

# LECTURE 26

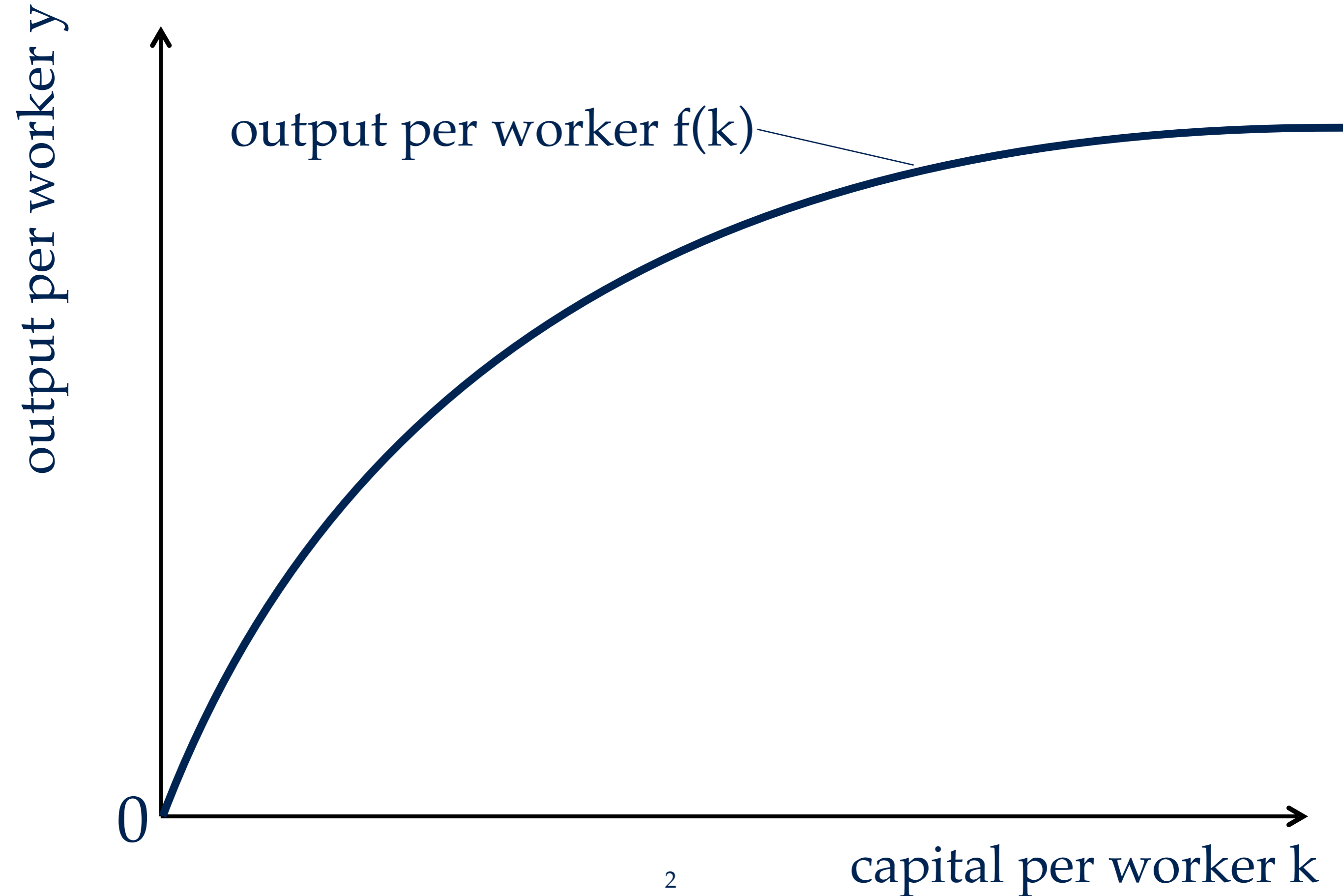
# SOLOW | OUTPUT PER WORKER

Pascal Michailat

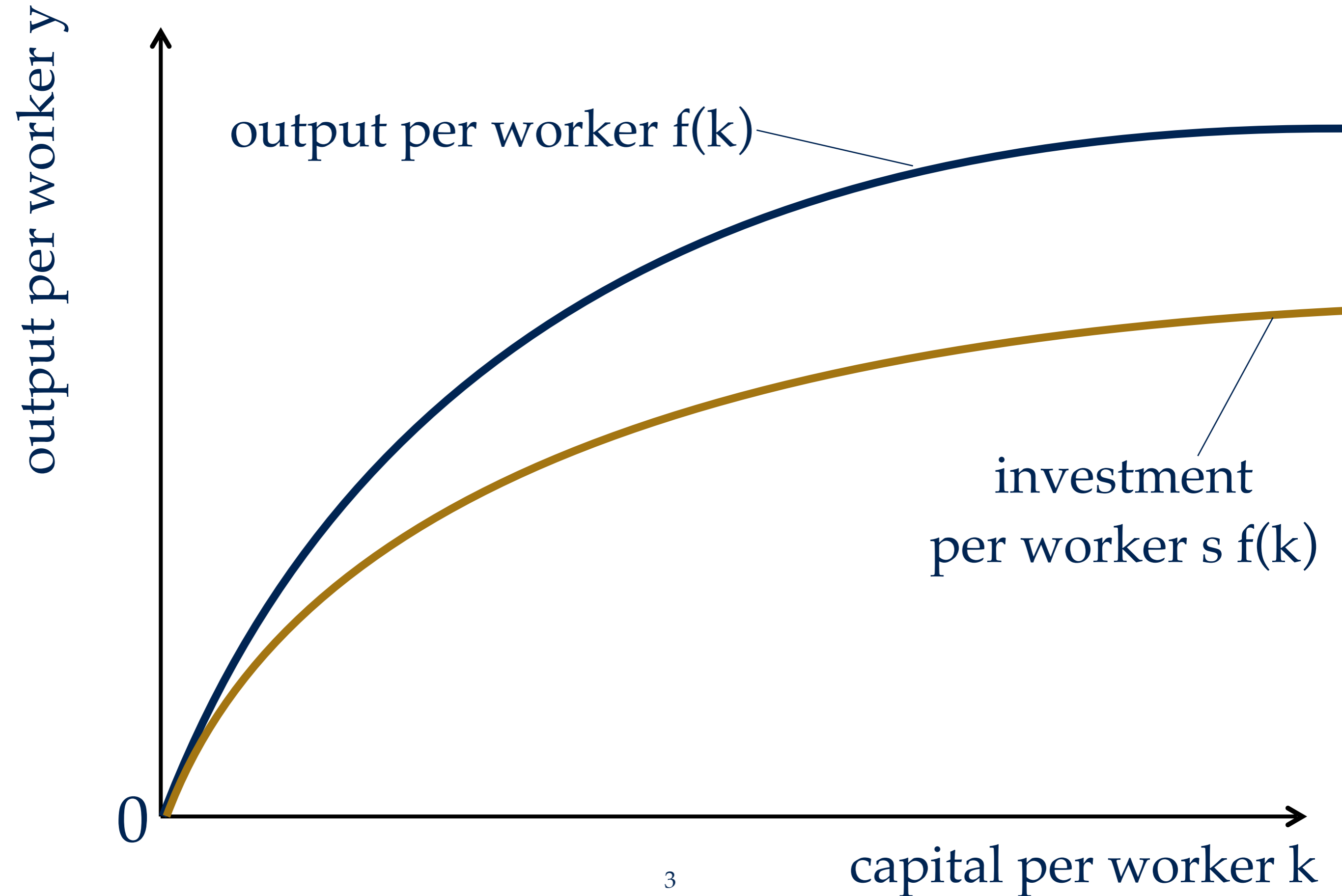
Brown University

<https://www.pascalmichailat.org>

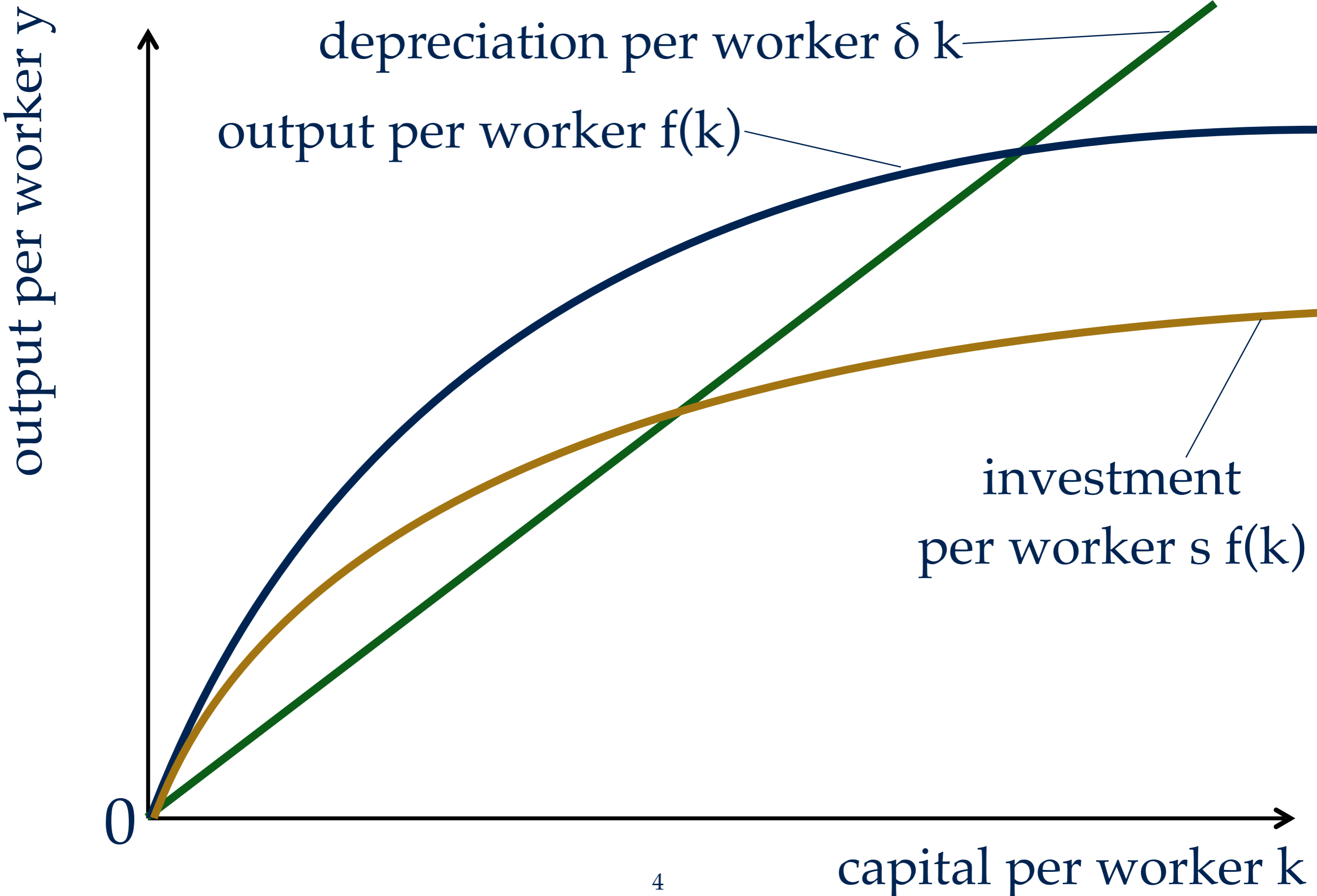
# EQUILIBRIUM IN THE SOLOW MODEL



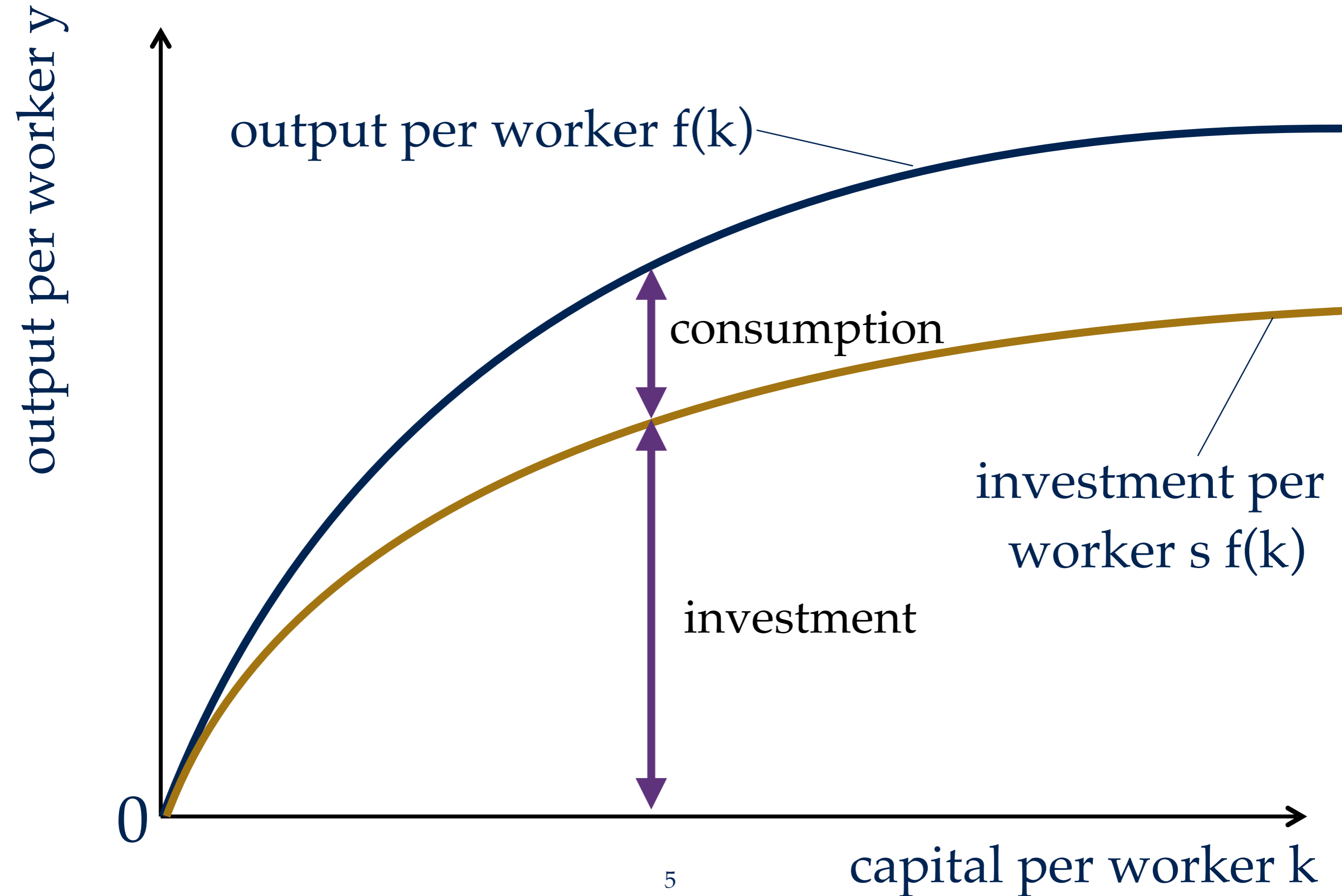
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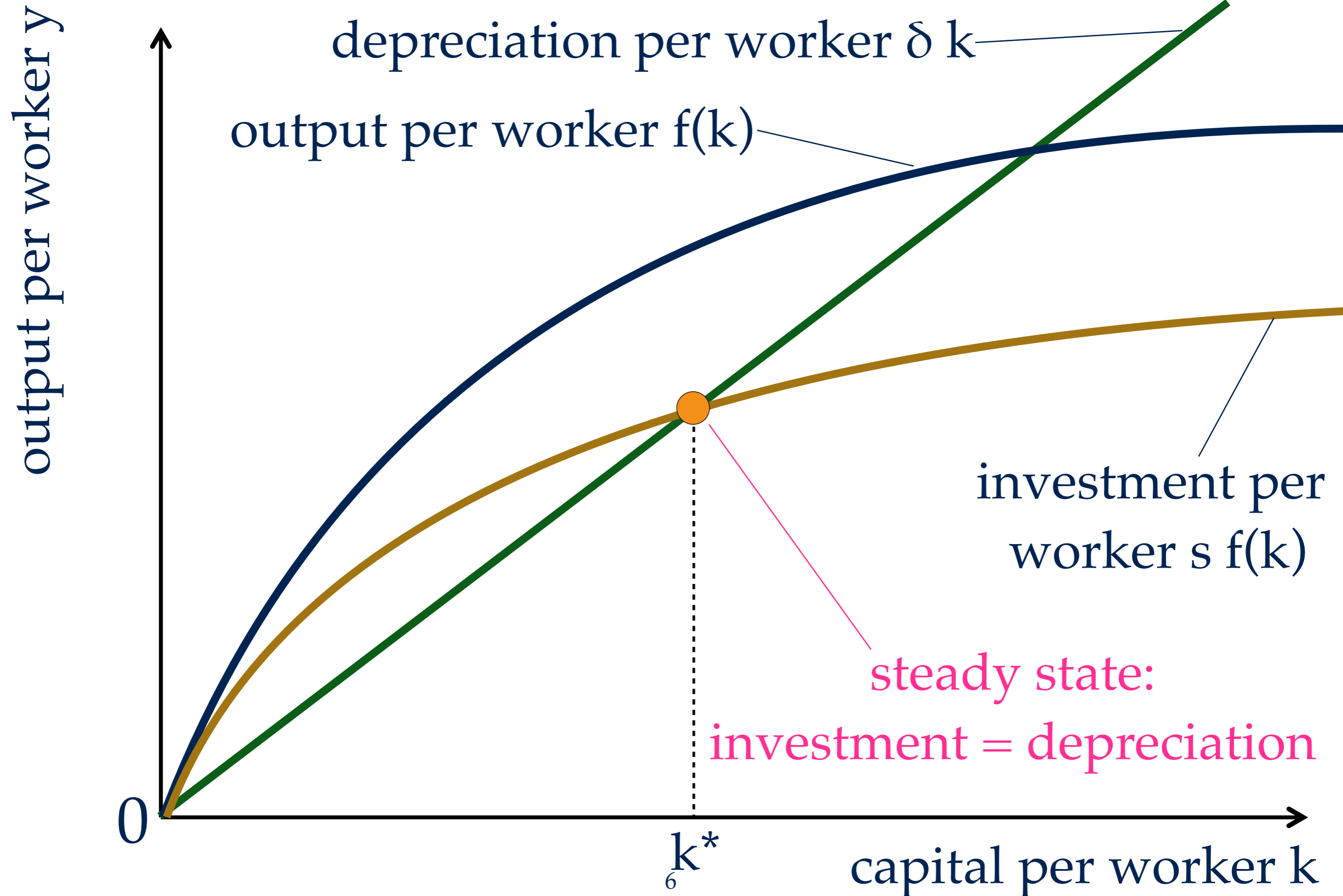
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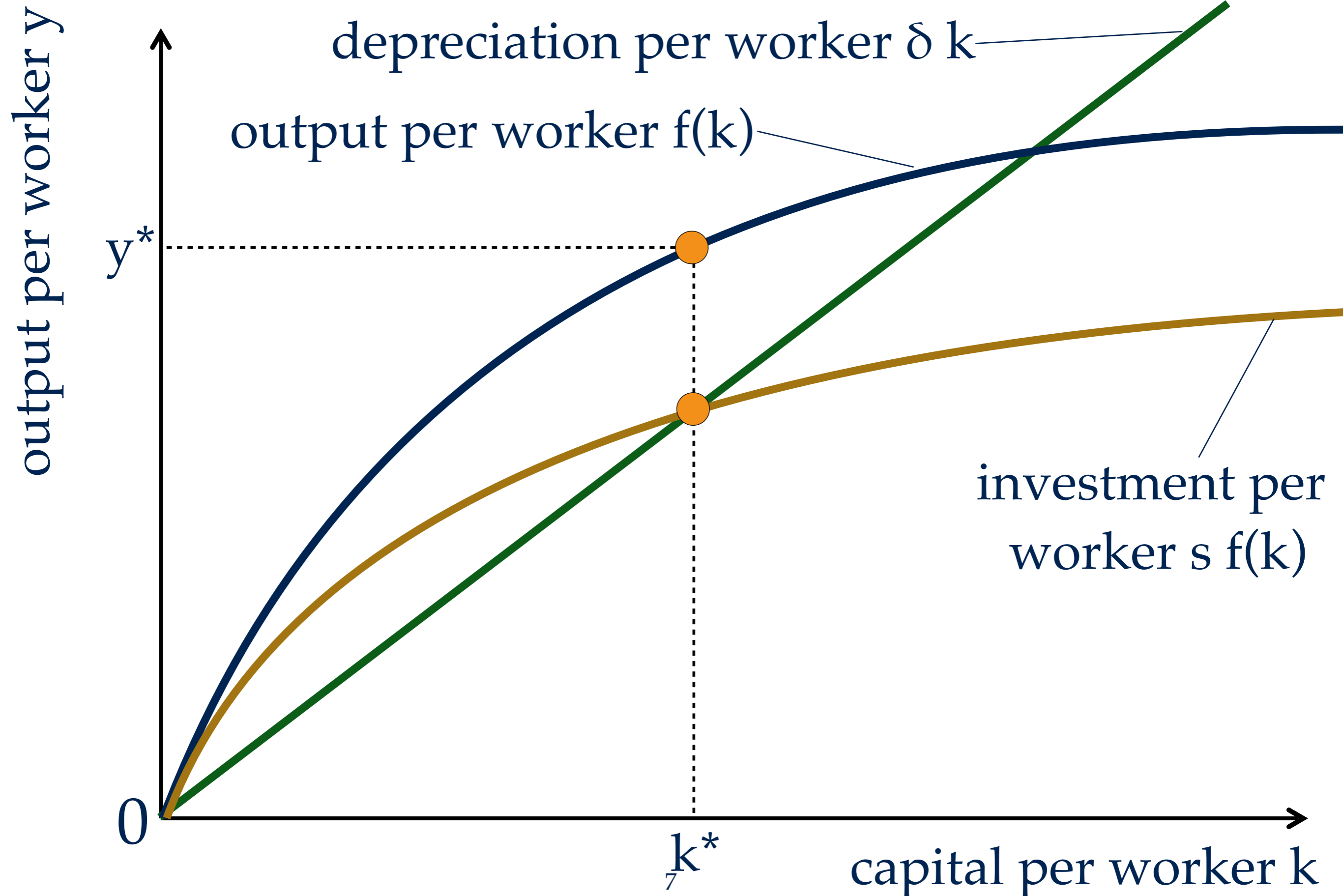
# EQUILIBRIUM IN THE SOLOW MODEL



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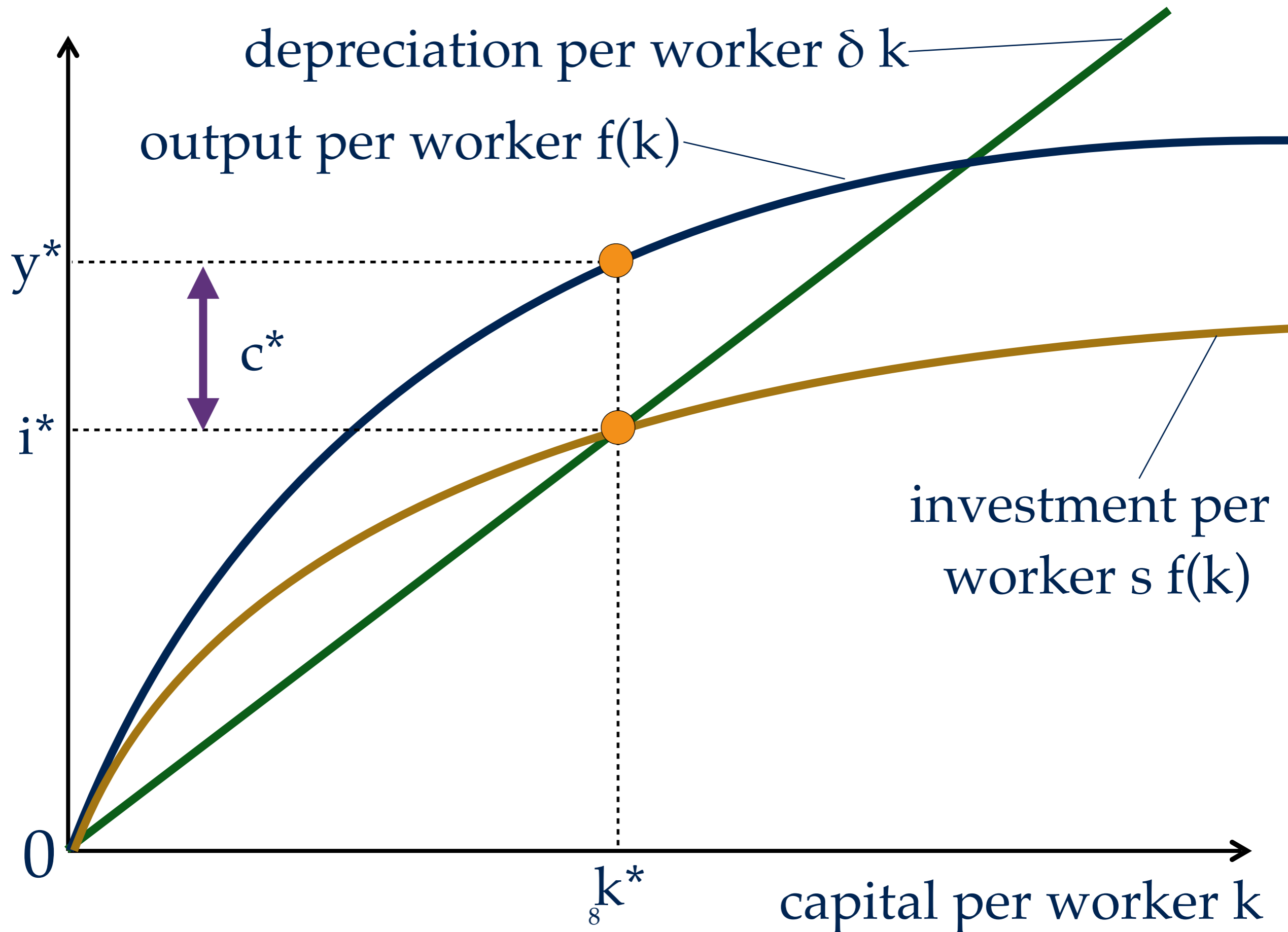


# EQUILIBRIUM IN THE SOLOW MODEL



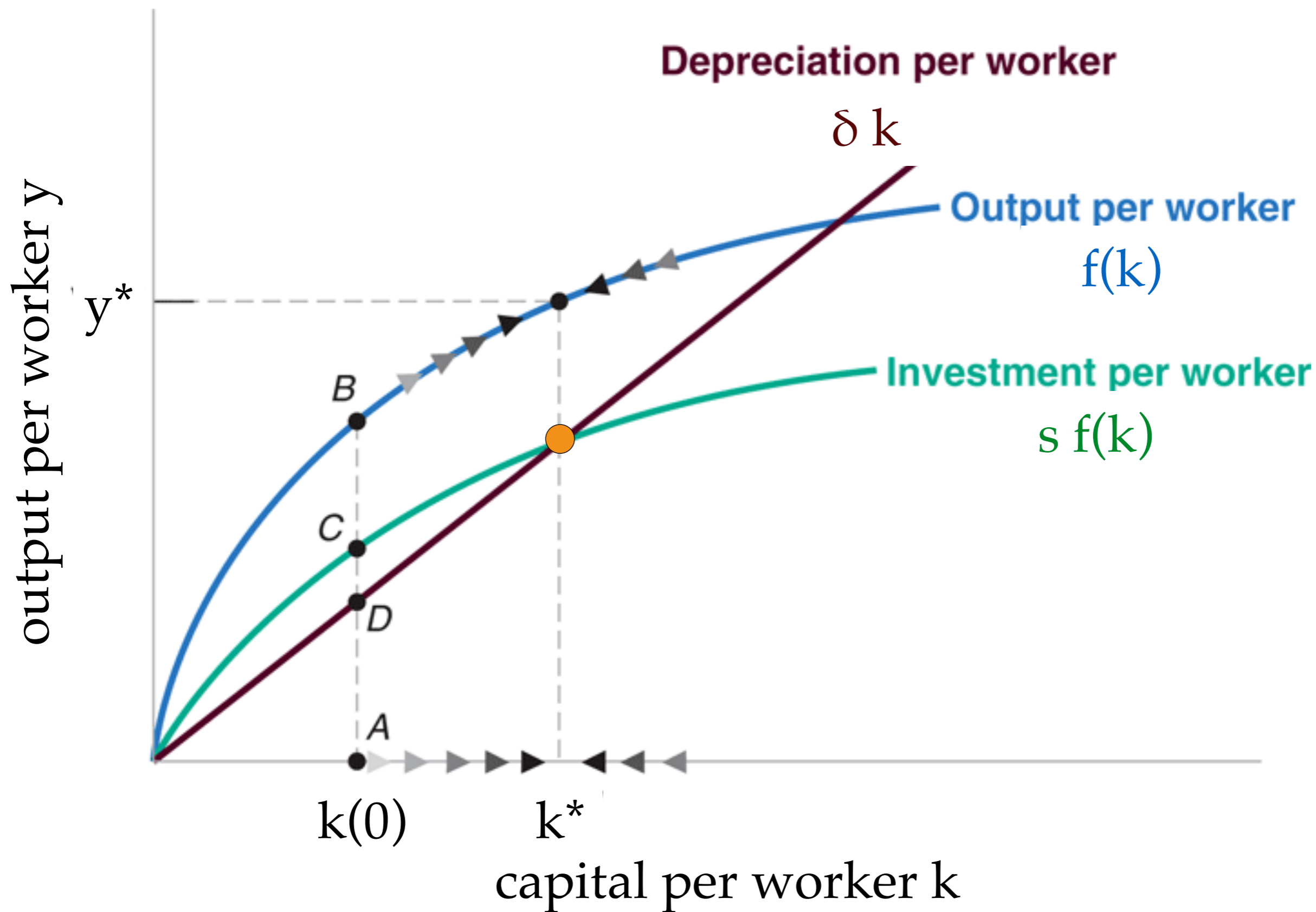
# EQUILIBRIUM IN THE SOLOW MODEL

output per worker  $y$





# LAW OF MOTION OF CAPITAL



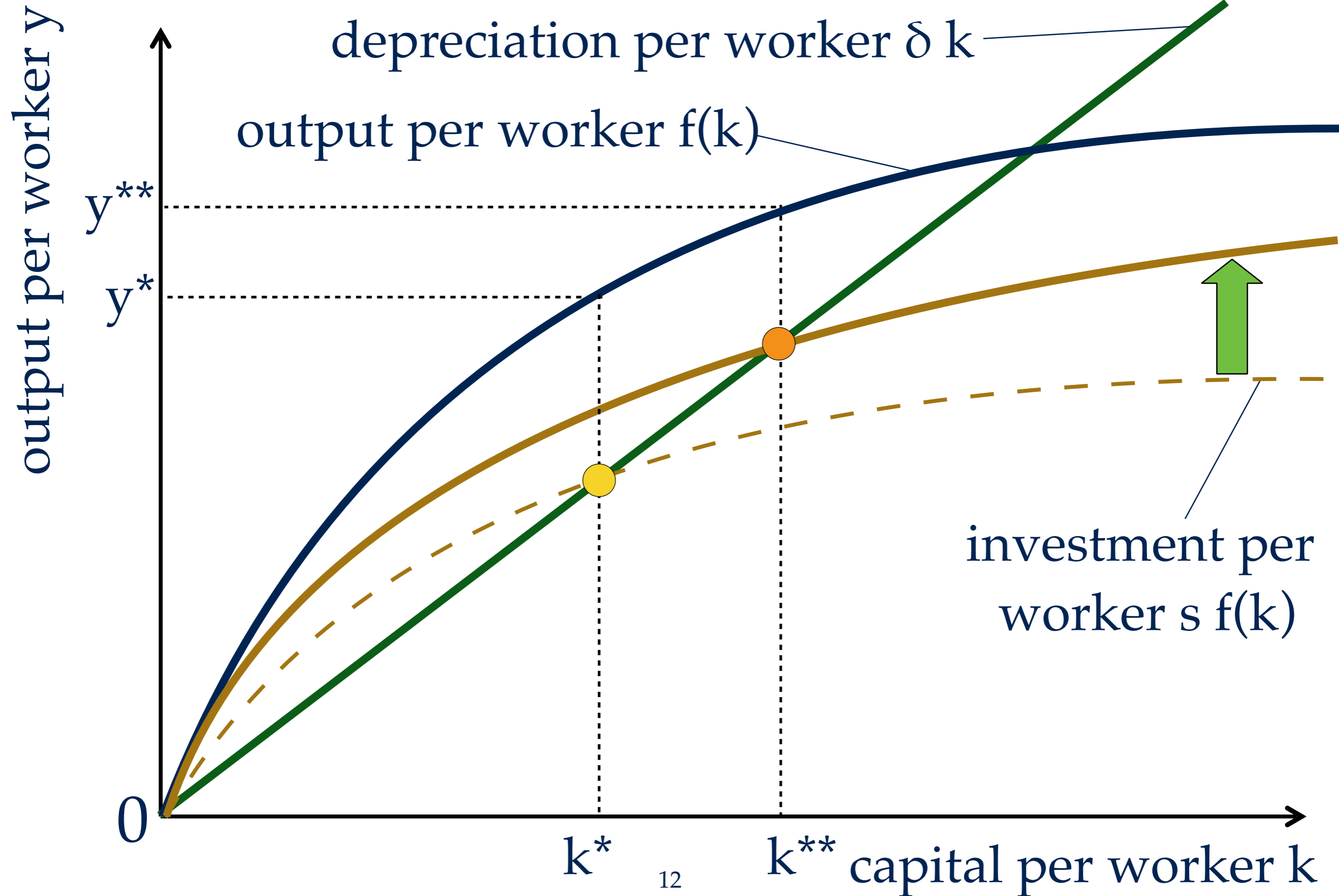
# EXPLAINING THE MOTION OF CAPITAL

- when capital per worker  $k$  is below steady state:
  - output per worker  $y = f(k)$  is somewhat low, so investment per worker  $s f(k)$  is somewhat low
  - but depreciation per worker  $\delta k$  is even lower than investment per worker
  - since investment is above depreciation: capital increases

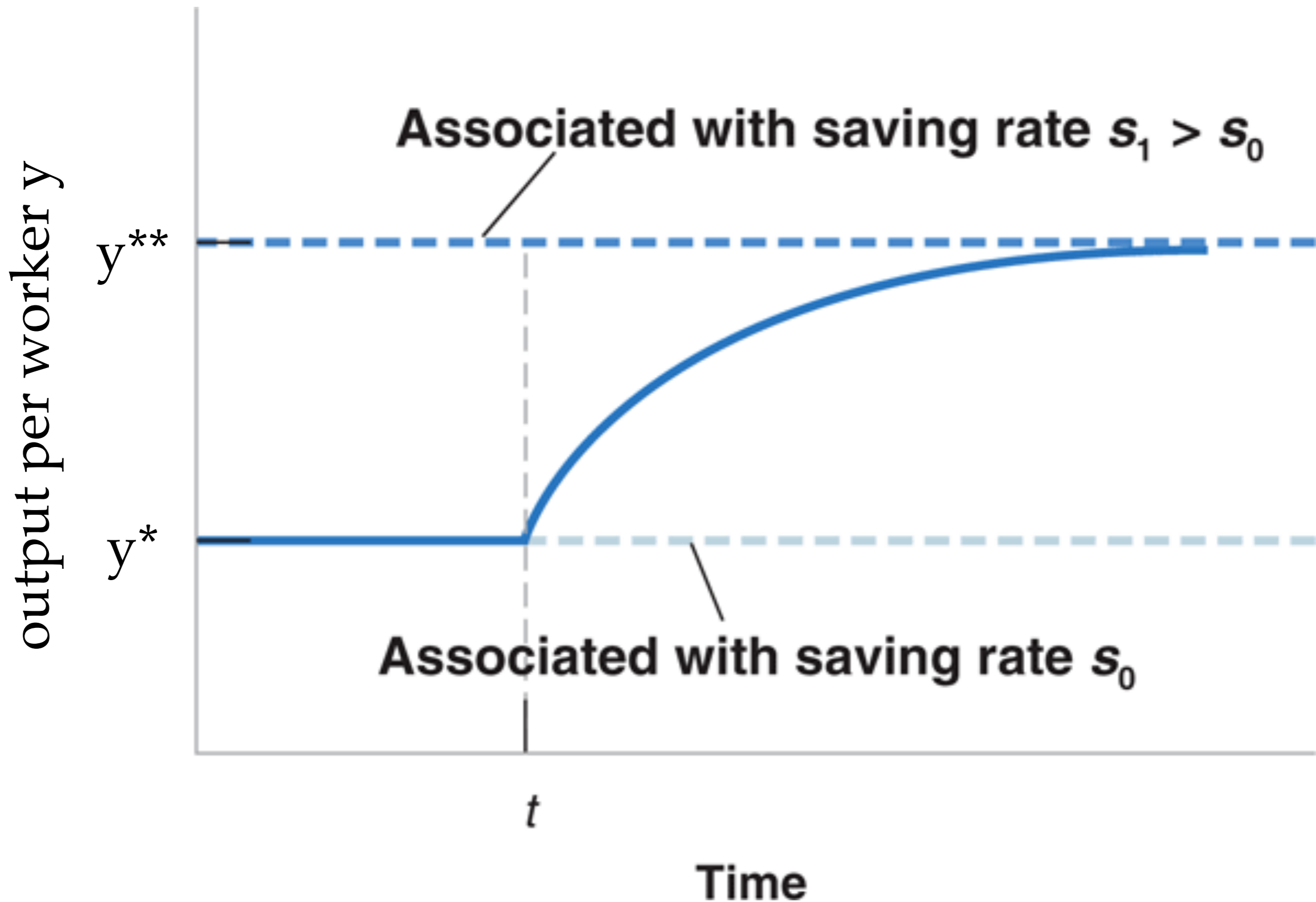
# EXPLAINING THE MOTION OF CAPITAL

- when capital per worker is above steady state, the opposite holds:
  - investment per worker is somewhat high
  - but depreciation per worker is even higher than investment per worker
- since investment is below depreciation: capital decreases

# INCREASE IN SAVING RATE: STEADY STATE



# INCREASE IN SAVING RATE: DYNAMICS



# EFFECTS OF THE SAVING RATE

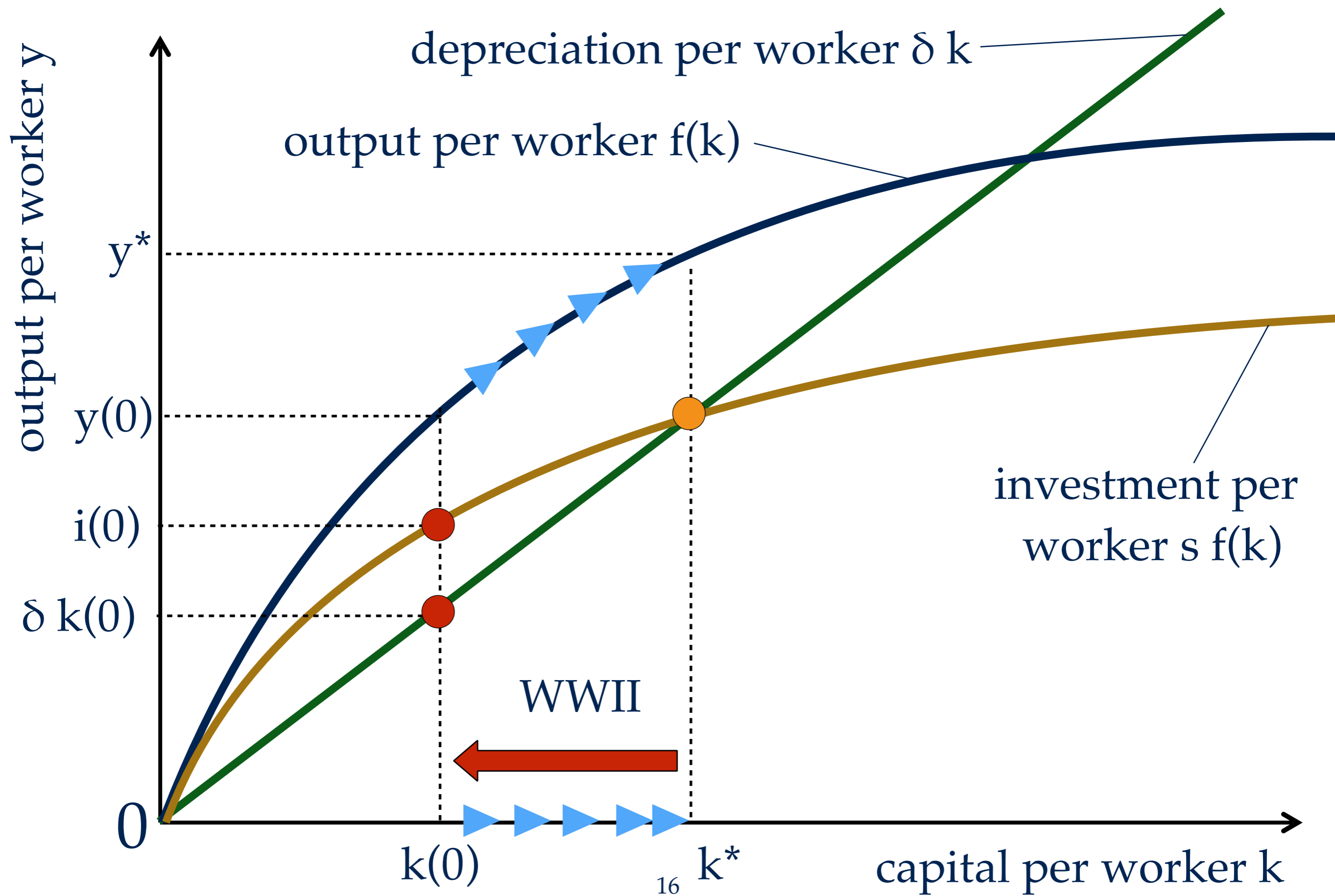
- a higher saving rate leads to positive growth of output per worker for some time, but not forever
- the saving rate has no effect on the growth rate of output per worker in the long run
  - in steady state: growth rate of output per worker=0
- but a higher saving rate leads to higher output per worker and higher capital per worker in the long run

# DESTRUCTION OF CAPITAL: FRANCE AFTER WWII

- France suffered heavy destruction of its capital stock during World War II
- proportion of the French capital stock destroyed in 1945:

<b>Railways</b>	<b>Tracks</b>	<b>6%</b>	<b>Rivers</b>	<b>Waterways</b>	<b>86%</b>
	<b>Stations</b>	<b>38%</b>		<b>Canal locks</b>	<b>11%</b>
	<b>Engines</b>	<b>21%</b>		<b>Barges</b>	<b>80%</b>
	<b>Hardware</b>	<b>60%</b>	<b>Buildings</b>	<b>(numbers)</b>	
<b>Roads</b>	<b>Cars</b>	<b>31%</b>		<b>Dwellings</b>	<b>1,229,000</b>
	<b>Trucks</b>	<b>40%</b>		<b>Industrial</b>	<b>246,000</b>

# DESTRUCTION OF CAPITAL: FRANCE AFTER WWII





# DESTRUCTION OF CAPITAL STOCK: FRANCE AFTER WWII

- the Solow model predicts that France would experience high capital accumulation and high output growth for some time
- indeed, from 1946 to 1950, French real GDP grew at 9.6% per year!
- this is because investment is much higher than depreciation when the capital stock is below steady state
  - this leads to rapid capital accumulation and rapid growth of output