

**EXAMINATION #3 VERSION C**  
**"Long-Run Economic Growth and Inflation"**  
**October 28, 2013**

INSTRUCTIONS: This exam is closed-book, closed-notes. Simple calculators are permitted, but graphing calculators or calculators with alphabetical keyboards are NOT permitted. Cell phones or other wireless devices are NOT permitted. Point values for each question are noted in brackets. Points will be subtracted for illegible writing or incorrect rounding. Maximum total points are 100.

**I. Multiple choice:** Circle the one best answer to each question. [2 pts each, 14 pts total]

(1) Unemployment caused by a mismatch of worker skills to jobs, or insufficient work incentives, is called

- a. structural unemployment.
- b. frictional unemployment
- c. cyclical unemployment.
- d. all of the above.

(2) The theory that unemployment is caused by the time it takes for job vacancies and unemployed workers to be matched is called

- a. "human capital."
- b. "search."
- c. "Phillips curve."
- d. "job rationing."

(3) Real GDP grows faster in the long run, the higher the fraction of total spending on

- a. government purchases.
- b. transfer payments.
- c. net exports.
- d. consumption.
- e. investment.

(4) If the interest rate rises in the U.S. but remains constant in other countries, then

- a. the exchange rate will remain constant.
- b. the U.S. dollar depreciate against other currencies.
- c. the U.S. dollar will appreciate against other currencies.
- d. cannot be determined from information given.

(5) Since 1700, long-run growth rates of real GDP per capita in the fastest-growing countries have

- a. remained about zero.
- b. started out positive but recently have turned negative.
- c. remained positive and constant from one century to the next.
- d. remained positive but decreased from one century to the next.
- e. increased from one century to the next.

(6) Hyperinflation is caused by excessive

- a. growth of the money supply.
- b. consumption spending.
- c. taxes.
- d. government borrowing.
- e. government spending.

(7) Phelps and Friedman argued that a higher rate of inflation will, in the long run, bring

- a. no change in the rate of unemployment.
- b. a higher rate of unemployment.
- c. a lower rate of unemployment.
- d. cannot be determined from information given.

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**II. Problems:** Insert your answer to each question in the box provided. Use graphs and margins for scratch work. Only the answers in the boxes will be graded. Work carefully: partial credit is not normally given for questions in this section.

(1) [Aggregate production function: 6 pts] According to the theory of the aggregate production function, *potential* GDP depends on which of the following? Answer *true* or *false*.

- a. The money supply.
- b. The number of workers and the average number of hours worked by each of them.
- c. The amount of physical or economic capital available.
- d. The level of stimulus spending by the federal government.
- e. The level of technology, or "know-how," in the economy.
- f. Consumer confidence.


(2) [Measuring the labor force: 5 pts] Indicate whether each person below would be counted by the U.S. Current Population Survey as *employed*, *unemployed*, or *out of the labor force*.

- a. Amanda wants to work and last looked for a job in July.
- b. Brian works 10 hours per week at a movie theatre.
- c. Cameron normally works at a Firestone factory, but is currently on temporary layoff. Cameron expects to be called back to work in January.
- d. Derek is not currently working, but checks online job advertisements every week. Derek last applied for a job two weeks ago.
- e. Elaine does unpaid volunteer work 40 hours per week for the Red Cross.


(3) [Measuring the labor force: 8 pts] ] The U.S. Bureau of Labor Statistics reported that in April 2009, 140.6 million people were employed, 154.5 million people were in the labor force, and 235.3 million people were in the working-age population.

- a. Compute the number of unemployed people to the nearest tenth of a million.
- b. Compute the unemployment rate to the nearest tenth of a percentage point.
- c. Compute the employment-to-population ratio to the nearest tenth of a percentage point.
- d. Compute the labor force participation rate to the nearest tenth of a percentage point.

	million
	%
	%
	%

(4) [Growth of capital stock: 2 pts] The following data (in chained 2005 dollars) were reported by the U.S. Bureau of Economic Analysis.

Exports in 2010	\$1.7 trillion
Private capital stock at end of 2009	\$31.5 trillion
Imports in 2010	\$2.1 trillion
Labor income (compensation of employees) in 2010	\$8.0 trillion
Corporate profits in 2010	\$1.7 trillion
Depreciation in 2010	\$1.5 trillion
Government purchases in 2010	\$2.6 trillion
Consumption in 2010	\$9.2 trillion
Gross private investment in 2010	\$1.6 trillion

Compute the private capital stock at the end of 2010. [Hint: Some data are extraneous and not needed for this problem.]

\$	trillion
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(5) [Interest rate: 4 pts] Compute the opportunity cost of consuming \$1000 today, in terms of forgone consumption 3 years from today. In other words, how much consumption 3 years from now is given up when \$1000 is consumed today? Compute your answer to the nearest whole dollar...

- a. ... assuming an interest rate of **4%**.
- b. ... assuming an interest rate of **12%**

\$
\$

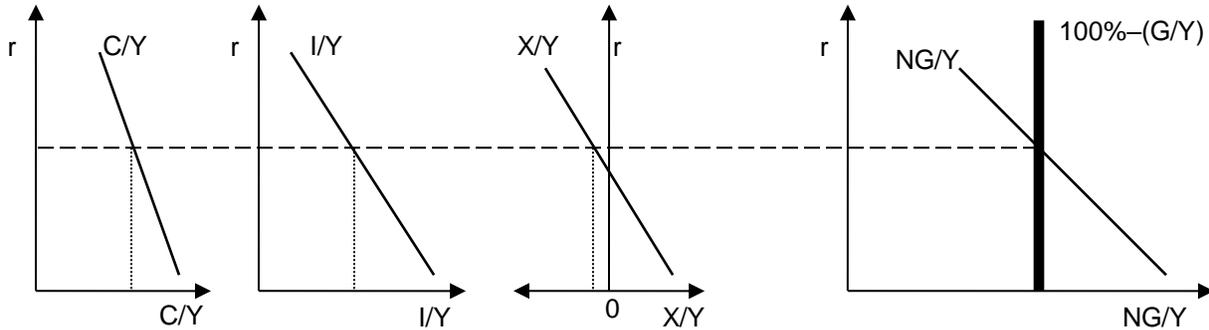
(6) [Interest rate and GDP shares: 10 pts] Suppose the following three equations relate the shares of consumption (C), investment (I), and net exports (X) in total GDP (Y) to the real interest rate (r) in the long run. In these equations, the GDP shares and the interest rate are expressed as percents.

$$(C/Y) = 72\% - 1r \quad (I/Y) = 25\% - 3r \quad (X/Y) = 5\% - 2r$$

Suppose further that the share of government purchases in GDP (G/Y) is fixed at **16%**. Compute the following. [Hint: Check your answer to be sure that the four GDP *spending* shares sum to 100%.]

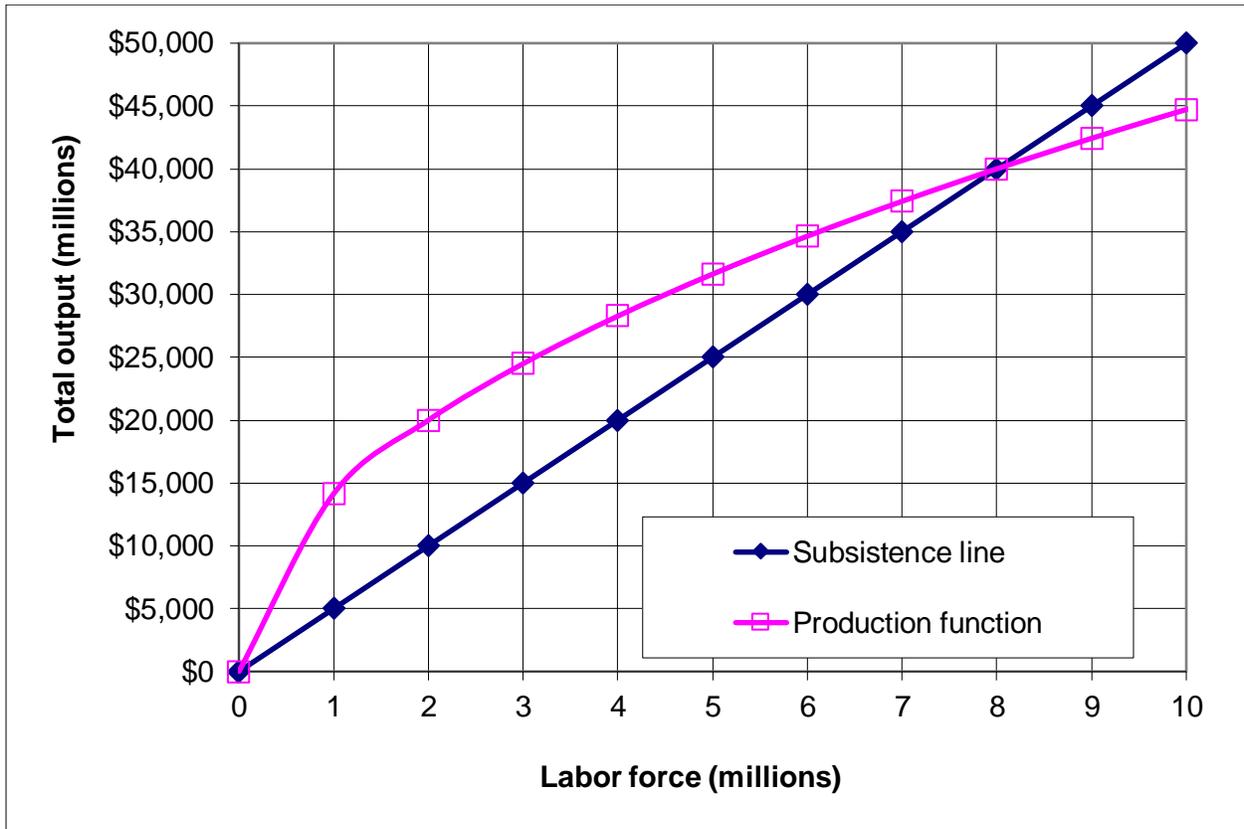
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|--|---|---|--|---|--|---|--|--|---|--|---|
| <ul style="list-style-type: none"> <li>a. Interest rate (r) <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="width: 50px; height: 20px;"></td><td style="text-align: center;">%</td></tr></table></li> <li>b. Consumption's share of GDP (C/Y): <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="width: 50px; height: 20px;"></td><td style="text-align: center;">%</td></tr></table></li> <li>c. Investment's share of GDP (I/Y): <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="width: 50px; height: 20px;"></td><td style="text-align: center;">%</td></tr></table></li> </ul> |   | % |  | % |  | % | <ul style="list-style-type: none"> <li>d. Net exports' share of GDP (X/Y): <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="width: 50px; height: 20px;"></td><td style="text-align: center;">%</td></tr></table></li> <li>e. Savings as a share of GDP (S/Y): <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="width: 50px; height: 20px;"></td><td style="text-align: center;">%</td></tr></table></li> </ul> |  | % |  | % |
|  | % |   |  |   |  |   |  |  |   |  |   |
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(7) [Interest rate and GDP shares: 16 pts] Suppose there is an increase in the share of government purchases in GDP (G/Y). Use the GDP shares model in the graphs below to answer the following questions.



- a. Does the consumption share (C/Y) curve shift *left*, *shift right*, or remain *unchanged*?
- b. Does the investment share (I/Y) curve shift *left*, *shift right*, or remain *unchanged*?
- c. Does the net exports share (X/Y) curve shift *left*, *shift right*, or remain *unchanged*?
- d. Does the downward-sloping nongovernment share (NG/Y) curve shift *left*, *shift right*, or remain *unchanged*?
- e. Does the vertical nongovernmental share line (labeled “100%-(G/Y)”) shift *left*, *shift right*, or remain *unchanged*?
- f. Does the real interest rate (r) *increase*, *decrease*, or remain *unchanged*?
- g. Does the long-run growth rate of potential GDP *increase*, *decrease*, or remain *constant*?
- h. Justify your answer to part (g).


(8) [Malthusian limits to growth: 8 pts] The diagram below shows a Malthusian model of economic growth.



- According to this model, how much output is required to sustain each worker? In other words, what is the subsistence level of output per worker?
- If the labor force were 6 million, would there be *more than enough* food for everyone, *just enough* food, or *not enough* food?
- If the labor force were 6 million, would the population tend to *increase*, *decrease*, or *remain constant*?
- If the labor force were 10 million, would there be *more than enough* food for everyone, *just enough* food, or *not enough* food?
- If the labor force were 10 million, would the population tend to *increase*, *decrease*, or *remain constant*?
- What is the equilibrium size of the labor force according to this model?
- What is the equilibrium level of annual wages (output per worker) according to this model?
- Suppose the production function shifts up permanently as new land is brought under cultivation. What will be the eventual new equilibrium level of annual wages (output per worker) according to this model?

\$
million
\$
\$

(9) [Technical change: 4 pts] In Netherlands over the period 1965 to 1990, the annual growth rate of capital per worker was 3.3% and the annual growth rate of output per worker in was 1.7%. Assume that the share of capital income plus depreciation in national income was about  $(\frac{1}{3})$ , as it is in the United States.

- Compute the contribution of capital to productivity growth, to the nearest tenth of a percentage point.
- Compute the contribution of technology to productivity growth, also called the Solow residual, to the nearest tenth of a percentage point.

	%
	%

(10) [Functions of money: 4 pts] For each sentence below, indicate whether money is functioning as a *medium of exchange*, a *store of value*, or a *unit of account*.

- a. You should take money out of the ATM to buy textbooks at the Bookstore.
- b. I brought money to pay off my Drake account.
- c. The merchandise in that store was worth hundreds of thousands of dollars.
- d. I still have money in my bank account from my job last summer.


(11) [Measuring the money supply: 10 pts] In January 2011, the U.S. government reported the following data. [Hint: Some of the data are extraneous and not needed for this problem.]

Federal debt held by the public	\$9.5 trillion
Consumer credit outstanding	\$2.4 trillion
Index of industrial production	92.8
Currency	\$0.9 trillion
Credit card balances	\$0.8 trillion
Bank reserves	\$1.1 trillion
Travelers checks, demand deposits, and other checkable deposits	\$0.9 trillion
GDP	\$15.2 trillion
Commercial paper outstanding	\$1.0 trillion
Savings deposits, small time deposits, money-market mutual funds, and other deposits on which check writing is limited or not allowed	\$7.0 trillion

- a. Compute the money supply measure "M1."
- b. Compute the money supply measure "M2."
- c. Compute the velocity of "M1" to the nearest tenth.
- d. Compute the monetary base.
- e. Compute the money multiplier for "M1" to the nearest tenth.

\$	trillion
\$	trillion
\$	trillion

(12) [Money multiplier: 4 pts] Suppose the required reserve ratio were 0.05 and assume banks hold no excess reserves. Also suppose that everyone held \$0.20 in currency for every \$1.00 in deposits (that is, the ratio of currency to deposits were 0.20)

- a. Compute the money multiplier.
- b. If the Federal Reserve increased bank reserves by \$50 billion, by how much would the money supply increase?

\$	billion

(13) [Quantity equation: 2 pts] Growth rates for various items over the period 2000 to 2010 are reported below. [Hint: Some of the data are extraneous and not needed for this problem.]

Real GDP	1.5 %
Exports	3.4 %
Labor force	0.8 %
Money supply (M2)	6.0 %

Assuming the velocity of money were constant, what should have been the average annual rate of inflation over this period, according to the quantity equation? Give an answer to the nearest tenth of a percentage point.

	%
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**III. Critical thinking:** Write a one-paragraph essay answering ONE question below (your choice). [3 pts]

- (1) Can the government influence the labor force participation rate? If so, how? If not, why not?
- (2) Can the government influence the fraction of GDP devoted to consumption ( $C/Y$ )? If so, how? If not, why not?

Please circle the question you are answering and write your answer below. Full credit requires correct economic reasoning, legible writing, good grammar including complete sentences, and accurate spelling.

[end of exam]