Path Dependence and Stagnation in a Classical Growth Model

Tom Michl, Colgate University
Daniele Tavani, Colorado State University

2022 Union for Radical Political Economics at ASSA Conference

Overview: An exercise in *structuralist* macroeconomics

- Taylor-Foley-Rezai (CJE) technical progress function.
  - Economies of scale (Kaldor-Verdoorn Law)
  - Distribution-led technical change
  - Supports path dependence—zero root system
- Classical foundation: Say's Law, normal utilization, Cambridge Equation
- Capital-using (saving) technical change
- Endogenous population growth and distribution
- Answer to Harrod combines Solow, Kaldor, and Marx
- Main results
  - Clarifies wage-led growth
  - Interprets neoliberal stagnation
  - Framework for interpreting shocks like Covid

The Model

g-rate of accumulation, π-profit share, ρ–output-capital ratio (capital productivity), β-consumption rate, γ-labor productivity growth, χ-capital productivity growth, κ–capital-population, e–employment-population, hat indicates growth rate.

Cambridge Equation

$$g = \pi\rho - \beta.$$

TFR technical progress function

$$\gamma = \gamma_0 + \gamma_1\hat{\kappa} - \gamma_2\pi.$$

Auxiliary equation

$$\chi = f(\hat{e}) + \varepsilon; \qquad f(0) = 0, \qquad f' < 0$$

Population growth

$$n = \bar{n} + \eta \min\{e, 1\}$$

Distribution

$$\pi = \bar{\pi} - \mu e$$

Exogenous population growth and distribution

How an increase in the profit share generates wage-led growth

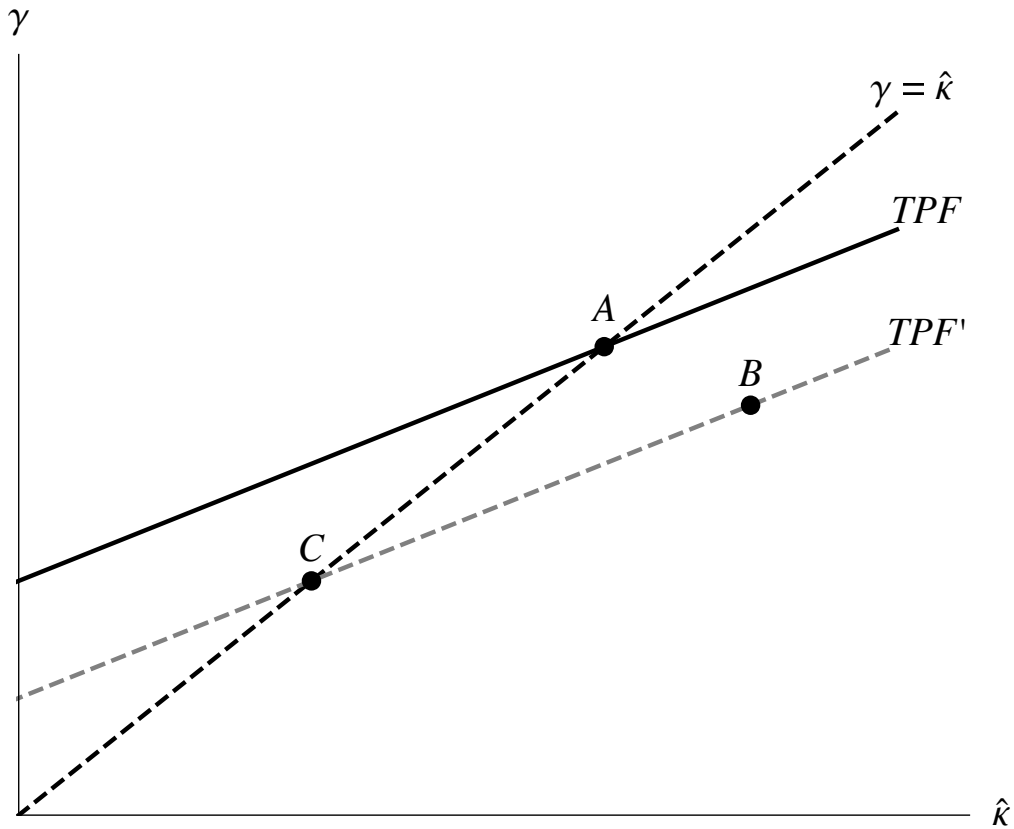


Figure: An increase in the profit share shifts the technical progress function (TPF) downward in the basic model. In the short run (B), accumulation and employment are profit-led. In the long run (C), growth is wage-led in the basic model.

Properties of the general model

The bottom row is an example of path dependence.

Table: **Comparative equilibria**

	de	$d\rho$	dn	$d\gamma$	dg	$d\pi$
$d\bar{n}$	$-$	$+$	$+$	$-/0$	$+$	$+/0$
$d\gamma_0$	$-$	$+$	$-/0$	$+$	$+$	$+/0$
$d\bar{\pi}$	$+$	$-$	$+/0$	$-$	$+/-$	$+$
$d(1-\beta)$	$+$	$-$	$+/0$	$+/0$	$+/0$	$-/0$
$d\epsilon$	$+$	$+/0$	$+/0$	$+/0$	$+/0$	$-/0$

The table shows the signs of dc/dr where r is the row entry and c is the column entry. A slash indicates that results depend on parameter values. Recall that $(1-\beta)$ is the capitalization rate. The bottom row identifies a temporary shock to capital productivity; all other entries refer to permanent changes in parameters.

What makes growth wage- or profit-led?

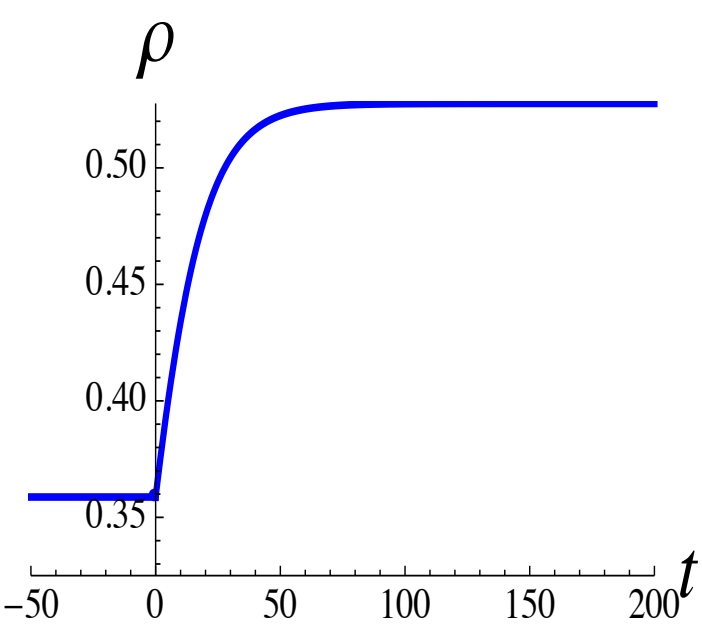
Exogenous labor supply is a sufficient condition for wage-led growth; endogenous labor is a necessary condition for profit-led growth

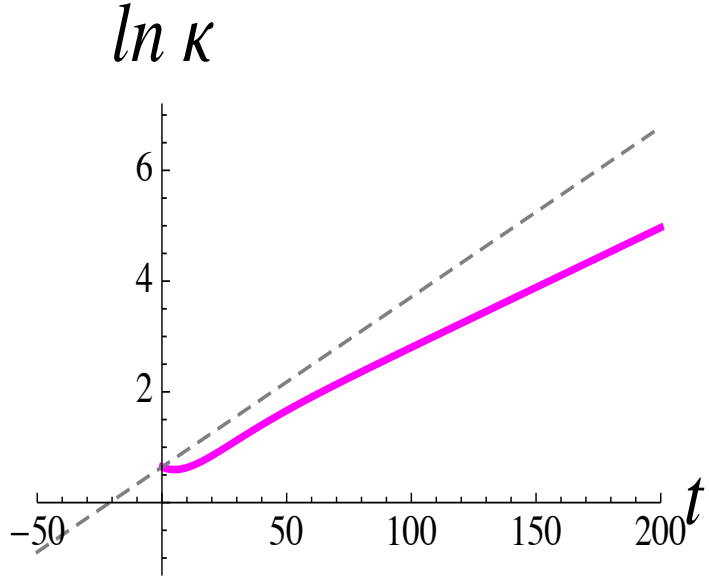
Table: **Distribution-led growth and alternative closures: the sign of $dg/d\bar{\pi}$.**

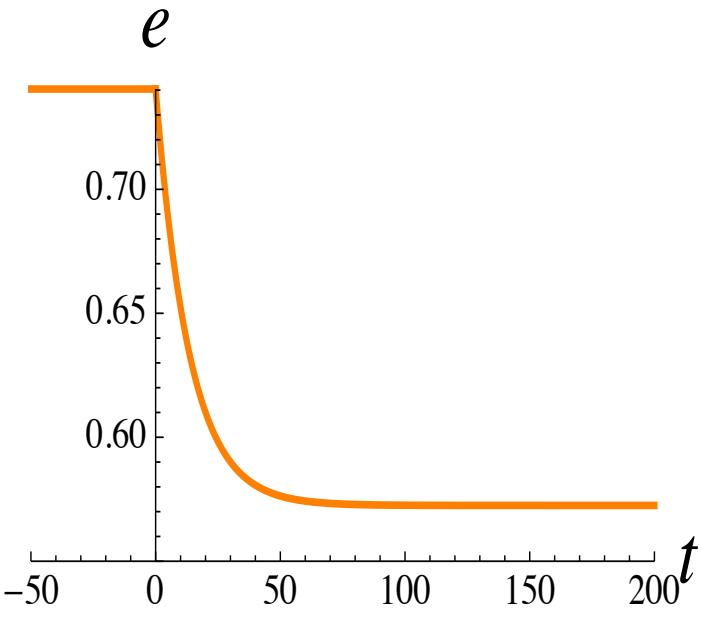
	exogenous n	endogenous n
exogenous π	$-$	$+/-$
endogenous π	$-$	$+/-$

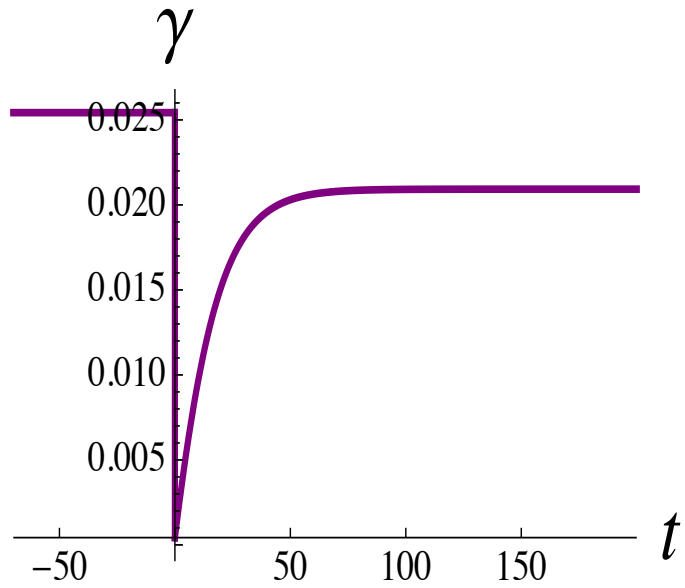
The table shows the signs of $dg/d\bar{\pi}$ in each of four cases of the model. A slash indicates that results depend on parameter values.

Deciphering stagnation: a decline in the capitalization rate









Alternative accounts of stagnation.

Supply-side story

- Slower population growth
- Slower exogenous technical change

Structuralist hypothesis

- Capital resurgent (rising profit share)
- Lower capitalization rate

Some evidence supports the structuralist hypothesis.

In particular, the rising profit share and decline in the employment rate

Table: **Selected Data for the U.S. 1980-2018**

Variable	(1) 1980-1999	(2) 1980-1989	(3) 1990-1999	(4) 2000-2018	(5) 2000-2007	(6) 2008-2018	(4)-(1) Change
e	0.7058	0.6877	0.7239	0.7001	0.7211	0.6849	-0.0057
ρ	0.3459	0.3019	0.3899	0.3642	0.3587	0.3682	+0.0183
n	0.0111	0.0109	0.0113	0.0074	0.0117	0.0043	-0.0037
γ	0.0192	0.0164	0.0220	0.0183	0.0245	0.0138	-0.0009
g	0.0204	0.0194	0.0214	0.0154	0.0181	0.0135	-0.0050
π	0.2490	0.2475	0.2506	0.2806	0.2640	0.2928	+0.0316
$1-\beta$	0.9341	0.9445	0.9237	0.9132	0.9236	0.9056	-0.0209
s	0.2388	0.2613	0.2162	0.1539	0.1926	0.1258	-0.0848

Conclusions

- Wage-led growth is strengthened by labor constraints. Profit-led growth depends on a high elasticity of labor force growth.
- Secular stagnation results from capital resurgence combined with a reduced capitalization rate. Profits without growth.
- Slower productivity growth and population growth are a *consequence* of stagnation, not a cause.
- Path dependence can occur from temporary shocks, such as a decline in capital productivity. Possible consequence of Covid?