

Las Fuentes Micro del Crecimiento Macro

Teoría

Noviembre 2004

Model

Standard one good economy with heterogeneous capital.

Production

- Labor and capital are needed for production.
- Capital embodies different levels of technology.
- Aggregate production function:

$$Y_t = e^{\lambda_t} N_t^\alpha \left[\int_{-\infty}^{+\infty} e^{\theta_t} k_t(\theta_t) d\theta_t \right]^{1-\alpha}$$

- At the end of the period, capital is either scrapped, with salvage value s , or it undergoes a random change in productivity:

$$\theta_{t+1} = \theta_t + \varepsilon_{t+1}^{\theta}, \varepsilon^{\theta} \sim N(0, \sigma_{\theta}^2)$$

- A newly created unit of capital operates in $t+1$ and draws its initial level of technology from:

$$\theta_{t+1} \sim N(z_t, \sigma^2)$$

- The leading edge technology evolves according to:

$$z_t = \mu_z + z_{t-1} + \varepsilon_t^z, \varepsilon^z \sim N(0, \sigma_z^2)$$

- Capital by state of productivity evolves according to

$$k_{t+1}^0(\theta_{t+1}) = \int_{-\infty}^{\infty} \frac{1}{\sigma_{\theta}} \phi\left(\frac{\theta_{t+1} - \theta_t}{\sigma_{\theta}}\right) k_t^1(\theta_t) d\theta_t + \phi\left(\frac{\theta_{t+1} - z_t}{\sigma}\right) I_t^c$$

- Exit determined by exogenous cut-off

$$s = q_t^1(\overline{\theta}_t) .$$

Consumption

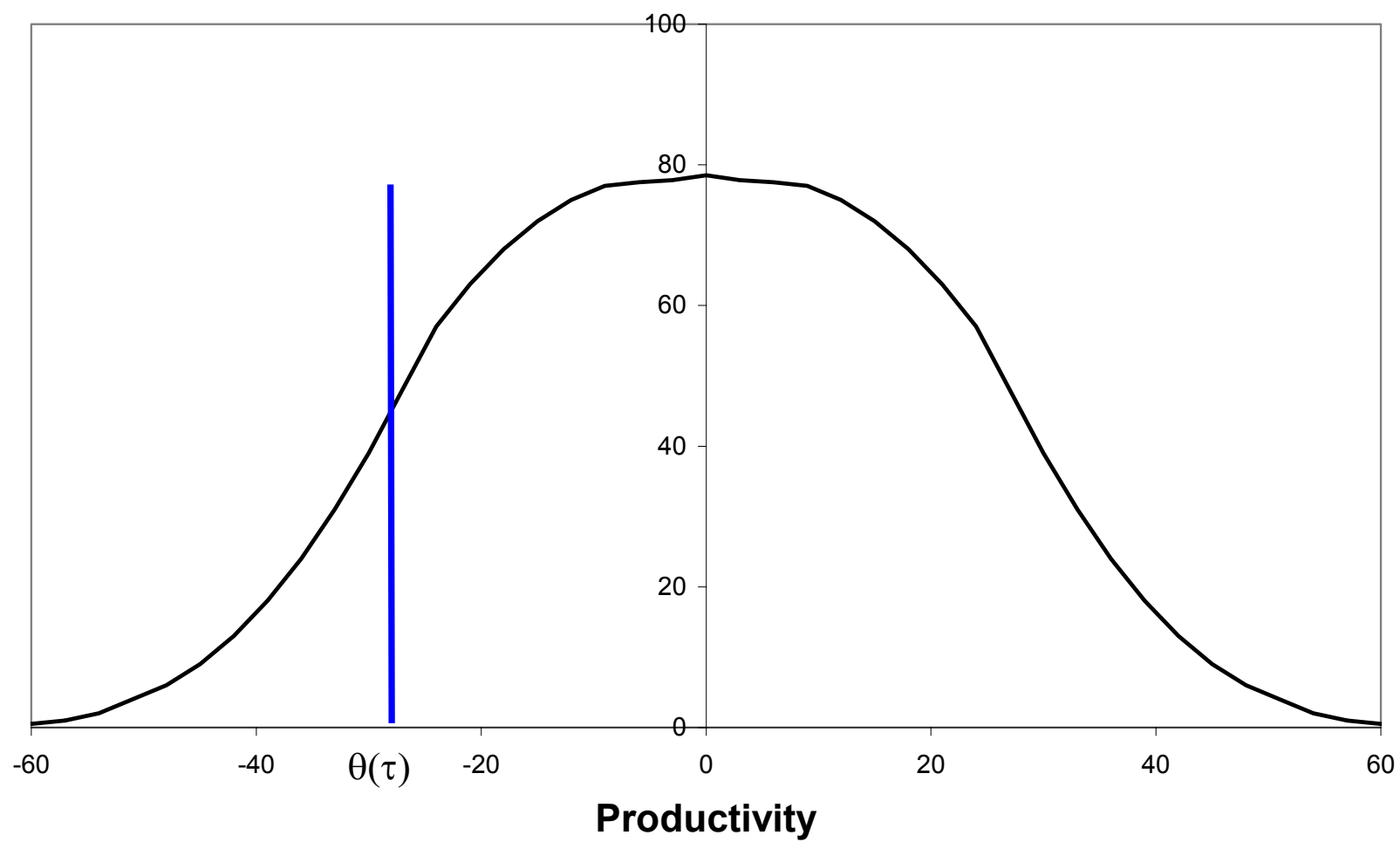
$$E_0 \left[\sum_{t=0}^{\infty} \beta^t \{ \log(c_t) + \gamma(1 - n_t) \} \right] \quad \text{s.t.}$$

$$c_t + I_t^c q_t^{1i} + (1 - \tau_t) \int_{-\infty}^{\infty} q_t^1(\theta_t) k_t^1(\theta_t) d\theta = \omega_t n_t + \int_{-\infty}^{\infty} q_t^0(\theta_t) k_t^0(\theta_t) d\theta - T_t$$

Market clearing

$$C_t + I_t = Y_t + S_t$$

Distribution of Plants



Parametric Specification

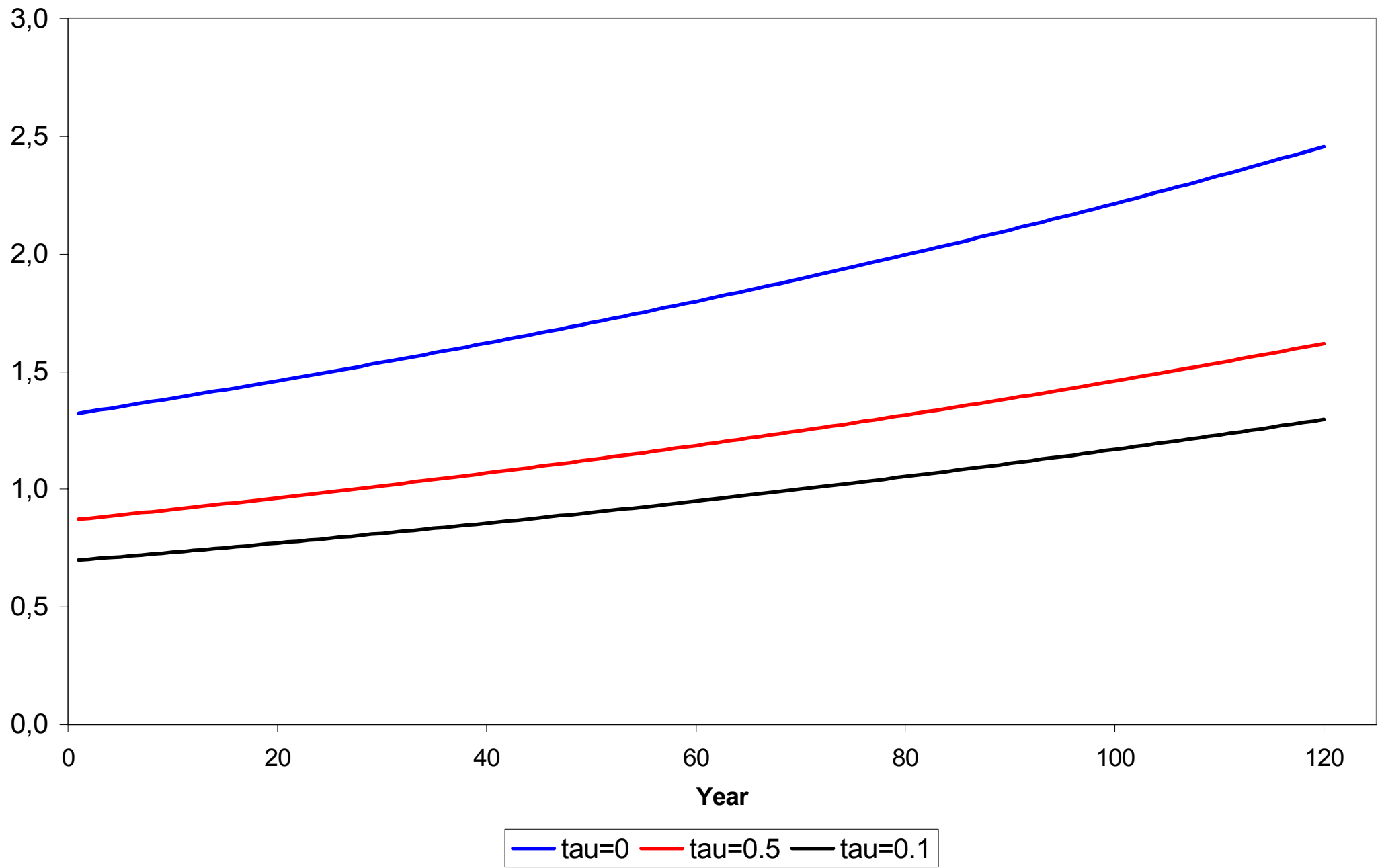
Aggregate parameters		
Discount factor	β	0.98
Marginal utility of leisure	γ	1.91
Labor share	α	0.6
Technology drift	μ_z	0.0052
Irreversibility	s	0.9
Depreciation rate	δ	0.02
Plant level parameters		
St. dv. of shock to incumbents	σ_θ	0.03
St dev of shock to startups	σ	0.25
Simulation parameters		
Productivity shock	σ_λ	-0.05
Productivity shock persistence	ρ_λ	0
Policy level	τ	(-0.1,-0.05, 0)
Policy shock	σ_τ	(-0.06,-0.03, 0)
Policy shock persistence	ρ_τ	0.66

Simulation exercises

Simulation 1:

- GDP per capita path
 - undistorted economy
 - 5% incumbent subsidy
 - 10% incumbent subsidy

Path of GDP Per Capita



Subsidized economies are poorer

Inefficient firms do not free enough resources:

- too little exit
- too little entry
- too little reallocation

Other policies with similar effects:

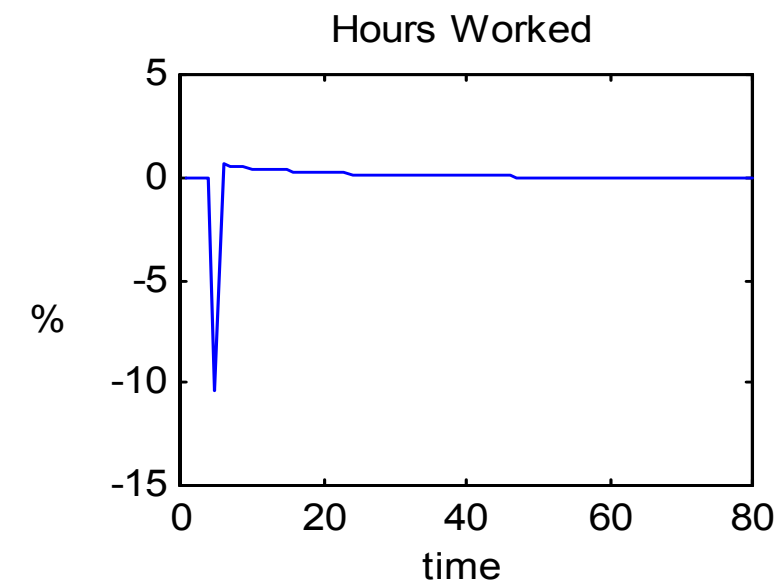
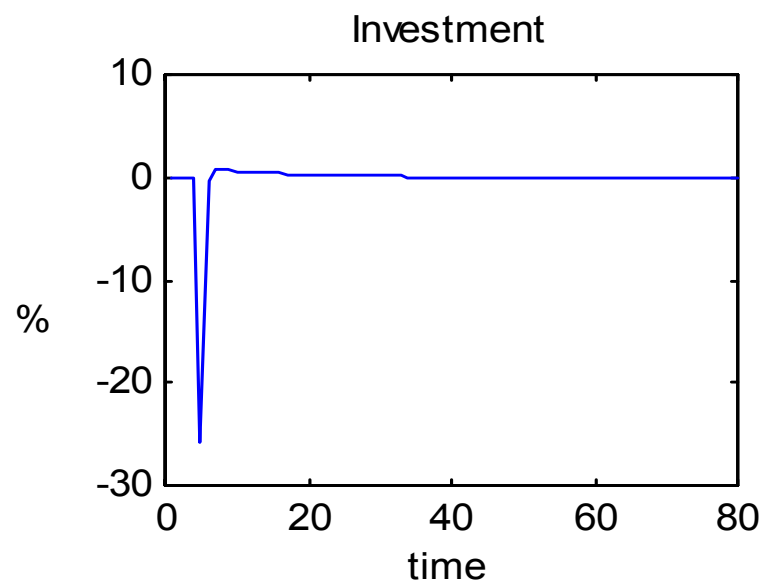
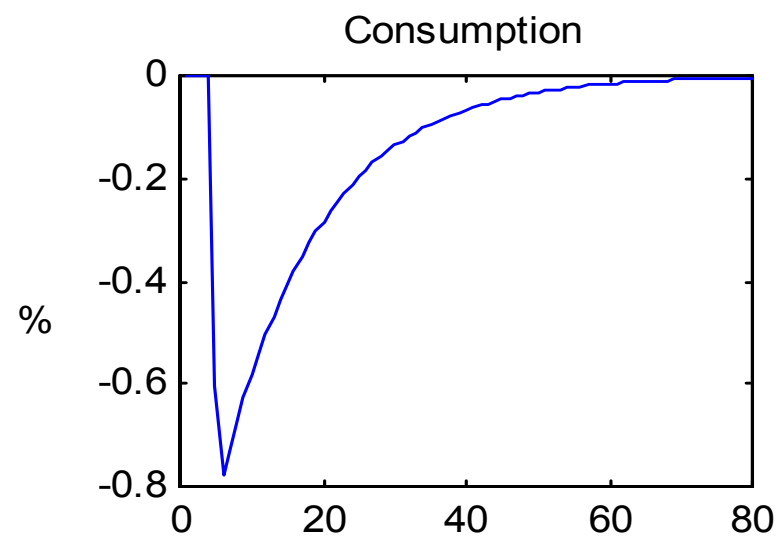
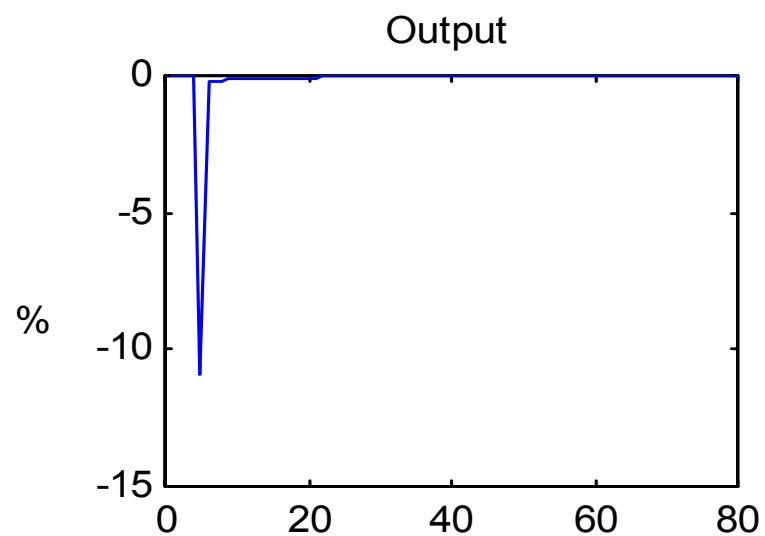
- investment subsidy
- firing cost
- entry regulation
-

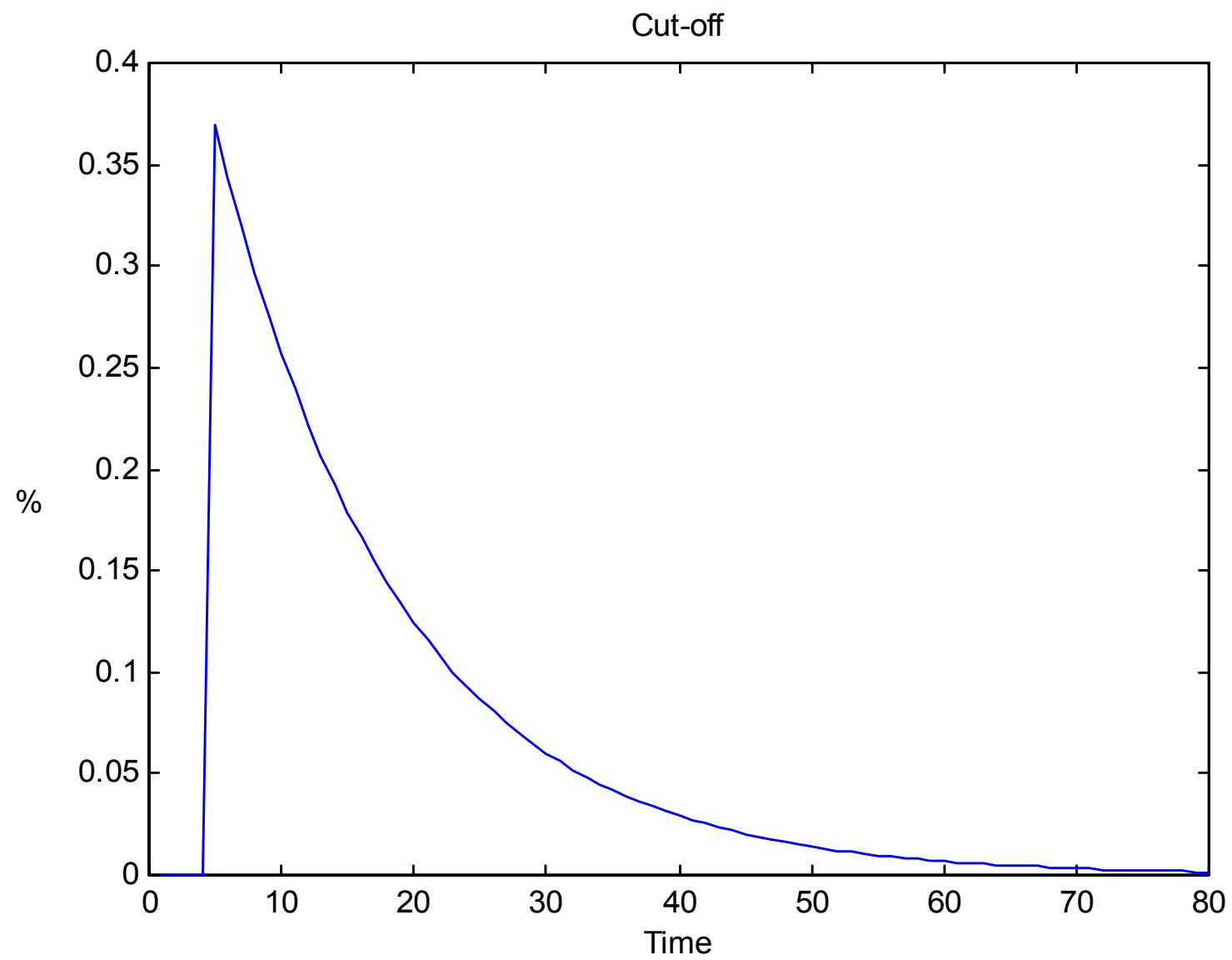
Simulation exercises

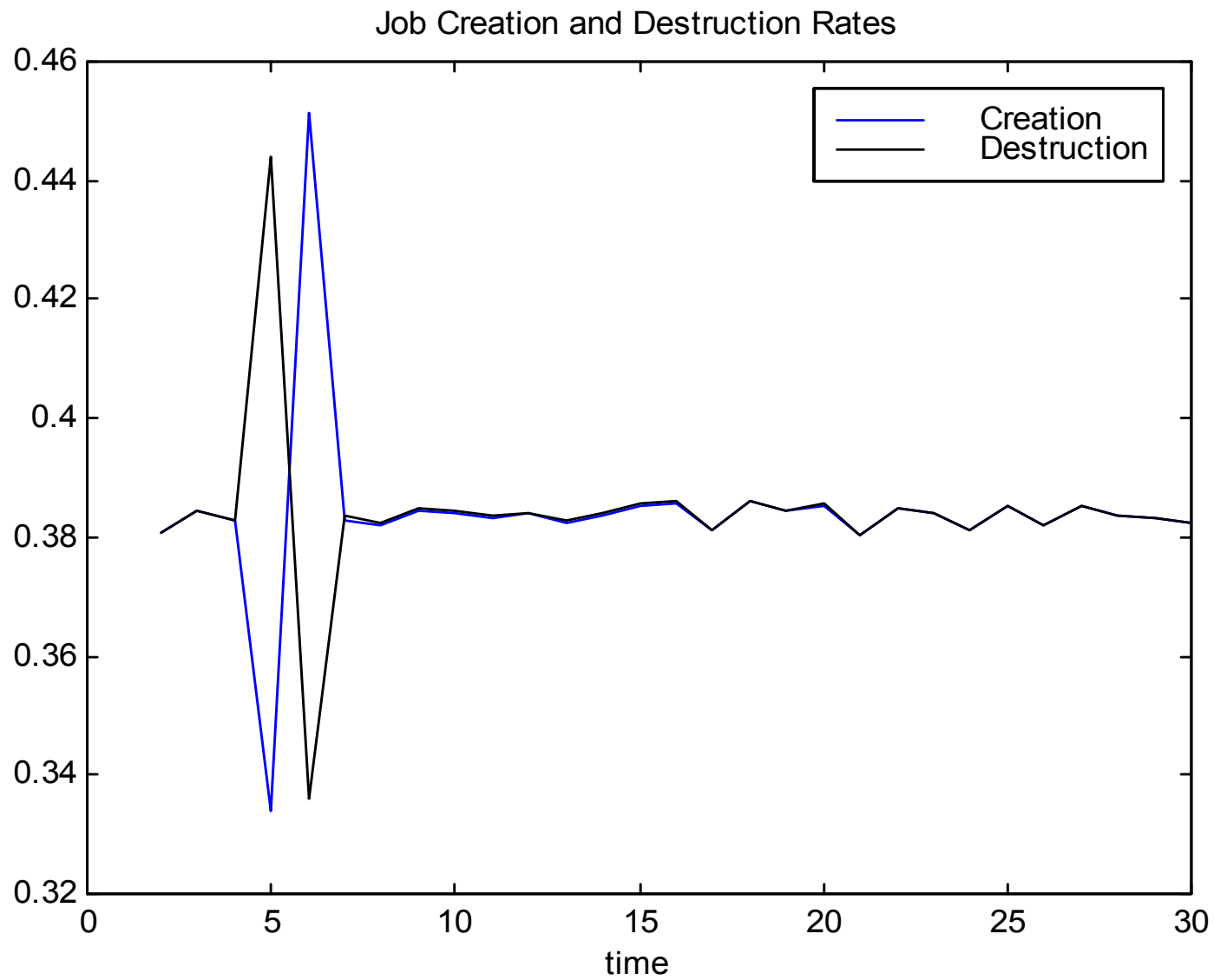
Three economies that face the same aggregate shock (5% of GDP with no persistence)

- Benchmark: Undistorted economy.
- Exercise 1: Pre-existing production subsidy to incumbents.
- Exercise 2: Production subsidy to incumbents given after the shock.

The benchmark economy

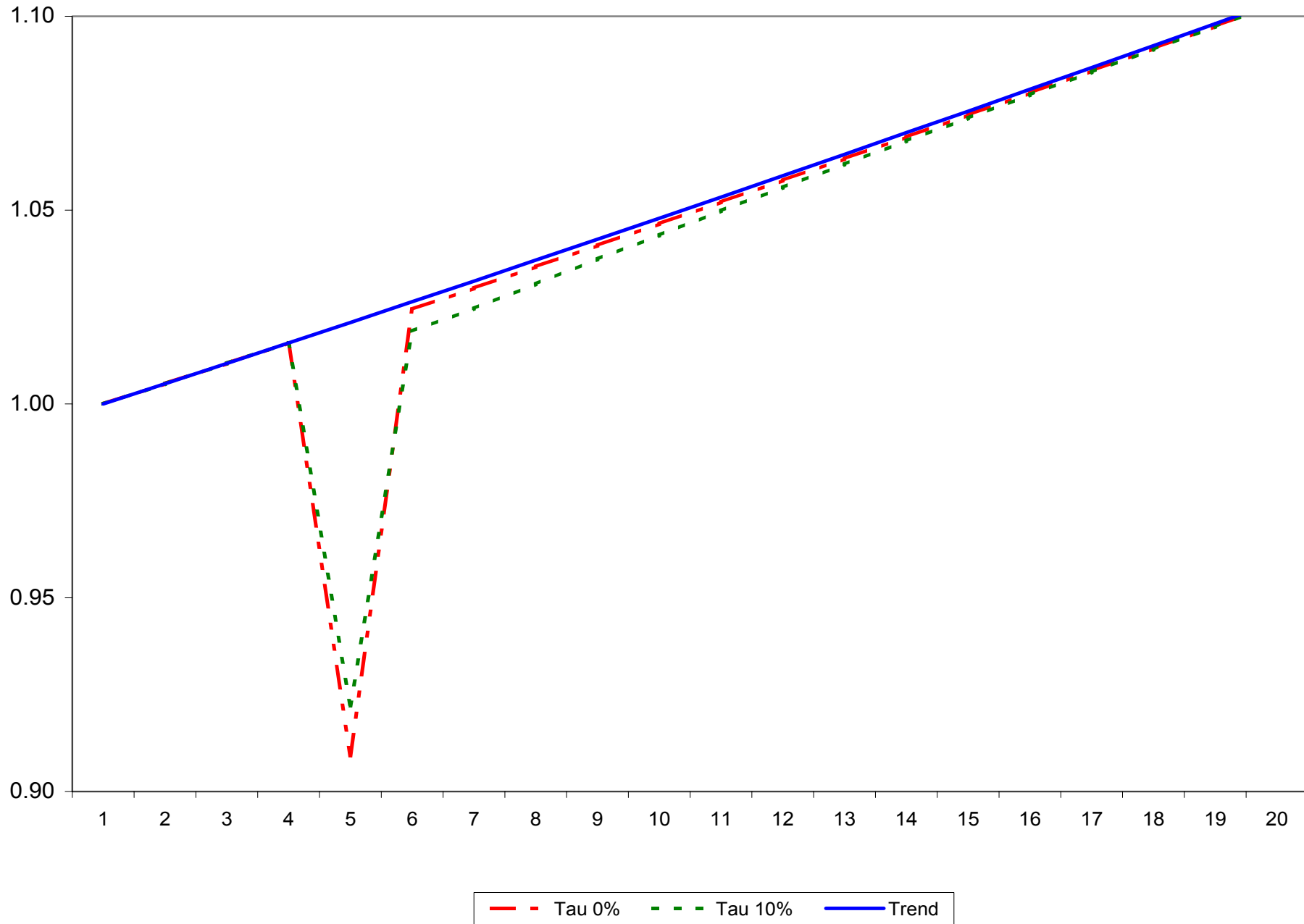




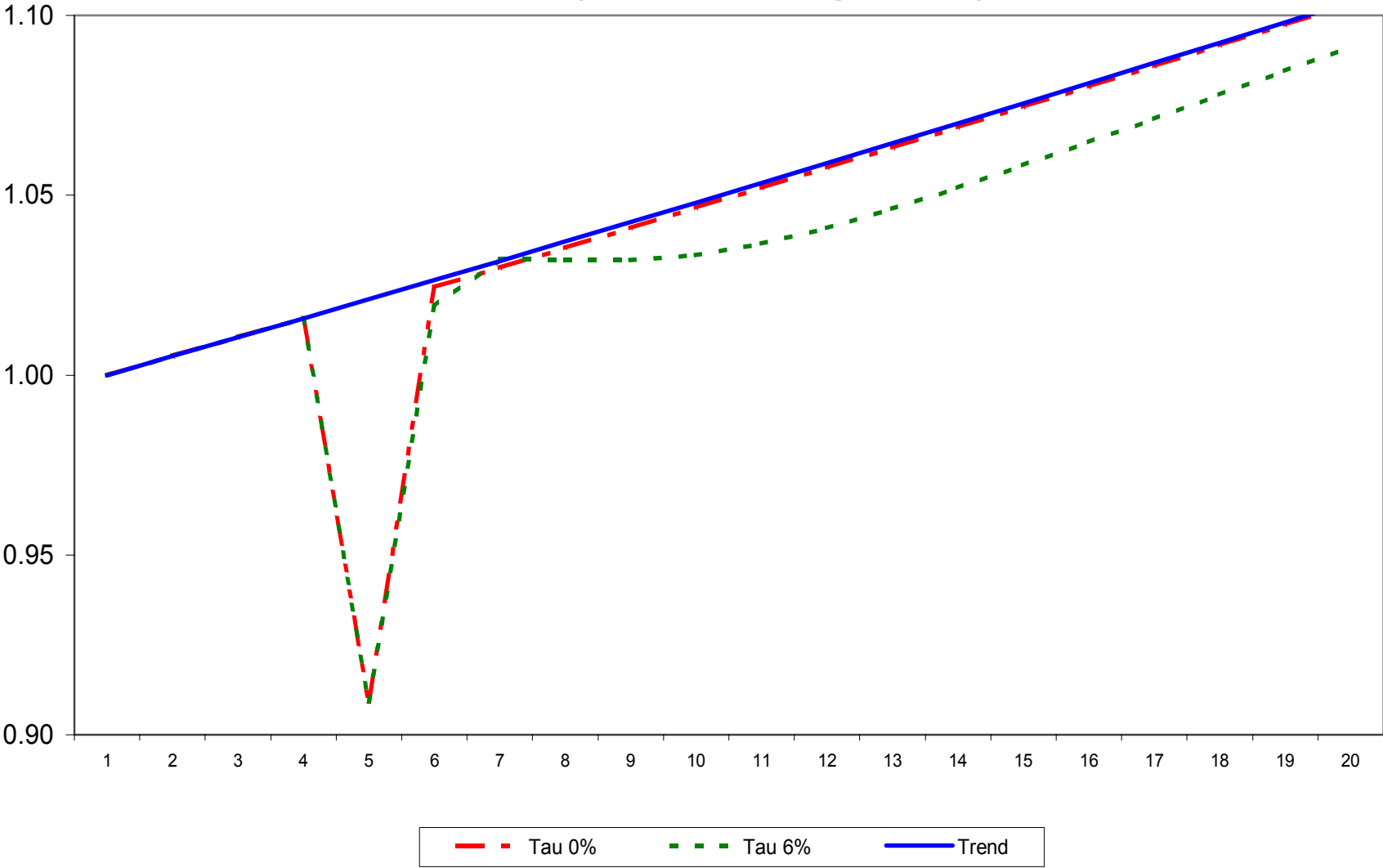


- Output, investment, consumption and labor fall.
- The fall is sharp, but short lived.
- Adjustment through creation and destruction margins.

Slow Recovery - Preexisting Distortion (normalized output level)



Slow Recovery: Transitory Distortion
(normalized output level)



Measuring slow recoveries

- Output loss: PDV of output deviations from trend as a fraction of pre-shock GDP.
- Length of recovery:
 - Number of quarters needed to reach the trend.
 - % of the loss realized in a given number of quarters.

Simulated Slow Recovery Indicators

Pre-existing distortion

		Subsidy (%)		
		0	5	10
Loss (% of pre-shock GDP)		13.1	14.2	14.3
Catching up with the trend (quarters)	0.2%	1	9	10
% of the loss realized in	1 quarter	84.2	72.3	68.1
	5 quarters	91.1	88.7	90.1
	10 quarters	94.5	94.9	96.5
	20 quarters	97.8	98.9	99.6
	30 quarters	99.1	99.8	100.0

Distortion along the way

		Subsidy (%)		
		0	3	6
Loss		13.1	23.7	36.3
Catching up with the trend (quarters)	0.2%	1	29	37
% of the loss realized in	1 quarter	84.2	46.4	30.3
	5 quarters	91.1	57.2	43.6
	10 quarters	94.5	71.9	63.5
	20 quarters	97.8	88.9	86.0
	30 quarters	99.1	95.6	94.6

Concluding remarks

- Reallocation is key
- Slow recoveries can be explained by a muted reallocation process.
- Output losses are large
- Obstacles to restructuring reduce the gains from major market reforms.