The Dynamics of Corruption and Unemployment with Heterogeneous Labour

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Large literature on LT adverse impact of corruption on econ growth & other factors:

- Private investment (Mauro, 1997); human capital accumulation (Ehrlich & Liu, 1999); income inequality (Blackburn & Forgues-Puccio, 2007);
- Non-linear and Non-monotonic;

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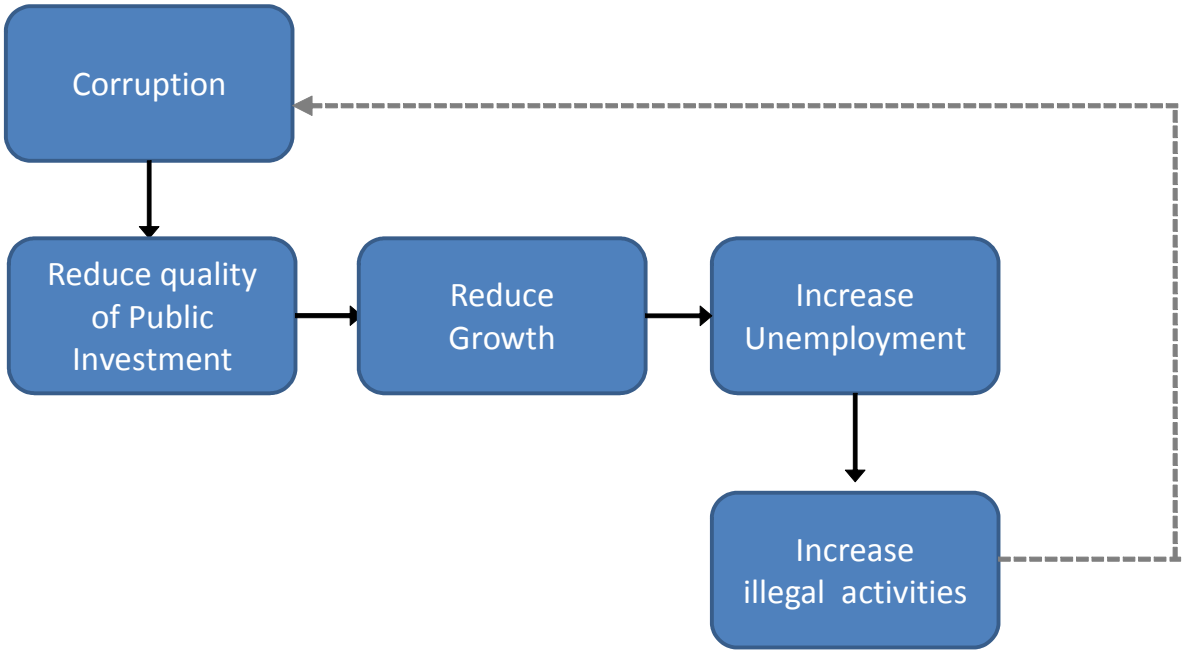
Shortcomings:

1. Public officials assumed to just exist as distinct group—**not truly endogenously** determined as occupational choice;
2. Large literature, but many lower-middle income African economies' twin (high) **Corruption-Unemployment** issue often been neglected;

Simple Unemployment-Corruption relationship



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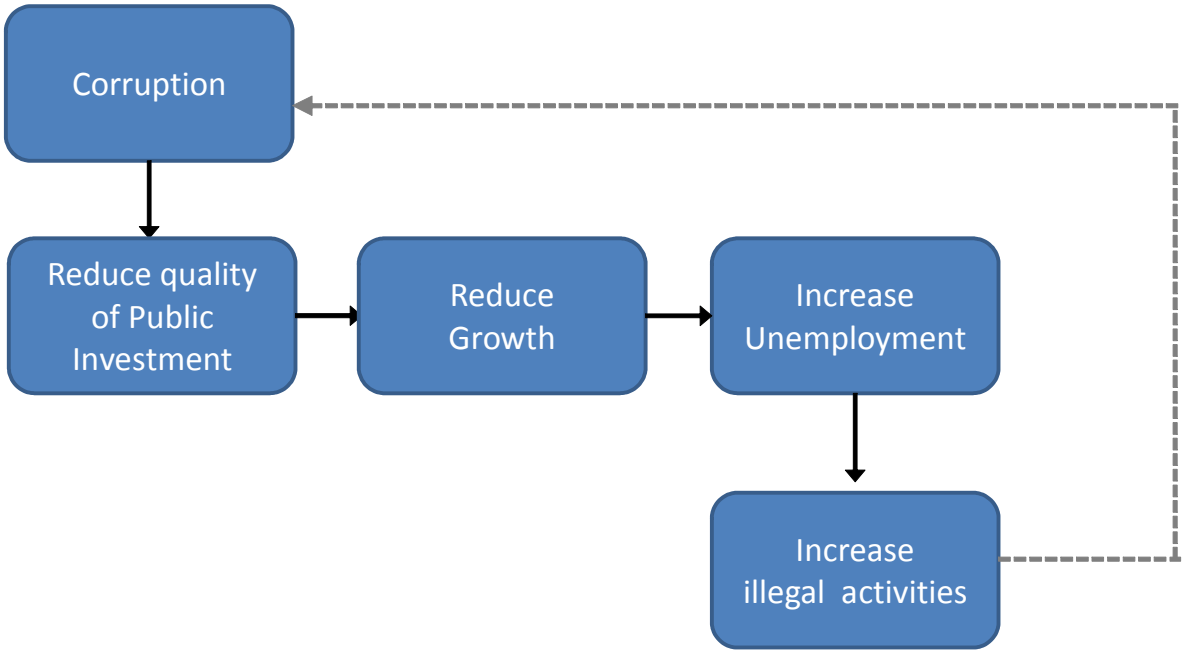

But, what happens if there were heterogeneous labour and therefore different type of unemployment?

Model with Corruption-Unemployment

- OLG growth model, heterogeneous abilities (**skilled & unskilled**) and endogenous occupational choice,
- Unlike Spinesi (2009, JDE),
  1. Romerian type **IGs & designs-production** sector (instead of Schumpeterian quality ladder), as expanded variety fits lower-middle income economy better;
  2. endogenous public officials (skilled occupational choice);
  3. structural unemployment due to trade union bargaining.

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  2. endogenous public officials (skilled occupational choice);
  3. structural unemployment due to trade union bargaining.
- Key link (through resources spent to conceal), hc_t:

$$hc_t = \left(\frac{\theta_t^{SL}}{\theta_t^{UL}} \right)^{\delta} \text{ illegal income.}$$

- Higher θ_t^{UL}, lower hc_t – a semi-quasi form for the hidden-economy channel;
- Higher θ_t^{SL}, higher hc_t – Shapiro-Stiglitz's *uemployment-as-disciplinary device*.

Preferences

$$V_t^{h,j} = c_{t|t}^{h,j} + \frac{c_{t|t+1}^{h,j}}{1+\rho}, \ h = U, SY, SG, \quad j = E, L \ .$$

In the absence of corruption possibility, period-specific budget constraints:

$$c_{t|t}^{U,j} + s_t^{Uj} = \begin{cases} (1-\tau)w_t^U & \text{if } j = E \\ b_t & \text{if } j = L \end{cases},$$

$$c_{t|t}^{S,j} + s_t^{S,j} = \begin{cases} (1-\tau)[(1-\varrho)w_t^S - tc_t] & \text{if } h = SY, \ j = E \\ (1-\varrho)b_t - tc_t & \text{if } j = L \\ (1-\varrho)w_t^S - tc_t & \text{if } h = SG, j = E \end{cases}$$

$$c_{t|t+1}^{h,j} = (1+r_{t+1})s_t^h, \quad h = U, SY, SG, \quad j = E, L,$$

where tc_t is proportional to expected skilled wage.

Complete bureaucratic participation condition: public officials' wages is non-taxable.

Training and Occupational Choice

Threshold ability, a_t^C, above which individuals choose to become skilled depends on

$$(1-\zeta_t^{UL})(1-\tau)w_t^U + \zeta_t^{UL} b_t,$$

$$(1-\varrho)(\zeta_t^{SY}(1-\tau)w_t^S + \zeta_t^{SG} w^S + \zeta_t^{SL} b_t) - tc_t,$$

where ζ_t^h, $h = SY, SG, SL, UY, UL$ are respective probabilities.

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Wage-setting and Benefit Rate

- **Wage-setting:** *right-to-manage* bargaining between a centralized TU & firms (refer Kester et al (2016) for TU's influences in Nigeria).
- Union maximises $\mathfrak{V}_t^h = (w_t^h - w_t^{hT})^{\xi^h}(N_t^h)^{1-\xi^h}$ for $h = U, S$, subject to L^{D} functions. Solution:

$$w_t^h = (\frac{1-\xi^h}{1-2\xi^h})w_t^{hT},$$

  where $w_t^{hT} = b_t(\theta_t^{hL})^{-\varkappa^h} w_0^h$, $hL = UL, SL$.
- UB ($b_t = \kappa_t \frac{Y_t}{\bar{N}}$) is endogenous to changes in (1) per capita income, and (2) indexation ratio, determined from gov's budget allocation to social security/benefit payments.

Production

- A perfectly competitive FG sector. Uses unskilled labor (N_t^{UY}), private capital (K_t^P), a variety of IGs ($x_{i,s,t}$, $s \in (0, M_t)$);
- Standard IG sector: monop. competitive (Agénor & Canuto, 2015). Firm transforms M_t^s to $x_{s,t}$ on 1-to-1 basis;
- Designs (private sector employer for skilled labor):

$$M_{t+1} - M_t = \left(\frac{K_t^G}{K_t^P}\right)^{\varsigma_1^m} \frac{(1-\varrho)N_t^{SY}}{\bar{N}} M_t.$$

Public Officials

- Procurement (Blackburn et al. 2011; Chakraborty and Dabla-Norris 2011). Corruption opportunies because official can over-report purchase cost;
- Gov demands aggregate $g_t = \psi Y_t$ capital goods. Each official procures g_t / N_t^{SG} units:
  1. Low-quality, $\Upsilon < 1$ unit; Realized Cost: 1 unit;
  2. High-quality, 1 unit; Realized Cost: uniformly distributed $\phi \in [1, \phi^{\max}]$;

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- **If not corrupt:** Procure: g_t/N_t^{SG} (quality), Spend: $\bar{\phi}[g_t/N_t^{SG}]$, Claim: $\bar{\phi} = (1 + \phi^{\max})/2$ (on avg), Earn: $(1 - \varrho)w_t^S$;

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- **If corrupt:** Procure: $\Upsilon[g_t/N_t^{SG}]$ (quality), Spend: $\bar{\phi}[g_t/N_t^{SG}]$, Claim: $\phi_t \in (\bar{\phi}, \phi^{\max})$ (optimal), Earn: $(1 - \varrho)w_t^S$, plus $(\phi_t - \bar{\phi})[g_t/N_t^{SG}]$;

Public Sector Corruption

- Embezzle public funds if:

$$\begin{aligned} & p\left[\begin{array}{c}((1-\varrho)w_t^S - tc_t) \\ +(\phi_t - \frac{1+\phi^{\max}}{2})\frac{g_t}{N_t^{SG}}\end{array}\right] \\ & +(1-p)[-tc_t] - hc_t \\ \geq\ & (1-\varrho)w_t^S - tc_t, \end{aligned}$$

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- Threshold ϕ_t^*, above which an official opts to corrupt:

$$\phi_t^* = \bar{\phi} + \frac{(1-p)}{p}(1-\varrho)\frac{(k_t^G)^{\varsigma_1^m}}{\psi[(1-\eta)\gamma]^{-1}}\frac{N_t^{SG}}{N_t^{SY}}\left[\frac{1}{p} - \left(\frac{\theta_t^{SL}}{\theta_t^{UL}}\right)^{\delta}\right]^{-1},$$

  which determines share of corrupted officials, ε_t:

$$\varepsilon_t = \frac{\phi^{\max} - \phi_t^*}{\phi^{\max} - \bar{\phi}}.$$

Public Finance and Investment Efficiency

- Actual quality of public capital goods:

$$\begin{aligned} K_{t+1}^{G} &= G_t^K = (1-\varepsilon_t) N_t^{SG} \frac{g_t}{N_t^{SG}} + \varepsilon_t N_t^{SG} \Upsilon \frac{g_t}{N_t^{SG}} \\ &= [1-\varepsilon_t(1-\Upsilon)]\psi Y_t, \end{aligned}$$

- while total claims filed:

$$G_t^I = \{(1-\varepsilon_t)[(0.5)(1+\phi_t^*)] + \varepsilon_t[(0.5)(\phi_t^* + \phi^{\max})]\} g_t.$$

- Compute public investment efficiency ratio, φ_t, endogenously:

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- Share of public officials, $\theta_t^{SG} = N_t^{SG}/\bar{N}$, determined from allocated G_t^G, which is a constant υ_G of revenue;

$$\begin{aligned} (1-\varrho) w_t^S N_t^{SG} &= \upsilon_G \{\tau\{w_t^U N_t^{UY} + N_t^{SY}[(1-\varrho)w_t^S - tc_t]\} \\ &\quad + (1-p)\varepsilon_t (1-\varrho) w_t^S N_t^{SG}\}. \end{aligned}$$

Parameterization

Parameterize to **Nigeria**, using primary published data by NBS Nigeria. **Initial Steady State:**

Variable	Description	Value	Variable	Description	Value
θ^U	Share of unskilled workers in population	0.847	ε	Corruption rate	0.336
θ^S	Share of effective skilled workers in population	0.141	κ	Social security/benefit rate, to per capita income	0.020
θ^{SG}	Share of (effective skilled) public officials	0.002	k^G	Public-private capital ratio	0.160
θ^{SY}	Share of effective skilled workers in private sector	0.103	Y/K^P	Final output-private capital ratio	0.524
θ^{SL}	Skilled unemployment rate	0.036	m	Blueprint-private capital stock ratio	0.100
θ^{UY}	Share of unskilled workers in private sector	0.741	ϕ^*	Optimal threshold cost for inflated reporting	1.246
θ^{UL}	Unskilled unemployment rate	0.106	φ_t	Public investment efficiency	0.285

Policy Experiments

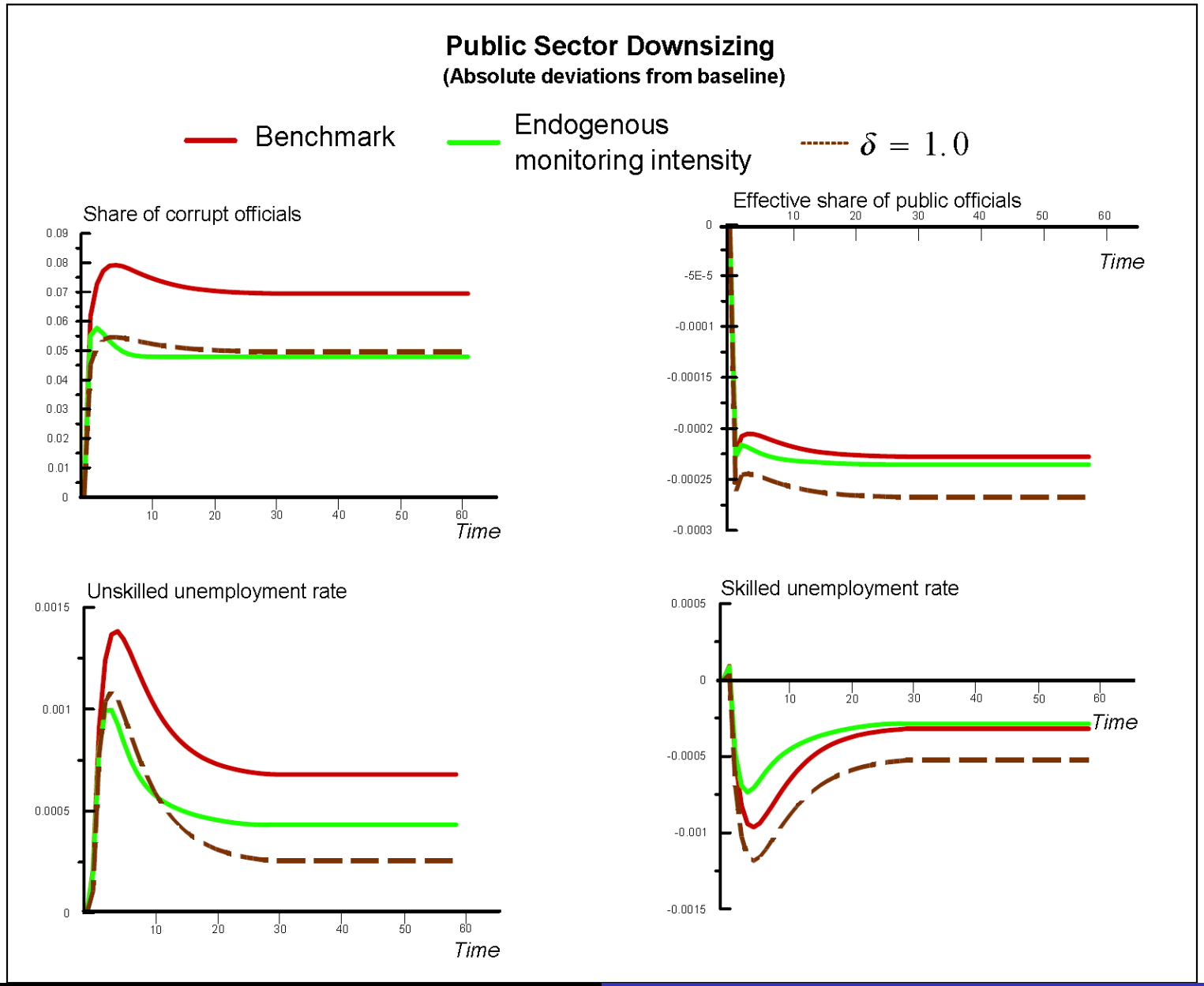
1. Obasanjo government's *Public Sector Downsizing* in 1990s (a cut in υ_G);
2. Buhari's *Social Intervention Scheme* (a rise in share of social benefit spending, υ_S);
3. Ambitious Social Reform (rise in υ_S, cut in μ, unionization reform, ξ^U cut), coupled with an increase in Public Investment (υ_I).

In addition to **Benchmark**, we also consider (i) **endogenous p,**

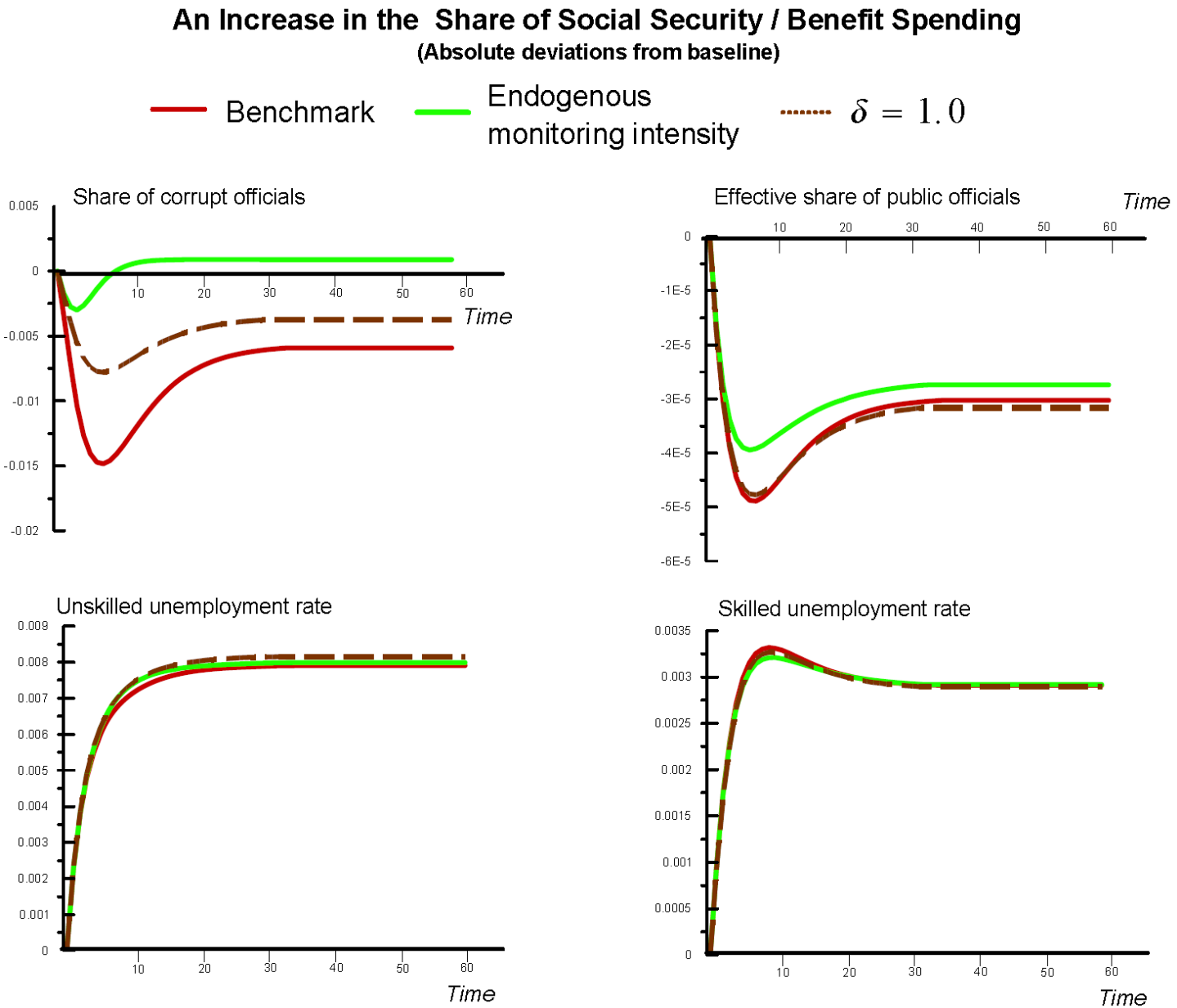
$$p_t = (p_{t-1})^{\mu_P}(p_m \frac{\bar{N}}{\varepsilon_t N_t^{SG}})^{1-\mu_P}$$

; (ii) **linear** specification for **concealment cost** ($\delta = 1.0$); (iii) **endogenous threshold model**.

Public Sector Downsizing

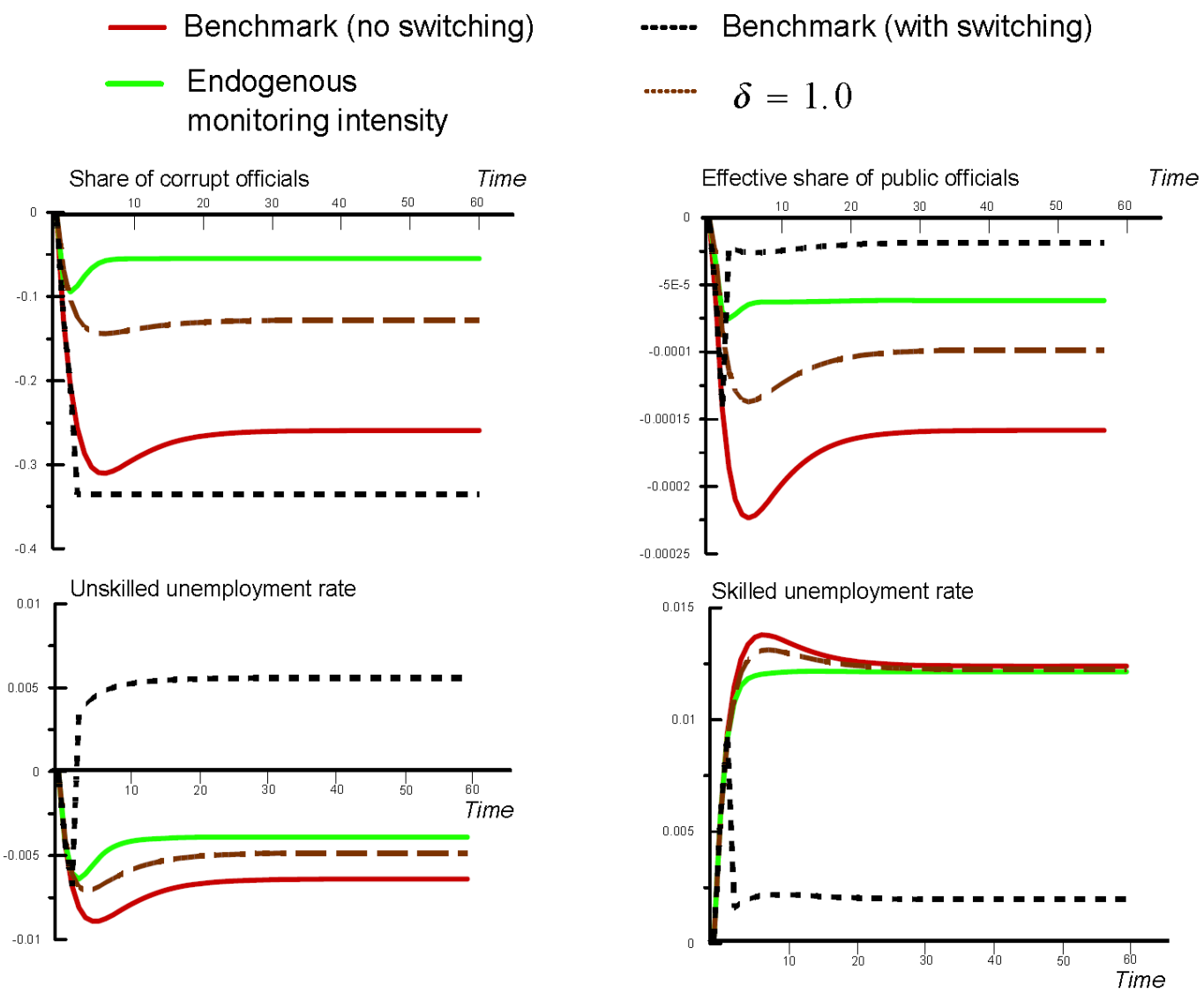


Increase min income by raising social benefit spending



Ambitious Social Reform, with Public Investment

Ambitious Social Reform, coupled with an Increase in Share of Public Investment
(Absolute deviations from baseline)



Thank You

Appendix

An *imperfect equilibrium with corruption and unemployment* is a sequence of consumption and saving allocations $\{c_{t|t}^{h,j}, c_{t|t+1}^{h,j}, s_t^{h,j}\}_{t=0}^{\infty}$, for $h = U, SY, SG$, $j = E, L$, prices of production inputs $\{w_t^U, w_t^S, r_{t+1}\}_{t=0}^{\infty}$, existing blueprint varieties $\{M_t\}_{t=0}^{\infty}$, private capital $\{K_t^P\}_{t=0}^{\infty}$, public capital $\{K_t^G\}_{t=0}^{\infty}$, such that, given initial stocks $M_0, K_0^P, K_0^G > 0$,

a) all individuals, skilled or unskilled, employed or unemployed, publicly or privately employed, maximise utility by solving their inter-temporal problems;
b) public officials maximise utility by choosing the cost to report (hence to corrupt or not to corrupt), taking the overall distribution of ϕ, the probability of being detected, the quality of the final goods, and public funds allocated for public investment as given;
c) firms in the final good sector maximise profits by choosing labour, private capital, and intermediate inputs, taking factor prices as given;
d) IG producers set prices so as to maximise profits, given the perceived aggregate demand curve;

Balanced Growth Equilibrium

A *balanced growth equilibrium* is an equilibrium with corruption and unemployment in which:

a) $\{c_{t|t}^{h,j}, c_{t|t+1}^{h,j}, s_t^{h,j}\}_{t=0}^{\infty}$, for $h = U, SY, SG$, $j = E, L$, and K_t^P, K_t^G, Y_t, w_t^U, w_t^S, b_t, grow at the constant, endogenous rate $1+\gamma$, implying that the blueprint-private capital ratio and the public-private capital ratio is constant;
b) the rate of return on capital, $1 + r_{t+1}$, is constant;
c) the threshold ability level, a_t^C, is constant;
d) the threshold level of cost above which public officials opt to corrupt, ϕ_t^*, is constant;
e) the fractions, θ_t^{UY}, θ_t^{SY}, θ_t^{SG}, are constant;

Balanced Growth Equilibrium

f) the proportion of the public officials who are corrupt, ε_t, is constant;
g) the benefit indexation variable (as a ratio of income per capita), κ_t, is constant;
h) the price of intermediate goods P_t and the fee Q_t, is constant;
i) skilled and unskilled unemployment rates, θ_t^{UL} and θ_t^{SL}, are constant; and
j) employment and unemployment probabilities, ζ_t^{UY}, ζ_t^{SY}, ζ_t^{SG}, and ζ_t^{UL}, ζ_t^{SL} are constant.