Comparative Advantage: Notes

Motivation

1. In EE economy, trade takes place because of different tastes.

2. Can differences in supply generate trade?

a. Sure: In EE economy, Alex/Antoine could have identical preferences and Bobby/Baptiste could have identical preferences, but differing endowments, leading to different AERP's.

b. How about technology and resources? Introduce production decisions.

3. Key idea: differences in AERP's reflect differences in marginal opportunity cost.

Production functions (technology)

Alex and Henry

We assume their *rates* of production for C and T are, respectively:

1. Alex produces one (1) unit of C per unit of time (in this example, one (1) day) spent in C production, and 0.1826 units of T per unit of time (again, one (1) day) spent in T production;

2. Henry produces one (1) unit of C per unit of time (in this example, a day) spent in C production, and one (1) unit of T per unit of time spent in T production.

To get a better picture of what these production relations mean, we can create a chart that displays this information for a subset of the allocations that Alex can choose: (Table A)

L_C^A	L_T^A	C_A^S	T_A^S
0	1	0	.1826
.1	.9	.1	.16434
.2	.8	.2	.14608
.3	.7	.3	.12782
.4	.6	.4	.10956
.5	.5	.5	.0913
.6	.4	.6	.07304
.7	.3	.7	.05478
.8	.2	.8	.03652
.9	.1	.9	.01826
1	0	1	0

Likewise, we can do the same for Henry: (Table B)

L_C^H	L_T^H	C_H^S	T_H^S
0	1	0	1
.1	.9	.1	.9
.2	.8	.2	.8
.3	.7	.3	.7
.4	.6	.4	.6
.5	.5	.5	.5
.6	.4	.6	.4
.7	.3	.7	.3
.8	.2	.8	.2
.9	.1	.9	.1
1	0	1	0

We could make bigger and bigger charts as we added more and more possible allocations of time for each of these people. End result:

$$C_A^S = (1) \times L_C^A;\ 0 \leq L_C^A \leq 1; \tag{3.A.C}$$

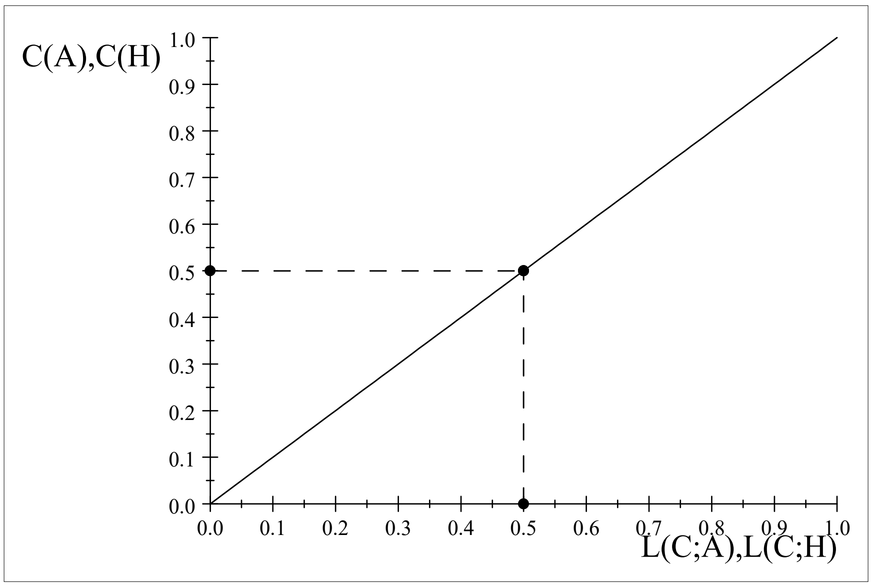
$$T_A^S = 0.1826 \times L_T^A,\ 0 \leq L_T^A \leq 1 \tag{3.A.V}$$

$$C_H^S = (1) \times L_C^H;\ 0 \leq L_C^H \leq 1 \tag{3.H.C}$$

$$T_H^S = (1) \times L_T^H;\ 0 \leq L_T^H \leq 1 \tag{3.H.V}$$

where C_A^S (C_H^S) denotes the amount of C produced, i.e., **s**upplied, by Alex (Henry), L_C^A (L_C^H) denotes the amount of time ("**L**abor time") devoted by Alex (Henry) to C production, and L_A^T (L_T^H) denotes the amount of labor time devoted by Alex (Henry) to T production. We subscript C and T by "A" or "H" to indicate this is output of Alex or Henry, respectively, and we superscript them by "S" to indicate this is the amount "supplied" or produced by Alex (Henry); this distinguishes this variable from amounts bought and consumed by Alex (Henry).

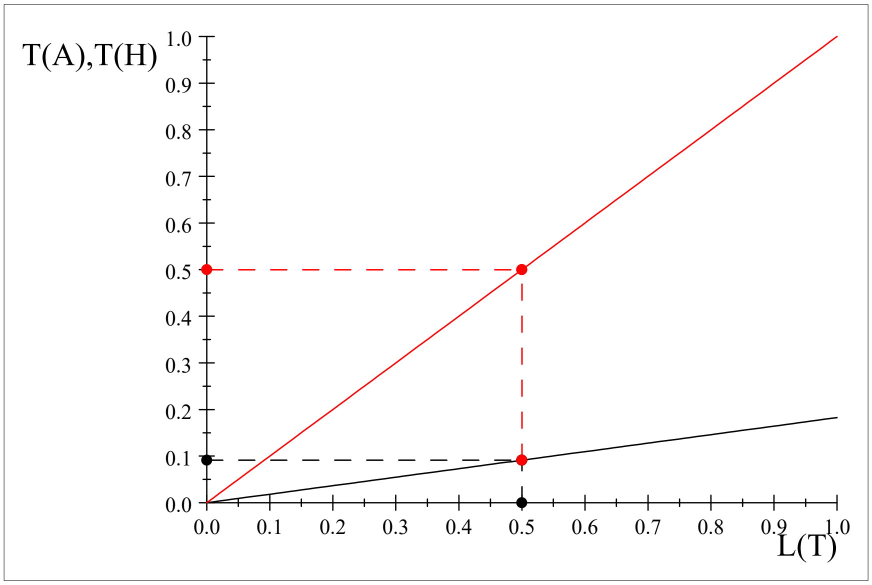
What do these four *production functions* look like? For both Alex's production of C and Henry's production of C, we have the following graphical depiction:



$$C_A^S = (1) \cdot L_C^A;\ C_H^S = (1) \cdot L_C^H$$

. In the diagram, we depict how much C Alex (Henry) would produce if s/she allocated $.5$ of her/her available working day hours to production of C, namely $.5$ units of C.

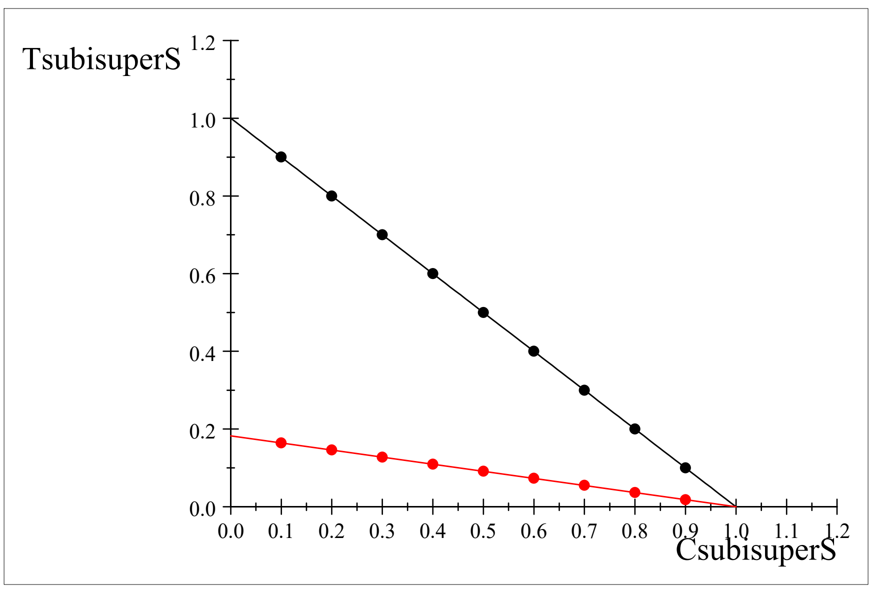
For Alex's production of T and Henry's production of T we have the two lines depicted in the associated Figure, with Henry's production depicted by the red line and Alex's by the black:



$$V_A^S = 0.1826L_V^H(b),\ V_H^S = 1 \cdot L_V^H(r)$$

Again, we depict in the graph one particular allocation of labor, namely $(L_C^i = .5,\ L_T^i = .5)$, and the associated outputs for each individual.

PPF's



Ind. PPI's: A(r),H(b)

$$T_A^S = 0.1826 - .1826C_A^S. \qquad PPF_A$$

$$T_H^S = 1 - C_H^S. \qquad PPF_H$$

Supply

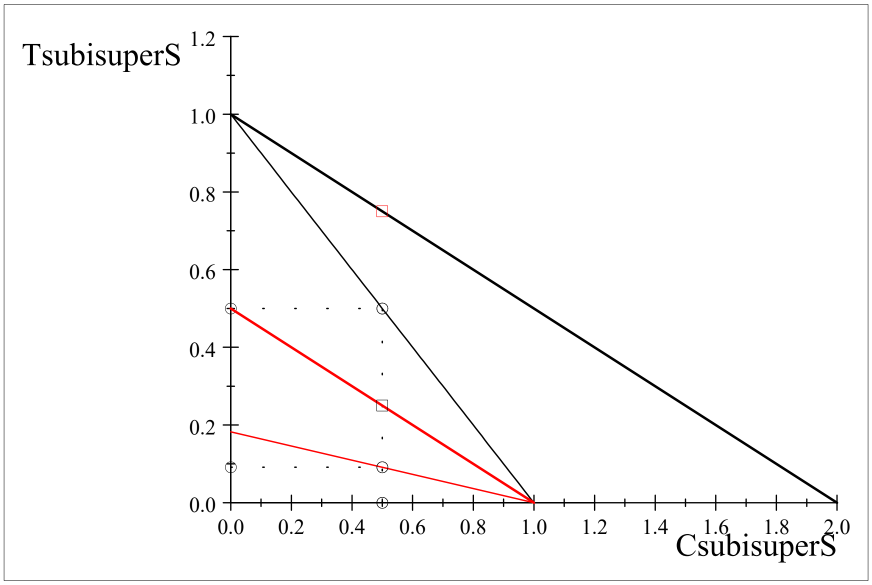


Figure 4: $p = 1/2$

Constructing the inverse supply function

Now consider other **relative price values**, that is, other rates at which one can exchange T for C. As long as this rate of exchange is greater than $.1826$ but less than 1, both Alex and Henry will want to specialize in production (allocating all of their time to producing one good): Alex specializing in producing C (producing one unit) while Henry specializes in producing T (producing one unit). If this relative price is less than $.1826$, *both* people specialize in fish production (Alex producing 0.1826 fish and Henry producing one fish, for a total of 1.1826 fish); if the price is greater than one, both specialize in coconut gathering (producing one coconut each). If the relative price is 0.1826, Henry specializes in fish, and Alex is indifferent between producing any amount of coconuts between zero and one. If the relative price is one (1), Alex specializes in coconuts, producing one (1), and Henry is indifferent between producing any amount of coconuts between zero and one (1). We can summarize this as an *inverse supply function*, which answers the question: For any permissible value of $\frac{P_c}{P_T}$, what quantity of coconuts will be produced?

1. If $\frac{P_C}{P_T} < 0.1826,\ C^S = 0\ (C^S_A = C^S_H = 0)$
2. If $\frac{P_C}{P_T} = 0.1826,\ C^S \in (0,1)\ (C^S_A \in (0,1);\ C^S_H = 0)$
3. If $0.1826 < \frac{P_C}{P_T} < 1, C^S = 1\ (C^S_A = 1;\ C^S_H = 0)$
4. If $\frac{P_C}{P_T} = 1,\ C^S \in (1,2)\ (C^S_A = 1;\ C^S_H \in (0,1))$
5. If $\frac{P_C}{P_T} > 1,\ C^S = 2\ (C^S_A = 1;\ C^S_H = 1)$

We can depict all this in the graph of the *inverse supply function*, depicted in Figure

5.

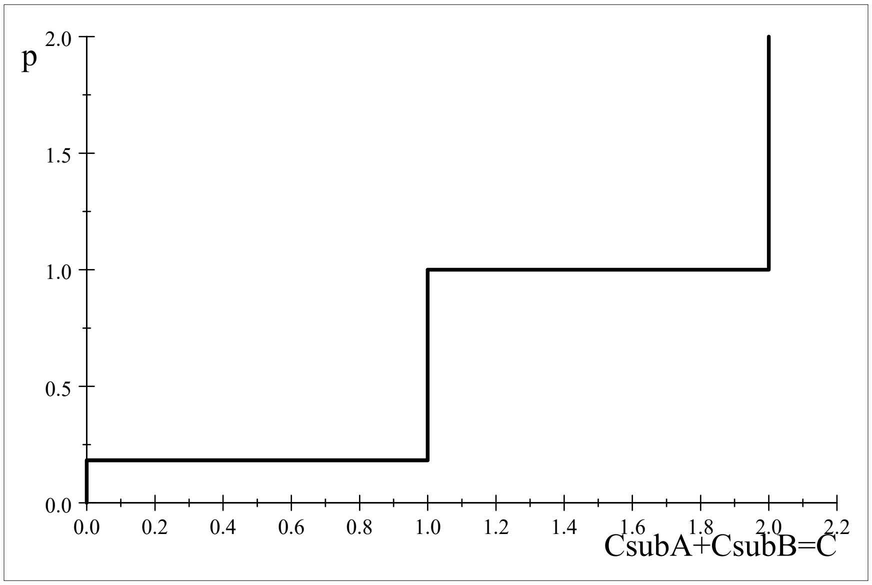


Figure 5

Demand and equilibrium

$$C_i^d = \frac{\gamma_i}{p};\ C^d = \frac{\sum_i \gamma_i}{p};\ p = \frac{\sum_i \gamma_i}{C^d}$$

Let

$$\gamma_i = 0.31065\ \forall i.$$

Hence for $i = A, H$:

$$p = \frac{.62130}{C^d};\ C^d = C_A^d + C_H^d$$

For $i = A, B, \ldots, H$ (8)

$$p = \frac{2.4852}{C^d};\ C^d = \sum_{i=A}^{i=H} \gamma_i$$

Pictures

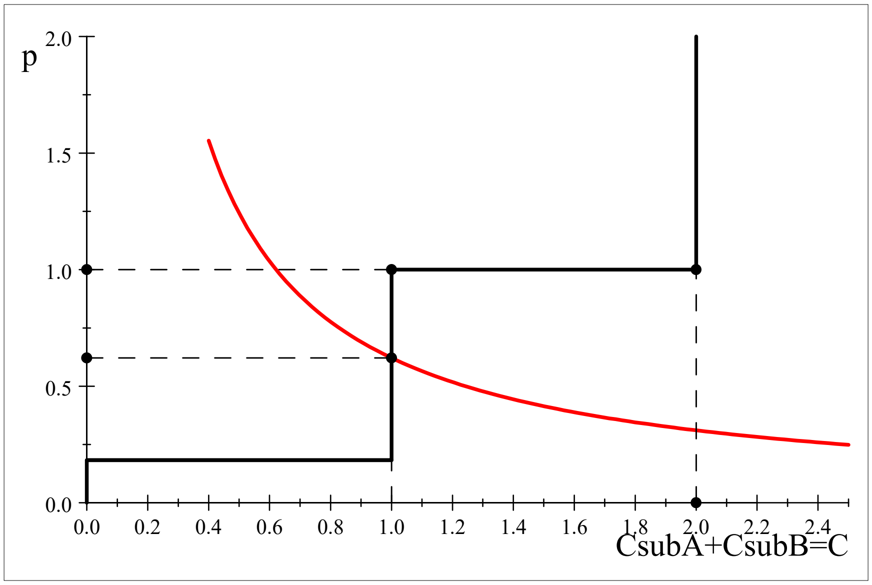
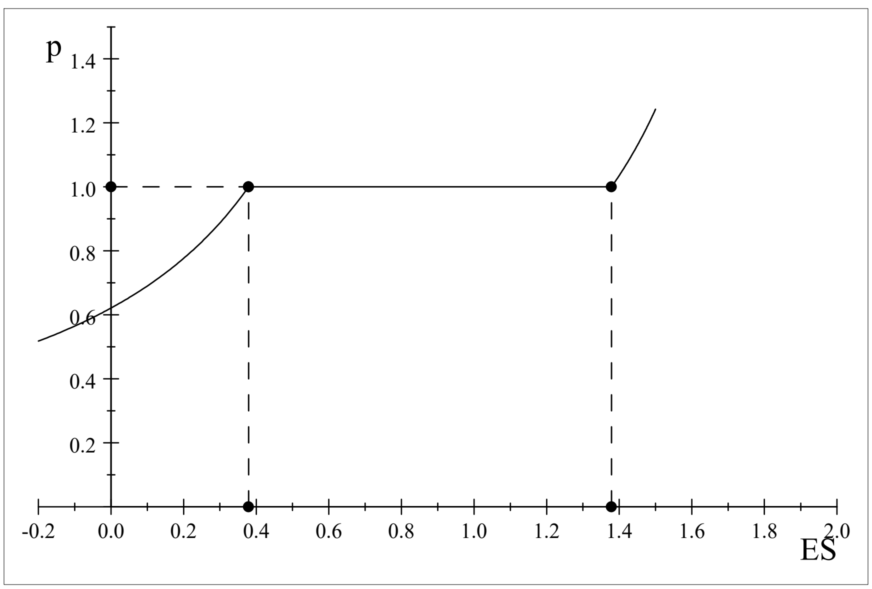


Figure 6: $p_a = .62130$

Excess Supply Picture:



France: Antoine and Baptiste

Demand:

$$p^* = \frac{.62130}{C^{*d}};\ C^{*d} = C^{*d}_{A^*} + C^{*d}_{H^*}$$

$\frac{.62130}{1.1} = 0.56482$

$\frac{.62130}{.5} = 1.2426$

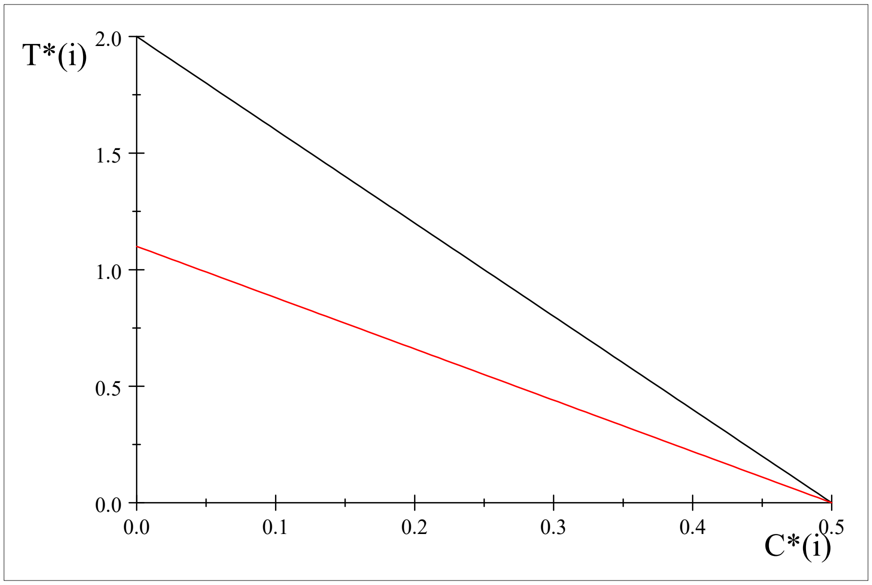
Antoine and Baptiste can only work shorter days–they are French, after all–and produce per day:

$$C_{A^*} = C_{B^*} = .5;$$
$$T_{A^*} = 1.1;\ T_{B^*} = 2.0.$$

Individual PPF's are:

$$T_{A^*} = 1.1 - 2.2C_{A^*};$$
$$T_{B^*} = 2 - 4C_{B^*};.$$

$y = 2 - 4x$



Inverse relative supply function:

$p^* < 1.1$	$C^S_{A^*} = 0$	$C^S_{B^*} = 0$	$C^{*S} = 0$
$p^* = 1.1$	$C^S_{A^*} \in (0, \frac{1}{2})$	$C^S_{B^*} = 0$	$C^{*S} \in (0, \frac{1}{2})$
$1.1 < p^* < 2$	$C^S_{A^*} = \frac{1}{2}$	$C^S_{B^*} = 0$	$C^{*S} = \frac{1}{2}$
$p^* = 2$	$C^S_{A^*} = \frac{1}{2}$	$C^S_{B^*} \in (\frac{1}{2}, 1)$	$C^{*S} \in (\frac{1}{2}, 1)$
$p^* > 2$	$C^S_{A^*} = \frac{1}{2}$	$C^S_{B^*} = \frac{1}{2}$	$C^{*S} = 1$

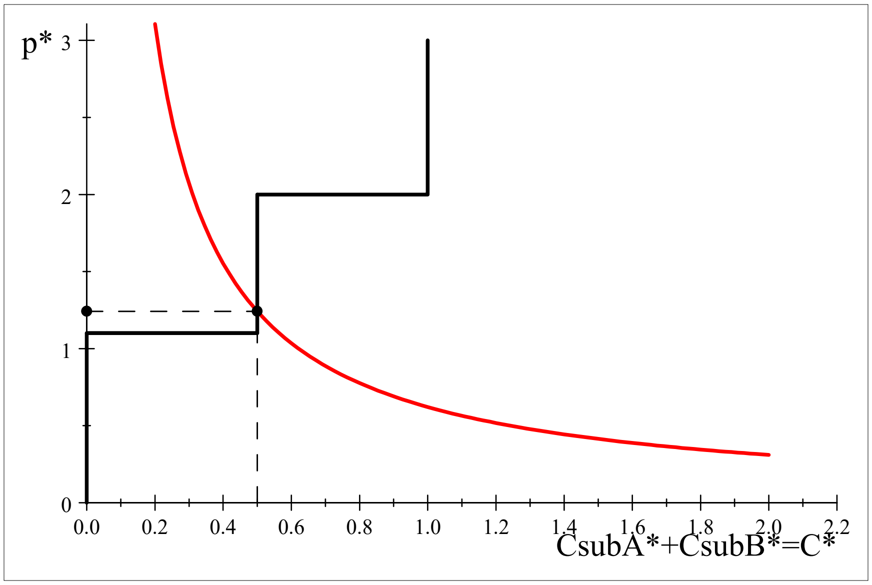
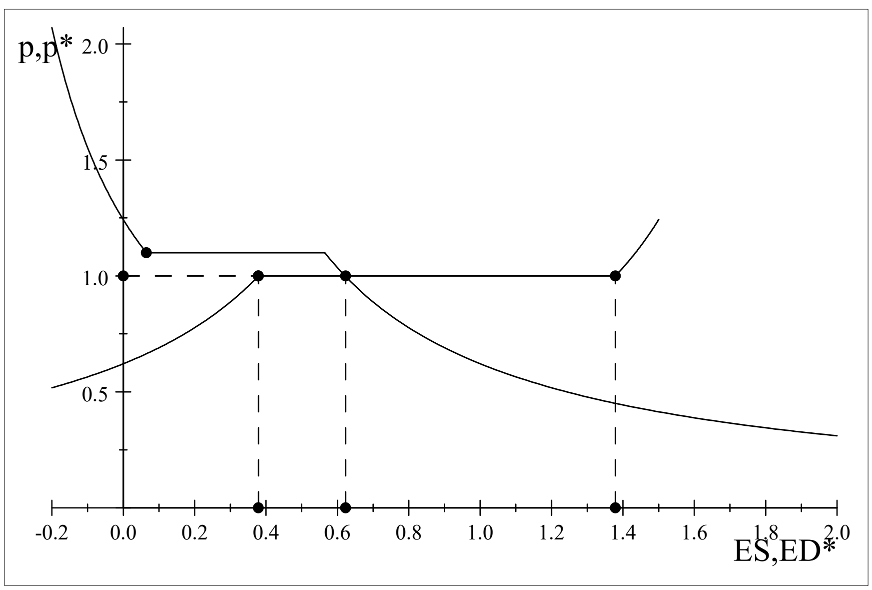


Figure XX: $p_a^* = 1.2426$

Trading equilibrium



ES=ED$^* = .62310, p_{ft} = 1$

$p_a = .62130$	$p_{ft} = 1$
$C_A^S = 1$	$C_A^S = 1$
$T_A^S = 0$	$T_A^S = 0$
$C_A^d = \frac{1}{2}$	$C_A^d = .31065$
$T_A^d = .31065$	$T_A^d = 0.6839$
$C_H^S = 0$	$C_H^S = .2426$
$T_H^S = 1$	$T_H^S = .7580$
$C_H^d = \frac{1}{2}$	$C_H^d = .31065$
$T_H^d = 0.6839$	$T_H^d = .68939$
	$\frac{-.31065}{1}$

Consequences at home

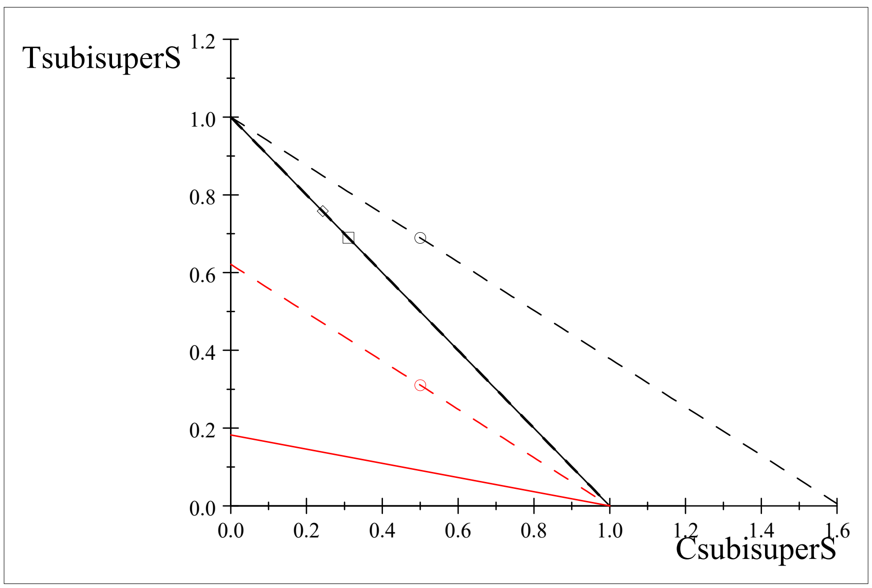


Figure 1; A(R),H(B); $p_a = .62130, p_{FT} = 1$

Suppose $p_{FT} = 1.1$?

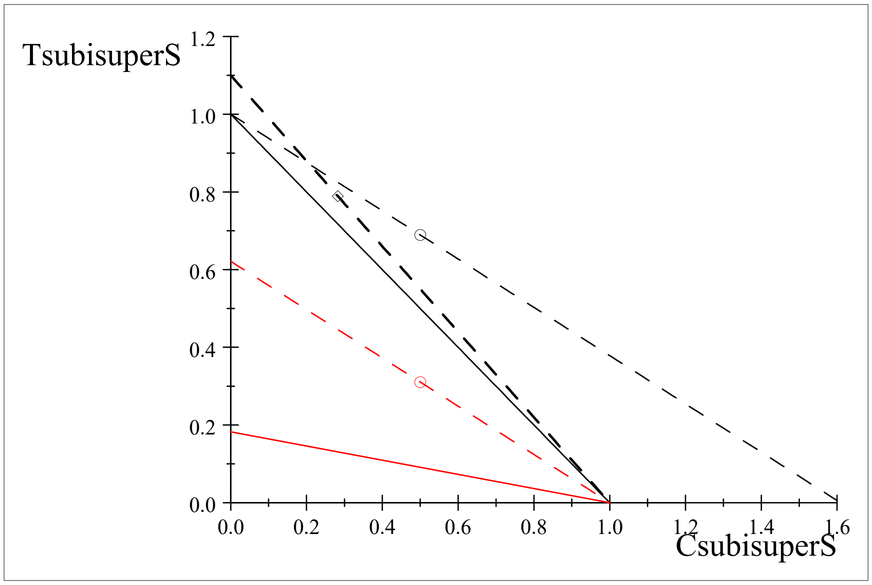


Figure 1; A(R),H(B); $p_a = .62130$

$(6)(.4142) = 2.4852$

$\frac{2.4852}{8} = 0.31065$

$\frac{.62130}{x}$

$\frac{.31065}{.62130} = 0.5 = C_i$; $T_A = p - .31065 = .31065$; $T_B = 1 - .31065 = 0.68935$

$1 - .31065 = 0.68935$

Eight people

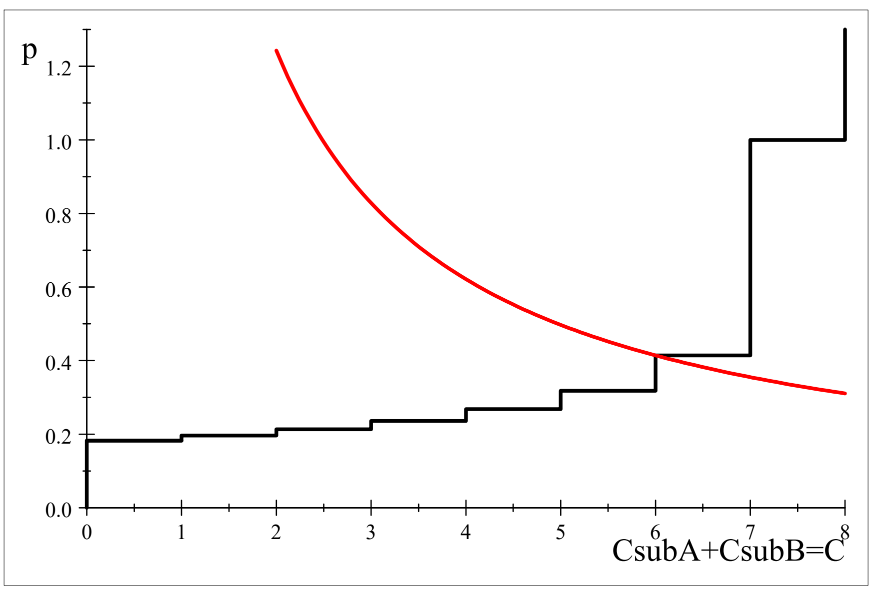


Figure 9

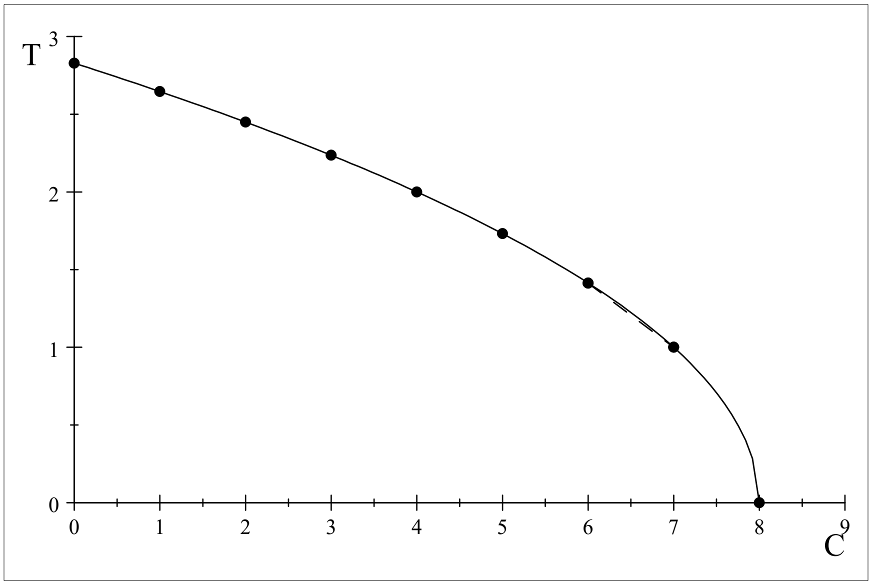


Figure 10

	C_i/day	T_i/day	$OC_i(T_i/C_i)$	$PPF's$
Alex	1	0.1826	0.1826	$T_A = 0.1826 - 0.1826C_A$
Bobby	1	0.1963	0.1963	$T_B = 0.1963 - 0.1963C_B$
Charley	1	0.2134	0.2134	$T_C = 0.2134 - 0.2134C_C$
Danny	1	0.2361	0.2361	...
Evelyn	1	0.2679	0.2679	...
Fran	1	0.3179	0.3179	...
Georgie	1	0.4142	0.4142	...
Henry	1	1	1	$T_H = 1 - C_H$

In autarky,

$$C = 6,\ p_a = .4142$$

Nota bene: the relative price is jsut equal to the marginal opportunity cost of this economy producing one more unit of C.

$\frac{2.4852}{6} = 0.4142$

$\frac{.31065}{1.1} = 0.28241$

$1.1 - .31065 = 0.78935$

$\frac{.31065}{.62130} = 0.5$

$1 - .31065 = 0.68935$

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