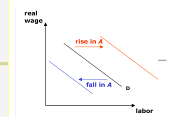
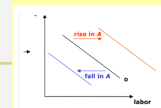
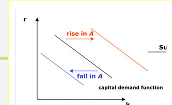
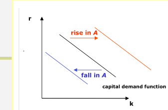
Chapter14_Handout

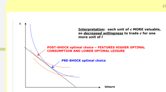
Chapter9_Handout

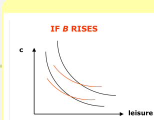
- **Total Factor Productivity (TFP) Shocks**
- ## Preference Shocks
- **TFP in Cobb-Douglas Production Function**
  - $\text{output}_t = A_t f(k_t, n_t) = A_t k_t^{\alpha} n_t^{1-\alpha}$
  - Cobb-Douglas form useful for illustrating effects of TFP shocks
- **Unexpected change (i.e., a shock) in A_t**
  - Causes change in marginal product of labor
    $mpn_t = \frac{\partial \text{output}_t}{\partial n_t} = A_t f_n(k_t, n_t) = A_t(1-\alpha)k_t^{\alpha} n_t^{-\alpha}$
  - Causes change in marginal product of capital
    $mpk_t = \frac{\partial \text{output}_t}{\partial k_t} = A_t f_k(k_t, n_t) = A_t \alpha k_t^{\alpha-1} n_t^{1-\alpha}$
- **TFP Shocks and Labor Demand**
  - **demand for labor**
  - $w_t = A_t(1-\alpha)k_t^{\alpha} n_t^{-\alpha} \; (= mpn_t)$
    Because exponent number, can move
    $w_t = A_t(1-\alpha)\left(\frac{k_t}{n_t}\right)^{\alpha}$ real wage
    - FOR GIVEN r_t and w_t, rise (fall) in A_t raises (lowers) n_t
    - 

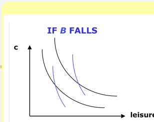
      Firm-level labor demand function
      - 

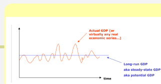
        Aggregate-level labor demand function
        - **IMPORTANT**: TFP shocks shift the labor demand curve
- **TFP Shocks and Capital/Investment Demand**
  - **demand for capital**
  - $r_t = A_t \alpha k_t^{\alpha-1} n_t^{1-\alpha} \; (= mpk_t)$
    Because expon number, can m
    $r_t = A_t \alpha \left(\frac{n_t}{k_t}\right)^{1-\alpha}$
    - FOR GIVEN r_t and w_t, rise (fall) in A_t raises (lowers) k_t
    - 

      Firm-level capital demand function
      - 

        Aggregate-level capital demand function
        - **IMPORTANT**: TFP shocks shift the capital demand (and hence investment demand – recall $inv_t = k_{t+1} - k_t$) curve
- **Preference Shocks**
  - using consumption-leisure framework
  - Utility function (modified from Chapter 2): $u(Bc, l)$
    - c: consumption
    - l: leisure
    - B: preference shifter, with $B > 0$
      - Chapter 2: were implicitly considering $B = 1$
    - Mechanics of B
      - Makes ***each*** unit of c more (high B) desirable…
      - …or less (low B) desirable
      - Interpretation of B
        - "Cultural" events that alter individuals' *preferences*
        - "Political" events that alter individuals' *preferences*
        - Any other events that alter individuals' *preferences*
  - MRS between consumption and leisure
  - $$MRS_{c,l} = \frac{\partial u / \partial l}{\partial u / \partial c}$$
    - But now need chain rule of calculus to compute $\partial u / \partial c$
      - Because first argument of $u(.)$ is now the *composite* Bc, not simply c
      - **Chain rule:** $\partial u / \partial c = u_1(Bc, l) \cdot B$
      - → MRS between consumption and leisure
        - B affects MRS in "two" ways
        - The effects of B here affect indifference curves
          $MRS_{c,l} = \frac{\partial u / \partial l}{\partial u / \partial c} = \frac{1}{B} \cdot \frac{u_2(Bc,l)}{u_1(Bc,l)}$
          The effects of B here cancel out (affects numerator and denominator in same way)
- **Preference Shocks and Indifference Maps**
  - **POSITIVE SHOCK TO B**
  - $MRS_{c,l} = \frac{\partial u / \partial l}{\partial u / \partial c} = \frac{1}{B} \cdot \frac{u_2(Bc,l)}{u_1(Bc,l)}$
    Increase in B flattens all indifference curves (i.e., lowers MRS at any point in c-l space).
    - 

  - Rise in B flattens all indifference curves (i.e., lowers MRS at any point in c-l space).
    Interpretation: each unit of c more valuable, so *decreased willingness* to trade c for one more unit of l
    - 

  - Fall in B steepens all indifference curves (i.e., raises MRS at any point in c-l space).
    Interpretation: each unit of c less valuable, so *increased willingness* to trade c for one more unit of l
    - 

- $\boxed{\text{Superimpose a budget line: optimal choice of } c \text{ and } l \text{ clearly affected by shock to } B}$
- **Preview of Business Cycle Theory**
  - 

- **Supply shocks: TFP shocks, others**
  - Demand shocks: preference shocks, monetary policy shocks, others
    - Shocks over time lead to changes over time in
      - Consumers' incentives to work, save, and consume
      - Firms' incentives to hire, invest, and produce
      Economy's response(s) to shocks mediated through labor markets, capital markets, and goods markets