Variation in Economic Activity; An Overview

Up until now, we have concerned ourselves with describing the various components of an economy and how they affect equilibrium. We have not discussed if this equilibrium is stable. With periods of higher growth, lower growth or outright contraction, I think it's safe to assume that it isn't. Does it degenerate into chaos? No. There are patterns that are reoccurring. For the United States, one fact is clear, growth seems to continue. This is not always true for other economies.

Why are business cycles important? Many times it doesn't take much of a change in economic activity to cause problems. A small change in national income of only one to three percent can cause widespread misery and fear from uncertain employment. Even a mere slowdown in the rate of economic growth can trigger a decline in the stock market. Tax revenues, wealth, consumption, employment, and profitability, all decline in a downturn.

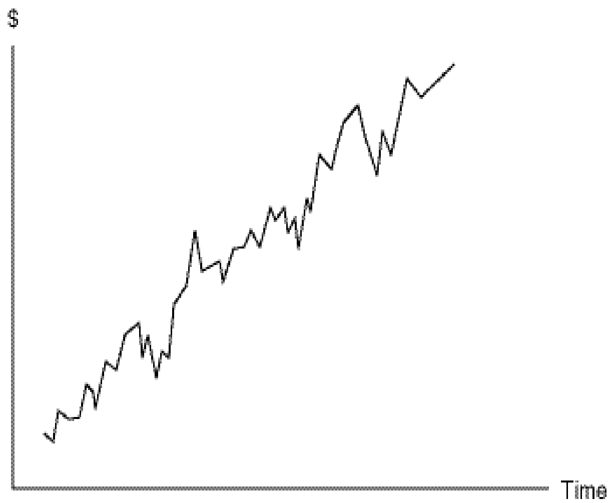
We will start the analysis by examining the different patterns in variation of economic activity that occur. Next, we will focus on the causes of business cycles.

After the section on business cycles, we will discuss one of the largest challenges in economics, unemployment. One of the other largest challenges, inflation will be discussed after that.

Types of Variation in Economic Activity

There are four major types of variation in economic activity: trend, cyclical, seasonal, and stochastic. Each is important but the emphasis in this course will be on the cyclical variation.

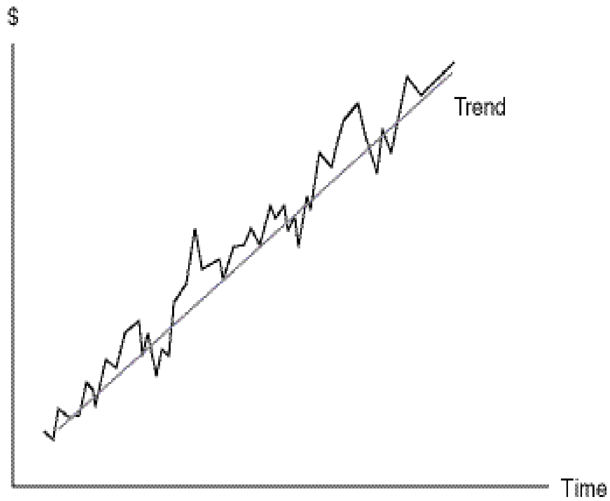
Figure 1.0 Typical GDP Growth over Time



Trend

Before describing a typical pattern of events in a business cycle, let's examine the types of variation in economic activity that occurs. First, there is trend, which is movement over an extended period of time in a particular direction.

Figure 2.0 Trend

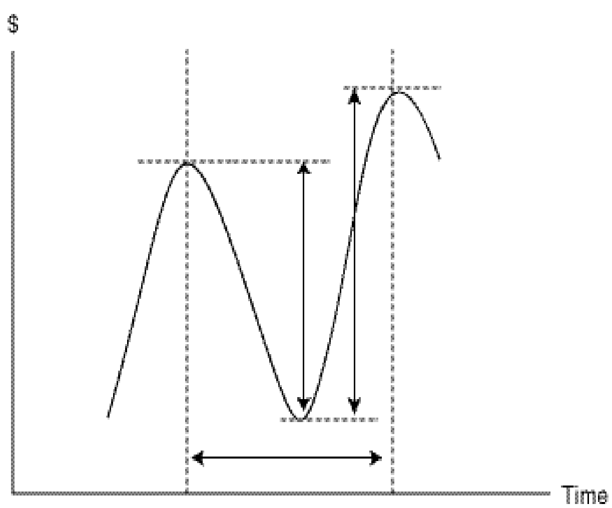


Despite the many ups and downs and irregular movements over time there is a clear upward trend in the American economy at roughly 2 to 3% per year. An increasingly large amount of economic research is focusing on what is necessary to have and increase economic growth. Growth will be covered in detail in a later section.

Cyclical

Secondly, there is a cyclical pattern, faster growth then slower, over and over again. Business cycles have different lengths or duration and different amplitudes (size of ups and downs). No two cycles are exactly alike. This increases the difficulty of forecasting cyclical activity.

Figure 3.0 Cyclical Variation



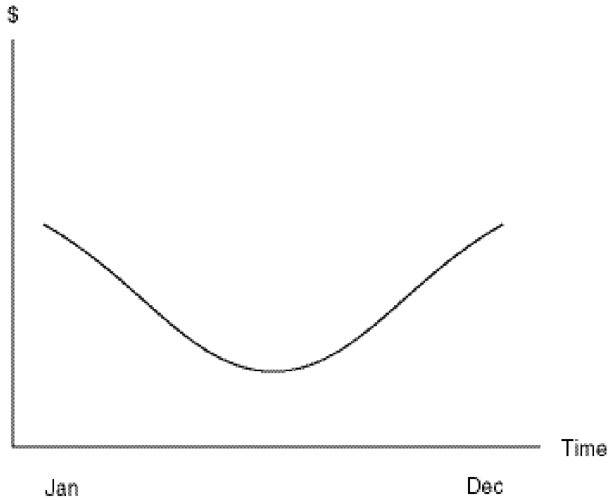
Cyclical variation is the focus of economic policy. Too strong a prosperity triggers inflation and too weak of an economy causes an unemployment problem. Using economic policy to at least moderate the swings is considered very desirable. Has economic policy been successful in this regard? Yes and no. Clearly there has not been a Great Depression and business cycle expansions seem to be longer and contractions shorter. But the business cycle is not dead.

I should point out that one could have growth and still have a recession. Called a growth recession, the best example of this is when the labor force is growing at 5 percent and income at 3 percent. Per capita growth would be negative in this instance.

Seasonal

Thirdly, there is seasonality. The traditional Christmas holiday shopping in Christian countries is reflected in Figure 4.0.

Figure 4.0 Seasonal Variation



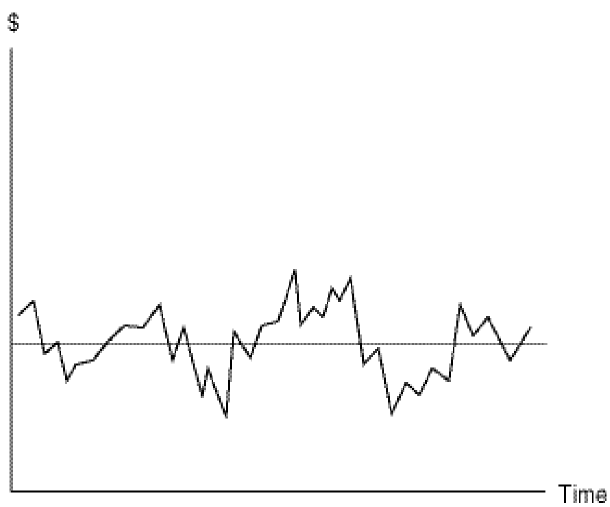
In any given year economic activity drops to a low point in the summer months and reaches a peak during the holiday season. If one had measured economic activity from the low to the yearly high, it could be concluded erroneously that the economy is growing. To remove the seasonal variation economic data are seasonally adjusted. Many data series are released as seasonally adjusted data.

To make matters more complicated, seasonal variation is not constant. There has been an elongation of the selling period associated with the holiday season in America. The curve becomes flatter over time. Other countries may have significant differences in their seasonal variation compared to the United States. Seasonal variation is relatively beyond the influence of economic policy. Otherwise some economists would have Santa visit more often.

Stochastic

Finally, there is stochastic variation. Variation caused by unpredictable or chance events such as wars, discoveries, and earthquakes.

Figure 5.0 Stochastic Variation



Stochastic variation should not have any trend or element of predictability. As such there is nothing that can be done about stochastic variation.

Business Cycles

The major variation in economic activity that everyone is interested in, is business cycles. No other event in economics inspires as much excitement and fear as the business cycle. Our discussion in this section focuses on the effects, causes, policies, and measurement of the business cycle.

Effects of Business Cycles

Two major economic problems arise out of business cycles: inflation and unemployment. Both of which cause misery among the population. These are discussed in considerably more detail under inflation, and unemployment, below.

Business cycles bring opportunities as well as threats. Investors staying ahead of curve can increase their wealth. It is well known that some industries profit during an economic contraction while the vast majority make more profit during economic expansion. Investing using market timing has the potential for high profits. The problem is, of course, timing. Only about 1% of investors are good at this. Nevertheless, business cycles certainly have an impact on investment portfolios. Structuring portfolio to minimize risk during business cycles is essential to good investment management.

Causes of Business Cycles

The question is why isn't there stability? Let us divide into two categories the courses of cyclical variation: external (exogenous) and internal (endogenous).

Internal Causes

Internal causes include credit cycles, stock market declines, panics, euphoria, etc. The idea is that the system itself is unstable. The mechanics of economic interreaction cause changes that continue on forever.

Let's describe a sequence of events that can occur in a business cycle starting from a peak. At a peak, profits are declining because although revenue may still be rising, costs are rising at a faster rate. This profit squeeze forces companies to lay off employees, which reduces aggregate demand. Investment spending declines because profits, which finance investment decline, and expectations of sales growth decline. Inventories are high relative to sales. The economy enters into a contraction. To make a long story short and to risk oversimplification, contraction bottoms out as consumption allows firms to make profits by providing a base level of sales. A weakened labor market has lower wages to keep costs low. After reaching bottom, firms start to expand, investment increases, and employment starts to rebound, causing income and aggregate demand to increase until reaching the peak again.

Another related approach to business cycles, again using an inherent property of the economy rather than an outside external shock is the Accelerator-Multiplier theory of business cycles. This theory implies cycles of boom and bust as the private sector is inherently unstable. As the economy is rising toward full employment, full GDP and business sales are increaseing at an increasing rate, because of the accelerator, investment increases, because of the multiplier investment causes GDP to increase by a multiple of investment. As the economy approaches full employment, the growth rate in business sales slow down. From the accelerator effect, investment goes down and due to the multiplier effect, GDP goes down. Recall that the accelerator principle states that increases in output lead to increases in investment. It assumes a constant relationship between an economy's capital stock and output.

Credit has an effect on the business cycle. Rapid growth of credit in the beginning and middle stages of an expansion finances investment and consumption growth. Consumers and investors spend beyond their income, which stimulates the economy, but lays the foundation for a contraction. During a contraction, consumers, who are pessimestic about employment and income, cut back consumption and repay debt. The decline in consumption is greater than the decline in income because of this need to repay debt. Consequently, credit tends to amplify cycle movements.

Now these are a very incomplete description of an endogenous approach to business cycles, but it does emphasize the interrelationships of income, costs, wages, profits, investments, and demand.

External Causes

Some theories of business cycles emphasize external causes or shocks. External causes could be war, earthquakes, new discoveries, Federal Reserve actions, etc. Additionally, there could be a war or a sudden change in the price or availabilty of a key input such as oil. Technology can also dramatically change economic activity although it usually takes time for a technological change to have an impact.

Certainly, there could also be a combination of external and internal factors. In fact, many economists feel that both internal and external causes are important. Consequently, each business cycle is different. Normally, it is thought that variations in aggregate demand drive the business cycle. Most of the time that variation comes from changes in consumer demand, which makes up 2/3's of spending. Occasionally, it is something else, in the 1970's, oil shocks, both in price and supply, had huge impacts on western economies. In the first decade of the 21st Century, it is a change in business (investment) spending that is the culprit.

Economic Policies toward Business Cycles

Traditionally, in economics, fiscal and monetary policies are viewed as the means to either control or subdue business cycles. During an economic contraction, expansionary fiscal and monetary policies are desirable. At some point in an economic expansion, restrictionary fiscal and monetary polices become necessary. It is not possible to eliminate business cycles with these policies but lessen the negative effects of these business cycles.

One of the problems with this approach is that each business cycle is different. In the business cycle in early 2000's, stimulative fiscal policies using tax cuts did not stimulate the economy. Although the economy did recover, it was clear that increased consumer spending did not occur. One of the problems may have been that the tax cut was aimed at the wrong income segment, the wealthy. The wealthy do not necessarily spend the savings from tax cuts, they save it. If there is a demand for savings for investment, then that might have helped, but there wasn't. In fact, the problem was that demand for investment was low. Computer spending, which has driven business spending in the 1990's had tapered off, industry had what it needed. Business spending began to recover in late 2003. Most of that was to replace worn out assets acquired in the 1990's. It had very little to do with tax cuts.

From the above discussion, it should be clear that generic policies on business cycles do not always work.

My view on the future is brighter. This is my personal opinion so take it for what it is worth. Research and development spending, while it did drop some the 2000's, it didn't drop much. Dramatic new technologies are being developed. Private space flight has started. Conversion of energy sources from oil to hydrogen has started. These developments will spur business spending. That is the good news.

Measurement and Forecasting

There is no single statistic or indicator that tells you where you are in the business cycle nor how much longer a recession or expansion will continue. What is available are indicators that confirm an expansion or contraction, or give a clue that conditions may change. No indicator performs well 100 percent of the time.

Diffusion Index

Indices formed from indicator series can be constructed mathematically in one of two ways, with many variants; composite index and diffusion index. Diffusion indexes give a measure of strength of the underlying movement. Usually a percentage of the components in the data series that are showing an increase or decrease are reported. If the S&P 500 index increases, it provides valuable information if the number of winners and losers are also reported. For example, 500 stocks up, a,700 stocks down, and 300 no change. This helps to gauge the breath and strength of the increase providing a clue as to its duration. Diffusion indexes usually reach their peak or trough before the reported aggregate index.

Composite Index

A composite index is an agglomeration of several data series. It is reported as a numerical value such as the S&P 500 index at 3,336.4 or up 1.5%. The combining of the series can be additive, simple averaging or a weighted average. The best known example of such a series is the Dow Jones Industrial Average which is quoted daily in the business news.

Economic Indicators

Indicators can be a simple statistic such as the unemployment rate, a time series such as a price index which measures the inflation rate, or a composite index such as the S&P 500 which measures stock prices.

Business cycles indicators are classified into three categories: leading, coincidental, and lagging. Leading indicators generally confirm direction up to four to six months in advance. They do not indicate strength. Coincident indicators confirm the current direction. The ratio of coincident series divided by the lagging indicator series signals turning points - when contraction turns to expansion and vice versa.

The best known indicator is the Index of Leading Economic Indicators (LEI) published by The Conference Board. It is an aggregation of 10 separate data series. The LEI is reported as a percentage change on a monthly basis.

Leading Economic Indicators

1. Average factory work week
2. Average weekly initial claims for unemployment insurance
3. Manufacturers new orders for consumers goods
4. Vendor performance (delivery lead times)
5. New contracts and orders for plant and equipment
6. New building permits
7. Change in yield curve (10 yr note yield minus Federal Funds rate)
8. Stock prices (as measured by S&P 500)
9. Money supply (M2)
10. Consumer expectations

The LEI, on average, leads economic activity by approximately six months. Fluctuations from month to month mean that a given change in one month may not be a reliable guide to the future. Generally three or four months of changes in the same direction are needed to confirm a fundamental change in the economy.

Composite Index of Coincident Indicators

- Unemployment Rate
- Personal Income

- Sales of Retail Stores

Lagging Indicators

- Business expenditures, new plant & equipment
- Labor cost per unit of output, manufacturing sector

The ratio of the coincident to the lagging indicators tends to signal turning points in the economy in advance of the leading indicators.

Business Cycles, Government Revenues, and Expenditures

Government revenues and expenditures are impacted by changes in economic activity within the business cycle. Cyclical elements of a government budget that vary are transfer payments and taxes. Consequently, the budgetary surplus or deficit can be attributed to structural and cyclical causes. The structural budget represents revenues and expenditures when the economy is operating at its normal level.

Let's try an example: G = $400, T = .2Y, Transfer payments = $150,000/Y, Debt = $8,000, i = 10%, GDP = $1,500, Potential GDP = $1,800

Deficit at FE GDP = .2(1800) - 400 - 150,000/1,800 - 10%(8,000) = (923)

Deficit at Current GDP = .2(1500) - 400 - 150,000/1,500 - 10%(8,000) = (1,080)

Actual deficit - structural deficit[deficit at FE] = cyclical deficit

Note: the cyclical deficit as a percentage of the total deficit is 7.7%.

Unemployment

At some point in time in your life, you will be unemployed. Very few escape this fate. Worse, very few have saved enough cash reserves in case of such an event. While the consequences for individuals are frightening, the effects on society can be catastrophic. Unemployment is considered one of the major economic problems.

Effects of Unemployment

There are effects to individuals and effects to society. As outlined above, the effects to individuals can not only be a loss of income, but a loss of home, car, family, and diginity. As many individuals become unemployed, society begins to show social stress. Government, religious institutions, and private foundations all provide services to help those in need. Higher unemployment may strain some of those programs beyond their capacity.

Many social statistics such as rates of suicide, divorce, child abuse, alcoholism, drug abuse, and the crime rate, show some correlation with the business cycle.

Okun's Law

What are the costs to society from lost production due to unemployment? An advisor to President Johnson, Professor Okun, noticed that for every one percent of unemployment above the natural rate of unemployment, GDP declined 2.5 to 3.0 percent (I use 3% because it is easier). This has become known as Okun's Law. Simply put, all those people you see on street corners carrying those signs like "will teach for beer", when they do work, increase aggregate supply so that you and I can enjoy a higher standard of living. It is in everyone's interest that they do work.

Causes of Unemployment

What are the causes of unemployment? They are seasonal, frictional, cyclical, and structural. Seasonal unemployment results from annual changes such as winter slow downs in construction in the "Great White North." Frictional unemployment results from job termination due to voluntary motives or for cause (poor work performance or attitude). People re-entering the work force seeking jobs are also classified as frictional unemployment. Structural unemployment is the result of permanent shifts in the pattern of demand for goods and services, or from changes in technology. As an example of the latter, imagine being employed as a horse carriage maker in 1900. Within years, your industry will be obsolete, and you will be unemployed. (I wonder if history is about to repeat itself with internal combustion engines being replaced by fuel cells). Considering the former, a shift in preferences from sports cars to four-wheel drives has changed employment in the auto industry. Finally, cyclical unemployment is caused by declines in GDP during periods of contraction in business cycles. Construction and auto manufacturing industries are highly cyclical.

Natural Rate of Unemployment and Frequency of Unemployment

Combining the structural and frictional causes of unemployment gives us the natural rate of unemployment. It is thought that this is the floor or bottom limit to unemployment rate can fall to. Generally, the agreed rate is around five percent. When the unemployment rate falls to this level, it is said that we are at full employment.

If unemployment falls below this level, it is because of very high aggregate demand. Inflationary pressures result as wages increase in this tight labor market. What determines the natural rate of unemployment? One, it is the organization of the labor market. Central postings of job information, job search agencies, etc., help match employee-employer, lowering search time and length of unemployment. Secondly, demographics. When baby waves hit the labor force, unemployment increases. Equal numbers of employees spread across the age brackets, lowers unemployment. Thirdly, the persistence of job seekers. Finally, the number and type of jobs supplied. If jobs are high technology, and the labor force is low tech, then that mismatch causes unemployment.

Some people such as those in the automobile industry, seem to experience a higher frequency of unemployment. This is due to the variability of demand in that industry. Another determinant of the frequency of unemployment is labor force growth. Surges of new entrants caused by baby waves make life difficult for those baby boomers that must face intense competition throughout their life for jobs.

Unemployment Policies

So what can be done to reduce unemployment? For cyclical unemployment, use fiscal and monetary policies to moderate business cycle swings. For structural unemployment, put into place relocation, re-education, counseling, local economic growth, and incentive programs. In the case of frictional unemployment, put into place state unemployment agencies, better job search programs, and unemployment compensation.

Unemployment can never be reduced to zero. Nor is it desirable. In a dynamic economy people need to be free to find the best job for their abilities. It is important to employers to find the best person for the job. Jobs change, people's abilities improve and expansion creates new opportunities while outdated industries slowly contract, thus providing a labor market of buyers and sellers. In the United States there has been a massive shift into information services. Networking and computer skills are in high demand. Consequently many people return to college to acquire new computer skills to enter new higher paying jobs leaving their old jobs. For new industries to grow, labor must be freed from old industries. In the industrial revolution, labor migrated from farming into manufacturing. This was made possible by productivity improvements in farming.

Measuring Unemployment

If we have zero unemployment, then absolutely everyone is working, right? Not exactly, An employed person is someone of working age that is working at least 20 hours a week. An unemployed person is someone of working age who is available for work and has actively sought employment during the previous four weeks. Adding the employed and the unemployed together equals the labor force. Dividing the unemployment by the labor force gives us the unemployment rate. The employment rate is the number of employed divided by the employable population. Consequently a 5% unemployment rate does not imply a 95% employment rate. They are calculated using a different base. Another related measure is the labor force participation rate, which is the labor force/employable population. Currently that number is approximately 65% for the US.

Summary of Labor Statistics

Unemployed	10
Employed	90
Employable Population	200
Labor Force	100
Unemployment Rate	10%
Employment Rate	45%
Labor Force Participation Rate	50%

State of Confusion Labor Statistics

Employed	200,000
Unemployed	10,000
Employable Population	500,000
Population	800,000

Problems & Exercises

1. From the above data, compute the unemployment rate.
2. From the above data, compute the employment rate.
3. From the above data, compute the labor force and labor force participation rate.

   Labor Force: 10,000 + 200,000 = 210,000

   Labor Force Participation Rate: 210,000 /500,000 = 42%
4. From the above data, what would be the maximum number of discouraged workers?
5. Given the natural rate of unemployment is 3%, what is the cost, if any, of excessive unemployment using Okun's Law?
6. Given a natural rate of unemployment of 2%, and an actual unemployment rate of 3% for year 1 and 3.5% for year 2, what is the cumulative cost of excessive unemployment?

Answers & Solutions

1. 10,000 / (10,000 + 200,000) = 4.8%
2. 200,000 / 500,000 = 40%
3. Labor Force: 10,000 + 200,000 =210,000
   Labor Force Participation Rate: 210,000 / 500,000 = 42%
4. 500,000 - 210,000 = 290,000

   Note: It is unlikely that all of the 290,000 nonparticipating workers are discouraged.
5. 4.8% - 3.0% = 1.8 * 3.0 = 5.4%
6. 3.0 + 3.5 = 6.5 - (2 * 2) = 2.5%

Inflation

Inflation is a continuing increase in the general price level. An increase in the price of Big Mac does not necessarily imply inflation, it could be due to supply and demand conditions in the burger market.

Effects of Inflation

When there is an inflation, there are winners and there are losers. If you hold debt and your income goes up, you are essentially paying it off with cheaper dollars. You are one of the losers. Consequently, you if hold debt, the real purchasing power of that investment is declining, you are one of the losers. As governments tend to be one of the largest issuers of debt, they gain from inflation. Holders of debt are not entirely helpless. To the extent they can anticipate inflation, they increase the interest rate demanded.

If your wages increase faster than the rate of inflation, then you are a winner. If not, you lose. Even rising profits may not be enough, if they do not rise faster than the rate of inflation. In fact, due to accounting procedures, profits during an inflation tend to rise but it due to depreciation being recorded at historical cost rather than replacement cost. Consequently, those profits are illusionary. The true cost of production is understated, thus causing profits to be overstated.

Clearly, people will strive to protect themselves from inflation. These protection actions may detract from economically productive activities. For example, speculation, hoarding capital into overseas investments, etc. Secondly, economic data is distorted. We will talk at length about price indexes and how they are used to adjust economic data. Finally, the environment of uncertainly will curtail investment to very short term projects.

If everyone knows that inflation is going to rise 6% next year, then why care? While prices rise 6%, so will nominal wages thus keeping purchasing power unchanged. This assumes that inflation was anticipated, and anticipated correctly. If there is an error in anticipation, we have the problems where prices and wages did not adjust in relative proportion. To the extent that inflation increased by more than the expected amount we have unanticipated inflation. Unexpected decreases in inflation can gave undesirable consequences, unemployment.

Causes of Inflation

A major question is what causes inflation, and then how do you stop it.

Money Supply

Empirical evidence supports the idea that excessive increases in money supply is the major determinant of inflation. Milton Friedman has documented this relationship in his Monetary History of the United States. The quantity theory of money also supports this assertion. Based on these results, monetary aggregates such as M-2 or M-1 should be good leading indicators of inflation but recent experience suggests this relationship may not be quite as strong. Globalization of the American dollar and liberalization of constraints on capital movement may be the reasons.

Demand Pull Inflation

Demand-pull is the case of too many dollars chasing too few goods. It is also a continual increase in aggregate demand. A large tax cut puts cash into consumers' hands that rush out to spend it. Since aggregate supply hasn't increased, price must increase.

It is thought that the excess extension of credit is a factor in generating excess aggregate demand that triggers inflation.

Cost Push Inflation

Cost-push inflation can occur when a key cost such as labor or raw material increases to such an extent as to cause the product price to be increased. Another way of looking at it is that aggregate supply has decreased compared to aggregate demand. Workers are not supplying the quantity of goods and services they desire.

Wage Price Spiral

After inflation starts, it very often becomes a combination of cost-push and demand-pull called a wage-price spiral inflation. Wages push up costs, which pushes up prices, which causes workers to demand higher wages to repeat the process again.

Expectations

This brings up the issue of how people form expectations about the future. There are two main concepts. The first is adaptive expectations and the second rational expectations. Adaptive expectations base predictions on the recent past. For example, the best forecast of today's weather is yesterday's. If inflation was 5% last year then according to some interpretations of adaptive expectations, the forecast of inflation for this year will be 5%. But what if inflation before the previous year was 4%? According to some critics of adaptive expectations, people would naively still pick 5% when 6% might be in line with the trend. Other models of adaptive expectations do take into account trends.

Rational expectations states that people base predictions on a model, although it doesn't specify what this model could be. With a knowledge of economics, presumably one would consider several factors such as monetary growth, exchange rates, consensus opinion, etc. The counterargument to rational expectations is that not everyone is so knowledgeable nor does that prevent forecast errors.

What do these differences imply? There are two main issues with these differences, speed of adjustment and systematic forecast errors. Critics of adaptive expections state that adaptive forecasts are slow to adjust and thus contain systematic errors.

An adaptive expectations example, during a burst of inflation more people will go shopping with their new cash. Firms are fooled into believing that this is a real increase in demand for their product. Consequently, they increase price but also production. Later, they find their costs have also risen and will have to cut production to contain per unit costs and maintain profitability. So the increase in aggregate supply is short lived and is due to a forecast error.

In rational expectations, neither firms nor workers are fooled so prices and wages adjust quickly. There is no change in output. It has been argued that certain types of macroeconomic policies will not have an effect because of this behavior. I will leave that discussion to a more advanced course.

Inflation Policies

To control inflation, that old adage, an once of prevention is worth a pound of curve surely applies. Most countries have central banks that supervise the money supply. As long as the central bankers encourage the money supply to grow only at the rate of real growth of the economy, inflation from that cause will be subdued.

Indexing tax tables and interest on government bonds not only protect tax payers and bond holders but remove important incentives for governments to engage in inflationary policies. Maintaining a balanced budget over time also serves to dampen inflationary pressures from excess government spending.

Demand and supply shocks from outside the country are much more difficult to control. When the price of oil rises significantly, governments may purposely engage in inflationary policies by printing money, to lessen the real impact of higher oil prices.

Confidence is a major issue in controlling inflation. A successful central bank and government can lower expectations of an inflation, which in itself may be a contributing factor to some inflations.

Measuring Inflation

Commonly used indicators of inflation include the Consumer Price Index (CPI), Producer Price Index (PPI), GDP Deflator, and Employment Cost Index (ECI). The GDP Deflator is the broadest of the indexes as it measures pricing for all goods and services produced or purchased, while the CPI is limited to items purchased by consumers but does not include items such as taxes, which are a substantial part of consumer costs nor interest on borrowings. There are different versions of the CPI, one for wage earners and another for urban consumers which is the broader of the two indexes. The PPI is an index of producer prices for goods but does not measure services. There are actually three indexes for PPI: finished goods, intermediate goods, and crude goods and materials. Employment costs are measured by the ECI. These costs include payroll taxes as well as wage and benefit payments. Certain commodity prices are used as indicators by some economists. Construction mechanics of indexes are discussed in detail under the price index section.

The earliest signs of inflation usually appear in commodities prices. However, commodity prices are very volatile and it is difficult at times to discern a clear trend that is signalling an inflation.

One broad indicator that the Fed is currently using is the PCE deflator (Personal Consumption Expenditures). It has the advantage of measuring the broadest line of consumer expenses.

Indexes

Inflation is measured by comparing changes in price levels through a price index. Economic data is very often adjusted by price indexes to reflect real purchasing power. Unfortunately there are many ways to construct a price index and each method yields a different estimate of inflation. Let's briefly discuss a few of the major types of price indexes. In Table 1.0 are the prices for goods and services for a simple economy for a country let's call Deseas Suenos.

Table 1.0

Data

	Price Per Unit			Quantity		
	2001	2002	2003	2001	2002	2003
Housing	7,200	7,600	8,000	50	54	54
Transportation	4,200	4,100	4,200	80	85	91
Entertainment	8,000	8,800	9,200	200	220	240
Food	6,600	6,400	6,500	100	102	104

A very simple price index would be unweighted.

$I = (P_n) / (P_0) * 100$

where P_n is the price in the nth year and P_0 is the price in year 0.

Using 2001 as the base year, P_0:

P_{2001} = \$7,200 + 4,200 + 8,000 + 6,600 = \$26,000
P_{2002} = \$7,600 + 4,100 + 8,800 + 6,400 = \$26,900

I = \$26,900/26,000 * 100 = 103.46

2002 prices were 103.46% of the base level or put another way prices increased 3.46% from 2001 to 2002.

There are two major problems with using an unweighted price level index. One, by changing the definition of a unit you change the price and therefore the index. For example, the price of a liter vs. the price of a kiloliter of oil. Secondly, it doesn't reflect the actual costs as quantities are missing. Before considering techniques incorporating weighting let's calculate nominal GDP using price times quantity from the data provided. This will serve as a baseline calculation for later comparisons.

Table 1.1

Nominal GDP

	2001	2002	2003
	$P_{01}Q_{01}$	$P_{02}Q_{02}$	$P_{03}Q_{03}$
Housing	360,000	410,400	432,000
Transportation	320,000	348,500	382,200
Entertainment	1,600,000	1,936,000	2,208,000
Food	660,000	652,800	676,000
Nominal GDP	2,940,000	3,347,700	3,698,200
Nominal GDP Growth		13.87%	10.47%

Growth for the years 2002 and 2003 looks strong. How much of that is real growth? We need to consider removing the price level changes. The key is to measure the value of the change in quantity. Prices can be weighted by quantities that exist at the beginning of the measurement period (base period weighting), end of the measurement period (terminal period weighting) or a chain weighting.

The Laspeyres technique uses base period quantities as the weighting factor. The Laspeyres price index is calculated as:

$I = (P_n Q_0) / (P_0 Q_0) * 100$

Table 1.2

Laspeyres Price Index

	2001	2002	2003
	$P_{01}Q_{01}$	$P_{02}Q_{01}$	$P_{03}Q_{01}$
Housing	360,000	380,000	400,000
Transportation	320,000	328,000	336,000
Entertainment	1,600,000	1,760,000	1,840,000
Food	660,000	640,000	650,000
Total	2,940,000	3,108,000	3,226,000
Laspeyres Index	100.0	105.71	109.73

To find inflation for:

2002 (105.71 - 100.00)/100.00 = 5.71%

2003	(109.73 - 105.71)/105.71 = 3.80%

Laspeyres is known as a fixed-weight price index. It compares the cost of fixed quantity of goods and services from a base year to the cost of that quantity in subsequent years.

Laspeyres has a tendency to overstate inflation. Some of the items included in the fixed quantity become expensive relative to other goods. For example, beer. Consequently, consumers may switch to a cheaper alternative, wine. However, Laspeyres is still measuring prices on a good that consumers consume much less of.

A disadvantage for Laspeyre index is that it does not take into account changes in product or quantities which may be due to changes in the product or its relative importance. An example of the former is records replaced by CD's and of the later, polio vacines.

The next technique for weighting uses terminal period quantities as weights. Called the Paasche Index it is calculated as:

$I = (P_n Q_n) / (P_0 Q_n) * 100$

Table 1.3

Paasche Price Index

	2001	2002	2003
	$P_{01}Q_{03}$	$P_{02}Q_{03}$	$P_{03}Q_{03}$
Housing	388,800	410,400	432,000
Transportation	320,000	373,100	382,200
Entertainment	1,920,000	2,112,000	2,208,000
Food	686,400	665,600	676,000
Total	3,315,200	3,561,100	3,698,200
Paasche Index	100.0	107.42	111.55

To find inflation for:

2002	(107.42 - 100.00)/100.00 = 7.42%
2003	(111.55 - 107.42)/107.42 = 3.84%

Paasche is a variable-weight price index. It computes costs on the currently consumption of goods and services to compare with prices of earlier periods.

A problem for Paasche Indexes is the recalculation of all previous years when a new year is added. When new products are added, comparisons with previous years may suffer as it is impossible to price products not in existence.

A Paasche price index can understate inflation to the extent that consumers substitute cheaper priced goods for more expensive ones. For example, let's say Coke increases 30% but Pepsi only 10%, then Coke drinkers will switch to Pepsi. The index will reflect the inflation of Pepsi more than that of Coke. People may actually have preferred Coke but because of inflation they have had to give it up. A Laspeyres price index would weight the Coke inflation more than the Pepsi based on the initial consumption quantity of Coke. Some would argue that may be overstating inflation as cheaper alternatives were available in later periods.

In what some consider a variant of the Paasche price index, GDP Deflator indexes were used to compute real GDP until recently replaced by the chain weighting methodology.

Table 1.4

GDP Deflator

	2001	2002	2003
	$P_{01}Q_{01}$	$P_{01}Q_{02}$	$P_{01}Q_{03}$
Housing	360,000	388,000	388,800
Transportation	320,000	340,000	364,000
Entertainment	1,600,000	1,760,000	1,920,000
Food	660,000	673,200	686,400
Real GDP	2,940,000	3,162,000	3,359,200
Nominal GDP	2,940,000	3,347,700	3,698,200
GDP Deflator	100.00	105.87	110.09

To find inflation for:

2002 (105.87 - 100.00)/100.00 = 5.87%

2003 (110.09 - 105.87)/105.87 = 3.99%

The GDP deflator is a variable weight price index as opposed to a fixed weight index such as Laspayres. It is a weighted average of percentage changes of the major components of GDP. Nominal GDP is divided by real GDP to arrive at the GDP deflator. In this sense the deflator is often called the implicit GDP deflator as it is the result and not a calculated index in the manner of Laspeyres or Paasche. Recently, it has been converted over to a chain-type price index, the next subject we will cover.

There is yet another index technique called chain weighting, also called a Fisher index. This method adjusts the relative-price weights between years to the changing composition of production. Chain-weighting averages the prices for two adjacent years, multiplies this average price by the production and sums the results by year. The ratio of those sums gives the ratio of chain-weighted GDP for those years. One problem with chain weighting is that the indexes are not additive over the time periods. This makes comparisions somewhat difficult.

Table 1.5

Chain-Weighting

Average Price Per Unit		
	2001-2002	2002-2003
Housing	7,400	7,800
Transportation	4,050	4,150
Entertainment	8,400	9,000
Food	6,500	6,450
Market Value at Ave Prices		

	2001	2002	2002	2003
Housing	370,000	399,600	421,200	421,200
Transportation	324,000	344,250	352,750	377,650
Entertainment	1,680,000	1,848,000	1,980,000	2,160,000
Food	650,000	663,000	657,900	670,800
	3,024,000	3,254,850	3,411,850	3,629,650
Ratio to base year	1.0	1.0763	1.0	1.0638

Inflation for 2002 is 7.63% and for 2003 it is 6.38%.

Note: I am using a simplified arithmetic average, actual calculations use geometric weighting which is described in the growth section of these notes.

In table 1.6 we summarize and calculate the real GDP based on the above methodologies.

Table 1.6

GDP Growth Rates

	2002	2003
Nominal GDP	13.87%	10.47%
Laspeyres	8.16	6.67
Paasche	6.45	6.63
GDP Deflator	8.00	6.48
Chain-weighting	6.24	4.09

Growth rates are calculated by subracting from nominal growth the portion attributed to price. For example 2002 nominal minus Laspeyres = 13.87 - 5.71 = 8.16%.

Each of these procedures yields a different estimate of inflation and growth. They all have their mathematical biases. But even when a procedure has a bias, it may still be useful when comparing it over time. Under any of these calculations, an economy experiencing growth will reveal itself. It is probably wise not to attach too much importance to a single growth rate in a single period. Instead, look at several periods of data.

It is interesting to note that Laspeyres gives the highest cumulative growth rate (14.83%) for the two years and that chain-weighting gives the lowest (10.33%). Don't expect these relationships to be always true. One of the important lessons to be gained from this exercise is the analysis required when comparing two different countries using a different price indexes. If Mexico claimed an annual growth rate of 7.4% using the Laspeyres technique and the United States reported a growth rate of 6% using chain-weighting, then one could not necessarily conclude that Mexico is growing faster.

From these techniques, literally thousands of inflation indexes are published each year for various countries, regions, states, etc. The US Dept of Labor publishes most of the major US indexes. The most widely known is the Consumer Price Index (CPI). Very often it is interpretated as the indicator of inflation by the press. It only measures prices of consumer goods. Among the excluded are items such as education, taxes, and interest rates. Some of these items are included in the broader Cost of Living Index.

Another index, the Producer Price Index (PPI), reflects producer and wholesale prices. Usually but not always, an increase in the PPI will be reflected in the CPI four to six months later as businesses pass on their cost increases to their customers.

Both the CPI and PPI used to be Laspeyre type indexes. Every few years these indexes were updated to reflect new products and services. Now they are chained.

New indexes incorporating new techniques are constantly being developed. The trend has been to convert or create chain-weighting indexes

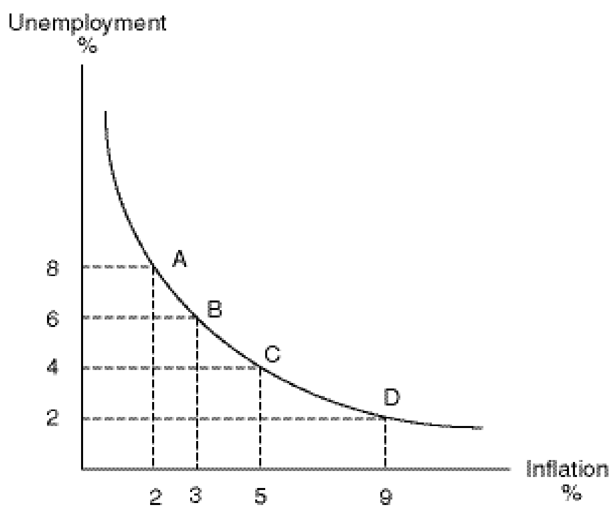
The government has a keen interest in measuring inflation as both its tax tables and benefits are indexed to inflation. (Please refer back to the product market discussion for the details of the effect of inflation on taxes.) If the index is overstating the true rate of inflation then tax collections will be less (as the income tax brackets rise) and benefit payouts will be more. Other programs will suffer as the government struggles to maintain a balanced budget. If the government can substitute an index that doesn't overstate inflation then tax collections rise and benefit payments decrease. A committee of economists has proposed such an adjustment and it should save the government substantial funds.

To summarize this complex material on price indexes it is important to realize that there is no one universally agreed on measure of inflation. Each index has it uses. The method of calculation and what items are included in each index affect its outcome.

The Relationship between Inflation and Unemployment

A British economist by the name of Phillips noticed a negative correlation between the change in wages and unemployment in Britain's economy. Later this work was extended to a negative correlation between inflation and unemployment. This curve was given the name of the Phillips Curve. It was thought that now policymakers could fine tune the economy within the constraint imposed by the Phillips Curve. One had to merely accept the trade-off between lower unemployment and inflation. It sounded so simple, and it was.

Figure 6.0 The Phillips Curve



From Figure 6.0 we see that the trade off between inflation and unemployment is not constant. Moving from point A to point B reducing unemployment by 2% costs 1% in additional inflation. Moving from point C to point D reducing unemployment 2% costs an additional 4% inflation. Policymakers must decide which is worse a little unemployment or inflation.

Misery Index

In the late 70's, reality struck. The U.S. economy suffered high inflation and high unemployment on top of a stagnant economy. It became known as stagflation, something that wasn't supposed to happen under the Phillips Curve theory. With the presidential elections in 1980 between Jimmy Carter and Ronald Reagan, a new term coined by Reagan's advisors called the Misery Index was used. Adding the inflation rate and the unemployment rate together, the Republicans asked the electorate if they were better off than four years earlier. The Misery Index provided an easy answer. Ronald Reagan won.

The empirical evidence supporting the Phillips curve seems somewhat weak. Inflation is not the trigger of employment as suggested. There is somewhat stronger evidence that it takes a recession to tame a high inflation. Because a recession imposes such high social and economic costs, central banks fight to keep inflation low so as to not use the recession weapon. If a low inflationary environment is good for economic growth then there may be a case to argue for a correlation between low inflation and low unemployment.

Problems & Exercises

Year	1	2	3
	450	495	510

1. Table 1.0: What is inflation between years 1 and 2?
2. Table 1.0: What is inflation between years 2 and 3?
3. Table 1.0: If real wages increased 3% between years 2 and 3, what was the increase in nominal wages?
4. Table 1.0: If nominal wages increased 6% between years 1 and 2, what was the increase or decrease in real wages?
5. Table 2.0: Fill in the blanks.

Year	1	2	3
Employed	200	180	240
Unemployed	50	20	60
Labor Force	250	200	300
Employable Population	500	500	500
Unemployment Rate	20%	10%	20%
Employment Rate	40%	36%	48%
Labor Force Participation Rate	50%	40%	60%

Answers & Solutions

1. (495 - 450) / 450 = 10.0%
2. (510 - 495) / 495 = 2.9%
3. 2.9% + 3.0% = 5.9%
4. 6% - 10% = -4%, real wages decreased 4%
5. Table 2.0 Employment Data

Year	1	2	3
Employed	200	180	240
Unemployed	50	20	60
Labor Force	250	200	300
Employable Population	500	500	500
Unemployment Rate	20%	10%	20%
Employment Rate	40%	36%	48%
Labor Force Participation Rate	50%	40%	60%

Growth

Everyone dreams of doing better. So it isn't surprising that growth, particularly, per capita growth is one of the major macroeconomic goals of society. Small changes in growth rates can effect dramatic changes in national and individual wealth over a period of several years.

Effects of Growth

In a simple word, wealth. It is important to understand that the real goal of growth is not simply more wealth but more wealth per person. It means standards of living increase over time. It also means that that countries experiencing higher economic growth gain more policital influence on the planet.

It is assumed, or it hope, that this growth will be spread out among the general population but that doesn't have to happen. Disparities in income can drive political turmoil.

Causes of Growth

Economists account for growth by dividing it into three components: increases in labor, increases in capital, and increases in the total factor productivity.

Labor growth is due to increases in the number of people working. Capital growth occurs when workers have more machinery to produce more product. Total factor productivity (TFP) improves when capital and labor are both utilized more efficiently. Technological improvements and production/operational innovations drive TFP growth. In short TFP is a measure of the efficiency of the economy. The importance in this argument lies in per capita increases of GDP. Without TFP, per capita increases are limited to increases in capital per person. Having TFP is important to achieve good economic growth.

To have long term sustainable growth then TFP must increase. Much of Asia’s growth has been due to an increase in labor force participation rates and some increases in capital stock. At some point in time this growth will cease as this rate reaches its limit, the employable population. Likewise additions in capital will generate less additional output due to diminishing marginal returns.

What is necessary for TFP to increase? In other words, how does society promote technological progress and productive innovation? Educational improvements, infrastructure, and a culture of change are among the elements many consider necessary for TFP growth.

Harrod-Domar Growth Model

This basic model stipulates what determines the maximum growth rate. It is very simple, G = APS / (Capital output ratio). G = growth rate, and APS = average propensity to save (the savings rate). Savings finances investment, the capital output ratio determines the increase in output attributable to that investment. Given that savings is a function of income, this model provides an explanation as to why poor countries remain poor, a low savings rate does not support economic growth. Note that this model doesn't take into account total factor productivity nor does it establish the other conditions necessary for growth.

Numerical Examples

Problem 1

Let's say that the savings rate = 6% with a 4.0 capital to output ratio, what is the maximum economic growth rate?

Solution:

6% / 4.0 = 1.5%

Problem 2

Let's say that the savings rate = 6% with a 3.0 capital to output ratio, what is the maximum economic growth rate?

Solution:

Economies with a more efficient use of capital, a lower capital to output ratio, will have a higher growth rate. 6% / 3.0 = 2.0% , which is higher than the 1.5% previously.

Problem 3

Continuing with our example let's say the savings rate increases to 8%, using the capital to output ratio of 4, what is the maximum economic growth rate?

Solution:

8% / 4.0 = 2.0% An economy with a higher savings rate will experience a higher growth rate.

Problem 4

Let's say that the savings rate = 2% with a 5.0 capital to output ratio, what is the maximum economic growth rate?

Solution:

2% / 4.0 = 0.5%, countries with a subsistence economy have a real problem in this model.

Problem 5

Let's say that the savings rate = 6% with a 6.0 capital to output ratio, what is the maximum economic growth rate?

Solution:

6% / 6.0 = 1.0%, the moral of the story is that high savings rates do not necessairly produce high growth rates.

A Simple Limit to Growth

From the aggregate supply side comes yet another measure of growth, the sum of labor supply growth and productivity growth. The addition of the two gives a limit to growth. There is some logic to support the assertion that in the long run aggregate supply is the constraining factor to growth. Assuming that what is supplied is what is demanded (i.e. not producing goods that no one wants or can use), then the payments to the factors of production necessary to obtain supply become the income that generates demand to buy the production. As long as there no demand shocks or economic crisis such as occurred during the Great Depression, this theory works.

This formula is similar to the formula provided by accounting of economic growth. Here productivity encompasses the other factors. For example, growth in capital which is explicitly included in earlier models is simply a part of productivity increases. This is a simple, understandable, and relatively easy to use measure.

Numerical Examples

Problem 1

Let's say that the labor supply grows at 1% and productivity at 3%, what is the maximum growth rate of the economy?

Solution:

1% + 3% = 4%

Problem 2

Let's say that the labor supply grows at 1% and productivity at 5%, what is the maximum growth rate of the economy?

Solution:

1% + 5% = 6%; Note here that if productivity grows faster than the labor force then per capita growth is occurring. This type of growth is preferrable to just growth occurring due to labor force growth.

Economic growth creates middle class countries. Middle class countries adopt higher labor standards and tend to spend more to protect the environment. Population growth in middle class countries tends to be close to zero. These reasons are why economic growth is desirable as an end onto its self.

Measuring Growth

The problem centers on measurement of the different components of growth. Typically the equation used to account for economic growth is stated as:

$\Delta Y/Y = \Delta A/A + \Delta K/K + (1-A)\Delta L/L$

Where is the contribution of increased productivity, is the contribution of increased capital, and $(1-A)\Delta L/L$ is the contribution of increased labor. Q represents capital's share of output and (1-A) represents labor's share of output.

Labor and capital can be directly measured but not total factor productivity. It is calculated as a residual:

$\Delta A/A = \Delta Y/Y - (A\Delta K/K + (1-A)\Delta L/L)$

Numerical Examples

Problem 1

Let's say labor's share of income is .75 and capital's share is .25; what is the growth rate of output given labor growth of 2%, capital growth of 4%, and total factor productivity growth of 3%?

Solution:

.75 * 2% + .25 * 4% + 3% = 5.5%

Problem 2

Let's say labor's share of income is .75 and capital's share is .25; what is the increase in total factor productivity given labor growth of 4%, capital growth of 5% and total growth of 5.0%?

Solution:

5.0% - (.75 * 4% + .25 * 5%) = .75%

Problem 3

Let's say labor's share of income is .60 and capital's share is .40; given labor growth of 2%, capital growth of 4% and total factor productivity growth of 3%, what is the growth rate of output? How does this differ from the situation in problem 1?

Solution:

.6 * 2% + .4 * 4% + 3% = 5.8%

Growth rate is higher than the 5.5% from problem 1. This is due to the higher proportion attributed to capital which has a higher growth rate relative to labor.

Mathematics of Growth

This is a discussion about different methods of calculating growth. It is not material crucial to the understanding of the course. Let's start with a sample set of data used to illustrate growth concepts.

Year	0	1	2	3	4	5	6	7	8	9	10
GDP $Bn	190	210	205	211	234	260	280	318	345	370	400

First, let's compute the percentage increase year-to-year. From year 1 to year 2, (205-200/200=2.5%, from year 2 to year 3 (211-205)/205 = 2.93%. . .

Year	0	1	2	3	4	5	6	7	8	9	10
% Chg	NA	10.53	-2.38	2.93	11.90	11.11	7.69	13.57	8.49	7.25	8.11

Fortunately, our economy only had one year of negative growth. Let's calculate the average growth rate factor the 10-year period. This is what is called the arithmetic mean growth rate.

= (10.53 - 2.38 + 2.93 + 10.90 + 11.11 + 7.69 + 13.57 + 8.49 + 7.25 + 8.11)/10

= 78.20/10

= 7.82%

Let's find the total growth for 10 years: (400-190)/190 = 110.5%

If we divided 110.5% by 10 we find the average rate to be 11.05%, which is different from the 7.82%

we computed. Why? The answer lies in the concept of compounding. The 7.82% is an equally weighted arithmetic average of these returns. Because it's computed year-on-year, it compounds. To give an example, consider your savings account, the interest you earn this year, if it remains on deposit, earns interest next year. $100 at 10% earns $10, next year that $10 itself earns $1. The interest earned on the original $100 is $11 or 11%; but the interest applied to the $110 to get the $11 was 10%.

A more accurate calculation of the interest rate uses a technique called geometric averaging. I mention this technique because this is the way the return rate is computed in presenting the investment performance of portfolio managers and mutual funds. Something of interest to all of us as we save for retirement.

Here are the details of the computations:

$r_g = [(1 + r_1)\ (1 + r_2)\ ...\ (1 + r_y)]^{1/4} - 1$

$= [1.1053 * .9762 * 1.0293 * ... * 1.0811]^{1/10} - 1$

$= 2.1036^{1/10} - 1$

$= 7.72\%$

Note that in year two the rate is subtracted as it was a decrease not an increase. The 7.72% is slightly lower than the arithmetic. That will always be the case, a proof of which is beyond the scope of this course.

To compute the effects of compounding, we use the formula $(1 + r)^n$.

Using our example with the geometric average; $1.0773^{10} = 2.10556$

which means the original $190 * 2.10556 = 400.06 ~ 400

If we used 7.82%, the total would be $403.41, thus not as accurate as the geometric rate. Consequently the geometric technique explains past performance the best; but in predicting future rates, the arithmetic technique is a better predictor.

The power of compounding explains why economists seem so excited by small changes in the economic growth rate.

A quick approximation of the effect of compounding uses the "Rule of 72." It divides the growth rate into 72 to calculate the number of years it takes for income (or wealth) to double. At a growth rate of 2%, it takes 36 years for income to double. At 3%, it takes 24 years. At 4%, 18 years -- less than a generation. Economies rarely grow at more than 4% for extended periods of time.

Again, look at the numbers, the difference between 3% and 4% shortens doubling time by 12 years. In a 4% growth economy, people will notice improvements to their standard of living.

Numerical Examples

Year	0	1	2	3
GDP $Bn	7,000	7,700	8,300	9,200

Problem 1

From the data set above, calculate total growth and average growth rate (using the arithmetic mean) between the beginning of year 1 to the end of year 3.

Solution:

To be calculated.

Problem 2

From the data set above, calculate the geometric growth rate between the beginning of year 1 to the end of year 3.

Solution:

To be calculated.

Problem 3

Using the rule of 72, given an annual growth rate of 2.5%, how many years will it take to double the standard of living?

Solution:

72/2.5 = 28.8 years

Problem 4

Using the rule of 72, let's say you want your income to double within 10 years. What is the annual increase, in percentage terms, that is necessary to accomplish this goal?

Solution:

72/10 = 7.2%

Study Guide

Fill-in-the-Blank

Business Cycles

.

1. Misery index is the sum of the _______ plus the _______.
2. Stagflation is a combination of _______ and _______.
3. _______ indicators are variables whose value lead changes in GDP.
4. Concidental indicators are variables whose value _______ changes in GDP.
5. _______ indcators are variable whose value follows changes in GDP.
6. _____ variation in economic activity that is annual and periodic.
7. _____ variation in economic activity that is unpredictable and erractic.
8. _____ variation in economic activity that is periodic but irregular.
9. Economic expansions can generate the problem of _____.
10. Economic contractions can generate the problem of _____.
11. _____ are whwere economic activity declines.
12. _____ occur as the economy changes direction.

13._____ gives an inaccurate suggestion that a change will take place.

Inflation

14._____ combines several indexes or averages into one index.
15._____ index indicates the strength of the udnerlying movement.
16.A(n) _____ index gives selected components more importance in its calculation than others.
17.To stop an inflation, a central bank may try to _____.
18.Problems of measuring inflation include _____.
19.If a price index moves from 400 to 500 in one year, then inflation would be _____.
20.Real wages have _____ given an inflation of 4% and a nominal wage increase of 1%.
21.Price indexes _____ in the types of goods and services over which they measure inflation.
22.The _____ index is the most popular index used to measure inflation.
23.Demand pull inflation is caused by _______ in aggregate demand.
24.Cost push inflation is caused by _______ in aggregate supply

Unemployment

25.The three main causes of unemployment are _____.
26._____ unemployment is due to employer termination.
27._____ unemployment is due to changes in the pattern of demand or supply.
28._____ unemploymnet is due to changes in economic activity from the business cycle.
29.The "natural" rate of unemployment is the sum of _____ and _____ causes of unemployment.
30.Okun's Law suggests that increasing unemployment by 1% _____ GDP by approximately 3%.
31.Minimizing cyclical unemployment involves the use of _____ policies.
32.Structural unemployment may be best handled by _____.
33.Frictional unemployment may be best treated by _____.
34.Better labor market organization such as internet job postings may _____ the unemployment rate.
35.Social costs show some _____ with unemployment and the business cycle.
36.Workers that stop seeking employment are said to be _______ workers.
37.The Labor Force Participation Rate is _______ divided by _______.
38.The Employment Rate is _______ divided by _______.
39.The unemployment rate is calculated as the _______ divided by _______.

Fill-in-the-Blank Solutions

Business Cycles

1. inflation rate, unemployment rate
2. inflation, high interest rates
3. Leading
4. changes concurrently with
5. Lagging
6. Seasonal
7. Stochastic
8. Cyclical
9. inflation
10. unemployment
11. Contractions
12. Turning points
13. false signals

Inflation

14. Composite
15. Diffusion
16. weighted
17. engineer a recession
18. different items are included in indexes, different mathematical procedures,unrepresentative of actual purchasing patterns, other non-inflationary process may be affecting data
19. 25%
20. fallen 3%
21. vary
22. CPI
23. increases
24. decreases

Unemployment

25. frictional, structural, cyclical
26. Frictional
27. Structural
28. Cyclical
29. frictional, structural
30. increases
31. fiscal and monetary
32. retraining or relocation
33. counseling
34. decrease
35. correlation
36. discouraged
37. labor force, employable population
38. employed, employable population
39. unemployed, the labor force

True-False

Business Cycles

1. Business cycles are uniform in length and amplitude.
2. Recessions are defined as two consecutive quarters of declining economic activity.
3. Economic expansions run the risk of inflation.
4. Economic contractions often have the problem of unemployment.
5. Trend is a constant movement in one direction over time.
6. Seasonal variation is a biannual change in economic activity.
7. Cyclical variation is the pattern of variation over a year.
8. Stochastic variation is variation due to chance.
9. Leading economic indicators are important in assessing direction.
10. Diffusion indexes give a measure of strength of direction.
11. Composite indexes are measured by the number of increases vs. deceases.
12. Major changes in inventories can be a 'trigger' in business cycles.
13. The Phillips curve reveals the relationship between interest rate and inflation.

Unemployment

14. Frictional unemployment is caused by corporate layoffs.
15. Changes in technology or demand can cause structural unemployment.
16. Cyclical unemployment is due to annual demand variations.
17. If you work less than 20 hours per week and are not seeking a full time position then you are unemployed.
18. Only the employed are considered in the labor force.
19. The natural rate of unemployment is affected by factors such as demographics and organization of the labor market.

Inflation

20. Nominal interest rates rise during periods of inflation.
21. Producer price index is considered a leading indicator of inflation.
22. Demand side policies such as tax cuts could trigger demand pull inflation.

True-False Solutions

Business Cycles

1. False, cycles vary in length and amplitude
2. True
3. True
4. True
5. True
6. False, seasonal variation occurs in the period of one year.
7. False, cyclical variation occurs over a business cycle which usually does not occur over a period of one year.
8. True
9. True
10. True
11. False, composite indexes are calculated to give an index number.
12. True
13. False, inflation and unemployment.

Unemployment

14. False, corporate layoffs would be a sign of structural unemployment.
15. True
16. False, seasonal unemployment is due to annual demand variations.
17. False, you fall into the neither world, you neither employed nor unemployed. You don't exist.
18. False, it is the employed plus the unemployed.
19. True

Inflation

20. True
21. True
22. True

Selected Definitions

Coincidental Indicators
Indicators that vary with the business cycle.
Composite Index
An index that contains several data series.

Correlation
A relationship between data. A positive correlation exists when both values increase or decrease together. A negative correlation exist when one value increases while the other decreases.

Cost Push Inflation
Increasing production costs push prices upward.

Cyclical Unemployment
Unemployment that varies with the business cycle.

Cyclical Variation
Economics activity that varies directly with the business cycle.

Demand Pull Inflation
Increasing demand versus supply causes prices to rise.

Diffusion Index
Percentage of items in a time series that are rising.

Employable Population
Population over 16 not in an institution such as jails, nursing homes, etc.

Employed
Over 16 and working on a paid job of at least one hour per week.

Employment Rate
Employed / Employable populaton; aka Employment-Population Ratio.

False Signals
Data or statistic that indicates falsely a change in economic activity.

Frictional Unemployment
Unemployment due to voluntary or involuntary reasons related to finding better jobs.

GDP Deflator
A price index constructed using GDP components.

Inflation
A general increase in prices.

Labor Force
The sum of employed and unemployed.

Labor Force Participation Rate
Labor Force / Employable Population.

Lagging Indicators
Data series that increase (decrease) after general economic activity increases (decreases).

Laspyeres Index
A weighted index that uses beginning period quantities as weights.

Leading Indicators
Data series that increase (decrease) before general economic activity increases (decreases).

Misery Index
The sum of the inflation rate and unemployment rate.

Natural Rate of Unemployment
Unemployment due to frictional and structural causes.

Okun's Law
The loss of GDP due to unemployment in excess of the natural rate of unemployment.

Paasche Index
A price weighted index that uses ending period quantities as weights.

Phillips Curve
A curve graphing the negative correlation between unemployment and inflation.

Recession
Two consective quarters of economic decline.

Seasonal Adjustment
A mathematical adjustment to remove the effects of seasonality.

Seasonality
Economic activity that varies in a pattern that is annual and periodic.

Stagflation
High inflation with high unemployment.

Stochastic
Variation due to chance. Inherently unpredictable.

Structural Unemployment
Unemployment related to job skill changes, changes in industry demand, or changes in the regional economy.

Trend
General direction of data or economic activity.

Turning Points
Statistic that indicates a change of direction in the data or economic activity.

Unemployed
Over 16, not working and have looked for work at least once in the prior 4 weeks.

Unemployment Rate
Unemployed / Labor Force.

Wage Price Spiral
An inflation process where wage increases lead to price increases which lead to additional wages increase which lead to more price changes.