.
- b) In autarky equilibrium, quantities of consumption and production for each good are equal:
 USA: $C_1^{US} = Q_1^{US} = 80$; $C_2^{US} = Q_2^{US} = 40$; $(p_1/p_2)^{US} = 1$.
 Cuba: $C_1^{Cuba} = Q_1^{Cuba} = 12$; $C_2^{Cuba} = Q_2^{Cuba} = 6$; $(p_1/p_2)^{Cuba} = 2$.
- c) If both countries were completely specialized according to their comparative advantages, world production would be $Q_1^W = 120$ and $Q_2^W = 30$, which is inconsistent with the preferences of consumers. Hence, the U.S. must continue to produce sugar while Cuba will be completely specialized in the production of sugar.
- d) With the U.S. incompletely specialized, the equilibrium relative price in the world goods market coincides with the U.S. autarky relative price $p_1/p_2 = 1$.
- e) In equilibrium, relative world production and consumption quantities must satisfy $(Q_1^W/Q_2^W) = (C_1^W/C_2^W) = 2$. From $Q_1^{US} = 2(Q_2^{US} + Q_2^{Cuba})$, $Q_2^{US} = 120 - Q_1^{US}$, and $Q_2^{Cuba} = 30$, we get
 $Q_1^{US} = 100$; $Q_2^{US} = 20$; $C_1^{US} = 80$, $C_2^{US} = 40$ (unchanged consumption in the U.S.).
 $Q_1^{Cuba} = 0$; $Q_2^{Cuba} = 30$; $C_1^{Cuba} = 20$; $C_2^{Cuba} = 10$ (consumption increased by $2/3$ in Cuba).
- f) Cuba imports 20 units of cars from the US in exchange for 20 units of sugar.
- g) The aggregate production of sugar increases from 46 to 50 and the aggregate production of cars increases from 92 to 100. Thus, the growth effect of free trade amounts to 8,7%.
- h) Cuba gets all the benefits from trade in this example. For U.S. consumers, at an unchanged relative price, the consumption possibilities frontier does not move outward.

Question 2

- The termination of the transfer payments T means that disposable income falls in Home and rises in Foreign by T . At unchanged prices, this causes a demand shift of $0.1T$ from good Y to good X . As a consequence, p_x/p_y will rise – a terms-of-trade improvement for Home which mitigates its real income loss (the case envisioned by Bertil Ohlin).
- With equal consumption preferences in both countries the transfer itself, as well as its termination, does not affect patterns of demand and hence relative prices.
- The scenarios considered in a) and b) are both highly unrealistic. If instead there is a third, nontradable good which absorbs a substantial share of spending, both countries would import less. The case $m^H + m^F < 1$ would thereby become more likely. In that case, the loss of the transfer would be exacerbated by a terms-of-trade deterioration for Home.

Question 3

- Since the capital-labor ratio is higher in the export industry than in the import-competing industry, the economy, according to H-O logic, must be relatively well endowed with capital.
- The wage differential is inconsistent with the factor price equalization theorem. It can be reconciled with Heckscher-Ohlin theory
 - if the economy has a superior technology level;
 - if relative goods prices at home do not equalize with relative world market prices;
 - if, in a multi-commodity world, the economy operates in a different (more capital-intensive) cone of diversification than its foreign trading partners.
- Influx of capital into the export sector from abroad: At unchanged prices of the two goods in the world market, with labor mobile between industries, but capital in the short run tied down in the industry in which it was invested, the effects on production, factor allocation and the wage level are as illustrated by the transition from A to B in the two panels of the diagram on p.3 (X: Export industry; Y: import-competing industry).
 In the upper panel (L, w space), the extra capital in the X-sector shifts the marginal product of labor in that sector up from X_L to X'_L . As a consequence, the X-sector attracts labor from the Y-sector by pushing up the wage rate from A to B.
 In the lower panel (L, K space), the addition of capital is represented by ΔK . The origin O_X moves down to O'_X . Capital in the X-sector increases by ΔK , capital in the Y-sector is unchanged. Again, the induced reallocation of labor is represented by $(A \rightarrow B)$.
- In the long run when both labor and capital are mobile between industries, the Rybczinsky theorem applies. At unchanged goods prices, factor prices must return to the initial levels prevailing in point A (by Stolper-Samuelson). Thus, in the lower panel of the diagram, labor and capital are further reallocated from the Y-sector towards the X-sector so as to re-establish the initial capital-labor ratios in both sectors at point C. In the upper panel, this reallocation of capital raises the marginal product of labor in the X-sector even more (from X'_L to X''_L) while reducing the marginal product of labor in the Y-sector from Y_L to Y''_L . As a result, the allocation of labor moves to point C where the same wage level must prevail as initially in point A.

