Growth Accounting

Basic Setup

- Want to partition the growth rate of output into components of factor accumulation and technological progress.

- Start with $Y = F(A,K,L)$. Take logs and derivative with respect to time:

$$\frac{\dot{Y}}{Y} = \left(\frac{F_A A}{Y}\right)\cdot\left(\frac{\dot{A}}{A}\right) + \left(\frac{F_K K}{Y}\right)\cdot\left(\frac{\dot{K}}{K}\right) + \left(\frac{F_L L}{Y}\right)\cdot\left(\frac{\dot{L}}{L}\right)$$

Cannot be measured directly, call it g

$$\frac{\dot{Y}}{Y} = g + \left(\frac{F_K K}{Y}\right)\cdot\left(\frac{\dot{K}}{K}\right) + \left(\frac{F_L L}{Y}\right)\cdot\left(\frac{\dot{L}}{L}\right)$$

Basic Setup

- Compute g as a residual:

$$g = \frac{\dot{Y}}{Y} - \left[\frac{F_K K}{Y}\right] \cdot \left(\frac{\dot{K}}{K}\right) - \left[\frac{F_L L}{Y}\right] \cdot \left(\frac{\dot{L}}{L}\right)$$

If factors are paid their social marginal products, i.e. $F_K = r$ and $F_L = w$, then the elements in brackets become factor shares of income: s_K and s_L. In the Cobb-Douglas case, these are constant over time, but not in general. When all income is exhausted on capital and labor, $s_L = (1 - s_K)$.

$$\hat{g} = \frac{\dot{Y}}{Y} - [s_K] \cdot \left(\frac{\dot{K}}{K}\right) - [1 - s_K] \cdot \left(\frac{\dot{L}}{L}\right)$$

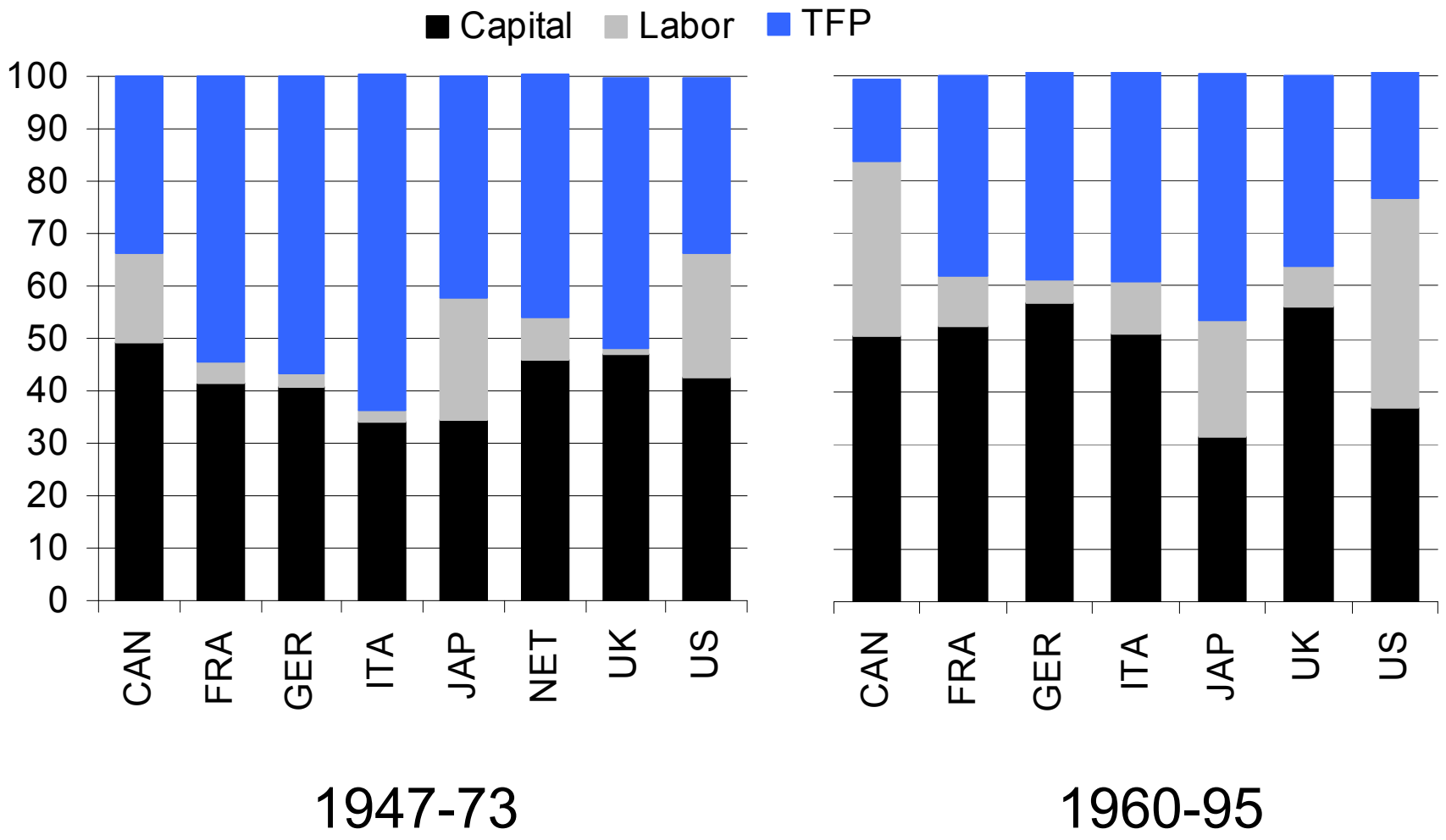
Empirical estimates: *OECD*

		Capital share	GDP growth rate	Contribution from: Capital	Contribution from: Labor	TFP growth rate
OECD **[1947-73]**	Canada	0.44	0.0517	0.0254	0.0088	0.0175
	France	0.40	0.0542	0.0225	0.0021	0.0296
	Germany	0.39	0.0661	0.0269	0.0018	0.0374
	Italy	0.39	0.0527	0.0180	0.0011	0.0337
	Japan	0.39	0.0951	0.0328	0.0221	0.0402
	Netherlands	0.45	0.0536	0.0247	0.0042	0.0248
	U.K.	0.38	0.0373	0.0176	0.0003	0.0193
	U.S.	0.40	0.0402	0.0171	0.0095	0.0135
OECD **[1960-95]**	Canada	0.42	0.0369	0.0186	0.0123	0.0057
	France	0.41	0.0358	0.0180	0.0033	0.0130
	Germany	0.39	0.0312	0.0177	0.0014	0.0132
	Italy	0.34	0.0357	0.0182	0.0035	0.0153
	Japan	0.43	0.0566	0.0178	0.0125	0.0265
	U.K.	0.37	0.0221	0.0124	0.0007	0.0080
	U.S.	0.39	0.0318	0.0117	0.0127	0.0076

Source: Barro, R. and X. Sala-i-Martin (2004), *Economic Growth*, 2nd ed, p. 439

Empirical estimates: *OECD*

- Graphically, in %:



Empirical estimates: *Latin America* and *East Asia*

		Capital share	GDP growth rate	Contribution from: Capital	Labor	TFP growth rate
Lat. Am. **[1940-90]**	Argentina	0.54	0.0279	0.0128	0.0097	0.0054
	Brazil	0.45	0.0558	0.0294	0.0150	0.0114
	Chile	0.52	0.0362	0.0120	0.0103	0.0138
	Colombia	0.63	0.0454	0.0219	0.0152	0.0084
	Mexico	0.69	0.0522	0.0259	0.0150	0.0113
	Peru	0.66	0.0323	0.0252	0.0134	-0.0062
	Venezuela	0.55	0.0443	0.0254	0.0179	0.0011
E. Asia **[1966-90]**	Hong Kong	0.37	0.073	0.030	0.020	0.0230
	Singapore	0.49	0.087	0.056	0.029	0.0020
	South Korea	0.30	0.103	0.041	0.045	0.0170
	Taiwan	0.26	0.094	0.032	0.036	0.0260

Source: Barro, R. and X. Sala-i-Martin (2004), *Economic Growth*, 2nd ed, p. 440

Empirical estimates: *Latin America* and *East Asia*

- Graphically, in %: