Krugman's Love-of-Variety Model of International Trade

ECO 2304: Topics in International Trade

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Love of Variety

- Next week we will review the Melitz model. It is therefore useful to understand its precursor, Krugman's love-of-variety model with identical firms. Melitz took this model and added heterogeneous firms to it.
- Krugman actually has two models:
  - In his AER (1980) paper he assumes CES preferences. Let σ be the constant elasticity of substitution. It is also equal to the elasticity of demand. Hence, the elasticity of demand is constant.
  - In his JIE (1979) model he allows the elasticity of demand to be variable.
- Today we will review the AER version. In week 4 we will review the JIE version.
- To gain familiarity with the AER version, and as a precursor to reading the Melitz model, you must do the problem set.

Competition and Trade (Krugman, JIE, 1979)

- Consumers value variety:

$$U = \Sigma_{i=1}^{N} (q_i^d)^{(\sigma-1)/\sigma}$$

where i indexes the n firms (varieties), q_i^d is consumption, and σ is the elasticity of demand ($\sigma > 1$). There are L consumers so that total demand is Lq_i^d.

- Labour demand for firm i is given by

$$l_i = f + q_i/\varphi$$

where productivity φ is the same for all i and, because all firms are identical, $q_i = Lq_i^d$.

- Supply equals demand for labour:

$$L = \Sigma_i (f + q_i/\varphi)$$

- In the symmetric equilibrium we can ignore the i subscripts.

Love of Variety (Continued)

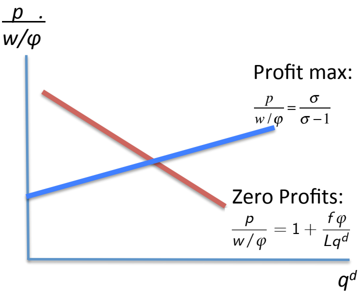
- **Profit maximization:** $MR = MC$. $MR = p\left(1 - \frac{1}{\sigma}\right) = p\frac{\sigma-1}{\sigma}$. $MC = w/\varphi$:

$$\frac{p}{w/\varphi} = \frac{\sigma}{\sigma - 1}. \qquad (1)$$

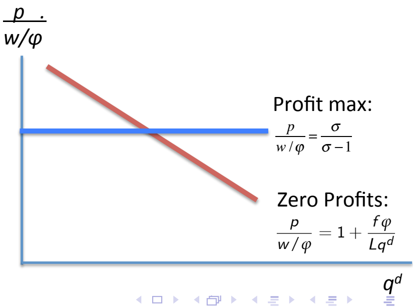
- **Zero profits:** $pq = (f + q/\varphi)w$ or, since $q = Lq^d$:

$$\frac{p}{w/\varphi} = 1 + \frac{f\varphi}{Lq^d}. \qquad (2)$$

Krugman (JIE, 1979)

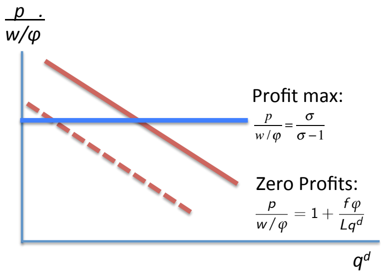


Krugman - CES (AER, 1980)



Competition and Trade (Continued)

Krugman - CES (AER, 1980)



- Trade integration means a rise in L: the zero-profit condition shifts in.
- While this reduces per capita consumption of each variety, it raises the number of varieties. Since consumers love variety, the net effect is an increase in welfare.
- Specifically, $d \ln N / d \ln L = 1$ and $d \ln U / d \ln L = 1/\sigma > 0$.

Proofs of $d \ln N / d \ln L = 1$ and $d \ln U / d \ln L = 1/\sigma > 0$

1. Equating (1) and (2) and simplifying yields
$$Lq^d/\varphi = (\sigma - 1)f. \tag{3}$$
Labour demand and $q = Lq^d$ imply $l = f + Lq^d/\varphi$. Hence $l = f + (\sigma - 1)f = \sigma f$.
2. Total employment (L) equals employment per firm times the number of firms ($l \times N$). Hence $N = L/l$. But $l = \sigma f$ so that
$$N = \frac{L}{\sigma f}.$$
and $d \ln N / d \ln L = 1$.
3. From (3), $q^d = (\sigma - 1)fL/\varphi$. Hence:
$$U = N(q^d)^{(\sigma-1)/\sigma} = \frac{L}{\sigma f}\left(\frac{(\sigma-1)f\varphi}{L}\right)^{(\sigma-1)/\sigma} = \left(\frac{L\varphi^{\sigma-1}(\sigma-1)^{\sigma-1}}{f\sigma^{\sigma}}\right)^{1/\sigma}$$
so that $d \ln U / d \ln L = 1/\sigma$.