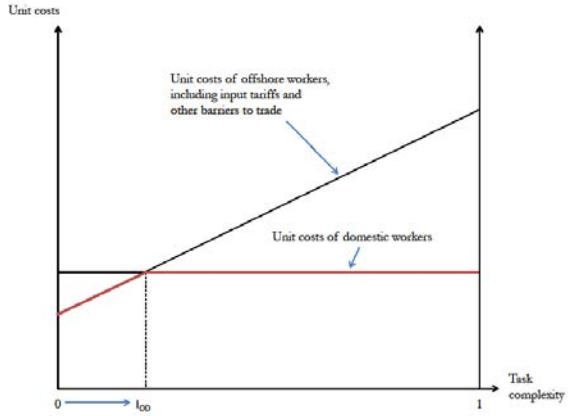
X2015W
Correction guide

International Trade and Investment

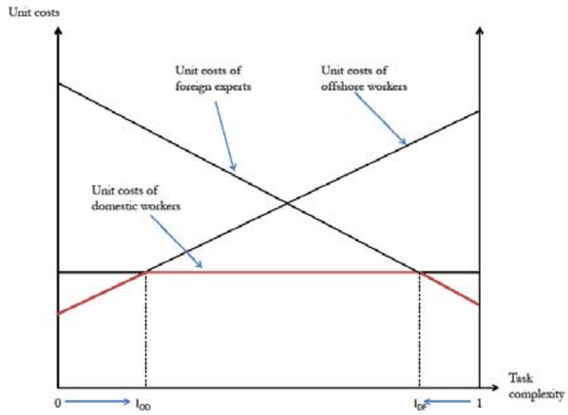
Question 1

a) The unit cost curve of employing offshore workers drop since it is now less expensive to offshore tasks. Some of the least complex tasks are now performed by offshore workers. Domestic workers' share of employment in sector *s* has decreased and the average complexity of tasks performed domestically has increased; i.e. task-upgrading of domestic work force. This is the substitution / displacement effect.



b) The net effect of offshoring on the employment of domestic workers is theoretically ambiguous due to the productivity/ cost-saving effect: The lower cost associated with hiring offshore workers to perform the low complexity tasks increases the efficiency of production allowing firms to expand thereby increasing labor demand.

c) The effects on relative and total employment are similar to those in 1.a-b but the effect on the average task complexity of domestic workers is opposite; i.e. task-downgrading.



Ad 2.a)
Unit-cost functions:

$$c_i(w,r) = \min_{L_i,K_i} \left(wL_i + rK_i | f_i(L_i,K_i) \geq 1 \right)$$

Insert optimal input choices in unit-cost function:

$$\begin{aligned} c_i(w,r) &= w \cdot L_i^* + r \cdot K_i^* \\ &= w \cdot \left(\frac{\alpha_i}{1-\alpha_i} \frac{r}{w} \right)^{1-\alpha_i} y_i + r \cdot \left(\frac{1-\alpha_i}{\alpha_i} \frac{w}{r} \right)^{\alpha_i} y_i \\ &= \left[\left(\frac{\alpha_i}{1-\alpha_i} \right)^{1-\alpha_i} + \left(\frac{1-\alpha_i}{\alpha_i} \right)^{\alpha_i} \right] \left(w^{\alpha_i} r^{1-\alpha_i} y_i \right) \end{aligned}$$

Calculate labor's cost share:

$$\begin{aligned} \theta_{iL} &= \frac{wL_i^*}{c_i(w,r)} \\ &= \frac{w \left(\frac{\alpha_i}{1-\alpha_i} \frac{r}{w} \right)^{1-\alpha_i} y_i}{\left[\left(\frac{\alpha_i}{1-\alpha_i} \right)^{1-\alpha_i} + \left(\frac{1-\alpha_i}{\alpha_i} \right)^{\alpha_i} \right] \left(w^{\alpha_i} r^{1-\alpha_i} y_i \right)} \\ &= \frac{\left(\frac{\alpha_i}{1-\alpha_i} \right)^{1-\alpha_i} \left(w^{\alpha_i} r^{1-\alpha_i} \right)}{\left[\left(\frac{\alpha_i}{1-\alpha_i} \right)^{1-\alpha_i} + \left(\frac{1-\alpha_i}{\alpha_i} \right)^{\alpha_i} \right] \left(w^{\alpha_i} r^{1-\alpha_i} \right)} \\ &= \frac{\left(\frac{\alpha_i}{1-\alpha_i} \right)^{1-\alpha_i}}{\left[\left(\frac{\alpha_i}{1-\alpha_i} \right)^{1-\alpha_i} + \left(\frac{1-\alpha_i}{\alpha_i} \right)^{\alpha_i} \right]} \\ &= \frac{1}{1 + \frac{1-\alpha_i}{\alpha_i}} \\ &= \alpha_i \end{aligned}$$

Ad 2.b)
In equilibrium, zero-profit condition holds:

$$p_i = c_i(w,r)$$

Totally differentiate and re-arrange:

$$dp_i = L_i^* dw + K_i^* dr$$

$$\implies \frac{dp_i}{p_i} = \frac{wL_i^*}{c_i}\frac{dw}{w} + \frac{rK_i^*}{c_A}\frac{dr}{r} \Leftrightarrow$$

$$\widehat{p}_i = \alpha_i \widehat{w} + (1-\alpha_i)\widehat{r}$$

Obtaining an expression for wage changes:

$$\begin{aligned}
\widehat{p}_A &= \alpha_A \widehat{w} + (1-\alpha_A)\left(\frac{1}{1-\alpha_M}(\widehat{p}_M - \alpha_M \widehat{w})\right) \\
&= \widehat{w}\left(\alpha_A - \alpha_M \frac{1-\alpha_A}{1-\alpha_M}\right) + \frac{1-\alpha_A}{1-\alpha_M}\widehat{p}_M \\
&= \widehat{w}\left(\frac{\alpha_A - \alpha_A\alpha_M - \alpha_M + \alpha_M\alpha_A}{1-\alpha_M}\right) + \frac{1-\alpha_A}{1-\alpha_M}\widehat{p}_M \\
&= \widehat{w}\left(\frac{\alpha_A - \alpha_M}{1-\alpha_M}\right) + \frac{1-\alpha_A}{1-\alpha_M}\widehat{p}_M
\end{aligned}$$

$$\begin{aligned}
\implies \widehat{w} &= \frac{1-\alpha_M}{\alpha_A - \alpha_M}\widehat{p}_A - \frac{1-\alpha_A}{\alpha_A - \alpha_M}\widehat{p}_M \\
&= \frac{(1-\alpha_M)\widehat{p}_A - (1-\alpha_A)\widehat{p}_M}{\alpha_A - \alpha_M}
\end{aligned}$$

If $\widehat{p}_A = 2 > 0 = \widehat{p}_M$, $\alpha_A = 0.7$ and $\alpha_M = 0.2$ then:

$$\widehat{w} = \frac{(1-0.2)2 - (1-0.7)0}{0.7-0.2} = \frac{1.6}{0.5} = 3.2$$

That is, wages increase by 3.2 percent if the price of agricultural goods increase by 2 percent. It is straightforward to show that $\widehat{r} = -0.8$. This illustrates the Stolper-Samuelson Theorem: An increase in the relative price of a good will increase the real return to the factor used intensively in that good and reduce the real return to the other factor.

Ad 2.c)
With no capital mobility, labor will flow between Agriculture and Manufacturing until the following equilibrium condition is satisfied:

$$w = p_A \frac{\partial f_A(L_A, K_A)}{\partial L_A} = p_M \frac{\partial f_M(L_M, K_M)}{\partial L_M}$$

$$= p_A \alpha_A L_A^{\alpha_A - 1} K_A^{1-\alpha_A}$$

With an exogenous change in p_A, the increase in w is:

$$dw = dp_A \frac{\partial f_A(L_A, K_A)}{\partial L_A} + p_A \frac{\partial^2 f_A(L_A, K_A)}{\partial L_A^2} dL_A$$

$$\implies \frac{dw}{dp_A} = \frac{\partial f_A(L_A, K_A)}{\partial L_A} + p_A \frac{\partial^2 f_A(L_A, K_A)}{\partial L_A^2} \frac{dL_A}{dp_A}$$

$$< \frac{\partial f_A(L_A, K_A)}{\partial L_A} = \frac{w}{p_A}$$

The strict inequality follows from the fact that $\frac{dL_A}{dp_A} > 0$ — that is, labor flows into Agriculture as the price of agricultural goods increase, combined with assuming an increasing, but concave, production function for which it holds that $\frac{\partial^2 f_A(L_A, K_A)}{\partial L_A^2} < 0$. It can easily be shown that the constant returns-to-scale Cobb-Douglas production function has this property.

It can therefore be shown that:

$$\frac{dw}{w} < \frac{dp_A}{p_A}$$

That is, workers nominal wages increase and they buy more of the Manufacturing good whose price is fixed. However, the workers' real wage in terms of the agricultural good has declined. Therefore, the price change has an ambiguous effect of the welfare of workers. So who gains? It must be the capital owners. As $\widehat{p}_A > \widehat{w}$, the zero-profit profit condition dictates $\widehat{r}_A > \widehat{p}_A$ for it to hold. That is, owners of Agriculture-specific capital are better off.

Question 3

a) In the monopolistic competition model of **Melitz (2003)**, firms differ in terms of productivity and the most productive firms export to international markets.

b) The Law of Comparative Advantage states that a country should, on average, **export** the goods that have lower relative autarky prices compared to other countries.

c) In a Ricardian trade model with two goods and two countries, **comparative** advantage determines the trade pattern, while **absolute** advantage determines the wage level.

d) The monopolistic competition model of Krugman predicts that larger economies export more through the **extensive** margin.

e) According to Anderson and van Wincoop (2003), national borders reduce international trade relative to internal trade more for smaller economies.

f) Imagine offshoring is estimated to have a positive effect on the wages of low-skilled workers. This finding is consistent with the **productivity** effect being larger than the **substitution** effect.