

## Lecture 5

# Economic Growth: Transition Dynamics

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## Economic Growth and Economic Fluctuations

### Saving

- In our discussion of the Solow model, we assumed that:
  - annual physical capital investment is a fraction,  $s$ , of the total output per year, i.e.  $I = s \cdot Y$  and
  - a fraction,  $\delta$ , of the capital stock depreciates each year
- So once again:  $\dot{K} = sY - \delta K$
- In practice, the saving rate depends on:
  - the decisions of individuals within the economy
  - government decisions about how much to collect in tax revenue and how much to spend
- **Government Saving** is the difference between Tax Revenues,  $T$ , and Government Purchases,  $G$ , so we can define the government saving rate as:  $s_G \equiv (T - G)/Y$
- If the government is running a budget deficit, then  $s_G$  is negative
- If we define  $s_P$  as the “private” saving rate, then the economy’s saving rate is:  $s \equiv s_G + s_P$

# Saving

- **Now consider the table below** (sources: BEA and BLS).
  - “Gross Saving Rate” is a measure of  $s$
  - “Government Saving Rate” is a measure of  $s_G$
  - “Net Nonresid. Invest. Rate” is a measure of  $\dot{K}/Y$
  - the last row gives the growth rate of the civilian noninstitutional population aged 20 to 64 – a measure of  $n$ , the labor force growth rate

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Gross Saving Rate*	18.2	18.6	18.1	17.8	16.2	14.6	13.9	14.4	14.9	15.9
Government Saving Rate*	-0.3	0.9	1.5	2.2	0.2	-2.9	-3.7	-3.2	-2.0	-1.1
Net Nonresid. Invest. Rate*+	3.7	4.1	4.2	4.4	3.3	2.0	1.7	2.0	2.3	2.7
%Δ Civ. Nonist. Pop. 20-64	1.2	1.0	1.2	–	1.4	1.4	1.8	1.0	1.2	1.1

\* as a percentage of Gross National Income

+ “Net Private Domestic Nonresidential Fixed Investment Rate”

- **Government saving fell dramatically – a result of:**
  - fluctuations – the recession of the early 2000s reduced tax revenues
  - the wars in Iraq and Afghanistan and
  - **TAX CUTS**
- **Due to the fall in saving, net capital investment had already fallen prior to the financial crisis of the late 2000s.**
- **All else equal this reduces steady state output per worker.**

## Steady State Income per Worker

- **I don’t know how much each of the aforementioned factors contributed to the growth of the federal budget deficit**
- **but the focus of this lecture will be on why we might prefer low saving rates, even though low saving rates lead to low steady state levels of consumption per worker**
- **To illustrate this preference, I’ll:**
  - **use the Solow Model without technology**, i.e.:  $A = 1$ ,  $g = 0$  and
  - **focus on the effect of tax cuts on the saving rate**

### DISCLAIMER

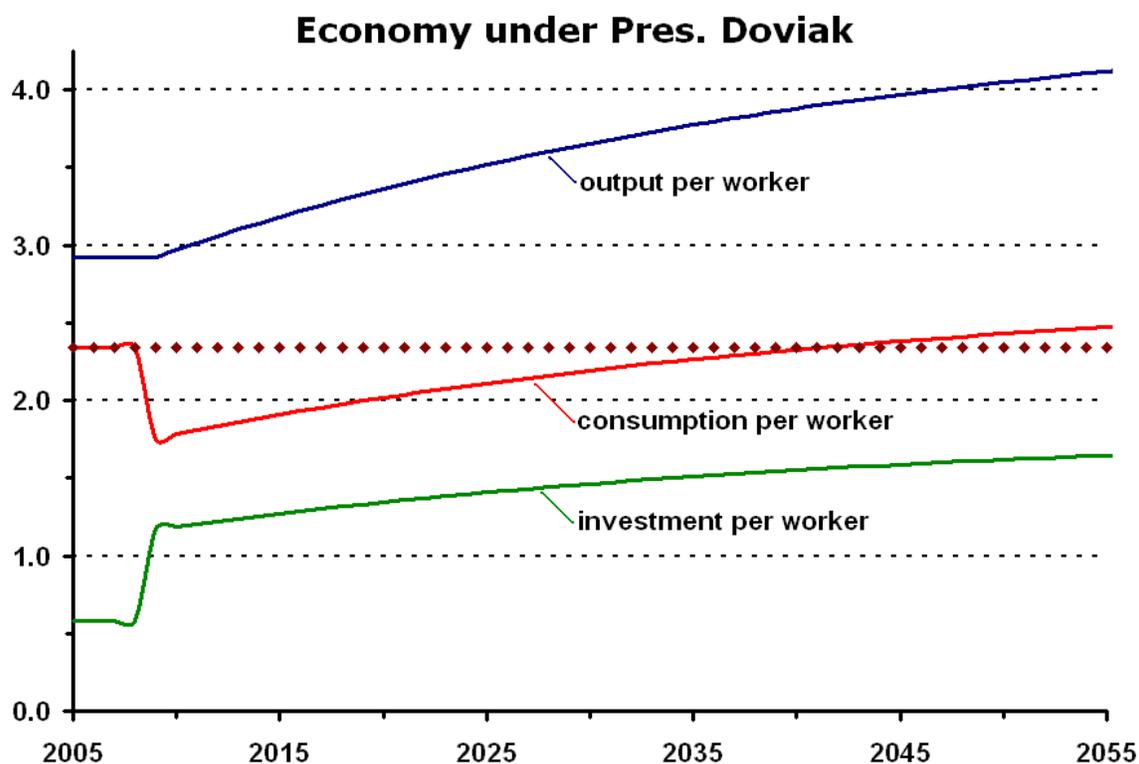
- Before diving into the discussion, I want to emphasize that empirical evidence suggests that:
  - high personal and corporate income tax rates may discourage net capital investment and thus lower steady state output per worker
  - although potentially beneficial, major tax reforms designed to increase steady state output per worker will be not be self-financing and
  - well-designed government spending can also increase steady state output per worker

# Doviak for President

## Investing for the Future

- Currently, our nation saves a mere 20 percent of its output and finds itself at a steady state level of consumption per worker that is 17 percent below the Golden Rule level
- We could now be enjoying a much higher standard of living had budget deficits not crowded out capital investment all these years
- To reach the Golden Rule level however, we need to double our saving rate by repealing Pres. Bush's tax cuts
- The tax increases I propose will immediately reduce your consumption 29 percent, but don't worry ...
- the capital investments resulting from the higher saving rate will increase output per worker over time and by the year 2042 your consumption will have returned to its current level
- And it will keep growing over time enabling your great-grandchildren to enjoy the highest possible level of consumption per worker, given the rate at which capital depreciates and our rate of labor force growth

Note: all numbers cited in this mock campaign speech are fictional.

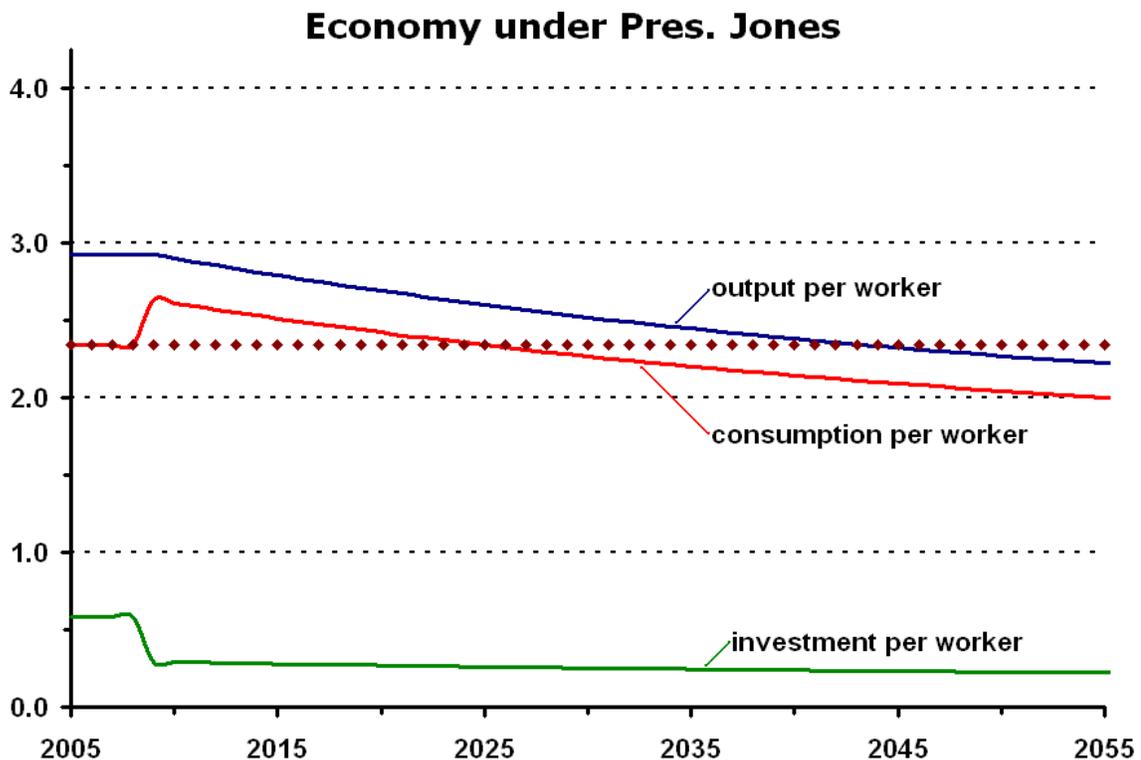


- The increase in the saving rate causes consumption to drop immediately.
- The fall in consumption is matched by an increase in investment.
- Over time output, consumption and investment all increase together.

# Jones for President

## More Lunches in Every Pail

- Saving Schmaving!
- What's all this gobble-de-gook about a Golden Rule?
- There's only one Golden Rule – the American people need more gold
- Don't listen to this Ivory Tower Elitist! He's outta touch with reality.
- Real people need more consumption now, not 40 years from now!
- Let him scratch Greek letters on a college blackboard, but don't let him run your economy!
- As your next president, my tax cuts will be so deep that the national saving rate will fall by half!
- And when I cut the saving rate in half, you'll consume more than you did before!

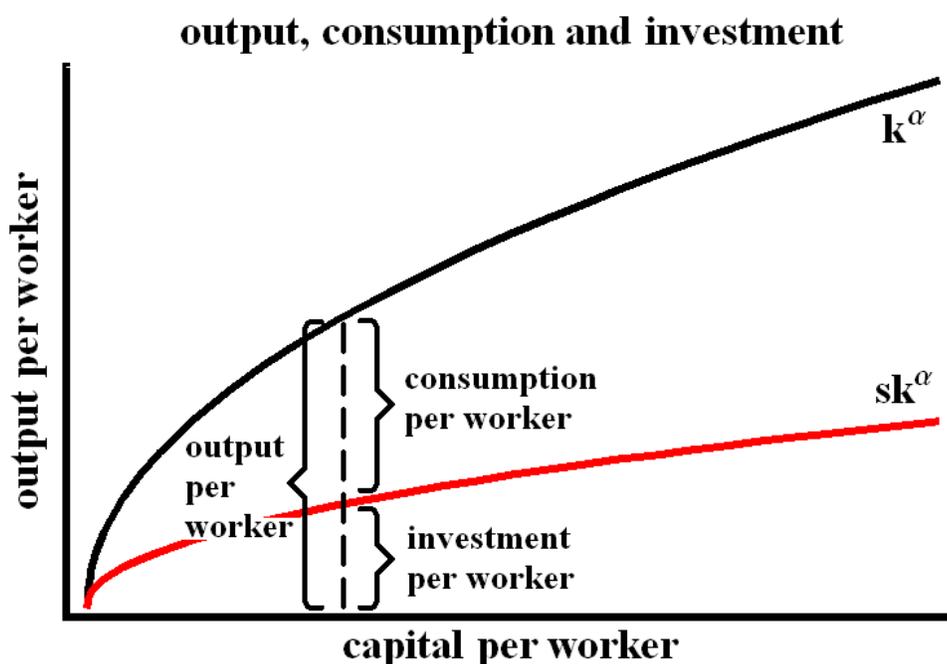


- The decrease in the saving rate causes consumption to rise immediately.
- The increase in consumption is matched by a fall in investment.
- Over time output, consumption and investment all decrease together.

# So who would you vote for?

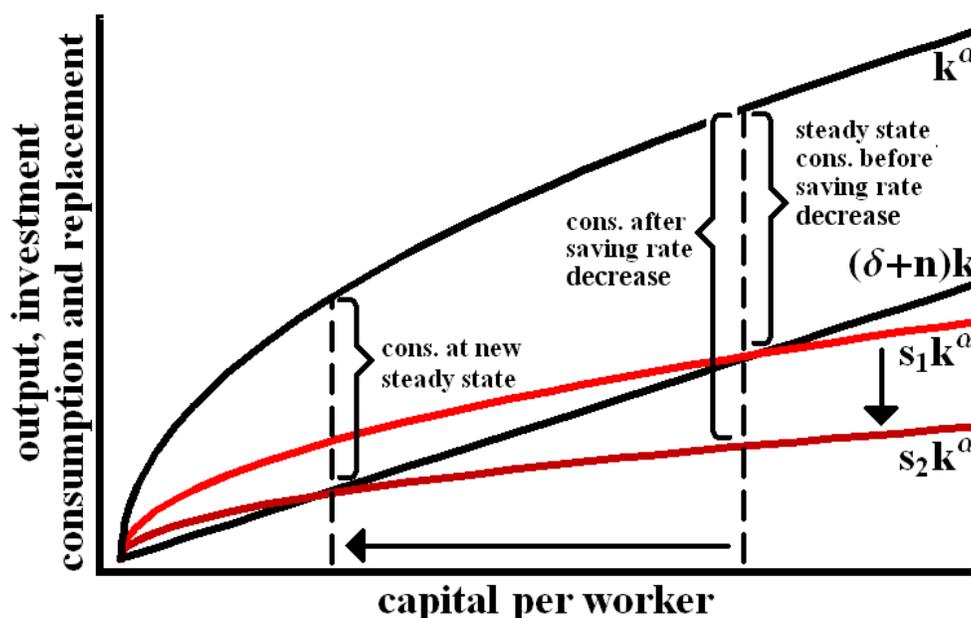
- You'd vote for Jones.
- He immediately increases your consumption 12 percent and your consumption doesn't slip below its original level until 2026.
- So how does he get away with it?
- Remember from Lecture 5 that there's a tradeoff between consumption and investment.
- Each level of capital per worker corresponds to a unique level of output per worker and the saving rate  $s$  determines the allocation of output between consumption and investment
- The level of consumption is free to vary but capital must be accumulated (or depleted) over time therefore:
  - on any given day, you can decide to consume more or less than you did the day before, but
  - to consume more, you save less – which will decrease the rate of capital accumulation
  - to consume less, you save more – which will increase the rate of capital accumulation

## Tradeoff between Consumption and Investment



- the saving rate  $s$  determines the allocation of output between consumption and investment

# Effect of Jones' Policy



- The decrease in the saving rate causes consumption to rise immediately.
- The increase in consumption is matched by a fall in investment.
- Over time output, consumption and investment all decrease together.

## Appendix

- At the beginning of the lecture, I wrote that the economy's saving rate,  $S$ , is the sum of the private saving rate,  $s_P$ , and the government saving rate,  $s_G$ , so that:  $S \equiv s_G + s_P$
- Recalling from Lecture 4 that when Net Exports are zero, then:

$$I = Y - C - G$$

$$I = (Y - T - C) + (T - G)$$

$$I = \text{private saving} + \text{government saving}$$

- Now if we define:  $s_P \equiv \frac{Y - T - C}{Y}$      $s_G \equiv \frac{T - G}{Y}$     then  $I = (s_P + s_G) \cdot Y$

- These equations give the false impression that taxation has no effect on national saving because I haven't defined the consumption function yet.
- If we assume that:  $C = a + b \cdot (Y - T)$     where:  $0 \leq a$  and  $0 < b < 1$

then national saving is an increasing function of Tax Revenues since:

$$s = \frac{Y - T - a - b \cdot (Y - T)}{Y} + \frac{T - G}{Y} \Rightarrow \frac{ds}{dT} = \frac{b}{Y} > 0$$