Macroeconomics 11th edition Abel Solutions Manual

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Chapter 1
Introduction to Macroeconomics

■ Learning Objectives

I. Goals of Part I

A. Introduce students to the main concepts in macroeconomics (Ch. 1)

B. Introduce national income accounting and major economic magnitudes (Ch. 2)

II. Section Goals

A. Summarize the primary issues addressed in macroeconomics (Sec. 1.1)

B. Describe the activities and objectives of macroeconomists (Sec. 1.2)

C. Differentiate between the classical and Keynesian approaches to macroeconomics (Sec. 1.3)

III. Notes to ~~N~~Tei~~n~~th Edition Users: This chapter is little changed; the data were updated.

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Teaching Notes

I. What Macroeconomics Is About (Sec. 1.1)

Macroeconomics: the study of structure and performance of national economies and government policies that affect economic performance. Macroeconomists study:

A. Long-run economic growth

1. Growth of output in United States over time
   a. Text Fig. 1.1: Output of United States since 1869
   b. Note decline in output during recessions; increase in output during some wars
2. Sources of growth—population, average labor productivity growth

This may be a good place to introduce students to the calculation of a growth rate, which is used throughout the textbook. You can write it first in general terms, as

$$\%\Delta X = [(X_{t+1} - X_t)/X_t] \times 100\% = [(X_{t+1}/X_t) - 1] \times 100\%.$$

Then you might use an example with something you're talking about, such as real GDP growth over the past year, or the inflation rate.

Throughout the text, students may come across mathematical calculations that are unfamiliar to them. The appendix to the textbook contains some helpful basic guidance to mathematical topics, including discussions of functions and graphs, slopes of functions, elasticities, functions of several variables, shifts of a curve, exponents, and growth-rate formulas.

3. Average labor productivity
   a. Average labor productivity: output produced per employed worker
   b. Text Fig. 1.2: Average labor productivity of United States since 1900
   c. Average labor productivity growth:
      (1) 2.6% per year from 1949 to 1973
      (2) 1.1% per year from 1973 to 1995
      (3) 1.9% per year from 1995 to 2007
      (4) 1.3~~0.9~~% per year from 2007 to 2021~~17~~

Working with Macroeconomic Data Problem 1 gives students practice in calculating average labor productivity and dealing with growth rates.

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B. Business cycles

1. Business cycle: short-run contractions and expansions in economic activity
2. Downward phase is called recession

C. Unemployment

1. Unemployment: the number of people who are available for work and actively seeking work but cannot find jobs
2. U.S. experience shown in text Fig. 1.3, showing unemployment rate (unemployment as a percent of labor force)
3. Recessions cause unemployment rate to rise

Analytical Problem 1 asks students to think about average labor productivity and unemployment and their relationship to output. Working with Macroeconomic Data Problem 2 has students examine data on the unemployment rate and to see how it behaves in recessions.

D. Inflation

Analytical Problem 2 asks students to think about the welfare consequences of having a higher price level.

1. U.S. experience shown in text Fig. 1.4
2. Deflation: when prices of most goods and services decline
3. Inflation rate: the percentage increase in the level of prices
4. Hyperinflation: an extremely high rate of inflation

You may wish to discuss how to calculate the inflation rate, which is just the growth rate of the price level. It can be expressed as $\pi = [(P_{t+1}/P_t) - 1] \times 100\%$. Numerical Problem 1 gives students practice calculating growth rates, including the growth rate of average labor productivity and the inflation rate. Working with Macroeconomic Data Problem 3 requires students to examine and analyze historical movements in inflation.

E. The international economy

1. Open vs. closed economies
   a. Open economy: an economy that has extensive trading and financial relationships with other national economies
   b. Closed economy: an economy that does not interact economically with the rest of the world

Working with Macroeconomic Data Problem 4 requires students to compare GDP growth rates across countries.

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2. Trade imbalances
   a. U.S. experience shown in text Fig. 1.5
   b. Trade surplus: exports exceed imports
   c. Trade deficit: imports exceed exports

F. Macroeconomic policy
   1. Fiscal policy: government spending and taxation
      a. Effects of changes in federal budget
      b. U.S. experience in text Fig. 1.6
      c. Relation to trade deficit?

Numerical Problem 2 serves two purposes: (1) to get students to look at some real data on the economy and (2) to give them some idea about how large the trade deficit and government budget deficit are. Working with Macroeconomic Data Problem 5 has students look at the ratio of federal government debt to GDP and to think about what causes it to rise.

   2. Monetary policy: growth of money supply; determined by central bank; the Fed in United States

G. Aggregation
   1. Aggregation: summing individual economic variables to obtain economywide totals
   2. Distinguishes microeconomics (disaggregated) from macroeconomics (aggregated)

II. What Macroeconomists Do (Sec. 1.2)

A. Macroeconomic forecasting
   1. Relatively few economists make forecasts

Data Application

There are many firms that provide forecasts for some macroeconomic variables, but only a few firms have complete, large-scale macroeconomic models that include details on every sector of the economy. The main forecasting firms in the United States are Macroeconomic Advisers and IHS Global Insight. These firms produce new forecasts every month and analyze the current economic situation.

You do not have to subscribe to one of these services to keep up-to-date on forecasts. There are several surveys of forecasters available to the general public, including the Blue Chip survey, the NABE (National Association of Business Economists) survey, a survey run by the *Wall Street Journal*, the Livingston survey, and the Survey of Professional Forecasters. (The latter two are free of charge and run by the Federal Reserve Bank of Philadelphia.) However, these surveys will not give you the level of detail that the large forecasting firms provide.

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2. Forecasting is very difficult

Data Application

Alan Meltzer gives a graphic example of how difficult it is to forecast the macroeconomy in his article, "Limits of Short-Run Stabilization Policy," *Economic Inquiry*, January 1987, pp. 1–14. He shows that the forecast errors for real output made at the beginning of the quarter are very large, making it almost impossible to use the forecasts to make policy. However, he looked only at the volatile time period from mid-1980 to early 1985. More recent current-quarter forecasts seem to be better.

B. Macroeconomic analysis

1. Private and public sector economists—analyze current conditions

Data Application

Wall Street hires a large number of economists, most of whom are engaged in data analysis on a daily basis. Their job is to tell traders what newly released economic data mean for financial markets in general, as well as for the prices of individual assets. Many Wall Street economists also make their own detailed forecasts of the economy.

2. Public sector employs many macroeconomic analysts who provide policy advice

C. Macroeconomic research

1. Goal: to make general statements about how the economy works
2. Theoretical and empirical research are necessary for forecasting and economic analysis
3. Economic theory: a set of ideas about the economy, organized in a logical framework
4. Economic model: a simplified description of some aspect of the economy

This is a good point for you to talk about your own research interests. Students are very interested in learning about the kinds of research their professors do. You may want to talk about your research later, when you come to a section of the textbook that discusses the topic on which you do your research.

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5. Usefulness of economic theory or models depends on reasonableness of assumptions, possibility of being applied to real problems, empirically testable implications, and theoretical results consistent with real-world data
6. In Touch with Data and Research: Developing and Testing an Economic Theory
   a. Step 1: State the research question
   b. Step 2: Make provisional assumptions
   c. Step 3: Work out the implications of the theory
   d. Step 4: Conduct an empirical analysis to compare the implications of the theory with the data
   e. Step 5: Evaluate the results of your comparisons

Theoretical Application

The classic discussion of research issues by Milton Friedman is, "The Methodology of Positive Economics," *Essays in Positive Economics*, Chicago: University of Chicago Press, 1953.

Analytical Problem 3 is an exercise in how to formulate and test a theory.

D. Data development—very important for making data more useful

Data Application

As head of the Council of Economic Advisers in the Bush presidency, Michael Boskin led an effort to get more accurate and timely statistics in the United States. See "Improving the Quality of Economic Statistics" in the *Economic Report of the President*, 1990.

A good example of data development came in early 1994, when the Commerce Department revised its questionnaire for the Current Population Survey. This survey determines the unemployment rate. Prior to 1994 the survey did not do a good job of distinguishing between people who were unemployed and looking for a job but spending most of their week doing work at home, and those who were out of the labor force and not even looking for a job. As a result of the change in the survey, there is a one-time jump in the unemployment rate in January 1994, not because of any change in the macroeconomy, but just because the more accurate questionnaire found that more people were unemployed than in the previous survey.

In 1996 the national income accounts underwent a major revision, changing how its price indexes are calculated (moving to a chain-weighted index) and changing how government purchases are measured (accounting more accurately for government capital formation).

Also in 1996, a major controversy arose over the calculation of the consumer price index (CPI). Economists argued that the CPI was biased upward significantly, so that inflation as

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measured by the CPI was about one percentage point greater than the true increase in the cost of living. This topic is also discussed in Chapter 2.

Data must change to keep up with technology. In October 1999, the national income accounts were revised in a significant way by treating computer software as an investment. This change raised the measured growth rate of the economy in the late 1990s. In 2013, the government began to explicitly recognize intangible investment, again leading to higher measured levels of GDP than before.

Policy Application

In a speech discussing what economists have learned from the financial crisis in 2008, Fed Chairman Ben Bernanke suggested that the financial crisis was the result of a failure of economic engineering or economic management, rather than economic science ("On the Implications of the Financial Crisis for Economics," at Princeton University, September 24, 2010). Economic science encompasses academic research and the development of theory and empirical estimation. Economic engineering is the development of frameworks that apply economic theory, such as banks' risk-management systems and the methods used by bank regulators, which clearly failed, leading to the crisis. Economic management is the operation of economic frameworks in practice, which also failed in the case of banks and investment firms, who failed to understand the risks they were taking, and of bank supervisors, who also failed to understand the risks that banks were taking. The crisis was thus less a problem with economic theory, but with how it was put into practice.

III. Why Macroeconomists Disagree (Sec. 1.3)

A. Positive vs. normative analysis

1. Positive analysis: examines the economic consequences of a policy
2. Normative analysis: determines whether a policy should be used

Analytical Problem 4 gives students practice in distinguishing positive from normative analysis.

B. Classicals vs. Keynesians

1. The classical approach
   a. The economy works well on its own
   b. The "invisible hand": the idea that if there are free markets and individuals conduct their economic affairs in their own best interests, the overall economy will work well
   c. Wages and prices adjust rapidly to get to equilibrium
      (1) Equilibrium: a situation in which the quantities demanded and supplied are equal
      (2) Changes in wages and prices are signals that coordinate people's actions
   d. Result: Government should have only a limited role in the economy

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Theoretical Application

At this point in the discussion, you may want to talk about philosophies of economics. Students are often fascinated by how philosophical differences arise and what they mean, especially for policy. This helps to reinforce the idea that the Keynesian and classical models are very different in their implications. You might suggest the idea that economists who are skeptical of the government's role in the economy are more likely to believe in a classical model, while those who believe the government can do good are more likely to become Keynesians. You can point out, however, that things are changing; some New Keynesians seem skeptical of government intervention.

2. The Keynesian approach
   a. The Great Depression: Classical theory failed because high unemployment was persistent
   b. Keynes: Persistent unemployment occurs because wages and prices adjust slowly, so markets remain out of equilibrium for long periods
   c. Conclusion: Government should intervene to restore full employment

Analytical Problem 5 asks students to distinguish between how a classical economist and a Keynesian economist would think about the same issue.

3. The evolution of the classical–Keynesian debate
   a. Keynesians dominated from World War II to 1970
   b. Stagflation led to a classical comeback in the 1970s
   c. Last 30 years: excellent research with both approaches

Theoretical Application

You may wish to add a discussion of the recent progression of research. You could start by a brief overview of how the failure of Keynesian models in the stagflation of the 1970s led to the growth of rational-expectations modeling, with its focus on the importance of microfoundations. Then you could discuss New Keynesian macroeconomics (discussed in greater detail in Chapter 11) and its attempts to provide some microfoundations for wage and price stickiness in Keynesian models.

Although the textbook presents just a few versions of classical models and Keynesian models, it is difficult to find a prototypical classical or Keynesian economist who believes fully in that particular model. The lack of convincing evidence on which model is correct has led macroeconomists to be eclectic, so they often hedge their bets. As a result, a one-armed macroeconomist is hard to find; analysis tends to be of the "on the one hand, on the other hand" variety. And of course that means that if you laid all the macroeconomists on the earth end to end, they still wouldn't reach a conclusion!

C. A unified approach to macroeconomics

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1. Textbook uses a single model to present both classical and Keynesian ideas
2. Three markets: goods, assets, labor
3. Model starts with microfoundations: individual behavior
4. Long run: wages and prices are perfectly flexible
5. Short run: Classical case—flexible wages and prices; Keynesian case—wages and prices are slow to adjust

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■ Additional Issues for Classroom Discussion

1. What Are Society's Major Economic Problems Today?

In the first class session, it may be interesting to discuss students' perceptions of the major economic problems facing the economy today. Public-opinion polls show that Americans' views on the importance of different issues vary sharply over the business cycle. In recessions, people perceive unemployment and economic growth as the main problems. When inflation is high, reducing it is a high priority.

You may wish to ask your students to rank the importance to them of the following economic issues:

(1) unemployment; (2) inflation; (3) economic growth; (4) stagnant incomes; (5) the trade deficit; (6) Social Security; (7) the government budget; and (8) income inequality. Some discussion of all these topics is covered later in the text.

2. Let's Forecast!

Here's an exercise that will surprise both you and your students. On the first day of class, before they even know much about the macroeconomic variables that will be studied in the course, ask them to forecast such things as inflation, unemployment, the growth rate of output, and interest rates. You can give them a handout of the current values of key variables. (By the way, it is easy to get the data online; the easiest way is to use the Federal Reserve Bank of St. Louis FRED database at *fred.stlouisfed.org*.)

Some of your students will have outrageously high forecasts for some variables, but others will be really low. If you calculate the median forecast, you and your students may be amazed at how close it is to the median forecast of the Survey of Professional Forecasters or one of the other macroeconomic surveys. And at the end of the semester, you may be surprised at how accurate your students' forecasts were.

3. Formulating a Model

Here is an exercise in formulating an economic model that will help students learn how to think about economic issues and how to model them. The idea is for you (or them) to pick a current topic like CPI bias, the basis of the business cycle, the effect of government deficits, the effect of trade deficits, or something else. It is useful to do this now, before they have learned much about the topic. Follow the steps outlined in the textbook for developing and testing an economic theory. This exercise will help them get an idea of how research is actually done, starting from a point when you do not know much about the answer to a question. It is especially important to emphasize how you could conduct an empirical analysis to test the theory. You can also spend some time talking about what key assumptions you need to make to simplify the theory.

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■ Answers to Textbook Problems

Review Questions

1. Both total output and output per worker have risen strongly over time in the United States. Output itself has grown by a factor of 150 in the last 148 years. Output per worker is more than 7 times what it was in 1900. These changes have led to a much higher standard of living today.

2. The business cycle refers to the short-run movements (expansions and recessions) of economic activity. The unemployment rate rises in recessions and declines in expansions. The unemployment rate never reaches zero, even at the peak of an expansion.

3. A period of inflation is one in which prices (on average) are rising over time. Deflation occurs when prices are falling on average over time. Before World War II, prices tended to rise during war periods and fall after the wars ended; over the long run, the price level remained fairly constant. Since World War II, however, prices have risen fairly steadily.

4. The budget deficit is the annual excess of government spending over tax collections. The U.S. federal government has been most likely to run deficits during wars or recessions. From the early 1980s to the mid-1990s, deficits were very large, even without a major war. The U.S. government ran surpluses for several years, from 1998 to 2001. But the deficit became enormous from 2008 to 2010 because of the depth of the recession caused by the financial crisis.

5. The trade deficit is the amount by which imports exceed exports; the trade surplus is the amount by which exports exceed imports, so it is the negative of the trade deficit. In recent years, the United States has had huge trade deficits. But from 1900 to 1970, the United States mostly had trade surpluses.

6. Macroeconomists engage in forecasting, macroeconomic analysis, macroeconomic research, and data development. Macroeconomic research can be useful in investigating forecasting models to improve forecasts, in providing more information on how the economy works to help macroeconomic analysts, and in telling data developers what types of data should be collected. Research provides the basis (results and ideas) for forecasting, analysis, and data development.

7. These are the steps in developing and testing an economic model or theory: (1) state the research question; (2) make provisional assumptions that describe the economic setting and the behavior of the economic actors; (3) work out the implications of the theory; (4) conduct an empirical analysis to compare the implications of the theory with the data; and (5) evaluate the results of your comparisons. The criteria for a useful theory or model are that (1) it has reasonable and realistic assumptions; (2) it is understandable and manageable enough for studying real problems; (3) its implications can be tested empirically using real-world data; and (4) its implications are consistent with the data.

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8. Yes, it is possible for economists to agree about the effects of a policy (that is, to agree on the positive analysis of the policy), but to disagree about the policy's desirability (normative analysis). For example, suppose economists agreed that reducing inflation to zero within the next year would cause a recession (positive analysis). Some economists might argue that inflation should be reduced, because they prefer low inflation even at the cost of higher unemployment. Others would argue that inflation is not as harmful to people as unemployment is, and would oppose such a policy. This is normative analysis, as it involves a value judgment about what policy should be.

9. Classicals see wage and price adjustment occurring rapidly, while Keynesians think that wages and prices adjust only slowly when the economy is out of equilibrium. The classical theory implies that unemployment will not persist because wages and prices adjust to bring the economy rapidly back to equilibrium. But if Keynesian theory is correct, then the slow response of wages and prices means that unemployment may persist for long periods of time unless the government intervenes.

10. Stagflation was a combination of stagnation (high unemployment) and inflation in the 1970s. It changed economists' views because the Keynesian approach could not explain stagflation satisfactorily.

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Numerical Problems

1. (a) Average labor productivity is output divided by employment:

   201917: In millions: 12,000 tons of potatoes$527,000 divided by 23.11000 workers = $22,81412 tons of potatoes per worker

   202018: $500,00014,300 tons of potatoes divided by 22.41100 workers = $22,32113 tons of potatoes per worker

   (b) The growth rate of average labor productivity is [(22,32113/22,81412) − 1] × 100% = -2.168.33%.

   (c) The unemployment rate is:

   201917: (1.4100 unemployed/24.51100 workers) × 100% = 5.79.1%

   202018: (2.250 unemployed/24.61150 workers) × 100% = 8.94.3%

   (d) The inflation rate is [(108.332.5/106.732) − 1] × 100% = 1.525%.

2. The answers to this problem will vary depending on the current date. The answers here are based on the data as of August 2022July 2018. Numbers are at annual rates in billions of dollars. There does not appear to be a trend in the data; all the ratios are fairly stableBoth the trade imbalance and the deficit worsened in the pandemic.

	2019	2020	2021
GDP	21372.58	20893.75	22996.09
Exports	2519.727	2123.41	2478.291
Imports	3115.99	2774.597	3396.462
Receipts	3713.668	3684.479	4237.62
Expenditures	4761.137	6794.469	7021.437
a.			
Exports/GDP	11.8%	10.2%	10.8%
Imports/GDP	14.6%	13.3%	14.8%
Trade Imbalance/GDP	-2.8%	-3.1%	-4.0%

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b.			
Receipts/GDP	17.4%	17.6%	18.4%
Expenditures/GDP	22.3%	32.5%	30.5%
Deficit/GDP	-4.9%	-14.9%	-12.1%

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	2015	2016	2017
GDP	18120.71	18624.48	19390.61
Exports	2264.916	2214.566	2343.988
Imports	2788.958	2735.805	2915.551
Receipts	3441.392	3452.073	3588.048
Expenditures	4028.044	4149.351	4252.472
a.			
Exports/GDP	12.5%	11.9%	12.1%
Imports/GDP	15.4%	14.7%	15.0%
Trade Imbalance/GDP	-2.9%	-2.8%	-2.9%
b.			
Receipts/GDP	19.0%	18.5%	18.5%
Expenditures/GDP	22.2%	22.3%	21.9%
Deficit/GDP	-3.2%	-3.7%	-3.4%

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Analytical Problems

1. Yes, average labor productivity can fall even when total output is rising. Average labor productivity is total output divided by employment. So average labor productivity can fall if output and employment are both rising but employment is rising faster.

   Yes, the unemployment rate can also rise even though total output is rising. This can occur in a number of different ways. For example, average labor productivity might be rising with employment constant, so that output is rising; but the labor force may be increasing as well, so that the unemployment rate is rising. Or average labor productivity might be constant, and both employment and unemployment could rise at the same time because of an increase in the labor force, with the number of unemployed rising by a greater percentage.

2. Just because prices were lower in 1890 than they are in 2022~~18~~ does not mean that people were better off back then. People's incomes have risen much faster than prices have risen over the last 100 years, so they are better off today in terms of real income.

3. There are many possible theories. One possibility is that people whose last names begin with the letters *A* through *M* vote Democratic, while those whose names begin with the letters *N* through *Z* vote Republican. You could test this theory by taking exit polls or checking the lists of registered voters by party. However, this theory fails the criterion of being reasonable, since there is no good reason to expect the first letters of people's last names to matter for their political preferences.

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A better theory might be one based on income. For example, you might make the assumption that the Republican Party promotes business interests, while the Democratic Party is more interested in redistributing income. Then you might expect people with higher incomes to vote Republican and people with lower incomes to vote Democratic. Taking a survey of people as they left the polls could test this. In this case the assumptions of the theory seem reasonable and realistic, and the model is simple enough to understand and to apply. So it is potentially a useful model.

4. (a) Positive. This statement tells what *will* happen, not what *should* happen.
   (b) Positive. Even though it is about income-distribution issues, it is a statement of fact, not opinion. If the statement said "The payroll tax should be reduced because it . . . ," then it would be a normative statement.
   (c) Normative. Saying taxes are too high suggests that they *should* be lower.
   (d) Positive. Says what *will happen* as a consequence of an action, not what *should be done*.
   (e) Normative. This is a statement of preference about policies.

5. A classical economist might argue that the economy would work more efficiently without the government trying to influence trade. The imposition of tariffs increases trade barriers, interfering with the invisible hand. The tariffs simply protect an industry that is failing to operate efficiently and is not competitive internationally.

   A Keynesian economist might be more sympathetic to concerns about the steel industry. Keynesians might argue that there may need to be a long-run adjustment in the steel industry, but would want to prevent workers in the steel industry from becoming unemployed in the short run.

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Working with Macroeconomic Data

1. The data as they existed in July 2018 were as follows:

Year	GDPC1	PAYEMS
1949	2,103004.7	43,522~~17~~
1959	3,2055.8~~1~~	54,1745
1969	4,9471~~5~~.1~~5~~	71,240
1979	6,820~~503~~.6~~9~~	90,6723
1989	98,263~~850~~.0~~2~~	108,8364~~9~~
1999	12,888~~323~~.3	130,7728~~9~~
2009	15~~4~~,379~~541~~.2~~9~~	129,788~~1~~
2019	19,202.3	151,789

Based on these data, average labor productivity at the end of each decade is as follows:

Year	Average Labor Productivity
1949	48.36~~.1~~
1959	59.26~~.4~~
1969	69.46~~.2~~
1979	75.2~~1~~.7
1989	85.1~~1~~.3
1999	98.64~~.2~~
2009	118.52~~.0~~
2019	126.5

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The growth rate of average labor productivity in each decade is as follows:

Year	Average Labor Productivity Growth Rate
1950s	2.0%
1960s	1.6%
1970s	0.8%
1980s	1.23%
1990s	1.5%
2000s	1.97%
2010s	0.7%

a. Using these data, labor productivity grew the most quickly in the 1950s and most slowly in the 201197 0s.

b. Annual growth rates are:

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Year	Labor Productivity Growth Rate
2021~~0~~	4.1~~1.~~9%
2021~~1~~	0.8~~1~~%
~~2012~~	~~-0.3%~~
~~2013~~	~~2.5%~~
~~2014~~	~~2.5%~~
~~2015~~	~~1.9%~~
~~2016~~	~~1.7%~~
~~2017~~	~~2.3%~~

The average annual growth rate from 2021~~0~~-2021~~7~~ is 2.4~~1.6~~%, which is ~~just a bit~~significantly above the average of all the decades from the 1950s to the 201~~0~~0s.

2. The rise in the unemployment rate was greatest during the 2020~~07–2009~~ recession compared with earlier recessions. The unemployment rate took longer to decline in the recoveries in the 2000s and 2010s compared with earlier recessions.

3. The inflation rate was highest in the 1970s. The inflation rate was the most stable in the 1990s.

4. Based on the data as of August 2022~~July 2018~~, the U.S.Mexico grew the fastest from 2017~~3~~-2021~~8~~ and Japan grew the slowest.

Year	US	Japan	Mexico
2017~~2013~~	2.3~~1.7~~	1.7~~2.0~~	2.1~~1.4~~
2018~~2014~~	2.9~~2.6~~	0.6~~0.4~~	2.2~~2.8~~
2019~~2015~~	2.3~~2.9~~	-0.2~~1.4~~	-0.2~~3.3~~

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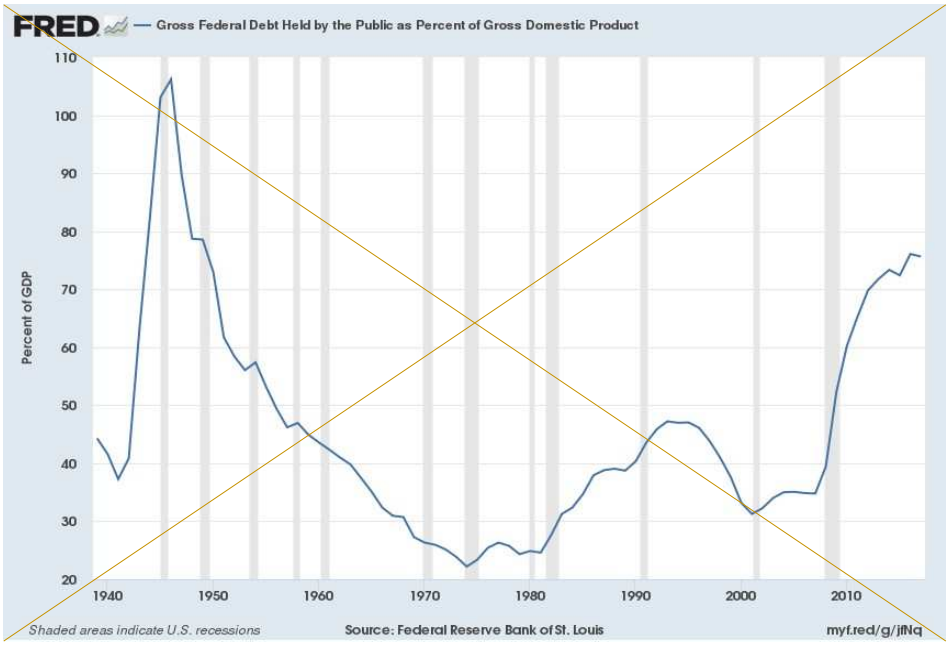
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20202016	-3.41.5	-4.51.0	-8.12.9
20212017	5.72.3	1.71.7	4.82.0
avgavg	2.02.2	-0.21.3	0.22.5

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5. Here is a plot of the data as of August~~July~~ 2022~~18~~:





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Prolonged declines in the debt/GDP ratio occurred from the mid-1940s to the early 1970s, and in the late 1990s. The ratio rose most rapidly in the early 1940s, ~~and~~ in the period during and following the Great Recession from 2008 to 2013, and in the pandemic recession of 2020. The rise in the 1940s was caused by government military spending to fight World War II. The rise in the Great Recession was caused by a sharp decline in tax revenues as incomes declined, combined with a rise of government expenditures, as the government tried to stimulate the economy. The rise in the pandemic recession of 2020 occurred as the government replaced people's incomes when the economy shut down because of the pandemic.

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