Problem Set 1

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Problem 1. Gains from Trade. Consider a world with two countries. In each country there is a representative agent. There are n commodities, some of which may be intermediate goods or primary factors of production. Compare two scenarios, one in which the first k commodities are freely traded and the remaining $n-k$ are non-tradable, and another in which the first $k+m$ commodities are freely traded and the remaining $n-k-m$ are non-tradable. Use superscript 1 refer to variables in the first of these scenarios and superscript 2 refer to variables in the second.

a. Under what conditions does trade in the extra m commodities generate aggregate welfare gains for the world economy? That is, if international transfer payments are possible, when will it be possible to construct a transfer scheme so that both countries enjoy higher welfare in the latter scenario compared to the former? (Hint: construct international transfers that allow each country to purchase its 1-bundle in the 2-scenario, and check if this transfer scheme is feasible.)

b. Suppose international transfers are not possible. Under what conditions can we be sure that the home country enjoys higher aggregate welfare in the latter scenario than in the former? (Hint: use revealed-preference logic.)

Problem 2. Non-traded Intermediate Goods. Imagine a constant-returns economy with the following production structure. There are three primary factors of production: capital, raw land, and raw labor, available in exogenously fixed supplies, K, E, and L respectively. These can be used to produce two intermediate goods: capital and raw land produce improved land, while capital and raw labor produce improved labor. Finally, improved land (B) and improved labor (H) produce food (F) and manufactures (M). The food sector is (improved)-land intensive. Let p_i be the price of factor or intermediate good i, for $i = K, E, L, B, H$. Let p be the relative price of food. Consider a country that exports manufactures and imports food in a competitive trade equilibrium. What are the distributional implications of trade in this economy? That is, consider the owners of capital, raw land and raw labor as three di§erent sets of households. Which of these households gain from trade, which lose, and under what conditions? You may use algebra, diagrams and/or logic to support your answers.

Problem 3. Factor Content of Trade and Factor Prices. There are three goods and three factors. In the free trade equilibrium, country 1ís output vector is $X = (20, 20, 10)$, the world output vector (including country 1) is $X = (100, 200, 200)$ and the output price vector is $P = (1, \frac{6}{5}, 1)$. All countries have an identical constant-returns fixed-coefficient technology, with the input coefficients given by the matrix

$$A = \begin{bmatrix} 2 & 1 & 1 \\ 1 & 2 & 1 \\ 1 & 1 & 2 \end{bmatrix}$$

where the element in row i and column j denotes the input of factor i per unit output of good j. All countries have identical homothetic preferences.

a. Calculate country 1ís pattern of goods trade, and its factor content. Calculate the factor prices.

b. Suppose the price of good 1 increases. Is it the case that all three factors will either benefit or lose unambiguously, no matter what their consumption patterns happen to be? If not, which factorís real reward is affected ambiguously?