The situation in 2009–2010 was very different. The Fed had exhausted its monetary toolkit. Keeping their interest rate target at zero meant the economy was at the zero lower bound (in a liquidity trap). Under these circumstances, the job of reviving the economy falls to fiscal policy. In December, 2010, a tax bill was passed by Congress, providing a two-percentage-point reduction in the payroll tax for a year, extending Bush tax cuts and unemployment compensation benefits. However, these are all temporary measures. We should not expect this bill to have the same punch as permanent changes in taxes. And, because of the deep recession, the U.S. current account deficit for 2009 was about half its 2005 level. Under these circumstances, the United States (and most other countries) did not pay much attention to the current account. They were properly concerned with reviving their domestic economies.

2. Suppose that American firms become more optimistic and decide to increase investment expenditure today in new factories and office space.
a. How will this increase in investment affect output, interest rates, and the current account?

**Answer:** This is an exogenous increase in investment demand. This leads to an increase in the demand for goods, shifting the IS curve to the right. This leads to an increase in output and the interest rate. The increase in the interest rate implies an appreciation in the Home currency that decreases the current account. This is illustrated in the following figure.
b. Now assume that domestic investment is very responsive to the interest rate so that U.S. firms will cancel their new investment plans if the interest rate rises. How will this affect the answer you gave previously?

**Answer:** If investment is very responsive to the interest rate, then this implies that when interest rates rise, investment will decrease by a larger amount. For any given change in the interest rate, investment will change by a larger amount, implying the IS curve is flatter. Therefore, for a given exogenous increase in investment demand, the effect on output will be smaller. This is illustrated in the following diagram. The original shift in the IS curve shown in (a) is the dotted line. Note that the horizontal shift in the IS curve is the same—this is the exogenous increase. However, the effects on output, interest rates, and the current account are smaller compared with (a).

![Exogenous increase in investment demand when investment demand is interest elastic](image-url)
3. For each of the following situations, use the IS-LM-FX model to illustrate the effects of the shock. For each case, state the effect of the shock on the following variables (increase, decrease, no change, or ambiguous): Y, i, E, C, I, and TB. Assume the government allows the exchange rate to float and makes no policy response.

See the following figures.

a. Foreign output decreases.

**Answer:** IS shifts left, DR shifts down: Y ↓, i ↓, E ↑, C ↓, I ↑, TB ↑

b. Investors expect a depreciation of the Home currency.

**Answer:** FR shifts right, IS shifts right, DR shifts up: Y ↑, i ↑, E ↑, C ↑, I ↓, TB ↑

c. The money supply increases.

**Answer:** LM shifts right: Y ↑, i ↓, E ↑, C ↑, I ↑, TB ↑
**Question 3d**

4. How would a decrease in the money supply of Paraguay (currency unit is the “guaraní”) affect its own output and its exchange rate with Brazil (currency unit is the “real”). Do you think this policy in Paraguay might also affect output across the border in Brazil? Explain.

**Answer:** A decrease in the real money supply leads to a leftward shift in the *LM* curve. This leads to a decrease in Paraguay’s output, an increase in Paraguay’s interest rates, and an appreciation in the guaraní. This is illustrated in the following figure. This could affect output in Brazil through the trade balance. First, because Paraguay’s income is lower, Brazil’s exports could decline. Second, because the real has depreciated relative to the guaraní, this may make Brazilian exports more attractive to foreigners, potentially boosting Brazil’s trade balance. The overall effects on Brazil’s trade balance and its output are ambiguous. At the same time, Brazil’s economy is more than 15 times the size of Paraguay’s. Therefore, the impact of a change in Paraguay’s monetary policy on Brazil’s economy is likely to be small. (Source: International Monetary Fund, World Economic Outlook Database, October 2009.)
5. For each of the following situations, use the IS-LM-FX model to illustrate the effects of the shock and the policy response. Note: Assume the government responds by using monetary policy to stabilize output, unlike question 3, and assume the exchange rate is floating. For each case, state the effect of the shock on the following variables (increase, decrease, no change, or ambiguous): Y, i, E, C, I, and TB.

See the following diagrams. Point B is identical to the outcomes shown in question 3. Point C shows the outcome when monetary policy is used to stabilize output.

a. Foreign output decreases.
   **Answer:** IS shifts left, LM shifts right to stabilize Y: Y no change, i ↓, E ↑, C no change, I ↑, TB ↑

b. Investors expect a depreciation of the Home currency.
   **Answer:** FR shifts right, IS shifts right, LM shifts left to stabilize Y: Y no change, i ↑, E ↓, C no change, I ↓, TB ↓

c. The money supply increases.
   **Answer:** LM shifts right, then LM shifts left to stabilize Y: No change in Y, i, E, C, I, or TB. Here, the money supply shock is annulled by the central bank.
d. Government spending increases.

**Answer:** IS shifts right, LM shifts left to stabilize Y: Y no change, \( i \uparrow, E \downarrow, C \) no change, I ↓, TB ↓

6. Repeat the previous question, assuming the central bank responds in order to maintain a fixed exchange rate. In which case or cases will the government response be the same as in the previous question?

See the following diagrams. Point B is identical to the outcomes shown in Question 3. Point C shows the outcome when monetary policy is used to fix the exchange rate.

**Answer:** IS shifts left, LM shifts left to keep E fixed: Y ↓, I and E no change, C ↓, I no change, TB ↑

**Answer:** FR shifts right, IS shifts right, LM shifts left to keep E fixed: Y ↑, i ↑, E no change, C ↑, I ↓, TB ↓
Answer: LM shifts right, then LM shifts left to keep $E$ fixed: No change in $Y$, $i$, $C$, $I$, or $TB$. Here, the money supply shock is annulled by the central bank.

**Question 6c**

7. This question explores IS and FX equilibria in a numerical example.

a. The consumption function is $C = 1.5 + 0.75(Y - T)$. What is the marginal propensity to consume $MPC$? What is the marginal propensity to save $MPS$?

Answer: $MPC = 0.75$, $MPS = 0.25$

b. The trade balance is $TB = 5(1 - [1/E]) - 0.25(Y - 8)$. What is the marginal propensity to consume foreign goods $MPC_f$? What is the marginal propensity to consume home goods $MPC_H$?

Answer: $MPC_f = 0.25$, $MPC_H = MPC - MPC_f = 0.75 - 0.25 = 0.5$

c. The investment function is $I = 2 - 10i$. What is investment when the interest rate $i$ is equal to $10\%$?

Answer: $I = 2 - 10(0.10) = 1$

d. Assume government spending is $G$. Add up the four components of demand and write down the expression for $D$.

Answer: $D = C + I + G + TB$

$$D = 1.5 + 0.75(Y - T) + 2 - 10i + G + 5(1 - [1/E]) - 0.25(Y - 8)$$

$$D = 10.5 + 0.5Y - 0.75T - 10i + G - 5(1/E)$$

e. Assume forex market equilibrium is given by $i = ([1/E] - 1) + 0.10$, where the two foreign return terms on the right are expected depreciation and the foreign interest rate. What is the foreign interest rate? What is the expected future exchange rate?

Answer: $i^* = 10\%$; $E^* = 1$ (this is the UIP condition)
Fixed Versus Floating:  
International Monetary Experience

1. Using the IS-LM-FX model, illustrate how each of the following scenarios affect the home country. Compare the outcomes when the home country has a fixed exchange rate with the outcomes when the home currency floats.

   **Answer:** See the following diagrams. In each diagram, Point B denotes the outcome with floating exchange rates. Point C denotes the outcome with fixed exchange rates.

   **a.** The foreign country increases the money supply.

   **Answer:** An increase in foreign money supply leads to a decrease in foreign interest rate, \( i^* \), so FR shifts down and the IS curve shifts to the left. Under a fixed exchange rate regime, the central bank shifts the LM curve to the right to keep \( E \) fixed.

   Floating (B): \( Y \downarrow, i \downarrow, E \downarrow \)

   Fixed (C): \( Y \downarrow, i \downarrow, E \) unchanged
b. The home country cuts taxes.

**Answer:** A decrease in the Home country’s taxes leads to an increase in demand in the Home country, shifting the IS curve to the right. Under a fixed exchange rate regime, the central bank shifts the LM curve to the right to keep $E$ fixed.

Floating (B): $Y \uparrow$, $i \uparrow$, $E \downarrow$

Fixed (C): $Y \uparrow$, $i$ and $E$ unchanged.

c. Investors expect a future appreciation in the home currency.

**Answer:** See the diagram from (a). An expected appreciation in the Home currency means investors expect a lower return on Foreign deposits, so FR shifts down and the IS curve shifts to the left (B). Under a fixed exchange rate regime, the central bank shifts the LM curve to the right to keep $E$ fixed (C).

2. The Lithuanian lita is currently pegged to the euro. Using the IS-LM-FX model for Home (Lithuania) and Foreign (Eurozone), illustrate how each of the following scenarios affect Lithuania:

a. The Eurozone reduces its money supply.

**Answer:** A decrease in Eurozone money supply leads to an increase in Foreign interest rate, $i^*$, so FR shifts up. Under a fixed exchange rate regime, the central bank shifts the LM curve to the left to keep $E$ fixed, so $Y \downarrow$ and $i_2 = i^*_2$. 
b. Lithuania cuts government spending to reduce its budget deficit.

**Answer:** When Lithuania implements the fiscal contraction, the IS curve shifts to the left and the central bank must cut the money supply, shifting the LM curve to the left to maintain the fixed exchange rate so $Y$ and $i$ remain unchanged. Note that the reduction in $Y$ is larger than it would be under floating exchange rates.

![Diagram](image)

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c. The Eurozone countries increase their taxes.

**Answer:** When the Eurozone countries raise taxes, the IS curve shifts to the left, decreasing foreign interest rate, $i^*$. This leads to an decrease in demand for Lithuania’s goods, shifting the IS curve to the left. To maintain exchange rate parity, the central bank must increase the money supply, shifting LM to the right so that $i_2 = i^*_2$.

![Diagram](image)
3. Consider two countries that are currently pegged to the euro: Lithuania and Comoros. Lithuania is a member of the European Union, allowing it to trade freely with other European Union countries. Exports to the Eurozone account for the majority of Lithuania’s outbound trade, which mainly consists of manufacturing goods, services, and wood. In contrast, Comoros is an archipelago of islands off the eastern coast of southern Africa that exports food commodities primarily to the United States and France. Comoros historically maintained a peg with the French franc, switching to the euro when France joined the Eurozone. Compare and contrast Lithuania and Comoros in terms of their likely degree of integration symmetry with the Eurozone. Plot Comoros and Lithuania on a symmetry-integration diagram as in Figure 8–4 (19–4).

**Answer:** In terms of economic integration, it is likely that Lithuania is more closely integrated with the Eurozone given its geographic proximity. Although the Comoros historically traded heavily with France, its other major trading partner, the United States, is not part of the Eurozone. Also, given the types of goods produced in each country, Lithuania’s economy is likely to experience more common shocks with the Eurozone. Most of the Comoros’ shocks will be asymmetric relative to those experienced in the Eurozone. See the following diagram. It is possible that when pegged to the French franc, the net benefit of fixing was higher, so that the FIX line was farther to the left in this case, making the exchange rate peg desirable. Also, the Comoros may benefit more from other considerations such as fiscal discipline and liability dollarization versus Lithuania.

![Symmetry-integration diagram](image)

4. Use the symmetry-integration diagram as in Figure 8–4 (19–4) to explore the evolution of international monetary regimes from 1870 to 1939—that is, during the rise and fall of the gold standard.

See the following diagram.

**a.** From 1870 to 1913, world trade flows doubled in size relative to GDP, from about 10% to 20%. Many economic historians think this was driven by exogenous declines in transaction costs, some of which were caused by changes in transport technology. How would you depict this shift for a pair of countries in the symmetry-integration diagram that started off just below the FIX line in 1870? Use the letter $A$ to label your starting point in 1870 and use $B$ to label the end point in 1913.

**Answer:** From 1870 to 1913, there was an increase in market integration (rising from 10% to 20% of GDP).
8. Evaluate the empirical evidence on how currency depreciation affects wealth and output across countries. How does the decision of maintaining a fixed versus floating exchange rate regime depend on a country’s external wealth position?

**Answer:** Figure 8-8 (19-8) reports data on the cumulative change in external wealth associated with valuation effects during currency crises from 1993 to 2003. From the figure, these valuation effects can be quite large, although they depend on the percent depreciation in the currency. Countries with a larger fraction of liabilities denominated in another currency (dollars or yen in these cases) or those experiencing larger depreciations suffered larger losses in wealth. Figure 8-9 (19-9) plots the percentage change in output against the wealth losses associated with valuation effects. The figure shows a clear relationship: countries suffering larger wealth losses experienced more severe contractions in output.

9. Home signs a free-trade agreement with Foreign, which lowers tariffs and other barriers to trade. Both countries are very similar in terms of economic shocks, as they each produce very similar goods. Use a symmetry-integration diagram as in Figure 8-4 (19-4) as part of your answer to the following questions.

See the following figure. Initially, the countries face similar shocks, as shown by Point A.

![Symmetry of shocks diagram](image)

**a.** Initially, trade rises. Does the rise in trade make Home more or less likely to peg its currency to the Foreign currency? Why?

**Answer:** As trade increases, this implies increased market integration, moving the economies from point A to point B, increasing the net benefit of a fixed exchange rate regime.

**b.** In the longer run, freer trade causes the countries to follow their comparative advantage and specialize in producing very different types of goods. Does the rise in specialization make Home more or less likely to peg its currency to the Foreign currency? Why?

**Answer:** If countries specialize in different types of goods and services, this means they will be subject to asymmetric shocks, moving the net benefit of fixing down, perhaps below the FIX line, as shown by point C. This means countries are less likely to peg their currencies.
3. Consider the central bank balance sheet for the country of Riqueza. Riqueza currently has $1,800 million escudos in its money supply, $1,100 million of which is backed by domestic government bonds; the rest is backed by foreign exchange reserves. Assume that Riqueza maintains a fixed exchange rate of 1 escudo per dollar, the foreign interest rate remains unchanged, and money demand takes the usual form, \( M/P = L(i)Y \). Assume prices are sticky.

a. Show Riqueza’s central bank balance sheet, assuming there are no private banks. What is the backing ratio?

**Answer:** The central bank balance sheet follows. The backing ratio is \( R/M = 700/1,800 = 38.9\% \).

<table>
<thead>
<tr>
<th>Assets</th>
<th>Liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reserves, ( R )</td>
<td>700</td>
</tr>
<tr>
<td>Domestic credit, ( B )</td>
<td>1,100</td>
</tr>
</tbody>
</table>


b. Suppose that Riqueza’s central bank sells $200 million in government bonds. Show how this affects the central bank balance sheet. Does this change affect Riqueza’s money supply? Explain why or why not. What is the backing ratio now?

**Answer:** Since the exchange rate is fixed, domestic interest rate, \( i \), equals the foreign interest rate. Further, since output, \( Y \), and price level, \( P \), do not change, the money supply remains fixed. The change in domestic credit (i.e., the selling of domestic government bonds) only affects the composition of the central bank’s assets. Reserves increase by the amount of the decrease in domestic credit. The new backing ratio is 50% (900/1,800).

<table>
<thead>
<tr>
<th>Assets</th>
<th>Liabilities</th>
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<tbody>
<tr>
<td>Reserves, ( R )</td>
<td>900</td>
</tr>
<tr>
<td>Domestic credit, ( B )</td>
<td>900</td>
</tr>
</tbody>
</table>

\[ \text{Money supply, } M = 1,800 \]
c. Now, starting from this new position, suppose that there is an economic downturn in Riqueza, so that real income contracts by 10%. How will this affect money demand in Riqueza? How will forex traders respond to this change? Explain the responses in the money market and the forex market.

**Answer:** Real money demand will decrease by 10% putting pressure on the currency to depreciate (decrease in interest rates). Forex traders will respond by selling escudos and buying foreign currency reserves from the central bank. See Figure Question 3c above.

d. Using a new balance sheet, show how the change described in (c) affects Riqueza’s central bank. What happens to domestic credit? What happens to Riqueza’s foreign exchange reserves? Explain the responses in the money market and the forex market.

**Answer:** With a 10% decrease in money demand, the money supply must fall by 10% because $P$ and $i$ do not change. This implies the new money supply is equal to $1,620$ million ($=1,800 - 0.1 \times 1,800$). Therefore, reserves declined by 180 million escudos.

<table>
<thead>
<tr>
<th>Assets</th>
<th>Liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reserves, $R$</td>
<td>720</td>
</tr>
<tr>
<td>Domestic credit, $B$</td>
<td>900</td>
</tr>
<tr>
<td>Money supply, $M$</td>
<td>1,620</td>
</tr>
</tbody>
</table>

4. What is a currency board? Describe the strict rules about the composition of reserves and domestic credit that apply to this type of monetary arrangement.

**Answer:** A currency board forces the central bank to maintain a backing ratio of 100%. The country’s money supply is entirely backed by foreign currency reserves, so it has no domestic credit ($M = R$). This means that the central bank cannot buy or sell domestic credit. All money demand shocks are fully absorbed in reserves. In the simple model of the central bank balance sheet, this is the furthest a central bank can be from the floating line, making it impossible for the currency to float unless the country decides to do away with the board itself.

5. What is a lender of last resort and what does it do? If a central bank acts as a lender of last resort under a fixed exchange rate regime, why are reserves at risk?

**Answer:** A lender of last resort provides credit to banks that are either insolvent or suffering from illiquidity. When a central bank serves as a lender of last resort to private banks, this means it will expand domestic credit when the banking system is struggling. To defend the exchange rate peg, this expansion of domestic credit implies that reserves are reduced. Therefore, each time the central bank extends credit, this reduces its ability to defend the peg.

6. Suppose that a country’s money supply is $1,200$ million and its domestic credit is equal to $800$ million in the year 2005. The country maintains a fixed exchange rate, the central bank monetizes any government budget deficit, and prices are sticky.


**Answer:** $M = 1,200$ and $B = 800$. Therefore, $R = 400$. 
9. A peg is not credible when investors fear depreciation in the future, despite official announcements. Why is the home interest rate always higher under a noncredible peg than under a credible peg? Why does that make it more costly to maintain a noncredible peg than a credible peg? Explain why nothing more than a shift in investor beliefs can cause a peg to break.

Answer: The home interest rate is always higher under a noncredible peg because there is a positive probability that currency may depreciate giving rise to an expected depreciation. In addition, the uncertainty of exchange rate also makes the currency holding risky. Therefore, due to the above two factors, investors require a currency premium to hold domestic assets (i.e., to prevent them from buying foreign currency and selling domestic currency). If the peg is credible, investors do not require this premium, so \( i = i^* \). This means that it is more costly to defend a noncredible peg. The required contraction in output is higher because the central bank will have to contract the money supply by more to drive up interest rates. From Figure 9-17 (20-17) in the textbook, we can see that there are two possible equilibria (in Zone II). The actual outcome for the economy depends on investors’ beliefs about the peg.

10. You are the economic advisor to Sir Buffon Tufton, the Prime Minister of Perfidia. The Bank of Perfidia is pegging the exchange rate of the local currency, the Perfidian albion. The albion is pegged to the wotan, which is the currency of the neighboring country of Wagneria. Until this week both countries have been at full employment. This morning, new data showed that Perfidia was in a mild recession, 1% below desired output. Tufton believes a downturn of 1% or less is economically and politically acceptable but a larger downturn is not. He must face the press in 15 minutes and is considering making one of three statements:

a. “We will abandon the peg to the wotan immediately.”
b. “Our policies will not change unless economic conditions deteriorate further.”
c. “We shall never surrender our peg to the wotan.”

What would you say to Tufton concerning the merits of each statement?

Answer: Each statement is designed to either affect or address investors’ expectations.

a. By abandoning the peg, the central bank is free to conduct monetary policy to push the economy closer to full employment, through the expansion of domestic credit and the money supply. The Prime Minister might do this for one of two reasons. First, the 1% output gap is in fact too large for his taste. The data may be revised to indicate it is actually larger. Second, the Prime Minister anticipates that investors will view the peg as not credible, realizing there is no purpose in defending it. Recall that defending a noncredible peg is more costly than defending a credible one. However, if the Prime Minister believes the costs of the peg are smaller than the benefits, he should not make this statement.

b. This statement is designed to reassure investors that the peg is credible because the cost of the output gap is smaller than the benefit of pegging. The benefit of this statement is that it conveys to investors that they should view the peg as credible. If the Prime Minister wants to maintain the peg, then this statement will help to reassure investors. The drawback of this statement is that it reminds investors of the contingent commitment and clearly defines the terms. If further data are released in the coming days to indicate the situation is worse than expected, a speculative attack will surely follow.
c. This statement has a similar effect to the previous one, but it too has its pros and cons. First, this statement is a stronger commitment to the peg, possibly staving off speculative attack if bad economic news arrives in the coming days. If the benefits from the peg are substantially higher than even-further output gaps, this statement is likely to help by stabilizing exchange rate expectations. The investors will believe that the government will fight with all its might to defend the currency. If the benefits are not substantially larger, investors are not likely to believe this statement. They know that there are conditions under which the Prime Minister will abandon the peg. Therefore, this statement may not help if investors do not take the Prime Minister’s statements as rational or believable.

11. What steps have been proposed to prevent exchange rate crises? Discuss their pros and cons.

**Answer:** The propositions are as follows:

- Impose capital controls to stop the outflow (or restrict the inflow) of foreign capital to prevent speculative attack. However, capital flows are hard to control, and by controlling capital flows the country may lose its reputation of open capital markets, which can hurt future capital inflows.

- Commit to either a floating or a fixed exchange rate, but do not attempt to maintain an intermediate regime because this creates added uncertainty, potentially driving up the currency premium. However, this also implies that the country loses the flexibility that comes with dirty float, i.e., ability to fix exchange rates as well as manage its money supply from time to time.

- Abandon the fixed exchange rate and switch to float. Floating exchange rates are not subject to speculative attacks, so the central bank need not have monetary policy dictated by the maintenance of foreign reserves. Floating exchange rates however can hurt trade in goods and services from its trading partners in particular if the country's trade is large relative to its GDP—this is one reason for Euro's existence.

- If a fixed exchange rate is preferred, then a hard peg (currency board) is the best way to defend the peg because the money supply is composed entirely of foreign reserves. This means that neither fiscal nor monetary policy makers can damage the peg's credibility through poor policy decisions. But this does not allow ANY monetary policy flexibility and sometimes the cost of currency board in terms of domestic economic contraction may get too high. Example: Argentina in the late nineties—it dissolved its currency board eventually in 2002.

- Work toward improving the institutions of macroeconomic policy and financial markets to reduce the risks associated with exchange rate pegs/crises. It is a long-run policy and can not be utilized in the short run.

- Establish a lender of last resort to loan foreign currency reserves during a crisis. This will help to defend the peg in case of a temporary crisis, mitigating its negative economic effects. The International Monetary Fund (IMF) can lend foreign currency to countries to help defend the peg during a crisis. However, having a safety umbrella with an expected bailout in case of crises can lead to countries engaging in excessive external borrowings and the private sector getting into risky investments.

- Accumulate reserves as insurance against a crisis. With large volumes of reserves, in some cases exceeding the money supply, the country is in a better position to defend the peg. However, only countries that have current account surpluses can successfully accumulate reserves. If the country as a whole is a borrower, it is hard for its central bank to be a lender.
3. The Maastricht Treaty places strict requirements on government budgets and national debt. Why do you think the Maastricht Treaty called for fiscal discipline? If it is the central bank that is responsible for maintaining the fixed exchange rate, then why does fiscal discipline matter? How might this affect the gains or losses for joining a currency union?

**Answer:** Although the central bank is responsible for maintaining the fixed exchange rate and for monetary policy within a currency union, fiscal policy decisions are taken independently by member governments. The two convergence criteria for fiscal discipline are designed to prevent the problem of inflationary bias. The countries that have a higher fiscal deficit and higher debt to GDP ratio are likely to lobby for a higher inflation because a higher inflation reduces the real value of debt. Second, a higher debt increases the likelihood of a country's default (the ongoing default crisis in Greece is an example). When such a default occurs, the country may pressure the ECB to come to its rescue by lending money to this country and thus increasing money supply and inflation. Both of these scenarios would lead to higher inflation rates that would be shared by all countries in the currency union, not just the ones with high debts and deficits. Therefore, convergence criteria require that countries that lack fiscal discipline tighten their belts, bringing them in line with the consistent fiscal policy needed to limit inflation bias.

4. The following figure shows the hypothetical OCA criteria with the Eurozone for selected countries. Assume that these are based solely on economic criteria—that is, without reference to other political considerations. Refer to the diagram in responding to the questions that follow.

![Symmetry-Integration Diagram](image)

**a.** Which of the countries satisfies the OCA criteria for joining a monetary union?

**Answer:** Denmark, Slovakia, Switzerland, and the United Kingdom satisfy the OCA criteria. They have relatively high market integration with the EU and also experience symmetric shocks.
b. Compare Poland and the United Kingdom in terms of the OCA criteria regarding market integration with the Eurozone. Discuss one possible source of differences in integration with the EU in the two countries.

**Answer:** According to the graph given in the question, Poland has lower market integration with EU countries relative to the United Kingdom's market integration with the EU. This could reflect lower trade volumes with the other countries on the graph. This could reflect access to ports, distance from major trading centers, or a variety of other factors. It is worth noting that the United Kingdom has a long history of trading with other EU countries, whereas Poland was aligned with the USSR both economically and politically (until 1989).

c. Compare Poland and the United Kingdom in terms of the OCA criteria regarding symmetric versus asymmetric shocks (relative to the Eurozone). Discuss one possible source of differences in symmetry with the EU in the two countries.

**Answer:** Poland's shocks are more symmetric with the EU than are the United Kingdom's. This indicates that economic growth rates in Poland are more closely correlated with those in the other EU countries (relative to the United Kingdom). Possible sources of these differences are in the types of goods and services produced in Poland and the United Kingdom. Relative to the United Kingdom, Poland might be producing more goods and services that are more common in other EU countries. Poland would be producing more manufactured goods, closer in composition to the rest of the EU, while the United Kingdom produces more services, for example, its financial industry based in London.

d. Suppose that policy makers in both Poland and the United Kingdom care only about being able to use policy in response to shocks. Which is more likely to seek membership in the EMU and why?

**Answer:** Because policy makers care only about the loss of monetary policy autonomy and place no weight on the efficiency gains, Poland would be more likely to join the currency union compared with the United Kingdom. This is because Poland gives up relatively less in forgoing autonomous monetary policy than does the United Kingdom, since Poland's shocks are more symmetric with the EU than the United Kingdom's are. Poland, since it is more likely to experience the same shocks as other Eurozone countries, would therefore give up relatively less than the United Kingdom in forgoing autonomous monetary policy.

e. What did the ERM crises reveal about the preferences of the United Kingdom? Why has the United Kingdom sought membership only in the EU without seeking membership in the Eurozone? Consider other costs and benefits not in the diagram, both economic and political.

**Answer:** The ERM crisis revealed that the loss of autonomous monetary policy was too costly for the United Kingdom. The British government was unwilling to remain on the exchange rate peg because this would have meant a severe economic contraction. The United Kingdom's shocks are not symmetric with the EU and therefore the United Kingdom prefers an independent monetary policy that allows it to handle its economic business cycles independently. However, being in the EU allows it to benefit both politically and economically from its political and market integration. Not having the euro as the United Kingdom's currency hurts its trade with the EU to some extent. But, in the balance, the United Kingdom's policy makers must have realized that the cost of giving up its monetary policy independence far exceeds its benefits from potential increase in trade with the EU countries.
f. What did membership of the Eurozone reveal about the preferences of Greece? Consider other costs and benefits not in the diagram, both economic and political.

**Answer:** Greece sought membership despite falling short of the OCA criteria. This indicates that Greece either (1) wanted to join the EU for political and cultural reasons, and/or (2) Greece believes the OCA criteria are self-fulfilling, especially in terms of increased market integration.

5. Congress established the Federal Reserve System in 1914. Until then, the United States did not have a national currency; Federal Reserve notes are still the paper currency in circulation today. Earlier attempts at establishing a central bank were opposed on the grounds that a central bank would give the federal government monopoly over money. This was a reflection of the historic debate between maintaining states’ rights versus establishing a strong centralized authority in the United States. That is, the creation of the Fed and a national currency would mean that states would no longer have the authority to control the money supply on a regional level. Discuss the debate between states’ rights versus centralized authority in the context of the EMU and the European Central Bank (ECB).

**Answer:** The debate in the United States is similar to that within EU countries. In terms of economic costs and benefits:

- Individual states would forgo autonomous monetary policy that could otherwise respond to asymmetric shocks affecting a particular state or region. This same compromise is made by Eurozone countries, in which there is no longer a national monetary policy but rather a Eurozone-wide monetary policy controlled by the ECB.

- Individual states would potentially benefit from efficiency gains associated with the elimination of state or regional currencies. Just as with individual currencies that previously existed in Europe, state or regional paper currencies also had an implied exchange rate that varied based on money supply, inflation, and so on. This added exchange transactions costs and exchange rate uncertainty potentially reduce the volume of trade that would otherwise prevail with a single currency.

In the EU, there are three countries that have opted not to join the currency union (Denmark, Sweden, and the United Kingdom). Economic costs and benefits are surely a consideration for these countries, but national or regional identity also seems to be an important factor. In the United States, the debate regarding states’ rights versus centralized authority was similarly influenced by a strong sense of regional identity, especially of the North versus the South leading up to and following the Civil War.

6. In recent years there have been reports that a group of six Gulf countries (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and United Arab Emirates) were considering the introduction of a single currency. Currently, these countries use currencies that are effectively pegged to the U.S. dollar. These countries rely heavily on oil exports to the rest of the world, and political leaders in these countries are concerned about diversifying trade. Based on this information, discuss the OCA criteria for this group of countries. What are the greatest potential benefits? What are the potential costs?

**Answer:** The potential benefits arise from the elimination of uncertainty regarding the value of the domestic currency relative to the U.S. dollar. All of these countries maintain a peg against the U.S. dollar, so they are effectively pegged to one another. However, with an exchange rate peg there is always the chance of a speculative attack, creating added risk that potentially hinders trade. If these countries were to adopt a region-wide currency such as the euro in Europe, this risk would be eliminated. If these countries have high market integration, that is, if the goods and services trade between these countries forms a substantial percentage of their GDPs, then the benefits of adopt-