

Laffer curve example

TheoryGuru applications

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Load Economicreasoning package only if it is not already loaded

```
If[Length@Names["PLTools`*"] < 10,  
  Get["http://economicreasoning.com"]]
```

Setup

$$\text{mrs}[c_ , n_] := - \frac{u^{(0,1)}[c, n]}{u^{(1,0)}[c, n]}$$

```
basicassumptions = {0 <  $\tau_L$  <  $\tau_H$  < 1,  $w_L$  > 0,  $w_H$  > 0,  $n_L$  > 0,  $n_H$  > 0,  $c_L$  > 0,  $c_H$  > 0,  
  (* the line below says that the  
  production function is increasing and weakly concave *)  
  ( $c_L - c_H$ ) ( $n_L - n_H$ ) > 0, ( $w_L - w_H$ ) ( $n_L - n_H$ )  $\leq$  0, ( $n_L - n_H$ )  $w_L \leq c_L - c_H \leq (n_L - n_H) w_H$ ,  
  (* the two lines below are revealed preference *)  
   $u_L > u_{Lb}$ , ( $u_{Lb} - u_H$ ) ( $c_{Lb} - c_H$ ) > 0,  $c_L - c_{Lb} = (n_L - n_H) (1 - \tau_L) w_L$ ,  
   $u_H > u_{Hb}$ , ( $u_{Hb} - u_L$ ) ( $c_{Hb} - c_L$ ) > 0,  $c_H - c_{Hb} = (n_H - n_L) (1 - \tau_H) w_H$ ,  
  (* the line below equates MRS to after-tax wage,  
  which is not relevant unless  
  additional assumptions about MRS are considered *)  
   $m_L = (1 - \tau_L) w_L$ ,  $m_H = (1 - \tau_H) w_H$ };  
  
ldemandiselastic = ( $w_L n_L - w_H n_H$ ) ( $n_L - n_H$ )  $\geq$  0;  
  
bothnormalgoods = {( $m_L - m_H$ ) ( $n_L - n_H$ ) > 0};  
  
samerevenue =  $\tau_L n_L w_L = \tau_H n_H w_H$ ;
```

Analytical Results

The high-tax equilibrium could have more work and utility

TheoryGuru[{basicassumptions[[1 ;; -3]], samerevenue}, $n_L > n_H$]

True for some, False for others

TheoryGuru[{basicassumptions[[1 ;; -3]], samerevenue}, $u_L > u_H$]

True for some, False for others

These are one in the same

TheoryOverlap[{basicassumptions[[1 ;; -3]], samerevenue}, $u_L > u_H$, $n_L > n_H$]

{ $u_L > u_H$, $n_L > n_H$ } are equivalent

Without holding revenue constant, the high-tax equilibrium can have more work, but then one of the goods (leisure) must be inferior

TheoryGuru[{basicassumptions, $n_L < n_H$ }, Not@bothnormalgoods]

True

Look at the frontier of the production possibilities between consumption and leisure. When leisure is a normal good, the wedge between MRS and w - and therefore the marginal tax rate that would be needed to support the allocation as a competitive equilibrium - must increase with the amount of leisure. But anywhere leisure is an inferior good, it is possible for the wedge to decrease with the amount of leisure. In other words, a high-tax-rate equilibrium can have more work than a low-tax-rate one.

If the high-tax equilibrium has the same revenue too, then labor demand must be inelastic

We might expect a high-tax-rate high-work equilibrium also has high tax revenue, but that depends on the elasticity of labor demand. If it diminishes enough, a high-work equilibrium can have less aggregate (pre-tax) labor income and therefore potentially the same or less labor income tax revenue.

```
TheoryGuru[{basicassumptions,  $n_L < n_H$ , samerevenue},  
  Not@bothnormalgoods &&  
  Not@ldemandiselastic]
```

True

```
TheoryGuru[{basicassumptions,  $u_L < u_H$ , samerevenue},  
  Not@bothnormalgoods &&  
  Not@ldemandiselastic]
```

True