

Growth: Endogenous Growth: Problems

1. The key difference between the two is that TFP is exogenous in the Solow Model while it is endogenous in the Endogenous Growth Model. Specifically, the growth of new ideas depends on firms' choice of how much labor to devote to R&D.

2. This would be evidence in favor of the Endogenous Growth Model which predicts that there is no tendency to converge, unlike the Solow Model. It would not necessarily be sufficient to claim that the Endogenous Growth Model is better because there are other predicted differences between the models.

3. Because ideas are a type of public good, the private market underproduces them. A well crafted subsidy could remedy this problem resulting in faster growth and a more efficient allocation. If the subsidy were too large, however, then firms may begin to overproduce.

4. In class, we assumed that the production of new ideas is increasing in the current stock of ideas. Reflecting this assumption, we imposed: $\Delta A_{t+1} = \bar{z}L_{at}A_t$. Now suppose that this is not the case, and the number of new ideas is independent of the existing stock of new ideas: $\Delta A_{t+1} = \bar{z}L_{at}$.

a. It follows that:

$$A_t = \bar{z}\bar{\ell}\bar{L} + A_{t-1} \quad (1)$$

and

$$A_{t-1} = \bar{z}\bar{\ell}\bar{L} + A_{t-2} \quad (2)$$

Inserting (2) into (1) yields:

$$A_t = 2\bar{z}\bar{\ell}\bar{L} + A_{t-2} \quad (3)$$

Using $A_{t-2} = \bar{z}\bar{\ell}\bar{L} + A_{t-3}$ yields:

$$A_t = 3\bar{z}\bar{\ell}\bar{L} + A_{t-3} \quad (4)$$

Repeating t times:

$$A_t = t\bar{z}\bar{\ell}\bar{L} + A_0 \quad (5)$$

b. Using $y_t = (1 - \bar{\ell})A_t$, which is unchanged from class.

$$y_t = t(1 - \bar{\ell})\bar{z}\bar{\ell}\bar{L} + A_0 \quad (6)$$

c. Now the change in TFP is constant instead of the percentage change being constant. It thus follows that the percentage growth rate declines over time.

5. Probably not. Because ideas flow among countries, the better frame of reference is to look at the global economy. Doing so shows that as global population has increased, so has economic growth.

6. The profession does not agree on this. The empirical evidence is mixed with some results supporting each model. Likewise, there is disagreement over which assumptions are more plausible.