

## SOLow MODEL WITH CAND AND TECHNOLOGICAL CHANGE

$$(1) \quad Y = B K^\alpha T^\beta L^{1-\alpha-\beta} \quad 0 < \alpha < 1, 0 < \beta < 1 \\ \alpha + \beta < 1$$
$$\hat{B} = \rho_B, \quad \hat{L} = n$$

$$(2) \quad \dot{k} = sY - dk$$

$$(3) \quad \hat{k} = \frac{sY}{k} - d \quad 0 < d < 1$$

LET  $z = k/Y$ , THEN (3)  $\Rightarrow$  (4)  $\hat{k} = \rho z^{-1} - d$

AND IT CAN BE SHOWN THAT:

$$(5) \quad \hat{z} = (1-\alpha)\rho z^{-1} - [\rho_B + d + (1-\alpha-\beta)n]$$

LOW MODEL WITH EXHAUSTIBLE  
NAT. RESOURCES & TECH. CHANGE

(1)  $Y = B k^\alpha E^\gamma L^{1-\alpha-\gamma}$   $0 < \alpha < 1, 0 < \gamma < 1$   
 $\alpha + \gamma < 1$   
 $E_t =$  ENERGY  
 $R_t =$  STOCK OF NON-RENEWABLE RESOURCE

(2)  $\dot{R}_t = -E_t$       (3)  $\hat{R}_t = -\frac{E_t}{R_t} = -r_E$   $0 < r_E < 1$   
EXTRACTION RATE  
 USING (1) & (3)

(4)  $Y = B k^\alpha (r_E R_t)^\gamma L^{1-\alpha-\gamma}$

(5)  $\dot{k} = rY - dk$       (6)  $\hat{k} = r\frac{Y}{k} - d$

(7)  $\hat{B} = \rho_B$

LET  $z = k/Y$  THEN (6)  $\Rightarrow$  (8)  $\hat{k} = r z^{-1} - d$

AND IT CAN BE SHOWN THAT:

(9)  $\hat{z} = (1-\alpha) r z^{-1} - \left[ \rho_B + (1-\alpha)d + (1-\alpha-\gamma)r - \gamma r_E \right]$