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SUMMARY 3

GROWTH THEORY: THE AUGMENTED SOLOW MODEL

Readings: Slides, Sørensen og Whitta-Jacobsen (2005), Ch. 6.

Motivation for the augmentation:

- (A) the need to explain bigger GDP per worker differences
- (B) Empirical mystery: α estimated to be implausibly high.

Human capital can be produced in school (facts and figures, analytical skills etc), and on the job (learning-by-doing); schooling seems to increase private wages at the micro level – seems productive (this helps in dimension A). Schooling seems positively correlated with investments, and negatively correlated with fertility (this helps with B). Finally, human capital accumulation is (just as growth itself) relatively recent.

New elements of the model

The human capital augmented production function; wages as compensation for “brains” and “brawn” (H and L, respectively), calibrating the share of human capital (ϕ); realistically about 1/3. Hence, 50% of total wage share seems to be compensation for H, 50 % for L.

The law of motion for human capital; constant fraction of output – direct costs or alternative costs (two alternative ways of thinking about the specification); human capital in a “quality” sense – allows it to keep growing in principle.

Solving the model

The new phasediagram with 2 difference equations; dynamics outside steady state in k, h ; comparative statics; changes in s_K, s_H and n affect y in the long run – s_K and s_H positively, whereas increases in n lowers long run y . In the absence of exogenous technological change: No growth in GDP per capita ; Capital accumulation (human and physical) cannot sustain growth.

Empirical Implications

Transitional dynamics as an explanation for persistent growth differences; The rate of convergence is *lower* in the augmented Solow model; implies better opportunity to explain long-run growth differences; The model is *much better* at motivating labor productivity differences; The empirical tests of the model: sign of parameters ok; structure implied by the model ok; parameter sizes ok; motivate 80% of productivity differences.

Empirical critique

Convergence from above: poor countries *systematically* above steady state in 1960, given the model. Otherwise: cannot quantitatively account for growth performance; growth accounting: Bulk of the variation in growth in GDP per worker due to TFP growth not factors; augmented solow model implies a much bigger effect of schooling on labor productivity than what is implied by micro estimations from the labor literature; Panel data implies we can test the identifying hypothesis that $\log A_i = \log A + \text{noise} - \text{country specific intercepts}$. Test rejects common intercepts $\rightarrow A$ varies across countries in a non-stochastic fashion. Moreover, this variation is systematic: $\text{cov}(\log A, \text{human capital}) > 0$. Implies the estimate for human capital is biased upwards.

Bottom line: Need a theory of “A” as well.