Macroeconomic Policy
Class Notes

Financial crises

Revised: December 13, 2011
Latest version available at www.fperri.net/teaching/macropolicyf11.htm

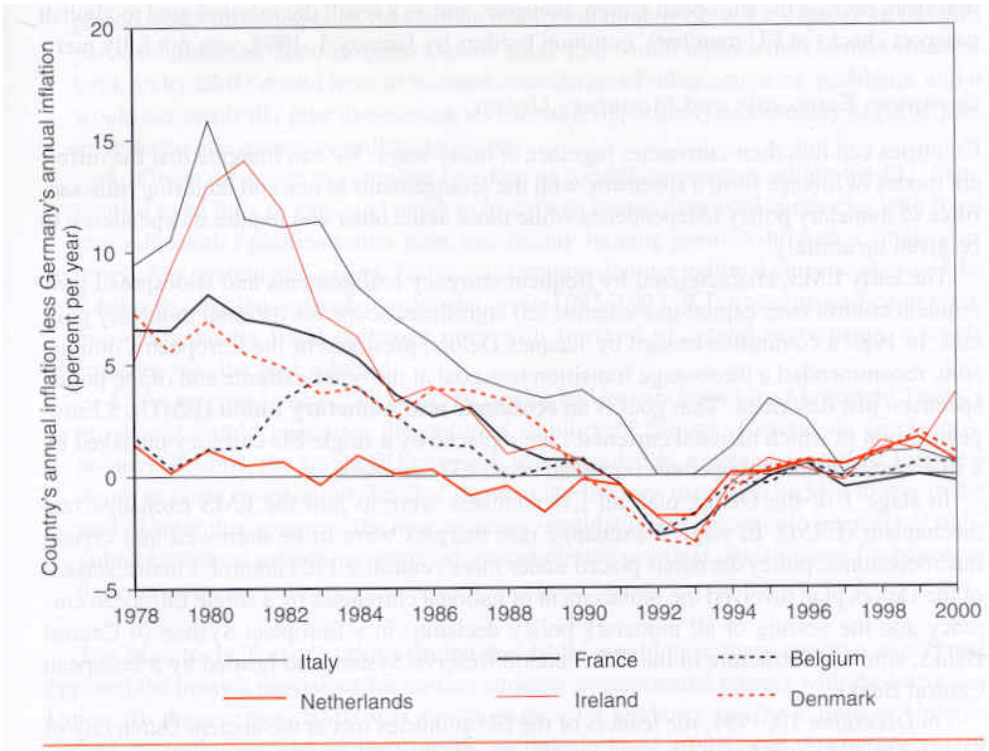
Financial crises have been a common occurrence throughout the 1990s. They are episodes in which a country which is pegging the exchange rate abandons the peg and this usually results in a sudden devaluation of the local currency. Although these crises have not been common throughout the 2000s the European debt crisis of 2011 has brought financial crises back to the center stage of economic policy discussion. To understand the causes and consequences of financial crises we need to understand what induced a country to peg in the first place.

The advantages of fixed exchange rates

In the previous class we established that under fixed exchange rates a country loses to a certain degree of its monetary independence (tie its hands). This can actually be a bad or a good thing. If the monetary authority is inflation prone then tying its hands might be an advantage. Below we show three examples of that. Figure 1 plots the differential of inflation rates between various European countries and Germany. All the European countries in the picture adopted some sort of fixed exchange rate policy with the German currency from 1978 on. We see that by fixing their exchange rate with the Germany many countries have been able to significantly reduce their inflation rates. This picture also explains why many European countries relinquished their monetary independence and joined the Euro.

Figure 2 shows inflation rates of Argentina before 1991, when its exchange rate was floating, and after 1991, when the exchange rate was pegged to the dollar. We see that pegging the exchange rate has provided the Argentina monetary authority with discipline. Pictures like that are the main argument of advocates of dollarization.

Figure 3 shows the effects of the moving peg (or target devaluation), implemented by Turkey with the aid of the IMF in January 2000, on the Turkish inflation rate.



Shown are the differences between domestic inflation and German inflation for six of the original EMS members, Belgium, Denmark, France, Ireland, Italy, and the Netherlands. As of 1997 all national inflation rates were very close to the German levels.

Source: CPI inflation rates from IMF, *International Financial Statistics*.

Figure 1: Inflation in Europe

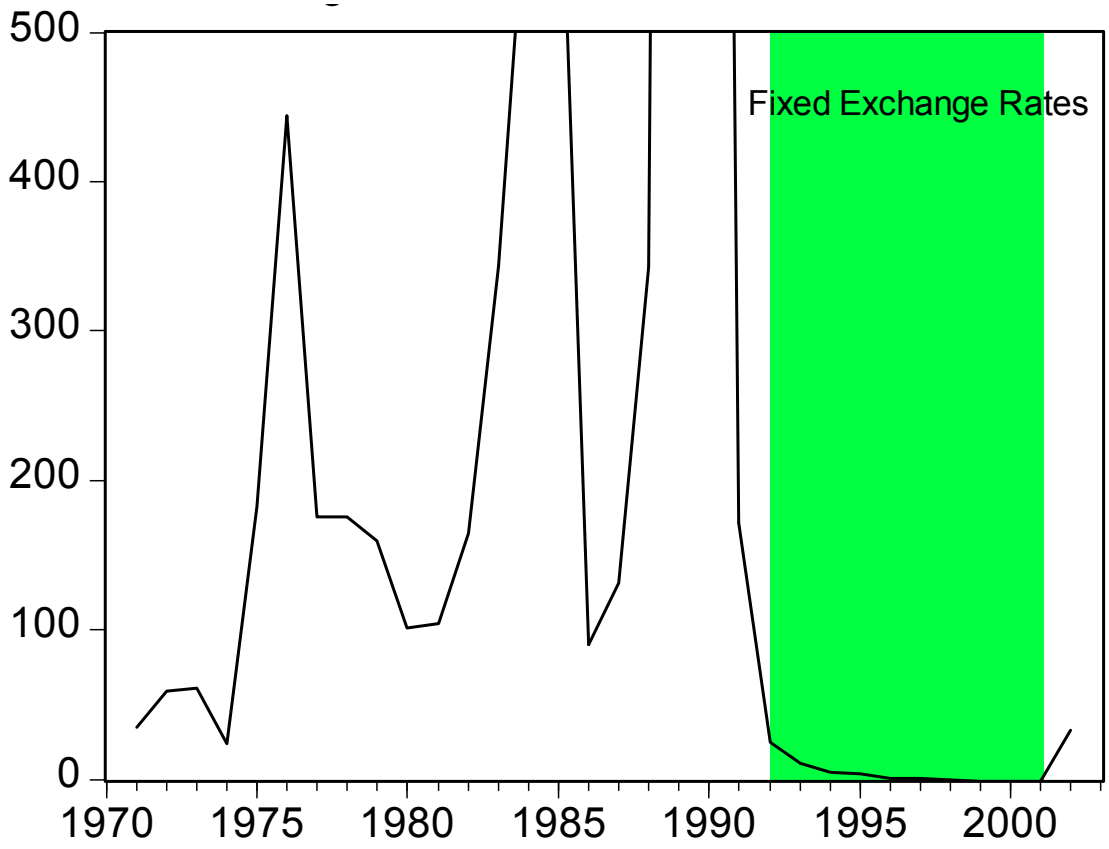


Figure 2: Inflation in Argentina

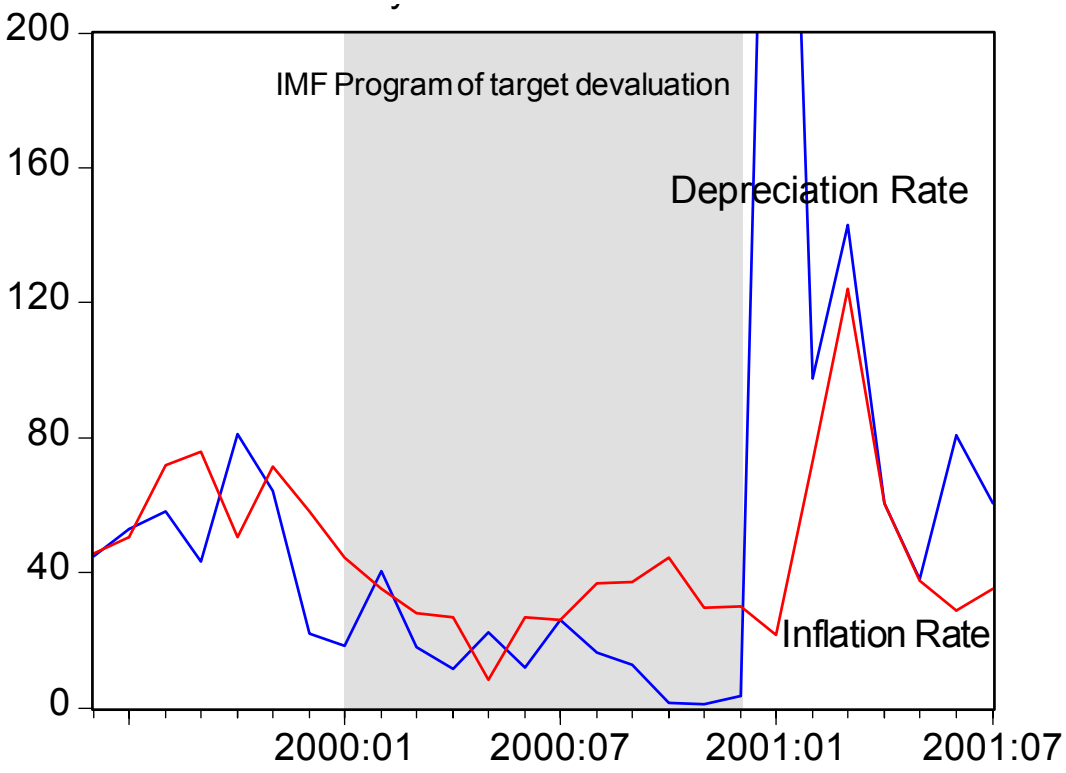


Figure 3: Inflation in Turkey

As you can see the constraint on the exchange rate (see the table in the previous lecture) also has forced a reduction in the money creation rate and a reduction of the inflation to an historical minimum. Notice though that after mid 2000, although the rate of depreciation kept declining, inflation rate has picked up again, signalling that money supply was still increasing. The money printing by the Turkey central bank eventually forced the abandonment of the target devaluation program, the Turkish lira has collapsed devaluing more than 30% in three days and inflation has climbed high again. This is not to say that the currency crisis has caused the high inflation. Rather it should be clear that both the large devaluation of the currency and the high inflation are the symptoms of the high rate of money printing by the Turkish Central Bank.

Another argument in favor of fixing the exchange rate has to do with international investment. One important policy objective of developing countries is to attract foreign capital. One reason why international investors might be reluctant to invest in such countries is the high volatility of returns. Since returns, sometimes, are paid off on local currency, a floating exchange rate might increase this volatility and might reduce capital inflows. This is one reason why some developing countries (for example

Hong-Kong) have fixed their exchange rate. The problem with is argument is that the exchange rate might not be irrevocably fixed and so fixing the exchange rate might just "hide" the volatility for a while, but eventually the volatility will resurface in a dramatic manner (as it did the Asian crisis). Also countries with flexible exchange rates might be able to raise foreign capital by issuing debt denominated in foreign currencies.

The costs of fixed exchange rates

Although the advantages of fixed exchange rates are we just discussed are quite important the recent events suggest that fixed exchange rates seem to have disadvantages as well as many country with fixed or semi-fixed exchange rate regimes ended in disastrous crises (Thailand, Korea, Indonesia, Turkey, Argentina). In order to understand the costs of fixed exchange rates we need to go back to analyzing the effects of monetary policy on output. In previous lectures we analyzed an aggregate demand curve in the output/price plane and we argued that increase in money supply would shift aggregate demand to the right, that is for any given level of prices there would be higher demand for output. We described that one important channel through which more money stimulates demand is the reduction in the real interest rate and therefore in the cost of capital. There are two other important channels through which monetary policy can affect aggregate demand.

- Exchange Rate Channel

For open economies an important way through which monetary policy affects aggregate demand and this is through exchange rates. We have seen before that, by reducing interest rates, an economy with flexible exchange rates will cause a depreciation of the nominal exchange rate. If in the short run prices are fixed a depreciation of the exchange rate causes also a depreciation of the real exchange rate, thus making goods of the domestic economy cheaper relative to foreign goods. This cause an additional boost in demand for two reasons: local consumers will buy less of the foreign goods and more of the local goods and there will higher demand for local products from foreign consumer. There is an important caveat to this effect though. When a country devaluates the exchange rate it gain competitiveness on the export market but also now pays higher price for its imports. This might either cause increases in costs and/or an increase in CPI inflation (because the price of foreign goods goes up).

- Financial Channel

This channel is mostly operating during financial/banking crises but there is evidence of its importance during normal times too. Liquidity provided to the financial system through open market operations is usually important for the smooth function of the system. A well functioning financial system is important for aggregate demand as it helps stimulate investment by corporations and consumer purchases through financing . In particular during times of financial distress the ability of firms and consumers to finance their purchases is reduced and this may lower additionally aggregate demand. Monetary policy, by injecting liquidity, prevents financial distress and affect aggregate demand through that.

These channels highlight an important cost of fixing exchange rates, that is the lost of monetary independence implies that no stabilization can be achieved through monetary policy. This point can be understood well by looking Argentina's 2001 crisis. Argentina had been in severe recession for more than two years, with unemployment reaching levels above 15%. Ideally policy makers wanted to use monetary policy to alleviate recession by keeping a low interest rate. This would have stimulated aggregate demand. Unfortunately Argentina was on a currency board, its exchange rate with the dollar was fixed and thus they were forced to have the same interest rate as the US (What would have happened had the central bank of Argentina printed more money?). The problem is that in the same period US was in expansion and so Greenspan was trying to cool down the US economy with high interest rates; high interest rates were not the best policy for Argentina. Also the dollar appreciated relative to other currencies. But since the peso was linked to the dollar this implied that also the peso was appreciating and thus Argentinian products became less competitive. Higher competitiveness could still be achieved with reduction in Argentinian prices but prices are slow to adjust and even slower to adjust downward so Argentinian goods become less competitive. This causes further reductions in aggregate demand and aggravated the recession. The whole thing was further aggravated by the fact that a neighbor country, Brazil, had devaluated its currency and enjoyed a competitive advantage over Argentinian producers.

Anatomy of a currency crisis

The fact that under fixed exchange rates stabilization cannot be pursued by local authorities is sometimes a very large cost and at some point countries abandon the fixed exchange system. Moreover to sustain a fixed exchange regime the central bank has to credible in the sense that has to have enough reserves to maintain the parity. Sometimes this reserves are not there, speculator can launch an attack and force the fixed exchange regime to collapse.

Sometimes a currency crisis can have positive macro consequences (for example in the case of Italy and UK 1992, Brazil 1998) because the country gains competitiveness,

exports and output boom in response. Unfortunately though sometimes this medicine (the devaluation) can be worst than the disease (the recession) and almost kills the patient (Asia 1997, Argentina 2002). To understand when a crisis happen and why sometimes a currency crises could be good and sometimes bad we have to describe some basic element that characterize a currency crisis.

Vulnerabilities before the crisis

Currency crises have occurred under different circumstances but there are some indicators that are usually important if you are looking at a country with a fixed exchange regime and you want to know how vulnerable is the country to a crisis.

Here is a brief list

1. **Current Account deficits**
   High current account deficit means increasing debts versus the rest of the world. This usually happens when a country is spending more that is selling abroad (large trade deficit). This implies that there is more demand for foreign currency by locals (used to import foreign goods) than demand for local currency by foreigners (used to export local goods). When this happens the central bank loses reserves of foreign currency and this makes it harder for the bank to defend the peg. The current account can also be a signal that the level of competitiveness of the country is low and so foreign demand is low. Figure 4 shows that the Tequila crisis of December 1994 in Mexico was anticipated by very large current account deficits. Notice that right after the crisis the current account deficit suddenly transformed into a surplus. Remember that the current account is a measure of foreign borrowing; after Mexico went into crisis, foreign investors lost confidence in the country and they stopped lending to Mexico. Mexico was forced to repay its debts by increasing its exports and the increase in exports was achieved making Mexican goods cheaper relative to US goods, i.e. depreciation the real exchange rate.

2. **Interest rate spikes**
   From the uncovered interest parity

   $$i_P = i_\$ + \text{Expected \% peso Depreciation}$$

   so whenever one sees the interest rate on peso denominated assets (peso here stands for the currency of the country that might have a crisis) being higher relative to a comparable US asset, that is a signal that the market expects a depreciation of the currency. The larger the differential, the larger the expected depreciation (currency collapse). Figure 5 shows the behavior of the Mexican interest rate relative to the US rate right before and during the Tequila crisis in which the Mexican real exchange rate collapsed by more than 40%.

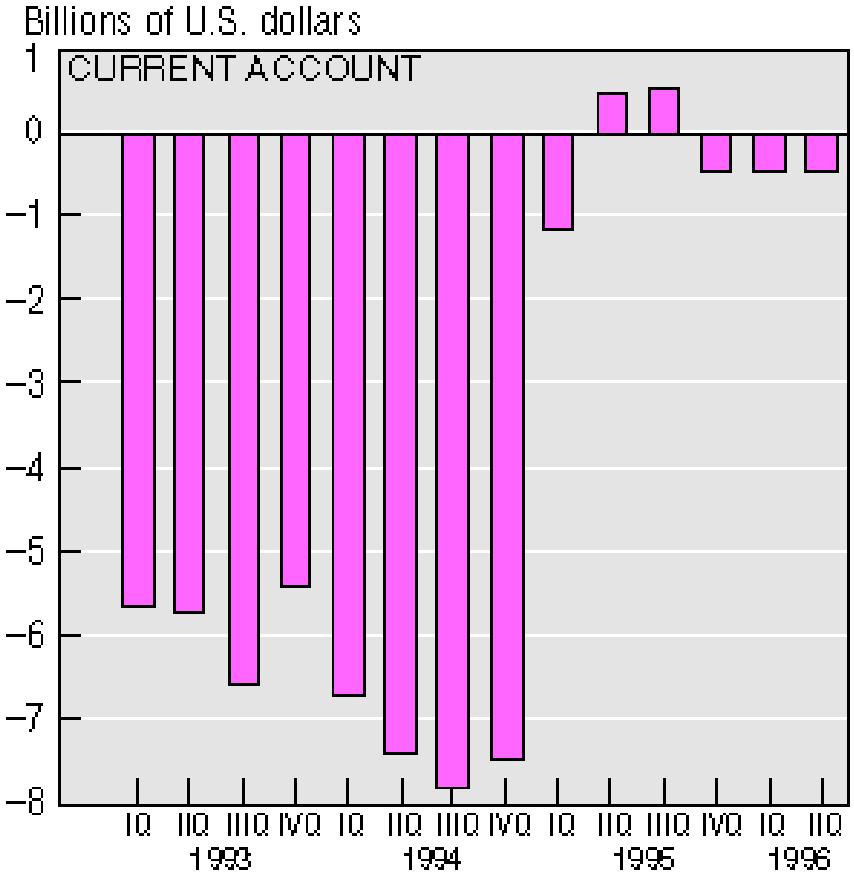


Figure 4: Current Account in the Tequila Crisis

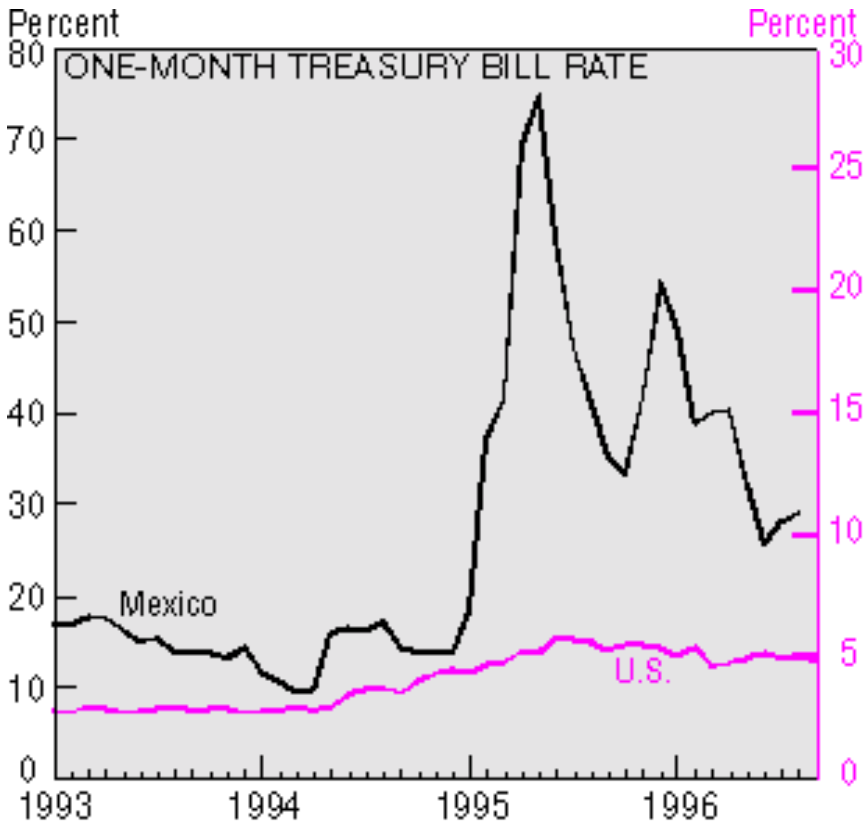


Figure 5: Interest rate spikes in the Tequila Crisis

3. **Inflation relative to the inflation of the currency to which the country is pegging**
   If inflation of the country that fix the exchange rate (say Argentina) remains higher than the one of the anchor currency (say US) this implies that Argentina will lose competitiveness relative to US and have lower foreign demand. To see this remember that the cost of American Goods relative to Argentinian goods is given by $\frac{P^{US}e}{P^{Arg}}$. If e is fixed and P^{Arg} grow faster than P^{US} , this means that Argentinian goods are getting more expensive relative to US goods. This creates more incentive for Argentina to devaluate to regain competitiveness. Notice for example that in the Turkish crisis of 2001(figure 3) even when the devaluation relative to the dollar was basically at 0 (in the second half of 2000) inflation rate in Turkey was much higher than US inflation, so Turkey was losing competitiveness.

4. **Level of reserves of the Central Bank**
   If reserves are low it is hard for the Central bank to defend the peg and a successful attack is more likely. Besides the actual level of reserves it is also important to consider how likely it is, in the event of a speculative attack, that an institution like the IMF provides the Central bank with additional reserves to defend against the attack.

5. **Government Budget and maturity of Government Debt**
   If the government has a high deficit then it is more likely that the CB will print more money to help the government finance the deficit. This though will inject more local currency in the system (relative to the level of reserves) and makes the peg harder to defend. If the government debt is short term there is the risk that in a confidence crisis short term government debt will not be rolled over by international investor and that would force the government to print more money to finance the debt. This in turn would force the abandonment of the currency.

6. **Macroeconomic Conditions**
   If the country is in a recession the central bank is more likely to intervene to sustain aggregate demand but this again increases the amount of domestic currency and increases the probability of a speculative attack and a crisis.

7. **Strength of the Financial/Banking System**
   If the banking system is weak the CB will tend to help it by injecting more liquidity in the system but that again makes the peg harder to defend.

In the last few years there have been many episodes of currency crises. In 1994 Mexico suffered one. In 1997 Thailand, Indonesia, Malaysia, Philippines and Korea all have suffered large devaluations. In 1999 Russia had a currency crisis in which also there was default on foreign debt and Brazil abandoned its peg. In 2001 Turkey has

Vulnerabilities Matrix

	Mex	Kor	Thai	Ind	Rus	Bra	Tur	Arg
Fixed Exchange Rates Reserves Depletion	1	2	1	2	1	1	1	2
Inflation Differential (Low competivness)	1	2	1	2	1	1	2	1
Current Account Def	1	2	1	2	2	2	2	1
Fiscal Deficit	2	3	3	3	1	1	1	2
Banking Sector Weaknesses	1	1	1	1	1	3	1	3
Government Short Term Debt, as % total (Debt rollover risk)	1	3	3	3	1	1	1	2

1: Very Serious **2: Somewhat Serious** **3: Not an Issue**

Figure 6: Vulnerabilities in currency crises

abandoned its peg to a basket of currencies and in 2002 Argentina had a massive devaluation and recession. Some of the crises have been characterized by all the elements described above, some of them only by a few. All the countries in crisis were characterized by low level of reserves, and large current account deficits. Government deficit though was not an issue in the Asian countries as their public finance was in order, while was an important factor in Russia, Brazil and Turkey. The banking system was very weak in Turkey, Russia and the Asian Countries but it was relatively healthy in Brazil and Argentina. The matrix in figure 6 summarizes all the vulnerabilities of the major recent currency crises.

During the crisis

A currency crisis happens when a central bank no longer maintain the exchange parity it was committed to and let the exchange rate float. Usually the flotation results in a large devaluation of the nominal exchange rate and also of the real exchange rate. The key point is what happen in consequence to this large real devaluation. UK boomed after the devaluation, while Italy, Spain and Brazil suffered only a very mild recession. On the other hand Asian Countries, Argentina suffered major recessions. Figures 7 and 8 below show two currency crises that have had very different effect on different countries.

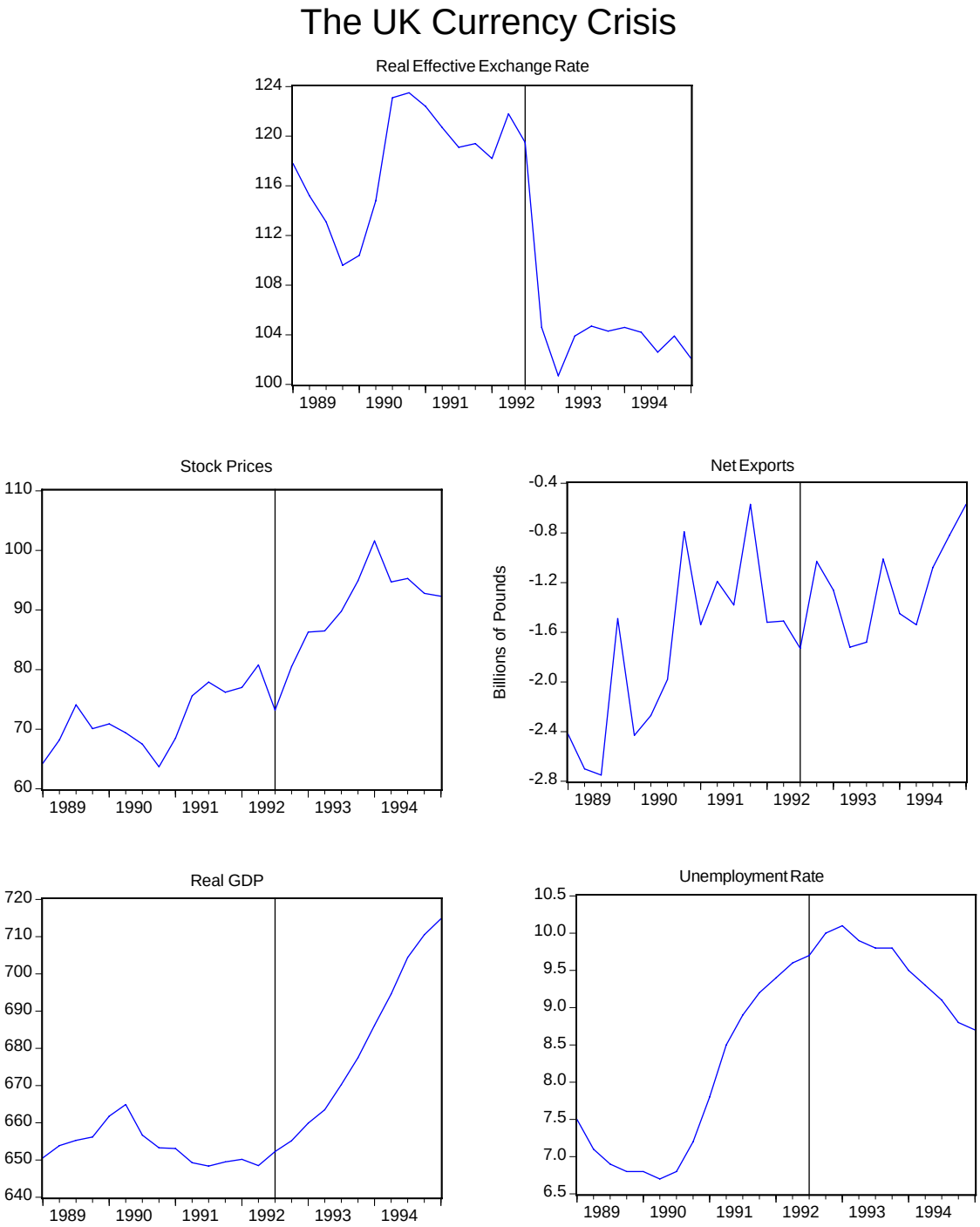


Figure 7: Effect of a currency crisis in UK

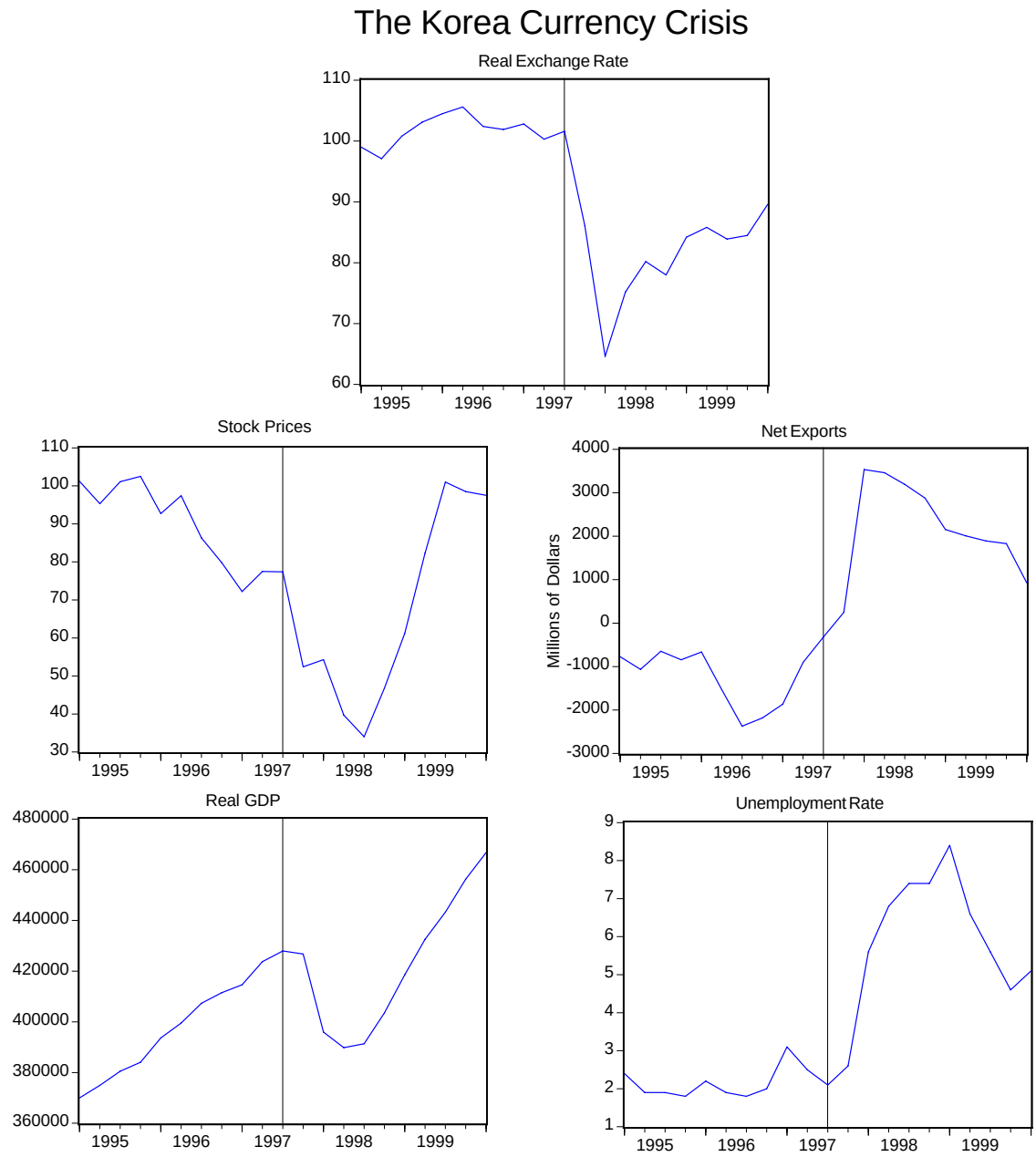


Figure 8: Effects of a currency crisis in UK

Country	Date	Foreign Net Debt to GDP	Real Exchange Rate depr.	GDP Change
Turkey1	Nov-93	32.1	43.5	-11.6
India	Aug-95	23.6	13.7	7.0
Bulgaria	Feb-96	73.8	118.2	-16.3
Korea	Sep-97	27.4	62.9	-8.4
Malaysia	Jul-97	32.8	55.6	-8.9
Thailand	Jun-97	47.7	57.7	-13.4
Indonesia	Jul-97	52.3	212.3	-16.5
South Africa	May-98	17.0	20.1	-0.3
Israel	Jul-98	43.6	17.8	2.0
Russia	Jul-98	42.9	101.8	-2.3
Mexico	Nov-94	34.2	65.1	-8.0
Brazil	Dec-98	28.2	43.6	-3.8
Italy	Aug-92	17.2	29.7	-1.9
UK	Aug-92	14.1	20.4	2.2
Turkey2	Jan-01	46.4	28.8	-11.3
Czech	Apr-97	26.7	9.0	-4.4
Ecuador	Aug-98	82.4	116.5	-6.9
Finland	Aug-92	45.2	24.2	-2.2
Philippines	Jul-97	51.4	37.9	-1.1
South Africa	Mar-96	13.7	10.8	4.1
Spain	Aug-92	13.8	26.2	-1.8
Sweden	Oct-92	52.7	24.5	-3.0
Venezuela	Nov-95	71.4	54.9	-2.3
Argentina	Jan-02	73.1	106.4	-12.8
Average		**40.2**	**54.2**	**-5.1**
Median		**38.5**	**40.7**	**-3.4**

Figure 9: Episodes of currency crises

Figure 9 summarizes these effects for all major currency crises of the past 15 years.

There are few possible explanations for the different effects of a sharp devaluation on GDP. The bottom line is that currency crises are sharp changes in relative prices (the real exchange rates) and as such they in general will hurt somebody and benefit someone else. Whether a country as whole benefits or loses is going to depend on the sum of these effects. Here we just discuss two important effects of these relative price changes

Balance Sheet Effects

If the net indebtness of companies, banks or private sector in the devaluating countries is denominated in dollars (foreign currency) and revenues are mostly in local currency, a devaluation, by increasing the value of the dollar, increase the value of the net value of the debt of the country. This makes it hard for companies to meet their financial

obligations and might cause bankruptcies. International investors might then become nervous about the situation in that country and start to call in their loans. This would increase the financial burden of corporations in that country and can cause a massive wave of bankruptcies (in Indonesia bankruptcy rate went from 0% before the crises to 60% after the crisis) that can produce a deep depression. Asian countries had a very high exposure in foreign currencies and these balance sheets effects played a potentially important role. UK and Italy did not have a significant amount of debt denominated in foreign currency so these effects were relatively small. Brazil on the other hand had a significant share of debt denominated in foreign currency but the central bank of Brazil before the devaluation used up all these reserves to provide corporations with foreign currency needed for hedging their foreign currency debt and after this operation the net indebtness in foreign currency of the Brazilian corporate sector was greatly reduced. This might be an important explanation of why Brazil had a mild recession after the currency crisis. Argentina had instead a large amount of debt denominated in dollars and when the crisis hit the debt of banks, corporations and private individuals increased enormously leading to widespread bankruptcy and fall in GDP.

Competitive Devaluations

One positive effect of a currency crisis (a sharp devaluation of the currency) should be the gain of competitiveness. This gain though do not only depend on the currency of that particular currency but also on the currency of the competing countries. One factor that made the Asian crisis worse was the fact that almost all Asian countries devalued together so that none of them really enjoyed a competitive advantage over their neighbors (they were all competing on the US market). Brazil on the other hand has been favored by the fact that its neighbor, Argentina, did not devalue so Brazilian exporters could gain a competitive edge. Notice also that a devaluation of the real exchange rate by making foreign goods more expensive makes exporters more competitive but at the same time increase the expenditures of consumers buying foreign goods. Suppose for example that the price of a Chinese tennis racket is 10$ and the one of comparable quality made in US is 15$. Consumers in US will buy Chinese. Suppose that now a devaluation of the US dollar increases the US dollar price of the Chines racket to 20 US dollars. Now domestic racket producers will be happy as they are now able to sell their rackets but the losers are the domestic consumers. As we discussed in the trade section though this is a case of dispersed losers and concentrated winners which are probably going to lobby hard to obtain a devaluations and this is why devaluations happen frequently.

In addition to change in relative prices there are two other important effects of currency crises:

Default and confidence Effects

Some countries, like Russia, after the devaluations officially defaulted on their foreign debt. This is because the devaluation of the currency had increased the value of foreign debt so much that they decided not to pay. This of course affects foreign investors (they lost their money) but also affects domestic business as it gets really hard to obtain foreign capital to finance investment projects after the crisis. Even for countries that did not default the currency crisis brings a confidence crisis (the international investors believe there might be default) and there a drastic reduction of capital inflows in the country (see the picture above of current account in Mexico)

Loss of discipline on the monetary authority

After the currency crisis the monetary authority is no longer constrained from printing money and can potentially print a lot of money and cause inflation (or hyperinflation). Several episodes of currency crises have indeed been followed by high inflation (see the Turkey example in figure 3), especially in countries where the monetary authority is not independent from the the government, and so the government can ask the cental bank to use money printing to finance the government deficit.

Conclusion

In this last section we can summarize all the previous discussion by analyzing the diagram of the Inconsistent Trinity (figure 10). It is impossible for any country to have all three features in the boxes. You can't have together monetary independence, fixed exchange rates and free capital mobility. The experience of the Asian countries in '97, of Mexico in '94, has taught us that if a country tries to keep a fixed exchange regime, with international capital mobility, and at the same time use monetary policy too discretionally, the exchange rate system is going to go under attack and eventually collapse. The experience of Argentina has taught us that if a country gives up monetary independence a fixed exchange rate regime can be sustained for a long time but the macroeconomic cost of not having monetary independence might be quite substantial. The experience of China of the 200s suggest that China is able to manage its exchange rate at a depreciated level and yet keep inflation from surging but only in a regime of highly restricted capital flows.

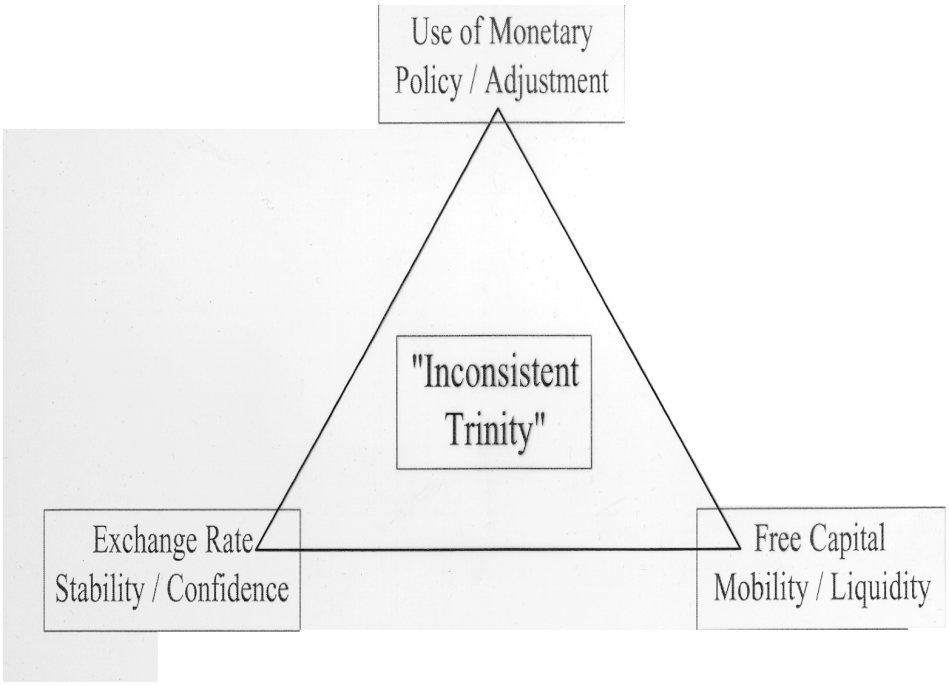


Figure 10: The inconsistent trinity