ARE 433: Hints on the Partial Equilibrium Framework
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As requested, I am providing a few additional background notes on the partial equilibrium model presented in class. I first want to reinforce a few points.

1. All policies, even those that are considered to be "domestic," policies (such as acreage controls, price supports, etc.) will affect a country's status in international markets. A country may be too small (i.e., a price taker) to affect international prices. In this case, the effects are limited to changes in the country's level of exports or imports. A larger country, in contrast, may affect international prices as well. This primary fact lies beneath most of the ongoing trade disputes in the WTO.

2. The *autarky* price refers to the price for a market that is insulated from international trade. In other words, the price where the domestic supply and demand cross one another–the point that you have become accustomed to seeing as the relevant market price.

3. If a country's autarky price is below the world price, they will be an exporter. If a country's autarky price is above the world price, they will be an importer.

4. As we will demonstrate below—the ES/ED function is *always* more elastic than either the domestic demand or domestic supply function. The only exception is in the case of completely inelastic S or D functions.

5. We commonly use two (or three) panels in a diagram to illustrate the effects of a policy. The first is the internal market and the second represents a "trade region." If we are also wanting to see the effects on the country's trading partner, we will also add a third panel, representing the foreign country's internal market. If the home country is an exporter, the foreign country is naturally an importer and vice versa.

Consider the simple case of an exporting country. This country is too small to affect the world price and thus they are a price taker at the price P_w. The diagram below illustrates market conditions for the country. In a case of autarky, the prevailing price and quantity is P_a and Q_a. Producer surplus is $C + D$ and consumer surplus is $A + B + E$. ES (representing the supply of exports) is given by the horizontal difference in domestic supply and demand (ES).

Now, what happens when the market is opened to trade? We know a few things—(1) there will be gainers and losers; (2) the gainers will gain more than the losers will lose; (3) in the case of an exporting country, producers gain from trade and consumers lose.

When the domestic market is opened to trade, consumption falls to Q_c and production rises to Q_p. Exports are given by the difference $Q_e = Q_p - Q_c$. Producer surplus rises by $B + E + F$, with $B + E$ being transferred away from consumers (their loss) and F being the new surplus (economic welfare) created by trade.

Now, let's consider elasticity relationships. I'm going to change the notation a little over what we used in class to make this more general. Define T as the amount traded. T is positive if the country exports and negative if the country imports. Thus,

$$T = Q^S - Q^D, \tag{1}$$

where Q^S is domestic supply and Q^D is domestic demand. The supply and demand relationships are given in quantity-dependent functions of prices (and other shifters). Thus, we can differentiate

this relation with respect to prices:

$$\frac{dT}{dP} = \frac{dQ^S}{dP} - \frac{dQ^D}{dP}. \tag{2}$$

Multiply both sides of this equation by P/T:

$$\frac{P}{T}\frac{dT}{dP} = \frac{P}{T}\frac{dQ^S}{dP} - \frac{P}{T}\frac{dQ^D}{dP}. \tag{3}$$

Now multiply the second term to the right of the equal sign by a conveniently chosen one Q^S/Q^S. Likewise, multiply the third term by Q^D/Q^D. This yields:

$$\frac{P}{T}\frac{dT}{dP} = \frac{P}{T}\frac{dQ^S}{dP}\frac{Q^S}{Q^S} - \frac{P}{T}\frac{dQ^D}{dP}\frac{Q^D}{Q^D}, \tag{4}$$

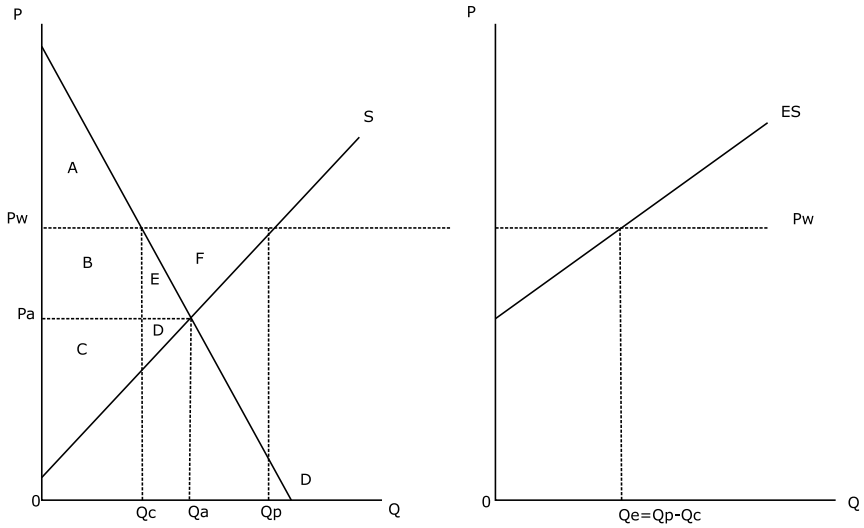
or, collecting terms:

$$\frac{dT}{dP}\frac{P}{T} = \frac{Q^S}{T}\frac{dQ^S}{dP}\frac{P}{Q^S} - \frac{Q^D}{T}\frac{dQ^D}{dP}\frac{P}{Q^D}. \tag{5}$$

In terms of elasticities (e.g., you know $\frac{dQ^D}{dP}\frac{Q^D}{P} = E_D =$ the price elasticity of demand), this implies:

$$E_T = \frac{Q^S}{T}E_S - \frac{Q^D}{T}E_D, \tag{6}$$

or that the elasticity of the ES/ED function is a weighted sum of the elasticities of domestic supply and demand. Note that since we know by law of demand that E_D is always negative, this implies that E_T will always be more elastic than either E_S or E_D.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