Our interest now turns to the total economy, to the aggregates. Recall the market model that was introduced to you in your introductory economics courses. The price level is measured on the vertical axis, quantity on the horizontal axis. We are unable to accurately measure aggregate economic activity by means of individual prices and quantity, so we turn to two aggregate measures of price and quantity: the gross domestic product (GDP) deflator and real gross domestic product. The GDP deflator is defined as $P_t = \frac{\text{Nominal GDP}}{\text{Real GDP}}$. Gross domestic product is defined as $Y = C + I + G$ where $C$ is consumption, $I$ is investment and $G$ is government expenditure. $P_t$ takes the place of $P$ on the vertical axis and GDP ($Y$) takes the place of quantity ($Q$) on the horizontal axis. We are ready to construct a model to describe the aggregate economy much like the model used for the individual market.

The two curves used when analyzing the market were the supply and demand curves. When we changed from price and quantity in the market model, we had to find similar measures for the aggregate model. Using the supply and demand curves for a single market, e.g. wool or Crayons or watermelon, is inappropriate. We must construct supply and demand curves for the aggregate economy i.e., the sum of wool and Crayons and watermelon, etc. These two curves are postulated to capture the behavior of economy. We start with demand. The aggregate demand curve (AD) has a negative slope like the market demand curve. Recall the market demand curve had a negative slope because of the Law of Diminishing Marginal Utility. However, there is no Law of Diminishing Marginal Utility with the aggregates. To explain why AD has a negative slope we turn to Don Patinkin at the University of Chicago. Patinkin termed his analysis the real balance effect. The real balance effect states $\uparrow P_t \rightarrow \downarrow \omega \rightarrow \downarrow C \rightarrow \downarrow Y$ where $\omega$ is the real value of
wealth consumers hold, C is consumption and Y is real GDP. Thus, Patinkin demonstrated why the AD sloped downward to the right.

In the market model, the supply curve had a positive slope suggesting increasing opportunity costs as output increased. Again we are unable to transfer the market curve into the aggregate so must construct an AS that does not depend on increasing opportunity costs. The reason there is a positive relationship between $P_1$ and Y is that $\uparrow P_1 \rightarrow$ fixed wages $\rightarrow \uparrow \pi \rightarrow \uparrow Y$. This causal chain merely suggests that an increase in the price level while wages are held constant leads to an increase in profit. As profit increases, firms find it more profitable when they increase production. Therefore, an increase in prices cause AS to increase, i.e., AS has a positive slope.

Let’s look at the aggregate model:

![Figure 1](image)

**Figure 1**

The vertical LAS is the long run aggregate supply. Notice the vertical LAS suggests that in the long run real GDP does not depend on the price level. However, does real GDP depend on the price level in the short run? The answer lies in the variables effecting AD and SAS. In class we’ve learned the variables influencing AD, SAS and LAS are:

<table>
<thead>
<tr>
<th>Aggregate Demand</th>
<th>Short Run Aggregate Supply</th>
<th>Long Run Aggregate Supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price Level</td>
<td>Price Level</td>
<td>Labor</td>
</tr>
<tr>
<td>Fiscal Policy</td>
<td>Factor Prices</td>
<td>Land</td>
</tr>
<tr>
<td>Monetary Policy</td>
<td>Resources</td>
<td>Capital</td>
</tr>
</tbody>
</table>
While prices do not impact long run economic activity, the short run is influenced by the price level. Having presented relevant variables to the analysis, it is important we know how they effect their respective curve. Start with AD. A change in the price level, like the market model, causes a movement along the demand curve. Fiscal and monetary policy shift the AD curve. Expectations shift the curve depending whether the expectation is positive or negative. For example, if there were wide spread opinions that the economy were headed for a recession, these expectations may actually cause economic activity to slow even though there was nothing wrong, except widespread pessimistic expectations. On the other hand, if expectation were positive, merely the sentiment that economic activity was about to improve may lead to increased economic activity.

With respect to SAS, an increase in the price level causes an increase in real GDP as demonstrated above. An increase in factor prices leads to a leftward shift in the SAS. Therefore, the price level goes up and real GDP declines. If resources increase, it causes the price of factors to decrease. As a result, an increase in resources causes a rightward shift in the SAS. Likewise with technology. LAS responds positively to labor, land, capital and technology.

The concept of policy has been introduced by way of the AD curve. We frequently encounter information suggesting the government is changing policy so as to effect economic variables such as GDP, unemployment and inflation. Government has two types of policy: fiscal and monetary policy. Fiscal policy deals with government spending and taxes. Monetary policy deals with Federal Open Market Operations, discount rates and the reserve requirement.

To finish the introduction to the Neo-classical macroeconomic model, it is necessary to address deviations from the LAS. When SAS=AD=LAS, we say the economy is in equilibrium. Everyone who wants a job has a job. Economic activity is consistent with its full employment level of resources. However, the economy is not always at its full employment level of GDP. It
may be above or below the GDP level consistent with full employment. When this occurs, the economy is said to deviate from equilibrium. In the dynamic setting, it is said to experience a \textit{business cycle}. The business cycle simply is the deviation of actual GDP from its long run trend or GDP that is consistent with \( \text{LAS} = \text{AD} = \text{SAS} \). Deviations from trend are classified into four categories: trough, expansion, peak and contraction. Trough is described as the bottom of the business cycle. It is the worst place to be in the cycle because not only is the economy far away from trend, the best place for the economy to be, but it is far away on the downside. After the economy goes through its low, it begins to experience an expansion. This is characterized by increasing GDP and employment. Eventually the economy reaches its peak. It is at the highest level of GDP for the cycle. The economy then moves into a period of contraction. These four phases can best be understood graphically.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure2.png}
\caption{Figure 2}
\end{figure}

We plot GDP as it relates to time. Region I represents contraction, II trough, III expansion and IV peak. A word of caution. Actual GDP is not Real GDP. Recall real GDP is adjusted for inflation. Actual GDP is the level of GDP observed in the economy. The line segment \textit{GDP trend} represents the time path consistent with the LAS. On the GDP trend line, everyone who wants a job, has a job. This is the best place for the economy to be. In reality, the economy deviates around GDP trend in a fashion consistent with \textit{GDP Actual}. The further from
the GDP trend that actual GDP gets the worse off the economy. The further from trend in the upward direction, the better off the economy tends to be. However, a problem arises during these peak conditions where inflation rears its ugly head. Inflation sets in and actual GDP begins to fall.

The next step is to bring the AS-AD graph together with the dynamic business cycle model.

When the economy is in equilibrium, LAS=SAS=AD. This is shown in the dynamic model as actual GDP corresponding to trend GDP. In other words, there are no deviations from trend, therefore, no cycle. This time path would be a good path for the economy to follow. Unfortunately, there are outside influences that “shock” the economy and cause actual GDP to deviate from trend GDP.

When actual GDP (AD=SAS) deviates from trend GDP (LAS), it leads to cyclical behavior or the business cycle. Consider the case where AD=SAS to the left of LAS. This is termed a recession. What will happen in the dynamic model? If AD=SAS to the left of LAS, we are in a recession. Therefore, actual GDP is below trend GDP.
When actual GDP (Y1) is less than trend GDP (Y*), the economy is in a recession.

Consider the opposite case when actual GDP is greater than trend GDP. The equilibrium will be to the right of the LAS curve and actual GDP is above the trend GDP.

As indicated earlier, the condition where actual is above trend is a good condition. But the economy runs the likelihood of “overheating.” Each expansion sows the seeds of its own destruction. If actual GDP is less than trend GDP, the AS will shift to the right, restoring equilibrium. If actual GDP is greater than trend GDP, the AS will shift to the left, restoring equilibrium. This brings us to a conclusion that actual GDP tends to trend GDP. In other words, there are forces in the economy that keep actual GDP close to trend GDP. May I suggest this dominant force in the economy is **self interest**.
Now that a theory has been constructed to explain the behavior of GDP, let’s look at the historical pattern of GDP in the post W.W. II period.

**GDP in Post WWII Period**

<table>
<thead>
<tr>
<th>Year</th>
<th>GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1947</td>
<td>1195.3</td>
</tr>
<tr>
<td>1953</td>
<td>1960.3</td>
</tr>
<tr>
<td>1960</td>
<td>1967.2</td>
</tr>
<tr>
<td>1967</td>
<td>1974.1</td>
</tr>
<tr>
<td>1974</td>
<td>1980.4</td>
</tr>
<tr>
<td>1980</td>
<td>1987.3</td>
</tr>
<tr>
<td>1987</td>
<td>1994.2</td>
</tr>
</tbody>
</table>

**Figure 5**

Notice the upward trend. There are deviations from this trend but the trend is undeniably upward. The level of GDP had been detrended so cycles can be seen more easily in the GDP cycles graph. A cycle occurs when the line crosses the horizontal dashed line at zero. There have been several cycles in the post W.W. II period. The graph suggests the 1950s were above trend, 1960s and much of the 1970s were below. After 1982, the majority of your life, the economy has been above trend.
This market model explains why gross domestic output goes through the cyclical variations since we first started keeping track of economic statistics. Our concern now turns to understanding where we are currently with respect to the business cycle. Economists have long sought to develop and refine the techniques by which we measure how the economy is operating. Using these statistics to predict future economic activity movements that rely on the assumption that what we observed after a given series of events can be predicted if we see the same series of events in the future. An example, if I see A today and B follows, then I see A tomorrow and B follows, and I see A the day after tomorrow and B follows, then I may predict with some degree of certainty that if I see A the day after the day after tomorrow, that B will follow. However, if I see A the day after the day after tomorrow, nothing says that B must follow. That is, correlation does not imply causation. So, if you have two economists arguing about what will happen in the future (B), they are arguing about the causal link between A and B. Those two economists are arguing about the processes generating B. Hence, when using statistics, we must proceed with a great deal of caution. The relationship of using A to predict B assumes that everything else is
held constant. In reality we all know that everything else is not being held constant. That is why we may see retail sales fall sharply before one recession while they remain strong preceding a second recession. Everything is not held constant. Nevertheless, we try to predict future events based on past experience. The popular economic statistics are based precisely in this intuition.

You have to decide for yourselves the value of these economic statistics when predicting the future (or you can, like most people, just rely on Dan Rather and Peter Jennings to tell you what to think. But keep in mind that it is the job of the journalist to explain things they do not understand. Also keep in mind that it is our ability to think abstractly, to think for ourselves that gives the monkey car keys. I will get off my soap box.).

Let us consider the relationships between some key economic statistics and what we may be occurring with economic activity. However, we must first define these key economic indicators.

1. **Leading Economic Indicators (LEI)** - One of several tools policy makers use to forecast the future direction of real GDP. LEI is a monthly index of 10 variables which in the past have together provided advance notice of changes in GDP. The 10 variables that the LEI uses to predict future economic activity are average work week, initial claims of unemployment insurance, new orders for consumer goods, vendor performance, new orders for capital goods, building permits for houses, stock prices, money supply, interest rate spreads, and consumer confidence. The LEI is intended to predict economic activity 6 months in advance. MB 258-59.

2. **Consumer confidence** - A monthly index collected by the University of Michigan that measures consumer optimism. The index is taken from a monthly survey which asks consumers an array of questions regarding their personal finances. The University of Michigan then determines if consumers are becoming more or less confident about the future direction of their personal financial status. The large sample is to reflect the trend in general economic confidence. Lehman 248.
3. **Manufacturing Orders** - Manufactures' orders for non-defense related capital goods. Defense related goods are related to government expenditures, which are typically invariant with respect to economic activity. Defense related government purchases are exogenous (determined outside of the economic system) while non-defense related manufactured purchases are endogenous (determined within the economic system).

4. **New vehicle sales** - the dollar value purchases of new vehicles. New vehicle sales are an indicator for durable goods.

5. **Employment** - The number of people within a work force who are employed. Employment is an indicator for labor market activity, which is in turn related to GDP.

6. **Consumer credit** - Consumer credit is a measure of liquidity (consumer's ability to borrow). Since big ticket consumer items are frequently purchased on credit, consumer credit is a good measure for how much liquidity consumers have to purchase new consumer items, such as washers, dryers, refrigerators, etc.

7. **Retail sales** - Sales of consumer goods at the retail level. Retail sales provide a link between disposable income (GDP-Taxes) and consumption. There is also a link between consumer confidence and retail sales. If consumers are not confident about the near term prospects for their personal finances, they may hold off making purchases until their personal finances improve.

8. **Industrial Production** - The Federal Reserve System collects monthly data on our economy's industrial production. This is a measure beyond GDP to assess where our economy is and may be heading. This index measures changes in the output of mining (mineral extraction [oil]), manufacturing, and the gas and electric sectors in our economy. Industrial production makes up about one third of our economic activity and is more volatile than GDP because industrial production includes sectors that are more sensitive to changes in short-run events, such as demand for autos and steel. Lehman, 219.
9. **Capacity Utilization** - Also known as the factory-operating rate, capacity utilization is the national rate where industrial plants operate. Capacity utilization is also tied to the microeconomic average total cost curve. If capacity utilization is less than minimum efficient scale, then we conclude that the economy is inefficient because capital is remaining idle that could be used if there were sufficient demand. Alternatively, when capacity utilization exceeds minimum efficient scale, industries are producing beyond the limits that they were designed to operate, and new capacity must be added if plants are to operate efficiently. So, how do we know when capacity utilization is at an "optimal level"? Most economists agree that optimal capacity utilization is around 85 percent of physical limits. Lehman, 220.

10. **Producer Price Index** - A price index that measures the raw material prices producers must pay.

11. **Consumer Price Index** - A price index that measures the prices consumers must pay.

12. **Housing Starts** - Measures the number of housing starts of private household units for construction that is begun in that month. Housing starts are a particularly important economic measure because they tell us how many new domestic units were begun in that month. This tells us about an economy's demand for current resources, (lumber, workers, etc.) and future demand for resources (carpet, fixtures, refrigerators, washers and dryers).

13. **Durable goods** - A consumer good with an expected life with 3 or more years. Examples include washers, dryers, etc. MB G-7.

14. **Inventories** - Goods that have been produced but have not been sold. Inventories typically increase during early recessions and decrease during early expansions. Technologies, such as the internet, have helped shorten the time between when a recession begins and when companies become aware that they are accumulating excess inventories. Since inventories are assets that tie up resources, firms like to keep inventories to a minimum. MB G-14.

15. **Federal Expenditures** - Expenditures made by the government to purchase items such as workers' wages, military aircraft and super coliders.
16. **Personal income** - Earned and unearned income available to resource suppliers and others before the payment of personal taxes. MB G-20.

We can now consider how these economic statistics may indicate the current and future direction of how the economy will perform. Each of the above indicators influence demand side variables. Hence, there will be a positive relationship between $P_I$ and GDP.

<table>
<thead>
<tr>
<th>Statistic</th>
<th>$P_I$</th>
<th>GDP</th>
<th>C</th>
<th>I</th>
<th>G</th>
<th>NX</th>
</tr>
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<tbody>
<tr>
<td>Leading Economic Indicator</td>
<td>↑ or 0</td>
<td>↑</td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Consumer Confidence</td>
<td>↑ or 0</td>
<td>↑</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Manufacturing Orders</td>
<td>↑ or 0</td>
<td>↑</td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>New Vehicle Sales</td>
<td>↑ or 0</td>
<td>↑</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Employment</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consumer Credit</td>
<td>↑ or 0</td>
<td>↑</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Retail Sales</td>
<td>↑ or 0</td>
<td>↑</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industrial Production</td>
<td>↑ or 0</td>
<td>↑</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Capacity Utilization</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Housing Starts</td>
<td>↑ or 0</td>
<td>↑</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Durable Goods</td>
<td>↑ or 0</td>
<td>↑</td>
<td>X</td>
<td>X</td>
<td></td>
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<tr>
<td>Inventories</td>
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<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
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<tr>
<td>Federal Expenditures</td>
<td>↑ or 0</td>
<td>↑</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Personal Income</td>
<td>↑ or 0</td>
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<td></td>
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</tbody>
</table>

**Three Important Markets**

We have constructed a macroeconomic model to explain variations in economic activity. We have also learned about the statistics that tell us where we are and where we might be going.

We now want to fill in this picture. Our first question is empirical, i.e., conclusion arrived at through sensory experience, which is are wages and prices flexible and as a result, does the market clear, or are wages and prices rigid preventing the market from attaining full employment? As economists, this is an important question because it is the basis for government activist policy. If wages and prices are flexible, then government has a limited role in economic policy making because the market is going to take care of itself. Any deviations from trend will take care of themselves and government intervention will only prove to be destabilizing. This is the premise of Adam Smith's Laissez Faire. However, if wages and prices are rigid, then government has an active role in economic policy making because the market will not take care...
of itself, and government may be needed to help it back to full employment. So, this is our first conundrum, what is the proper role of government? May I submit that this question is much more complicated and important than it may first appear because many of the great economic minds have attempted to address this question. Adam Smith, David Ricardo, John Stuart Mills, Milton Friedman, and Robert Lucas have maintained that wages and prices are sufficiently flexible to clear the market, meaning that the government's in the economy is limited. On the other hand, Karl Marx, John Meynard Keynes, Robert Samuelson, Gregory Mankiw and Paul Krugman maintain that wages and prices are not sufficiently flexible to clear the market, meaning that government has an active role in the economy. Whether or not wages and prices are flexible or rigid is not important at this point. We will look at cases when they are and when they are not flexible. At this point, we are interested in the predictions of the model and not the validity of the assumptions.

We now turn to a more full explanation of the economy. To do so, we must introduce three important markets: the goods market, the money market and the labor market. These markets are not merely theoretical constructs, but markets that policy makers monitor when making policy decisions. For this reason, we are going to learn what policy makers think and how they use what we are studying to determine how they should conduct monetary and fiscal policy variables. An example of how Federal Reserve policy makers look at the goods, money and labor markets is illuminated in an Alan Greenspan Congressional Report in February, 1998. The report is an excellent example of how policy makers use these three markets to make policy decisions. Greenspan's report is at


We will discuss Greenspan's in class, perhaps have a quiz on it.

We continue our presentation of the national economy by considering the goods market. The goods market simply considers how real GDP varies over time; however, there are two parts of the goods market. The first deals with the relationship between real GDP and the price level.
The second deals with real GDP and the interest rate. The first part of the goods market is simply the model presented on pages 1 through 6. We must also construct the second part of the goods market. Real GDP (Y) is the sum of consumption, investment, government expenditures and net exports. Consumption and investment in turn depend on the interest rate. Higher interest rates cause consumption and investment to fall because consumers and businesses must pay higher borrowing costs. These higher costs cause consumption and investment to fall, causing real GDP to decline. The graphical representation of the relationship between real GDP and the interest rates is the IS curve, which has a negative slope. The IS curve represents the locus of all points between the interest rate and real GDP where the goods market is in equilibrium. On the other hand, there is a relationship between interest rates and real GDP where the money market is in equilibrium, which is called the LM curve. The LM curve has a positive slope because as real GDP increases, the demand for money to facilitate finance transactions increases. As the demand for money increases, given a fixed supply of money, interest rates increase. Therefore, there is a positive relationship between interest rates and real GDP in the money market.

A graphical display is helpful. Table 7 demonstrates the relationship between consumption, investment and the IS curve. The investment, consumption line is negatively sloped and this is proportional to the IS curve. If there were an autonomous increase in either consumption or investment, it would lead to a rightward shift in the IS curve. Likewise, anything that led to a decrease in autonomous consumption or investment, such as pessimistic consumer expectations would lead to a leftward shift in both the consumption, investment curve and the IS curve. In short, anything that causes real GDP to increase leads to a rightward shift in the IS curve and anything that causes real GDP to decline leads to a leftward shift in the IS curve.

Figure 7, Liquidity Market
Deriving the LM curve is likewise straightforward. We start in the money market. The function labeled Ms is the real money supply or \( M^s = \frac{M}{P} \). The real money supply is the measure that the Federal Reserve comes closest to controlling through its manipulation of Federal Open Market Operations. Money demand can be derived from a well-known relationship in economics known as the equation of exchange. The equation of exchange gives the relationship between the money in the economy, the velocity of that money, the price level, and real GDP. We will become quite familiar with measures for money in the economy. For now, we will call it the M1, which is the sum of cash and checks in the economy. This is a measure of money in its most liquid form. The velocity of money is simply the number of times that a dollar moves through the economy over a given time period. Since we measure GDP and the price
index over a one-year interval, we will measure the velocity of money over a one-year interval. The price level is simply the GDP price deflator, $P_t$ and real GDP is the by now familiar the $Y=C+I+G+X-Im$. Hence, we can express the equation of exchange as $M \times V = P_t \times Y$. From this relationship, we can derive the demand for money by isolating $M$, or

$$M \times V = P_t \times Y \Rightarrow \frac{1}{V}(M \times V = P_t \times Y) \Rightarrow M = \frac{P_t \times Y}{V}.$$

This suggests that the demand for money is positively related with the price level and real GDP, and negatively related with the velocity of money. The intuition behind these relationships are straightforward. When inflation increases, $\Delta P_t$, we need more dollars to finance our purchases of goods and services; therefore, when inflation rises, our demand for money increases. Real GDP ($Y$) is the quantity of real purchasing power out there in the economy, so when we produce more goods, we demand more money to finance the purchase of those goods. Finally, if velocity, $V$, increases, that means that dollars are moving more quickly through the economy. When dollars move quickly through the economy, we do not need as many dollars; therefore, our demand for money decreases.

The next market that we consider is the labor market. The labor market is a critical part of our macroeconomy, and when the labor market is either lax or tight, it will influence both the goods and money markets. Hence, we spend time here to introduce the labor market. Labor is a resource like capital and land. Therefore, we must understand the process behind the labor market if we are to understand the economy as a whole. On the one side of the market are demanders of labor, which are firms that use labor to combine resources to produce goods. Demanders offer wages to employees in exchange for time spent at work. When workers demand too high of wages, firms find it less profitable to employ these workers and higher less of them. Therefore, there is a negative relationship between the wage that employers will pay workers and the number of workers that firms will employ. On the other side of the market are suppliers, i.e., households, people, . . . , you and me. When firms offer higher wages, we generally find that workers will work more hours. However, labor economists tell us that the elasticity of labor
supply is quite inelastic, meaning that if employers want workers to work more hours, they are forced to pay significantly higher wages. This suggests that the relationship between the supply of labor and the wage is positive. Figure 8 presents the labor market model.

![Figure 8, Labor Market](image)

The upper left hand graph in Figure 8 demonstrates the demand for labor. When capital which is complementary to labor increases, the labor demand curve shifts to the right. This is a shift from D to D1. If there were a destruction of capital, a war or an earthquake, which destroys capital, shifting the demand for capital to the left. This is a shift from D to D2. Figure 8's upper
right hand graph is the supply of labor. Suppose that there is an increase in labor, say through increased immigration. This shifts the labor supply curve up, from S to S1. A decrease in labor shifts the labor supply curve down, from S to S2.

The bond market is the final market that we consider. The money market is closely related to the bond market. In fact, if we let $M^s$ and $M^d$ equal money supply and money demand, and if we let $B^s$ and $B^d$ equal bond supply and bond demand, then we can express the market for financial assets as $B^d + M^d = B^s + M^s$. This just says that the demand for financial assets equals the supply of financial assets. If we take $B^s$ to the left hand side of the equation and $M^d$ to the right hand side of the equation, we find that $B^d - B^s = M^d - M^s$. This suggests that when the bond market is in equilibrium, $B^d - B^s = 0$, the money market has is in equilibrium, $M^d - M^s = 0$. We call the money market the liquidity preference theory of interest rate determination and the bond-market the loanable funds theory of interest rate determination. In this model, we use the loanable funds theory for interest rate determination.

There is a negative relationship between the interest rate and the number of bonds traded, making the demand curve for bonds negatively sloped. The intuition behind the negatively sloped demand curve is that at higher interest rates, demanders of the available loanable funds, i.e., households and firms, will demand fewer bonds because investment projects now must yield higher returns to be profitable. Therefore, higher interest rates decrease the number of profitable projects and decrease the demand for funds. On the supply side, the supply of funds that bondholders are willing to offer is positively related with the interest rate, suggesting the bond supply curve is positively sloped. The loanable funds theory is that the interaction between the demand and supply of bonds in debt markets determine interest rates. Figure 9 presents the loanable funds theory of interest rate determination.
Figure 9 suggests that when the demand for bonds increases (B1 to B2), the interest rate and number of bonds traded increases. If the demand for bonds decreases, interest rates and the number of bonds traded decreases. The loanable funds theory indicates that the prevailing market interest rates and the number of bonds traded are simply determined by the interaction between the supply and demand for loanable (available) funds.

There is one final relationship that we must consider before we integrate the goods, labor and money market. Our final relationship is the production function. You were (or should have been) introduced to the production function in your introductory microeconomics course. The production function embodies the relationships between inputs, outputs and technology. When inputs increase, outputs increase (explicit growth). When technology increases, while inputs remain constant, outputs increase (implicit growth). Notice also that the production increases at a
decreasing rate. This is known as diminishing returns to inputs, typically labor. A production function is displayed in Figure 10.

**Figure 10, Production Function**

We can now integrate the goods, labor and money markets. We position the labor market in the top left graph. The production function is located in the top right graph. The market for loanable funds is located in the left center position. The IS-LM curve is located in the right center position. Finally, the neoclassical synthesis in the price, GDP space is located in the bottom right position.
Hence, integration of the goods, labor and money markets provides us with important insights into how our economy operates. Perhaps the most significant insight from our model in Figure 11 is the degree to which the goods, money and labor markets are related. When the goods market is in equilibrium, the labor and money markets are also in equilibrium. When one of the markets is out of equilibrium, the other markets are out of equilibrium. In other words,
they are interrelated. To put it still another way and one in which Disney® would be proud, it’s "the circle of economic life."

1. Classical Thought

So, now let's use our market of the economy to assess how exogenous shocks in one market influence outcomes in the remaining markets. Suppose that the Fed increases the money supply under the assumptions of classical economics, i.e., wages and prices are flexible. Consider how employment, wages, output, interest rates and the price level are influenced.
Figure 12, Monetary shock in a Classical economy

Any time we change a government policy variable, it has the potential to influence the economy. Whenever we change a policy variable, we start in the IS-LM model. We first observe that the increase in the money supply shifts the LM curve to the right, moving from equilibrium A to B. This increases output from $Y^*$ to $Y'$ and reduces interest rates from $r^*$ to $r'$. Decreased interest rates increase investment from $I^*$ to $I'$ (Loanable Funds Model). The increased money supply shifts the AD curve (AD-AS model) from AD to AD' which in turn increases output from
Y* to Y' and increases the price level from P* to P'. The increase in the money supply also increases output in the production function from Y* to Y'. The increase in the money supply increases prices and drives down the real wage rate from w* to w' and increases employment from N* to N'. Hence, the short run effect of increasing the money supply are

\[ W \downarrow, N \uparrow, Y \uparrow, r \downarrow \text{ and } P_t \uparrow. \]

However, if wages and prices are fully flexible, the increase in the money supply is nominal, i.e., it does not affect real variables. In the long run, workers are able to renegotiate their contracts, demanding higher wages to compensate for the decrease in real purchasing power brought on by inflation. Wages move back from W' to W* and employment falls from N' to N*. This corresponds to a decrease in production from Y' back to Y*. These real wage increases are an increase in the price of factors, which shifts the short run aggregate supply curve to the left from SAS to SAS'. The increase in the price level also perfectly offsets the original increase in the money supply, shifting the LM curve from LM' back to LM*. Interest rates increase back to their pre-money supply increase levels, r' back to r*. Output decreases from Y' to Y*. Hence, the long-run effect of an increase in the money supply is

\[ \bar{W}, \bar{N}, \bar{Y}, \bar{r} \text{ and } P_t \uparrow. \]

In other words, when wages and prices are flexible, the only influence the increase in the money supply has is to increase prices. That is it!!! No long run increases in output or employment. In the classical model, we are somewhat at the mercy market forces because any interference in the market process only leads to future instability (Ferderic Bastiat. "What is seen and what is unseen."). The increase in the money supply has absolutely not influence on employment and output. This seems counterintuitive, since it appears that money, employment and output are positively related. This condition in the classical world where nominal variables (price level, interest rates) have no affect of real variables (employment and output) is known as the classical dichotomy.

On the other hand, a second policy variable is government's ability to tax and spend. When the economy is producing at less than full employment, government can either increase
spending or decrease taxes. It is clear that an increase in government expenditures increases aggregate demand directly. However, a decrease in taxes should indirectly increase aggregate demand. Suppose government decreases taxes. Reduced taxes leaves more money in the hands of households and businesses, who may in turn increase their consumption and investment. Increased consumption and investment leads to greater demand for goods and services, which increases aggregate demand. Hence, government may be able to influence the economy through its policy manipulation. Figure 13 presents how an increase in government expenditures (decrease in taxes) may influence wages, employment, output, interest rates and the price level in the goods, labor and money market.
Figure 13, Fiscal Policy shock in a Classical economy

We start in the IS-LM diagram. Increased government spending increases the demand for goods in the output market, increasing output and driving up interest rates and the price level. Increased output requires greater employment. We may be tempted to assume that increased output will drive the real wage up, but due to the increased price level, real wages falls. Hence, the short-run influence of an increase in government expenditures (decreased taxes) is $W \downarrow, N \uparrow, Y \uparrow, r \downarrow and P \uparrow$. However, once wages and prices adjust, the long-run effect of the
fiscal policy shock is that $W, N, Y, r \uparrow$ and $P_t \uparrow$. Notice that the only difference between long-run and short-run monetary and fiscal policy shocks is that interest rates are permanently higher from the fiscal policy shock. They remain unchanged with the monetary policy shock. Notice as well, that the fiscal policy shock leads to permanently higher interest rates and "crowd-out" investment. The following diagram explains crowding out.

Level 1: $\uparrow G \rightarrow \uparrow AD \rightarrow \uparrow Y$ (Direct effect of increasing gov't)

Level 2: $\uparrow M^d \rightarrow \uparrow r \rightarrow \downarrow I \rightarrow \downarrow Y$ (Indirect effect of gov't)

Level 1 demonstrates how increased government expenditures leads directly to an increase in $Y$ through $Y=C+I+G+Ex-Im$. However, level 2 demonstrates that increasing government expenditures may reduce $Y$ by decreasing $I$. This occurs because government must have money to pay for its transactions, yet it can only get the money through 1) increasing taxes, 2) printing more money, and 3) borrowing. Well, the economy is in a recession, so the government does not want to increase taxes. This would only further reduce output. Government also does not want to call on the Fed to print more money because this will only lead to inflation later. Hence, government decides to borrow, yet government borrowing in the private sector (money markets) drives up the price of borrowing for firms, which in the interest rate. Higher interest rates that firms must pay to borrow means that projects that were profitable at lower interest rates are no longer profitable, thereby reducing investment opportunities. So, in the classical world, where wages and prices fully adjust, the increase in government expenditures "perfectly crowds-out" investment. In other words, the long-run effect of increased government expenditures is $W, N, Y, r \uparrow$ and $P_t \uparrow$.

2. Keynesian Thought

So is that it? We are at the mercy of the market? Well, it really comes down to what you think about wages and prices. Are they flexible, or are they rigid? As you might guess, there is a second school of economic thought which maintains that wages and prices are not flexible, that
the market is not efficient; therefore, government has an active role in the economy to make up for that which the market leaves out. We can use the goods, labor and capital markets to understand what happens to employment, wages, output, interest rates and the price level when wages and prices do not adjust to unexpected shocks. Figure 14 predicts the affects of a monetary shock (Fed increases the money supply.).

Figure 14, Monetary Shock in a Keynesian economy
Figure 14 illustrates well what occurs to employment, wages, output, interest rates, and the price level when wages and prices are rigid. Again, we start in the IS-LM graph and increase the money supply, shifting the LM curve from LM to LM". Interest rates decline and output increases. Lower interest rates induce households and firms (Consumption and Investment) to spend more, which shifts AD to AD'. The increase in output leads to greater demand for workers, while the increase in the money supply causes real wages to decline to W'. The short, run affect of the increase in the money supply is $W \downarrow, N \uparrow, Y \uparrow, r \downarrow \text{ and } P_i \uparrow$. However, prices are yet to fully adjust to the monetary shock. When they adjust and a new long-run equilibrium is reached, we see that $W \downarrow, N \uparrow, Y \uparrow, r \downarrow \text{ and } P_i \uparrow$, yet not as much as in the short-run. Hence, under the Keynesian regime where wages and prices are rigid, an increase in the money supply permanently affects the real variables of employment and output, avoiding the classical dichotomy.

We can also consider when wages and prices are rigid and government increases government expenditures (or decreases taxes). Figure 15 presents the influence of a fiscal policy shock when wages and prices are rigid.
We start in the IS-LM diagram and shift the IS curve to IS'. This increases both output and the interest rates. Increased interest rates crowd out private investment. Increased output increases employment in the labor market. Increasing AD increases output and the price level. However, increasing prices in the output market puts downward pressure on wages in the labor market.

Figure 15, Government Shock in a Keynesian economy
market. The short-run and long-run results of an increase in government expenditures are
\[ W \downarrow, N \uparrow, Y \uparrow, r \downarrow \text{ and } P_t \uparrow. \]

So, let us put this all together. We have three important markets: goods, labor and money. The goods, labor and money markets are significant because that is where employment, wages, output, interest rates and the price level are determined. These markets are constantly in a state of change, and when the economy falls short or exceeds its potential, we have two policy options to bring the economy back into full employment. However, how monetary and fiscal policy influence employment, wages, output, interest rates and the price level depends on the rigidity of wages and prices. If wages and prices are sufficiently flexible to adjust to shocks, deviations from potential output are temporary. Government has little role in the economic system because any policy change may interfere with the economy's natural processes that pull it toward equilibrium. If wages and prices are not flexible, deviations from potential output are long lasting, and the economy can reach a permanent state of under-employment, or what John Maynard Keynes termed an *under-employment equilibrium*. If wages and prices are not sufficiently flexible to clear the market, the market is said to be inefficient. The government has a role to close the gap between the economy's actual and potential output. In this case, government action is seen as beneficial.

In academics, we have arrived at some type of quasi-equilibrium between the classical and Keynesian economics. We see the short run as the period in which wages and prices are rigid, the market is not necessarily efficient to clear all markets, giving government an active role in the economy. However, most economists have sufficient faith that the market is efficient in the long run.