# ECON 403: Agricultural Economics and Policy
# MIDTERM EXAMINATION

February 15, 2019 NAME: _____

On the next page is a three-panel trade model. In the left-hand panel are the demand and supply curves in country A for some good Q. In the right-hand panel are the demand and supply curves for country B for the same good. Both A and B are large countries in the sense that their production and consumption affect world-level prices. Assume no shipping and handling costs.

**(a)** In the middle panel, draw the excess demand (ED; also referred to as import demand) and excess (export) supply (ES) curves for A and B, respectively. Be sure to label the curves.

**(b)** Label the equilibrium world price in free trade as $P^W$, and indicate the quantities consumed and produced in each country, as well as the quantity of good Q traded (label this $M_o$). (For convenience use labels A and B to denote quantities in the two countries, rather than $Q_B$, say.

**(c)** Suppose that country B imposes a specific per unit export tax of $\$t$. Show the new equilibrium price in country A and in country B, plus the new level of good Q traded (label this $M_1$). Also indicate the new quantities produced and consumed in each country.

**(d)** Label the areas in the right-hand panel with letters a, b, c, …, and use these areas to find the following. Relative to free trade (i.e., relative to $P^W$), what is the

**(i)** change in consumer surplus in country B?

ANSWER: $\Delta CS = a + b$

**(ii)** change in B's producer surplus?

ANSWER: $\Delta PS = -[\ a + b + c + d + e\ ]$

**(iii)** change in the government revenue in B?

ANSWER: $\Delta$ Government Revenue $= d + f$

**(iv)** total change in B's welfare. Explain *why/whether* B's export tax makes country B better off.

ANSWER: $\Delta W = f - c - e$

The total effect of an export tax imposed by B is ambiguous. It depends on the size of the government revenue and the dead weight losses that result from over consumption and under production in country B.

**(e)** Label the areas in the left-hand panel using Greek letters $\alpha$, $\beta$, $\lambda$, $\pi$, …. Relative to free trade, what is the

**(i)** change in A's consumer surplus?

ANSWER: $\Delta CS = -[\ \alpha + \beta + \lambda + \pi\ ]$

**(ii)** change in A's producer surplus?

ANSWER: $\Delta PS = \alpha$

**(iii)** change in government revenue in country A?

ANSWER: The government of country A imposes no tax and receives no revenue

**(iv)** total change in A's welfare? Explain *why/whether* B's export tax makes A worse off.

ANSWER: $\Delta W = = -[\beta + \lambda + \pi]$

**(f)** Define global welfare as the sum of consumer surpluses, producer surpluses, and government revenues for each country.

**(i)** Using the labeled areas from the graph, what is the effect of the export tax on global welfare?

ANSWER: $\Delta W^{global} = f - [\beta + \lambda + \pi + c + e] = -[\beta + \pi + c + e]$ because $f = \lambda$

**(ii)** Does the export tax raise/lower/have an ambiguous effect on global welfare?

ANSWER: The export tax has a negative effect on global welfare as shown because $f = \lambda$.

**(g)** Suppose B were to employ a voluntary export restriction (quota) leading to an equivalent amount of exports as does an export tax *t*.

**(i)** Would A be better off/worse off/indifferent in this case? Explain.

ANSWER: Country A is indifferent as to whether B uses an export tax or quota to restrict trade. A faces the same import price as before. The difference is now that the foreign producers (country B) now receive the government revenue, previously collected as a tax by the foreign government. It is a matter of who gets the rents from the restricted output.

**(ii)** Would B producers be better off/worse off/indifferent if they used a quota instead of an export tax? Explain.

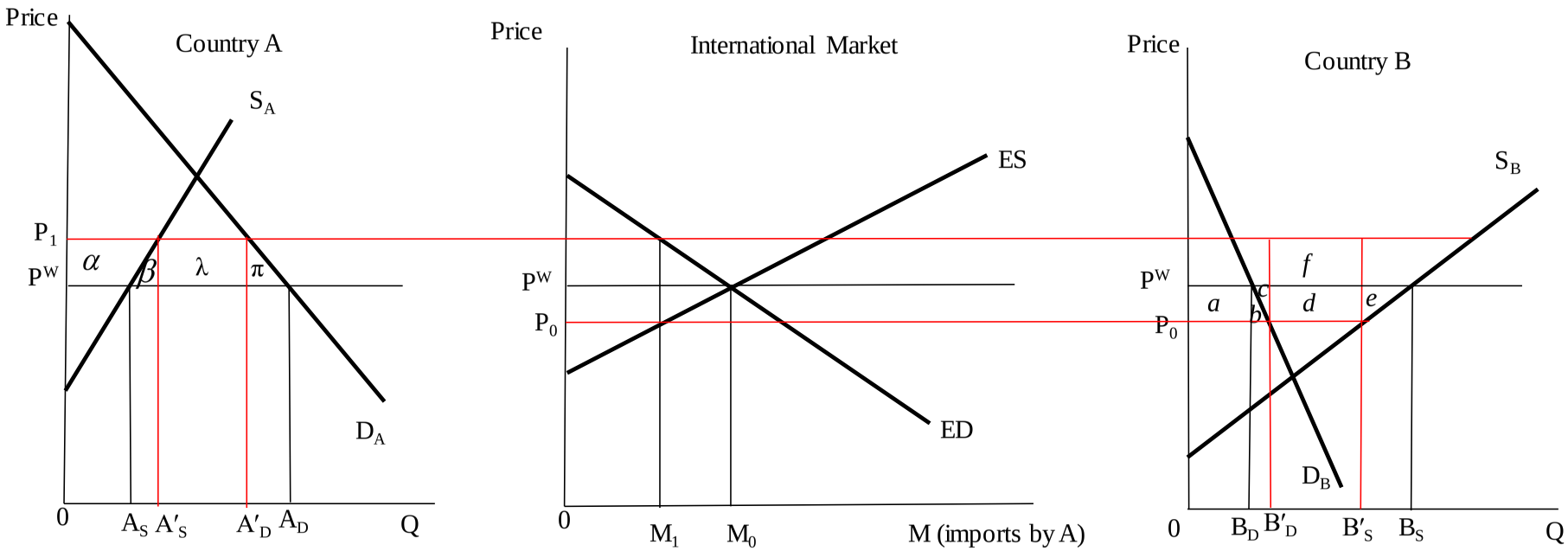
ANSWER: Country B producers will definitely better off with a quota than an export tax. With the tax they have to pay area $(d + f)$ to the government, but with an export quota they would receive this money in the form of a quota rent.

**Ques 2:** What are the main factors that have contributed to the expansion of agricultural output during the period of the so-called Green Revolution (from about 1960s through the early 2000s)? (*20 marks*)

The Green Revolution refers to the period when advances in agricultural research and development led to a variety of yield and performance enhancing advances summarized as follows: (1) new and improved crop varieties as a result of traditional crop breeding; (2) greater use of fertilizers; (3) development and greater use of herbicides and pesticides; (4) machinery improvements leading to economies of scale and less soil degradation; and a fertilization effect caused by rising atmospheric concentrations of $CO_2$. Crop yield improvements were NOT due to genetic engineering as this came later and is still not everywhere acceptable.

**Ques 3:** What is meant by the Amber Box of the Agreement on Agricultural? What is its intention? (*20 marks*)

Price and other support payments that distorted production are included in the Amber Box of the WTO's Agreement on Agriculture. De minimis limits (5% of gross value of output for developed and 10% for developing countries) of support are identified beyond which countries cannot go. The policies in the amber box are to be reformed so that production is decoupled from production – incentives to produce more are to be removed over time.


Price
Country A
$S_A$
$P_1$
$P^W$
$\alpha$
$\beta$
$\lambda$
$\pi$
$D_A$
0
$A_S$ $A'_S$
$A'_D$ $A_D$
Q
Price
International Market
ES
$P^W$
$P_0$
ED
0
$M_1$
$M_0$
M (imports by A)
Price
Country B
$S_B$
$P^W$
$P_0$
$f$
$a$
$b$
$c$
$d$
$e$
$D_B$
0
$B_D$ $B'_D$
$B'_S$ $B_S$
Q