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WHY CLASHES BETWEEN INTERNAL AND EXTERNAL STABILITY GOALS END IN CURRENCY CRISES, 1797-1994

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ABSTRACT

We argue that recent currency crises reflect clashes between fundamentals and pegged exchange rates, just as did crises in the past. We reject the view that crises reflect self-fulfilling prophecies that are not closely related to measured fundamentals. Doubts about the timing of a market attack on a currency are less important than the fact that it is bound to happen if a government's policies are inconsistent with pegged exchange rates. We base these conclusions on a review of currency crises in the historical record under metallic monetary regimes and of crises post-World War II under Bretton Woods, and since, in European and Latin American pegged exchange rate regimes.

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1. Introduction

The Mexican crisis of December 1994 and the European Monetary System (EMS) crisis of September 1992 have aroused interest in the subject of currency crises. Academics seek to understand their causes and propagation mechanisms. Policy makers debate the need for new mechanisms to prevent them.

In the traditional view, a country faces a currency crisis when inconsistencies arise between preserving pegged exchange rates, whether fixed or crawling pegs, and protecting domestic monetary and fiscal policy -- the fundamentals -- for the sake of internal stability and competitiveness. For countries that are part of a pegged exchange rate system, such as Bretton Woods or the EMS, crises are an endemic part of the system. They arise because of unexpected shocks that may make unsustainable policies that were previously compatible with existing exchange rate arrangements. Market participants understand this tension and precipitate an attack on a currency by selling it short when destabilizing shocks occur.

Recently, the traditional view and its modern extension, speculative attack models based on rational expectations, have been challenged by the view that currency crises reflect self-fulfilling prophecies that are not closely related to measured fundamentals. Crises instead can happen under conditions of multiple equilibria in the foreign exchange market. In this paper we argue that recent crises reflect fundamentals, just as did crises in the past. The trick is to identify the fundamentals.

We define a currency crisis as a market-based attack on the exchange value of a currency. It involves a break with earlier market judgment about

the exchange value of a currency. If a devaluation, which also involves a change in the peg, does not occur because of market pressure, it does not qualify as a currency crisis. In both cases, however, it is imperative to sort out the inconsistency between fundamentals and the pegged rate.[1] A currency crisis is also different from a banking panic, which sharply increases the demand for currency, but the two types of crises may feed upon one another (Krugman, 1991; Bordo, Mizrach, and Schwartz, 1996).

We report in section 2 the discussion in the literature of the two competing theories of currency crises: the classical view based on fundamentals, and the recent view based on self-fulfilling prophecies. For a judgment on the validity of the competing theories we believe the crises of experience offer guidance. In section 3 we examine famous historical examples of crises from 1797 to World War II. In section 4 we examine post-World War II crises. In section 5 we offer lessons from history.

2. The Literature on Currency Crises

In the traditional view on currency crises, pegged exchange rates are durable only as long as monetary authorities are credibly committed to maintaining them. This requires that domestic policy always is subordinated to the objective of maintaining the fixed exchange rate. Under the classical gold standard, the commitment to the fixed price of gold was credible for the core countries of Western Europe and the United States. Speculative attacks on

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[1] Frankel and Rose (1996) define a currency crash in emerging markets as a nominal depreciation of at least 25% that is also at least a 10% increase in the rate of depreciation. Eichengreen, Rose, and Wyplosz (1995) distinguish between a devaluation and a currency crisis. Both are preceded by monetary and fiscal expansion and the deterioration of other fundamentals, but in a devaluation inconsistent policies are reversed with a change in parity, whereas in a currency crisis inconsistent policies continue after the parity change.

their currencies that forced abandonment or alteration of the parity rarely occurred.[2]

Under special circumstances, such as wartime emergencies or financial exigency, the commitment might be temporarily suspended, but the market understood that the original parity would be restored once the emergency had passed. These events, moreover, were rarely characterized by the type of duress crises today are subject to. For peripheral countries, such as the Latin American countries, however, the pattern set by the core countries is not observed. They suspended convertibility and altered parities when subordinating domestic needs to the dictates of external balance proved onerous (Bordo and Schwartz, 1996).

Of two recent interpretations of currency crises, both based on the postulate of rational expectations, one extends the traditional view, maintaining that speculative attacks on a currency are driven by the incompatibility of the pegged exchange rate and expansionary domestic financial policy, the other, maintaining that currency crises are not necessarily driven by a conflict between deteriorating fundamentals and the pegged exchange rate, but reflect self-fulfilling prophecies. The innovation of the first interpretation is that the timing of the attack is predictable. It occurs before the monetary authority has exhausted its reserves. In the second interpretation, the timing is not predictable. Crises may be self-fulfilling prophecies of market participants. Because their expectations are that the monetary authority's policies will be inconsistent with the peg, they

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[2] Incipient attacks on the Bank of England and other central banks were countered on several occasions by central bank cooperation and, more important, stabilizing short-term capital flows by market participants confident of the credibility of the commitment to gold parity (Bordo and Kydland, 1996; Eichengreen, 1992).

take actions to force the authority to abandon the peg and thereby ratify their expectations. Crises occur in circumstances of multiple equilibria -- indeterminacy -- in foreign exchange markets, in which random shocks called sunspots can trigger an attack.

2.1. Classical Currency Crises

Two seminal articles by Krugman (1979) and Floyd and Garber (1984a) argue that, in a world of perfect foresight, a speculative attack on a currency with a fixed exchange rate will occur when a monetary authority, in disregard of the inconsistency with maintaining the peg, expands domestic credit to finance a budget deficit. The path of domestic credit expansion is assumed to be exogenous. Unlike the traditional view, a speculative attack that forces abandonment of the peg and adoption of a floating exchange rate, occurs before the point at which reserves would have been exhausted. Speculators sell the currency short in anticipation of the depreciation that is bound to occur, since international reserves are declining pari passu with domestic credit expansion.

In this literature, a speculative attack takes place when the shadow exchange rate -- the exchange rate that would prevail if exchange rates freely floated, determined by the interaction of the growth of money supply and money demand -- equals the existing peg. When the attack occurs, reserves fall to zero, the exchange rate depreciates and nominal interest rates rise, on a path determined by the growth of money supply and money demand. At the time of the attack, the decline in reserves and the money supply equals a decline in real money demand, in turn a reflection of expected depreciation incorporated in nominal interest rates. The size of the decline in money demand and reserves is determined by the semi-elasticity of demand for money. Thus the money

market is always in equilibrium.

The equilibrium is unique and the timing of the attack is precisely determined. This is so because, were the attack delayed until reserves are exhausted, the exchange rate would jump, providing opportunities for arbitrage by speculators taking short positions in the domestic currency; alternatively, if the attack were staged too soon, opportunities for arbitrage in the opposite direction would arise. Only when the shadow exchange rate equals the pegged exchange rate do no further opportunities for arbitrage profits arise.

The original model has been extended in a number of ways. In one extension, incorporating uncertainty over the path of domestic credit expansion permits nominal interest rates to rise steadily up to the collapse, whereas in the original model, interest rates increase with a jump when the collapse occurs (Agenor, Bhandari, and Flood, 1992). In addition, other fundamentals, such as the real exchange rate, the current account deficit, and the ratio of debt to GDP, consistent with the extension, deteriorate before the crisis. Velasco (1987), citing Chile in 1982, argues that currency crises can be driven by banking crises. Chilean authorities by bailing out insolvent banks fueled an expansion of domestic credit.

The model has been applied to hypothetical and actual crises: the case of a depreciation of one country's currency that damages the competitiveness of a trading partner (Gerlach and Smets, 1994; Eichengreen and Rose, 1996); the 1976 Mexican devaluation (Blanco and Garber, 1986); the attack on Argentina's crawling peg in 1981 (Cumby and Van Wijnbergen, 1989); the postmortem on Mexico's 1994 crisis, as well as the 1982 Chilean and Mexican crises, and the Finnish 1992 crisis (Dornbusch, Goldfajn, and Valdes, 1995).

Another strand in the literature is a critique of the classical model of

currency crises by a number of authors, who find that it cannot explain the 1992 EMS exchange rate crisis (Eichengreen, Rose, and Wyplosz, 1993, 1995; Obstfeld, 1995; Obstfeld and Rogoff, 1995). According to the critique, in most of the countries, fundamentals before their currencies were attacked did not appear inconsistent with pegged exchange rates, reserves were adequate, budget deficits, money growth and inflation rates were low, and interest differentials between EMS members and Germany -- a measure of credibility financial markets monitored -- did not predict the September 1992 crisis until late August 1992 (Rose and Svennson, 1994). The basic assumption of the Krugman model, that the growth of domestic credit is exogenous, has been challenged because it fails to take account of the policymaking environment. When governments are viewed as optimizing agents, making choices between competing objectives, subject to constraints that are influenced by market participants' expectations, domestic credit expansion becomes an endogenous variable (Obstfeld, 1995). This approach opens up the possibility of multiple equilibria and self-fulfilling speculative attacks.

2.2. *Currency Crises Reflecting Self-Fulfilling Speculative Attacks*

The 1992 EMS crisis is cited as an example of a currency crisis seemingly unrelated to the behavior of fundamentals. The explanation offered for its occurrence is the presence of multiple equilibria in foreign exchange markets that can be triggered by random events like sunspots. The approach derives from articles by Flood and Garber (1984b) and Obstfeld (1986), which showed that the classical currency crisis model could accommodate multiple equilibria. In Obstfeld (1986), on the assumption that domestic credit growth in normal circumstances is consistent with the currency peg, there are two possible equilibria, which depend upon the expectations of market participants

about monetary authority actions in the event of a speculative attack: (1) If an attack never comes, the fixed exchange rate survives indefinitely; (2) if an attack happens, the system may collapse. Essentially the approach extends the Diamond and Dybvig (1982) model of bank runs -- whether a run on a bank will or will not occur depends on depositors' expectations.

In multiple equilibria models, the monetary authority's decision to maintain the currency peg or float is determined by a cost-benefit analysis in a world of rational expectations. In a typical model (Obstfeld and Rogoff, 1996; Ozkan and Sutherland, 1994), the central bank minimizes a loss function based on unemployment or the deviation of output from potential, the expected inflation rate, and some measure of the credibility cost of abandoning the peg. The authority adopts the currency peg as a commitment mechanism to maintain low inflation, but in the event of a large shock to output, it can decide to abandon the peg in favor of a floating exchange rate and an expansionary monetary policy. The central bank, given such a shock, weighs the cost of maintaining the peg, i.e., a decline in output and a rise in unemployment, against the cost of abandoning it, i.e., a loss of credibility. Market participants understand this choice and, in light of their assessment of the central bank's judgment of the state of the economy relative to a potential loss of credibility, may or may not provoke an attack.

It is this scenario that creates the possibility of multiple equilibria. If unemployment is low and the state of the economy is sound, then the likelihood that the peg will be abandoned in the event of an external shock is low. Hence there will be no attack. If unemployment is high and the economy is sluggish, the likelihood that the peg will be abandoned in the event of an external shock is high. Hence speculators are likely to attack the currency.

The attack may be triggered by a seemingly trivial event. If the response is an increase in interest rates to astronomical heights, it may succeed in temporarily repulsing the attack, as Sweden did in September 1992, but the weakening effect on the economy of the interest rate increase, heightens the likelihood of a later successful attack.

The credibility of the central bank, which may be path dependent, can affect the likelihood and success of an attack (Kenen, 1996). Past adherence to the peg under the gun may help forestall future attacks (Davies and Vines, 1995). On the other hand, a central bank which had high credibility in the past could still be exposed to an attack on its currency if the state of the economy were bad enough (Drazen and Masson, 1994).

The state of the economy is not the only factor that could create conditions for a self-fulfilling speculative attack. Another factor is rising interest rates with effects on government debt, mortgage interest rates, and the stability of the banking system (Obstfeld, 1994). Concern for each of these objectives competes with the commitment to maintain a peg, and creates a situation that makes the cost of maintaining the peg prohibitive in the event of a speculative attack.

As noted above, the events of the September 1992 EMS crisis spawned the model of self-fulfilling attacks. Obstfeld (1994) explains the attack on the Italian lira on Black Wednesday, 16 September, in this way. Market participants, expecting a devaluation of the lira, bid up domestic interest rates, thereby threatening the government's ability to roll over its short-term debt, which caused the devaluation, and validated their expectations. Similarly, the attacks on the Swedish krona reflected the effects of high interest rates on unemployment and the stability of the banking system. The

rise in German interest rates following reunification was the factor that triggered self-fulfilling attacks on EMS member currencies (Ozkhan and Sutherland, 1994).

The Maastricht Treaty itself has been held responsible for self-fulfilling attacks on the EMS (Eichengreen and Wyplosz, 1993). The argument is that what occasioned the attacks was the belief that, if members devalued, they would not qualify for admission to the European Monetary Union (EMU) and therefore would no longer have an incentive to adopt conservative policies. The adverse news of the Danish "no" vote on the referendum in June and the tight race in France on the referendum in early September led to the attacks.

A different systemic explanation for the EMS exchange rate collapse is that it was a response to market perceptions that the cooperative arrangements between Germany and the peripheral EMS countries and among the peripheral countries themselves broke down following the shock of German reunification (Buiter, Corsetti, and Pesenti, 1996). The Germans refused to reflate, and the other countries were unwilling to adopt a coordinated moderate devaluation strategy. Sensing the breakdown of the "rules of the game" of the EMS, market participants staged attacks on individual members.

Contrary to the self-fulfilling explanation, there is no dearth of evidence that fundamentals, in the EMS crisis as in earlier crises, augured the outcome. The evidence includes deterioration of unemployment, competitiveness, and debt to GDP ratios for virtually all the EMS devaluers, following the German reunification shock (Krugman, 1996; Branson, 1993; Dornbusch, 1993). These patterns suggest that the market anticipated that money growth would become more rapid were the exchange rate unpegged. Moreover, the crisis was preceded by surprise political developments (the

results of the Danish and French referenda) that would have altered the way markets assessed the fundamentals.

For Krugman (1996), the key aspect of the new crisis models that distinguishes them from his own, and that produces multiple equilibria, is not that they are based on a more sophisticated objective function but that they do not assume that fundamentals deteriorate predictably. If the parameters in the monetary authority's loss function deteriorate over time, then, just as in his model, a predictable speculative attack will follow, and the equilibrium will be unique. A possibility of multiple equilibria arises if the evaluation of fundamentals is uncertain, but the range will be narrow. Moreover, speculators who attempt to profit from multiple equilibria will limit the range even more.

In our opinion, it is incontrovertible that currency crises occur because of inconsistency between domestic policy objectives and a pegged exchange rate. Doubt about the timing of the attack is less important than the fact that it is bound to happen if governments pursue inconsistent policies.

The logical possibility of multiple equilibria in foreign exchange markets in a world of rational expectations does not mean that they have actually occurred. In every case in which events have been explained as self-fulfilling prophecies, the events can also be explained by fundamentals. The important task for economic historians is to uncover the real world forces that lead to inconsistency. That task involves an understanding of the political process and the preference function of monetary authorities. In this context the classical approach is a useful way to study currency crises.

3. Famous Historical Examples of Currency Crises

The examples we briefly describe in this section were crises affecting

currencies linked to (or in the process of restoring a link to) a gold (or metallic) standard. The usual symptom of an impending crisis was a loss of specie reserves. The circumstances that produced the reserve loss varied. No case was typical. The stylized portrayal of the monetary authority failing to limit money creation in order to finance government budget deficits or maintaining low interest rates, when adhering to the commodity standard required restraining monetary growth or raising interest rates, captures the features of only one of the individual crises - the 1923-26 French franc crisis -- although it applies in some respects to other crises as well.

Currency crises that occurred in wartime must be distinguished from those that occurred in peacetime. In wartime, a suspension of convertibility might be the correct policy, to allow the authorities to pursue an optimal fiscal policy of taxation, borrowing, and seigniorage. The classical theory of tax smoothing postulates that a rational government should finance wartime expenditures with debt, which would be retired in peacetime (Barro, 1979). High collection costs of conventional taxes in wartime might also make it optimal to use the inflation tax (Vegh, 1989).

Thus, how wartime expenditures were financed (taxation, borrowing, the printing press) was crucial for currency stability. Moreover, wartime exigencies could create internal or external drains of specie reserves, even if monetary authorities behaved prudently. Sometimes legal arrangements (the U.S. Independent Treasury) or adventitious events (enemy invasion; military mutiny) accounted for reserve losses.

The common element in the individual episodes we review is that in each case the authorities confronted the dilemma of choosing between the internal or external objective. Giving up the external objective -- convertibility of

the currency into the weight of specie specified by the fixed exchange rate -- constituted the currency crisis. Besides the common element, as the descriptions that follow show, each episode had unique features.

3.1. John Law's Operations, 1716-20

John Law in 1705 theorized that currency creation could finance a major economic project that would employ unused resources and expand real wealth without raising prices. He put the theory to work in France with the Regent's support by establishing a note-issuing bank in 1716, and organizing a company to take over a monopoly on trade with Louisiana, then adding the tobacco monopoly, trade with Africa, and finally all French trade outside Europe. The conglomerate company in 1719 purchased the right to issue new coinage, and the right to collect all French taxes, first indirect ones and then direct taxes. He also bought up the French national debt, at market prices below par, to refund it at an interest rate below that paid by the state while collecting the government service. Despite Law's theory, the conglomerate never undertook a major economic project.

To sell shares in the company, the bank increased its note issue. By January 1720 share prices began to fall below 10,000 livres per share, as holders converted their gains into specie. Law countered by prohibiting specie payments above 100 livres. In February 1720 the company took over management of the bank, made its notes legal tender for payments above 100 livres, and terminated support of the stock price by note creation. The ensuing price decline led the bank to peg the price at 9,000 livres, intervening to convert shares into banknotes. The pegging operation ended in May 1720, by which time the legal tender note circulation and price level had doubled and the specie stock had disappeared. At the same time Law in several steps devalued specie

in terms of livre tournois, and imposed exchange controls. There is evidence that Richard Cantillon, the French financier and economist, who recognized the incompatibility between Law's domestic operations and the exchange rate, sold banknotes and managed to buy Dutch guilder by evading the exchange controls (Murphy, 1987). Events proved Cantillon right. A run on the Banque Royale's specie reserves forced Law to reverse his policy, precipitating a massive loss of confidence, and a quick collapse of his operations.

The collapse occurred even though Law presided over a deflation from May to December 1720. The note circulation fell by 56% by October 1720, and the price level declined by one-third from its peak. Following his fall from power, the share price fell to 500 livres in September 1721, about the same price as in May 1719. Specie reappeared and was revalued to the definition it had at the beginning of 1720 (Garber, 1990).

3.2. England, 1797

The Bank of England suspended the gold standard on February 27, 1797, when its bullion reserve fell to just above £1 million. In February 1793, at the start of the war with France, it had stood at £4 million. According to O'Brien (1967), contractionary actions by the Bank in response to its dwindling gold reserves hindered the government's war finance. The tension between the exigencies of war finance and specie convertibility increased from 1793 to 1797. Finally, to prevent the Bank's collapse in the face of a massive external drain occasioned by a premium on gold in France (marking its return to a metallic currency after the disastrous assignat inflation), and of an internal drain in February 1797 (because of an invasion scare when a French frigate landed a handful of men in Ireland), the government authorized the suspension of convertibility. Soon after suspension, the Bank was prepared to

resume payment, but the government demurred, and the act of suspension was renewed year after year until 1803, when it was extended until six months after a definitive peace treaty had been ratified.

3.3. The United States, 1861

The Civil War broke out in April 1861. When Treasury Secretary Salmon P. Chase took office in March, he met with the banks of New York, Philadelphia, and Boston, who agreed to make three advances of $50 million each to the government. Immediately they paid $5 million to the Assistant Treasurers in coin, the remainder to be paid in coin as needed. The secretary agreed to issue 3-year 7.30 bonds or Treasury notes and to reimburse the banks from the national subscription. The arrangement was intended to give the government large sums needed to redeem maturing treasury notes and for other disbursements, and to maintain specie payments. According to the Independent Treasury Act of 1846 under which the Treasury operated, the proceeds of government loans subscribed to by banks had to be transferred to subtreasuries in coin. This much of the act was repealed on 5 August 1861, to permit the secretary to leave the proceeds with the banks until needed, but he accorded the Treasury's needs a priority ahead of the banks'.

In New York City the banks had agreed to keep a specie reserve of 25% against net liabilities, and the Clearing House tried to assure that no bank's specie would fall short. On 19 August $35 million was credited to the government, and banks began to pay the subtreasury $3.5 million in specie weekly. By 2 September some banks had a deficiency and the Clearing House charged them interest daily. On 19 September the Clearing House began to issue loan certificates. To escape the interest charge, the banks with the deficiency exchanged the loan certificates for gold. On 1 October the second

$35 million of treasury notes was allotted to the New York banks, and on 16 November, another loan of the same amount, half in coupon bonds, half in registered bonds. (These issues collateralized to 90% of their value the loan certificates the Clearing House issued.)

In December the secretary issued demand notes (greenbacks), further draining specie from the banks. At the end of the month, the banks suspended specie payments, and the Treasury followed suit. It is important to note that suspension did not occur because of an overissue of paper money (domestic credit) that forced a decline in international reserves. It occurred because of the institutional peculiarities of the Independent Treasury, and the inflexibility of the treasury secretary. Given the magnitude of the greenback issues that followed, it is likely that a suspension of payments associated with a currency crisis would have eventually occurred.

The suspension of specie payments in 1861 immediately put gold at a premium over paper. Resumption of payments did not occur until 1 January 1879 (Myers I, 1931).

3.4. U.S. Currency Weakness, 1894-96

In the context of a U.S. budget deficit after 1890 and the creation of legal tender Treasury Notes of 1890, redeemable in coin, that the Sherman Silver Purchase Act of 1890 mandated, uncertainty about the convertibility of the U.S. dollar surged, despite the repeal of the Sherman Act in 1893. To finance the deficit, the Treasury ran down its stock of gold and legal tenders. The increase in legal tenders outstanding, however, when presented for redemption threatened the gold reserve. In January and November 1894, the Treasury attempted to restore its gold reserve to at a minimum $100 million by offering for public subscription $50 million 10-year 5% bonds. The subscribers

used legal tenders to obtain gold to pay for the bonds with no increment to the gold reserve. In January 1895 a run on gold in exchange for legal tenders reduced the reserve to $45 million.

Stymied, in February 1895 the Treasury secretary contracted with the Belmont-Morgan banking syndicate, under a law which authorized him to purchase coin on terms he negotiated, to market a 30-year 4% bond issue and provide the Treasury with a 6-month line of short-term interest-free gold credit to restore the gold reserve. One-half of the 3,500,000 ounces of gold delivered was to be shipped from Europe at a rate not exceeding 300,000 ounces a month. The syndicate agreed to protect the Treasury against gold withdrawals paid out to redeem legal tenders or sold to obtain exchange. It delivered an additional $25 million in gold in exchange for legal tenders, and borrowed exchange in London to sell in New York, effectively controlling the exchange market. The syndicate marketed the bonds for a total of $68.8 million.

During the five months after the contract was signed no gold was withdrawn from the Treasury. At the end of August 1895, when agricultural exports and associated gold imports rose, the syndicate was dissolved. During the electoral campaign in 1896, domestic accumulation of gold and gold exports resumed in response to the strength of the pro-silver forces, and gold reserves declined. Once the Republicans won the election, pressure on the dollar eased, this time permanently.

The crisis of the U.S. gold standard in 1894-96 has been modeled as a speculative attack, and the probability of the timing of the attack estimated as only 6% (Grilli, 1990). The episode has been interpreted as displaying the advantage of obtaining a line of credit in foreign currency to avoid a devaluation (Garber and Grilli, 1986).

3.5. *Crisis of 1914*

What was distinctive about the 1914 crisis, on the outbreak of war, unlike earlier gold standard wartime crises, was the breakdown of international clearance through London that followed. Indeed, it was a crisis in the sense of a disruption of the foreign exchange market but different from others in not being associated with an inconsistency between internal and external balance. Moreover, it was a systemic crisis, affecting the entire worldwide gold standard, and not just one country in isolation.

Under these conditions, banks contracted their short-term loans to be ready for panic demands for cash. The London discount market was deprived of a flow of new bills. The London acceptance houses responded by refusing new acceptance credits. Foreigners as a result could not replenish their sterling balances. Long-term credits ceased. While the London Stock Exchange continued to operate, it was possible to sell securities and obtain sterling. Fearing a price collapse in the face of an attempt worldwide to liquidate securities, stock exchanges everywhere closed down. Payment in gold in any event would have been inadequate to replace international remittance, and gold embargoes were established worldwide.

By 1 August the Bank of England had raised Bank rate to 10%, made loans to discount houses and the Stock Exchange to replace call loans, and gotten a letter of indemnity from the Chancellor to permit issue of notes beyond the limits of Peel's Act. The Treasury issued Currency Notes, although no panic withdrawals from banks occurred. On 13 August the Bank of England undertook to discount at Bank rate approved bills accepted before 4 August and granted acceptors postponement of payment on maturity on condition of paying 2% above Bank rate. On 5 September the Bank announced that it would have funds for

repayment of all pre-moratorium acceptances, thus enabling acceptors to meet their obligations at maturity, and the banks agreed to finance discount of new bills. The reopening of the London Stock Exchange on 4 January 1915, marked the end of the transactions impasse the outbreak of war had created.

In New York the breakdown of the money market led interior banks to drain gold from their correspondent banks. The Aldrich-Vreeland Act banknotes relieved the domestic demand for currency, but a solution was needed for the lack of sterling. New York banks provided credits in New York against obligations falling due abroad at provisional rates of exchange. London, however, demanded gold. A gold pool of $100 million was arranged on 1 September by banks in and outside New York. They obtained complete knowledge of international indebtedness that had to be settled by remittance of dollar-sterling exchange. The banks knew from day to day what the exchange rate would be. Little gold was shipped.

When wartime international movement of goods took over, the sterling-dollar exchange rate reached and passed par. By December 1914, the dollar was strong in terms of the belligerent currencies. Early in 1915 the sterling-dollar exchange rate fell below the gold export point to the United States. During the rest of the year sterling depreciated, but in January 1916, sterling was pegged at $4.76 7/16, where it was held for the rest of the war.

In Britain, the Defense of the Realm Act on 5 December 1916, prohibited melting of gold coin, and the Act of 18 May 1918, made it illegal to buy or sell gold at a premium. The operation of the bullion market, a key feature of a functioning gold standard, was suspended. In the United States, the export of gold was licensed from September 1917 to June 1919. Interconvertibility of notes and gold and free international movement of gold were suspended in both

countries (Brown I, 1940).

3.6. French Franc Crisis, 1923-26

When the franc was unpegged in March 1919, its exchange value declined sharply as the government seemed bent on inflation. The law of 31 December 1920, however, signaled a shift to deflationary policy in that it required the repayment of Bank of France advances on an annual basis, and imposed a legal limit on the government's borrowings from the Bank. The exchange rate of the franc reflected this improvement in fiscal affairs, rising from 6.27 to 8.99 cents over the next five quarters.

The national budget, however, posed a special problem for the franc's reputation. The budget was divided into an ordinary and a special budget, the latter detailing reconstruction expenses that were expected to be recoverable from Germany under the Versailles Treaty. Doubts concerning Germany's readiness to pay reparations had an effect on the exchange value of the franc, especially after hyperinflation developed there. By December 1922, the franc declined to 5.25 cents from 8.99 in April. In 1923 the government was unable to repay the Bank of France under the terms of the Law of 31 December 1920, in reaction to which the franc fell to 3.49 cents in March 1924.

The crisis was defused by the imposition of new taxes that month and negotiation of foreign loans of $100 million and £4 million against a pledge of gold at the Bank of France. The credits were used to support the franc, which rose to 6.71 cents during the next few weeks, and foreign exchange reserves increased. The new taxes assured that the ordinary budget would be balanced, but payments under the Dawes Plan that were counted on to finance special budget expenditures turned out to fall short. The failure of a government debt issue in October 1925 brought the franc down from 4.7 cents in

September to 2.05 in July 1926. Only with the appointment of Raymond Poincare as premier and finance minister, who opposed a capital levy his predecessors in office had proposed, was financial stability restored. The franc rebounded to 3.95 cents by the end of the year. The Bank of Franc then pegged the exchange rate at that level. The de facto stabilization became de jure in June 1928.

Interpretations of the French franc gyrations have emphasized different aspects of the experience: the importance of confidence in the ability of government to honor its debts, fiscal causes related to inadequate taxes or excessive spending, the failure of short-term interest rates on government debt to rise as they should have, disappointment that the prewar parity of the franc was not restored, political infighting between left and right that unsettled Frenchmen and foreigners (Brown I, 1940; Makinen and Woodward, 1989; Krugman, 1991; Eichengreen 1992). Rather then giving pride of place to any one of these interpretations, we are willing to settle for all of the above.

3.7. Sterling, 1931

A succession of political and economic shocks unhinged sterling's link to gold. In the first half of 1931, a deficit in the fiscal budget resulted from depression-increased outlays on unemployment insurance. The invisible trade balance shrank as interest rates on foreign investments fell, and income from shipping and financial services declined with the contraction of foreign trade. Reserve losses starting in May 1930 brought gold reserves down to under £150 million, a level observers regarded as a critical minimum. In May 1931 the Austrian banking crisis precipitated capital flight and the announcement of a banking holiday. British deposits of £5 million in Vienna were thereby frozen. The next month banking difficulties in Germany made £70 million of

German debts to British banks uncollectible, and at the same time German investors repatriated their London funds. The closing of Germany's largest bank in July and the publication of the Macmillan Committee Report led to a fall in sterling below the gold export point against major currencies. Bank rate was raised twice in July from 2.5% to 4.5% but not changed again before convertibility was suspended.

On 1 August, the May Committee forecast large budget deficits that would require tough political decisions to raise taxes and reduce expenditures. The Labour Government, unable to solve the budget problem, resigned on 23 August, and was replaced by a multiparty coalition. Its attempt on 10 September to achieve budget balance was unsuccessful. Though New York and Paris provided loans, the run on sterling did not halt. The crowning event that disturbed investor confidence was disaffection among navy personnel over pay cuts that the press described as a mutiny. With reserves dwindling, the Government suspended convertibility on 19 September.

One vein of analysis of the events leading up to Britain's departure from gold is that devaluation came as a surprise, and that fundamentals by themselves do not explain investors' devaluation expectations, requiring invocation also of international political and economic events (Eichengreen and Hsieh 1995). It is hard to believe that investors who were running down Britain's reserves to the point of exhaustion did not associate that loss with the probability of devaluation.[3] That investors were influenced by events large and small as well as by fundamentals seems to us uncontroversial. The

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[3] Violations of credibility bands (bands within which uncovered interest arbitrage prevails consistent with gold point arbitrage efficiency) for the dollar/sterling rate, estimated for the interwar period, begin after June 1931 (Officer, 1996).

other vein of analysis that emphasizes self-fulfilling balance-of-payments speculative attacks does not fit the facts of sterling devaluation in 1931.

3.8. The Dollar Crisis, February 1933

From the date of Roosevelt's victory at the polls in November 1932, it was well known that he and his advisers were considering the possibility of taking the dollar off the gold standard. Foreign countries were not in a position to attack the dollar. In 1932 they had already deposited under earmark in New York or moved to their own countries all the gold they could claim. Fears that year of a European drain had proved unfounded. The United States held more gold at the end of 1932 than at the beginning. U.S. gold, moreover, amounted to 40% of total world gold reserves; the trade balance was in surplus;, and U.S. foreign investments three times as great as its gold holdings were. American securities held by foreigners amounted to one-fifth of U.S. foreign investments.

The danger, if danger there was, lay in possible domestic withdrawals of gold or capital flight. Private investors, alarmed by the threat they perceived Roosevelt's gold policy represented, began exporting gold. Private bankers were selling dollars short, buying sterling with the proceeds. The British bought the dollars offered for sterling, and earmarked a corresponding amount of gold. The Federal Reserve staff unfortunately lacked expertise in dealings in foreign exchange that would serve to offset the speculation that was under way. The enormous issue of Federal Reserve notes as the currency-deposit ratio zoomed, temporarily reduced the System's reserve ratio below the legally required 40% of gold to outstanding notes. Panic at the New York Federal Reserve Bank at the end of February explains its eagerness to join the demand for a banking holiday.

Disconnecting the dollar from gold may have been a stabilizing influence on the depression-racked U.S. economy, but it was in no way an action the United States was forced to take, unlike the devaluations that followed currency crises in other countries.

3.9. Gold Bloc, 1935-36

The currencies of the Gold Bloc countries (France, Belgium, Holland, Italy, Poland, and Switzerland) were the only major ones still freely convertible into gold in 1935. For them adherence to the gold standard itself represented an ever higher barrier for domestic policies to surmount. Their difficulties mounted in face of competition from the depreciated sterling bloc, capital flows to the United States, exchange controls in many countries, and resistance at home to the deflationary effects of maintaining their parities (Eichengreen, 1992).

The need for fiscal austerity was undermined by rearmament expenditures. Capital flight was one manifestation of the erosion of confidence in the ability of the bloc to sustain their parities. Belgium, heavily dependent on foreign trade, was the first to abandon the bloc in March 1935. France was in the same situation as Belgium, but tried to expand domestic credit while remaining firm in its gold commitment. Holland escaped the pressures that Belgium and France experienced because its foreign trade was mainly with its colonies. By 1936 the condition of the gold bloc had markedly deteriorated. Poland imposed exchange controls. France, Holland, and Switzerland did not, and experienced gold losses. In April 1936, the Popular Front came to power in France. As previous governments had done, it tried to combine reflation and defense of its parity, and failed. In September 1936 France devalued after negotiating the Tripartite Agreement with the British and Americans not to

engage in competitive devaluations. The other Gold Bloc countries also devalued and joined the Agreement (Eichengreen, 1990). Again, when countries found internal policies incompatible with external commitments, they finally had to choose between them, and the choice favored internal stability.[4]

4. Post-World War II Currency Crises

We distinguish the crises that punctuated the Bretton Woods pegged exchange rate era from those that followed post-1973. Under Bretton Woods, each member country declared a par value for its currency in terms of the dollar or gold. It was required to intervene to maintain its exchange rate within 1% of its parity with the dollar. Currency crises arose when domestic economic conditions proved incompatible with the chosen parity. The examples of currency crises in the managed float period after Bretton Woods collapsed were cases of failed attempts to peg exchange rates.

A. Bretton Woods

4.1. Sterling in Crisis, 1947-49

Britain, as was the case with other European belligerents, emerged from World War II with a massive balance-of-payments deficit in gold and dollars. To ensure that she would ratify the Bretton Woods Articles and quickly restore current account convertibility, the United States and Canada extended a $5 billion loan. Britain restored current account convertibility on 11 July 1947. The ensuing run on sterling depleted the U.K.'s reserves by $1 billion within a month. Convertibility was suspended on 20 August 1947.

The return to the pre-World War II parity of $4.03 without accounting for

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[4] Political factors, such as the ascendancy of a left-wing government and a politically dependent central bank, according to Simmons (1994), led governments in the interwar period to abandon their external commitments.

the change in competitiveness that had occurred since created the conditions for the crisis. These conditions did not disappear. In the summer of 1949 confidence in the official exchange rate of sterling weakened markedly, setting the stage for a speculative attack.

Sterling was an international currency, with exchange controls to protect its inconvertibility into dollars. Nonresident holders of inconvertible sterling, however, had an incentive to get around British exchange controls, for example, by selling sterling for dollars at a rate of exchange that was lower than the official rate, then using the proceeds to buy dollar goods that could be sold at a profit. The buyer could purchase sterling goods cheaply. Speculating on devaluation was a sure bet. On 18 September, sterling was devalued to $2.80.

4.2. Sterling in Crisis, 1967

Internal and external objectives were on a collision course from 1964 on in Britain. Expansionary monetary and fiscal policies to promote employment produced inflation, a deficit in the current account, and declining international reserves. Speculation against sterling followed. The Labour Government that assumed office in October 1964 opposed devaluation, and instead adopted a surcharge on imports, leaving internal policies unchanged. In November a $4 billion IMF and G-10 loan, and in July 1965 contractionary fiscal measures and restrictions on capital outflow temporarily improved the external situation, but in the spring and summer of 1966, sterling was again under pressure. Reconciling faster growth and improving the balance of payments was evidently not possible. A seamen's strike in May and June led to a run on sterling. Deflationary monetary policy was announced, and a compulsory price and incomes policy was enacted. Foreign central banks

provided loans this time. From May 1967 onwards confidence in sterling ebbed. Talk of a possible British devaluation became widespread as unemployment rose and the balance of payments deteriorated. An enormous run on sterling on 17 November preceded by one day devaluation of the pound to $2.40.

4.3. French Franc in Crisis, 1968-69

In May 1968, student riots in France touched off strikes and lockouts throughout the country. The settlement raised hourly wage rates by 11%, shortened the work week, and provoked a flight of capital into D-marks and gold. France tightened price controls, restricted imports and some external payments, introduced subsidies for exports, and imposed exchange controls. Credit restrictions replaced these measures in September. In November a flight from francs to D-marks intensified, and on 20 November major European exchange markets shut down.

Between April and November France lost $2.9 billion of its foreign exchange reserves. France cut public spending, increased indirect taxes, imposed ceilings on commercial bank lending, and raised interest rates. Yet these measures did not suffice to reduce the growing deficits in the French current account during the first two quarters of 1969. The French again tightened restrictions on bank credit, raised minimum requirements for hire purchase, and in July froze funds for public investment. To resist devaluation France incurred short-term debts of $2.3 billion. The drain on French reserves, however, continued. On 10 August French resistance ended. The franc was devalued by 11.11%.

4.4. U.S. Dollar in Crisis, 1960

Successful operation of the Bretton Woods system depended on foreign central banks intervening with their own currencies against the dollar to

maintain par values, and the United States standing ready to buy or sell gold at $35 an ounce in transactions with foreign monetary authorities. The U.S. balance of payments accordingly was determined largely by the exchange parities other countries established. Current account surpluses of other countries that added to their dollar reserves tended to produce a steadily weakening U.S. balance of payments and growing doubts about the sustainability of the U.S. gold convertibility commitment. A portent of the troubled future of the system was that 1960 was the first year in which U.S. gold reserves declined below the level of its total liquid liabilities to all foreign holders of assets denominated in dollars.

A focus of pressure on the U.S. dollar was the London gold market. In March 1960, the price rose above $35 an ounce, as European central banks and private investors bought gold for dollars. The Bank of England sold gold to stabilize the price, but the U.S. Treasury initially was not willing to restore the Bank's holdings. Hence, when a rise in the price of gold occurred in October, the Bank did not intervene. On 27 October, with the price reaching $40 an ounce, the Treasury agreed to sell gold to the Bank, reserving for the Bank the decision on intervention in the market.

Kennedy's victory in November 1960 triggered concerns that it would favor internal over external objectives, given his campaign rhetoric about getting the economy to move ahead. Gold losses after the election were seen as an expression of a lack of confidence in the administration's commitment to gold convertibility at the fixed price. The response of the administration was to adopt capital controls, to institute measures to improve the balance of payments, to alter the monetary-fiscal policy mix, to stem conversion of outstanding dollars into gold, and to enlist the Federal Reserve in foreign

exchange market intervention. The collapse of the Bretton Woods system that we describe in the currency crisis a decade later underscores the failure of these stratagems.

The dollar-based international monetary system was fated to succumb to expansionary monetary and fiscal policies the United States adopted by the middle of the 1960s. Other countries faced the choice of maintaining exchange rate stability at the cost of a level of inflation the United States was imposing on the rest of the world, or giving up fixed exchange rates for the sake of their own domestic price stability.

4.5. Bretton Wood's Collapse, 1971-73

Once the French franc was devalued in August 1969, France rapidly moved from a $1.7 billion deficit on current account to a small surplus in 1970, an overall balance-of-payments surplus of $2 billion in that year and of $3.4 billion in 1971. Its official reserves rose correspondingly. Part of this change was owing to increased U.S. monetary growth and a higher U.S. balance-of-payments deficit.

U.S. expansionary policy fostered a market perception that the D-mark was undervalued in relation to the dollar, stimulating a flow of funds to Germany. A few days before the German election in October 1969, the government closed the exchange market, and a day after reopening it, permitted the D-mark to float. The spot rate against the dollar appreciated, and on 26 October, a revaluation of 9.29% was announced. Although there was a capital outflow in the last quarter of 1969, by 1970 there were large inflows of foreign funds, and official reserves increased substantially. Domestic inflation in Germany was thereby eventually worsened.

In March 1971, several European countries requested conversion of their

dollar reserves into gold to enable them to pay for an increase in their IMF quotas. The payout reduced the U.S. gold stock to the lowest level since 1936. A persistent dollar outflow thereafter accelerated in the first few days of May 1971, overwhelming foreign exchange markets. On 5 May seven European countries closed their foreign exchange markets, and five others on several continents withdrew their support for the dollar. Dealings in D-marks, guilders, and Swiss francs were suspended. On 9 May both Germany and Holland announced that their currencies would float, since they could not maintain exchange rates within the established margins.

The devaluation of the dollar vis-a-vis the D-mark as the result of the float left unsolved the dollar's exchange rate vis-a-vis the yen. Japan's capital controls were proof against the dollar flows that inundated European foreign exchange markets but not against the large deficit in U.S. trade with Japan. That bilateral trade imbalance was a provocation, over and above the imbalance between U.S. gold reserves and outstanding dollar liabilities, for the changes the United States introduced on 15 August 1971 to achieve a dollar devaluation. The convertibility of the dollar was formally suspended, as was the use of the swap network through which dollars could be exchanged with central banks for other currencies.

The effect was to oblige other countries to hold dollars or to trade them for a price determined in the market and so to revalue their currencies. Foreign exchange markets abroad, except in Japan, shut down. The Japanese initial attempt to maintain the pegged rate of the yen compelled them to purchase $4 billion in the two weeks after 15 August. The yen was then freed to float upwards; other currencies floated when exchange markets were reopened on 23 August. Restoration of a repegged system of exchange rates, however,

remained the goal of the United States and its partners.

After much negotiation, a readjustment of currency parities was arranged at a meeting at the Smithsonian Institution in Washington, D.C. on 17-18 December 1971. Currencies were revalued at varying percentages, with the proviso that 2 1/4% margins of fluctuation above and below the so-called central rates were permissible. The Smithsonian agreement specified that the official dollar price of gold would henceforth be $38 an ounce, implying a depreciation of 7.9% of the gold value of the dollar rather than an appreciation of the dollar value of other currencies. The dollar, however, remained inconvertible.

The central rates established at the Smithsonian meeting lacked credibility, as the participants in the gold and foreign exchange markets revealed. The London free market price of gold rose with few reversals. Money growth and inflation continued to rise in the United States, and both the balance of trade and the U.S. balance-of-payments deficit soared, with a corresponding surge in dollar holdings of the major European countries and Japan. Capital controls were imposed in Holland and Japan, and Germany followed suit. On 10 February 1973 Japan closed its foreign exchange market and suspended support of the dollar. New central rates were set in a hurried round of negotiations, although the lira, yen, Canadian dollar, U.K. and Irish pounds, and Swiss franc all floated. Again, the official price of gold was raised (this time to $42.22 an ounce), leaving unchanged the gold value of other currencies. The new central rates did not staunch the flow of dollars abroad, and a further crisis erupted in March 1973. This time the major industrial countries discontinued pegging their exchange rates to the dollar.

B. *Managed Float Regime*

4.6. European Economic Community Snake

The notion of a European monetary union had been the subject of discussion for years. Implementing the notion had been scheduled for a start in June 1971, but the turbulence in exchange markets during the collapse of the Bretton Woods system delayed activation of the snake until April 1972. The impetus for the initiative was dissatisfaction with the effects of the weak dollar on European currencies. The D-mark and the Swiss franc were the main targets of the capital inflows. European exchange rates as a result did not reflect country fundamentals but dollar disturbances. Germany believed the revaluation of its currency occasioned by the dollar's problems had contributed to its low economic growth. The snake was supposed to provide a zone of stability.

The technical motivation of the snake was to narrow the margin of fluctuation of EEC currencies below the 2 1/4% margins set by the Smithsonian agreement by a convergence of economic and monetary policies so that exchange parities among them would be fixed.

Operationally, if an EEC currency premium over its central rate plus the discount on the central rate of another EEC currency reached 2 1/4% (half the amount permitted by the Smithsonian agreement, which was 4 1/2% between floor and ceiling in relation to the dollar, but as much as 9% in relation to another EEC currency, if one rose from floor to ceiling and the other fell from ceiling to floor), the weak currency was to be bought either by the strong-currency country. the weak-currency country, or by both. A monthly settlement was stipulated, so the creditor country could exchange the weak currency acquired for a desired reserve asset and obtain repayment for its

short-term credit facility if it had lent its currency to the debtor. Debtors were to make settlement in a prescribed mix of reserve assets.

Six countries (France, Germany, Italy, Belgium, Luxembourg, Holland) originally joined the snake; three others joined in May 1972 but left in June (U.K., Denmark, Eire). Denmark rejoined in October 1972. Italy left in December 1972. France left in January 1974, rejoined in June 1975, and left again in March 1976. Sweden and Norway, non-EEC countries, joined in May 1972. Sweden left in August 1977.

Many changes in exchange rates within the snake were made. On four occasions between March 1973 and October 1978, the D-mark was revalued within the system. The guilder and the Norwegian krone each was revalued once. Countries other than Germany devalued in October 1976. The Swedish krona was subsequently devalued again, as was the Danish krone, and the Norwegian krone several times.

The feasibility of the snake was doubtful in the absence of consensus by the national governments to yield to the union direct monetary autonomy, and to seek convergence of economic policies. In December 1978 proposals were drawn up for a replacement of the snake by the European Monetary System to remedy the perceived shortcomings of its forerunner. In March 1979 it was formally established.

4.7. Chile's Currency Crisis, 1982

Chile fixed its exchange rate at 39 pesos to the dollar in June 1979 and maintained it unchanged until the peso was devalued by 18% in June 1982, Pegging the exchange rate to the dollar was a strategy to lower inflationary expectations and the actual rate of inflation, which was at an annual rate of 35% in 1979.

If capital inflows do not complicate the strategy, for the nominal anchor approach to succeed, two assumptions must be true, one, that the anchor country has a firmly established low-inflation record, and second, that adopting the exchange rate link to the anchor country is a firm commitment. The strategy would then be expected to deliver two objectives: the exchange rate commitment would enforce restraint on the part of the country's central bank in creating money, thereby contributing to the decline in inflation expectations, and it would give credibility to the achievement of an inflation rate for traded goods about equal to that of the anchor country.

The assumption that the anchor country had a low-inflation policy that was firmly established was contrary to fact at the time Chile adopted the exchange rate link to the dollar. U.S. consumer prices had risen from 5% in 1976 to 6.6% in 1977, 9.0% in 1978, and 12.7% in 1979. Producer prices rose at roughly similar rates. The 1979 rate of price rise continued in 1980, followed by declines in 1981 and 1982. This U.S. price history was one set of circumstances affecting Chile's experience with a nominal anchor. A second set was the shift to monetary tightening in late 1979 to combat U.S. inflation. U.S. long-term government interest rates in 1981-82 averaged 13.3%, 2 percentage points higher than in 1980. A decline in the exchange value of the dollar until late 1979 was reversed in 1980-82 by a 29% appreciation in nominal terms and 28% appreciation in real terms. How did these fluctuations in the anchor country prices, interest rates, and exchange rates affect Chile?

Tradable goods prices in Chile declined in 1980-81, as would be expected if its commitment to a fixed exchange rate had credibility. Prices of nontradable goods, however, rose, in part apparently because of a system of backward-looking wage indexation that was not abandoned until the peso was

devalued. As we next note, monetary expansion apparently also played a part.

As a result of financial liberalization, and the fixing of the exchange rate, which were generally applauded, Chile was the recipient of a large inflow of short-term capital, with real interest rates rising from 6.7% in 1979 to 59.2% in 1981 providing a high yield. While external demand for Chilean pesos surged, instead of 39 pesos to the dollar at the fixed exchange rate, the peso price of dollars would have fallen in 1980-81, had the authorities not intervened. Keeping the nominal exchange rate from appreciating seemingly benefited exporters and hurt importers, but in real terms the fixed exchange rate hurt exporters and benefited importers. In 1982, when external demand for Chilean pesos faltered, the peso price of dollars would have increased, had the authorities not intervened. Keeping the nominal exchange rate from depreciating, seemingly hurt exporters and benefited importers, but in real terms exporters were better off than importers.

Monetary consequences of the inflow increased the base unless fully sterilized by the central bank. The base was two-thirds higher in 1980 than in 1979, fell 10% in 1981, and more than doubled in 1982. While Chilean authorities bought foreign currencies (dollars) to prevent the peso from adjusting to the increase in demand for Chilean assets, foreign exchange balances rose by a third in 1980, barely changed in 1981, before falling in 1982 below their initial level in 1979. By not fully sterilizing the increase in foreign balances, domestic money growth spurted. By permitting domestic credit to rise more than foreign balances declined in 1982, domestic money growth accelerated.

Trying to keep the exchange rate from changing meant that, when tradable goods sectors lost competitiveness, because their prices rose

relative to foreign goods prices, the authorities stuck by their commitment to the nominal anchor. The trade deficit by 1981 was 10% of GDP. Financing the current account deficit, however, as long as capital inflows continued, posed no problem but terms of trade deteriorated steadily. When capital inflows ceased, the authorities sold foreign reserves to settle the current account deficit. The banking system, meanwhile, which had borrowed abroad in dollars and lent in pesos, found itself in dire distress.

At the end of 1981 Chile was plunged into recession. Output declined sharply from the middle of 1981 to June 1982. The unemployment rate rose to almost 30%, the trade deficit grew, foreign reserves fell, and domestic credit rose. Inflation soared once again and expectations spread that the peso-dollar rate would not last. Capital inflows ended not only because Chile ceased to be an attractive economy for foreign investors but also because the steep rise in U.S. real interest rates made the United States a successful competitor for capital inflows.

Devaluation in 1982 ended Chile's experiment with a nominal anchor. By the end of 1982, the peso exchange rate with the dollar was 73.43. The experiment has been assessed as a case of overvaluation of the real exchange rate that was bound to collapse, and that making inflation the main priority of economic strategy is a mistake (Dornbusch, Goldfajn, and Valdes, 1995). This assessment overlooks dimensions of the Chilean experience that we stress.

One dimension relates to the monetary consequences of an exchange rate target. Chile had a choice between limiting the supply of pesos to protect internal price stability or letting the supply of pesos grow with capital inflows to protect the peso-dollar exchange rate. It tried to do both and failed. The other lesson we draw is that, if a country chooses to adopt a

nominal anchor, it would be wise to avoid an anchor undergoing wide swings in monetary growth.

4.8. Mexican Devaluations, 1976, 1982, 1994

A.1976. Three episodes of devaluation in Mexico were generated in different macroeconomic settings that were similar in terms of their incompatibility with the fixed exchange rate regime that prevailed. We describe each one in turn.

In 1972 a cyclical recovery began, fueled by expansionary demand policies. Fiscal deficits rose from 2.5% of GNP in 1971 to 10% in 1975, financed by borrowing from the central bank. As a result the growth rate of the monetary base accelerated from 19.6% in 1971 to 33.8% in 1975. From 1974 to 1976 foreign debt replaced domestic debt as the main source of deficit financing, but the monetary base continued to grow strongly. Inflation rose above 20% per annum in 1973-74, and private investment declined.

At the nominal exchange rate of 12.5 pesos per dollar, the real price of imports declined and they surged in dollar value while the real price of exports rose and they stagnated. Accordingly, the deficit in the current account mounted from less than $1 billion in 1971 to $4.4 billion in 1975, about 5.5% of GNP. Capital flight of approximately $5.3 billion was a feature of 1974-76.

The Echeverria administration attributed domestic inflation to higher world prices, and the slow growth of exports to world recession, justifying continuing expansionary demand policies. Import controls were imposed, but the exhaustion of foreign exchange reserves compelled the decision on 31 August to allow the peso to float. Inflation rose to 27%. In October the peso was devalued to 23 per dollar. Mexico then entered into negotiations for medium-

term financing from the IMF (Buffie 1990).

B. 1982. The Lopez Portillo administration, in office 1977-82, initially supported an austerity program to stabilize the economy in line with IMF targets. In the course of 1977, the estimate of Mexico's proven oil reserves was nearly tripled to 16 billion barrels compared to the estimate in 1975. With oil prices at $31.25 per barrel in 1980, the IMF program was set aside in favor of an expansionary policy and weakened restraints on foreign borrowing. Once more demand stimulus, provided by higher public sector spending, was adopted, but combined with a more flexible exchange rate (crawling at the rate of 9% per annum), and reduced monetization of the fiscal deficit with the introduction of government bonds (CETES).

The improvement in the economy 1977-81 was bought at the expense of a huge increase in public sector expenditures that was not matched by revenue increases. The large fiscal deficits were matched by balance of payments deficits. Trade liberalization and real exchange rate appreciation lowered the real price of imports, leading to rising current account deficits. In 1981 quotas were imposed on many consumer and capital goods imports but overall import volume still rose by 15.2%. Dollar earnings from petroleum exports rose substantially, 1978-81, but nonoil exports were hampered by real exchange rate appreciation.

The increase in current account deficits was financed by growth in foreign indebtedness to some $80-odd billion by 1981, of which 50% to 83% was used to finance capital flight. Public sector debt was two and a half times private sector debt, mostly in the form of commercial loans. In 1981 debt service including short-term amortization represented an 80% claim on current account income.

By mid-1981 devaluation of the peso appeared unavoidable, but no restraint was exerted on fiscal expenditures, and foreign debt continued to increase at premiums commercial banks had not previously demanded. A 40% depreciation of the peso announced on 17 February 1982 was followed by a 30% wage increase. Fiscal and monetary expansion continued, and the consolidated public debt rose to 17.6% of GNP. Massive capital flight was not halted by the resort to a dual exchange rate system in August. On 1 September the banking system was nationalized, and comprehensive exchange controls were introduced. Debt service by the public and private sectors quickly came to a halt, as did net foreign lending.

By the end of 1982 the Mexican economy was in a deep contraction. The devaluation sharply increased prices of intermediate imported inputs. Real output fell and the inflation rate doubled. Had the foreign debt been used to finance productive investment, Mexico would not have had to endure the plight it faced. Instead the debt financed capital flight and public sector consumption, public sector investment having been wasteful (Buffie 1990).

C.1994. The dominant view in a vast literature on the Mexican peso crisis at the end of 1994 is that Mexico was an innocent victim of a speculative attack on the peso by foreign investors frightened by manifestations of political instability in a basically sound economy. From 1988 on Mexico certainly had corrected many of the ruinous policies it favored that led to the 1982 debacle and the subsequent period of stagnation. One feature of the economy in 1993-94 that had concerned some observers was a growing current account deficit that presaged a need to devalue the peso. Other features of the economy, however, also merited concern.

The condition of the banks at the very least was problematical, with the

percent of nonperforming loans rising year by year from 1990 on. Foreign-currency denominated loans varied from 18.5% to 27.1% of total loans. Mexican firms borrowed from local banks in dollars. Borrowers in a country with a sound currency do not choose to replace peso liabilities with dollar liabilities. The Mexican inflation rate declined after 1988 but not enough to close the gap between the Mexican and U.S. price performance. There was thus more than one indicator that the underpinnings of a fixed dollar/peso exchange rate were shaky. Moreover, had the Mexican economy been in as good a shape as those who believe that it did not deserve its fate in late 1994, it ought to have survived devaluation without the jumps in the inflation rate and nominal and real interest rates, the collapse of output, and the stupendous rise in unemployment that it in fact experienced. We next review the origins of the crisis.

Monetary growth was highly erratic from 1988 on. The level of M1 quadrupled from 25.3 billion pesos in 1989 to 96 billion pesos in 1991. In 1990-92 average growth of M1 was more than 100% per year. The New Peso, introduced in January 1993, was equal to 1,000 old pesos. The growth rate of M1 and M3 in 1993-94, which was about 20% per annum, was hardly restrictive.

During the 1980s and early 1990s Mexico brought the public deficit under control and reduced outstanding debts. In 1982 domestic and external public debt was 51% of GDP. By 1992 the ratio was 27%. In 1992 the budget was in balance. Fiscal easing in 1993-94, however, unbalanced the budget position somewhat, but it was nevertheless among the best performers among OECD countries.

The government until 1994 financed its short-term needs with Cetes, Treasury bills of less than one year maturity. When the interest rate it had

to pay on Cetes rose in 1994, reflecting the market's concern over fiscal laxity, as had occurred in previous decades, the government shifted to short-term dollar-indexed Tesobonos that paid a lower interest rate, exposing the government to interest rate and exchange rate risk.

During 1982-88 average annual inflation in Mexico was 86% and per capita real GDP contracted 1.9% per year. The Salinas government that took office in December 1987 opted for an ambitious stabilization program that would deliver structural reforms to free markets, privatize government-owned enterprises, open Mexico to trade, balance the budget, and bring down inflation. To achieve the latter objective, an incomes policy was given a role but the primary mechanism was a nominal anchor.

On 1 March 1988 the government fixed the peso/dollar exchange rate at its 29 February level for the next three months and then extended it until the end of the year. In 1989 a crawling peg of 1 new peso per day was introduced, then 80 centavos per day in 1990, 40 per day in 1991, and 20 centavos per day in 1992. In November 1991 a system of bands was announced, the lower limit depreciated at the daily rate, and the upper limit held constant. The fluctuation band widened from 1.1% to 15% by the end of 1994. From early 1993 a narrower band was established for the day's trading range that intervention would maintain. The permitted rate of depreciation was revised in October 1992 to 40 centavos per day or around 4% annually, but this was not enough to offset the inflation differential between Mexico and the United States until the end of 1993. The Mexican annual inflation rate was then 10%.

Over the period from 1988 on the trend of the real exchange rate sharply appreciated, owing to growing capital inflows. The result was a widening current account deficit that the capital inflow financed. The interest rate

hikes in the United States in 1994, however, diminished the attraction of Mexico and other emerging markets as an outlet for foreign portfolio investment. In addition, political unrest and the assassination of the presidential candidate in March 1994 precipitated capital outflows that drove the peso close to the bottom of the fluctuation band, signaling the vulnerability of the exchange rate. Foreign exchange reserves were drawn down with no remission until the end of the year.

To defend the peso exchange rate, the central bank would have had to tighten monetary policy to convince the market that it would not devalue. To tighten, however, would restrict economic growth that was already subpar, and would exacerbate problems for the banks sinking under a weight of nonperforming loans. The dilemma of choosing between internal and external objectives once again confronted authorities that had made a commitment to a fixed exchange rate. On 20 December, Mexico devalued the peso by 15%, but that did not stem shifts out of peso assets, and on 22 December Mexico freed the peso to float (OECD 1995; Meigs 1996).

4.9. Crisis in the European Exchange Rate Mechanism, 1992-93

In the European Monetary System, Germany was the nominal anchor. Other EMS countries pegged their currencies to the DM in order to import its low-inflation credibility.

German reunification in 1990 is commonly cited as the external event that had disruptive effects on the European Monetary System. But for that event, it is claimed, the period of exchange rate stability that began in 1987 would have continued until European monetary union was attained. We doubt that this is a realistic projection. The conflict between EMS countries' monetary autonomy and their exchange rate commitments would not have been absent, even

had German reunification been accomplished without undesirable side effects. The conjunction of many forces ensured that the slightest shock that could derail the path to monetary union would lead to severe stress on the system (Eichengreen and Wyplosz, 1993). The forces included the elimination of capital controls in 1989, the discouragement of adjustments in parities after 1987, the supposition of credible commitment by member countries to policies consistent with fixed rates, and the unwarranted belief of unlimited intervention by the Bundesbank in the event of pressure on a member to realign.

To contain the inflation generated by government budget deficits that financed reunification, the Bundesbank adopted a restrictive policy. It made no allowances for the blow to its domestic real economy or to the economies of its European partners that its interest rate hikes inflicted. High German interest rates, coupled with a weak U.S. dollar, drew capital inflows to Germany. Hence the German real exchange rate appreciated. For the existing nominal exchange rate arrangements to be plausible, other EMS countries would have had to reduce their inflation rates below the German inflation rate or realign their currencies. The other countries were reluctant to deflate or to devalue, but in the end the market enforced devaluations.

Evidence of loss of competitiveness of Spain, Portugal, the UK, and Italy, and of Sweden and Finland, non-EMS members, from the second half of 1991 indicated to market participants that a realignment was predictable. A recession that began in the first quarter of 1992 worsened the situation of these countries. There were thus many currencies that traders had reason to believe were incorrectly priced in foreign exchange markets.

The Italian lira was the first currency exposed to market distrust of

its parity. Italian foreign reserves began to decrease in February 1992 and losses became heavy in June. Lira bond prices then declined in both the futures and spot markets. In July the outflow accelerated when Italy imposed a wealth tax on deposits and the government declined responsibility for the foreign liabilities of a bankrupt state holding company. Moody's thereupon downgraded Italian debt from AA1 to AA3. On 28 August the lira was quoted at the bottom of the currency band. A week later, to defend its parity, the Bank of Italy raised the discount rate to 15%.

On 25 August the British pound was quoted slightly above its ERM floor, but did not recover despite heavy intervention. To signal its commitment to defend the existing parity, on 3 September the Bank of England borrowed $14.5 billion equivalent of DM from the market.

The next currencies to be sold off were the Finnish markka and the Swedish krona. Finland had been forced to devalue by 12% in November 1991 owing to the collapse of its trade with the former Soviet Union. On 8 September Finland, having exhausted its reserves, and unwilling to defend the peg by raising short-term rates above the existing level of 14%, floated the markka. The depreciation of the markka by about 13% implied that there was also a substantial deviation between the pegged rates of other ERM currencies and market evaluations, with fluctuation bands as much as three times the size of ERM bands.

Sweden, unlike Finland, to counter the attack on the krona, raised the rate charged by the central bank for overnight bank reserves to 75%, and borrowed DM to add to its reserves. Sterling and lira were also under attack. Because home mortgages bore floating rather than fixed interest rates in Britain, the authorities were constrained in their response. For the market,

this made the British commitment suspect. The Italians responded by intervening on their own and with others, using D-marks, estimated at 24 billion in Frankfurt and 60 million in other exchange markets. On 13 September, Italy capitulated, devaluing the lira by 7% against the D-mark. The next day the Bundesbank for the first time in five years decreased two key interest rates.

Within a day the lira was again at the bottom of its band, and so was sterling. That day the Bank of England was thought to have lost $15 billion in reserves. Another currency that was under pressure was the peseta that fell below its central ERM rate.

On 16 September, the Bank of England raised the minimum lending rate from 10% to 12% and announced a further increase to 15% which was never put into effect. Sterling fell below its ERM floor, and that evening it was withdrawn from the ERM, temporarily then, indefinitely on 19 September. Italy also withdrew from the ERM and the peseta was devalued by 5% within the ERM.

Sweden was not yet ready to give up. The Swedish central bank raised its marginal lending rate to 500%. On 20 September all currencies under attack that had survived were near their ERM floors. The Bank of England restored its minimum ending rate to 10%, and lowered it to 9% on 21 September. The Bank of Ireland, however, raised its overnight rate to 300%.

Greece, an EC country that had not joined the ERM, also suffered an attack on the drachma in September. The Bank of Greece intervened in the market, tightened capital controls, and raised the official lending rate from 30% to 40%

When the French franc came under attack on 23 September, both the Banque de France and the Bundesbank intervened heavily. That attack was repulsed.

On 4 January 1993, the franc was again near its ERM floor but both central banks firmly stated their readiness to defend it.

In November, when the krona again came under attack, after a few hours, the Riksbank ended its resistance. It floated the krona and lowered its key interest rate to 12.5%. The Norwegian krone was allowed to float on 10 December.

On 22 November Spain and Portugal devalued their central parities by 6%. The Bank of Ireland raised its overnight rate to 100% between 26 November and 2 December to defend the punt. In early January the overnight rate was raised again, but on 30 January the punt was devalued by 10%.

The wave of attacks appeared to subside in the first months of 1993. On 13 May, however, the peseta was again under pressure, and for the third time since the 1992 currency attacks began, it was devalued, this time by 5%. The Portuguese escudo followed suit. There was another interlude. In mid-July, however, the French franc was only a little above its ERM floor. The increase in French interest rates above already high German ones seems to have convinced market traders that France was willing to pay the price to preserve its link to the DM. This was not, however, an unalloyed triumph for a fixed rate.

On 30 July all ERM currencies were at the bottom of their bands vis-a-vis the D-mark. On 1 August the ERM was altered, making it closer to a free float than a pegged but adjustable exchange rate system. The bands were widened to 15% above and below the existing central parities. Only the DM and guilder exchange rates were unaltered (Buiter et al., 1996).

5. Lessons from History

Our survey of the historical episodes of currency crises in the past two

centuries suggests a number of lessons. First, currency crises occur when internal economic conditions are incompatible with the external conditions set for the currency. Institutions and the circumstances in which currency crises occurred differed widely among the countries we have surveyed. What was common across all these experiences was this basic incompatibility.

Second, the crises in the historical cases before World War II always occurred within the context of a commodity standard. Under a commodity standard currency crises could arise for two reasons; a government following unsound financial practices; or banking instability. Crises affecting the developed countries usually occurred on the outbreak of war, when it became apparent to market agents that the government would be driven to suspend convertibility in order to pursue the war effort. In peacetime currency crises were usually associated with banking instability. These were usually very short-lived, and the original parity was restored. For developed countries the commitment to convertibility before World War II was paramount, a norm that time has since eroded.

The experience of developing peripheral countries was different. They suspended convertibility under the pressure of speculative attack consequent upon the market's realization that the governments were pursuing lax financial policies.

Third, in the post-World War II period the Bretton Woods system was exposed to currency crises. They occurred under two sets of circumstances for individual countries. Some countries followed fiscal and monetary policies incompatible with a commitment to the peg. Virtuous countries, however, could also face currency crises if competitive trends had changed the real exchange rate, requiring an adjustment of the nominal parity. Although Bretton Woods

was designed as an adjustable pegged system, in practice, countries were reluctant to voluntarily alter their parities because they were punished by adverse capital movements even if there were only a hint that devaluation or revaluation was in the offing. Consequently, when delayed adjustment finally occurred, it was traumatic. Delay was possible because of capital controls, but in the end capital controls could not avert an attack on the peg that either set of circumstances precipitated.

Fourth, Bretton Woods itself was subject to a systemic crisis. The unwillingness of the United States, the reserve center country, to conduct its affairs in a noninflationary manner, and of the nonreserve countries to absorb the dollar spillovers from U.S. balance-of-payments deficits doomed the system.

Fifth, the experience of the subsequent snake and ERM resonates with that of Bretton Woods. Despite more elaborate arrangements than existed under Bretton Woods to defend parities under attack, these systems also succumbed. A lesson of the 1992-93 ERM currency crises is that in today's world of highly mobile capital and deep international capital markets, it is possible for developed countries to obtain whatever resources are required to defend their parities. However, the price of doing so in the form of astronomical short-term interest rates is often prohibitive, and the market is aware of this constraint.

Sixth, the recent currency crises in Chile and Mexico represent clear examples of inconsistency between domestic priorities and the demands of adherence to their parities.

Seventh, the theory of self-fulfilling speculative attacks may have intellectual merit but contributes nothing to our understanding of real-world

events. In every crisis examined here, the fundamentals are more than adequate to account for the actions of speculators.

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