

GEORGE WASHINGTON UNIVERSITY
Department of Economics

International Finance: Economics 284

Graciela L. Kaminsky

Problem Set 4

1. You are asked to advise a country on the optimal exchange rate regime. You are told that in the past this country has suffered from various fiscal shocks. The country has entered in several wars and as a result military spending has fluctuated substantially, increasing during wars and declining dramatically when wars ended. These war/no-war episodes may recur in the future. What type of exchange rate regime would you advise the government to adopt if the government would like to smooth the effects of the war on economic activity? Fixed? Flexible? Why? Use the model in Krugman and Obstfeld to answer this question.

2. Some have argued that international capital inflows have been excessive and have triggered excessive booms and busts in financial markets in emerging economies that have ended in banking and currency crises. These critics have suggested that emerging economies should introduce capital controls on inflows. Do you think that capital controls have worked in the past? Discuss the findings in the literature on the effects of controls on capital inflows.

3. You are asked to advise a Latin American country on whether or not to devalue its domestic currency. Using the model discussed in class and what you have learned about currency crises, explain to the government officials in that country what are the advantages of devaluing and what are the advantages of defending the current peg.

4. Explain the differences between the Gold Standard until 1914 and the Bretton Wood System in the post-war period.

5. You are asked to advise a country on the optimal exchange rate regime. You are told that the country has aversion to inflation. You are also told that the rest of the world is in an easing mode, that is, the other countries are following an expansionary monetary policy (i.e., reducing i^*). What type of exchange rate regime would you advise the government to adopt? Fixed? Flexible? Why? Use the model in Krugman and Obstfeld to answer this question.

6. In February 2001, Turkey devalued its domestic currency by 40 percent. By the end of the year, the exchange rate had depreciated by 120 percent. You are asked to examine the signals of upcoming crises in Turkey in 1999 and 2000. You are given the following indicators (see next table). Answer the following questions:

- 1.** What is the real exchange rate? Does the real exchange rate signal an upcoming crisis in 2001?
- 2.** What is the trade balance? Is the trade account deteriorating?

3. What is the money multiplier? Does the money multiplier anticipate a crisis
4. What is the behavior of Domestic Credit/GDP? Does this ratio anticipate an upcoming crisis?
5. Did the 2001 crisis happen in the midst of a recession?
6. Do you think Turkey suffer from external vulnerability in 2000? How do you measure external vulnerability?
7. Write a small report on the state of the Turkey economy in 1999 and 2000.

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Answers to Problem Set 4

1. War and no-war episodes are shifting the demand for domestic goods. In war times, demand increases and pushes domestic activity up. As domestic activity increases, demand for money will also increase. To equilibrate the money market, domestic interest rates will have to increase. In a floating exchange rate regime, this increase in domestic interest rates will make investors want to purchase domestic bonds and sell foreign-currency denominated bonds. As a result the domestic currency will appreciate. This appreciation will reduce demand for domestic goods and will offset the expansionary effect of the war. With a fixed exchange rate regime, this offsetting effect will not occur. In fact, as interest rates increase, the central bank will start intervening in the foreign exchange market to avoid the appreciation. The purchases of foreign assets by the central bank result into an increase in the money supply, which accommodates the increase in money demand. Thus, if the government wants to avoid instability in output, it should allow the exchange rate to float. See, figure 1. (Naturally, we can also examine what happens when there is a contraction in fiscal spending. The results are similar, although this time output declines and the exchange rate depreciates). Note: We have assumed that wars are transitory phenomena, thus exchange rate expectations are not affected.

2. Of course, the literature on the effects of capital account controls is immense. But some of the findings can be summarized by looking at the experience in Chile. One of the problems that capital controls try to avoid is too much capital. To do so, Chile introduced an unremunerated reserve requirement on capital inflow, which imposes a tax on capital inflows since the required deposit at the central bank does not earn any interest. The results from this experience suggest that these controls did not reduce the flows of capital into Chile even though controls became more restrictive over time. Interestingly, there is some evidence when looking at the experience in Chile that capital flows of very short maturities (hot money) did decline following the introduction of capital controls. Still, capital account controls did not insulate Chilean financial markets from shocks overseas. For example, large shocks in financial markets in Asia were transmitted to financial markets in Chile, suggesting that capital controls may not work.

3. The traditional model in Krugman and Obstfeld suggests one beneficial effect of devaluations. If prices are sticky, a devaluation of the nominal exchange rate will be also a depreciation of the real exchange rate. The price of domestic goods (relative to that of foreign goods) will be lower, competitiveness will increase, demand for domestic goods will increase and the current account deficit will decline. Thus, a devaluation can help the domestic economy to get out of a recession and reduce its current account deficit. That is what happened when Britain left the EMS and let the pound devalue in August 1992. Still this effect is just transitory.

A devaluation will lead to an increase in domestic prices and the real devaluation will disappear over time.

In contrast, when a country has liabilities in foreign currency, a devaluation may have an adverse effect on economic activity (witness Thailand, 1997), with firms going into bankruptcy as their liabilities in domestic currency increase in proportion to the devaluation. Households also may have liabilities in foreign currency but assets in domestic currency. As the balance sheet of the firms deteriorates and households net wealth declines, aggregate demand will fall and output may decline. See, figure 2.

4. During the Gold Standard (1870-1914), all countries adhering to the system of fixed rates played a symmetric role. All had to intervene in the gold market to peg the value of their currencies in terms of gold. The growth of world money supply was constrained by gold discoveries. Since world economic activity increased more than gold production, the tendency was for relative contractionary world monetary policy and for price deflation. The Bretton Woods System was a dollar standard. All countries (with the exception of the US) had to intervene in the foreign exchange market to peg their currencies relative to the US dollar. The US still could implement independent monetary policy. Compared to the Gold Standard, the Bretton Wood System did not necessarily imply price deflation. World money supply increased with increases in the US money supply.

5. When the rest of the world is in an easing mode, world money supply increases. In the short run, world interest rates will decline (the liquidity effect). However, in the long run, as prices in the rest of the world increase, supply of real balances will decline again and world interest rates will return to their previous equilibrium.

Let's examine what are the effects of this policy in the domestic economy under flexible exchange rates. First, let's examine the long run equilibrium. Note, that in the long run, world interest rates do not change. Thus money demand in the domestic economy in the long run, will not change either. As a result, in the long run, prices in the domestic economy will not change. Interestingly, since prices in the rest of the world do change as a result of the expansionary monetary policy, the domestic currency will have to appreciate to guarantee full employment level of output in the domestic economy (if it does not appreciate in the long run, there will be excess demand for domestic goods in the long run). Thus, when the expansionary monetary policy is implemented in the rest of the world, investors will know that in the long run the domestic currency will appreciate and they will modify their expectations accordingly. In the short run, when world interest rates decline (as a result of the expansionary monetary policy abroad), investors will prefer to purchase domestic bonds instead of foreign bonds, both because the decline in world interest rates and because of the expectations of appreciation of the domestic currency. In the long run, world interest rates return to their previous equilibrium value. As the interest rate effect fades away, the domestic currency will depreciate to its long run equilibrium value. Note that flexible rates allow the domestic economy to choose its own rate of inflation. In this example, prices at home do not change as a result of the easing in monetary policy abroad.

Let's examine now the effects of this policy in the domestic economy under fixed exchange rates. To do so, let's examine first the long run equilibrium in the domestic economy. Let's

look at the goods market equilibrium. Note that in the long run prices abroad increase. If in the initial equilibrium the domestic economy was in full employment, the increase in prices abroad trigger excess demand for domestic goods. In the flexible exchange rate regime economy, the exchange rate appreciated to eliminate the excess demand. In the fixed exchange rate regime, this cannot happen. The only way to eliminate the excess demand for domestic goods in the long run, is for domestic prices to increase. But how can this happen? We should note that in the fixed exchange rate regime, money supply in the domestic economy is endogenous. We will see that the change in the monetary policy abroad triggers a change in money supply at home under fixed exchange rates. This in turn will trigger increases in prices at home. But let's look at the short run equilibrium. When interest rates abroad decline, investors will prefer to purchase domestic-currency denominated bonds. To avoid the appreciation of the domestic currency, the central bank in the domestic economy will purchase foreign assets. The money supply at home will increase. This expansionary monetary policy at home will trigger increases in prices at home. In the long run, prices at home and abroad will increase in the same proportion. Thus, a fixed exchange rate regime does not allow the domestic economy to choose its own inflationary policy. See Figure 3.

6.

- a.** The real exchange rate is equal to eP^*/P , that is the relative price of foreign goods over domestic goods. As you can see from the attachments, the real exchange rate appreciated 10.29 percent in 1995, 2.52 percent in 1997, 8.43 percent in 1998, and 7.51 percent in 2000. These appreciations were not compensated by the depreciations in 1996 and 1999. These figures suggest a loss of competitiveness as Turkey approaches the crisis in 2001.
- b.** The trade balance is the difference between exports and imports. Turkey had large trade deficits in the 1990s, with exports around 50 percent of imports.
- c.** The money multiplier reflects money creation by the banking system. In our case, it is equal to $M2/M0$. The money multiplier grew substantially in 1995 and 1996.
- d.** Domestic Credit/GDP growth was highly positive since 1996 indicating the presence of pronounced booms in financial markets.
- e.** Industrial production declined 9.58 percent in 1998 and 4.10 percent in 2000. It grew 3.33 percent in 1999. This increase did not compensate for the two declines. Overall industrial production declined by about 11 percent in those three years, suggesting a downturn in the economy.
- f.** One way of measuring external vulnerability is to look at the external debt/export ratio. If the ratio is high it means the country may not obtain foreign currency to repay the debt. In the case of Turkey, this ratio oscillated around 30 in the late 1990s and about 13 in 2000. Another way of looking at external vulnerability is to examine the short-term debt/foreign exchange reserves of the central bank. This ratio was about 1.3 in 1999 indicating that short-term debt was about 30 percent higher than the reserves of the central bank, indicating liquidity problems.
- g.** In the late 1990s, Turkey suffered from a real exchange rate appreciation and a deterioration of the trade balance. The loss of competitiveness also led to a 10 percent decline in industrial production in the 1998-2000 period. There are also signs of financial vulnerability, domestic credit/industrial production ratio increased almost continuously since 1996 even increasing more than 50 percent just in 2000 and 2001. Stock prices in dollars increased dramatically in the since 1996 and collapsed in 2000-2001 suggesting the burst of a bubble. Finally, as

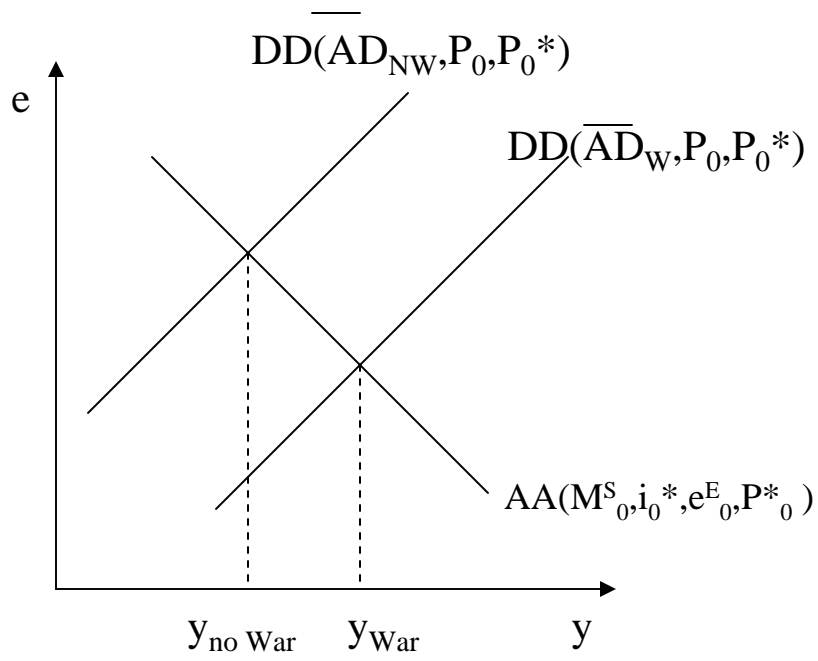
shown in **f.** external vulnerability was high with external short-term debt about 30 percent higher than the stock of foreign exchange reserves held at the central bank.

| Year | Turkey | | | | | | |
|--------|------------------------|----------------|------------------------|----------------|-------------------------|-----------------------|---------------------|
| | Exchange Rate | Reserves | M0 | Deposits | Domestic | M1 | M2 |
| | Liras per Dollar | in US Dollars | in Liras | in Liras | Credit in Liras | in Liras | in Liras |
| Dec-70 | 15 | 304,140,000 | 19,725,000,000 | 32,635 | 52,827,881,000 | 35,422,000,000 | 50,000,000 |
| Dec-71 | 14 | 631,428,550 | 26,193,000,000 | 42,250 | 61,212,752,000 | 43,733,000,000 | 50,000,000 |
| Dec-72 | 14 | 1,262,080,300 | 35,898,000,000 | 53,146 | 74,389,565,000 | 53,622,000,000 | 70,000,000 |
| Dec-73 | 14 | 1,985,872,400 | 45,615,000,000 | 68,384 | 91,720,485,000 | 71,145,000,000 | 90,000,000 |
| Dec-74 | 14 | 1,561,691,900 | 58,357,000,000 | 84,539 | 122,930,010,000 | 90,477,000,000 | 110,000,000 |
| Dec-75 | 15 | 943,818,540 | 77,020,000,000 | 111,599 | 191,892,350,000 | 119,102,000,000 | 150,000,000 |
| Dec-76 | 17 | 990,470,620 | 93,178,000,000 | 137,326 | 268,403,140,000 | 152,500,000,000 | 180,000,000 |
| Dec-77 | 19 | 638,036,440 | 137,184,000,000 | 180,045 | 388,794,520,000 | 211,979,000,000 | 250,000,000 |
| Dec-78 | 25 | 801,299,640 | 198,907,000,000 | 233,961 | 551,191,900,000 | 288,872,000,000 | 340,000,000 |
| Dec-79 | 35 | 658,197,600 | 309,410,000,000 | 381,953 | 879,902,400,000 | 456,480,000,000 | 550,000,000 |
| Dec-80 | 90 | 1,077,000,000 | 457,747,000,000 | 705,819 | 1,659,053,500,000 | 758,149,000,000 | 950,000,000 |
| Dec-81 | 134 | 928,209,510 | 717,244,000,000 | 1,426,535 | 2,482,337,400,000 | 1,024,104,000,000 | 1,770,000,000 |
| Dec-82 | 187 | 1,080,121,300 | 1,011,155,000,000 | 2,266,007 | 3,647,870,600,000 | 1,412,955,000,000 | 2,680,000,000 |
| Dec-83 | 283 | 1,288,125,200 | 1,397,100,000,000 | 2,913,100 | 5,071,363,700,000 | 2,090,000,000,000 | 3,490,000,000 |
| Dec-84 | 445 | 1,270,680,400 | 2,100,500,000,000 | 4,730,900 | 8,964,636,900,000 | 2,487,300,000,000 | 5,540,000,000 |
| Dec-85 | 577 | 1,055,929,300 | 2,899,900,000,000 | 7,521,900 | 14,456,258,000,000 | 3,467,700,000,000 | 8,600,000,000 |
| Dec-86 | 758 | 1,411,594,700 | 4,587,500,000,000 | 10,408,300 | 19,572,153,000,000 | 5,061,700,000,000 | 14,570,000,000 |
| Dec-87 | 1021 | 1,775,836,900 | 6,758,700,000,000 | 14,197,600 | 30,099,854,000,000 | 8,437,500,000,000 | 21,930,000,000 |
| Dec-88 | 1815 | 2,344,493,000 | 12,083,700,000,000 | 22,996,300 | 44,074,002,000,000 | 11,020,400,000,000 | 36,240,000,000 |
| Dec-89 | 2314 | 4,780,460,500 | 20,780,000,000,000 | 39,860,900 | 65,713,365,000,000 | 19,092,100,000,000 | 61,210,000,000 |
| Dec-90 | 2930 | 6,049,535,200 | 28,746,100,000,000 | 60,078,100 | 98,346,112,000,000 | 30,236,700,000,000 | 93,810,000,000 |
| Dec-91 | 5080 | 5,144,174,300 | 43,076,500,000,000 | 102,590,100 | 168,048,540,000,000 | 44,278,600,000,000 | 171,360,000,000 |
| Dec-92 | 8564 | 6,159,412,500 | 76,773,100,000,000 | 170,244,700 | 297,767,010,000,000 | 76,372,600,000,000 | 306,240,000,000 |
| Dec-93 | 14473 | 6,271,513,000 | 128,901,800,000,000 | 257,312,000 | 541,850,980,000,000 | 125,867,700,000,000 | 503,340,000,000 |
| Dec-94 | 38725 | 7,168,443,351 | 282,973,951,481,768 | 560,374,356 | 1,125,442,035,491,740 | 228,405,826,304,917 | 1,234,717,633,400 |
| Dec-95 | 59648 | 12,441,033,920 | 507,827,091,357,641 | 1,152,678,959 | 2,200,183,979,286,520 | 384,382,976,110,272 | 2,514,040,699,985 |
| Dec-96 | 107771 | 16,434,723,799 | 972,303,577,362,296 | 2,660,270,677 | 4,987,659,020,756,660 | 882,273,878,072,614 | 5,462,351,867,953 |
| Dec-97 | 205598 | 18,657,096,975 | 1,943,186,970,641,880 | 5,124,476,894 | 10,509,614,008,806,200 | 1,491,674,692,553,310 | 10,790,232,717,598 |
| Dec-98 | 314464 | 19,487,511,754 | 3,505,608,911,670,030 | 10,524,981,293 | 20,382,064,491,906,200 | 2,432,919,691,107,170 | 20,473,045,301,040 |
| Dec-99 | 541400 | 23,344,356,793 | 6,922,866,086,561,690 | 20,304,057,534 | 36,074,887,535,032,800 | 4,315,178,546,778,550 | 40,613,239,465,719 |
| Dec-00 | 673385 | 22,486,913,475 | 10,118,698,908,793,900 | 28,387,922,291 | 65,244,489,943,847,900 | 6,617,942,040,419,080 | 56,837,231,979,156 |
| Nov-01 | 1477520 | 17,430,021,223 | 17,772,650,453,980,900 | 38,659,584,066 | 126,080,544,511,434,000 | 8,576,044,513,367,710 | 102,816,769,302,057 |
| Dec-01 | | | | | 134,564,019,525,627,000 | | |

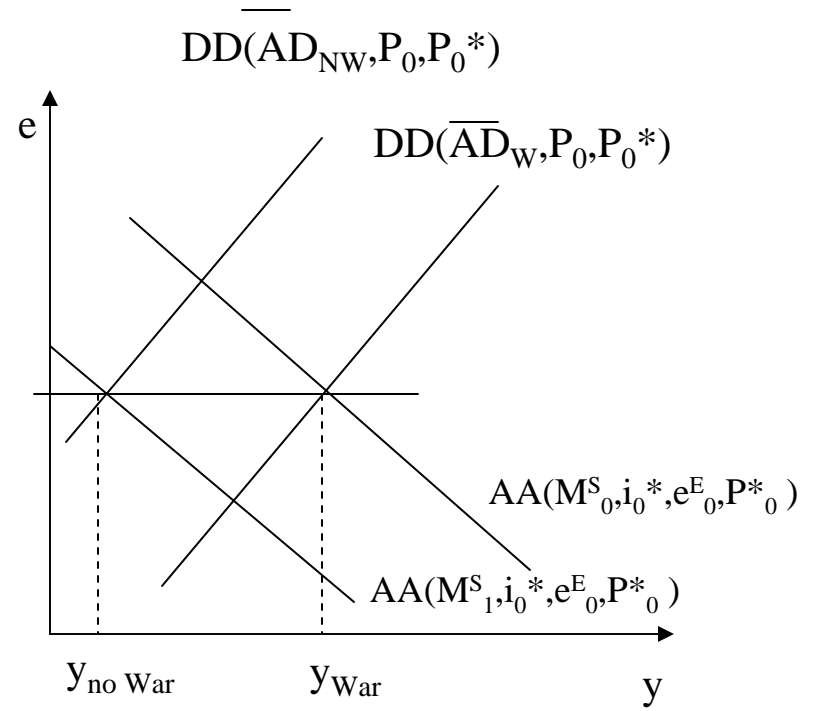
| Year | Turkey | | | | | United States CPI Index |
|--------|--------------|-----------------------------------|--------------------------|--------------------------|--------------------------|----------------------------|
| | CPI Index | Industrial Production Index | Stock Prices in Liras | Imports in US Dollars | Exports in US Dollars | |
| Dec-70 | 0 | | | 98,200,000 | 77,400,000 | 30 |
| Dec-71 | 0 | | | 109,300,000 | 133,800,000 | 32 |
| Dec-72 | 0 | | | 201,600,000 | 131,020,000 | 33 |
| Dec-73 | 0 | | | 228,900,000 | 161,060,000 | 35 |
| Dec-74 | 0 | | | 534,200,000 | 162,170,000 | 40 |
| Dec-75 | 0 | | | 372,300,000 | 169,500,000 | 43 |
| Dec-76 | 0 | | | 473,300,000 | 209,400,000 | 45 |
| Dec-77 | 1 | | | 577,700,000 | 265,940,000 | 48 |
| Dec-78 | 1 | | | 610,400,000 | 381,230,000 | 52 |
| Dec-79 | 1 | | | 642,400,000 | 218,240,000 | 59 |
| Dec-80 | 3 | | | 995,000,000 | 457,170,000 | 66 |
| Dec-81 | 3 | | | 962,000,000 | 665,300,000 | 72 |
| Dec-82 | 5 | | | 1,084,600,000 | 764,030,000 | 75 |
| Dec-83 | 6 | | | 1,090,100,000 | 674,040,000 | 78 |
| Dec-84 | 10 | | | 1,366,900,000 | 769,500,000 | 81 |
| Dec-85 | 14 | | | 1,086,000,000 | 809,600,000 | 84 |
| Dec-86 | 18 | | 100 | 1,081,300,000 | 864,800,000 | 85 |
| Dec-87 | 28 | | 457 | 1,777,000,000 | 1,204,100,000 | 88 |
| Dec-88 | 47 | | 294 | 1,502,000,000 | 1,500,000,000 | 92 |
| Dec-89 | 77 | | 1943 | 1,583,000,000 | 1,378,900,000 | 97 |
| Dec-90 | 123 | | 2300 | 2,452,400,000 | 1,663,000,000 | 102 |
| Dec-91 | 211 | 113 | 2229 | 2,358,300,000 | 1,445,000,000 | 106 |
| Dec-92 | 349 | 120 | 1714 | 2,605,500,000 | 1,501,900,000 | 109 |
| Dec-93 | 598 | 134 | 9173 | 3,364,000,000 | 1,923,000,000 | 112 |
| Dec-94 | 1317 | 118 | 13676 | 2,705,000,000 | 2,305,000,000 | 115 |
| Dec-95 | 2318 | 136 | 18642 | 4,319,000,000 | 2,396,000,000 | 118 |
| Dec-96 | 4166 | 136 | 47541 | 4,496,000,000 | 2,394,000,000 | 121 |
| Dec-97 | 8295 | 152 | 190804 | 4,849,320,221 | 2,402,977,436 | 124 |
| Dec-98 | 14079 | 137 | 135003 | 3,770,711,788 | 2,141,632,564 | 125 |
| Dec-99 | 23764 | 142 | 825553 | 4,351,727,243 | 2,225,422,566 | 129 |
| Dec-00 | 33040 | 136 | 492682 | 4,355,162,301 | 2,482,777,574 | 133 |
| Nov-01 | 53944 | 136 | 618366 | 3,559,796,479 | 2,836,852,460 | 136 |
| Dec-01 | 55683 | 125 | 745753 | 3,441,054,088 | 2,655,733,698 | 135 |

| Year | GDP | Short-Term External Debt (only to Foreign Banks) | Total External Debt |
|---------------|-----------------------------------------|-----------------------------------------------------|---------------------|
| | Billions of Liras in Constant Prices | Millions of Dollars | US Dollars |
| Dec-70 | | | |
| Dec-71 | 30,923.25 | | 2,746,500,000.00 |
| Dec-72 | 33,401.80 | | 3,287,200,000.00 |
| Dec-73 | 35,295.35 | | 3,554,600,000.00 |
| Dec-74 | 37,451.34 | | 4,204,200,000.00 |
| Dec-75 | 40,699.66 | | 4,632,800,000.00 |
| Dec-76 | 44,244.25 | | 5,058,800,000.00 |
| Dec-77 | 47,802.54 | | 6,001,300,000.00 |
| Dec-78 | 50,438.08 | | 11,452,300,000.00 |
| Dec-79 | 51,079.18 | | 14,855,000,000.00 |
| Dec-80 | 50,654.74 | | 15,928,400,000.00 |
| Dec-81 | 51,329.96 | | 19,131,100,000.00 |
| Dec-82 | 53,369.79 | | 19,235,500,000.00 |
| Dec-83 | 55,494.26 | | 19,716,000,000.00 |
| Dec-84 | 58,609.26 | 1,193.00 | 20,324,100,000.00 |
| Dec-85 | 61,977.31 | 1,899.00 | 21,608,600,000.00 |
| Dec-86 | 65,304.26 | 3,400.00 | 26,012,600,000.00 |
| Dec-87 | 70,549.61 | 4,312.00 | 32,933,700,000.00 |
| Dec-88 | 75,130.95 | 5,809.00 | 40,943,600,000.00 |
| Dec-89 | 76,235.22 | 4,750.00 | 40,992,900,000.00 |
| Dec-90 | 79,208.97 | 4,777.00 | 41,577,100,000.00 |
| Dec-91 | 83,744.66 | 7,719.00 | 49,424,200,000.00 |
| Dec-92 | 86,166.81 | 7,165.00 | 50,873,500,000.00 |
| Dec-93 | 91,943.23 | 7,901.00 | 56,553,900,000.00 |
| Dec-94 | 94,364.64 | 11,420.00 | 68,604,800,000.00 |
| Dec-95 | 94,174.01 | 7,282.00 | 66,249,200,000.00 |
| Dec-96 | 100,677.95 | 8,965.00 | 73,781,100,000.00 |
| Dec-97 | 107,934.44 | 11,515.00 | 79,829,400,000.00 |
| Dec-98 | 114,069.33 | 16,311.00 | 84,785,000,000.00 |
| Dec-99 | 113,803.30 | 20,921.00 | 97,142,900,000.00 |
| Dec-00 | 113,968.76 | 21,354.00 | 102,242,100,000.00 |
| Nov-01 | 114,995.06 | 26,351.00 | 117,430,700,000.00 |
| Dec-01 | 113,413.23 | 18,963.00 | 113,436,900,000.00 |

Figure 1



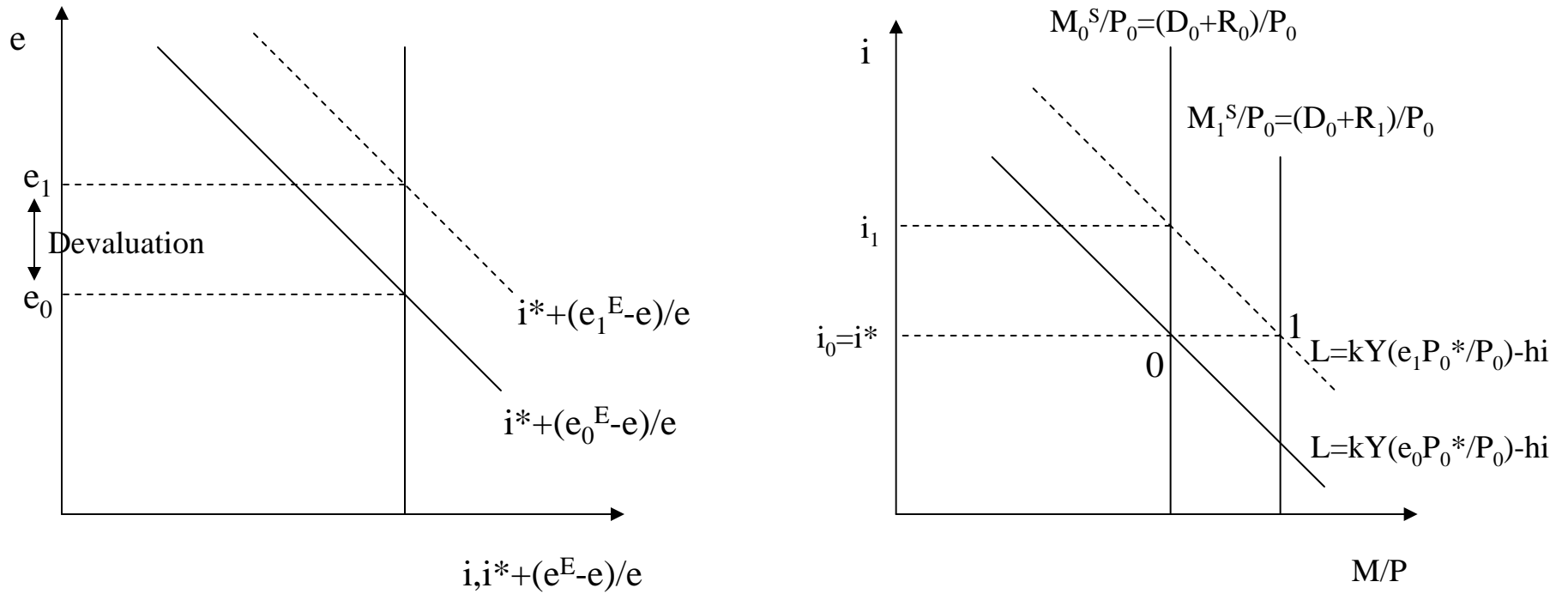
Float



Larger Fluctuations

Fix

Figure 2



In the short-run, a devaluation without balance-sheet problems, increases demand via a real exchange rate depreciation. It triggers an increase in demand for money and pushes “ i ” up. To avoid an appreciation, central bank intervenes, R increases. The new short-run equilibrium moves from 0 to 1.

Figure 2

If Balance-Sheet Effects

$$AD = \overline{AD} + b(eP^*/P) + cW$$

Where W is net wealth of households: $W = \text{Assets} - \text{Liabilities}$. As W goes up, consumption increases and so does AD .

After devaluation: If liabilities are in foreign currency but assets are in domestic currency, wealth will decline, pushing consumption down. There are two effects on aggregate demand the competitiveness effect and the wealth effect.

If the wealth effect is larger:

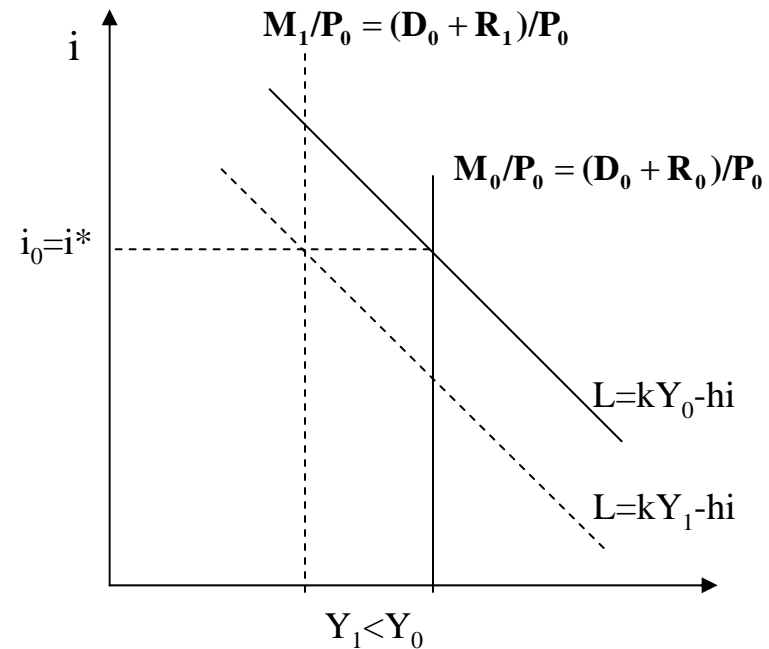
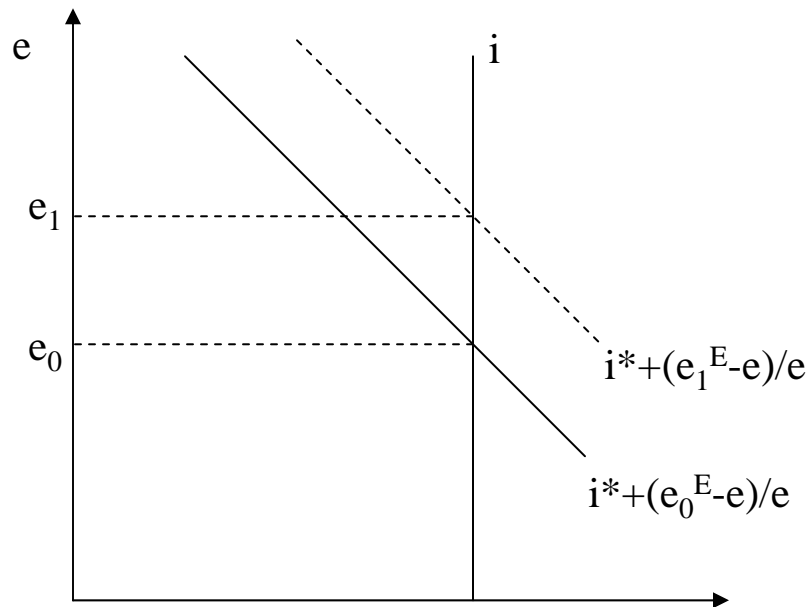
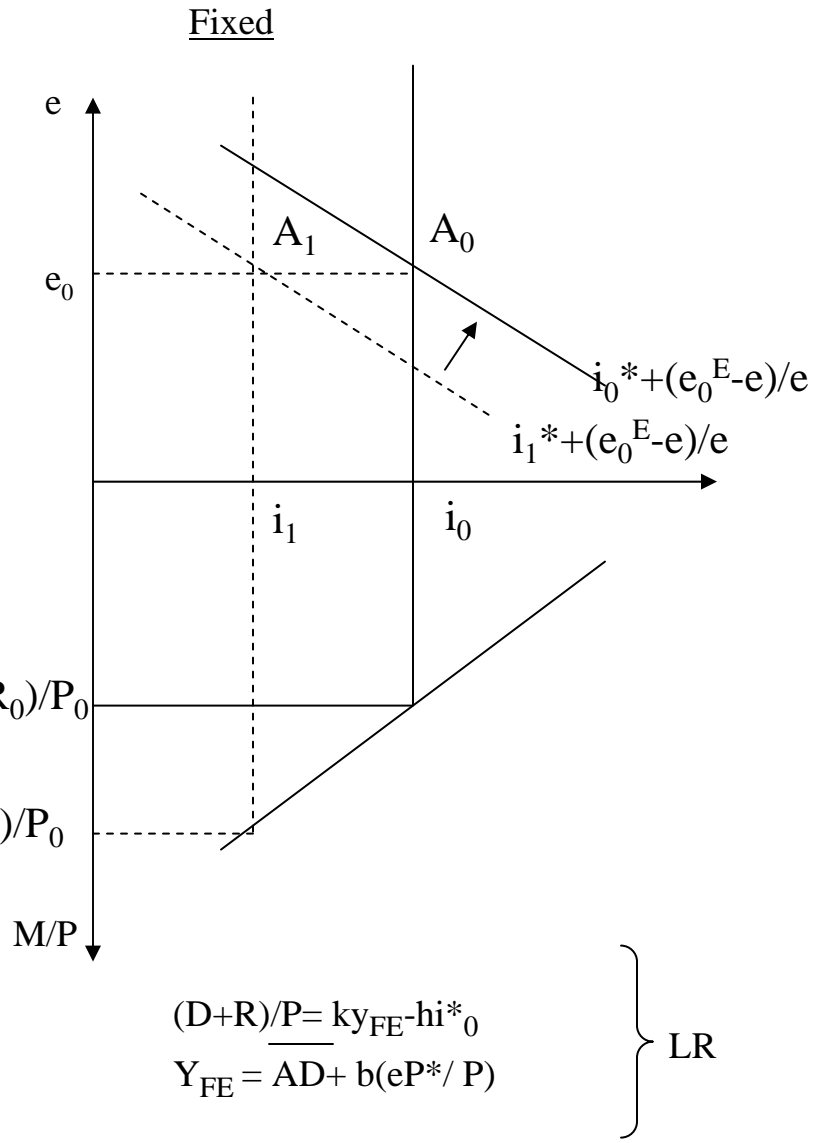
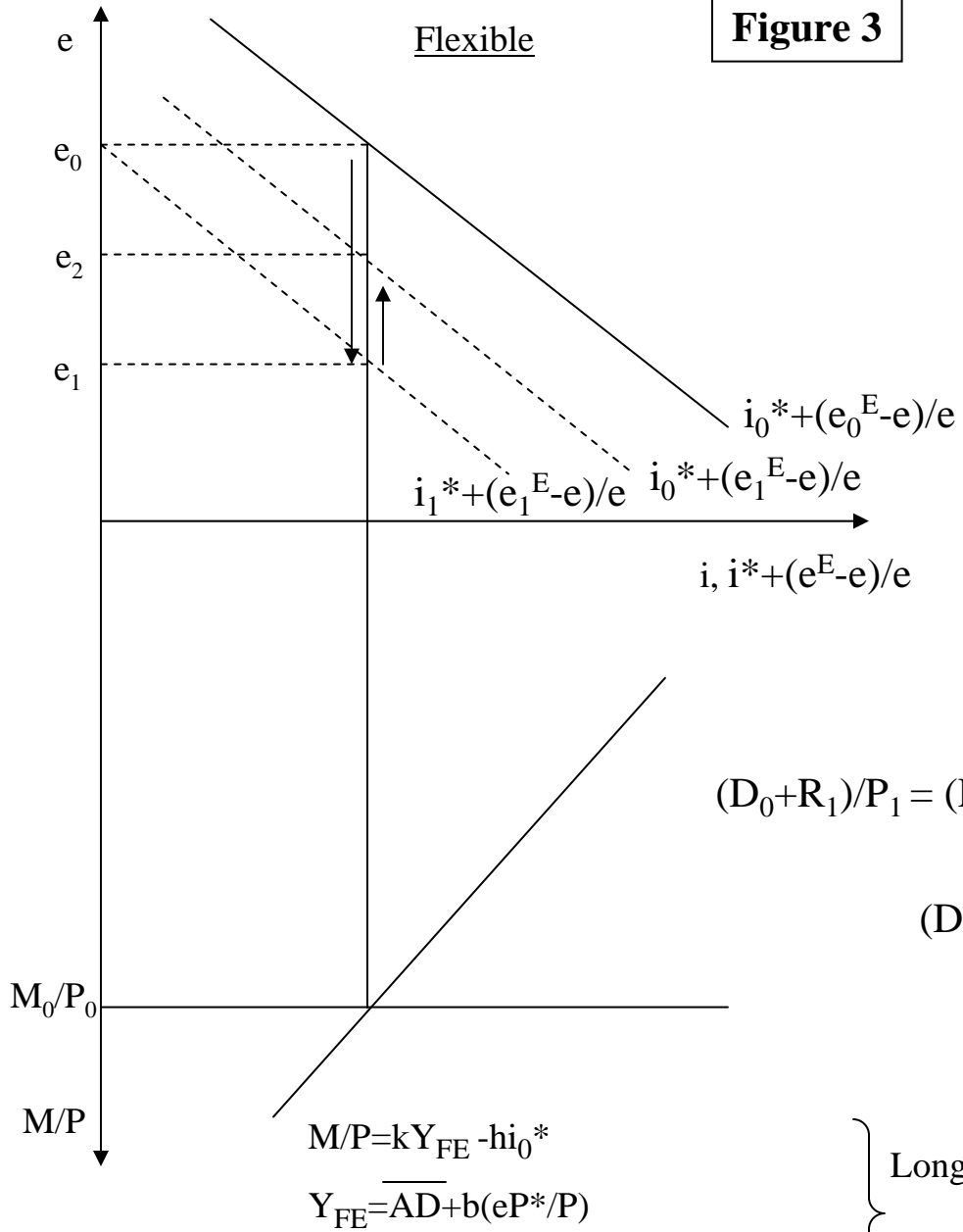


Figure 3



In the Long Run i^* does not change but P^* increases
 Since P does not change e has to decline.

P^* increases, so does P .