Outline of Material for Economics 701 Final, Spring 2005

I. An improved wage setting (WS) equation

A. Efficiency wage theory gave us

\[ \frac{W}{P} = F(u, z) \]  
where \( z = \text{factors that shift the wage setting curve} \)

and also \( \frac{\partial F}{\partial u} < 0 \) and \( \frac{\partial F}{\partial z} > 0 \)

B. Rewrite this equation in nominal terms

\[ W = P \cdot F(u, z) \]

C. There are 2 problems with this simple wage setting relationship

1. Most wages are set before prices are determined
   a. we should specify the wage setting equation in terms of expected price, not actual price
   b. Hence, write the equation as

\[ W = P^e \cdot F(u, z) \]  
where \( P^e = E_{t-1}P_t \) and

\[ E_{t-1}P_t = E(P_t | \text{Information available at time } t - 1) \]

2. Productivity affects wage setting
   a. Up to this point in the course, our model has predicted that a one-time increase in MPN causes a one-time decrease in the natural unemployment rate
   b. Consequently, a persistent and continual increases in MPN would lead to a persistent decline in the natural rate of unemployment
   c. This implication is contrary to the evidence: Over time we’ve seen rising average labor productivity (Y/N), but no trend (downward or upward) in the unemployment rate over the long run
   d. What is missing? The fact that suppliers and demanders of labor take the expected future marginal product of labor into account when they negotiate a wage agreement. Therefore, we modify the new wage setting equation to allow for this:

\[ W = P^e \cdot F(u, z) \cdot MPN^e \]  
where \( MPN^e = E_{t-1}MPN_t \)

D. We can also write this wage setting equation in real terms:

\[ \frac{W}{P} = \left( \frac{P^e}{P} \right) \cdot F(u, z) \cdot MPN^e \]

E. Implications of this new wage setting equation for our graphical model of the labor market

1. If MPN and MPN^e both increase by the same amount, then the natural unemployment rate and the equilibrium level of employment will be unaffected. In this case the real wage rises by exactly the amount that MPN increases.

2. And if MPN > MPN^e, then the economy will be at a lower level of unemployment and higher employment
a. We showed that a productivity boom will temporarily lower the unemployment rate, but not permanently affect it. (This ignores any effect technology may have on labor supply. If technological improvement were to make people wealthier, then it is possible that labor supply would decline)

3. And if MPN < MPN^e, then the economy temporarily will be at a higher level of unemployment and lower employment

4. You can also show that the WS setting curve shifts when P is different than P^e. For example, if P<P^e that shifts the WS curve up and to the left and so unemployment rises (above the natural rate), employment falls, the real wage is higher and output falls (below full employment output)

   a. This is not an equilibrium in the labor market because people's expectations for price are different than the actual price level.

   b. Robert Lucas and others have developed theories in which the fact that P differed from its expected value was a critical source of business cycles

II. Price Setting

A. Microeconomic theory tells us that price (P) will be set as a mark-up (1+mu) over marginal cost (MC): 
   \[ P = (1 + \mu)MC \]

1. Perfectly competitive product markets have \( \mu = 0 \)
   a. Here firms are price takers
   b. Most Classical theories make this assumption

2. Markets with imperfect competition in product markets have \( \mu > 0 \)
   a. Here firms are price setters
   b. If we add to imperfect competition some theory about why prices are costly to change (e.g. a menu cost of changing prices), we can generate an explanation for why there are sticky prices in the economy
   c. Most Keynesian theories use some version of one or both of these assumptions (1. imperfect competition, 2. a cost of price changes)

3. Marginal cost (MC):
   a. In the short run, the MC is primarily associated with adjusting the input to production that is easiest to adjust — labor
   b. Capital and technology are essentially fixed in the short run
   c. Let 
   \[ MC = \frac{W}{MPN} \]

B. The mark-up pricing equation combines with MC to yield a real wage equation:

1. \[ \frac{W}{P} = \frac{MPN}{(1 + \mu)} \]
III. Combining the new wage setting equation with this pricing equation yields:

\[ \frac{W}{P} = \frac{\text{MPN}}{(1 + \mu u)} = \left( \frac{P^e}{P} \right) \cdot F(u, z) \cdot \text{MPN}^e \]

A. The natural unemployment rate occurs when all markets are in equilibrium, which requires that people not be surprised by anything in the economy:
   1. \( P = P^e \)
   2. \( \text{MPN} = \text{MPN}^e \)

B. Combining both of these conditions in the previous equation yields an equation that determines the natural unemployment rate \( (u_n) \):

\[ \frac{1}{(1 + \mu u)} = F(u_n, z) \]

C. Under the assumption that \( F(u, z) = \exp(-au + z) \) and \( \ln(1 + \mu u) = \mu u \), then we can calculate the (approximate) value of the natural unemployment rate:

\[ u_n = \frac{z + \mu u}{a} \]

D. Using this equation it is easy to see that:
   1. An increase in the mark-up will lead to an increase in the natural rate of unemployment.
      a. Our graphical model shows this will decrease the equilibrium values for employment and the real wage
   2. Factors that shift the wage setting curve upward will also raise the natural unemployment rate
      a. Our graphical model shows that in equilibrium this shift will cause the equilibrium real wage to rise and the equilibrium employment level to fall
   3. An increase in the parameter \( a \) will cause the natural unemployment rate to decline
      a. Graphically, one can show that this works something like a downward shift in the WS curve

IV. The Phillips Curve

A. The Original Phillips Curve is an empirical relationship between unemployment rate and inflation (technically A.W. Phillips used wage inflation, not price inflation, in his empirical analysis, but that is not an important difference)
   1. The relationship was stable and nearly linear in pre 1960 data
   2. In the 60's it started to change and since 1970 there is no clear relationship if we plot \( u \) versus \( \pi \).

B. We can derive an Expectations Augmented Phillips Curve starting with the WS and PS relationships

\[ \frac{\text{MPN}}{(1 + \mu u)} = \left( \frac{P^e}{P} \right) \cdot F(u, z) \cdot \text{MPN}^e \]

Divide by expected MPN and then divide each of the price terms by last period’s
price level \((P_{t})\) rewrite as:

\[
\left(\frac{\text{MPN}}{\text{MPN}^e}\right) \cdot \left(\frac{1}{1 + \mu u}\right) = \left(\frac{P}{P^{-1}}\right) \cdot F(u, z) \cdot \frac{P^e}{\text{MPN}^e}.
\]

1. Insert the following identities in the previous equation:

\[
(1 + \pi) = \frac{P}{P^{-1}}, \quad (1 + \pi^e) = \frac{P^e}{P^{-1}}, \quad (1 + \varepsilon^{\text{MPN}}) = \frac{\text{MPN}}{\text{MPN}^e}
\]

To obtain:

\[
(1 + \varepsilon^{\text{MPN}}) \cdot \left(\frac{1}{1 + \mu u}\right) = \left(\frac{1 + \pi^e}{1 + \pi}\right) \cdot F(u, z).
\]

2. Using the definition of \(F(u_N, z)\) from before, rewrite this last equation as:

\[
(1 + \varepsilon^{\text{MPN}}) \cdot F(u_N, z) = \left(\frac{1 + \pi^e}{1 + \pi}\right) \cdot F(u, z)
\]

3. Linearize this equation by:
   a. Assuming \(F(u, z) = \exp(-au + z)\)
   b. Using the approximation \(\ln(1 + x) = x\) for \(x = \pi, \pi^e\) and \(\varepsilon^{\text{MPN}}\)

   after taking the natural log of the equation in 2, and obtain

   \[
   \varepsilon^{\text{MPN}} - au_N + z = \pi^e - \pi - au + z
   \]

4. Solve for inflation to obtain the expectations augmented Phillips curve

   \[
   \pi = \pi^e - a(u - u_N) - \varepsilon^{\text{MPN}} \quad \text{EAPC}
   \]

5. Implications:
   a. A stable linear Phillips curve exists when:
      (1) expectations of inflation are stable;
      (2) unexpected movements in the MPN are close to zero and;
      (3) the natural rate of unemployment is stable.
   b. If there are unexpected changes in MPN, if inflationary
      expectations change significantly, or if the natural rate of
      unemployment changes by a large amount, the Phillips curve
      relationship will no longer be stable.
   c. The fact that inflation and unemployment were relatively high
      from the early 70s into the 80s, in comparison to the original
      Phillips Curve relationship. This is because of adverse supply
      shocks that increased the natural unemployment rate for a number
      of years and also caused the MPN to be unexpectedly low. Both of
      these events increase the inflation rate (can show this using our
      standard model: IS-MP-FE and IIA-ADII-LRAS)
   d. In the late 90s we had beneficial supply shocks, that lowered the
      natural rate of unemployment (at the very least it was temporarily
      lower) and temporarily made the MPN higher than expected.
      Hence, inflation fell while the unemployment rate fell to low levels
from the mid to late 90s.

V. An Inflation Adjustment (ΠA) Curve

A. PS+WS gave us EAPC: \[ \pi = \pi^e - a(u - u_N) - \varepsilon^{MPN} \]

B. Okun’s Law: \[ \frac{Y_{FE} - Y}{Y} = b \cdot (u - u_N) \]

C. Combine EAPC and Okun’s Law: \[ \pi = \pi^e + \left( \frac{a}{b} \right) \cdot \left( \frac{Y - Y_{FE}}{Y_{FE}} \right) - \varepsilon^{MPN} \]

D. Factors that shift this new ΠA
   1. An increase in \( Y_{FE} \) causes ΠA to shift Right
   2. An increase in \( \pi^e \) causes ΠA to shift Up
   3. An increase in \( \varepsilon^{MPN} \) causes ΠA to shift Down

VI. Putting it all together

A. IS-MP-FE

B. WS-Nd-LS
   1. \( N^d \) is now based on the PS equation: \[ \frac{W}{P} = \frac{MPN}{1 + mu} \]
   2. The WS curve is now our improved version: \[ \frac{W}{P} = \left( \frac{P^e}{P} \right) \cdot F(u, z) \cdot MPN^e \]

C. Production function

D. LRAS-ADπ-ΠA

E. Examples of short-run, medium-run and long run analysis using the model
   1. Central bank lowers its interest rate
   2. Stimulative fiscal policy
   3. An adverse supply shock that causes an unexpected decline in the MPN,
      a. This is a decline in \( \varepsilon^{MPN} \). It shifts the ΠA Curve Up, inflation rises and output falls below \( Y_{FE} \).
      b. Economists often make the simplifying assumption that \( E^{-1}_t \Pi = \Pi_{t-1} \), which is not always true but is not too bad most of the time for most modern economies.
      c. Once the shock dissipates (i.e. \( \varepsilon^{MPN} = 0 \)) and expected inflation is equal to actual inflation, the economy returns to its initial position, assuming we started from a position of general equilibrium and also that the policy rule was not changed in response to this shock.
   4. A decline in full employment output
a. This shifts the LRAS (and FE) curve to the left, but it also shifts the IIA Curve to the left. Initially inflation rises and output falls.
b. Inflation is higher than was initially expected and so expected inflation will rise, shifting the IIA Curve Up causing inflation to rise more and output to fall more.
c. This process continues until output falls to $Y_{FE}$ and inflation rises to the point where LRAS intersects the AD II Curve.

VII. Could a Disinflation be Costless (i.e. could a central bank get the inflation rate to fall without causing a reduction in output)?

A. Yes, in principle. If the Fed could get wage setters to expect a lower inflation rate and this decline in expected inflation coincides with the policy to lower inflation (i.e. raising the MP curve and shifting the AD Curve Down and to the Left to aim for a lower target inflation rate)

B. In practice this costless outcome is difficult to achieve because:
   1. Some wages are set a year or two earlier, so the Fed would have to be planning ahead to implement this disinflationary policy
   2. People would have to believe the Fed was really committed to this policy (credibility of the proposed policy)
   3. People would also have to believe that the Fed would not change its mind once people lowered their expectations of future inflation.
      a. In fact, there might be an incentive for the Fed not to follow through with its claimed policy of lowering inflation in the future.
      b. The reason: If IIA shifts down but the Fed does not shift down its AD II as it claimed it would, then the economy will have output above full employment, at least initially and for as long as it takes the economy to adjust.
      c. It is possible that a Fed might like to do this for political reasons (when the economy does well incumbents tend to get re-elected, thus political pressure has sometimes been applied to central bankers to stimulate the economy)

VIII. Our simple model suggests that stabilization policy is fairly straightforward. Suppose we knew the full employment output level and the natural rate of interest and that we have some desired level of the inflation rate. Suppose we have guided the economy into its ideal position for $Y$, $r$, and $\pi$, and so now we should try to keep the economy operating there. That is we should respond immediately to anything that changes $r_N$ or $Y_{FE}$ by shifting the MP curve to bring the economy immediately to the new equilibrium level of $r$ and $Y$. if there is some change in one or both of them. This would mean that, in principle, the Fed would respond immediately to shifts in the IS and FE curves so that the inflation rate would not change and the economy would immediately go to $r_N$ and $Y_{FE}$ when one or both of these variables changes. There are various problems with this simple analysis:

A. Stabilization policy is immensely more difficult in practice than the simple version of model would suggest
   1. Our targets for $r$ and $Y$ are not constant and are not known precisely
      a. $Y_{FE}$ is growing over time
b. \( r_N \) is also subject to variation over time.

c. To provide an estimate of these two variables requires that we estimate the production function, and construct measures of capital, labor and technology.

d. To estimate \( r_N \) also requires that we estimate the IS curve and measure all the factors that shift that curve.

2. The variables we are trying to control are not known precisely at a point in time.

a. Measures of \( Y \) come out one month after the quarter is over and go through a sequence of revisions before we get the final numbers.

b. \( i \) is known, but the calculation of \( r \) requires that we know the market’s expectation for future inflation, which we can estimate but we don’t always know with certainty.

c. \( \pi \) also goes through a sequence of revisions.

3. How much policy to use is a question.

a. Structural equations are estimated with error. Basing policy on this equations can mean that policymakers use to much or too little policy than would actually be best for achieving their goals for output, inflation and possibly other macroeconomic variables.

b. The economy responds fairly slowly to changes in policy, particularly changes in monetary policy. E.g. It is possible that the economy will have recovered from a recession about the time policy stimulus starts to take effect.

c. Hence, it is theoretically possible that an economy may be less stable when policy attempts to stabilize the economy. This is in essence the Monetarist Critique of Stabilization Policy.

B. A second difficulty come from supply shocks that shift the \( \Pi A \) Curve. For example, suppose that the economy is initially at a point where \( Y, r \) and \( \pi \) are at the Fed’s targeted levels for each variable. Then assume that the MPN is lower than expected which shifts the \( \Pi A \) Curve up. The policymaker is faced with a dilemma. The policymaker may:

1. Do nothing different to policy.

a. This would mean that the inflation rate and the real rate are higher than target levels and output will be below full employment output for some time.

b. In the long run, all variables will return to their desired levels.

2. Not allow a recession.

a. Using stimulative monetary policy to eliminate the recession, by shifting the AD\( \Pi I \) curve up by as much as the \( \Pi A \) curve shifts up, the Fed would then make the rise in inflation permanently higher than its targeted level, but would keep \( r \) and \( Y \) at their desired levels.

3. Inhibit the short run increase in inflation.

a. Shift the AD\( I I \) to the left as \( \Pi A \) shifts up.

b. The decline in output relative to full employment output will be larger than in case 1. Hence the recession would become more
severe and would probably last a lot longer

IX. The Term Structure of Interest Rates
A. Rates do not all have the same term (amount of time) to maturity (when the final payment is made from the debtor to the creditor). While monetary policy is conducted via changes in short term interest rates, long-term interest rates are relevant for most borrowing and lending. The Term Structure Theory of Interest Rates will be used to connect a long-term interest rate to a short-term rate.

B. Consider a 2-period and a 1-period interest rate. Ignoring risk, arbitrage in financial markets, suggests that: 
\[
(1 + i_{2t})^2 = (1 + i_{1t})(1 + i_{t,t+1}^e)
\]
where the 
\(e\) superscript refers to an expectation formed today (i.e. based on today’s information). Many prefer to use a linear approximation to this nonlinear equation: 
\[
i_{2t} = \left(\frac{1}{2}\right)(i_{1t} + i_{t,t+1}^e).
\]
This equation states that the 2-period nominal rate is an average of the current one period nominal rate and the one-period rate expected for one-period in the future.

C. A similarly relationship also holds for the real rate. The expected inflation over two periods equals the average of expected inflations for each period, which is given by 
\[
\left(\frac{1}{2}\right)(\pi_{t+1}^e + \pi_{t+2}^e).
\]
Subtract this from both sides of the last equation in part B:
\[
i_{2t} - \left(\frac{1}{2}\right)(\pi_{t+1}^e + \pi_{t+2}^e) = \left(\frac{1}{2}\right)(i_{1t} + i_{t,t+1}^e) - \left(\frac{1}{2}\right)(\pi_{t+1}^e + \pi_{t+2}^e)
\]
The left side of this equation is by definition the 2-period real rate, \(r_{2t}\), the right side can be written as: 
\[
\left(\frac{1}{2}\right)((i_{1t} - \pi_{t+1}^e) + (i_{t,t+1}^e - \pi_{t+2}^e)),
\]
therefore the equation can equivalently be written as: 
\[
r_{2t} = \left(\frac{1}{2}\right)(r_{1t} + r_{t,t+1}^e).\]
Hence, the 2-period real rate is equal to the average of the 1-period real rate today and the 1-period real rate that we expect to occur 1 period in the future.

D. Its not too difficult to generalize the two period results, to find:
1. The n-period nominal rate is an average of the current and n-1 expected future one period nominal rates;
2. The n-period real rate is an average of the current and n-1 expected future one period real rates.

E. The term structure theory needs to have one more factor, a term premium or risk premium, \(\rho\), which is always a positive number (and in fact this risk premium may vary over time)
\[
r_{2t} = \left(\frac{1}{2}\right)(r_{1t} + r_{t,t+1}^e) + \frac{\rho}{2}.
\]
2. In the data we see that long term interest rates are higher, on average, than short-term interest rates. To explain this result we require that this term premium increases with term-to-maturity of a security.

X. IS-MP Model with Expectations and the Effects of Monetary and Fiscal Policy

A. The IS Curve has many expectational factors
   1. An increase in expected future output raises the expected future MPK for firms
   2. An increase in expected future output raises expected future incomes for consumers and so they will consume more
   3. An increase in expected future r (short-term real rate) raises long-term real rates and so reduces investment and may also reduce consumption
   4. An increase in expected future taxes on households reduces consumption
   5. An increase in expected future taxes on firms reduces investment

B. Expectations and the effects of monetary policy
   1. Our traditional view of monetary policy is that it shifts only the MP curve
   2. Our new model allows monetary policy to also shift the IS curve, but only if policy affects people’s perceptions about future r.
   3. This may be an important enhancement of our theory about the effects of monetary policy because empirical evidence suggests that changes in current r, holding future r constant have very small effects on consumption and investment spending (i.e. the IS curve is very steep)
      a. In this case, if more policy did not also shift the IS curve, the effects of monetary policy on output would be small
      b. But if the IS curve responds to expected future real rates, the central bank may still have significant effects on the real economy.

C. Expectations and fiscal policy: Can the elimination of a budget deficit cause the economy to go into an expansion?
   1. In the standard model:
      a. The long-run consequences of eliminating a budget deficit are beneficial. In the long-run the natural real rate of interest falls, causing investment to rise, which raises capital and ultimately increase the full employment level of output.
      b. However, the short run consequence is that the economy falls into recession (assuming we were at full employment before the policy is implemented)
   2. In theory, it is possible that expectations may be able to turn the short-run consequences of a deficit reduction from recession to an expansion. Along with the standard effects of a deficit reduction listed in 1:
      a. Solving a deficit problem today might cause people to lower their expectations about future taxes, which would increase spending today, ceteris paribus
      b. This policy also raises future output, and if people come to expect this, then spending on C and I will increase, ceteris paribus.
      c. This policy also lowers future r and if people come to expect this, then spending on C and I will increase, ceteris paribus.
3. This suggests an interesting empirical question! Some believe that the beneficial effects in 2 might outweigh the more traditional effects in 1. If they do, then that suggests some of the 90s boom in the US economy could be attributed to the fiscal policies that were designed to eliminate the deficit. (Personally, I am skeptical of this idea. I believe that the late 90s boom is associated much more with investments in technology, such as the explosion in information technology investments. This technological boom also caused a large increase in government revenues and so helped eliminate the deficits at that time)

XI. The Great Depression
A. The Great Depression is widely believed to have started in October 1929 when the stock market crashed. There is some debate about what caused the large decline in stock prices.
B. Initially, this event was looking much like the typical recession we had seen before, and not like the cataclysmic event it would eventually become
C. Policy failed to react to this recession
   1. Government then believed in balancing its budget, even during a recession, and so did not implement any serious cut in taxes or increase in expenditures.
   2. Monetary policy initially did not respond to the economic downturn
   3. A consequence of this big negative shock to the economy and the lack of any policy to correct the recession was that prices began falling (i.e. deflation)
D. Liquidity trap theory
   1. Zero is roughly the lower bound on a nominal interest rate.
      a. This implies that the lower bound on a real rate is equal to the negative of the expected rate of future inflation
      b. Hence the minimum real rate can be negative if expected inflation is positive and the minimum real rate can be positive if there is expected deflation. And the more negative the expected inflation is the larger the minimum real rate will be. For example, if we expected inflation to be -10% (this negative inflation of 10 % is the same as a 10 % rate deflation for prices), then the minimum real rate would be 10%.
   2. If minimum real rate exceeds the natural real rate of interest then the economy can not get to full employment. It will get stuck at the level of output determined by the IS curve and the minimum real rate.
   3. This caused a persistent decline in output and prices which is sometimes called a deflationary spiral. This happened because when the economy got stuck at $Y<Y_{FE}$, prices began to fall faster, which made the expected inflation rate become even more negative, which raised the real rate of interest which made output fall even more, and so on and so on.
   4. Policy solutions to a liquidity trap:
      a. Stimulative fiscal policy to shift the IS right and raise the amount of output
b. Inflationary monetary policy to try to make prices fall at a slower rate, and better yet, to cause prices to rise. For example:
   (1) Buy large quantities of government bonds, and other securities if necessary to increase the monetary base and hopefully get inflation to stop being negative
   (2) Depreciate the country’s currency. This will raise the cost of imports in terms of the domestic currency. The price level also depends on the cost of imports
c. These policies are intended to simultaneously cause deflation to end as well as to stimulate the economy

Additional explanations for why the Great Depression was so severe
E. Debt-Deflation Hypothesis, primarily associated with Irving Fisher
   1. Unexpected deflation makes the ex post real rate larger than the ex ante real rate. In other words, unexpected deflation raises the ex post real cost of borrowing. If this rate becomes too large many borrowers will default on their loans, reducing spending on I and C and shifting the IS Curve to the left

F. Bank Failures, Ben Bernanke is a leading proponent of this view
   1. Banks were failing for various reasons
      a. Borrowers were failing to pay back loans and so banks had negative profits (the recession, the liquidity trap and the debt-deflation hypothesis can individually or collectively explain this outcome)
      b. Banks sometimes failed because of a banking panic, in which depositors withdrew money from a sound banks, forcing it to liquidate assets and take such a loss in selling assets that is was forced to go bankrupt
         (1) Federal Deposit Insurance solved this problem
   2. Commercial bank failures lead to a decline in bank lending. If borrowers could find alternative sources to banks, they would not have to reduce spending. However, bank lending is special; Many who borrow from banks have no alternative source for obtaining a loan. So if banks disappear, then they won’t be able to borrow, won’t be able to spend on C and I and so the IS curve would shift left
   3. Banks are in the business of collecting information on potential borrowers, and with this information they decide whether or not it is worth taking the risk to make a loan to a person or institution. When a bank fails, much of this information can be destroyed because it is not something that can easily be transferred to another financial company.

XII. Open Economy Macroeconomics
A. Open economy IS equation
   1. $Y^d = Y^d$
   2. $Y^d = C^d + I^d + G + NX^d$
B. Demand for NX (NX=Exports-Imports)
   1. Exchange rate will affect NX
a. A nominal exchange rate ($\xi$) is the value of one currency relative to another currency (e.g., $\frac{\text{Euro}}{}$, $\frac{\text{\$}}{\text{Euro}}$, etc.).

b. I prefer to measure $\xi$ as the amount of foreign currency relative to dollars because when measured this way, the dollar appreciates when the measure rises and the dollar depreciates when this measure declines.

c. Real exchange rate ($\varepsilon$) can be thought of as the price of a good (or more generally all goods) from one country relative to the price of that same good (or more generally all goods) in another country in terms of a common currency.

\[ (1) \quad \varepsilon = \frac{\xi}{\frac{P_{\text{US}}}{P_{\text{For}}}} \text{ where price measures refer to the US price and the foreign country price, respectively} \]

\[ (2) \quad \text{theory says that } \varepsilon = 1 \text{ if there is perfect competition, no tariffs and no transportation costs.} \]

2. $\text{NX}^d$ is a function of

\[ (1) \quad \varepsilon, \text{ a rise in this causes } \text{NX} \text{ to fall (exports fall, imports rise)} \]
\[ (2) \quad Y, \text{ a rise in this causes } \text{NX} \text{ to fall (imports rise)} \]
\[ (3) \quad Y_f, \text{ a rise in this causes } \text{NX} \text{ to rise (exports rise)} \]

C. Net Foreign Investment (Net Capital Outflow)

1. For every dollar of exported good or service there must be a corresponding increase of one dollar in holdings of foreign assets by the exporter. Imports do the opposite. Thus net exports are associated with a change in net foreign asset holdings, and this change in assets is called net foreign investment (NFI).

2. In other words, $\text{NX} = \text{NFI}$

3. Factors that influence $\text{NFI}^d$

a. $R$, an increase in our real rate of return will reduce our $\text{NFI}^d$

b. $R_f$, an increase in the foreign real rate of return will increase $\text{NFI}^d$

c. $\varepsilon' - \varepsilon$, an expected appreciation in our currency will reduce $\text{NFI}^d$

4. Graph $\text{NX}^d$ and $\text{NFI}^d$ with $\varepsilon$ on the vertical axis and $\text{NX}/\text{NFI}$ on the horizontal axis

5. What can explain why countries sometimes run deficits? We used our graphical model to show that $\text{NX}$ will decline for a country under any of the following 4 conditions:

a. When the country implements a stimulative fiscal policy (when a fiscal deficit is associated with a trade deficit it is often called a twin deficit)

b. When output for the country ($Y$) expands faster than the output of its trading partners ($Y_f$)

c. When the demand for the country’s goods falls relative to the demand for foreign produced goods

d. When the demand for domestic investments in the country
(financial or real investments) increases relative to the demand for investments in foreign countries

D. How does a country peg (hold fixed) its nominal exchange rate?
1. It must stand ready to buy or sell any amount of its currency at the pre-determined price
   a. To keep the price from falling it must buy its currency by selling its international reserves, and vice versa.
   b. Pegging the currency at a relatively high level is limited by the amount of international reserves a bank has on hand to trade for its own currency on the open market. If it runs out of international reserves it can no longer peg the economy’s exchange rate.
   c. Pegging the currency at a relatively low level causes a country’s price level to rise
2. Why do countries peg there exchange rate?
   a. It reduce fluctuations in real exchange rates
      (1) this should stimulate foreign trade by reducing the risks associated with this fluctuation in price of traded goods
   b. Countries that have had high inflation sometimes like to peg their currency value to the currency of a country that has low inflation.
      (1) theory shows that the inflation rate will eventually come down to the low country’s inflation rate
         (a) countries that have had trouble establishing a low inflation monetary policy often peg their currency, and made explicit this was their motivation

E. Why is capital flight such a bad thing for the economy?
1. At first glance it looks as if capital flight would seem beneficial to an economy: By causing the real exchange rate to fall, net-exports rise. The rise in NX, ceteris paribus, would shift the IS curve to the right causing output to go up. But capital flight is not associated with economic expansion
2. When there is capital flight, there is also a rise the risk premium on investment for the country capital is fleeing. This will raise the long term real rate and so cause investment to decline. This effect shifts the IS curve to the Left.
3. When there is capital flight, this negative effect on investment dominates the positive effect on NX and so the IS Curve shifts to the Left, causing output to fall.