Prep Questions for Exam #1

1. *Business Cycle Behavior: During a recession, what is expected to happen to the following economic variables?*

    a. *Employment*   (increase/**decrease**/no change)
    b. *Unemployment rate*   (**increase**/decrease/no change)
    c. *Inflation rate*   (increase/**decrease**/no change)
    d. *Nominal interest rate*   (increase/**decrease**/no change)
    e. *Real interest rate*   (increase/**decrease**/no change)
    f. *Real money supply*   (increase/**decrease**/no change)
    g. *Real wage rate*   (increase/**decrease**/no change)

2. *National Income Accounting: Use the information below to calculate the following values.*

Consumption	$420
Corporate profits	70
Depreciation	30
Employee compensation	440
Gross domestic product	710
Net national product	660
Net interest	20
Personal income	555
Personal taxes	60
Proprietor's income	30
Rental income	40

a. *National income*

National Income = EC + CP + Pro. Inc. + Net Int. + RI
National Income = 440 + 70 + 30 + 20 + 40 = 600

b. *Gross national product*

GNP = NNP + Dep
GNP = 660 + 30 = 690

c. *Net factor payments from abroad*

Net Factor Payments = GNP – GDP
Net Factor Payments = 690 – 710 = – 20

d. *Private savings*

S_P = Personal Income – Personal Income Taxes – C
Personal Savings = 555 – 60 – 420 = 75

3. *Inflation: Suppose the price level was 150 in 2018 and 155 in 2019, while the inflation rate was 1.5% in 2020.*

   a. *What was the inflation rate in 2019?*

   $\pi_{19} = (P_{19}/P_{18} - 1) \times 100$
   $\pi_{19} = (155/150 - 1) \times 100 = 3.33\%$

   b. *What was the price level in 2020?*

   $\pi_{20} = (P_{20}/P_{19} - 1) \times 100$
   $1.5 = (P_{20}/155 - 1) \times 100$
   $P_{20} = ((1.5/100) + 1) \times 155 = 157.325$

   c. *What measure of inflation includes the most goods and services?*

   Answer: GDP Price Deflator

   d. *What measure of inflation does the Federal Reserve target?*

   Answer: Personal Consumption Expenditures Price Deflator

4. *National Income Accounting: Use the information below to calculate the following values.*

Capital investment by firms	$420
Durable goods	570
Exports	160
Government spending	440
Government transfer payments	335
Imports	220
Interest on government debt	185
Inventory investment by firms	– 90
Non-durable goods	430
Residential investment	360
Services	510
Taxes	690

a. *Consumption*

Consumption = Durables + Non-durables + Services
Consumption = 570 + 430 + 510 = 1,510

b. *Investment*

Investment = Capital Inv. + Residential Inv. + Inventory Inv.
Investment = 420 + 360 − 90 = 690

c. *Government savings*

S_G = Taxes − Gov. spend. − Transfer pay. − Interest on debt
Government savings = 690 − 440 − 335 − 185 = − 270

d. *Gross domestic product*

GDP = C + I + G + (X − IM)
GDP = 1,510 + 690 + 440 + (160 − 220) = 2,580

5. *Unemployment*: *Circle the correct answer*

    a. *Someone who is not working but looking for work is* (working/**unemployed**/not in the labor force)

    b. *Someone who is on vacation is* (**working**/unemployed/not in the labor force)

    c. *Someone who is on retired and not looking for work is* (working/unemployed/**not in the labor force**)

    d. *The establishment survey calculates employment numbers by interviewing* (**businesses**/households/both)

    e. *The current population survey calculates employment numbers by interviewing* (businesses/**households**/both)

6. *Measuring Unemployment*: *Suppose there are 180 million people in the labor force, the unemployment rate is 5.0%, the labor force participation rate is 60%, and the natural rate of unemployment is 4.0%.*

   a. *How many people are unemployed?*

   UR = (U/LR)×100
   U = (UR/100)×LF
   Unemployed = (5/100)×180 = 9 million

   b. *How many people are working?*

   Working = Labor force − Unemployed
   Working = 180 − 9 = 171 million

   c. *How many people are in the adult population?*

   LFPR = (LF/AP)×100
   AP = (LF/LFPR)×100
   Adult population = (180/60)×100 = 300 million

d. *How many people are not working?*

Not working = Adult Population – Working
Not working = 300 – 171 = 129 million

e. *How many percentage points is output above or below its potential?*

$(Y - Y^*)/Y^* = -2 \times (u - u^*)$
$(Y - Y^*)/Y^* = -2 \times (0.05 - 0.04) = -0.02 = -2\%$

Answer: Actual output is 2 percentage points below its potential.

7. *Labor Demand/Supply: Suppose the labor demand is given by the equation: N = 19 – (W/P), and labor supply is given by the equation: N = 4 +2*(W/P), where N is labor and W/P is the real wage.*

a. *Using the labor demand and supply equations, construct a labor demand/supply graph and indicate the equilibrium level of labor and the equilibrium real wage.*
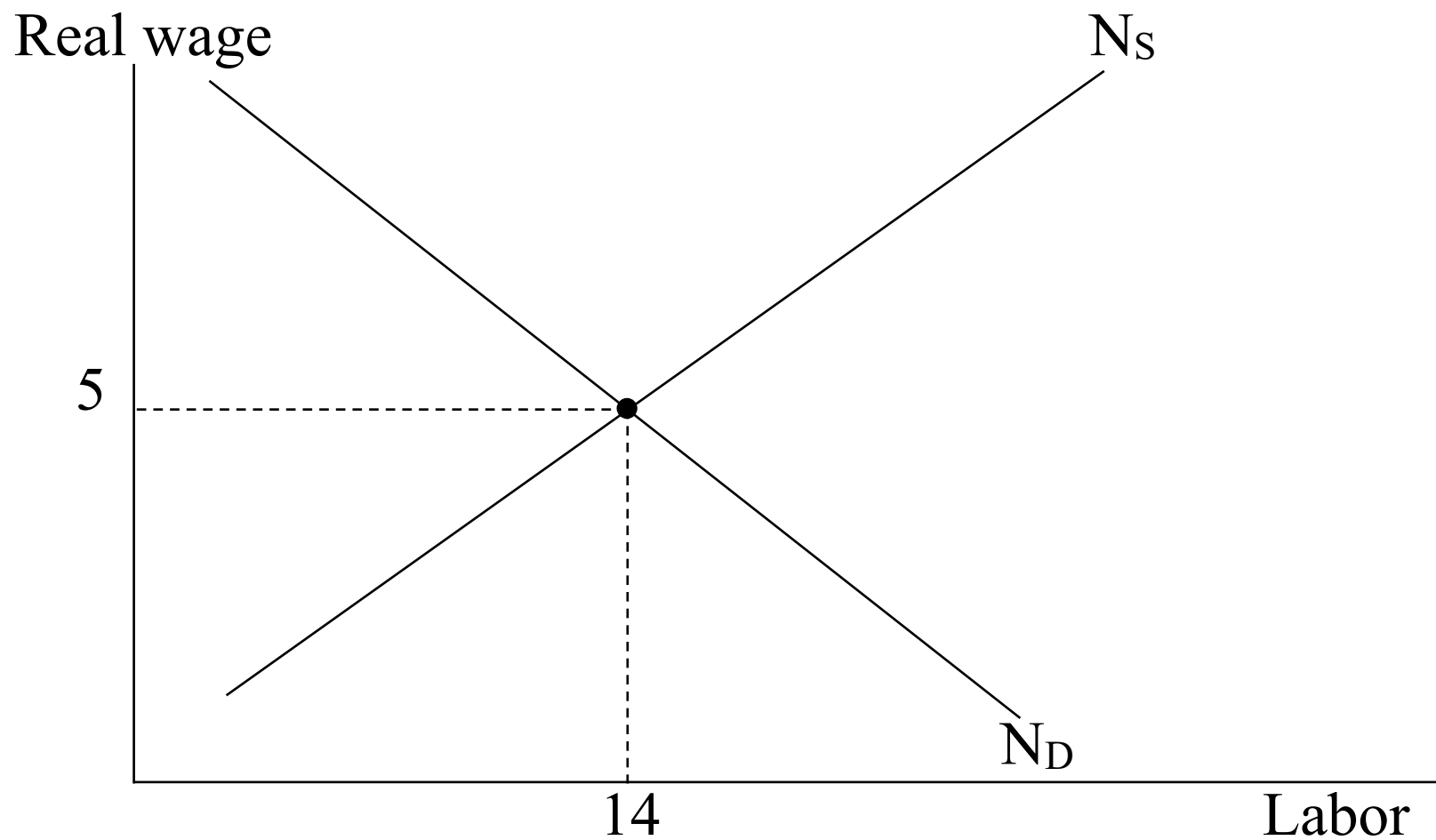
Set labor demand equal to labor supply

$$19 - (W/P) = 4 + 2\times(W/P)$$
$$3\times(W/P) = 15$$
$$W/P^* = 5.$$

Plug the value W/P* = 5 into either the labor demand or labor supply curve equation to get N*.

Labor demand: N* = 19 – (W/P) = 19 – 5 = 14
Labor supply: N* = 4 + 2×(W/P) = 4 + 2×5 = 14.

Graph

Real wage

N_S

5

N_D

14

Labor

b. *Suppose the minimum wage is 7, how many people are working and how many people are unemployed?*

Plug the minimum wage into the labor demand and labor supply equations.

Labor demand: $N^D* = 19 - (W/P) = 19 - 7 = 12$.
Labor supply: $N^S* = 4 + 2\times(W/P) = 4 + 2\times7 = 18$.

Since $N^S* > N^D*$, the number of people working equals the demand for labor ($N^D*=12$), while the number of people unemployed equals the supply of labor minus the demand for labor ($N^S* - N^D* = 18 - 12 = 6$).

c. *Briefly describe the substitution and income effects of an increase in the real wage on labor supply.*

<u>Substitution Effect</u>

$$W/P\uparrow \to \underset{\text{Working}}{\overset{\text{Opportunity}}{\text{Cost of Not}}}\uparrow \to N^S\uparrow$$

<u>Income Effect</u>

$$W/P\uparrow \to Y\uparrow \to N^S\downarrow$$

The substitution effect usually dominates the income effect so a higher real wage causes the supply of labor to increase. (i.e., The labor supply curve is usually upward sloping.)

d. *In this example, does the substitution effect dominate the income effect or vice versa? Briefly explain.*

In this example, the labor supply curve equation is given by $N^S* = 4 + 2 \times (W/P)$. Since the supply of labor, (N^S*), is positively related to the real wage, (W/P), the substitution effect dominates.

8. *Solow Model: Consider a Solow growth model where output is given by $Y = 5 \times (K \times N)^{1/2}$, the savings rate equals 8%, and the labor force growth rate equals 2%.*

a. *Construct a graph showing equilibrium in the Solow Model with capital-to-labor ratio, K/N, on the x-axis and savings/investment-to-labor ratio on the y-axis. Be sure to properly label the equilibrium capital-to-labor ratio.*
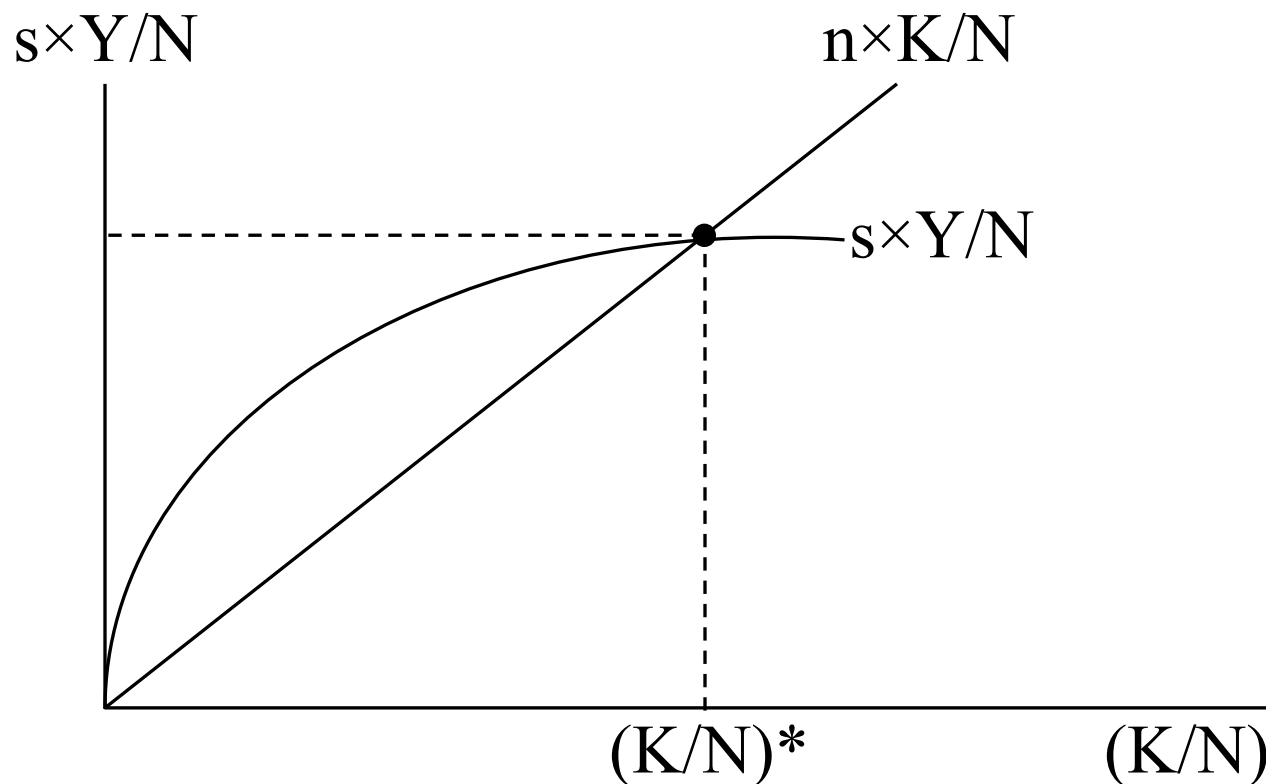
b. *Using the production function and data above, calculate the equilibrium capital-to-labor ratio.*

$$s \times Y/N = n \times K/N$$
$$s \times 5 \times (K/N)^{1/2} = n \times K/N$$
$$0.08 \times 5 \times (K/N)^{1/2} = 0.02 \times K/N$$
$$5 \times 0.08/0.02 = (K/N)^{1/2}$$
$$20 = (K/N)^{1/2}$$
$$(K/N) = 20^2$$
$$(K/N)^* = 400$$

c. *On the balanced growth path, is the capital growth rate higher, lower, or the same as the labor growth rate. Briefly explain.*

On the balanced growth path, K/N is constant, so the growth rate of capital is the <u>same</u> as the growth rate of labor.

d. *Suppose the economy is on its balanced growth path. If the savings rate rises, then what are the initial and long-run responses of the growth rates of capital and output. Use a graph of the Solow Model to support your answer.*
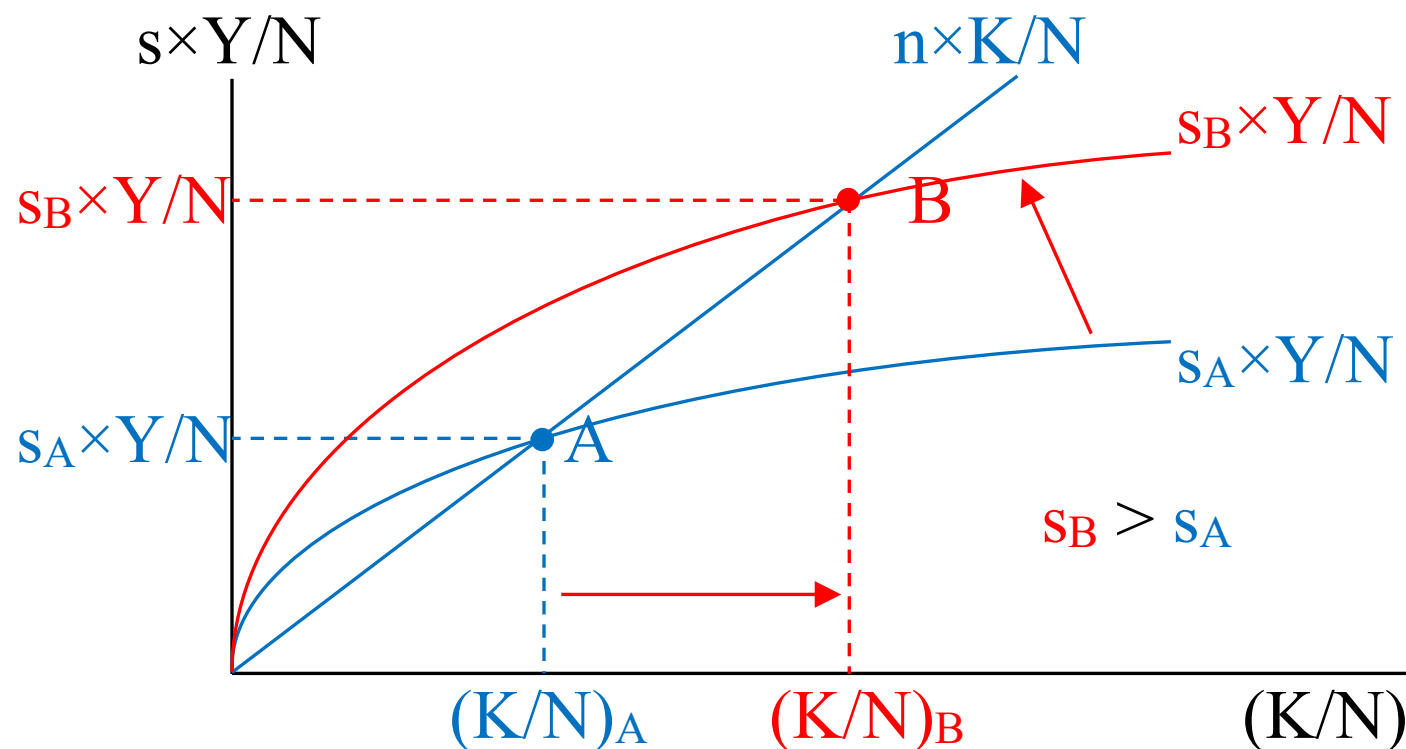
Initially, a higher savings rate pushes up the growth rates of capital and output as K/N rises to $(K/N)_B$. In the long-run, K/N converges to $(K/N)_B$ so output and capital growth return to their original levels.

9. *Endogenous Growth Theory and the Long-Run Labor Supply*:

a. *According to the endogenous growth theory, how can the long-run output growth rate permanently rise? What is the effect of such a policy change on the current production of goods and services? Briefly explain.*

The long-run growth rate of output can be permanently increased by permanently raising the amount of capital and/or labor allocated toward the production technology. That policy, however, will reduce the current production of goods and services because there will be less capital and/or labor allocated towards that type of production.

b. *Which policy tends to generate a larger long-run increase in the labor supply: A reduction in the personal income tax rate or a tax reform where marginal income tax rates are lower and personal deductions are eliminated? Briefly explain.*

A tax reform generates a larger increase in the labor supply because both tax reform and tax cut benefit from the positive effects on labor supply from the substitution effect but only the tax cut suffers from the negative effects on labor supply from the income effect.

10. *1970's Productivity Slowdown*:

    a. *What are the four potential reasons for the productivity slowdown in the 1970's?*

        The four potential reasons are

        1. The overall labor force quality seems to have worsened, which would decrease labor productivity.

        2. Output shifted from the more productive manufacturing sector to the less productive service sector.

        3. High budget deficits drained the resources available for capital investment.

        4. A reduction in R&D spending slowed technology growth.

b. *If the technology growth rate declines by 1% how much does the output growth rate fall? Now suppose the growth rate of capital drops by 1%, how much does the output growth rate fall? Use an equation to justify both of your answers.*

To solve this problem, you use the Growth Accounting Formula:

$$\%\Delta Y = \%\Delta A + (2/3)\times\%\Delta N + (1/3)\times\%\Delta K$$

If the technology growth rate, ($\%\Delta A$), falls by 1%, then the growth rate of output, ($\%\Delta Y$), declines by 1%.

If the growth rate of capital, ($\%\Delta K$), drops by 1%, then the growth rate of output, ($\%\Delta Y$), falls by 1/3%.
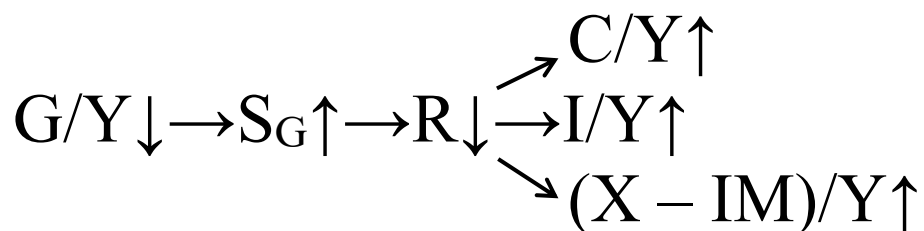
c. *How did the real wage growth rate respond to the 1970's productivity slowdown? Use evidence from microeconomic theory to justify why the response of the real wage growth rate to the 1970's productivity slowdown was reasonable.*

In the 1970s, the real wage growth rate declined as a result of the productivity slowdown. A profit maximizing firm sets the marginal product of labor equal to the real wage, ($MP_L = W/P$). When productivity growth slowed, the growth rate of MP_L fell which caused the real wage growth rate to decline.

11. *Long-Run Fiscal Policy: Suppose the government is running a long-run budget deficit.*

   a. *If the government permanently lowers its government spending to balance its budget, how would the interest rate, consumption's share of output, investment's share of output, and net exports' share of output respond in the long-run? Briefly explain your answer.*
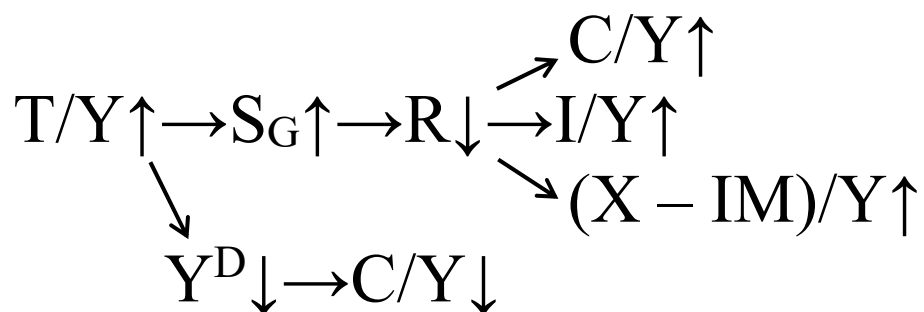
   A fall in government spending's share of output, (G/Y), pushes up government savings, (S_G). That rise in S_G pushes down the interest rate, (R), which causes consumption's share of output, (C/Y), investment's share of output, (I/Y), and net exports' share of output, ((X − IM)/Y), to increase.

$$G/Y\downarrow \rightarrow S_G\uparrow \rightarrow R\downarrow \nearrow \begin{matrix} C/Y\uparrow \\ \rightarrow I/Y\uparrow \\ \searrow (X-IM)/Y\uparrow \end{matrix}$$

   Thus, G/Y↓ causes S_G↑, R↓, C/Y↑, I/Y↑, and (X − IM)/Y↑.

b. *If the government permanently raises taxes to balance its budget, how would the interest rate, consumption's share of output, investment's share of output, and net exports' share of output respond in the long-run? Briefly explain your answer.*

An increase in taxes' share of output, (T/Y), pushes up government savings, (S_G), so the interest rate, (R), falls. That lower R raises consumption's share of output, (C/Y), investment's share of output, (I/Y), and net exports' share of output, ((X − IM)/Y). The increase in T/Y also pushes down disposable income, (Y^D), which causes C/Y to decrease. The downward effect from the lower Y^D dominates, so C/Y falls.
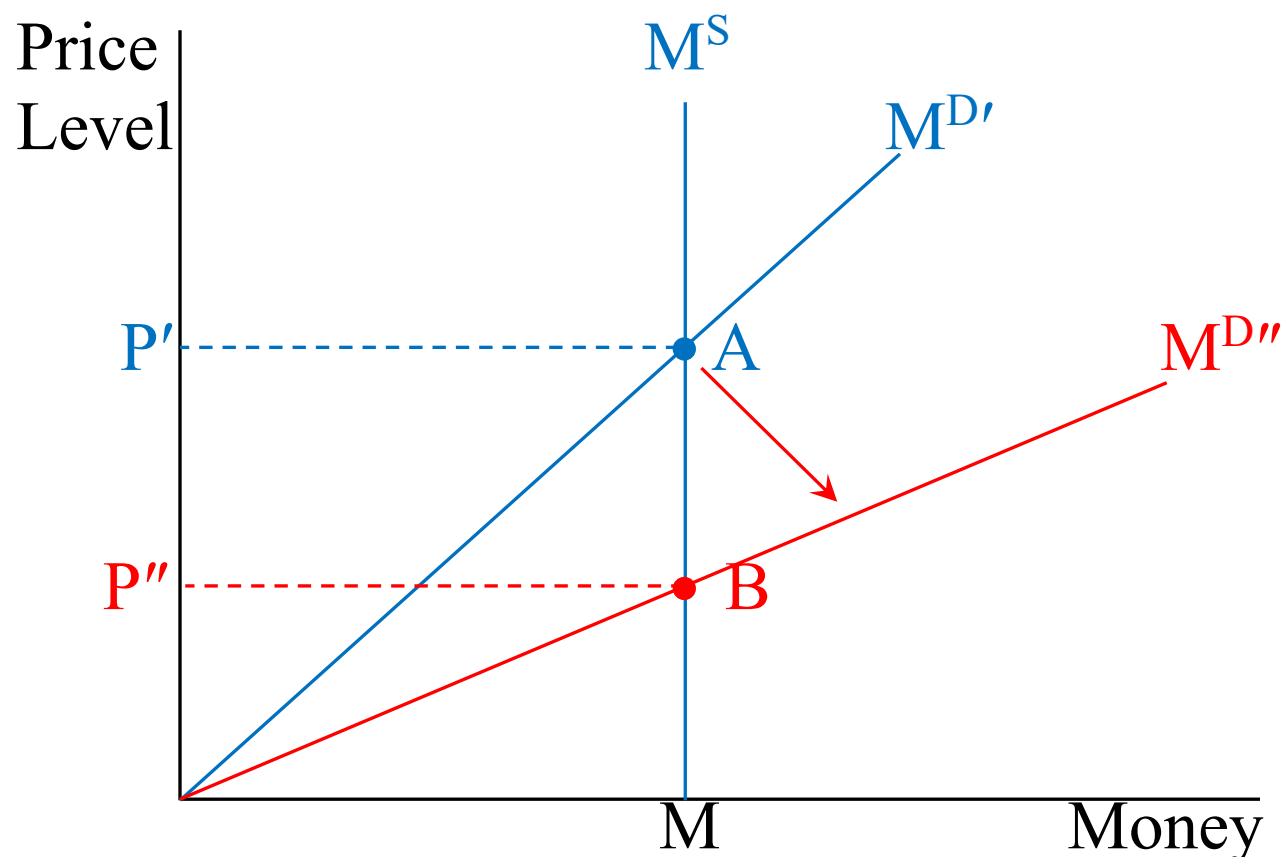
$$
\begin{array}{l}
\hspace{5.3cm} \nearrow C/Y\uparrow \\
T/Y\uparrow \rightarrow S_G\uparrow \rightarrow R\downarrow \rightarrow I/Y\uparrow \\
\hspace{1.3cm} \searrow \hspace{2.6cm} \searrow (X-IM)/Y\uparrow \\
\hspace{1.7cm} Y^D\downarrow \rightarrow C/Y\downarrow
\end{array}
$$

Thus, T/Y↑ causes S_G↑, R↓, C/Y↓, I/Y↑, and (X − IM)/Y↑.

12. *Long-Run Money Market*: *Use a graph of the long-run money market to support each answer.*

   a. *What is the long-run impact of an increase in potential output on the price level?*

   The rise in Y* increases M^D (the M^D curve rotates downward to $M^{D''}$), which causes P to fall. $[Y*\uparrow \rightarrow M^D\uparrow \rightarrow P\downarrow]$

A rise in potential output pushes down the price level.

b. *What can the central bank do to prevent the long-run price level from changing in part a?*

The central bank can prevent the price level from falling by raising the money supply from $M^{S\prime}$ to $M^{S\prime\prime}$.
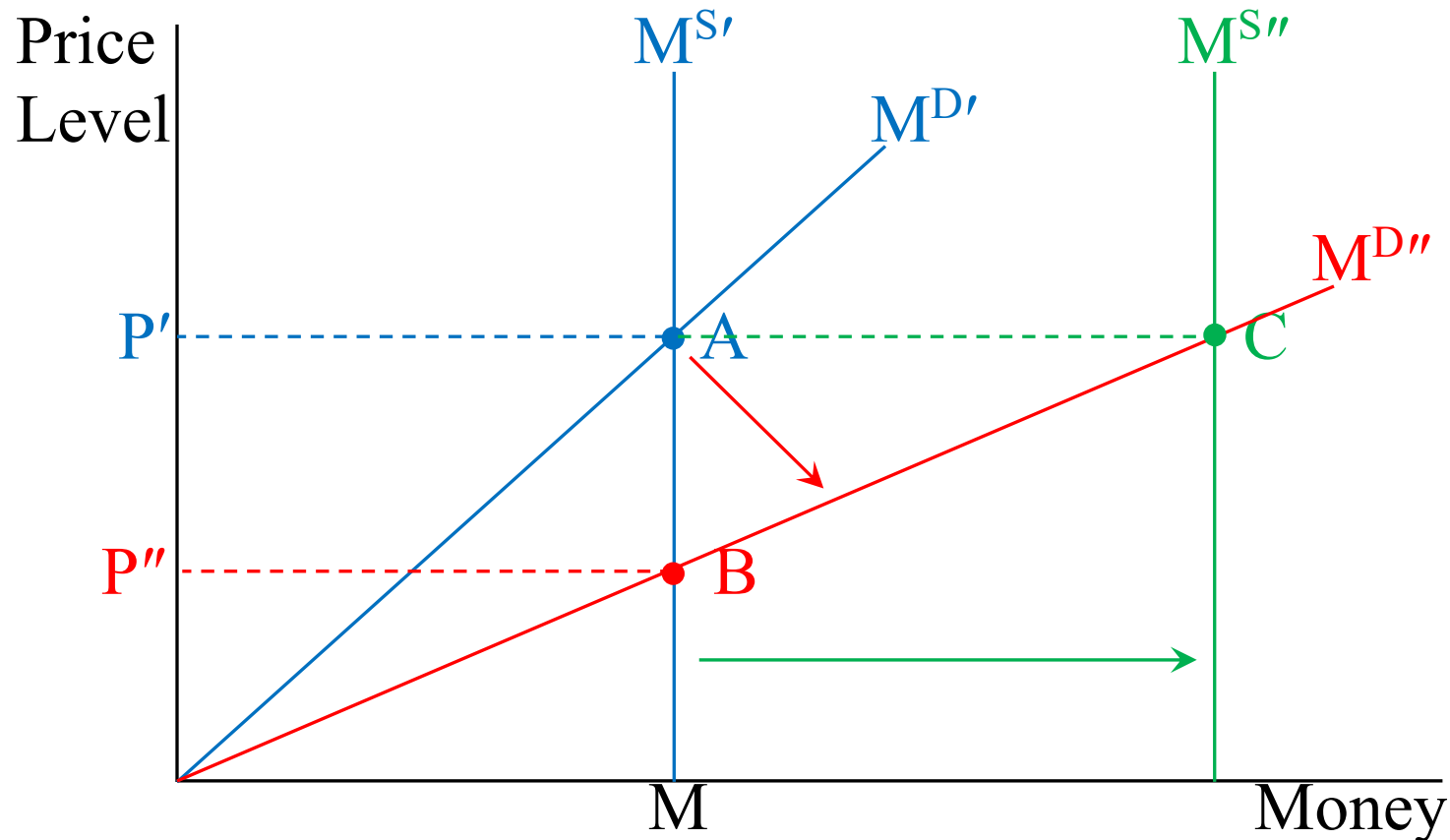
13. *Convergence: Suppose that the production function for the South Korea and North Korea is given by $Y = A \times (K)^{1/3}(N)^{2/3}$. If capital per capita, K/N, is 27 times larger in the South Korea than in North Korea and technology, A is 7 times larger in the South Korea than in North Korea, how much larger is output per capita, Y/N, in the South Korea than in North Korea.*

Answer: Divide the production function by N to get:

$$Y/N = A \times (K/N)^{1/3}.$$

Since $[K/N]_{SK}/[K/N]_{NK} = 27$ and $A_{SK}/A_{NK} = 7,$ we get

$$[Y/N]_{SK}/[Y/N]_{NK} = [A_{SK} \times ([K/N]_{SK})^{1/3}]/[A_{NK} \times ([K/N]_{NK})^{1/3}]$$

$$[Y/N]_{SK}/[Y/N]_{NK} = 7 \times (27^{(1/3)})$$

$$[Y/N]_{SK}/[Y/N]_{NK} = 21.$$

Hence, Y/N is 21 times higher in South Korea than in North Korea.

14. *Conditional Convergence: What two factors in the Solow growth model prevent two countries from converging to an identical capital-to-labor ratio? Use a graph for each factor to support your answer.*

Answer: The savings rate (s) and the population growth rate (n).

If the savings rate in Country A, s_A, is higher than in Country B, s_B, then the steady-state K/N in Country A is higher than in Country B.

Savings per worker

$n \times K/N$

A

$s_A \times Y/N$

B

$s_B \times Y/N$

$s_A > s_B$

$(K/N)_B$ $(K/N)_A$ (K/N)
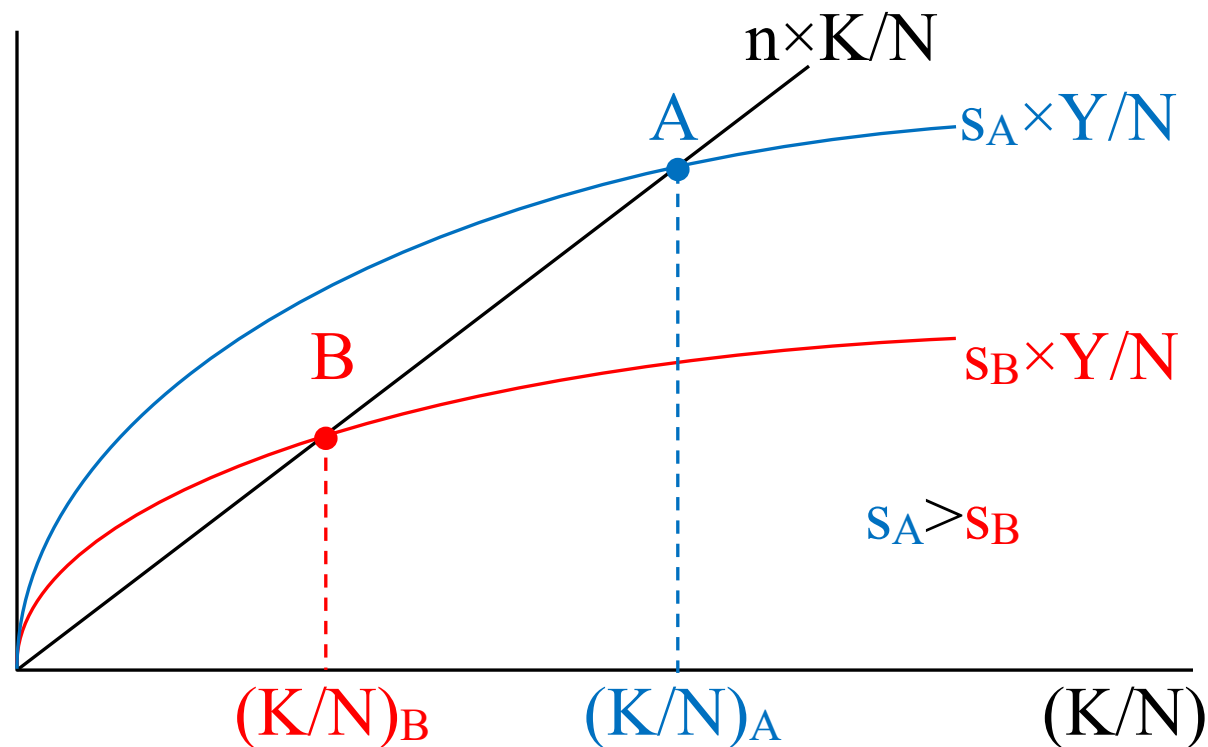
If the population growth rate in Country A, n_A, is lower than in Country B, n_B, then the steady-state K/N in Country A is higher than in Country B.

Savings per worker

$n_B \times K/N$

$n_A \times K/N$

A

$s \times Y/N$

B

$n_B > n_A$

$(K/N)_B$

$(K/N)_A$

(K/N)