

Economic Growth Theory And Financial Development

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Basic Economic Theories of Growth

- Solow-Swan Theory
 - Solow (1956) and Swan (1956)
 - Constant saving rate
 - Constant returns to two factors
 - Labor
 - Capital
- Optimizing models of growth
 - Exogenous – Cass, Koopmans
 - Endogenous -- Romer (1990) and Lucas (1988)
 - Optimal saving
- Ak models
 - Knight (1944)
 - One factor with no diminishing returns

Basic Theories of Finance and Growth

- Optimizing models
 - Development of financial institutions
 - Allocate capital
 - Alternative institutions
 - Banks
 - Capital markets

Order of Presentation

- Solow-Swan theory
- Ak model
- Optimizing models of growth
- Summary of literature on financial development and growth
 - Nice summaries available
 - Levine (2004)

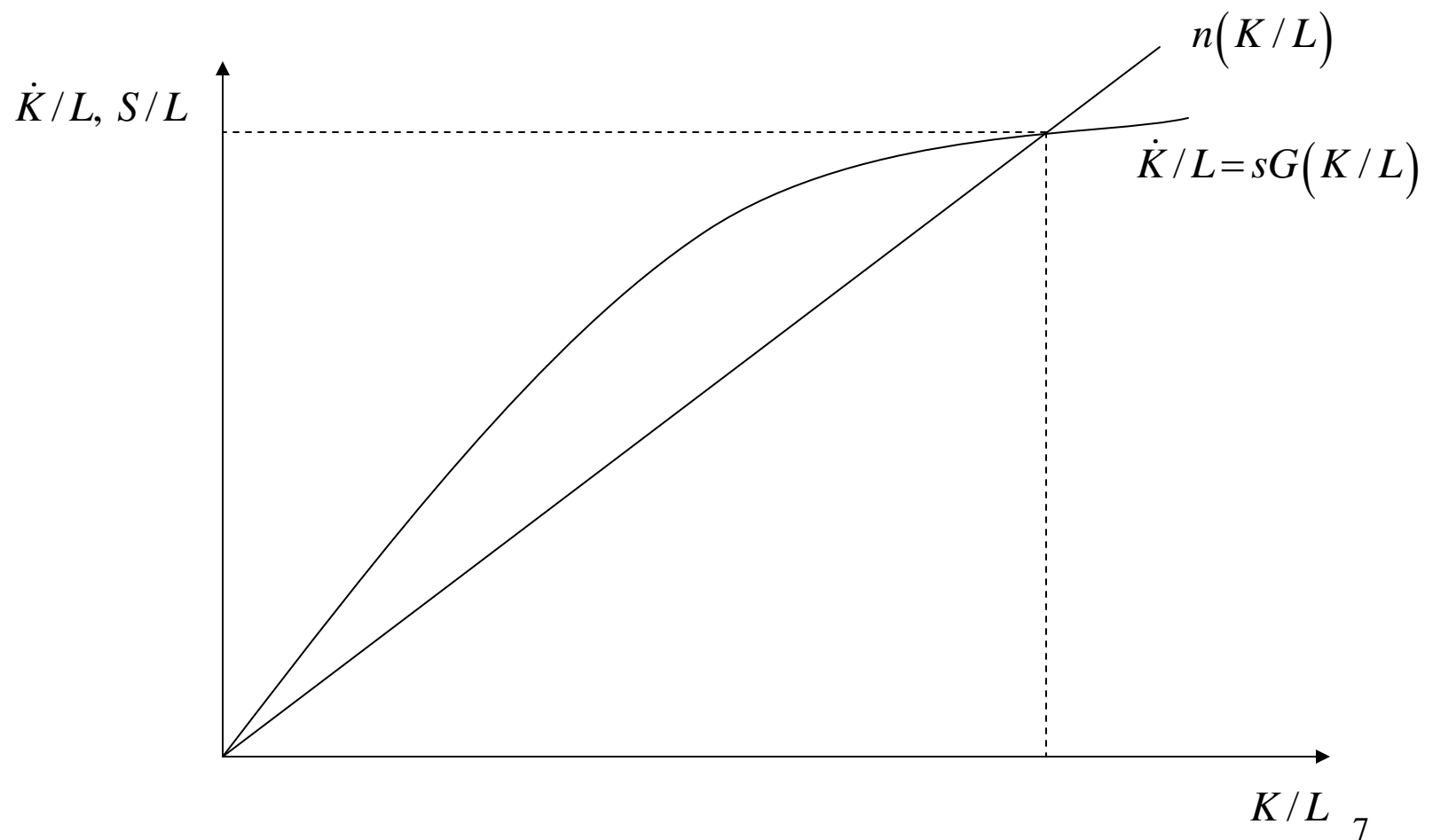
Solow-Swan Theory

- Production function
 - Constant returns to scale
 - Can write it as $Y/L = F(K/L, 1) = G(K/L)$
 - First partial derivatives positive and second negative
- Saving rate
 - Constant saving rate and can write as $S/L = s(Y/L)$
 - Or $S = sY$
 - By definition $\dot{K} = S$
 - Which implies that $\dot{K}/K = s(Y/L)/(K/L) = s[G(K/L)]/(K/L)$
- Constant growth rate of labor n
- Equilibrium when growth rate of labor equals growth rate of capital – constant capital-labor ratio

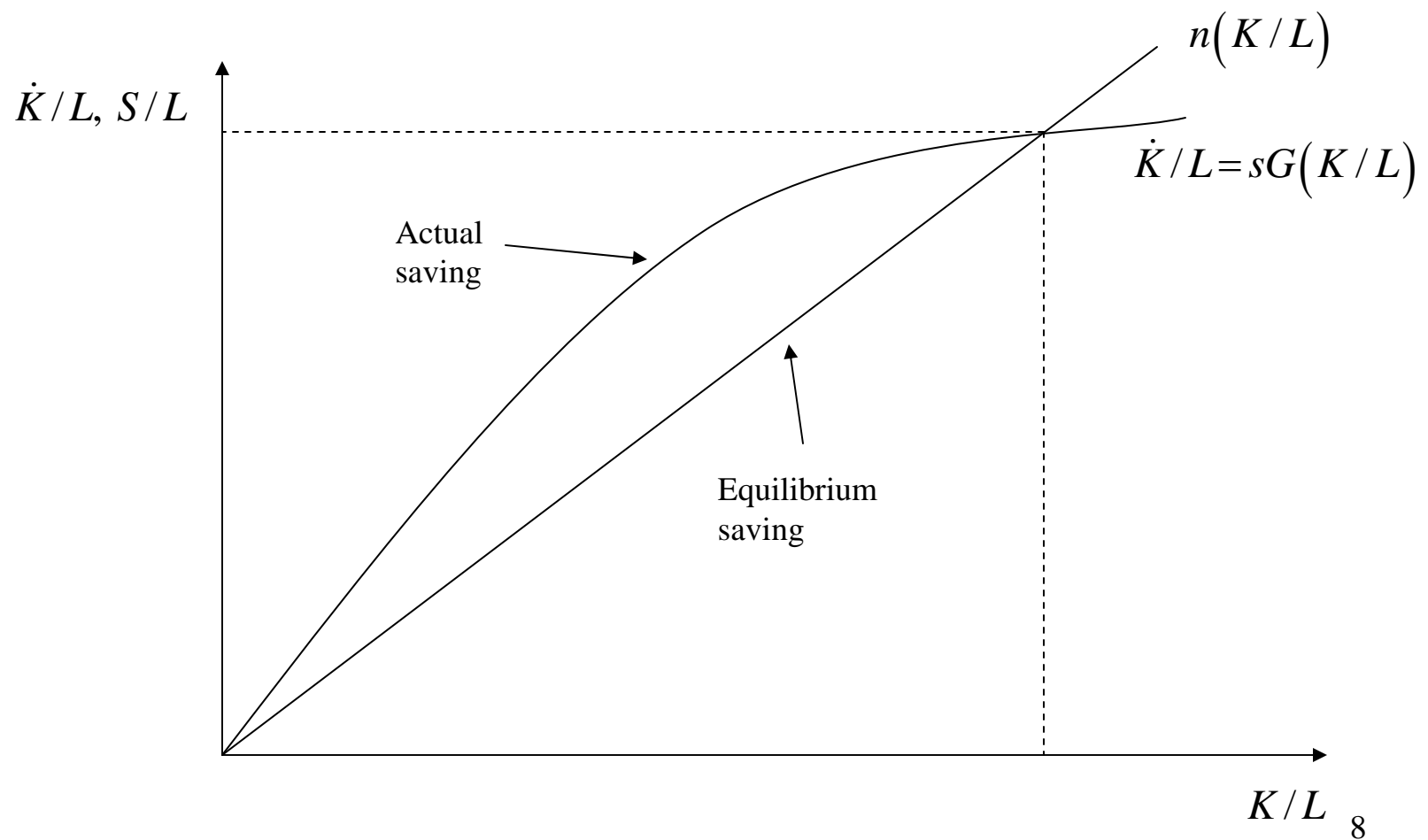
Graphical Presentation

- S/L and that generated by growth
- Saving per worker $S/L = s(Y/L) = G(K/L)$
- Equilibrium $n = \dot{K}/K = \dot{K}/L \square L/K$
 - or $n(K/L) = \dot{K}/L$ or for convenience $\dot{K}/L = n(K/L)$

Solow-Swan Equilibrium Illustrated



Solow-Swan Equilibrium Illustrated



Technological Progress

- This basic model delivers growth of total output, but not per worker
- Labor-augmenting technological progress can deliver growth of output per worker and preserve equilibrium
 - Start with $Y = F(K, A(t)L)$
 - Define $A(t)L = L_A(t)$
 - Proceed as before with L_A where used L before
- Technological progress is just added on top of economic model

Ak Model

- In the empirical analysis, human capital
- Simple model would be that all inputs are capital

$$Y = AK \text{ or } (Y/L) = A(K/L)$$

- Which implies $y = x + a$
 - Where x is the growth rate of physical and human capital
- Make no distinction between physical and human capital
 - Think of K in Ak model as aggregate input of physical and human capital
 - No diminishing returns to investment $y = x$
 - Can think of investment broadly as being in physical or human capital or invention
 - Self-sustaining growth

Optimal Growth

- Ramsey model
 - Households maximize utility
 - Firms maximize profits
 - Horizon
 - Ramsey's version was infinite horizon
 - Can also do overlapping generations versions
 - Common to do infinite-horizon model in
 - Continuous time
 - Algebra simpler
 - Non-stochastic (i.e. deterministic) and therefore perfect foresight

Outline of Infinite Horizon model

- Firms
 - Produce goods and services
 - Demand labor and pay W per unit of labor
 - Rent capital from households at rate R
- Households
 - Consume
 - Supply labor inelastically and receive W
 - Rent capital to firms at rate R
 - Borrow and lend consumption loans between households at interest rate r
 - Hold assets – physical capital and consumer loans

Optimization Problems

- Households

- Preferences

- $c(t)$ is consumption per person
 - Aggregate utility is

$$U = \int_0^{\infty} e^{-\rho t} u(c(t)) dt$$

$$U = \int_0^{\infty} e^{-\rho t} u(c(t)) e^{nt} dt$$

- Budget constraint

$$c(t) = w(t) + r(t)a(t) - na(t) - \dot{a}(t)$$

- Firms

- Profits are

$$\pi(t) = y(t) - w(t)\ell(t) - r(t)k(t)$$

- Solve for equilibrium with optimizing agents

- Solve for steady states with constant growth

Growth in Infinite Horizon Models

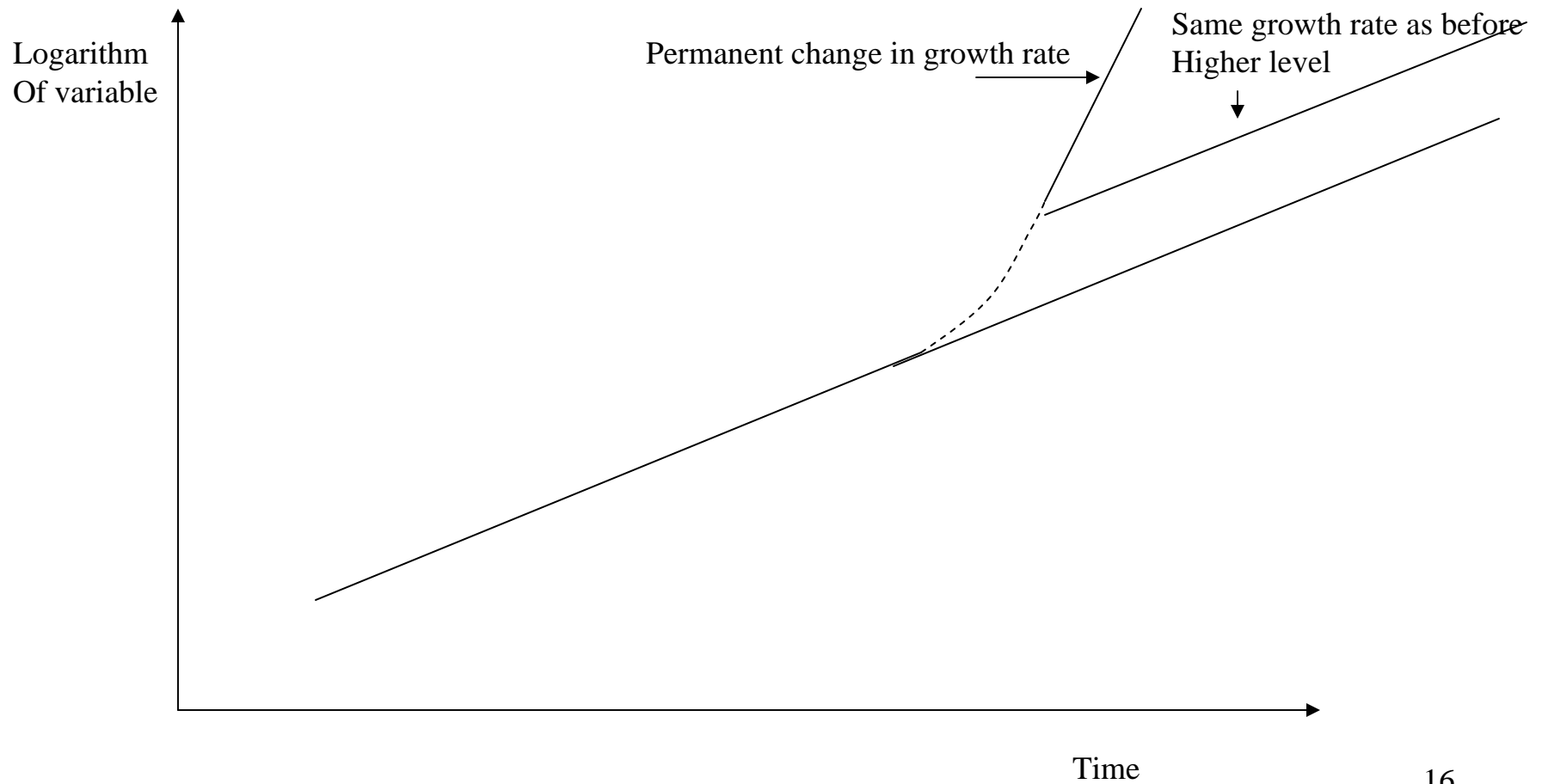
- The big issue in growth theory would seem to be whether or not there are diminishing returns to investment in physical and human capital and new technology
 - Models without diminishing returns
 - Capital investment – human and physical
 - New technology – “ideas”
 - Models with diminishing returns
 - Growth is not self-sustaining forever
- I am sure that I cannot adequately characterize the actual debate
- Actual debate seems to be about whether investment in technology is
 - Embodied in physical and human capital
 - Not reflected in physical and human capital – “ideas”
- Somehow, this gets translated into discussion of whether growth in output in growth accounting is associated with
 - Growth of physical and human capital
 - Growth of total factor productivity

Level versus Growth Effects

- Consider a change such as an increase in the savings rate in the Solow model
 - It does not permanently change the growth rate
 - Increase in saving rate increases the level of income, not the growth rate
 - Why?
 - $(\text{growth of } K) = n$ is the equilibrium condition
 - Nothing ever changes n – exogenous
- More generally, the effect on the growth rate is limited because there are diminishing returns to factors that can grow at a faster or slower rate

Level versus Growth Effects

Illustrated



Levels versus Growth Effects in *Ak* model

- If the saving rate permanently increased the growth rate of capital and if there are not diminishing returns to capital – as in an *Ak* model – then the growth rate of output can increase forever

Financial Markets or Banks Better?

- There is a strand of the literature that compares financial markets and banks, arguing for the superiority of one or the other
- I will not pursue this

Financial Markets and Banks

- How can they increase growth?
 - Markets and banks aggregate information
 - Markets and banks lower transactions costs
- Improve allocation of capital
 - Markets – Make capital more liquid
 - Banks – Make loans reflecting a comparative advantage in
 - collecting and processing information
 - monitoring behavior of borrowers

Financial Markets and Growth

- Greenwood and Jovanovic (1990)
- Intermediaries provide customers with a distribution of returns that is both higher average return and preferred
 - Fixed cost of starting an intermediary
 - A new stock exchange can increase economic growth by aggregating information about firms' prospects, thereby directing capital to investment with higher returns
- Introduction of intermediary associated with higher return on capital and higher growth
 - Growth before introduction necessary to have wealth to start intermediary
 - Higher growth after intermediary due to improved allocation of investment – Market aggregates information

Banks and Growth

- Large literature on banks as intermediaries that process information on borrowers
- Best new research looks at investment by industry, trying to determine those in which banks are especially important