

Low elasticity of substitution or extensive growth?

Sophie Saul

2017

Plan

1. Review of the problem
2. Easterly and Fischer (1995) finding
3. Beare (2008) correction
4. Data issues
5. Estimation issues
6. Perspectives

Growth slowdown: possible reasons

Extensive growth

Increasing use of inputs to fuel growth
Falling total factor productivity

Ofer (1987)

Berliner (1976) –

central planning rigidities

“soft budget constraints”

Low elasticity of substitution

Further use of factor with diminished
marginal product

Weitzman (1970)

Easterly and Fischer (1995)

Easterly and Fischer (1995)

1. Cross-sectional Levine-Renelt regression on national investment and human capital accumulation → **world's worst and worsening growth in USSR**
2. Landau's military spending regression → **not very significant**
3. Weitzman's extensive growth hypothesis →
TFP growth similar to Japan and Korea
low elasticity of substitution

Easterly and Fischer (1995)

- Better, almost perfect fit for data since Weitzman (1970)
- Constant decade TFP growth consistent with R&D
- Low elasticity of substitution

$$\ln Y_t = \delta_0 + \delta_1 t_{50-59} + \delta_2 t_{60-69} + \delta_3 t_{70-79} + \delta_4 t_{80-87} + \frac{\gamma}{\gamma - 1} \ln \left[\alpha K_t^{(\gamma-1)/\gamma} + (1 - \alpha) L_t^{(\gamma-1)/\gamma} \right]$$

	Elasticity	capital share	TFP1950-59	TFP 1960-69	TFP 1970-79	TFP 1980-87	TFP
CIA	0.37	0.96	1.09	1.1	1.16	1.09	-0.82

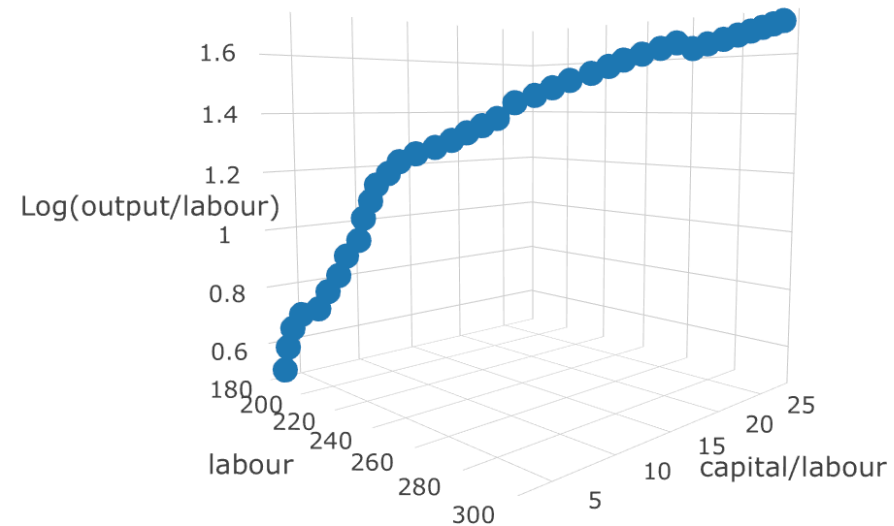
Beare (2008):

Easterly and Fischer's specification fault

EF predictions

Discontinuous jumps in
decade-specific
technical progress

The specification must reflect
increments, not level drops



$$\begin{aligned} \ln Y_t = & \delta_0 + \delta_1 t D_{50-87} + (\delta_2 - \delta_1)(t - 10) D_{60-87} + (\delta_3 - \delta_2)(t - 20) D_{70-87} \\ & + (\delta_4 - \delta_3)(t - 30) D_{80-87} + \frac{\gamma}{\gamma - 1} \ln \left[\alpha K_t^{(\gamma-1)/\gamma} + (1 - \alpha) L_t^{(\gamma-1)/\gamma} \right] \end{aligned}$$

Beare's correction

	Elasticity	capital share	Tech 1950-59	Tech 1960-69	Tech 1970-79	Tech 1980-87
CIA Beare correction	0.75	0.53	2.9	1.35	0.61	-0.14

- Much larger standard errors → regression
- Strongly declining TFP

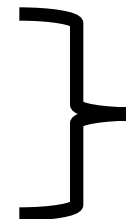
Easterly and Fischer's reply with squared trend

Model with Trend and Squared Trend:

$$\ln(Y) = C1 + C2 * T + C3 * T^2 + \frac{\gamma}{(\gamma - 1)} * \ln(\alpha * K^{(\gamma - 1)} / \gamma + (1 - \alpha))$$

Parameter	Estimate	T-Stat
C1	-0.3844	-4.11
C2	0.0243	3.08
C3	-0.0003	-2.85
alpha (capital share)	0.83	11.45
gamma (elasticity of substitution)	0.49	7.56

- Strongly declining TFP
- Still low elasticity of substitution



Extensive growth
and
low elasticity of substitution

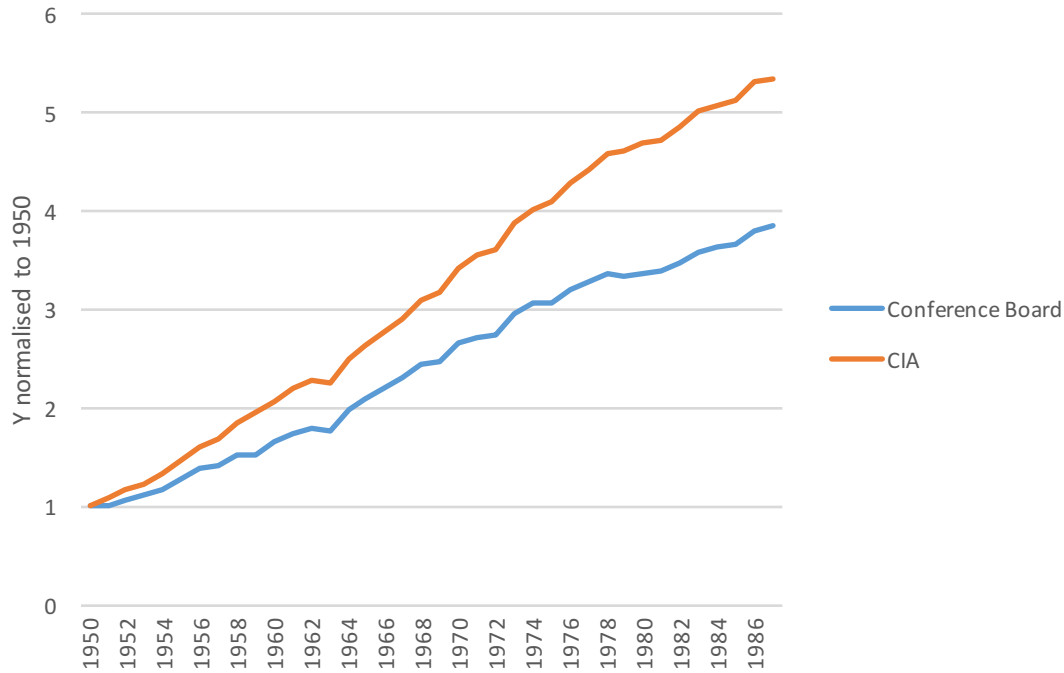
Replication results:

normalization and data issues

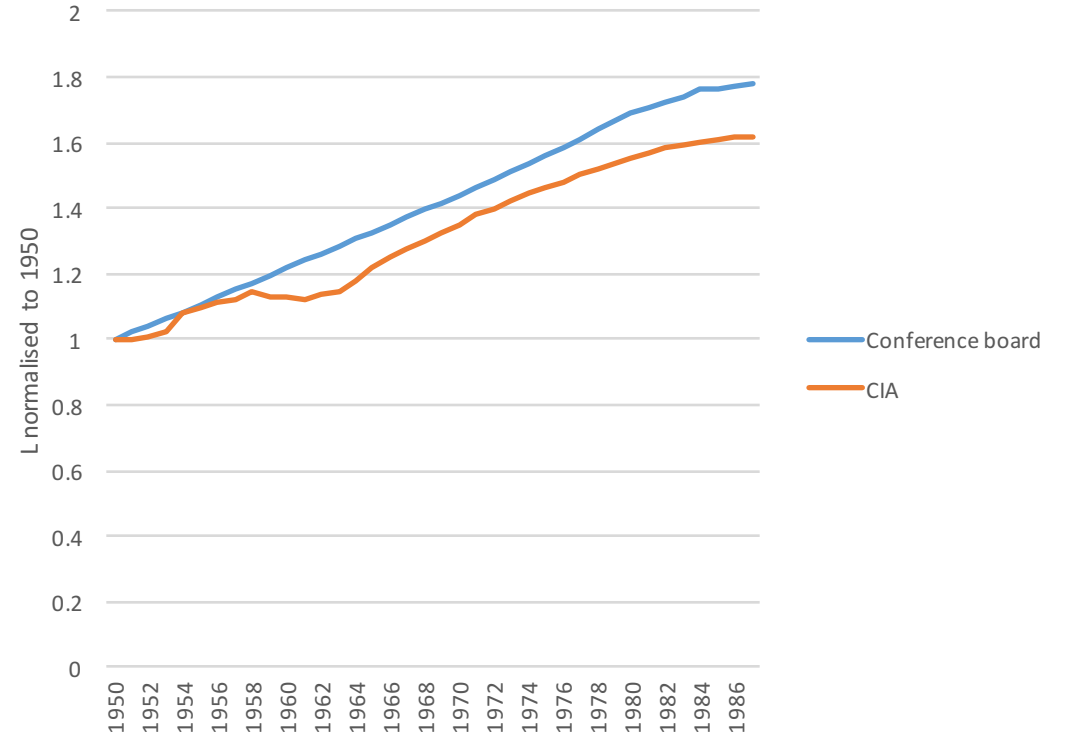
	normalised L (CIA)	normalised K,L (CIA)	normalised Y,K,L (CIA)	Beare	EF	normalised Y,L (CfB), K (CIA)
Elasticity	0.40	0.37	0.37	0.38	0.37	0.69
capital share	0.98	0.77	0.77	0.96	0.96	0.49
Tech 1950-59	0.94364	1.0467	1.0467	0.99	1.09	0.18
Tech 1960-69	0.86322	1.038	1.038	0.95	1.1	0.237
Tech 1970-79	0.97529	1.1743	1.1743	1.08	1.16	0.338
Tech 1980-87	0.8628	1.0607	1.0607	0.97	1.09	0.0697
Tech	-0.54468	1.0928	-0.02004	-0.5786		-0.03679

Data issues: new datasets

CIA and Conference Board output data



CIA and Conference Board labour data



	Elasticity	capital share	TFP1950-59	TFP 1960-69	TFP 1970-79	TFP 1980-87	TFP
normalised Y,L (CfB), K (CIA)	0.69	0.49	0.18	0.237	0.338	0.07	-0.037

Estimation issues

- Normalization problem (Nakamura 2015)
- Autocorrelation and significance problems (Nakamura 2015, Beare 2008)