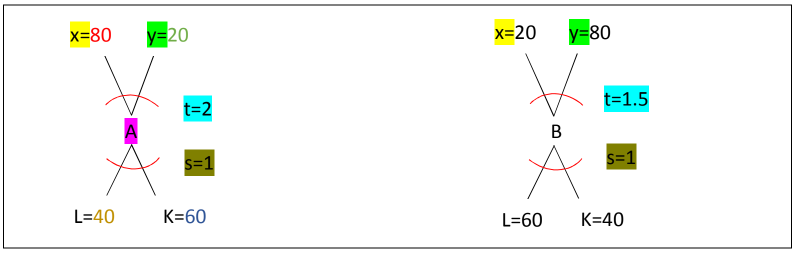
EXAMPLE 9c: joint production (production possibility frontier)

Goods X and Y are both produced by two sectors (A and B): $MRT_{XA,YA} = -\frac{MC_{XA}}{MC_{YA}} = -\frac{\Delta Y_A}{\Delta X_A}$ and $MRT_{XB,YB} = -\frac{MC_{XB}}{MC_{YB}} = -\frac{\Delta Y_B}{\Delta X_B}$, which measures the producers ability to substitute X and Y. The proportion by which a sector decides how many units to produce of each good is determined by elasticity of transformation t:



Marginal rate of transformation (MRT) measures a slope of the production possibility frontier (PPF), while elasticity of transformation measures a curvature of the production possibility frontier. **Constant elasticity of transformation (CET)** function has similar functional form to CES function, but it is concave with respect to the origin (the opposite sign for elasticity):

$$A = f * [\ \alpha X^{(1+\varphi)/\varphi} + (1-\alpha) Y^{(1+\varphi)\varphi}\ ]^{\varphi/(1+\varphi)} = Q = F*[\ \delta K^{(\sigma-1)/\sigma} + (1-\delta) L^{(\sigma-1)/\sigma}]^{\sigma/(\sigma-1)}$$

```
$PROD:A t:2     s:0.9
        O:PX    Q:80
        O:PY    Q:20
        I:PL    Q:40    A:CONS  T:TA
        I:PK    Q:60    A:CONS  T:TA
```

However, the original code assumes, Cobb-Douglass production function, not the CES:

$$A = f * [\ \alpha X^{(1+\varphi)/\varphi} + (1-\alpha) Y^{(1+\varphi)\varphi}\ ]^{\varphi/(1+\varphi)} = Q = F*K^{\delta} * L^{(1-\delta)}$$

```
$PROD:A t:2     s:1
        O:PX    Q:80
        O:PY    Q:20
        I:PL    Q:40    A:CONS  T:TA
        I:PK    Q:60    A:CONS  T:TA

$PROD:B t:1.5   s:1
        O:PX    Q:20
        O:PY    Q:80
        I:PL    Q:60
        I:PK    Q:40
```

If transformation function was expressed as **Cobb-Douglas** relationship, then it looks like $A = X^{1/\delta} + Y^{1/\alpha}$, where $\delta=\alpha<1$ for decreasing returns to scale, $\delta=\alpha=1$ for constant returns to scale, $\delta=\alpha>1$ for increasing returns to scale.

MRT can be simply calculated by comparison of production outputs:

$$MRT_{XA,YA} = \frac{\Delta Y_A}{\Delta X_A} = \frac{20}{80} = \frac{1}{4} \text{ and } MRT_{XB,YB} = \frac{\Delta Y_B}{\Delta X_B} = \frac{80}{20} = 4$$

In order to check it, we have to define PPF in the benchmark equilibrium. For example, for sector A:

$$(L_x+K_x) + (L_y+K_y) = (L_x+L_y) + (K_x+K_y) = L + K = 40\% + 60\% = 100\% = 1$$

XA= 80(L+K) **and** YA=20(L+K), i.e. at the same time sector A may produce 80 units of X and 20 units of Y

In order to define PPF we have to know the max amount of units of each good sector A may produce

X= 160(L_x+K_x) **or** Y=40(L_y+K_y), i.e. sector A may produce max 160=20*4+80 units of XA if no YA will be produced or 40=20+80/4 units of YA if no XA will be produced.

Since PPF shows all possible combinations of XA and YA, we have to add two extreme cases:

$$(L_x+K_x) + (L_y+K_y) = \frac{X}{160} + \frac{Y}{40} = 1 = 40\% + 60\%$$

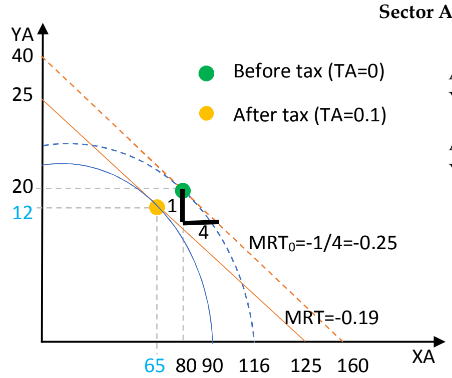
The right side represents the sum of production factors limiting production outcome. After simplification we obtain:

$$X/4 + Y = 40$$

$$MRT = \frac{MC_{XA}}{MC_{YA}} = 1/4 = \frac{\Delta Y_A}{\Delta X_A} \Rightarrow YA=4XA$$

If producer A will decreases the production of YA by 1 unit, he will be able to increases the production of XA by 4 units without changing technological process. Since the elasticity of transformation is not equal to 1, the PPF is non-linear.

Sector A: t=2



A_0=[0.8*$X_A^{(1+2)/2}$ + 0.2*$Y_A^{(1+2)/2}$] $^{2/(1+2)}$ = 100%
Y_A=0 => X_A=116 and X_A=0 => Y_A=?

A=[0.8*$X_A^{(1+2)/2}$ + 0.2*$Y_A^{(1+2)/2}$] $^{2/(1+2)}$ = 77.7%
Y_A=0 => X_A=90 and X_A=0 => Y_A=?

25 = 12+65/5	125 = 12*5 + 65	20/80 = ¼ = MRT_0
40= 20+80/4	160 = 20*4 + 80	12/65 = 0.19 = MRT

After tax MRT is slightly lower (PPF becomes slightly more horizontal, flat), i.e. the opportunity cost decreases. In the case of concave PPF, opportunity cost is increasing, i.e. MRT goes up when shifting along horizontal axis. In our case, XA decrease by 19%=65/80, while YA decreases by 40%=12/20. This means that XA decreases relatively more than YA, so we have backward shift w.r.t. horizontal axis. This explains decrease of MRT. When PPF is non-linear, MRT increases w.r.t. horizontal axis, according to the theory of comparative advantage.

Algebraic description of optimization process (without tax):

max U=**min{W}** **s.t.** **Pw*W**=**P$_L$*L+Pk*K**, **where** **W=X$^{0.5}$Y$^{0.5}$**

```
$PROD:W s:1
        O:PW      Q:200
        I:PX      Q:100
        I:PY      Q:100

$DEMAND:CONS
        D:PW      Q:200
        E:PL      Q:100
        E:PK      Q:100
```

General form

Above equation represents 'goal function' for the whole model, i.e. maximization of utility subject to budget constraint. The general form is: $\boldsymbol{max\ U(w_1,\dots w_n)}$ s.t. $\sum_i \boldsymbol{p_i w_i} = \boldsymbol{R = \sum_i q_i x_i}$ for aggregation function $\boldsymbol{W = f(w_1 \dots .w_n)}$.

In addition to the main goal function, sectors has their local goal: $\boldsymbol{min \sum_i q_i x_i}$ s.t. production function $\boldsymbol{X = f(x_1 \dots .x_n)}$ and transformation function $\boldsymbol{X = g(w_1 \dots .w_n)}$**.** The solution w.r.t production function is set of factor demands: $(\boldsymbol{x_1^*(q_1 \dots .q_n,\ p_1 \dots .p_n, X)}, \dots \boldsymbol{x_n^*(q_1 \dots .q_n,\ p_1 \dots .p_n, X)})$.

Description of the MPSGE parts:

1) W=X$^{0.5}$*Y$^{0.5}$=200 or W=X^{100}*Y^{100}=1 *(utility function)*

   This how the MPSGE reads the code.

$PROD:W s:1		or	$PROD:W s:1	
O:PW	Q:1		O:PW	Q:200
I:PX	Q:0.5		I:PX	Q:100
I:PY	Q:0.5		I:PY	Q:100

   Pw – unit cost function (consumer price index)

   By default all variables are equal to 1 in MPSGE, thus W=1. In the right case, the code of the model is based on data, but the results - on multipliers. In the left case, the code of the model is based on multipliers, while the results – on data

   Since both functions gives the same MRTS=Y/X, they are equivalent. The same is for the unit cost:

   Pw = (Px/0.5)$^{0.5}$*(Py/0.5)$^{0.5}$ = 2*(Px)$^{0.5}$*(Py)$^{0.5}$ => 0.5*Pw= Px$^{0.5}$*Py$^{0.5}$

   or

   Pw = 200*(Px/100)$^{100/200}$*(Py/100)$^{100/200}$ = 200*100^{-1} *(Px)$^{0.5}$*(Py)$^{0.5}$= 2*(Px)$^{0.5}$*(Py)$^{0.5}$

   In both cases the compensated demand function is

   X=0.5*Pw*W/Px = Px$^{0.5}$*Py$^{0.5}$ *W/Px and Y=0.5*Pw*W/Py = Px$^{0.5}$*Py$^{0.5}$ *W/Py

   or we can rewrite it as following:

   Pw' =0.5*Pw = (Px)$^{0.5}$*(Py)$^{0.5}$ => X=Pw'*W/Px = Px$^{0.5}$*Py$^{0.5}$ *W/Px

2) A = L$_A^{0.4}$*K$_A^{0.6}$=100 or A=L$_A^{40}$*K$_A^{60}$=1 or =>

   This how the MPSGE reads the code.

\$PROD:A t:2 s:1		or	\$PROD:A t:2 s:1	
O:PX	Q:0.8		O:PX	Q:80
O:PY	Q:0.2		O:PY	Q:20
I:PL	Q:0.4		I:PL	Q:40
I:PK	Q:0.6		I:PK	Q:60

where A is represented by Cobb-Douglas production function $A= L_A^{40}*K_A^{60}$,
where $MRTS= -MP_L/MP_K =-\frac{40*K^{60}*L^{39}}{60*K^{59}*L^{40}} = -\frac{2K}{3L}$

or A is represented by CET transformation function $A=[\ 0.8*X_A^{(1+2)/2} + 0.2*Y_A^{(1+2)/2}\ ]^{2/(1+2)} = 100$
or $A=[80*X_A^{(1+2)/2} + 20*Y_A^{(1+2)/2}\ ]^{2/(1+2)}$

> NOTE:
> the result x=80 and y=20 does not give A=100, but 70. How then MPSGE calculates it? 100 is just 100% that is splitted in 80% of X and 20% of Y no matter what is the size of the sector. Thus X=80 is just 80% of A but not the amount of X, because A is normalized to %.

Pa(PL,PK,1) - unit cost function of Cobb-Douglas production function:
$$Pa= \left(\left(\frac{40}{60}\right)^{\frac{60}{40+60}} + \left(\frac{60}{40}\right)^{\frac{40}{40+60}}\right) * PL^{\frac{40}{(40+60)}} * PK^{\frac{60}{(40+60)}}$$

PA(PX,PY,1) – represents CET unit cost function (Producer Price Index)
$PA=[0.8^{-2}*Px^{(1+2)} + 0.2^{-2}*Py^{(1+2)}]^{1/(1+2)}$

Pa=PA

3) $B = L_B^{0.6}*K_B^{0.4} = 100$ or $B = L_B^{60}*K_B^{40} = 1$ => $MRTS = -\frac{3K}{2L}$
$$PB= \left(\left(\frac{60}{40}\right)^{\frac{40}{60+40}} + \left(\frac{40}{60}\right)^{\frac{60}{60+40}}\right) * PL^{\frac{60}{(40+60)}} * PK^{\frac{40}{(40+60)}}$$
or
$B = [\ 0.2*X_A^{(1+1.5)/1.5} + 0.8*Y_A^{(1+1.5)/1.5}\ ]^{1.5/(1+1.5)}$
$PB =[0.2^{-1.5}*Px^{(1+1.5)} + 0.8^{-1.5}*Py^{(1+1.5)}]^{1/(1+1.5)}$

PB=PB

4) $X_A+X_B=X$ => supply=demand
X_A - how much X is produced in the sector A
$X_A=A*Px/(0.8*PA)^2$
$X_B=B*Px/(0.2*PA)^{1.5}$
$X=W*Pw*0.5/Px = W*Pw'/Px$ - see the part (1)

$Y_A+Y_B=Y$
$Y_A= A*Py/(0.2*PB)^2$
$Y_B=B*Py/(0.8*PB)^{1.5}$
$Y=W*Pw*0.5/Py =W*Pw'/Py$

$L_A+L_B=L=100$

L_A= A*PA*0.4/PL
L_B= B*PB*0.6/PL

K_A+K_B=K=100
K_A= A*PA*0.6/PK
K_B= B*PB*0.4/PK

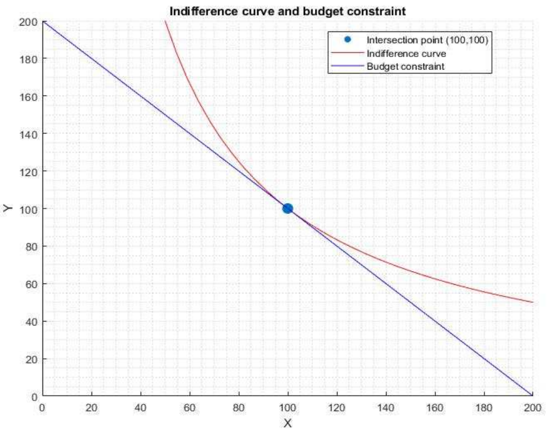
Benchmark results:

The results are the same no matter of numeraire choice.

*Benchmark results: CONS is a default numeraire	LOWER	LEVEL	UPPER	MARGINAL	*Benchmark results: PL is numeraire	LOWER	LEVEL	UPPER	MARGINAL
---- VAR A	.	1.000	+INF	.	---- VAR A	.	1.000	+INF	.
---- VAR B	.	1.000	+INF	.	---- VAR B	.	1.000	+INF	.
---- VAR W	.	1.000	+INF	.	---- VAR W	.	1.000	+INF	.
---- VAR PX	.	1.000	+INF	.	---- VAR PX	.	1.000	+INF	.
---- VAR PY	.	1.000	+INF	.	---- VAR PY	.	1.000	+INF	.
---- VAR PL	.	1.000	+INF	.	---- VAR PL	1.000	1.000	1.000	EPS
---- VAR PK	.	1.000	+INF	.	---- VAR PK	.	1.000	+INF	.
---- VAR PW	.	1.000	+INF	.	---- VAR PW	.	1.000	+INF	.
---- VAR CONS	.	200.00	+INF	.	---- VAR CONS	.	200.00	+INF	.
---- VAR XA	.	80.0000	+INF	.	---- VAR XA	.	80.0000	+INF	.
---- VAR XB	.	20.0000	+INF	.	---- VAR XB	.	20.0000	+INF	.
---- VAR YA	.	20.0000	+INF	.	---- VAR YA	.	20.0000	+INF	.
---- VAR YB	.	80.0000	+INF	.	---- VAR YB	.	80.0000	+INF	.

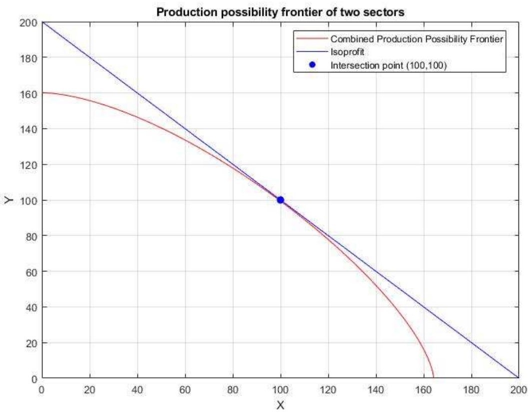
Consumer

For Leontief utility function U=min{W}, consumers use Cobb-Douglass technology W= $X^{0.5}Y^{0.5}$ to aggregate consumption bundle (X,Y) in a single good W. The budget constraint is $200 = PX * X + PY * Y$, where equilibrium prices are normalized to 1 (see the above results. The consumer in benchmark equilibrium would equally spend half of income on each good. Algebraically Cobb-Douglas demand functions of form $X = \frac{c}{c+d}$, $Y = \frac{d}{c+d}$ where c,d=0.5 also indicate such allocation



Producers

Is benchmark equilibrium is Pareto efficient allocation? Any competitive equilibrium is Pareto efficient at MRS=MRT. Previously plotted PPF was only for one sector, below graph represents the combined PPF for A and B. The blue intersection point indicates solution to profit maximization problem highlighting tangency of isoprofit line to PPF.



MRT = $-\frac{MC_X}{MC_Y} = -\frac{\Delta Y}{\Delta X} = -\frac{100}{100} = -1$ which is the same as MRS = $-\frac{MU_X}{MU_Y} = -\frac{\Delta Y}{\Delta X} = -\frac{0.5Y^{0.5}X^{0.5}}{0.5X^{0.5}Y^{0.5}} = -1$

$MRT = MRS = \frac{PX}{PY} = -1$ determines Pareto efficient allocation.

Also zero profit condition works: $\pi = X * PX + Y * PY - L * PL - K * PK$ =0

Counterfactual results:

```
*Counterfactual: 10% tax on A sector inputs
        TA = 0.10;

              LOWER     LEVEL     UPPER    MARGINAL

---- VAR A    .         0.777     +INF       .
---- VAR B    .         1.220     +INF       .
---- VAR W    .         0.995     +INF       .
---- VAR PX   .         1.125     +INF       .
---- VAR PY   .         0.990     +INF       .
---- VAR PL             1.058     +INF       .
---- VAR PK   .         0.965     +INF       .
---- VAR PW   .         1.056     +INF       .
---- VAR CONS.         210.00     +INF       .
---- VAR XA   .        65.0075    +INF
---- VAR XB   .        28.3050    +INF
---- VAR YA   .        12.5842    +INF
---- VAR YB   .        93.4578    +INF
```

```
*Counterfactual: 100% tax on A sector inputs
        TA =1.00;

              LOWER     LEVEL     UPPER    MARGINAL

---- VAR A    .          .        +INF     69.1652
---- VAR B    .         1.960     +INF       .
---- VAR W    .         0.896     +INF       .
---- VAR PX   .         2.061     +INF       .
---- VAR PY   .         1.184     +INF       .
---- VAR PL   .         1.683     +INF       .
---- VAR PK   .         1.120     +INF       .
---- VAR PW   .         1.562     +INF       .
---- VAR CONS .        280.045    +INF       .
---- VAR XA              .         .        EPS
---- VAR XB             67.933    +INF
---- VAR YA              .         .        EPS
---- VAR YB            118.278    +INF
```

```
*Counterfactual: 10% tax on A sector inputs
        TA = 0.10;
        PL.FX=1;
              LOWER     LEVEL     UPPER    MARGINAL
```

```
*Counterfactual: 100% tax on A sector inputs
        TA = 1.00;
        PL.FX=1;
              LOWER     LEVEL     UPPER    MARGINAL
```

---- VAR A . 0.778 +INF .	---- VAR A . . +INF 41.163
---- VAR B . 1.220 +INF .	---- VAR B . 1.960 +INF .
---- VAR W . 0.995 +INF .	---- VAR W . 0.896 +INF .
---- VAR PX . 1.064 +INF .	---- VAR PX . 1.227 +INF .
---- VAR PY . 0.936 +INF .	---- VAR PY . 0.705 +INF .
---- VAR PL 1.000 1.000 1.000 8.527E-14	---- VAR PL 1.000 1.000 1.000 7.047E-10
---- VAR PK . 0.912 +INF .	---- VAR PK . 0.667 +INF .
---- VAR PW . 0.998 +INF .	---- VAR PW . 0.930 +INF .
---- VAR CONS. 198.554 +INF .	---- VAR CONS . 166.667 +INF .
---- VAR XA . 65.0075 +INF	---- VAR XA . . +INF
---- VAR XB . 28.3050 +INF	---- VAR XB 67.933 +INF
---- VAR YA . 12.5842 +INF	---- VAR YA . . +INF
---- VAR YB . 93.4578 +INF	---- VAR YB 118.278 +INF

The difference between both rows is due to change in numeraire from CONS (default numeraire by MPSGE) to PL. Since numeraire should not affect the results interpretation, we can simply prove that both cases give the same results:

Calculating relative prices from above values	Calculating relative prices from above values
---- VAR PX/PL= 1.125/1.058= 1.064	---- VAR PX/PL= 2.061/1.683= 1.225
---- VAR PY/PL= 0.990/1.058= 0.936	---- VAR PY/PL= 1.184/1.683= 0.704
---- VAR PK/PL= 0.965/1.058= 0.912	---- VAR PK/PL= 1.120/1.683= 0.666
---- VAR PW/PL= 1.056/1.058= 0.998	---- VAR PW/PL= 1.562/1.683= 0.928
---VAR CONS/PL= 210/1.058= 198.554	---VAR CONS/PL=280.45/1.683= 166.40

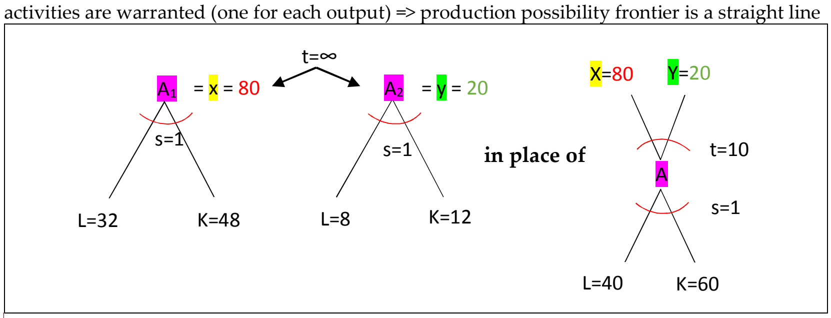
However, the default numeraire does not fix CONS (the benchmark equilibrium was 200, 10% tax changes it to 210, 100% changes it to 280), but this income is defined by fixed price relationships: PX/PY/PL/PK/PW=const no matter of numeraire choice for given solution (scenario). This means that a numeraire choice PL=1 just helps to avoid the work involved in scaling the solution.

Conclusion: (i) Tax burden 10% on inputs for sector A implies that its production decreases for both X and Y. **(ii)** Since B is the Y-intensive sector, the price for this good becomes more competitive. **(iii)** Higher elasticity of transformation allows A to be more flexible than B, but it will not be enough when tax rate is too high (A stop to produce both X and Y because PX is too high and it cannot compete with B on production of Y).

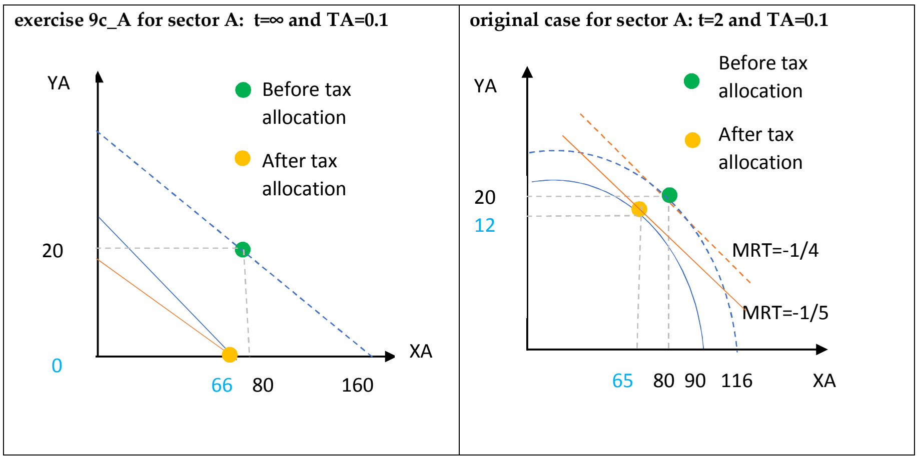
Exercise 9c_A:

```
a) Revise the model structure to represent an infinite elasticity of
transformation in sector A.
```

Transformation elasticity can be set to zero in MPSGE, but not to infinity. If it is infinite, then two activities are warranted (one for each output) => production possibility frontier is a straight line



Z komentarzem [MZ2R1]: TA:0 . MRTxy=-1
TA:0.1 . MRTxy=-px/py=-1.1364
TA:1 . MRTxy= -px/py= -1.7410




```
$PROD:A1           s:1
        O:PX       Q:80
        I:PL       Q:32    A:CONS   T:TA
        I:PK       Q:48    A:CONS   T:TA

$PROD:A2           s:1
        O:PY       Q:20
        I:PL       Q:8     A:CONS   T:TA
        I:PK       Q:12    A:CONS   T:TA

$PROD:B t:1.5      s:1
        O:PX       Q:20
        O:PY       Q:80
        I:PL       Q:60
```

```
        I:PK    Q:40

$REPORT:
 v:XA1    o:PX     prod:A1
 v:YA1    o:PY     prod:A1
 v:XA2    o:PX     prod:A2
 v:YA2    o:PY     prod:A2
 v:XB     o:PX     prod:B
 v:YB     o:PY     prod:B
```

Counterfactual results:

Green fonts indicate increase wrt original elasticity of transformation

*Counterfactual: **10% tax** on A sector inputs TA = 0.10; **t=∞**					*Counterfactual: **100% tax** on A sector inputs TA = 1; **t=∞**				
	LOWER	LEVEL	UPPER	MARGINAL		LOWER	LEVEL	UPPER	MARGINAL
VAR A1	.	0.8233	+INF	-1.172253E-8	VAR A1	.	.	+INF	44.1302
VAR A2	.	.	+INF	1.8090	VAR A2	.	.	+INF	27.9060
VAR B	.	1.3366	+INF	-1.475900E-8	VAR B	.	1.9601	+INF	.
VAR W	.	0.9961	+INF	.	VAR W	.	0.8964	+INF	.
VAR PX	.	1.1003	+INF	3.0901575E-8	VAR PX	.	1.9821	+INF	.
VAR PY	.	1.0099	+INF	-3.703896E-8	VAR PY	.	1.1384	+INF	.
VAR PL	.	1.0887	+INF	-7.206341E-8	VAR PL	.	1.6158	+INF	.
VAR PK	.	0.9454	+INF	5.4331309E-8	VAR PK	.	1.0772	+INF	.
VAR PW	.	1.0542	+INF	-3.040328E-7	VAR PW	.	1.5021	+INF	.
VAR CONS	.	210.0000	+INF	3.8235825E-7	VAR CONS	.	269.2951	+INF	.
VAR XA1	.	65.8627	+INF	.	VAR XA1	.	.	+INF	EPS
VAR YA1	.	.	+INF	EPS	VAR YA1	.	.	+INF	EPS
VAR XA2	.	.	+INF	EPS	VAR XA2	.	.	+INF	EPS
VAR YA2	.	.	+INF	EPS	VAR YA2	.	.	+INF	EPS
VAR XB	.	29.5617	+INF	EPS	VAR XB	.	67.9328	+INF	EPS
VAR YB	.	103.9709	+INF	.	VAR YB	.	118.2778	+INF	.

Conclusion: (i) Infinite elasticity of transformation implies that sector A will produce X only and almost at the same level as before when tax is 10%. No influence on the results when tax is 100%. **(ii)** Infinite elasticity of transformation does not have influence on welfare. **(iii)** Infinite elasticity of transformation may help sector to be better off (sector A1+A2 versus A).

Exercise 9c_B:

```
(b) Try a higher elasticity of transformation between output in the two sectors, such
as t = 10.
```

For $\mathbf{t_A=10}$ the transformation factor $\left(\frac{\varphi}{(1+\varphi)}\right)$ in CET transformation function increases from $\left(\frac{2}{3}\right)$ up to $\left(\frac{10}{11}\right)$, affecting value of output production, decreasing value of A_X and A_Y by c.10%.

$$A = f * [\ \alpha X^{(1+\varphi)/\varphi} + (1-\alpha)Y^{(1+\varphi)\varphi}\ ]^{\varphi/(1+\varphi)} = 1 * [\ 80X^{(1+10)/10} + 20Y^{(1+10)/10}\ ]^{10/(1+10)}$$

Also, as for benchmark case we had $|MRT_A|=0.19$ indicates that most of the impact would be observed in production of good Y.

*Counterfactual: **10% tax** on A sector inputs
TA = 0.10; t=10

	LOWER	LEVEL	UPPER	MARGINAL
---- VAR A	.	0.707	+INF	.
---- VAR B	.	1.290	+INF	.
---- VAR W	.	0.994	+INF	.
---- VAR PX	.	1.116	+INF	.
---- VAR PY	.	1.001	+INF	.
---- VAR PL	.	1.076	+INF	.
---- VAR PK	.	0.953	+INF	.
---- VAR PW	.	1.057	+INF	.
---- VAR CONS	.	210.000	+INF	.
---- VAR XA	.	64.8124	+INF	
---- VAR XB	.	29.2927	+INF	
---- VAR YA	.	5.4472	+INF	
---- VAR YB	.	99.4961	+INF	

*Counterfactual: **100% tax** on A sector inputs
TA = 1; t=10

	LOWER	LEVEL	UPPER	MARGINAL
---- VAR A	.	.	+INF	.
---- VAR B	.	1.960	+INF	.
---- VAR W	.	0.896	+INF	.
---- VAR PX	.	2.014	+INF	.
---- VAR PY	.	1.157	+INF	.
---- VAR PL	.	1.642	+INF	.
---- VAR PK	.	1.095	+INF	.
---- VAR PW	.	1.526	+INF	.
---- VAR CONS	.	273.627	+INF	.
---- VAR XA	.	.	+INF	
---- VAR XB	.	67.9328	+INF	
---- VAR YA	.	.	+INF	
---- VAR YB	.	118.2778	+INF	

Conclusions: i) The higher elasticity of transformation, the stronger reaction to imposed change (YA decreases considerably) **ii)** No influence on variables in real terms when tax burden is very strong.