





**PROFESSIONAL DEVELOPMENT**

# **AP<sup>®</sup> Macroeconomics**

**Time Value of Money, Price Indices,  
and Unemployment**

**CURRICULUM MODULE**

**The College Board  
New York, NY**

## About the College Board

The College Board is a mission-driven not-for-profit organization that connects students to college success and opportunity. Founded in 1900, the College Board was created to expand access to higher education. Today, the membership association is made up of over 6,000 of the world's leading educational institutions and is dedicated to promoting excellence and equity in education.

Each year, the College Board helps more than 7 million students prepare for a successful transition to college through programs and services in college readiness and college success—including the SAT<sup>®</sup> and the Advanced Placement Program<sup>®</sup>. The organization also serves the education community through research and advocacy on behalf of students, educators, and schools.

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## **Equity and Access Policy Statement**

The College Board strongly encourages educators to make equitable access a guiding principle for their AP programs by giving all willing and academically prepared students the opportunity to participate in AP. We encourage the elimination of barriers that restrict access to AP for students from ethnic, racial and socioeconomic groups that have been traditionally underserved. Schools should make every effort to ensure their AP classes reflect the diversity of their student population. The College Board also believes that all students should have access to academically challenging course work before they enroll in AP classes, which can prepare them for AP success. It is only through a commitment to equitable preparation and access that true equity and excellence can be achieved.



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# Preface

AP<sup>®</sup> curriculum modules are exemplary instructional units composed of one or more lessons, all of which are focused on a particular curricular topic; each lesson is composed of one or more instructional activities. Topics for curriculum modules are identified because they address one or both of the following needs:

- a weaker area of student performance as evidenced by AP Exam subscores
- curricular topics that present specific instructional or learning challenges

The components in a curriculum module should embody and describe or illustrate the plan/teach/assess/reflect/adjust paradigm:

1. *Plan* the lesson based on educational standards or objectives and considering typical student misconceptions about the topic or deficits in prior knowledge.
2. *Teach* the lesson, which requires active teacher and student engagement in the instructional activities.
3. *Assess* the lesson, using a method of formative assessment.
4. *Reflect* on the effect of the lesson on the desired student knowledge, skills, or abilities.
5. *Adjust* the lesson as necessary to better address the desired student knowledge, skills, or abilities.

Curriculum modules will provide AP teachers with the following tools to effectively engage students in the selected topic:

- enrichment of content knowledge regarding the topic;
- pedagogical content knowledge that corresponds to the topic;
- identification of prerequisite knowledge or skills for the topic;
- explicit connections to AP learning objectives (found in the AP curriculum framework or the course description);
- cohesive example lessons, including instructional activities, student worksheets or handouts, and/or formative assessments;
- guidance to address student misconceptions about the topic; and
- examples of student work and reflections on their performance.

The lessons in each module are intended to serve as instructional models, providing a framework that AP teachers can then apply to their own instructional planning.

## Note on Web resources

All links to online resources were verified before publication. In cases where links are no longer working, we suggest that you try to find the resource by doing a key-word Web search.

— The College Board





# Introduction

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Working with numbers and quantifying macroeconomic concepts are sometimes scary for students. Time value of money, price indices, and unemployment rates are three important concepts that students must understand conceptually, be able to calculate, and use numbers to analyze. The goal of this curriculum module is to demystify these concepts for students. The module focuses on the basic calculations of price indices, unemployment rates, and the relationship between bond prices and interest rates for time value of money.

The Chief Reader's comments from the 2011 AP Macroeconomics Exam noted that less than 25 percent of students correctly answered the portion of a free-response question that asked about types of unemployment and the natural rate of unemployment. Additionally, the Chief Reader's comments about the 2010 exam acknowledged that less than one-third of students knew the inverse relationship between bond prices and interest rates.

You can weave these fundamental concepts together to create a cohesive curriculum unit or use the lessons in this curriculum module separately. An understanding of these concepts enhances a student's ability to use the aggregate supply-and-demand model and the short- and long-run Phillips curves for analysis. Each of these models tells a story about price levels, employment, and unemployment. The goal is for students to better understand the impact on the economy caused by changes in these economic variables.

In Lesson 1: Time Value of Money—Interest Rates and Prices, Nora Traum focuses on the relationship between bond prices and interest rates. This is the most important application of time value of money in an introductory macroeconomics course and a fundamental concept that not all students intuitively understand. This lesson provides the rationale for the inverse relationship and requires students to practice calculating both bond prices and interest rates in different situations, reinforcing the relationship. The activity and assessments support student understanding and allow them to apply this understanding as they encounter interest rates and bond prices later in the course.

In Lesson 2: Price Indices—Construction and Use, Kevin Magavern demonstrates how price indices are constructed, what they tell us and don't tell us about prices, and how they are used to calculate inflation rates, real wages, and real interest rates. The lesson starts with the class creating a student consumer index: an excellent way to engage students in a difficult concept by applying that concept to the choices they make in their everyday lives.

In Lesson 3: Unemployment, Mary Saso continues the theme of helping students understand and quantify economic variables, in this case unemployment. Using



activities and simulations that involve students, this lesson helps them define unemployment, identify types of unemployment, and determine which type presents an economic problem. Students also learn some causes of changes in the labor force and unemployment rates. Involving students in these simulations allows them to discover the relationship between an equilibrium real wage rate and the natural rate of unemployment.

Each lesson includes a description of the concept and a method to introduce students to it in a manner that they will find relevant. Each lesson also has practice in calculations and analysis for students. Additionally, formative assessments are provided to help diagnose students' levels of understanding. Based on the information from the formative assessments, you can target areas for student feedback and for re-teaching with alternative instructional strategies. Formative assessments help students learn to self-assess and become more independent learners. After the assessments, a reflection section provides alternate or additional instructional suggestions.

### **Connections to the AP Macroeconomics Course**

These lessons cover concepts included in the AP Macroeconomics Course Description that are found in the sections on Measurement of Economic Performance and the Financial Sector. Lesson 1 addresses bonds as a financial asset and the time value of money. Lesson 2 addresses price indices and real and nominal values. Lesson 3 addresses the definition and measurement of unemployment and the natural rate of unemployment.

### **Connections to the AP Macroeconomics Exam**

This curriculum module will help students understand and calculate the economic variables of unemployment, inflation, and interest rates as they relate to bond prices. These concepts are tested in both the multiple-choice and free-response sections of the AP Macroeconomics Exam. The activities and assessments in the module will allow students to diagnose their understanding and misunderstandings of the concepts and practice with assessments that are similar to both types of assessments used on the AP Exam.

### **Instructional Time and Strategies**

This curriculum unit requires approximately five class periods of 50 minutes each. Lesson 1 requires one period, and Lessons 2 and 3 each require two class periods.

# Lesson 1: Time Value of Money— Interest Rates and Prices

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## ***Essential Question***

What is the relationship between bond prices and interest rates?

## ***Lesson Summary***

This lesson will help students understand the relationship between bond prices and interest rates. Many textbooks seem to overlook discussion of the bond price/interest rate relationship, often causing students to memorize the correlation without understanding the connection. First, the characteristics of a bond (i.e., face value, coupon rate, and maturity date) are introduced. In order to facilitate comprehension, students work in groups to analyze ways that the returns of competing bonds influence the price of a particular bond, giving rise to the inverse relationship between bond prices and returns on bonds (or interest rates in general).

### ▶ ***Connections to the AP Macroeconomics Course***

This lesson correlates to the following topics in the AP Macroeconomics Course Description outline:

- Definition of financial assets: money, stocks, bonds (IV.A.1)
- Time value of money (present and future value) (IV.A.2)

### ▶ ***Student Learning Outcomes***

As a result of this lesson, students should be able to explain how the market price of bonds adjusts when the returns of similar bonds change.



### ▶ ***Student Prerequisite Knowledge***

Before undertaking this lesson, you should review or, if necessary, define the following terms and concepts:

- Borrowing, lending, and interest
- Demand, supply, and market equilibrium
- Opportunity cost

### ▶ ***Common Student Misconceptions***

Students sometimes find the negative relationship between bond prices and interest rates to be counterintuitive. Often, students memorize the relationship without understanding the origin of the connection. The following instructional activity provides an easy way to introduce the relationship to students.

### ▶ ***Teacher Learning Outcomes***

You will learn instructional strategies that are effective in a classroom of students with different learning styles and cognitive abilities. You will learn ways that formative and summative assessments may be used to correct misunderstandings.

### ▶ ***Teacher Prerequisite Knowledge***

You should understand the inverse relationship between bond prices and interest rates. You must be able to explain how/why the market price of bonds adjusts when the returns of similar bonds change. In addition, basic knowledge of multiplication and division is required to implement the lesson.

### ▶ ***Materials or Resources Needed***

No special materials are needed in this lesson. You should use your course textbook as a reference.

## ***Activity : Time Value of Money and Bond Pricing***

### ▶ ***Step 1: Lecture and Class Participation***

#### **Introduction to Concepts**

1. Begin by giving students some examples of loan contracts (e.g., a simple loan, fixed-payment loan, or coupon bond). Ask students what would make them prefer to offer one loan over another, helping them recognize the importance of the rate of return. One way you could do this is by offering to sell the class two different simple one-period bonds: one with a 2 percent interest rate and one with a 3 percent interest rate. You should state that you are willing to sell both for \$1 and ask if any students will buy the 2 percent interest rate bond (and why).

2. Describe a *coupon bond* to students: a bond that pays a fixed interest payment (*coupon payment*) each year until maturity, when the initial amount being borrowed (*face value*) is repaid. Point out that a bond's current rate of return can be defined from the following relationship: coupon payment / bond price = current return.
3. Have the class discuss and answer the following questions:

- a. Suppose a bond has a face value of \$100 and coupon payment of \$2. Initially the bond is priced at its face value of \$100. What is the bond's current return?

*Answer:  $\$2 / \$100 = 2$  percent*

- b. What is the current return if the price of the bond is \$50? \$200?

*Answer: For \$50 price:  $\$2 / \$50 = 4$  percent; for \$200 price:  $\$2 / \$200 = 1$  percent*

- c. Students should plot the bond prices and their corresponding current returns. Verify that students plot an inverse relationship.

### ► **Step 2: Group Activity**

#### **Market Price of Bonds**

Have students form groups of three or four and analyze these examples involving the relationship between bond prices and returns:

1. Suppose that Mary bought a bond in 2011 for \$100 that matures in three years. It has a coupon payment of \$2 per year. In 2012, Mary decides to sell the bond because she needs the money. If she sells the bond for \$100, what is the bond's current return?

*Answer:  $\$2 / \$100 = 2$  percent*

2. Suppose that new bonds issued in 2012 have a return of 4 percent. Will others want to buy Mary's bond at the price of \$100?

*Answer: No, at \$100, Mary's bond has a 2 percent rate of return, which is dominated in return by the new bonds. The opportunity cost is too high for others to want to buy Mary's bond.*

3. What must happen to the price of Mary's bond? At what prices will Mary be willing to sell the bond? At what prices will others be willing to buy the bond?

*Answer: Mary must lower the price of her bond to be able to sell it. If she sells the bond for \$50, it will have the same return as the new bonds ( $\$2 / \$50 = 4$  percent), and she can sell it. If Mary wants to get rid of the bond, then she will be willing to sell the bond for this price (or a higher price). Others will be willing to purchase the bond for \$50 or a lower price (which would give a return higher than 4 percent).*



4. Discuss what happens to the price of Mary's old bond and the current return on Mary's old bond as a result of the higher returns on new bonds.

► **Formative Assessment**

Have students individually answer the following questions:

1. Suppose Alex owns a bond with a current return of 6 percent. New bonds issued have a 4 percent return. Would Alex want to sell his bond? Explain your answer.

*Answer: No, because his bond has a higher return.*

2. What will happen to the price of Alex's bond? Explain your answer.

*Answer: It will increase. Because Alex's bond offers a higher return than the new bonds, others will want to buy it, leading its price to rise.*

3. If the price change you identified in question 2 occurs, what will happen to the current return on Alex's old bond?

*Answer: It will decrease.*

4. Suppose Chris owns a bond with a current return of 6 percent. If interest rates rise, so that a simple one-year loan offers an interest rate of 10 percent, will Chris want to sell his bond? What will happen to the bond's price?

*Answer: Yes, Chris will want to sell his bond and offer a loan. The price will decrease.*

Circulate around the room, checking students' answers before having them return to their groups (formed in Step 2) to discuss their answers. Ask the groups to share their answers. As they do, ask probing questions that encourage students to explain their answers; this will give you an opportunity to correct any misunderstandings.

► **Reflection on Formative Assessment**

During the classroom activity, you may observe that the students have answered the questions correctly and have a sound understanding of the concept. If so, you may conclude the lesson. If students still struggle with comprehending this topic, provide additional scenarios, asking when one would want to buy/sell a bond and how the purchase or sale affects the bond's price. Emphasize the negative relationship between bond prices and returns/interest rates and that this is just a market outcome based on when individuals are willing to buy/sell bonds.

## Lesson 2: Price Indices— Construction and Use

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### *Essential Questions*

- How is a price index calculated?
- What are the shortcomings of the consumer price index (CPI)?
- How do economists use a price index to calculate real wages and real interest rates?

### *Lesson Summary*

This lesson will help students understand how economists use the consumer price index to calculate changes in the purchasing power of a nominal wage. Because many lessons on inflation construct a price index based on an abstract average household, students often fail to grasp that the price index should track a representative set of goods and services. When students construct the price index from their own purchase preferences, the price index becomes relevant and its limitations become more apparent.

#### ▶ *Connections to the AP Macroeconomics Course*

This lesson correlates to the following topics in the AP Macroeconomics Course Description outline:

- Price indices (II.B.1)
- Nominal and real values (II.B.2)

#### ▶ *Student Learning Outcomes*

As a result of this lesson, students should be able to:





- List the steps to construct a price index.
- Calculate a price index.
- Use the CPI in the following calculations:
  - Inflation rate
  - Real wage
  - Real interest rate
- Explain why CPI can overstate the rate of inflation.

### ► ***Student Prerequisite Knowledge***

Before beginning the lesson, you should review the following concepts with students:

- The reasons for the inverse relationship between price and quantity demanded
- The formula used to calculate percentage change

### ► ***Common Student Misconceptions***

Initially, in a discussion of inflation, students often confuse a change in price level with a change in price. Students should understand that a change of a product's price in the market often results from factors that only affect that product's market and therefore do not constitute inflation. Inflation reflects an increase in the average level of prices. You should draw the distinction between the microeconomic and macroeconomic concepts at the beginning of the lesson and again when the model of aggregate demand and aggregate supply is introduced. Construction of a price index will also help to clarify the confusion.

### ► ***Teacher Learning Outcomes***

Using a list of goods and services generated by students to construct a price index will allow you to show that a more representative price index can more effectively capture changes in cost of living. In addition, by using student-selected products, you will be able to elicit a meaningful product substitution from students in response to price changes of individual items in the market basket.

### ► ***Teacher Prerequisite Knowledge***

In order for economists to measure changes in cost of living, they use the consumer price index (CPI). To develop the CPI, economists list representative goods and services purchased by households, they tabulate the average quantities of those items purchased by average households in a month to create a *market basket*, and they track changes in the dollar value of the market basket from month to month.

When the CPI rises, a typical family must spend more to maintain its standard of living. An increase in the CPI from a previous period is called the *inflation rate*.

Economists use the CPI to show how much inflation has decreased the purchasing power of a given income and how much it has diminished returns to saving. If households either change what they buy or how much they buy in response to price changes of individual items, the CPI can fail to capture the actual change in the typical household cost of living.

### ► **Materials or Resources Needed**

No special materials are needed in this lesson; you can use the price index tables in this module. You should also use your course textbook as a reference.

## **Activity 1: Constructing a Price Index**

### ► **Discussion Script**

This activity begins with a short discussion of standard of living and cost of living. The purpose of the discussion script is to develop a relevant consumer price index for students. You should develop your own Student-Consumer Price Index in response to the script prompts before using the script in a class setting. Some instructor shaping of the discussion is required, and you may only see the opportunities for shaping if you have developed a sample that covers every point in the lecture.

Solicit student responses to the following questions and prompts. Ask questions of the entire class, or distribute the questions in written form to groups of students.

1. Ask students to define the following terms:

- *standard of living*: a level of material comfort as measured by the goods, services, and luxuries available to an individual, group, or nation
- *cost of living*: the cost of basic necessities as defined by an accepted standard
- *price level stability*: the absence of large or rapid increases or decreases in the price level

2. Tell students that the class will construct a Student-Consumer Price Index to measure cost of living. Ask students to list items, and lead them to include elements such as a variety of consumer goods, services, and items that might be substitutes for each other.

3. If students developed their lists in groups, these lists should be used to compile a common list that represents the purchases of a typical student. For each item on the list, survey the class for the following information:

- Quantities of each item purchased by a typical student in a year
- Unit prices of each item for the current year



4. Arrange the items on the board so that students can see the total amount spent for each item in a year and the total cost of the market basket can be tallied.
5. Explain that the purpose of the Student-Consumer Price Index is to follow changes in the cost of living for students over time. The price and quantities identified by students are used as the base year (a year against which other years will be compared). Explain that subsequent years will be measured against this base year.
6. Show students how to use the market basket values to calculate the consumer price index with the following formula:

**Figure 1: Consumer Price Index Formula**

$$\text{Consumer Price Index} = \frac{\text{Price of market basket in a selected year}}{\text{Price of market basket in base year}} \times 100$$

7. Create a price index with the class that reflects the cost of living for three years, the first of which is the base year. Address each of the following:
  - Change prices for the market basket items to derive a value for the second and third years. The prices of many (but not all) items will rise over time. Ask students to help estimate future prices.
  - Point out to students that the weights do not change.
  - When the market basket totals have been summed, use the consumer price index formula (along with student input) to calculate the price index numbers. Point out each of the following:
    - The base year value is always 100.
    - Price index numbers have no units—not percent or dollars.
8. Ask students: “How much did the overall cost of the market basket change from the base year to Year 2? From Year 2 to Year 3?”
  - Use a percent-change formula to calculate the answer.

**Figure 2: Percent Change Formula**

$$\text{Percent Change} = \frac{\text{New Data} - \text{Old Data}}{\text{Old Data}} \times 100$$

- Point out to students that economists use price index data in the percent change formula to calculate the inflation rate.
9. Direct students to evaluate the limitations of the Student-Consumer Price Index by asking the following questions:



**LESSON 2:**  
Price Indices—  
Construction and  
Use

- “Are any items on the list imported from other countries?”

*Answer: Most likely, the student-generated list will include imports. The Student-Consumer Price Index can include imports. The purpose of this price index is to reflect cost of living. The market basket for this price index should reflect consumer purchases wherever they are produced, not domestic production.*

- “Are there any subgroups of students for whom this Student-Consumer Price Index will not reflect cost of living?”

*Answer: Yes, many students have co-curricular and extracurricular commitments that require them to buy supplies, uniforms, etc.*

- “Will the Student-Consumer Price Index indicate changes in cost of living for teachers, counselors, or administrators?”

*Answer: No, presumably their market baskets would be different.*

- “Will the Student-Consumer Price Index indicate increases in prices for the entire economy?”

*Answer: No, the market basket focuses only on a subset of the entire economy.*

- Help students consider how the changes in relative prices might encourage them to substitute products (in this case, pencils and pens) by asking the following questions:

- “If the price of pencils rises, how will students change the quantity of pencils they purchase? How will they change the quantity of pens they purchase?”

*Answer: Buy fewer pencils and more pens.*

- “If students substitute products, are the weights used in the price index accurate?”

*Answer: No.*

- “If we don’t change the weights to reflect the change in buying patterns, how does the cost of the market basket compare to the purchases actually made?”

*Answer: It will overstate the effect of a price change on cost of living.*

- “How does this affect the accuracy of the price index as a reflection of changes in cost of living?”

*Answer: It will be less accurate.*

- Help students consider how the process of using a fixed list of products for the market basket limits the ability of the index to capture cost of living by asking the following questions:



- “Are there any items in the market basket that did not exist 10 or 15 years ago?”

*Answer: Yes, for example, smart phones and other technologies.*

- “Are there any items in the market basket that existed five years ago but weren’t as good then?”

*Answer: Yes, for example, smart phones and other technologies.*

- “Is it possible, in the next few years, that students will purchase products that haven’t been invented yet or that the products they have will have been improved?”

*Answer: Yes.*

- “How do new and improved products change our standard of living?”

*Answer: Raise it.*

- “Does a fixed market basket reflect changes in standard of living?”

*Answer: No.*

### ► **Formative Assessment**

The Pirate Island formative assessment is designed to give students an opportunity to practice calculating price index numbers and recognize what price index numbers reflect. Additionally, students will determine some shortcomings of price index numbers.

Place students in pairs to complete this formative assessment. Circulate around the room to assist students as they ask questions and to redirect students as necessary. Encourage students to explain their thinking to their partner, as this will help them identify topics that they still might not understand.

When students have completed this assessment, randomly call on students to answer each question. Correct student misunderstandings and help them extend their answers, emphasizing important points such as the fact that quantities are held constant in calculating price index numbers. Ask students probing questions and encourage them to explain their answers, as this helps to identify the depth of understanding that students possess. Continue discussing the answers to these questions until all students can explain how to calculate price index numbers. This knowledge is necessary in order to move to the next step of calculating rates of inflation.

See Handout 1 for a copy of this assessment.

Handout 1

### ► Reflection on Formative Assessment

You should observe students' work solving these issues and check for understanding as they complete the classroom activity. Some students may need to be reminded that price index numbers incorporate no specific measurement units. If students master the calculations, you may move on to the next activity. If students incorrectly calculate the price index numbers, you should work through the calculation of the market basket totals and the application of the formula with them to clear up the difficulty before going on to the price index application activity.

## Activity 2: Using a Price Index

### ► Discussion Script

This activity begins by defining terms related to price-level stability and engaging in a short discussion to reveal the effects of inflation on measures of income and the time value of money.

1. Ask students to define the following terms:

- *inflation*: the percentage increase in the average price level from a preceding time period
- *deflation*: the percentage decrease in the average price level from a preceding time period

2. Ask: "How is a change in price different from a change in price level?"

*Answer: Price change refers to a specific good or service, and price-level change refers to the change in a selected group of goods and services.*

3. Ask: "What do economists use to calculate inflation or deflation?"

*Answer: Price level changes are the percentage change in a price index.*

- Review the calculation of percentage change in the Student-Consumer Price Index from Step 8 in the Activity 1 discussion.

### Figure 2: Percent Change Formula

$$\text{Percent Change} = \frac{\text{New Data} - \text{Old Data}}{\text{Old Data}} \times 100$$

- Use the price index numbers from the Activity 1 Formative Assessment (Pirate Island) in the percent change formula for Year 1 to Year 2 and Year 2 to Year 3.
- Point out that the percentage change in a particular item's price might differ from the inflation rate for those years.



4. Ask: “How does inflation affect the purchasing power of a dollar?”

*Answer: When prices go up, a dollar buys fewer items. If it buys less, it is worth less.*

Ask the following questions:

- “How would inflation affect the purchasing power of a paycheck?”

*Answer: It would buy less, so the value would go down.*

- “How would inflation affect the value of interest earnings on savings?”

*Answer: Purchasing power of earnings would be reduced. If price level increases enough, savings would lose value (i.e., savings would buy fewer goods and services than they did at deposit time).*

- “How does inflation affect nominal GDP?”

*Answer: It makes it larger than real GDP.*

- “How do economists use a price index to derive real GDP from nominal GDP?”

*Answer:*

### Figure 3: Real GDP Formula

$$\text{Real GDP in Yr 1} = \frac{\text{Nominal GDP in Yr 1}}{\text{Price Index in Yr 1}} \times 100$$

#### ► **Formative Assessment**

This formative assessment allows students to practice calculating rates of inflation and then use those numbers to find real interest rates and changes in real income. Have students complete the practice questions individually, then pair them with their partner from the Pirate Island formative assessment to compare answers and collaborate until they have reached consensus. Give students the correct answers, but ask individual students to explain how each answer was derived. Correct any misunderstandings and help students extend their answers until all students understand the concepts and skills in the assessment.

See Handout 2 for a copy of this assessment.

#### ► **Reflection on Formative Assessment**

If students incorrectly calculate the inflation rate, work through the calculations with them. Emphasize that the inflation number is followed by a “%.” If students incorrectly calculate real income, approximate real income changes, or approximate real interest rates, work through the problems with them. Students

Handout 2

might use the wrong year's price index in the calculation of real income or an incorrect inflation rate in the calculation of the approximate real income changes or real interest rate.

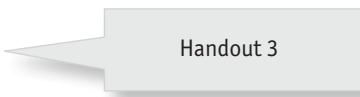
## ***Summative Assessment***

The tasks required in this assessment enable students to use the skills that they learned in calculating price index numbers and rates of inflation. Additionally, students apply these measures by determining real income and real interest rates and evaluating shortcomings of the measures. The assessment should receive a lower factor in grading than the unit test. On completing the assessment, the whole class should be encouraged to review together and expand upon the correct answers. Help students understand the significance of these concepts. They will be used as evaluative tools throughout the course. For example, understanding real and nominal interest rates helps students understand the money market model and the loanable funds market model. Additionally, the concepts of real and nominal wages are crucial to a student's understanding of short-run and long-run effects on economic activity.

See Handout 3 for a copy of this assessment.

A black arrow-shaped graphic pointing to the right, containing the lesson title in white text.

## **LESSON 2: Price Indices— Construction and Use**

A light gray callout box with a pointer on the left side, containing the text "Handout 3".

Handout 3





## Lesson 3: Unemployment

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Mary Saso  
International School of the Sacred Heart  
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### *Essential Questions*

- How are changes in the unemployment rate related to real GDP?
- How is unemployment defined and measured?
- What is the natural rate of unemployment?

### *Lesson Summary*

Students will be asked to look at actual data trends in different countries in order to generate curiosity about divergences. After this they should be more receptive to learning the principal definitions and measurement formulae, as well as to considering the significance of real wages. The activities, which include simulations, are intended to heighten students' awareness of the significance of macroeconomic variables in their lives. The assessments may be used either as crucial tools in formative assessment or as critical steps in summative assessments prior to the main topic test. For assessment of their understanding and to engender a lively atmosphere in the classroom, students should be encouraged to share their interpretations of the data and their depictions of the models.

### ► *Connections to the AP Macroeconomics Course*

This lesson correlates to the following topics in the AP Macroeconomics Course Description outline:

- Definition and measurement (II.C.1)
- Types of unemployment (II.C.2)
- Natural rate of unemployment (II.C.3)



### ▶ ***Student Learning Outcomes***

As a result of this lesson, students should be able to:

- Recognize the main kinds of unemployment and realize that movements into and out of the labor force reveal the presence of discouraged workers.
- Correctly measure the labor-force participation rate and the unemployment rate and suggest causes for changes in the rates.
- Understand the significance of:
  - real wages
  - the natural rate of unemployment

### ▶ ***Student Prerequisite Knowledge***

Prior to this lesson, students should:

- Understand from the production-possibility frontier that labor is a resource that may be wasted.
- Be able to calculate the consumer price index and know its significance in adjusting for inflation.

### ▶ ***Common Student Misconceptions***

Students sometimes misunderstand to whom the unemployment rate refers. A graphic depiction of the labor force is proposed here to reinforce the correct definitions. Students are also often confused by the natural rate of unemployment and fail to realize its significance in determining what policies are required to cope with higher unemployment levels. They may not realize that only cyclical employment is affected by short-run changes in real GDP.

### ▶ ***Teacher Learning Outcomes***

Using data visually, you will be able to demonstrate that measuring unemployment and its natural rate, which in any case fluctuates, is subject to dispute. The simulation activity will enable you to provide a student-centered learning experience, especially for those with kinesthetic-learning preferences. By emphasizing the significance of the real wage in labor-force decisions in this lesson, you will be able to explain later in the course the significance of expectations in determining policy outcomes and in distinguishing between neoclassical and Keynesian theories.

### ▶ ***Teacher Prerequisite Knowledge***

Unemployment matters because its rise indicates that the economy is below its potential GDP; transfer payments have to be paid to the unemployed, and poverty

levels worsen. Its causes and its remedies are controversial, however, because there are fluctuating flows into and out of the labor force. Those outside the labor force have no impact on the measurement of unemployment, even though they might appear superficially to be unemployed. To be unemployed, one must be looking for work and able to work.

A random sample of households is questioned as part of a monthly labor-force survey. The unemployed are those aged 16 and over who are looking for work but who have not worked even one hour in the survey week. Those part-time workers who have only worked a few hours, but want to work more, are counted, therefore, as employed. On the other hand, a woman who takes care of her home, but who really wants a job as well, may be designated as a discouraged worker—someone who has given up and left the labor force.

An economist considers there to be “full employment,” with the economy at its potential GDP level, when the measured unemployment rate equals the “voluntary” or natural rate of unemployment (the sum of frictional, seasonal, and structural unemployment, though this definition is quite ambiguous).

### ► *Materials or Resources Needed*

- A digital projector with an Internet connection (or Internet access for each student)
- A whiteboard

## **Activity 1: Comparing Data and Finding Linkages**

Lead students through the following exploration. Project the information for the whole class to see, or, if resources permit, have students find the data themselves.

**Step 1:** Direct students to Google’s Public Data Explorer in order to view Eurostat data on unemployment. [http://www.google.com/publicdata/explore?ds=z8o7pt6rd5uqa6\\_](http://www.google.com/publicdata/explore?ds=z8o7pt6rd5uqa6_)

Different countries may then be selected along with the unemployment rate so as to yield a line chart. In order to make a startling comparison, Austria, Germany, and Greece are good examples.<sup>1</sup>

**Step 2:** Students should consider what distinguishes the three countries displayed. When the issue of real GDP arises, direct students to use either OECD or World Bank data to plot the appropriate trends.

[http://www.google.com/publicdata/explore?ds=z8ehg1neoorltg\\_&ctype=l&met\\_y=evogdp\\_t1](http://www.google.com/publicdata/explore?ds=z8ehg1neoorltg_&ctype=l&met_y=evogdp_t1)

Useful website

Useful website

<sup>1</sup> Of course, many other country choices are possible; this is one idea. If students do not have their own access to the Internet, the teacher may adopt suggestions for different countries from students.



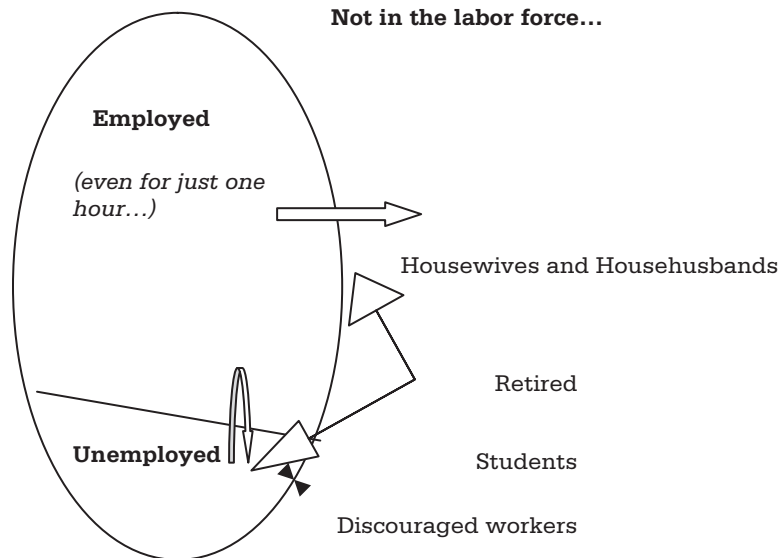
**Step 3:** Have students explain why the unemployment rate rose so steeply in Greece after 2009, while it fell in Germany. With Austria as a benchmark, they will quickly realize that there is an inverse relationship between real GDP growth and the unemployment rate, albeit with a lag of about three months. Guide students toward the realization that when real GDP grows, job creation occurs because of increases in output.

**Step 4:** Students may remark upon the fact that even when GDP growth is high, unemployment exists at around 5 percent—it never seems to reach anywhere near zero. Direct them to consider a long-run natural rate of unemployment, which in the case of Austria, for example, hovers around 4 percent (though its rate has occasionally fallen below 4 percent after higher real GDP growth in 2000 and 2007).

## Activity 2: Defining and Measuring Unemployment

Students need to understand the significance of labor-force participation. Display Figure 4, or with the help of those students who have some prior knowledge of unemployment concepts, it may be hand-drawn on the whiteboard.

**Figure 4: Labor Force “Egg” and Its Inward and Outward Flows**



Ask students to insert arrows to show that people are often moving between different parts of the diagram, which means that there are significant fluctuations in both of the calculated rates. In particular, movements into and out of the labor force “egg” affect the unemployment rate, even though the actual number of unemployed workers may not have changed. The discouraged workers sometimes become officially unemployed, but in a recession, they are the ones who have given up looking for a job. Table 1 can then be used to demonstrate the calculations involved.

$$\text{Labor force participation rate} = \frac{(\text{Employed} + \text{Unemployed})}{\text{Population aged 16 and over}} \times 100$$

$$\text{Unemployment rate} = \frac{\text{Unemployed}}{(\text{Employed} + \text{Unemployed})} \times 100$$

Table 1: Calculation of Rates (2006)

Popul. 16 and over (million)	Employed (million)	Unemployed (million)	Labor force participation rate (%)	Employment rate (employed/popul.) (%)	Unemployment rate (%)
50	30	10			

Table 1: Answer Key (2006)

Popul. 16 and over (million)	Employed (million)	Unemployed (million)	Labor force participation rate (%)	Employment rate (employed/popul.) (%)	Unemployment rate (%)
50	30	10	$40/50 \times 100=80$	$30/50 \times 100=60$	$10/40 \times 100=25$

### Activity 3: Simulation of Unemployment Flows

The concept of real wages needs to be understood before engaging in this activity. On the whiteboard, sketch some of the data shown in Table 2. Lead the students through the periods so as to reflect upon how the data could change.

Table 2: Changes in Nominal and Real Wages between 2011 and 2012

	Change in nominal wages	Inflation rate	Change in real wages	Expected inflation rate
Period 1 <i>Expansionary policies</i>	+ 4%	+ 3%		+ 6%
Period 2	+ 6%	+ 6%		+ 8%
Period 3	+ 8%	+ 9%		+ 1%
Period 4 <i>Contractionary policies</i>	+ 1%	- 1%		0%



Table 2: Answer Key

	Change in nominal wages	Inflation rate	Change in real wages	Expected inflation rate
Period 1 <i>Expansionary policies</i>	+ 4%	+ 3%	+ 1%	+ 6%
Period 2	+ 6%	+ 6%	+ 0%	+ 8%
Period 3	+ 8%	+ 9%	- 1%	+ 1%
Period 4 <i>Contractionary policies</i>	+ 1%	- 1%	+ 2%	0%

In order to reinforce the distinction between the different types of unemployment, display the following information before beginning the following simulation:

- **Cyclical / demand deficient:** needs appropriate macro policies
- **Frictional:** indicates a flexible market with mobile resource allocation
- **Structural / technological:** needs training, better job mobility
- **Real-wage disequilibrium:** due to effective minimum wage or “efficiency wages”
- **Seasonal:** cannot be remedied by policies
- **Discouraged workers (disguised):** needs better data, e.g., on ratio of job openings (offers) to applications

**Step 1:** Have students choose identities for themselves, or give them various personae (e.g., sailing fanatic, student taking a year off between high school and college, mother of 2-year-old twins, healthy 62-year-old gardener). Encourage creativity by having them devise their own narratives.

**Step 2:** Designate different parts of the classroom as belonging to those who are:

- employed
- unemployed
- not in the labor force:
  - *seated comfortably enjoying their leisure activities or household production (a perfectly valid economic choice) OR*
  - *miserable because they have given up looking for a job as there are relatively few job offers (i.e., discouraged workers)*

**Step 3:** Whenever the nominal wage rate and the inflation rate (see Table 5) are changed, the personae should move between the three designated areas (depending on their interpretation of the real-wage rate).

**Step 4:** Ask students what other factors will affect their decision: job satisfaction (economic rent for those who’ve studied microeconomics), life-cycle aspects

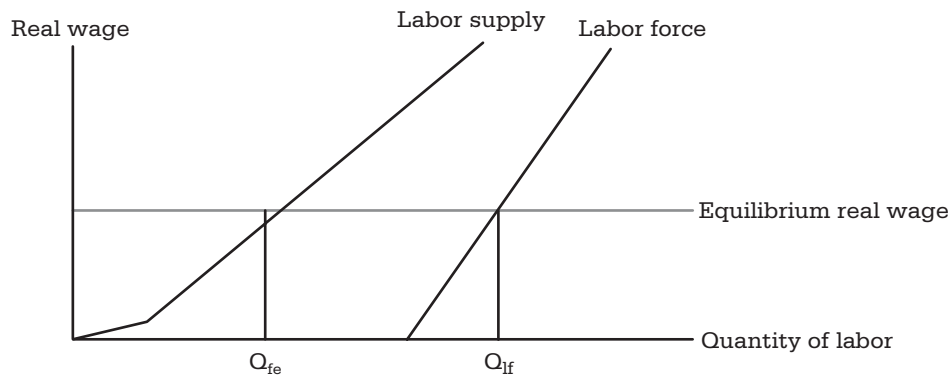
(career considerations), unemployment benefits, union activity, or alternative household production (child care, gardening, attractive leisure activities).

**Step 5:** Based on their answers, students should discuss how many would be *not in the labor force* either because of their alternatives that raise the opportunity cost of employment or because they are discouraged by the level of the real wage and the lack of job opportunities (unemployed students because of the lack of job opportunities won't be able to find a space in the employed section of the room).

**Step 6:** Ask students to consider what would be a real-wage level where about 5 percent of them would be unemployed (in the labor force) either because they do not yet have the skills required in a changing economy or because they do not have enough information about job openings. Point out that this is the *equilibrium real wage*.

Encourage students to envision two separate supply curves in the labor market: the most active job searchers are the “labor supply,” which is to the left of the labor force supply, as shown in Figure 5 below. The horizontal gap between the two is usually considered to represent “voluntary” or natural unemployment. An unemployment rate that equals the **natural rate of unemployment (NRU)**—which consists of frictional, seasonal, and structural unemployment—is usually considered tantamount to “full” employment ( $Q_{fe}$ ). The labor market has “cleared” at the prevailing real wage, but there are skill and regional mismatches between job seekers and available jobs.

**Figure 5: Natural Unemployment within Labor Force**



At this unemployment level, represented by  $Q_{if}$  less  $Q_{fe}$ , the inflation rate should be stable because there is neither an excess demand nor excess “supply of labor.” (Having too little unemployment generates wage inflation, and too much unemployment causes wages to fall.) However, because union strength, government policies, skills, and technology keep changing, the natural rate of unemployment is not necessarily a constant figure. Nor do economists agree about the relative strength of certain factors in determining the natural rate. Nonetheless, when unemployment is at its natural (non-inflationary) rate, the theoretical consensus is that real GDP is at its potential level.





Ask students whether discouraged workers who have left the “egg” (Figure 4) are represented in Figure 5. Their absence from the data indicates that the official unemployment rate underestimates the true extent of unemployment, but their presence in the population could possibly put downward pressure on real wages. In other words, students should envision a third curve that represents the “potential labor supply” to the right of the labor force curve.

### ► **Formative Assessment**

Whenever a new figure is introduced, seek students’ help in adding information and data. For example, while drawing Table 2 on the board, ask students to assist in filling in the real-wage column. (Students may also suggest appropriate expected inflation rates.) Some students may struggle with the calculations involved; however, they should all be actively involved in coming up with the answers, whether individually or in groups. During the simulation activity, students should be asked into which unemployment category each one falls, while emphasizing that those who are discouraged will not be counted in the unemployment data. If students have difficulty identifying the categories, correct any misunderstandings and help them think of further examples of people who are not working. For example, where does a recent graduate who has not yet found a job fall?

### ► **Reflection on Formative Assessment**

When expanding on the data in Table 1, ensure that students can easily estimate rates without the use of a calculator. Suggested data prompts could be 100 in the population, of whom 60 are employed and 15 are unemployed. (The participation rate would be 75 percent, while the unemployment rate would be  $15/75 \times 100 = 20$  percent.) Differentiation will be apparent because some students will have better mathematical skills than others. Nonetheless, all students should feel empowered enough to calculate simple percentages. The students who are more able in mathematics should provide tips to those who are struggling. If necessary, ask some mental arithmetic problems (e.g., 60 is what percentage of 80? Answer: 3 over 4 or 75 percent).

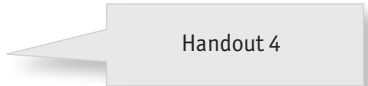
If students show any confusion about the definitions during the activity’s simulation, they should be given further examples of the structurally unemployed, especially in their own region (e.g., textile workers, miners, kimono makers). They should be the ones to find out that there are still unemployed workers at the equilibrium real wage. (Students may also be asked to consider which among their personae are likely to become discouraged workers during a recession.)

If there is evidence that the distinction between nominal and real wages is not fully understood, students who are playing the part of “homemakers” could be asked whether they would rejoin the labor force if the inflation rate were expected to be 10 percent and they were offered a wage rise of 8 percent. Ensure that students understand the distinction between nominal and real wages before they begin to analyze the aggregate-demand and supply model in the third major topic of the AP course outline.

# Summative Assessment

The tasks required in this assessment enable students to use the skills they have learned both in calculating rates and in defining different kinds of unemployment. The assessment should receive a lower factor in grading than the unit test. On completing the assessment, encourage the whole class to review together and expand upon the correct answers, which will often provide linkages to the next topic. For example, Question 5 on the assessment may be illustrated with a standard model of the labor market on the board in order to demonstrate that a change in the real wage does not shift either the demand or the supply of labor; instead, there will be a movement along each curve. Suggest to students that the outcome is a shortage of labor, which will ultimately lead to a rise in wages.

See Handout 4 for a copy of this assessment.



Handout 4



# Handout 1

## Pirate Island

The citizens of Pirate Island have decided to construct a price index. They have taken a survey to find the goods and services that best reflect the lifestyle of Pirate Island's people and the quantities consumed by the typical pirate household in a year. They have tracked prices for three years and recorded them as follows:

Product	Quantity Bought in Yr 1 (Base Year)	Unit Price in Year 1 (Base Year)	Spending in Yr 1	Unit Price in Yr 2	Spending in Yr 2	Unit Price in Yr 3	Spending in Yr 3
Pantaloons	4 pairs	\$5.00		\$6.00		\$7.00	
Parrot food	20 lbs.	\$1.00		\$1.25		\$2.00	
Porridge	150 lbs.	\$1.50		\$2.00		\$2.25	
Prunes	30 lbs.	\$1.00		\$1.10		\$1.20	
Total							
Consumer Price Index							

1. Compute the total cost of buying all the items in the base year.
2. Find the total cost of buying those same items in Year 2 and Year 3.
3. Calculate the Pirate Island Consumer Price Index.

Explain how the following situations affect the price index's ability to accurately measure the cost of a given standard of living:

- a. Between Year 2 and Year 3, people began to buy pantaloons with pockets (not previously available).
- b. In response to higher parrot-food prices in Year 3, people began to buy porridge rather than parrot food to feed their parrots.



## Pirate Island Answer Key

Product	Quantity Bought in Yr 1 (Base Year)	Unit Price in Year 1 (Base Year)	Spending in Yr 1	Unit Price in Yr 2	Spending in Yr 2	Unit Price in Yr 3	Spending in Yr 3
Pantaloons	4 pairs	\$5.00	<b>\$20.00</b>	\$6.00	<b>\$24.00</b>	\$7.00	<b>\$28.00</b>
Parrot food	20 lbs.	\$1.00	<b>\$20.00</b>	\$1.25	<b>\$25.00</b>	\$2.00	<b>\$40.00</b>
Porridge	150 lbs.	\$1.50	<b>\$225.00</b>	\$2.00	<b>\$300.00</b>	\$2.25	<b>\$337.50</b>
Prunes	30 lbs.	\$1.00	<b>\$30.00</b>	\$1.10	<b>\$33.00</b>	\$1.20	<b>\$36.00</b>
Total			<b>\$295.00</b>		<b>\$382.00</b>		<b>\$441.50</b>
Consumer Price Index			<b>100.00</b>		<b>129.49</b>		<b>149.66</b>

1. Compute the total cost of buying all the items in the base year.
2. Find the total cost of buying those same items in Year 2 and Year 3.
3. Calculate the Pirate Island Consumer Price Index.
4. Explain how each of the following situations affects the price index's ability to accurately measure the cost of a given standard of living:
  - a. Between Year 2 and Year 3, people began to buy pantaloons with pockets (not available before).

*Answer: Quality increase not entirely captured, therefore price index less accurate.*

- b. In response to higher parrot-food prices in Year 3, people began to buy porridge rather than parrot food to feed their parrots.

*Answer: Quantity changes from product substitution not captured, therefore price index less accurate.*

# Handout 2

## *Rate of Inflation*

Use the consumer price index below to calculate the inflation rate from one year to the next. Then answer the questions that follow.

Year	Price Index	Rate of Inflation
<b>1</b>	<b>100</b>	
<b>2</b>	<b>110</b>	
<b>3</b>	<b>121</b>	
<b>4</b>	<b>140</b>	

1. If nominal income was \$30,000 in Year 2, what was real income in that year?
2. If nominal income was \$30,000 in Year 3, what was real income in that year?
3. If nominal income increased by 12 percent from Year 1 to Year 2, what was the approximate percentage change in real income?
4. If nominal income increased by 8 percent from Year 2 to Year 3, what was the approximate percentage change in real income?
5. If the nominal interest rate was 14 percent from Year 1 to Year 2, what was the approximate real interest rate during the same time period?
6. If the nominal interest rate was 6 percent from Year 3 to Year 4, what was the approximate real interest rate during the same time period?



## Rate of Inflation Answer Key

Use the consumer price index below to calculate the inflation rate from one year to the next. Then answer the questions that follow.

Year	Price Index	Rate of Inflation
1	100	
2	110	10.0%
3	121	10.0%
4	140	15.7%

1. If nominal income was \$30,000 in Year 2, what was real income in that year?

*Answer: \$27,272.73*

2. If nominal income was \$30,000 in Year 3, what was real income in that year?

*Answer: \$24,793.39*

3. If nominal income increased by 12 percent from Year 1 to Year 2, what was the approximate percentage change in real income?

*Answer: +2.0 percent*

4. If nominal income increased by 8 percent from Year 2 to Year 3, what was the approximate percentage change in real income?

*Answer: -2.0 percent*

5. If the nominal interest rate was 14 percent from Year 1 to Year 2, what was the approximate real interest rate during the same time period?

*Answer: +4.0 percent*

6. If the nominal interest rate was 6 percent from Year 3 to Year 4, what was the approximate real interest rate during the same time period?

*Answer: -9.7 percent*

# Handout 3

## *Gustatus*

The country of Gustatus has outlined the following price index. Complete the price index, and then answer the questions that follow.

Product	Quantity Bought in Yr 1 (Base Year)	Unit Price in Yr 1 (Base Year)	Spending in Yr 1	Unit Price in Yr 2	Spending in Yr 2
Truffles	200	\$1		\$2	
Cheese	100 lbs.	\$5		\$6	
Cider	100 gallons	\$3		\$4	
Clothing Repair	6 repairs	\$20		\$22	
Total					
Price Index					

1. What is the price index in Year 1?
2. How much inflation did Gustatus experience between Year 1 and Year 2?
3. Chef Pullus, a resident of Gustatus, earned \$25,000 in Year 1 and \$30,000 in Year 2. What was Chef Pullus's real income in Year 2?
4. Chef Pullus's savings account earned 15 percent nominal interest in Year 2. What was the approximate rate of real interest for his account?
5. How will the following events affect the ability of the price index to reflect Gustatusian cost of living?
  - a. The widespread use of a new garlic cheese
  - b. Cider producers dilute the cider with more water





## Gustatus Answer Key

The country of Gustatus has outlined the following price index. Complete the price index, and then answer the questions that follow.

Product	Quantity Bought in Yr 1 (Base Year)	Unit Price in Yr 1 (Base Year)	Spending in Yr 1	Unit Price in Yr 2	Spending in Yr 2
Truffles	200	\$1	<b>\$200.00</b>	\$2	<b>\$400.00</b>
Cheese	100 lbs.	\$5	<b>\$500.00</b>	\$6	<b>\$600.00</b>
Cider	100 gallons	\$3	<b>\$300.00</b>	\$4	<b>\$400.00</b>
Clothing Repair	6 repairs	\$20	<b>\$120.00</b>	\$22	<b>\$132.00</b>
Total			<b>\$1120.00</b>		<b>\$1532.00</b>
Price Index			<b>100.0</b>		<b>136.79</b>

1. What is the price index in Year 1?

*Answer: 100*

2. How much inflation did Gustatus experience between Year 1 and Year 2?

*Answer: 36.79 percent*

3. Chef Pullus, a resident of Gustatus, earned \$25,000 in Year 1 and \$30,000 in Year 2. What was Chef Pullus's real income in Year 2?

*Answer: \$21,931.43*

4. Chef Pullus's savings account earned 15 percent nominal interest in Year 2. What was the approximate rate of real interest for his account?

*Answer: -21.79 percent*

5. How will the following events affect the ability of the price index to reflect Gustatusian cost of living?

- a. The widespread use of a new garlic cheese:

*Answer: Substitution bias: Gustatusian standard of living no longer reflected in index.*

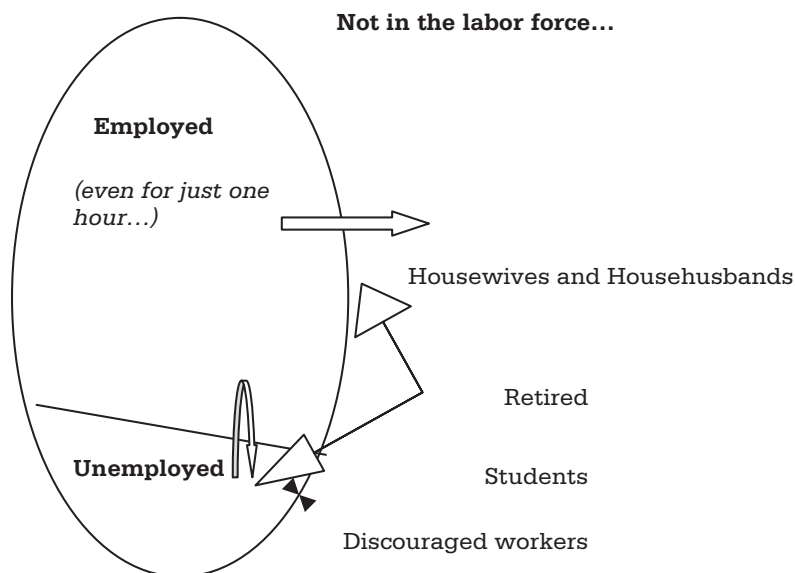
- b. Cider producers dilute the cider with more water:

*Answer: Quality decrease not captured and price index understates the cost of maintaining a given standard of living.*

# Handout 4

## Measurement and Description of Unemployment

Figure 1: Labor Force “Egg” and Its Inward and Outward Flows



1. Where do the following fit in the diagram of the "Population aged 16 and over" and its labor force (the egg)?  
[employed/unemployed/not in the labor force]

If your choice is *unemployed*, then indicate whether the type of unemployment is *frictional/structural/cyclical/seasonal*.

- a) A housewife working for one hour a week who wants to work full time
- b) A discouraged worker
- c) Students presently researching careers to enter after graduation
- d) A recent graduate who has still not found a job



2. Use the table below to calculate the various rates:

	Popul. 16 and over (billion)	Employed (billion)	Unemployed (billion)	Labor force participation rate (%)	Employment rate (%)	Unemployment rate (%)
2000	20	12	3			
2010	25	15	5			

Explain what could have been happening between the two years in both the economy and its associated labor market. (*Hint: Think of how the labor force “egg” has changed.*) In particular, consider what might have been happening to wages.

3. In what ways do the following have an impact on the natural rate of unemployment?
- a) Changes in labor force characteristics
  - b) Changes in government policies
  - c) Changes in productivity
  - d) Changes in labor market institutions
4. Suppose that since last year the nominal wage rate has risen by 5 percent, while the consumer price index has increased from 100 to 104. What has happened to real wages?
5. Suppose that since last year the nominal wage rate has remained stable, while the consumer price index has changed from 97 to 100.
- a) What has happened to real wages?
  - b) What has happened to profit per unit (= price – average unit production costs)?
  - c) What will, therefore, happen to output?

- d) What will be happening, therefore, to the quantity demanded of labor (from firms)?
  
- e) What will be happening to the quantity supplied of labor (from households)?
  
- f) Why might some people choose not to look for work any longer?
  
- g) As a result, what is the short-run outcome in the labor market?



## Measurement and Description of Unemployment: Answer Key

1. Where do the following fit in the diagram of the “Population aged 16 and over” and its labor force (the egg)?  
[employed/unemployed/not in the labor force]

If your choice is *unemployed*, then indicate whether the type of unemployment is *frictional/structural/cyclical/seasonal*.

- a) A housewife working for one hour a week who wants to work full time

*Answer: employed*

- b) A discouraged worker

*Answer: not in the labor force*

- c) Students presently researching careers to enter after graduation

*Answer: not in the labor force*

- d) A recent graduate who has still not found a job

*Answer: unemployed, frictional*

2. Use the table below to calculate the various rates.

	Popul. 16 and over (billion)	Employed (billion)	Unemployed (billion)	Labor force participation rate (%)	Employment rate (%)	Unemployment rate (%)
2000	20	12	3	$15/20 = 75\%$	$12/20 = 60\%$	$3/15 = 20\%$
2010	25	15	5	$20/25 = 80\%$	$15/25 = 60\%$	$5/20 = 25\%$

Explain what could have been happening between the two years in both the economy and its associated labor market. (*Hint: Think of how the labor force “egg” has changed.*) In particular, consider what might have been happening to wages.

*Answer: Because relatively more people have joined the labor force, even though a higher proportion is unemployed, real wages and job offers are probably higher, which suggests economic growth.*

3. In what ways do the following have an impact on the natural rate of unemployment?

- a) Changes in labor force characteristics

*Answer: skill acquisition lowers rate*

- b) Changes in government policies

*Answer: unemployment benefits could increase rate*

c) Changes in productivity

*Answer: improvements in productivity would increase demand for labor and lower rate*

d) Changes in labor market institutions

*Answer: stronger labor unions could increase rate*

4. Suppose that since last year the nominal wage rate has risen by 5 percent, while the consumer price index has increased from 100 to 104. What has happened to real wages?

*Answer: risen by approximately 1%*

5. Suppose that since last year the nominal wage rate has remained stable, while the consumer price index has changed from 97 to 100.

a. What has happened to real wages?

*Answer: fallen*

b. What has happened to profit per unit (= price – average unit production costs)?

*Answer: risen*

c. What will, therefore, happen to output?

*Answer: increase*

d. What will be happening, therefore, to the quantity demanded of labor (from firms)?

*Answer: increase*

e. What will be happening to the quantity supplied of labor (from households)?

*Answer: decrease*

f. Why might some people choose not to look for work any longer?

*Answer: lower real wages so opportunity cost of being in the labor force exceeds opportunity cost of alternatives*

g. As a result, what is the short-run outcome in the labor market?

*Answer: tighter with unemployment falling below the natural rate of unemployment*



# Contributors

## Editor

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