Fiscal policy in a two-period neoclassical growth model

TheoryGuru applications

Load Economicreasoning package only if it is not already loaded

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

Setup

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

$$\text{eqsepeff} = \left\{\text{mrs}[c1, n1] == f'[n1],\ \text{mrs}[c2, n2] == f'[n2],\ f[n1] + h[k1] == c1 + g1 + k2 - k1,\right.$$
$$\left. f[n2] + h[k2] == c2 + g2 - k2,\ u^{(1,0)}[c1, n1] == \frac{u^{(1,0)}[c2, n2]}{1+\rho}\left(1 + h'[k2]\right)\right\};$$

$$\text{eqseptax} = \left\{\text{mrs}[c1, n1] == (1-\tau 1)\, f'[n1],\ \text{mrs}[c2, n2] == \left(1-\tau 2\right) f'[n2],\right.$$
$$f[n1] + h[k1] == c1 + g1 + k2 - k1,\ f[n2] + h[k2] == c2 + g2 - k2,\ g1 == \tau 1\, n1\, f'[n1],$$
$$\left. g2 == \tau 2\, n2\, f'[n2],\ u^{(1,0)}[c1, n1] == \frac{u^{(1,0)}[c2, n2]}{1+\rho}\left(1 + h'[k2]\right)\right\}$$

$$\left\{-\frac{u^{(0,1)}[c1, n1]}{u^{(1,0)}[c1, n1]} == (1-\tau 1)\, f'[n1],\ -\frac{u^{(0,1)}[c2, n2]}{u^{(1,0)}[c2, n2]} == \left(1-\tau 2\right) f'[n2],\right.$$
$$f[n1] + h[k1] == c1 + g1 - k1 + k2,\ f[n2] + h[k2] == c2 + g2 - k2,\ g1 == n1\, \tau 1\, f'[n1],$$
$$\left. g2 == n2\, \tau 2\, f'[n2],\ u^{(1,0)}[c1, n1] == \frac{\left(1 + h'[k2]\right) u^{(1,0)}[c2, n2]}{1+\rho}\right\}$$

```
iqseppositive =
  {mrs^(1,0)[c1, n1] > 0, mrs^(1,0)[c2, n2] > 0, mrs^(0,1)[c1, n1] > 0, mrs^(0,1)[c2, n2] > 0,
   f[n1] > 0, f'[n1] > 0, f''[n1] ≤ 0, D[n1 f'[n1], n1] > 0,
   f[n2] > 0, f'[n2] > 0, f''[n2] ≤ 0, D[n2 f'[n2], n2] > 0, h[k1] > 0, h[k2] > 0,
   h'[k2] > 0, h''[k2] < 0, n1 > 0, c1 > 0,
   n2 > 0, c2 > 0, g1 ≥ 0, g2 ≥ 0, 0 ≤ τ1 < 1, 0 ≤ τ2 < 1, ρ > -1,
   u^(1,0)[c1, n1] > 0, u^(0,1)[c1, n1] < 0, u^(2,0)[c1, n1] < 0, u^(0,2)[c1, n1] < 0,
   u^(2,0)[c1, n1] u^(0,2)[c1, n1] - (u^(1,1)[c1, n1])^2 > 0,
   u^(1,0)[c2, n2] > 0, u^(0,1)[c2, n2] < 0, u^(2,0)[c2, n2] < 0,
   u^(0,2)[c2, n2] < 0, u^(2,0)[c2, n2] u^(0,2)[c2, n2] - (u^(1,1)[c2, n2])^2 > 0};
```

A permanent increase in government purchases

Increases the efficient amount of labor

```
TheoryGuru[{iqseppositive, Dt[eqsepeff, g],
  Dt[g1, g] == 1, Dt[g2, g] == 1, Dt[ρ, g] == 0, Dt[k1, g] == 0},
 Dt[n1, g] > 0(* more labor *)]
```

```
The variables {c1, c2, g1, g2, f(n1), f(n2), h(k1), h(k2)}
  are isolated and irrelevant to the conclusions.
Assumptions 18 && 20 && 21 && 22 && 5 && 9 && 13 && 14, respectively, were therefore dropped.
True
```

But not necessarily the equilibrium amount

```
TheoryGuru[{iqseppositive, Dt[eqseptax, g],
  Dt[g1, g] == 1, Dt[g2, g] == 1, Dt[ρ, g] == 0, Dt[k1, g] == 0},
 Dt[n1, g] > 0(* more labor *)]
```

```
The variables {c1, c2, g1, g2, f(n1), f(n2), h(k1), h(k2)}
  are isolated and irrelevant to the conclusions.
Assumptions 18 && 20 && 21 && 22 && 5 && 9 && 13 && 14, respectively, were therefore dropped.
True for some, False for others
```

Variable interpretations