28th of October 2012

International Trade and Investment

Exam 2nd of November 2012 – Answer key

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a. Derive expressions for the Stolper-Samuelson and the Rybczynski effects.

This follows from Feenstra p. 76 and the corresponding lecture note.

The Rybczynski effect is the change in the production of good i when the endowment of factor k changes, for any i and any k. To find the Rybczynski effect, remember that s_i is the share of product i in nominal GDP:

$$p_i y_i = s_i G$$

Take the log on both sides

$$lnp_i + lny_i = lns_i + lnG \Leftrightarrow$$

$$lny_i = lns_i + lnG - lnp_i$$

Now differentiating with regard to factor V_k, remembering that p_i is exogeneous and that the assignment already states the expressions for s_i and s_k.

$$\frac{\partial lny_i}{\partial lnV_k} = \frac{1}{s_i}\Phi_{ik} + s_k$$

The Stolper-Samuelson effect is the change in the price of one factor V_k when the price of the final good i changes, for any k and any i. Since I know s_k, the share of factor k in total nominal GDP, I have the following

$$s_k G = w_k V_k \Leftrightarrow$$

$$lnw_k = lns_k + lnG - lnV_k \Leftrightarrow$$

I can now differentiate with respect to prices. I already know the expressions for s_k and lnG differentiated with respect to prices, and V_k is exogeneous.

$$\frac{\partial lnw_k}{\partial lnp_i} = \frac{1}{s_k}\Phi_{ik} + s_i$$

The exam assignment does not explicitly ask students to interpret these results but the following comments may be provided:

The Rybczynski effect is the sum of a direct and an indirect effect. If the endowment of factor k increases, the direct effect is that output of product i will increase by s_k. For instance, if labor represents 30 per cent of GDP and endowment of labor is increased by one unit, the output of good i will increase by 0,3 (and so will the output of all other products). In addition to this direct effect there is an indirect effect: output of good i will also change by the covariance between factor k and good i in the GDP function, which is Φ_{ik}, relative to s_i.

The Stolper-Samuelson effect is the sum of a direct and an indirect effect. If the price of good i increases by one dollar, and labor represents 30 per cent of GDP, then the factor price of labor will increase by 0,3 (and so will all other factor prices). In addition to this direct effect there is an indirect effect: The factor price will also change by the covariance of factor k and good i in the GDP function, which is Φ_{ik}, relative to s_k.

b. Discuss whether the test supports the Stolper-Samuelson theorem

For an increase in each good price, there is at least one factor price that increases and at least one factor price that decreases. Although we cannot speak to real returns, we would conclude that the test supports the Stolper-Samuelson theorem.

c. Is your conclusion consistent with what you would have expected in a model with 2 output goods and 3 input goods?

Feenstra p. 71: yes, the generalized Stolper-Samuelson theorem continues to hold in a model with more factors than goods.

d. Would you expect the Rybczynski theorem to hold in such a model?

Feenstra p. 71: no, the generalization of the Rybczynski theorem does not hold in a model with more factors than goods. This has also been explained in the lecture note. The model now has a simultaneous causal structure where factor prices are determined along with outputs, so neither factor price equalization nor the Rybczynski effect hold.

e. Discuss what this means for the empirical testing of the model.

Feenstra p. 80 and the lecture note: All empirical tests of the Stolper-Samuelson and Rybczynski theorems rely on an assumption of 'non-joint production'. This excludes the case where outputs are produced jointly from one or more inputs. Students would be expected to be able to refer to the importance of this assumption, but should not be expected to give precise recommendations for how to respecify the model.

Question 2

Consider a country that imports capital-intensive goods and exports labor-intensive goods.

a. Explain why in a median-voter model, this country would be expected to introduce an import subsidy (you are not required to develop the median-voter model formally but to give a verbal reference to the results).

Feenstra p. 303 (this has also been extensively discussed in class). The median voter can always be expected to have less capital relative to the average in society and will therefore want policies that favor labor relative to capital. This will mean distorting the domestic price of capital-intensive products so they become cheaper than labor-intensive products (and via the Stolper-Samuelson theorem, this will then increase the factor price of labor). If the country is importing

capital-intensive products, theoretically the median voter would then use his influence to introduce an import subsidy that would make capital-intensive products cheaper.

b. Given that import subsidies are rarely seen in practice, how can the predictions of the median-voter model be tested emprically?

Same reference (and also extensively discussed in class). The model can still be tested by analyzing changes in tariffs (or non-tariff barriers) over time correlated with changes in the other parameters of the model, such as wealth distribution. If inequality decreases over time, the median voter will be relatively wealthier and have will less of a preference for protecting labor intensive products relative to capital-intensive products. Conversely, in a recession political pressure for protectionist measures for labor-intensive products can be expected to mount since the median voter is poorer and focuses singularly on his role as a provider of labor not as an owner of capital. Analyzed this way, the median-voter model gives quite realistic predictions. The student may note that most empirical studies look at inequality in terms of income distribution rather than distribution of wealth.

Question 3

Since 1980, the wages of highly-skilled labor in the US have risen relative to wages of unskilled labor. Discuss the main reasons for this development.

This discussion is the red thread of Feenstra chapter 4 and has also been treated in class. This change in relative prices in the US cannot be explained by the Stolper-Samuelson theorem since we cannot identify products that are intensive in highly-skilled labor and that have increased in price. Rather, prices of (finished) innovative products have plummeted in the same period due to the IT revolution.

Feenstra lists two explanations: the IT revolution has increased the marginal product of highly-skilled labor so that the factor unit price has increased without increasing the total factor share of GDP. And secondly, rather than apply the Stolper-Samuelson theorem directly, a model with trade in intermediate inputs can be constructed. If the US specializes in relatively complex production processes and imports inputs that are intensive in unskilled labor, this can also explain the relative increase in the wages of highly skilled labor.

Feenstra surveys a large number of empirical tests, most of which readily prove the importance of technology while being more inconclusive as to the role of outsourcing. He finally (p. 130) quotes his own study as concluding that both technology and outsourcing play significant roles.

The students should be given latitude in answering this question. It is important that the obvious Stolper-Samuelson explanation is discarded and that reference is made to the model of trade in intermediate inputs. Technology should also be listed as a factor.

Question 4

a. Do you expect factor price equalization to obtain?

Feenstra p. 90. We are outside the FPE set so we would not expect factor price equalization to obtain. It may be noted that the fact that we're outside the FPE 'cigar' in the middle is also the prerequisite for obtaining determinate solutions to the model.

b. Where in the continuum of outputs would you expect country A to specialize?

At point M, country A is relatively capital abundant and will therefore (the loose answer) specialize in high values of z or (the specific answer) the model can be solved for a value of z^*that will determine the pattern of trade. Country A will specialize in the continuum $[z^*; 1]$ and country B in $[0; z^*[$.