The Distributional Consequences of Government Spending

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- This is an important policy question:
  - Inequality has been rising in both OECD and non-OECD countries (Atkinson, 2003, Smeeding, 2002)
  - Reducing inequality may be a social objective for the government (Anand and Segal, 2008)

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  - Need for an underlying mechanism that relates public policy, growth, and inequality

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    - **Growth-Inequality literature** has not dealth with issues related to public investment and its financing
    - **Public investment-Growth literature** has generally ignored distributional questions

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  - Caselli and Ventura (2000), Sorger (2000, 2002), Garcia-Penalosa and Turnovsky (2006, 2008), Kraay and Raddatz (2007), Carroll and Young (2009), Barnett et al. (2009)

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  - a determinant of growth and distributional dynamics: affects relative factor returns

- Firms (indexed by j) are all identical and use the following CES production technology

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- $s = 1/(1+\rho)$: elasticity of substitution between private capital and "effective" labor in production

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Firms and Technology

- Since all firms are identical, the production function pins down the economy-wide average real wage and return on capital:

$$w = \omega(z, l)K, \quad \omega(z, l) = \alpha A^{-\rho} \left[\frac{y(z, l)}{1 - l} \right]^{1+\rho} z^{-\rho(1-\varepsilon)}$$

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- $y(z, l) = A \left[\alpha \left\{ (1-l) z^{1-\varepsilon} \right\}^{-\rho} + (1-\alpha) \right]^{-1/\rho}$: average product of private capital (output-capital ratio)

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- The i-th consumer's (cross section's) resource allocation problem:

$$\text{Maximize } U_i = \int_0^\infty \frac{1}{\gamma} \left[C_i^{-v} + \theta \left(X_U l_i \right)^{-v} \right]^{-\gamma/v} e^{-\beta t} dt$$

subject to

$$\dot{K}_i = (1 - \tau_k) r K_i + (1 - \tau_w) w (1 - l_i) - (1 + \tau_c) C_i - T$$

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- Lumsum tax revenues, T, is a fraction of aggregate GDP:

$$T = \tau Y, \quad 0 < \tau < 1$$

Aggregate Equilibrium Dynamics

- Due to the Gorman (1953) properties, the aggregate equilibrium is *independent* of distributional characterisitcs:

$$\frac{\dot{z}}{z} = g\frac{y(z,l)}{z} - [(1-g)y(z,l) - \Omega(z,l)l]$$

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- Evolution of the aggregate economy represents the behavior of *averages*:

$$z(t) = \tilde{z} + (z_0 - \tilde{z})e^{\mu t}$$

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Distributional Dynamics: Wealth

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- Steady-state relationship between relative wealth and leisure:

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  - $s_k(t)$: share of capital in total income
  - $\zeta(t) =$

  $$s_k(t) - [1 - s_k(t)]\frac{l(t)}{1 - l(t)}\left[1 - \frac{\Delta(\tilde{z}, \tilde{l})}{\Gamma(\tilde{z}, \tilde{l})\tilde{l}}\right]\left[1 + \frac{\delta_1(\tilde{z}, \tilde{l})}{\mu - \delta_2(\tilde{z}, \tilde{l})}\{z(t) - \tilde{z}\}\right]^{-1}$$

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- Relative welfare:

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- Dispersion of relative welfare

$$\sigma_u = \left[1 - \frac{\Delta(\tilde{z}, \tilde{l})}{\Gamma(\tilde{z}, \tilde{l})\tilde{l}} \right] \tilde{\sigma}_k$$

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Preferences	$\beta = 0.04$, $\gamma = -1.5$, $\theta = 1.75$, $\upsilon = 0$
Production	$A = 0.6$, $\alpha = 0.6$, $\rho = 0$
Externalities	$\varepsilon = \varphi = 0.6$
Fiscal	$g = 0.05$, $\tau = 0.05$, $\tau_k = \tau_w = \tau_c = 0$

- Benchmark: Cobb-Douglas production and utility functions

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Financing Policy	$\tilde{z}$	$\tilde{l}$	$\tilde{y}$	$\tilde{\psi}(\%)$
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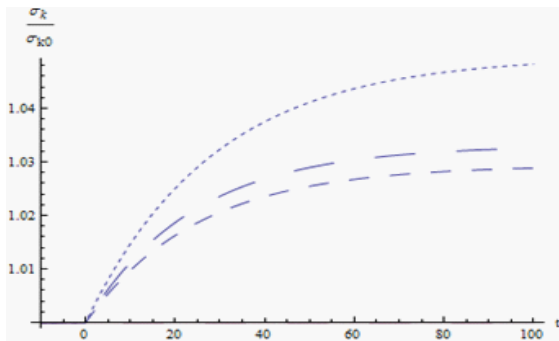 | Policy Change ($dg = 0.03$) | $d\tilde{z}$ | $d\tilde{l}$ | $d\tilde{\psi}$ |
  |---|---|---|---|
  | Lump-sum tax-financing ($d\tau = 0.03$) | 0.259 | -0.01 | 0.206 |
  | Capital income tax-finaning ($d\tau_k = 0.075$) | 0.353 | -0.006 | 0.101 |
  | Labor income tax-financing ($d\tau_w = 0.05$) | 0.268 | 0.002 | 0.168 |
  | Consumption tax-financing ($d\tau_c = 0.096$) | 0.265 | -0.001 | 0.179 |

Wealth Inequality
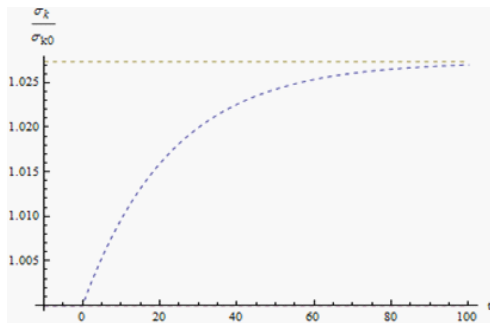
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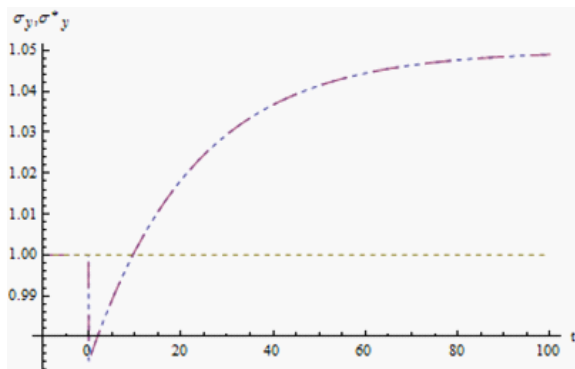
Pre- and Post-tax Income Inequality
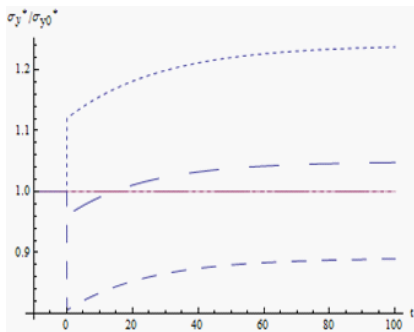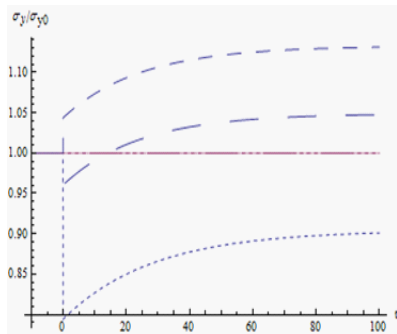
Pre-tax income inequality   Post-tax income inequality

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  - relative magnitude of the composite public-private externality in the utility and production functions, φ and ε (Table 4)

The Growth-Inequality Relationship
Generated by an Increase in Government Spending

A. Composite Externality in Utility and Production, $\varepsilon = \varphi = 0.6$ (Benchmark Case)

Policy Change	Short Run Change			Long Run Change		
	Growth	Post-tax Income Ineq.	Relation	Growth	Post-tax Income Ineq.	Relation
Lump-sum tax-financed increase in g	0.129	-2.602	−	0.206	4.996	+
Capital income tax-financed increase in g	0.044	-9.174	−	0.101	-0.149	−
Labor income tax-financed increase in g	0.096	-0.110	−	0.168	7.933	+
Consumption tax-financed increase in g	0.106	-3.117	−	0.179	4.955	+

B. Public Good Externality in Utility Function: $\varphi = 0$, $\varepsilon = 1$

Policy Change	Short Run Change			Long Run Change		
	Growth	Post-tax Income Ineq.	Relation	Growth	Post-tax Income Ineq.	Relation
Lump-sum tax-financed increase in g	-0.107	-4.964	+	0.025	3.373	+
Capital income tax-financed increase in g	-0.215	-11.631	+	-0.102	-2.199	+
Labor income tax-financed increase in g	-0.136	-2.511	+	-0.010	6.210	−
Consumption tax-financed increase in g	-0.128	-5.468	+	-0.0002	3.315	+

C. Public Good Externality in Production Function: $\varphi = 1$, $\varepsilon = 0$

Policy Change	Short Run Change			Long Run Change		
	Growth	Post-tax Income Ineq.	Relation	Growth	Post-tax Income Ineq.	Relation
Lump-sum tax-financed increase in g	0.409	-2.287	−	0.446	8.392	+
Capital income tax-financed increase in g	0.377	-9.087	−	0.386	4.060	+
Labor income tax-financed increase in g	0.375	0.113	+	0.408	11.531	+
Consumption tax-financed increase in g	0.385	-2.938	−	0.419	8.479	+

Trade-off between Average Welfare and its Dispersion
Generated by an Increase in Government Spending

A. Composite Externality in Utility and Production, $\varepsilon = \varphi = 0.6$ (Benchmark Case)

Policy Change	$d\bar{W}(\%)$	$d\tilde{\sigma}_u(\%)$
Lump-sum tax-financed increase in g	4.012	5.415
Capital income tax-financed increase in g	1.790	3.620
Labor income tax-financed increase in g	3.139	2.996
Consumption tax-financed increase in g	3.398	2.946

B. Public Good Externality in Utility Function: $\varphi = 0$, $\varepsilon = 1$

Policy Change	$d\bar{W}(\%)$	$d\tilde{\sigma}_u(\%)$
Lump-sum tax-financed increase in g	6.830	5.773
Capital income tax-financed increase in g	5.041	3.872
Labor income tax-financed increase in g	5.930	3.312
Consumption tax-financed increase in g	6.198	3.299

C. Public Good Externality in Production Function: $\varphi = 1$, $\varepsilon = 0$

Policy Change	$d\bar{W}(\%)$	$d\tilde{\sigma}_u(\%)$
Lump-sum tax-financed increase in g	3.384	6.300
Capital income tax-financed increase in g	1.227	4.929
Labor income tax-financed increase in g	2.554	3.926
Consumption tax-financed increase in g	2.801	3.902

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