Equilibrium World Price

Firms in a particular country will wish to export any commodity for which the world price exceeds the domestic price and import any commodity for which the world price is less than the domestic price. The equilibrium world price for a commodity is the price that equates total world exports and imports, or in other words, eliminates all shortages or surpluses of the commodity on the world market.

Consider a world with just two countries, A and B. In country A, domestic demand and supply of a commodity are given by $D_A = f_A(P)$ and $S_A = g_A(P)$, respectively, where D_A is the quantity demanded at price P and S_A is the quantity supplied. We assume normal shapes for the demand and supply curves, so that $f_A'(P) < 0$ and $S_A = g_A'(P) > 0$. To find whether A will wish to import or export this commodity, we will construct the "excess demand," $ED_A(P)$, for this commodity. Excess demand is simply the difference between domestic quantity demanded and domestic quantity supplied, as a function of the price: $ED_A(P) = f_A(P) - g_A(P)$. Note that $ED_A(P) = 0$ at the domestic equilibrium price. However, when evaluated at the world price, this excess demand may be positive, in which case A will wish to import the difference; negative, in which case A will wish to export the difference; or zero, in which case A can exactly satisfy all its desired consumption of the product with its domestic production. Alternatively, we might have constructed A's "excess supply" as the domestic quantity supplied minus the domestic quantity demanded, or $ES_A(P) = g_A(P) - f_A(P) = -ED_A(P)$. In this case, positive excess supply reflects desired exports and a negative value indicates desired imports.

For now, let's assume with no loss of generality that A will be an importer at the world price and B will be an exporter.

Since we are assuming B will be an exporter, let's now construct this excess supply function for country B: $ES_B(P) = g_B(P) - f_B(P)$, where $g_B(P)$ and $f_B(P)$ are B's domestic supply and demand for this commodity, respectively. World equilibrium requires that the excess domestic demand for A equals B's excess domestic supply: $ED_A(P) = ES_B(P)$. (Alternatively, equilibrium requires that the sum of the two countries' excess demands equals zero.) The equilibrium world price is the price that satisfies this equality.

For concreteness, suppose we have the following (this example mirrors the one in the text.) Country A represents the United States. Its domestic demand is given by $f_A(P) = 200 - 100P$ and its domestic supply by $g_A(P) = 100P$. Its excess demand is then the difference: $ED_A(P) = 200 - 100P - 100P = 200 - 200P$. The domestic equilibrium price is \$1.00, and the U.S. will import at any price below \$1.00 ($ED_A(P) > 0$) and export at any price above \$1.00 ($ED_A(P) < 0$.)

Country B is Canada. Its domestic demand is $f_B(P) = 175 - 100P$ and domestic supply is $g_B(P) = 25 + 100P$. Its excess supply is $ES_B(P) = 25 + 100P - (175 - 100P) = -150 + 200P$. Canada's domestic equilibrium price is \$.75, and will export at any price above \$.75 ($ES_B(P) > 0$) and import at any price below \$.75 ($ES_B(P) < 0$.)

To find the world equilibrium price, we equate the U.S. excess demand (U.S. imports) to Canada's excess supply (Canadian exports): $200 - 200P = -150 + 200P$. Solving this for P, we find the equilibrium world price to be $P_e = \$.875$, or approximately \$.88. Inserting this value back into $ED_A(P)$ and $ES_B(P)$, we find that the U.S. imports 25 and Canada exports 25 of this commodity.

This analysis can be extended to any number of countries. Simply construct the excess demand function for each country. At the equilibrium world price, some of the N countries will have positive excess demands (importers) and others will have negative excess demands (exporters.) Self-sufficient countries will have excess demand of zero at the world price. Equilibrium requires that all countries' excess demands sum to zero: $\sum_{i=1}^{N} ED_i(P) = 0$. The price that satisfies this condition is the equilibrium world price.