TWTS

Cotton goes to China

Trump

What are goals?

1. Reduce trade deficits? Bilateral, overall?
2. Protect employment? In which industries?
3. Protect IP? By interfering in joint venture relationships?
4. Gain Mkt. access?

Negotiating strategy: credible threats require that carrying them put hurts the other party more than it hurts you.

Steel?

S and M

Sub-model of supply

1. Technology
2. Profit-max behavior
3. Labor-mkt equilibrium
4. Supply function

$$C^S = F(p).$$

Sub-model of demand

Demand depends on relative prices.

Equilibrium

Autarkic

Free trade

Lessons and previews

1. **IF** economy is perfectly competitive (no externalities, public goods, mkt power), **then**

   a. Pattern of trade determined by comparative advantage (whichever country has the lower AERP exports).

   b. Moving from autarky to free trade is a PPI.

2. Other sources of lower AERP?

a. Institutions (TWTS)

b. Ext. economies of scale (why wool in Florence, textiles in Prato, watches in Switzerland, houseboats in Kentucky, carpet in Dalto Georgia, and on and on)

Strategy

Discrete, then real numbers.

The following chart expresses the technology, i.e., the connection between inputs (labor in this case) and ouputs (vino and cloth in this case), with a description of marginal products for the two goods, i.e., the MPL_V and the MPL_C columns. The **value** of the marginal products in currency units per unit of time are expressed in the columns labeled $P_V \times MPL_V$ and $P_C \times MPL_C$.

$$P_V = 2,\ P_C = 1.$$

L_i	MPL_V	$P_V \times MPL_V$	MPL_C	$P_C \times MPL_C$
1	8	16	12.2	12.2
2	7	14	11.2	11.2
3	6	12	10.2	10.2
4	5	10	9.2	9.2
5	4	8	8.2	8.2
6	3	6	7.2	7.2
7	2	4	6.2	6.2
8	1	2	5.2	5.2

What does the desire for profit maximization tell us? Consider different possible values of w (for simplicity, we only consider integer values), and the associated profit-maximizing choices of EJ and LW:

EJ: if w=10, hires 3 or 4 workers; if w=9, hires 4 workers; if w=8, hires 4 or 5 workers; if $w = 7$, hires 5 workers, and so on.

LW: if w=10, hires 3 workers; if w=9, hires 4 workers; if w=8, hires 5 workers; if w=7, hires 6 workers, and so on.

This means that the value of the marginal product can be interpreted as a demand function for labor. It implicitly answers the question: for any feasible wage (and exogenously given prices of output), what is the profit-maximizing choice of labor?

Can you find the labor demand functions for another set of output prices?

$P_V = 2,\ P_C = 1.5$:

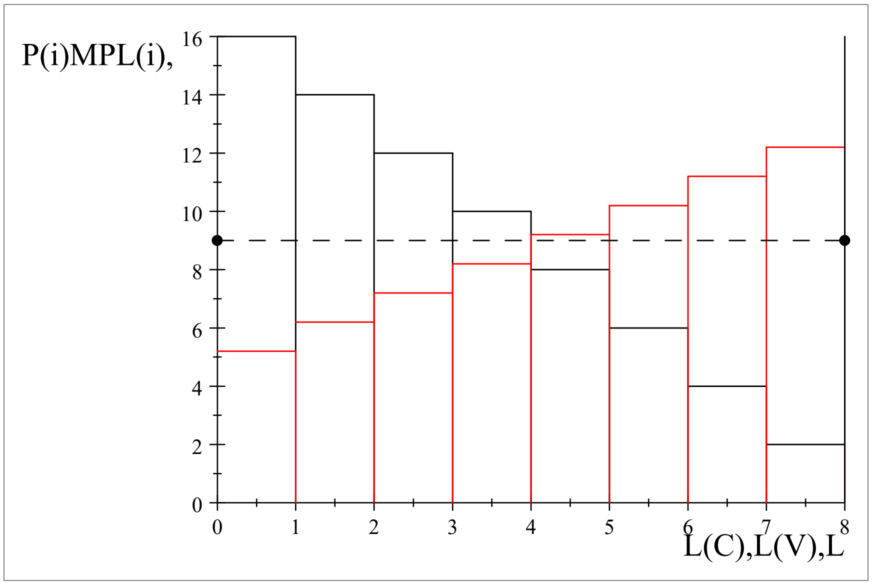
L_i	MPL_V	$P_V \times MPL_V$	MPL_C	$P_C \times MPL_C$
1	8	16	12.2	18.3
2	7	14	11.2	16.8
3	6	12	10.2	15.3
4	5	10	9.2	13.8
5	4	8	8.2	12.3
6	3	6	7.2	10.8
7	2	4	6.2	9.3
8	1	2	5.2	7.8

Labor market equilibrium

Given prices of outputs, i.e., given values for P_V and P_C, what is the wage rate that equates demand to supply? Suppose the supply of labor is eight (8) units of work, e.g., workers who work a fixed amount of time per day. For $P_V = 2$ and $P_C = 1$, total demand for labor is eight (8) when $w = 9$.

We graph this as below. The dotted line is drawn at $w = 9$. The value of the

marginal product associated with a workforce of four (4) workers in the vino sector is ten (10), while the value of the marginal product associated with a workforce of four (4) workers in the cloth sector is 9.2. You might note that if we allowed wage rates to be any real number, any wage greater than 8.2 and less than 9.2 would clear the labor market. These "multiple equilibria" are a feature of discreteness.



Note that the equilibrium wage is where the values of the marginal products are "close to equal." Discreteness helps us think sequentially about what is going on, but is a little "clunky" because the VMP's are only "close" to being equal.

Consider some other values for the prices of outputs, and construct the analogue to the above chart. We also include the associated relative prices, and values of marginal products measured in units of vino.

MPL_V	$\overbrace{P_V}^{2} \times MPL_V$	MPL_C	$\overbrace{P_C}^{1} \times MPL_C$	$\overbrace{P_C}^{1.6} \times MPL_C$	$\overbrace{p}^{.5} \times MPL_C$	$\overbrace{p}^{.8} \times MPL_C$
8	16	12.2	12.2	19.25	6.1	9.76
7	14	11.2	11.2	17.92	5.6	8.96
6	12	10.2	10.2	16.32	5.1	8.16
5	10	9.2	9.2	14.72	4.6	7.36
4	8	8.2	8.2	13.12	4.1	6.56
3	6	7.2	7.2	11.52	3.6	5.76
2	4	6.2	6.2	9.92	3.1	4.96
1	2	5.2	5.2	8.32	2.6	4.16

Let's consider a sequence of questions that make use of the above chart and illustrate the properties of the S and M model.

1. For $P_V = 2$ and $P_C = 1$, show (make the argument) that the equilibrium wage in dollars is \$9 and the allocation of labor between the two sectors is: $L_V = 4,\ L_C = 4.$

2. For $P_V = 2$ and $P_C = 1$, show that the equilibrium wage in units of vino is 4.5 units of vino (we now allow wages to be paid in integers plus or minus a half) and the equilibrium wage in units of cloth is 9 units of cloth.

3. Joe Bob Briggs says, "Check it out." Suppose $P_V = \lambda \bullet 2$ and $P_C = \lambda \bullet 1$, where $0 < \lambda < \infty$, e.g., $\lambda = 2$, which implies $P_V = 4$ and $P_C = 2.$ What happens to the equilibrium allocation of labor and the real wages measured in units of vino and cloth, respectively, when λ changes value?

Answer: look at the new chart and check out various values of w :

L_i	MPL_V	$\overbrace{P_V}^{4} \times MPL_V$	MPL_C	$\overbrace{P_C}^{2} \times MPL_C$	$\overbrace{p}^{.5} \times MPL_C$
1	8	32	12.2	24.4	6.1
2	7	28	11.2	22.4	5.6
3	6	24	10.2	20.4	5.1
4	5	20	9.2	18.4	4.6
5	4	16	8.2	16.4	4.1
6	3	12	7.2	14.4	3.6
7	2	8	6.2	12.4	3.1
8	1	4	5.2	10.4	2.6

If $4 < w < 8:\ L_V = 7;\ L_C > 8;$

If $8 < w < 12:\ L_V = 6;\ L_C =\geq 8;$
If $12 < w < 16:\ L_V = 5;\ L_C \geq 5$
If $16 < w < 20:\ L_V = 4;$
$L_C = 5$ if $16 < w < 16.4;$ $L_C = 4$ if $16.4 < w < 18.4;$ $L_C = 3$ if $18.4 < w < 20$
If $20 < w < 24:\ L_V = 3;$
$L_C = 3$ if $20 < w < 20.4;$ $L_C = 2$ if $20.4 < w < 22.4;$ $L_C = 1$ if $22.4 < w < 24.$

What will work? If $w \in (16, 20)$, $L_V = 4.$ If $w \in (16.4, 18.4)$, $L_C = 4.$ So this will work:

$$w = 18,\ \frac{w}{P_V} = \frac{18}{4} = 4.5;$$

$$\frac{w}{P_C} = \frac{18}{2} = 9.$$

So would $w = 17.$ Discreteness makes things messy in that there are multiple equilibria. But note that doesn’t affect the allocation of labor, just the exact amount of the wage (and by implication the profits of EJ and LW).

1. For $P_V = 2$ and $P_C = 1$, how much cloth is produced at this equilibrium wage? It helps to consider the following chart:

L_C	MPL_C	C
1	12.2	12.2
2	11.2	$12.2 + 11.2 = 23.4$
3	10.2	$23.4 + 10.2 = 33.6$
$\underline{4}$	9.2	$33.6 + 9.2 = \underline{42.8}$
5	8.2	$42.8 + 8.2 = 51.0$
6	7.2	$51.0 + 7.2 = 58.2$
7	6.2	$58.2 + 6.2 = 64.4$
8	5.2	$64.4 + 5.2 = 69.6$

2. What is the equilibrium wage in currency units, and in vino, when $p = .8$?

w	L_V	L_C
15	1	3
14	1,2	4
13	2	4
12	2,3	5
11	3	6
10		
9		

Equilibrium: $w = 12$; $\frac{w}{P_V} = 6$

3. What is cloth output when $p = .8$?

First, what is L_C? It is 5. So, $C = 51$.

4. Individual demand for each of the 10 individuals in this economy and total demand for all ten is given by, respectively:

$$C_l^d = \frac{2.25}{p};\ C_{EJ}^d = \frac{2}{p};\ C_{LW}^d = \frac{1.4}{p};\ C^d = \frac{21.4}{p}$$

where l signifies any one of the identical eight workers. This implies the following AERP (Autarkic Equilibrium Relative Price) for this economy, and associated consumptions of vino and cloth (it's fun to work out: briefly, if $p = .5$, then $C^d = 42.8$, which equals C^S):

$$P_V = 2,\ P_C = 1,\ \frac{P_C}{P_V} = .5;$$

$$w = 9,\ L_V = 4,\ L_C = 4;\ \frac{w}{P_V} = 4.5; \frac{w}{P_C} = 9$$

Output

$$C^S = 42.8,\ V^S = 26$$

Profits measured in vino (and in cloth for LW as well)

$$\Pi_V^{EJ} = 26 - 4.5 \times 4 = 8;$$
$$\Pi_C^{LW} = 42.8 - 9 \times 4 = 6.8;$$
$$\Pi_V^{LW} = p \times 6.8 = 3.4$$

Consumptions

	C_a	V_a
l	4.5	2.25
$L = 8l$	36	18
EJ	4	6
LW	2.8	2

Autarky versus free trade

Now imagine this country can trade with the rest of the world, and the resulting free-trade relative price becomes:

$$p_{FT} = .8\left(= \frac{8}{10}\right).$$

The associated, new, equilibrium values for this economy are (how do we find these?):

$$C^S = 51, V^S = 21;$$
$$L_C = 5;\ L_V = 3;$$
$$\frac{w}{P_V} = 6; \frac{w}{P_C} = 7.5;$$
$$\Pi_{EJ}^V = 3 \textit{ units vino};$$
$$\Pi_{LW}^C = 13.5 \textit{ units cloth};$$
$$\Pi_{LW}^V = 10.8 \textit{ units vino}$$

Consider budget constraints for the three classes of people here:

$$V_{EJ} = \Pi^V_{EJ} - pC_{EJ}.$$
$$V_{LW} = \Pi^V_{LW} - pC_{LW};$$
$$V_l = \frac{w}{P_V} - pC_l.$$

Can you diagram each for the autarkic and FT values?

The equilibrium quantities consumed are displayed below, along with the equilibrium quantities that were consumed in autarky:

	C_a	V_a	C_{FT}	V_{FT}
l	4.5	2.25	2.8125	3.75
$L = 8l$	36	18	22.5	30
EJ	4	6	2.5	1
LW	2.8	2	1.75	9.4

1. 10 points. Show that the quantities imported and exported for this economy satisfy the following equation:

$$V^d - V^S = p_{FT}(C^S - C^d).$$

Answer: We know (can you remember how?)

$$C^S = 51, V^S = 21;$$
$$V^d_{FT} = 40.4,\ C^d_{FT} = 26.5.$$

Hence,

$$19.6 = .8 \times 24.5$$

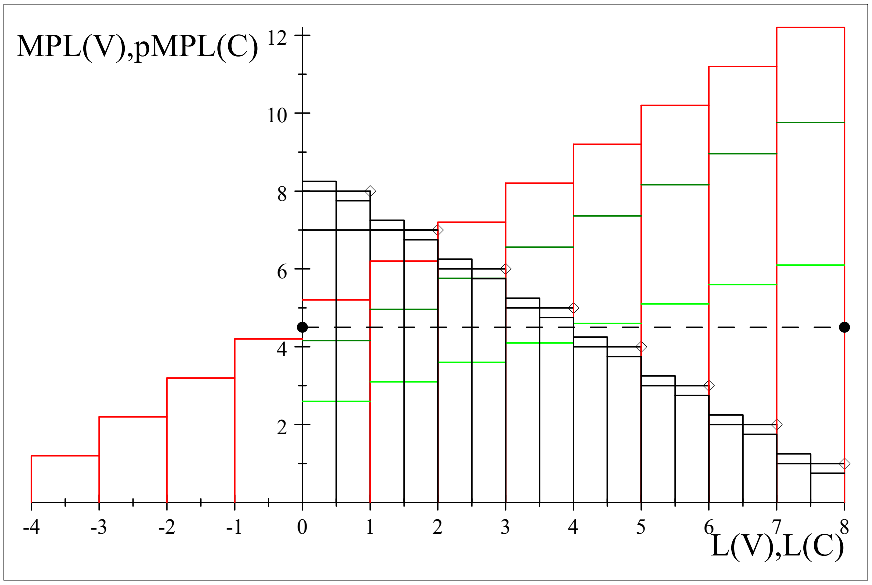
$.8 \times 24.5 = 19.6$

Yup! We'll see the diagramatic representation in a little bit.

Further remarks

The labor mkt diagram again:

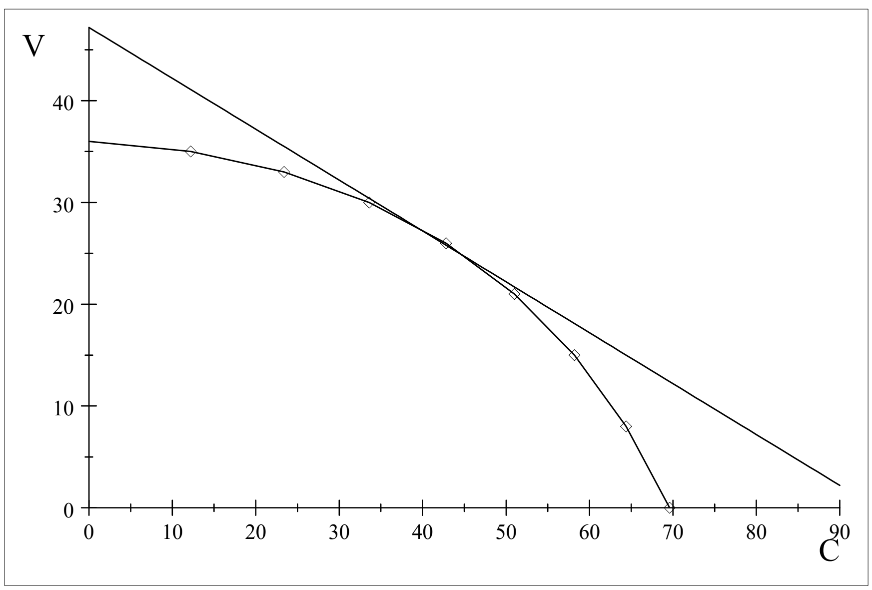
1. More relative prices
2. "Finer" divisions of labor in the vino sector-closer to a unique solution.



$$p = 1(red);\ p = .8(dk.gr.);\ p = .5(lght.gr.)$$

$12.2 + 11.2 + 10.2 + 9.2 + 8.2 + 7.2 + 6.2 + 5.2 = 69.6$

The PPF



Autarky:

$$P_V = 2,\ P_C = 1,\ \frac{P_C}{P_V} = .5;$$

$$w = 9,\ L_V = 4,\ L_C = 4;\ \frac{w}{P_V} = 4.5;\ \frac{w}{P_C} = 9$$

Output

$$C^S = 42.8,\ V^S = 26$$

Profits in vino

$$\Pi_V^{EJ} = 26 - 4.5 \times 4 = 8;$$
$$\Pi_C^{LW} = 42.8 - 9 \times 4 = 6.8;$$
$$\Pi_V^{LW} = p \times 6.8 = 3.4$$

Demand

$$C_l = \frac{2.25}{p};\ C_{EJ} = \frac{2}{p};\ C_{LW} = \frac{1.4}{p};\ C = \frac{21.4}{p}$$

Preferences (not required, but for inquiring minds which have had Intermediate Micro).

$$U_l = V_l + 2.25\ln C_l;$$
$$V_l = U_l - 2.25\ln C_l;$$
$$\frac{dV_l}{dC_l} = -\frac{2.25}{C_l} = -p$$

$2.25 = U - 2.25\ln 4.5$

$U = 2.25 + 2.25\ln 4.5$

$2.25 + 2.25\ln 4.5 = 5.6342$

$V_l = 5.6342 - 2.25\ln C_l$

Eqilibrium

	C_a	V_a	p_a	p_{FT}	C_{FT}	V_{FT}
l	4.5	2.25	.5	.8	2.8125	3.75
L	36	18			22.5	30
EJ	4	6			2.5	1
LW	2.8	2			1.75	9.4

$y = 2.25 - .5(x - 4.5)$

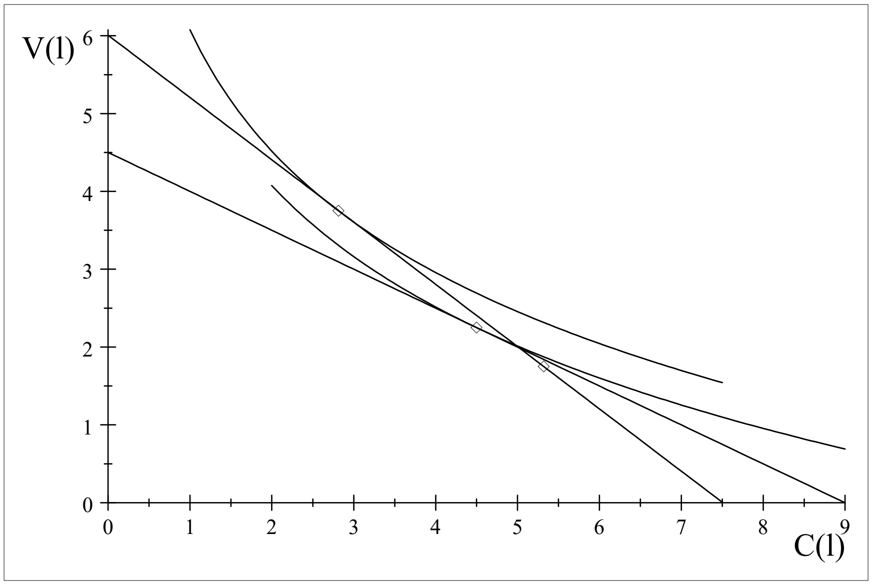
$y = 4.5 - .5x$

$V_l = 5.6342 - 2.25\ln C_l;\ V_l = U - 2.25\ln(2.8125);\ U = 3.75 + 2.25\ln(2.8125)$

$3.75 + 2.25\ln 2.8125 =$

$3.75 + 2.25\ln 2.8125 =$

$\ln 2.8125 =$



$1.75 + .8(5.32) = 6.006$

$y = 6.006 - .8x$

Free trade:

$$P_V = 2; P_C = 1.6,\ p = .8$$

$$L_V = 3;\ L_C = 5;\ V^S = 21;\ C^S = 51.$$

$$C^D = \frac{21.4}{.8} = 26.75$$

$\frac{21.4}{.8} = 26.75$

Demand

$$C_l = \frac{2.25}{p};\ C_{EJ} = \frac{2}{p};\ C_{LW} = \frac{1.4}{p};\ C = \frac{21.4}{p};$$

$$C_l = 2.8125; C_{EJ} = 2.5;\ C_{LW} = 1.75;\ C^d = 26.75.$$

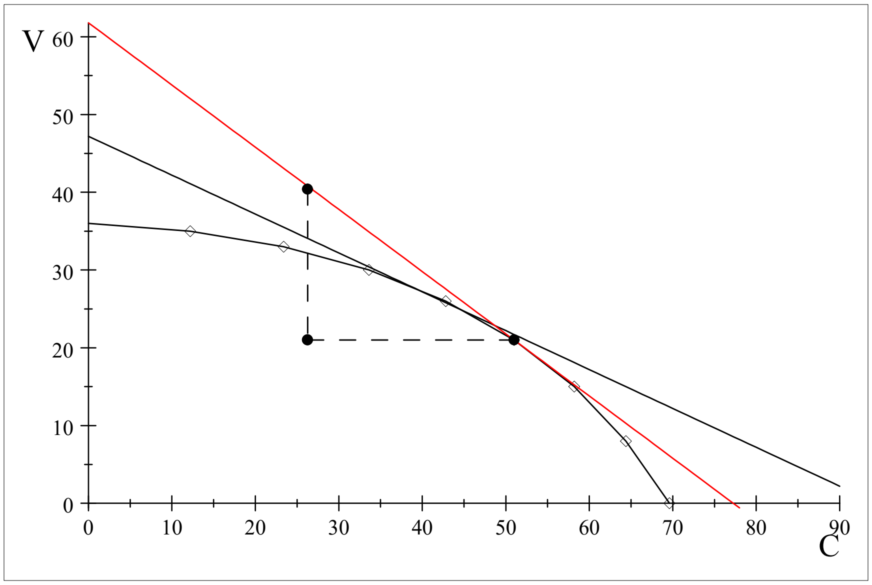
$$V_L = 30; V_{EJ} = 1;\ V_{LW} = 9.4; V^d = 40.4.$$

$$C^S - C^d = 24.25;$$

$$.8 \times 24.25 = 19.4.$$

$$V^d - V^S = 19.4$$

$$p(C^S - C^d) = (V^d - V^S)$$



The non-discrete version

Diagrams:

1. LME
2. MP's.
3. PPF

Interpretation:

$$\frac{\Delta V}{\Delta C} = -\frac{MPL_V}{MPL_C};$$

$$p = \frac{MPL_V}{MPL_C};$$

$$\frac{\Delta V}{\Delta C} = -p.$$

Key lessons?

1. Political Economy