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## Interpreting currency crises : a review of theory, evidence, and issues

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303

Omar F. Saqib

Interpreting Currency Crises - A Review  
of Theory, Evidence, and Issues

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# **Interpreting Currency Crises**

## **A Review of Theory, Evidence, and Issues**

**Omar F. Saqib\***

### **Abstract**

The main objective of this paper is to understand the causes and symptoms of currency crises by reviewing its seminal literature, establishing its determinants, and outlining some of the relevant issues. The paper highlights the need to comprehend the process, which may lead to the inconsistency of the policies and render the situation favourable for a speculative attack. This involves, broadening the determinants of exchange rate crises beyond pure economic fundamentals through incorporating non-economic factors, such as political incentives on macroeconomic policy making. In effect, the review accentuates upon the need to develop a model that bridges the gap between the conventional and non-conventional determinants of a currency crisis.

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# 1 Introduction

The main objective of this paper is to understand the causes and symptoms of currency crises by reviewing the seminal literature and outlining some of the significant issues. The paper accentuates upon the need to comprehend the process, which may lead to inconsistency of the policies and render the situation favourable for a speculative attack. This involves, broadening the determinants of exchange rate crises beyond economic fundamentals, incorporating non-economic factors. In particular, the development of a model that bridges the gap between the conventional and non-conventional determinants of a currency crisis.

In recent times, the collapse of a number of fixed or quasi-fixed exchange rate regimes has gained much attention. The recent decade provides a handful of experiences: Exchange Rate Mechanism crisis of 1992-93; Turkish lira crisis of 1994; collapse of the Mexican peso during 1994-95; East Asian currency/financial turmoil during 1997-98; fall of the Russian ruble in August 1998; crisis of the Brazilian real in January 1999; and again, after nearly six years, crisis of the Turkish lira in February 2001.

The consequences of currency crisis can be highly costly, as opposed to a mere disturbing financial event. The resulting wealth effect can substantially increase the debt burden, cause output to contract, and disrupt the distribution of income. It may undermine the process of policy reform. Furthermore, treasuries usually loose huge amounts of foreign exchange during initial defences of the exchange rate. Finally, in the event of a currency crisis the authorities and the economy as a whole loose credibility.

An extensive range of economic literature investigates both theoretical and empirical determinants of currency collapses. The literature usually focuses around the main predictions of the canonical models, the so-called first- and second-generation theories by Paul Krugman (1979) and Maurice Obstfeld (1986). However, the issue remains largely debatable. Each crisis presents a new set of puzzles and thus requires a new model. There has been continues failure to predict and hence prevent the crises, or as Dornbusch (1998) puts it: "*Of six crises predicted by experts, five never happen*".

What causes markets to initiate a speculative attack? Is it economic fundamentals that dictate the outcome, or something beyond the conventional thinking? The paper attempts to answer

these questions by reviewing the seminal work and by focusing on certain aspects of currency crises in recent times.

The paper is organised as follows. Section 2 describes and criticises the traditional models of currency crises. This includes first-generation and second-generation models, and Kindleberger-Minsky's view of financial/currency crises. The crisis, in a first-generation model, is the outcome of inconsistent government policies. The inconsistency arises mainly due to the credit financed loose fiscal policy monetarised by the central bank lending. At the same time, the central bank is committed to maintain exchange rate parity by selling foreign exchange. The monetarisation and maintenance come into clash resulting in the decrease of foreign exchange reserves. When reserves fall below a critical level speculators initiate attack, which leads to the abandonment of the exchange rate and free floating of the currency.

In a second-generation model, a government is faced with minimising a loss function based on unemployment, growth rate, current account deficit, and credibility loss in case of abandoning the peg. Given a shock, it may become increasingly difficult for a government to strike a balance between the internal and external objectives. Markets in light of their assessment, based on self-fulfilling prophecies, of the government's judgement about the state of the economy may or may not provoke an attack. If the state of the economy is sound, then the probability of abandoning the peg in case of an external shock is low therefore the likelihood of an attack is low, while the opposite is true in case of an unsound economy. Moreover, the model assumes that even a seemingly trivial event is sufficient to trigger an attack.

The kindleberger-Minsky model, broadly, describes three phases of a process that leads to a financial crisis— mania, panic, and crash. Manias take place at the time of business cycle expansion when economic agents change from liquid to real or financial assets. Panics are characterised by stampede, race for changing real or financial assets into money. Crash is the final outcome of the process preceded by panic and mania. A focused model can be summarised in five different, yet relatively contemporaneous stages of displacement, boom, overtrading, revulsion, and tranquillity.

First-generation model is usually termed as overly simplistic mainly due to its distance from reality that stems from its treatment of the 'mechanical-behaviour' government versus 'rational' agents. Second-generation model, on the other hand, treats the government as rational optimising agent but the self-fulfilling feature of the model reduces it to the status of special cases and examples. Furthermore, the distinction between the models is only theoretical since

it is fundamentals that predict the outcome in both cases. Finally, the Kindleberger-Minsky model is termed overly broad, which does not supply a rigorous theory of what characterises a financial/currency crisis.

Section 3 highlights the traditional and non-traditional determinants of currency crises. The conventional determinants are based on empirical studies, stemming from the predictions of first- and second-generation models. The notion of 'market euphoria' preceding collapses begins the list of non-conventional determinants. In particular, the notion suggests that how an exaggerated praise for certain economies mask the traditional signals of financial fragility, which eventually result in crisis. The second of the non-conventional determinants focuses on the spreading of crisis from one country to another, the contagion phenomenon. This constitutes the wake-up call hypothesis in which investors assess other economies that exhibit problems prone to the crisis one. Finally, political factors determining exchange rate crises are discussed; in particular, elections and devaluations, war of attrition, political instability and deficit bias, and delegation.

Section 4 addresses three main issues associated with currency crises. The first two concern the on going discussion of international financial architecture, while the last one suggests a methodological issue. The first issue highlights the controversy regarding the need of a lender-of-last-resort before and after a crisis. The second focuses on the debate of cross border capital mobility, the steady capital inflows and then abrupt outflows at the onset of currency crises. The final issue highlights the limitations of the conventional approach to the exchange rate determination and suggests new insights from the application of micro finance tools to the foreign exchange market. This section might appear to be somehow separated from the main body of the essay. The reason for reviewing these issues is to highlight the general importance of currency crises, which has generated a renewed interest in these issues. Furthermore, how these issues are helpful in understanding the currency crises is discussed in the last section.

The final Section first notes a narration by a prominent currency speculator George Soros in which he unfolds the events that led to the Exchange Rate Mechanism crisis of 1992. The chapter then gives a nut-shell review of all the discussed features in light of the narration. This leads to the discussion of the possibility of currency crises in the cases of pure-fix and pure-flexible exchange rate extremes. Finally, the review accentuates upon the need of a model that bridges the gap between the economic and non-economic determinants of currency crises, to simply broaden the scope of the current research.



## 2 Models of Currency Crises

This section presents a description of the first-generation and second-generation models, underlines some of their deficiencies, and discusses their similarities. Furthermore, an alternative view on currency crises, the Kindleberger-Minsky's model, is also accounted.

According to the traditional models of currency crises, the crash of a currency is an outcome of a clash between the internal and external objectives of a government. In other words, the durability of a fixed or quasi-fixed exchange rate rests with the commitment of the authorities.

### 2.1 The Models

The traditional models of currency crises follow the seminal work by Paul Krugman (1979), and Maurice Obstfeld (1986). The alternative view on currency crises stems from the writings of Hyman Minsky (1982a, 1982b, 1977, 1975) championed by Charles Kindleberger (1996) in his classic work *Manias, Panics, and Crashes*.

#### 2.1.1 First-Generation

A standard first-generation model<sup>1</sup> of a small open economy in log notations is given as:

$$m - p = -\alpha(i) \quad \alpha > 0 \quad (2.1) \quad [\text{Money Market Equilibrium}]$$

$$m = d + r \quad (2.2) \quad [\text{Money Supply}]$$

$$p = p^* + e \quad (2.3) \quad [\text{Purchasing Power Parity}]$$

$$i = i^* + \dot{e} \quad (2.4) \quad [\text{Uncovered Interest Rate Parity}]$$

$i$  : domestic-currency interest rate       $i^*$  : foreign-currency interest rate

$p$  : domestic price level                       $p^*$  : foreign price level

$e$  : nominal exchange rate                       $\dot{e}$  : expected and actual rate of exchange rate change

$d$  : domestic credit                               $m$  : domestic supply of money

$r$  : international reserves

---

<sup>1</sup> Krugman's work has been simplified and extended by several authors, for example, Flood and Garber (1984); Connolly and Taylor (1984); Calvo (1987); Krugman and Rotemberg (1991); Flood, Garber, and Kramer (1996).

The model argues that the collapse of exchange rate parity is an outcome of inconsistent monetary policy that induces steady loss of international reserves. The inconsistency of monetary policy arises due to the credit-financed loose fiscal policy monetarised by the central bank lending. The central bank is also committed to maintain the exchange rate parity by selling foreign currency at fixed rates. The monetarisation of, usually, a budget deficit and maintenance of exchange rate parity come into clash and results in the decreasing of international reserves. When reserves fall below a critical level traders start a speculative attack that leads to the exhaustion of foreign exchange reserves. Eventually, the peg is abandoned and the exchange rate is floated free. Typically, a first-generation model predicts that fiscal deficit, credit creation, and decrease in foreign exchange reserves precede a speculative attack.

Formally, the mechanism of reserve loss can be illustrated by substituting from Equations (2.2), (2.3), and (2.4) into Equation (2.1):

$$d + r - p^* - e = -\alpha(i^* + \dot{e}) \quad (2.5)$$

When the exchange rate is fixed at  $e = \bar{e}$ , it follows that  $\dot{e} = 0$ :

$$d + r - p^* - \bar{e} = -\alpha(i^*) \quad (2.6)$$

The foreign price level, foreign-currency interest rate, and fixed exchange rate are exogenous which implies that  $p^* = i^* = \bar{e} = 0$  in Equation (2.6):

$$r = -d \quad (2.7)$$

When the exchange rate is fixed and is expected to stay that way, the above equation says that money stock must likewise be fixed. An increase in the central bank's domestic assets must be offset by a decrease in its foreign assets. If  $d$  grows at a rate  $\mu$  then  $r$  falls at the same rate,  $\dot{r} = -\mu$ . If  $d$  continues to grow, the country would exhaust its  $r$  and eventually the exchange rate is floated free. In other words, credit creation produces a balance-of-payments crisis.

In this model it is possible to fix the timing of crisis by introducing the idea of shadow exchange rate,  $\tilde{e}$ , the exchange rate that balances the money market following an attack in which foreign exchange reserves are exhausted.

In Equation (2.5), assume  $p^* = i^* = 0$  and  $e = \tilde{e}$ , which follows that  $\dot{e} = \dot{\tilde{e}} = \mu$ , that is, actual and expected rate of fixed exchange rate change depends upon credit growth. Also,  $\tilde{e}$  prevails when international reserves are exhausted, therefore  $r = 0$ :

$$\tilde{e} = d + \alpha\mu \quad (2.8)$$

Figure 2.1 illustrates Equation (2.8). At  $A$ , where the fixed exchange rate parity line,  $\bar{e}$ , intersects the shadow exchange rate line,  $\tilde{e}$ , is the point where speculators would initiate an attack. Or if  $d > d^A$ , the speculators would earn profits in case of attack due to the resulting depreciation of currency. If  $d < d^A$  then there would be capital losses for speculators as an attack in this area would appreciate the currency. Thus an attack could be foreseen if  $d = d^A$ .

To find out the exact timing of crisis, let the size of attack be  $\Delta r$  (or  $-\Delta r$ , negative in attack). Equation (2.8) shows that  $\tilde{e}$  would start rising after the attack and Equation (2.4) illustrates that domestic-currency interest rate must jump by  $\mu$ . This jump reflects the prospective currency depreciation and results in the decrease of domestic currency demand. The money market balances by a decrease in the money supply at the instant of attack. Thus,  $-\Delta r = \alpha\mu$ .

Since domestic credit follows  $d_t = d_0 + \mu t$ , international reserves follow  $r_t = r_0 - \mu t$ . At the time of attack,  $T$ , reserves fall to zero. The condition for attack becomes,  $\Delta r = r_0 - \mu T = \alpha\mu$ , or rearranging the terms:

$$T = \frac{r_0 - \alpha\mu}{\mu} \quad (2.9)$$

Equation (2.9) implies that the higher the stock of initial reserves ( $r_0$ ) or lower the rate of credit expansion ( $\mu$ ), the longer it takes before the fixed exchange rate regime collapses.

### 2.1.2 Second-Generation

Following Obstfeld (1986), the second-generation models note that the crises in foreign exchange market are due to rational and self-fulfilling expectations, which can be triggered by random events like sunspots.<sup>2</sup> Government is assumed to be an optimising agent faced with minimising a loss function. The optimising behaviour and exchange rate policy of a government can be described by the following equation:

$$\min L = \frac{\theta}{2} \delta^2 + \frac{(\delta - E\delta - \mu - \kappa)^2}{2} \quad (2.10)$$

$L$ : social loss function

$\kappa$ : measure of distortion

$\mu$ : zero-mean shock with variance  $\sigma^2$

$E\delta$ : expected rate of currency depreciation

$\delta$ : rate of currency depreciation

$\theta$ : relative weight attached to price changes

The model assumes two modes of policy-making: rule and discretion. The rule requires that a government pursue policy regardless of the state of economy. Under discretion, a government can set policy after observing the state of the economy, including predetermined expectations.

The fixed exchange rate,  $\delta = 0$ , is the rule. The rule is obeyed under both modes of policy making. Therefore, under the 'rule' mode, the expected rate of currency depreciation amounts to zero,  $E\delta = 0$ . Also, replacing the shock,  $\mu$ , by its variance,  $\sigma^2$ , the expected loss from Equation (2.10) results in the following:

$$EL^R = \frac{\sigma^2 + \kappa^2}{2} \quad (2.11)$$

In case the government follows discretion then agents form their expectations accordingly,  $E\delta = \kappa / \theta$ . Assuming  $\theta = 1$  for simplicity, the expected loss function under 'discretion' mode from Equation (2.10) can be calculated as follows:

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<sup>2</sup> A host of papers follow the second-generation line of approach, for example, Obstfeld (1994) and (1996); Cole and Kehoe (1996); Ozkan and Sutherland (1995).

$$EL^D = \frac{\sigma^2}{4} + \kappa^2 \quad (2.12)$$

Equations (2.11) and (2.12) illustrate two interesting results: (i) in the absence of a shock, rule is better than discretion; (ii) in the presence of a shock, discretion may be better than rule, or  $EL^D$  is better than  $EL^R$  for sufficiently high  $\sigma^2$  relative to  $\kappa$ .

It is in the interest of a government to follow rule and undertake discretion only in case of a particular disruptive shock. However, it is costly for the authorities to follow discretion all the time or otherwise it would dominate the option of rule. Thus rule is followed whenever:

$$L^R < L^D + C \quad (2.13)$$

Where  $C$  is the cost in case of following discretion. In this model to follow discretion implies the devaluation of currency. This is the key point in understanding the main argument of the model. Given a shock, it may become increasingly difficult for a government to strike a balance between its internal and external objectives. The authorities contemplate the option of following discretion by analysing the cost,  $C$ , associated with it. On the other hand, traders in light of their assessment of the government's judgement about the state of economy may or may not provoke an attack. Thus the model presents multiple equilibrium.

To explain a currency crash by second-generation models, it is sufficient to examine the unemployment, inflation, and growth rates to assess the overall state of economy. However, Obstfeld (1996) argues that the state of economy goes beyond these indicators. He notes that the rising interest rate is a crucial variable that creates conditions favourable for a self-fulfilling attack. Since, the rising interest rate adversely affects the public debt, short-term real interest rates, and banking sector's stability.

An extension of first-generation model can also describe the situation of multiple equilibrium. To illustrate this point lets draw shadow exchange rate,  $\tilde{e}$ , from Equation (2.8) for two domestic growth rates: one when there is no attack,  $\mu_0$ , and the other under attack,  $\mu_1$ . In Figure 2.2 there are four possible situations depending upon the size of domestic credit,  $d$ . In the first case,  $d < d^B$ , an attack would bring no profit to the speculators as the equilibrium remains below the fixed exchange rate parity line,  $\bar{e}$ . In the second case,  $d = d^B$ , an attack would bring no profit no loss as the equilibrium simply shifts from  $C$  to  $B$ . Thus 'good'

equilibrium exists as long as  $d \leq d^B$ . However, if  $d^B < d < d^A$  then there is a possibility of multiple equilibrium only when speculators are small and uncoordinated. The unique equilibrium arises only when there is a large well-financed speculator capable of taking massive positions against the parity. The final situation,  $d \geq d^A$ , is 'bad' equilibrium and the crisis is bound to happen. This illustration shows the similarity of these two generations of currency crises, which follows in more detail later.

### **2.1.3 Kindleberger-Minsky**

Kindleberger (1996) describes three phases of a process that leads to a financial crisis—mania, panic, and crash. Manias take place at the time of business cycle expansion when economic agents change from liquid to real or financial assets. Panics are characterised by stampede, race for changing real or financial assets into money. Crash is the final outcome of the process preceded by panic and mania. Compared to these phases, a focused model can be summarised in five different, yet relatively contemporaneous stages of displacement, boom, overtrading, revulsion, and tranquillity.

#### **Displacement**

The crisis starts out with an exogenous shock, significantly large and pervasive, to the macroeconomic system. Minsky calls it 'displacement'. The source of displacement can be an invention, political event, war, crop failure, bumper harvest, policy change, and discovery of natural resources, unexpected financial success. The list of sources is not exhaustive. The sufficient assumption is that the source of displacement is considerably large, thus having strong effects on the economy.

Displacement alters profit opportunities in at least one sector of the economy. This sector could be new or already in existence. Opportunities in others tend to decrease. Individuals, firms, and businesses with savings or credit try to take advantage of the new opportunities, retreating from the old and others. If new profit opportunities overtake the old ones, investment and production pick up and a 'boom' is underway.

#### **Boom**

Typically, a boom enlarges the money supply through the expansion of bank credit. Issuance of bank notes, or lending in the form of additions to bank deposits, expands money. Usually, the existing system of monetary payments cannot withhold due to ever increasing

requirements of a boom. Thus resulting in the development of new credit instruments, such as new banks or finance companies, more financial intermediaries.

Assuming that speculation exists and is transferred into demand for objects of speculation, then excess demand over the existing supply of objects of speculation gives rise to the prices. The increase in prices, in turn, attracts further firms and investments and increases in income. With the propagation of positive feedback, new investment and a further income increase takes place.

### **Overtrading**

The process of ever increasing investment and income is termed as 'overtrading'. Overtrading involves: *speculation*, buying for resale rather than use or income; *overestimation*, euphoric estimate of an object above its fundamental value; and *gearing*, buying by instalments in which an obligation can also be sold along with the object for future payments.

The process of overtrading continues. As individuals and firms see others making profit, they tend to join the trend. Without a real understanding of the processes involved, more and more people seek to become rich. When a large number of firms and households, including the segment of population who are normally not well informed of the processes, indulge in the practice then speculation for profit deviates from normal or rational behavior. It is noteworthy that, the object(s) of speculation are different. Generally, the objects may be foreign exchange, domestic or foreign securities, contracts to buy or sell securities, land, buildings, goods manufactured for export, etceteras.

### **Revulsion**

As the boom continues, interest rates, prices, profits, velocity of circulation, all continue to increase. During the course of boom, at some stage, few insiders decide to sell out after taking their profits. Entries to the speculating community continue, thus, balancing the withdrawals. Prices cease to increase. This is the period of financial distress, awareness on the part of speculating community that a rush for liquidity may develop. Gradually or suddenly with the persistence of distress, speculators realise that the market cannot go higher. The crisis is looming. This realisation may turn into a stampede, race for liquidation. Some of the specific signals, which announce the crisis: fall in the price of object of speculation; a firm going bankrupt; banks becoming insolvent; unearthing of a fraud or a swindler.

The crisis sets in and the rush for liquidation grows, prices decline, bankruptcies increase, disorderly liquidation, worsening business conditions, and rise in uncertainty. When people suspect or realise that there is not enough money available to enable everyone to sell out with profit, the whole scenario turns into a panic. Like speculation, panic feeds on itself.

### **Tranquility**

The panic continues to feed on itself, just like speculation during overtrading, until the market realises that sufficient money will be available to meet the demand for cash (despite the fact that panic cannot go on forever!). More specifically, the panic ceases when one or more of three things happen: (i) low prices tempt people to move into less liquid assets; (ii) cutting off of trade because of limits on price declines; or (iii) a lender-of-last-resort convinces the market of sufficient cash.<sup>3</sup>

## **2.2 The Critique**

This section accounts for the general criticism attributed to the theories of first and second generation's models, and the Kindleberger-Minsky model. In other words, why first-generation models are termed as overly simplistic; second-generation models as a collection of special cases and examples; and Kindleberger-Minsky model as overly broad.

### **2.2.1 Overly Simplistic**

The theory of first-generation models has provided some useful insights to understand the balance of payments crisis. In the first place is the identification of the relevant macroeconomic fundamentals whose variation in a certain trend helps to foresee the crisis. Related to this is its demonstration of speculative attacks that are fully anticipated, as opposed to irrational panics. Secondly, given particular values of fundamentals, timing of the crisis can be fixed. Finally, crisis is unavoidable. In other words, first-generation models are subject to unique equilibrium.

However, first-generation model is generally termed as overly simplistic mainly because of its distance from reality. This is largely because of asymmetry in the behaviours of government and private agents. The model assumes 'mechanical' behaviour of the monetary and fiscal authorities compared to the 'rational' disposition of private agents. It does not explain the apathy of a rational government towards the depletion of foreign exchange reserves even

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<sup>3</sup> Kindleberger (1996: p.15).



knowing that the monetarisation of budget deficit would eventually lead to the balance-of-payments crisis. Also, bond financing of the budget deficit is an alternative to hide the fiscal imbalances and thus prevent the foreign exchange reserve losses. Furthermore, the model notes the deterioration of fiscal balances as a leading indicator preceding the collapse. However, a cursory survey of the recent currency crises accounts for a host of indicators that precede a crisis. Current account deficit, overvalued real exchange rate, and debt structure are some other glaring indicators.<sup>4</sup>

The model notes that with the deterioration of fundamentals crisis become unavoidable and even at the time of attack government remains passive. This is in contrast to the actual events. The governments frequently engage in sterilised interventions and defend the parities as opposed to the passive role of government assumed by the model. Typically, authorities undertake these interventions either by engaging in open market operations or by following active interest rate policy. At switch time the monetary authorities intervene through open market operations to provide bank credit that disappears due to decrease in demand for money. Central banks fend off speculative attacks by raising short-term interest rates, sometimes to astronomic heights. This policy may allow them to buy enough time to adapt more fundamental measures in order to regain credibility. In some events, announcement of higher interest rate may postpone the crisis until foreign exchange reserves actually hit zero.<sup>5</sup>

On empirical grounds, Obstfeld and Rogoff (1996: pp.565-566) do not find it convincing to underlie insolvency as the ultimate cause of crisis. By citing some actual events of currency collapses of the early 1990s, their main conclusion is that were the governments of the countries committed to maintain their respective parities they had the means to do so. For example, the foreign exchange reserves to monetary base ratios as of September 1994 in Finland, United Kingdom, and Mexico was 93, 116, and 120 percent respectively. These resources, they argue, are sufficient to beat back even a very determined attack. Moreover, a government can always borrow enough foreign exchange to increase its reserves that may convince the market of solvency.

### **2.2.2 Special Cases and Examples**

As opposed to the passive role of authorities in the event of speculative attack in a first-generation model, the second-generation model treats the government as an active optimising

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<sup>4</sup> See Kaminsky, Lizondo, and Reinhart (1998) for leading indicators of currency crises.

<sup>5</sup> Flood, Garber, and Kramer (1996) and Calvo and Végh (1999).

agent. This feature of the authorities to some extent overcomes one of the main drawbacks of the first-generation line of thought. Nonetheless, there remain two main paradoxes that reduce the model to a status of special cases and examples.

Firstly, in a second-generation model crisis is a result of self-fulfilling attacks triggered by random events? The model suggests that these attacks should take place irrespective of the soundness of fundamentals, since being self-fulfilling in nature. Paradoxically, the model notes that given deteriorated fundamentals the economy would converge to the 'bad' equilibrium and the crisis then is bound to happen.<sup>6</sup> Secondly, sound fundamentals do not guarantee full prevention from the crisis since speculative attacks are self-fulfilling in nature, only uncertainty about the attack increases. These paradoxes reduce the model to a collection of special cases and examples.<sup>7</sup> Furthermore, Bordo and Schwartz (1996) completely reject the notion of self-fulfilling prophecies by presenting a historical account of currency crises. They argue that second-generation models might have an intellectual merit but it is the fundamentals that predict the crises.

In a nutshell, the deficiencies of the models can be summarised as follows: the theory of first-generation model is overly simplistic and the theory of second-generation model is a collection of special cases and examples. Furthermore, a closer examination of this generation of models reveals that the difference between them is only theoretical.

### **2.2.3 Similarities Between the First and Second Generation Models**

The main distinguishing feature between the first- and second- generation models is that the former is subject to unique equilibrium and the latter to multiple, given its feature of self-fulfilling prophecies. This feature is based on the notion of speculation. While its proponents *imply* the word (that is, *self-fulfilling*) in its literal meaning, they *suggest* 'speculation' as its driver. They do not, however, explain what really drives speculation. Eventually, it is economic fundamentals that predict the outcome. Indeed, experiences from the actual events suggest that a greater deterioration of fiscal imbalances adhere the events of a currency crash to the first-generation model and a greater deterioration of other fundamentals, such as rising unemployment or falling growth rates, to the theory of self-fulfilling prophecies. The distinction remains theoretical, as the collapse of an exchange rate regime is fundamentals-driven in both cases.

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<sup>6</sup> Krugman (1996).

<sup>7</sup> Eichengreen, Rose, and Wyplosz (1996).

To illustrate this point, replace domestic credit,  $d$ , with other fundamentals like unemployment rate, growth rates, or debt structure in Figure 2.2. By assigning some critical values to the non-fiscal fundamentals, the extension of first-generation theory can well be applied in this case. For example, if growth rate of GDP hits less than five percent, speculators may well initiate an attack in the hope of prospected currency depreciation. Or, an unemployment rate of ten percent may increase the hope of a future devaluation. Thus, it is difficult to find a fundamental difference between these models.

#### 2.2.4 Overly Broad

Currency crises are usually synonymous with financial crisis, where the former tends to be the first major break-down of a much deeper financial melt-down that follows. Kindleberger himself best describes the relevance of Kindleberger-Minsky model to explain a currency crash. He notes (1996: p.18), “One place where the model surely applies today is foreign-exchange markets, in which prices rise and fall in wide swings, despite sizeable intervention in the market by the monetary authorities, and in which exchange speculation has brought large losses to some banks. Financial crisis has been avoided, but in the opinion of some observers, not by much.”<sup>8</sup> Kindleberger (1996) gives a stylised outline of less than three dozen financial crises covering a period from 1618 to 1990 by using more or less the same frame work as described in Section 2.1.3.

Wolfson (1986) using the same argument develops a business-cycle model of financial crises and argues that the crises are likely to occur near the peak. He sees the role of three determinants crucial for the robustness or fragility of a financial system: relative weights of hedge, speculative, and ponzi finance; degree of liquidity; and degree of debt-financed investments. Whereas, If a unit’s cash flow commitments on debts are such that over each significant period the cash receipts are expected to exceed the cash payments by a significant margin, the unit is said to be engaged in **hedge** financing. A **speculating** financing unit has cash flow payments over some periods that exceed the cash flows expected over this period. A **ponzi** financing unit is a speculative financing unit for which the interest portion of its cash payment commitments exceeds its net income cash receipts.<sup>9</sup>

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<sup>8</sup> See Saqib (2001) for an application of the Kindleberger-Minsky model in the case of the 1997-98 East Asian crisis.

<sup>9</sup> Minsky (1977: p. 143).

In an interesting account, Schwartz (1986) argues that there has been no real financial crisis since the end of second-world-war. She claims that all those so-called financial crises were merely runs on the currencies thus branding them as pseudo financial crises, as opposed to the real one. She criticises the emphasis on a lender-of-last-resort facility suggested by the Kindleberger-Minsky's model. It is this recommendation she notes, that confuses the distinction between a pseudo and a real financial crisis. While criticising the Kindelberger-Minsky's model, Mishkin (1992) notes that the view is too broad and does not supply a rigorous theory of what characterises a financial crisis. Apart from this, causality between the different stages is confusing; except for the very first and very last stages. Moreover, each stage is unique and exhibits some significant features of its own that may mix up the real cause of the crisis. For example, an exaggerated panic in the revulsion stage could be a real cause of a crash. On the other hand, one cannot underestimate the notion of euphoria during the overtrading stage of the model that may contribute to the problem of moral hazard. Related to this is the realisation of the facility of a lender-of-last-resort that could also exasperate the moral hazard during tranquil times. Despite this, the Kindleberger-Minsky view is quite suggestive. It offers new insights in viewing the currency collapses, away from the two generations of currency crises.

### **3 Determinants of Currency Crises**

The recent decade (the focus of this paper is mainly on the decade of 1990s) carries some significant features associated with the field of currency collapses. This invites the attention to broaden the scope of the determinants of currency crises. The prime determinants of currency crises in the literature have traditionally been the macroeconomic fundamentals from the theories of first- and second-generation models. However, a focused examination of the recent episodes of crises reveals some other non-economic determinants as well. First of these non-conventional determinants is the notion of market euphoria that, as argued, masks the traditional indicators of financial fragility and eventually undermining a peg. The second determinant is the phenomenon of contagion, the spreading of crisis from one economy to the other. Among many forms of contagion it is the wake-up call hypothesis, in which the investors assess other economies that exhibit problems prone to the crisis one, that carries merit. Finally, the section reviews the least investigated determinants. In particular, the political factors, such as, elections and devaluations, war of attrition, political instability and deficit bias, and delegation.

### 3.1 Traditional Determinants

In recent times, each crisis presents a unique set of puzzles and requires a ‘third-generation’ model. There is a confusion to explain the events of this decade through first- and second-generation theories. Nonetheless, the main predictions of the models, that is deterioration of certain fundamentals, did seem to precede exchange rate crises.<sup>10</sup>

Thus, stemming from the predictions of first-generation and second-generation models, a fairly large number of empirical studies on the determinants of currency crisis have emerged. These studies can be classified into two categories. First category investigates the determinants of crises in a single country analysis. While, the second focuses on multi-country analysis. Generally, the country specific studies suggest that domestic macroeconomic indicators play a key role in undermining an exchange rate peg. Domestic credit growth, exchange rate misalignments, foreign exchange reserve losses, debt structure, expansionary fiscal and monetary policies are some of the leading indicators suggested by these studies. Interestingly, these studies do not consider structural and/or political factors and focus exclusively on macroeconomic fundamentals. Table 3.1 summarises a list of economic fundamentals in single-country analysis.

A major portion of empirical studies on currency crisis focuses on multi-country analysis. The results obtained from multi-country category are not as interesting and robust as the single-country’s ones. Nevertheless, they introduce a wide variety of determinants of currency crises, promising for future course of research. Table 3.2 summarises the list. These studies, with the exception of Klein and Marion (1997), as well do not take into account political and/or structural factors.

### 3.2 Market Euphoria

Most of the crises in recent times did not turn out as a result of a darkening economic horizon. They took place after a prolonged period of economic boom based on some successful implementation of a stabilisation program and/or a period of high economic growth. This success phenomenon preceding crises, it is argued, may be called as ‘market euphoria’. The following hypothetical example explains this notion.

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<sup>10</sup> See Section 2 for a detailed discussion on the traditional theories of currency crises.

Consider an economy that implements stabilisation program aimed at curbing high inflation or stagnant growth. Given that the program is successful in achieving its objective then the success, in turn, induces 'euphoria' signified by huge capital inflows, high growth rates, and low levels of inflation and/or unemployment. In other words, the success creates 'psychology of boom' as supported by market participants and analysts, national or international institutions (popularly, the International Monetary Fund), and especially as reported by the business press. Thus, traditional indicators of financial fragility, though patent, are largely neglected.<sup>11</sup>

Edwards (1998) while investigating the Mexican peso crisis of 1994-95 blames a host of market participants in creating a false perception of the Mexican economy (ibid., p.4):

*In spite of the divergence between policy actions and economic results, the Mexican reforms were consistently praised by the media, financial experts, academics and the multilaterals – including the World Bank, and the International Monetary Fund – as a major success. In a way, Mexican 'miracle' was 'invented' by these institutions.*

Similarly, Bello (1998) while commenting on the 1997-98 East Asian financial crises blames the business press and media for creating a false psychology of permanent boom that eventually resulted in the financial turmoil. In this regard, he cites an assessment of the Thai economy in December 1996 by a leading expert on Asian investment who was widely quoted in the *Economist*, *Far Eastern Economic Review*, *Financial Times*, *Reuters*, and the *Asian Wall Street Journal* (ibid., p.48):

*We believe that current pessimism about the Thai economy is based on a number of key misconceptions. We do not believe any of the following:*

- *Thailand is entering a recession.*
- *Investment is collapsing.*
- *Export growth is collapsing.*
- *The Bank of Thailand has lost control.*
- *Current account deficit is unsustainable.*
- *Thailand faces a debt crisis.*
- *There is a chance that the baht will devalue.*

It is not surprising, then, that the market euphoria may exaggerate the problem of moral hazard.<sup>12</sup> Furthermore, it may cause unnecessary delay in the implementation of a due stabilisation or correction of some misalignment in economic fundamentals.

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<sup>11</sup> The notion of market euphoria plays a significant role in the 'overtrading' stage of the Kindleberger-Minsky's model of currency or financial crisis (see 2.3).

<sup>12</sup> See Saqib (2001) for an example of 'market euphoria' that exaggerates the problem of moral hazard.

Few examples from the decade of 1990s are worth mentioning. First, the successful export-led growth policy culminates in the fall of Turkish lira in 1994. The Turkish exports had increased from \$ 2.9 billion in 1980 to \$ 13.6 billion in 1991.<sup>13</sup> Second Mexico joins the exclusive club of rich countries, OECD, on the eve of its peso crisis in 1994-95. Third, the 'Asian miracle' stumbles in East Asia during 1997-98. Fourth, consumption boom by lower- and middle-income consumers before the Brazilian real comes down in January 1999. The consumption boom was mainly due to the phenomenal success of the 'Plano real' that brought inflation down to 2.5 percent in 1998 from 5500 percent in 1994.

### 3.3 Contagion

Following three regional waves of Exchange Rate Mechanism, Tequila, and Asian crises, a considerable proportion of currency crises literature concentrates on contagion effects. The argument of contagion is that the crash of, for example, an emerging economy's currency would spread in other emerging economies by a domino effect. A wide variety of terminologies for contagious currency crises are used, consider following. The crises tend to spread among countries due to informational cascades, the herd behaviour contagion; due to similar macroeconomic fundamentals, the fundamentals contagion; due to trade or political proximity, the real integration or political contagion; and due to third-country investors who balance their portfolios in other countries to cover crisis-induced losses from the triggering country, the institutional contagion.<sup>14</sup>

Masson (1998) effectively distinguishes this variety of contagion under three categories: monsoonal effects, spillovers, and pure contagion. Monsoonal effects means that the economic disturbances in developing countries are related to the general economic shifts in the developed countries. Frequently cited examples are the recessions and high real interest rates in industrial countries before the debt crises of 1980s, and the U.S. interest rate hike before the Mexican crisis of 1994-95, popularly known as "tequila" crises.

The second category of contagion states that the crisis in one country tends to "spillover" to the others, since the crises-affected economies are interdependent due to trade linkages. If country A competes with country B for a third country, then a devaluation in country A would result in the loss of price competitiveness for country B. This induces a pressure on country B's

<sup>13</sup> Togan (1996) and Aktan (1996). See, also, Saqib (2000).

<sup>14</sup> Frankel and Schmukler (1998), Glick and Rose (1998), Drazen (1998), Fratzcher (1998), Calvo (1996), Eichengreen, et al. (1996), Gerlach and Smets (1994), Bikhchandani, et al. (1992).

currency because of increasing trade deficit and declining reserves which may lead to its devaluation. This is also true for the countries that have motivations for political integration, for example, Exchange Rate Mechanism of the European Community countries.

Under the final category of pure contagion, the currency crises that tend to be contemporaneous in time are not directly linked to the macroeconomic fundamentals. The simultaneity of the crises is linked to the self-fulfilling speculative attacks. Masson builds a balance of payments model in which external debt plays a crucial role in a way that its service after exceeding a certain level may provoke a crisis in the event of a shock to the current account. In other words, "vulnerability to contagion...is greater when there is a large (floating rate) debt, when reserves are low, and when the trade balance is in deficit" (ibid.: p. 13). Masson argues that models of this type are capable of explaining the contagion phenomenon and should be categorised as "pure" contagion. Moreover, the model implicitly takes into account of the Goldstein (1998) "wake-up call" hypothesis. The hypothesis states that the crisis in one country warns the international investors to reassess other economies for possible weaknesses that were not apparent previously.

However, in some crises it may become difficult to distinguish between the monsoonal and spillover effects. If two economies are interlocked with each other due to trade, or as Drazen (1998) puts it, due to political factors then the crises may exhibit both effects. The Exchange Rate Mechanism crisis of 1992-93 presents a classical example. The crisis had a strong monsoonal component: The German interest rate hike (Germany being the central country) caused pressures on the parities of the member countries that eventually led to the crisis and to an end of the mechanism. The member countries had trade linkages as well as political motivations. Thus it is difficult to brand this crisis under the separate category of either monsoonal or spillover effect. However, one similarity between these classifications is that both these effects are related to the *changes* in fundamentals.

On the other hand, the pure contagion argument is completely in line with the traditional currency crises models of self-fulfilling expectations and multiple equilibrium. For given weaknesses of an economy, trivial events are capable of triggering a crisis. Thus it seems plausible to conclude that crisis in one country is a triggering event to start crisis in the other. In line with this argument, Schwartz (1998) strongly criticises the hypotheses of contagion. She argues that only economies with the problems prone to the crisis would suffer the same fate. Otherwise, a healthy economy is immune from such events. Indeed, her argument sheds light on some recent experiences. As she herself cites that the floating of the Thai baht was not the



only cause of the spread of the crisis in the region during 1997-98. The economies of Indonesia, Malaysia, the Philippines, and Korea had in-built problems which were vulnerable to the event.

Apart from these weaknesses, there are other issues that have not been taken into account. For example, how long is the time lag between the crises? Related to this is the causality and simultaneity of the crises and if the crises are always regional or tend to be global? These issues are yet unresolved. Perhaps, as Frankel and Schmukler (1998) argue that there is no universally accepted definition of the term "contagion". Nevertheless, one can conclude that crisis in one country is a *triggering* event to start crisis in other, provided the other exhibits problems prone to it. This conclusion is in line with Goldstein's (1998) and Shwartz's (1998).

### **3.4 Political Factors**

Many economists, keeping in view the inherent fragility of pegged exchange rates in a world of highly developed global capital markets, suggest the timely government interventions for exchange rate adjustments. The suggestion is that once the objective of pegging an exchange rate, such as price stability, is achieved then necessary steps should be taken to avoid a future run on the currency. Devaluations to correct the exchange rate misalignments, which tend to arise during an exchange rate based stabilisation program, is one such step. Apart from this, consistent monetary and fiscal policies are another requirement for the success of an exchange rate peg.

However, recent experiences have shown that governments have repeatedly failed to undertake the required devaluations and/or shrewd monetary or fiscal policies. Two explanations can be accounted for this failure. First, the existence of 'market euphoria', as discussed in the preceding section, which conceals the necessity of reforms. Second, the political factors that delay the implementation of a stabilisation program or policy reform. Eichengreen and Rose (1999: p. 5) note:

*[T]he failure of governments to adapt policy in a manner consistent with their exchange rate targets is at the heart of many currency crises. This points to the need to study political incentives and constraints on economic policy formulation.*

The political factors can be discussed under the categories of ‘elections and devaluations,’ the phenomenon of ‘war of attrition’, the concept of political instability and deficit bias, and the notion of delegation.

### **3.4.1 Elections and Devaluations**

As mentioned above, devaluations to correct the exchange rate misalignments are usually delayed before elections. A major explanation to this fact is the significant political costs that an incumbent may have to incur by using this policy tool, especially before elections. A popular misalignment is the over valued real exchange rate that tends to arise after an exchange rate based stabilisation program. To correct this misalignment, devaluation is necessary. However, an incumbent is reluctant to undertake this step in fear of being voted out of office.<sup>15</sup> Since an overvalued currency generally means cheap consumer goods and high real urban wages.

Stein and Streb (1999), using a rational political budget cycle model for the open economy, predict that there is a tendency to delay devaluations until after elections. They also provide evidence drawn from the experience of 26 countries in Latin America and the Caribbean in a sample period of 1960 through 1994. Their result provides a striking support to the hypothesis that devaluations are delayed until after presidential and parliamentary elections. Moreover, the same pattern is even stronger when only presidential elections are considered.

Some of the currency collapses in the 1990s were preceded by elections. For example, Turkish lira during the first quarter of 1994— local bodies elections during mid 1993; Mexican peso during 1994-95— presidential elections in 1994; Brazilian real during the first quarter of 1994— presidential elections during mid 1998.

### **3.4.2 War of Attrition**

Yet another channel of delay in reforms is the phenomenon of ‘war of attrition’ between conflicting political groups as modeled by Alesina and Drazen (1991). A typical example to explain this phenomenon is an unsustainable budget deficit. Even though it would be efficient to close down the deficit, a political agreement over this is often not found. This delay in fiscal stabilisation may last until it becomes extremely costly for everybody. The reason in this delay,

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<sup>15</sup> Ploeg (1989).

as suggested by Alesina and Drazen, has to do with asymmetric information among key political figures. That is, who bears the cost of stabilisation?

A focused explanation of this phenomenon through a hypothetical example goes as follows. Consider a coalition government in office that comprises political parties A and B. The senior partner (party A) wishes to minimise a seemingly unsustainable budget deficit through the abandonment of generous pension-related expenditures. Party B, however, does not agree to this, as it is afraid to lose its substantial vote-bank that enjoys the privileges stemming from pension-related expenditures of the government. Thus, party A and party B is locked in a war of attrition and the delay in this stabilisation may carry adverse economic consequences.

In the context of currency crises, the phenomenon of war of attrition is quite suggestive. Since it describes the situation of multiple equilibrium. Given that there is deterioration in (lets say) fiscal balances, the likelihood of a speculative attack increases with the persistence of budget deficit. Recent collapse of the Brazilian real provides a reasonable example of this phenomenon. In spite of numerous warnings, the Brazilian *coalition* government did not reduce its fiscal expenditures. The fiscal imbalances were considerably large enough to warn for a looming crisis, especially after the fall of the Russian ruble in August 1998. The most recent example is the floating of Turkish lira, a repeat of currency crisis after nearly six years. According to preliminary analysis, the reason of the crisis is the row between the Turkish President and the Prime Minister over IMF-backed stabilisation program.<sup>16</sup>

### 3.4.3 Political Instability and Deficit Bias

The concept of 'political instability and deficit bias', as modelled by Alesina and Tabellini (1990), argues that alternating governments disagree over the composition of public spending that give rise to budget deficits. Typically, the deficit bias is stronger the unstable is the political system or the greater is the likelihood of a government change. Empirically, several studies have found positive correlation between political instability and external debt, inefficient tax system, and low growth.<sup>17</sup>

In the context of currency crises, therefore, continuous political instability refers to persistent budget deficits, external debts, low revenues, and low growth rates. All these fundamentals are the leading indicators of currency crises. Indeed, this suggests the effect of political factors

<sup>16</sup> Financial Times, 23 Feb 2001 and The Economist, 22 Feb 2001.

<sup>17</sup> See, Ozler and Tabellini (1991), Cukierman et al. (1992), and Alesina et al. (1992).

directly on economic fundamentals. In fact, what implied here is the indirect effect of political factors on the initiation of a speculative attack *via* various economic fundamentals.

The August 1998 crisis of the Russian ruble provide a prime example of this concept as the decade of 1990s was characterised by frequent changes in Russian governments and prime ministers, a time of political and economic confusion. During 1991-99 there have been seven prime ministers and arguably more than seven governments. These changes were abrupt and untimely giving an impression of great uncertainty. With this level of political instability, it is not surprising to find an overall dismal performance as indicated by very low even negative GDP growth rates (the annual average of GDP growth rates over 1993-98 remained around -5.3 percent), a budget deficit that kept an unsustainable level at an annual average of 6.29 percent of GDP over 1993-98, and external debt that rose from 21.15 percent of GDP in 1993 to 55.75 percent of GDP in 1998.<sup>18</sup>

#### **3.4.4 Delegation**

The notion of 'delegation' means to transfer the power of policy- or decision-making from government to an institution to conduct, for example, restrictive monetary policy.<sup>19</sup> By doing so, an economy can achieve its objective of, for example, low inflation. In the context of currency crises, the advantage of this notion can be understood by considering the example as given in Section 3.4.1 above. Devaluations to correct the exchange rate misalignments are usually delayed before elections. This is due to the significant political costs that an incumbent may have to incur by using this policy tool, especially before elections. A popular misalignment is the overvalued real exchange rate that tends to arise after an exchange rate based stabilisation program. To correct this, devaluation is necessary. However, an incumbent is reluctant in fear of being voted out of office since an overvalued currency means cheap consumer goods and high real urban wages.

In the context of currency crises then by delegating the power to conduct exchange rate policy independently to a central bank, an economy might eliminate any political considerations associated with it. Saqib (2002) argues that it was the shrewd management of the exchange rate policy by the National Bank of Poland (NBP) during the 1990s that defined the immunity of the Polish zloty from currency crises at the height of international financial turbulence amid

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<sup>18</sup> Saqib (2002).

<sup>19</sup> See, Rogoff (1985) for the case of a conservative central bank and Giavazzi and Pagano (1988) for the case of fixed exchange rate system with special reference to European Monetary System experience.

slight weaknesses in the Polish economic fundamentals. This success, he notes, is attributed to the relative independence of the NBP in its conduct of monetary and exchange rate policy.

## **4 Issues in Currency Crises**

The rapidly changing global economic scenario, national or international (political, social, and economic) institutional set ups, and the need to view exchange rate economics beyond the traditional line of thought along with currency collapses have aroused interest in new and old issues. These issues carry a promising direction for the future research, lessons for the current research, and highlight the phenomenon of currency crises. These include, the controversy regarding the facility of an international lender-of-last-resort, the debate on the cross border mobility of capital, and a methodological suggestion for the application of the tools of microstructure finance. Whereas, the former two issues are in vanguard of the current discussion on the proposals of international financial architecture.

### **4.1 Lender-of-Last-Resort**

The intellectual case for a lender-of-last-resort, domestic or international, rests on its ability to provide cash on demand in order to thwart or prevent fully a crisis. The main criticism of this facility remains, according to its opponents, its capability to give rise to the problem of moral hazard. The argument is that the realisation of the availability of cash during the times of instability may exaggerate the moral hazard problem during tranquillity. The proponents of this facility argue that it may thwart a crisis because of its timely action.

Charles Kindleberger, one of the leading proponents of a lender-of-last-resort, in his classic *Manias, Panics, and Crashes* [Kindleberger (1996)] by citing more than two dozen episodes of financial/currency crises advocates the existence and appropriate use of this facility. He emphasises on the irrationality of market stemming from the rationality of individuals as one of the major causes of market crashes. He then proposes a lender-of-last-resort as a therapy for financial/currency crises, in which its role is existent but with doubts. Fischer (1999) while advocating the role of an international lender-of-last-resort suggests a number of reforms in an international context for the better definition and effectiveness of this facility. Furthermore, Rogoff (1999) gives a theoretical argument in support of this facility. He notes that given that the notion of multiple equilibrium in financial/currency crises exists then the disturbance can be

eliminated in the first place with the facility of a lender-of-last-resort, as indicated by Bryant (1980) and Diamond and Dybvig (1983) seminal works.

Anna Schwartz, one of the leading critics of an international lender-of-last-resort, indicates the existence of International Monetary Fund (IMF) as a symbol of market failure, especially in the 1990s when capital markets are deregulated with enormous funds at their disposal. In particular, Schwartz (1999) notes that the IMF is a mere simulacrum of a lender-of-last-resort since it lacks the ability to create high-powered money and its access to other resources is limited. Also, she notes that the general economic conditions in emerging economies are not better off in crisis with the intervention of IMF as international and local investors are the only one to benefit through its action. Furthermore, citing the experiences of the 1990s, Bordo (1999) singles out implicit contracts with the IMF as the major source of the rise of moral hazard and the financial/currency crises. Similarly, Mishkin (1999) sounds a cautionary note on the positive relationship between moral hazard and the facility of international lender-of-last-resort.

Indeed, the role of an international lender-of-last-resort during the 1990s crises has come under harsh criticism. The recent East Asian and the Brazilian crises have revitalised the debate on its need. In the former case, it is because of the wrong policy prescriptions that resulted in the exaggeration of the crisis, and in the latter it is because of the failure to prevent the instability in the first place. Several alternatives are being contemplated which include regional lender-of-last-resort and insurance funds. Nonetheless, the markets closely watch the interaction of an international lender-of-last-resort, the International Monetary Fund, with any country.

## **4.2 Capital Flows**

Following the general trend of the 1980s (which continued well into early 1990s), many developing countries pursued liberal economic policies. This included reduction in trade barriers and opening up of the capital markets. As a result of liberal policies these economies, especially the crisis-affected ones, attracted massive capital inflows. Moreover, two other factors have also played a crucial role in attracting large-scale inflows. First is a good track record of economic growth and the second is the successful implementation of some

stabilisation program or policy reform.<sup>20</sup> These inflows have usually consisted of portfolio and direct investments, fixed-income and privatisation funds, currency loans, bank lending to non-banks, inter-bank lending, and bond issuance. A considerable proportion of these inflows have comprised short-term claims.

For example, the capital inflows to the Brazilian economy stood at \$ 128 billion in 1997 from a total of \$ 43 billion in 1994.<sup>21</sup> This owes to the liberalisation policies of the 1980s and the success of 'plano real' in the mid-1990s. Similarly, Asian-5 [Indonesia, Malaysia, the Philippines, South Korea, and Thailand] economies based upon their good track record of economic growth and liberalisation policies of the late 1980s and early 1990s attracted massive capital inflows. From \$ 40.5 billion in 1994, the net private inflows to these economies soared to \$ 93 billion in 1996.<sup>22</sup>

However, at the onset of nearly all the crises of the 1990s, there had been a sudden reversal of the inflows. At the onset of 1997-98 East Asian crises the long period of inflow abruptly reversed. In 1997 alone there was a net outflow of around \$ 12 billion from the Asian-5 economies.<sup>23</sup> Generally, financial or creditor panics, who usually hold short-term claims, are considered as the driving force behind every crisis. Following this, a strong debate on the cross border mobility of capital has emerged. Some concerned economists and politicians have even suggested extensive capital controls to prevent such flows, the conditions similar to the world of 1960s.

The argument that free mobility of capital is beneficial for the world economy including the developing ones is still mainly an argument. Fischer (1999) notes that there is a dearth of empirical and theoretical investigations that suggests a positive link between the openness of the economy and growth. Nevertheless, he concludes, the consensus among the critics of the mobility of capital remains that eventually the benefits of this activity would result with the reduction in the scale and frequency of financial/currency crises. In order to avoid financial disturbances stemming from the mobility of capital flows, Edwards (1999) suggests the countries to follow sound macroeconomic policies, avoid overly rigid exchange rates, and implement banking supervisory systems that reduce moral hazard and corruption.

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<sup>20</sup> Nevertheless, one cannot overlook the importance of high interest rates as one of the driving forces behind capital inflows.

<sup>21</sup> Saqib (1999).

<sup>22</sup> Radelet and Sachs (1998).

<sup>23</sup> Radelet and Sachs (1998).

### 4.3 Tools of Microstructure Finance: A Methodological Issue<sup>24</sup>

In context of exchange rate determination following the paper of Meese and Rogoff (1983), there is now a growing debate on the link between the exchange rates and macroeconomic fundamentals. The main draw back of the conventional macro approach to the exchange rate determination remains its inability to explain the short-run movements as opposed to its better performance for the long-run relationships. Two explanations are in vanguard. First is the negligence of speculative forces active in the foreign exchange market by the traditional macroeconomic fundamentals. Second the omission of the same fundamentals by the participants of the foreign exchange market in drawing their opinions, especially over the short-run.<sup>25</sup>

Furthermore, lack of empirical evidence for the traditional macroeconomic approaches to the exchange rate determination is also behind this increasing trend. Arguing on the same line, Lyons (2001: p. 5) emphasises on the need of a new approach:

*Does exchange rate economics need a new approach? Yes. Exchange rate economics is in crisis. It is in crisis in the sense that current macroeconomic approaches to exchange rates are empirical failures.*

He then goes on to quote Jeffrey Frankel and Andrew Rose:

*To repeat a central fact of life, there is remarkably little evidence that macroeconomic variables have consistent strong effects on floating exchange rates, except during extraordinary circumstances such as hyperinflations. Such negative findings have led the profession to a certain degree of pessimism vis-à-vis exchange rate research.*

Taylor (1995) in a thorough survey on exchange rate economics, notes the following case for the introduction of microstructure in foreign exchange market:

*[T]he empirical literature as a whole demonstrates that there are often large and persistent movements in exchange rates which are apparently unexplained by the macro fundamentals. One motivation for the emerging literature on market microstructure has been the desire to understand the mechanisms generating these deviations from the fundamentals.*

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<sup>24</sup> See, Frankel, Galli, and Giovannini (eds.) (1996) for a thorough investigation on the microstructure approach to the foreign exchange market.

<sup>25</sup> Flood and Taylor (1996).



Thus, the application of micro finance tools, which take into account the deficiencies of the conventional macro approach, provides a promising course of action in the field of exchange rate economics. A brief description of the microstructure approach to the exchange rate market makes the point more clear.

### The Microstructure Approach

Traditionally, the determination of exchange rates has been through the goods or asset market approach with exchange rate depending upon the macroeconomic fundamentals, for example interest rates, money supply etceteras. The microstructure approach may incorporate both micro and macro variables. Consider the following equation:<sup>26</sup>

$$\Delta P_t = f(i, m, \dots) + g(Q, I, \dots) + \varepsilon_t \quad (3.1)$$

$\Delta P_t$ : change in the nominal exchange rate

$f(\ )$ : macro determinants (interest rate, money supply, ...)

$g(\ )$ : micro determinants (order flow, inventory, ...)

$\varepsilon_t$ : stochastic term

Recall that there are two main drawbacks of the conventional macro approach to the exchange rate over the short run. First, its inability to take into account of the forces of speculation active in the foreign exchange markets. Second, omission of the traditional macroeconomic fundamentals by the participant of the foreign exchange markets in drawing their opinions. To a certain extent these deficiencies are covered in equation (3.1). The micro variables, order flow and inventory, in equation (3.1) can reveal the private information of the foreign exchange market participants.

In case of order flow, the counter-party either purchases at dealer's offer (signified by a positive sign); or sells at dealer's bid (signified by a negative sign). A positive or negative sign then signifies the direction of the market and the revelation of the private information, that is, the preferences of the agents. Inventory, on the other hand, is a measure of dealer net positions. A dealer may reduce his position, if more than desired, by shedding his bid and offering downward to initiate counter-party's purchase. In this way the private information of the dealers and agents and hence the speculative forces are taken into account. This is in addition to the

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<sup>26</sup> Evans and Lyons (1999).

public information, which is revealed by the traditional macroeconomic fundamentals.<sup>27</sup> Lyons (2001) and Evans and Lyons (1999) estimate the portfolio shifts model using data on DM/\$ and ¥/\$ exchange rates to determine change in exchange rates with and without order flow. Their results show a significant increase in the explanatory power of the regressions after incorporating order flow.

## 5 Final Remarks: How Much Do We Know?

It is interesting to note the narration of events that led to the Exchange Rate Mechanism crisis of 1992 by a prominent currency speculator George Soros:<sup>28</sup>

*European Exchange Rate Mechanism ... was near-equilibrium system, about as good as an exchange rate mechanism can get ... Then came the collapse of the Soviet Union and the reunification of Germany ... system was thrown into a dynamic disequilibrium ... According to my theory, every exchange rate regime is flawed ... flaw was that the Bundesbank played a dual role in the system: It was both the anchor of the ERM and the constitutional protector of the stability of the German currency ... the reunification of Germany ... created a conflict between the two roles of the Bundesbank ... tremendous injection of capital from West Germany into East Germany ... inflationary pressures within the German economy ... [constitution-bound Bundesbank] counteract by pushing up the interest rates ... when Europe in general, and Britain in particular ... depths of recession ... other conflicts exacerbated the situation ... [in particular, three] conflicts ... that Germany needed a different monetary policy than rest of the Europe ... that the Bundesbank advocated a different fiscal policy for Germany than the one that Chancellor Kohl actually adopted ... that the Bundesbank was fighting for its institutional survival ... The conflicts simmered for a while ... after all reunification occurred in 1990 and the crisis came to a head only in 1992 ... first hint from Bundesbank President Schlesinger in a speech ... investors were making mistake ... [if they] thought of the ECU (European Currency Unit) as fixed basket of currencies ... [after speech in private conversation] liked [ECU] as a concept [not the name] ... preferred it if it were called the mark ... I got the message ... the Italian lira was forced out of the Exchange Rate Mechanism shortly thereafter ... a clear sign that sterling was also vulnerable ... The climax was finally reached when the British government increased the interest rate by 2 percent in order to defend sterling ... an act of desperation ... British position was untenable ... encouraged us to continue selling sterling even more aggressively ... That was the end.*

The narration is quite suggestive since, as noted by Corsetti et al. (2001), the presence of a large currency speculator can increase a country's vulnerability to a crisis and make other

<sup>27</sup> Evans and Lyons (1999) and Lyons (2001).

<sup>28</sup> Soros et al. (1995: pp. 79-82). George Soros runs one of the famous big funds, Quantum, in the world ["Hedge Funds: A Guide", *The Economist*, October 3rd 1998].

investors more aggressive in their position-taking. Furthermore, it summarises the discussion of this paper. The narrator's praise for the mechanism, "*near-equilibrium system, as good as an exchange rate mechanism can get*", in the beginning signifies the notion of market euphoria. Indeed, the European Monetary System (EMS) including the "New EMS" grew and prospered during 1979 and 1987 and then during 1987 to 1990. It was the demise of the Soviet Union and the fall of the Berlin wall that attracted the attention of investors for profit opportunities.

Secondly, the interest rate hike by the German government to counteract inflationary pressures within the German economy at a time when Europe in general and Britain in particular were experiencing recessionary trends is in accordance with the main predictions of the traditional models of currency crises, the determinants of crises. Clearly, high *inflation* and *interest rates*, and the recessionary trends that imply low *growth rates* signify the deterioration of economic fundamentals.

Thirdly, the aforementioned events single out the political factors as defining forces that undermined the Exchange Rate Mechanism, which eventually led to the crisis. In the first place is the action of *constitution-bound* Bundesbank that had to counteract the inflationary pressures within Germany when circumstances were adverse for Europe. Then there were three conflicts: (i) Germany needed a different monetary policy than rest of the Europe; (ii) Bundesbank advocated different fiscal policy than Chancellor Kohl; and (iii) Bundesbank was fighting for its institutional survival. These three conflicts signify the situation of multiple equilibrium, which George Soros refer to as dynamic disequilibrium. As he notes, "*conflicts simmered for a while*", that is, the situation presented multiple equilibrium for almost two years, reunification of Germany in 1990 to crisis in 1992. It is not surprising then, when the mechanism converges to crisis equilibrium after the speech of the Bundesbank's President.

Finally, the contagion phenomenon is reflected in the sequence of initial attack on Italian lira and then English sterling. Agreeably, the contagion in ERM crisis can be termed as fundamental contagion. Hence, the narration provides real-time evidence to the discussed features of this review.

However, in the above narration, there is no mention of capital inflows and abrupt outflows and the action of any lender-of-last-resort. Indeed, it does not mean that the unmentioned features are not significant? Rather it is due to their insignificance as long as the events of the above narration are concerned. These features are, nonetheless, more associated with the emerging

economies. Furthermore, the events do have a strong hint of explanation through the tools of microstructure finance. Since, they carry a substantial element of non-economic factors.

### **Pure-Fix and Pure-Flexible Extremes**

Moreover, one part of the above narration by George Soros is highly thought provoking: *“According to my theory, every exchange rate regime is flawed”*. It is easier to analyse this claim in extreme cases of pure-fix and pure-flexible exchange rates where there are (at least in theory) nearly zero expectations of devaluation.

A pure-fixed exchange rate regime is defined as one in which the authorities stand ready to exchange foreign currency for the domestic one at the predetermined price, such as Currency Board Arrangement short of dollarisation. The authorities are supposed to remain committed to the predetermined price irrespective of other developments, losing their control over monetary policy. Now, consider an economy that commits to pure-fixed exchange rate regime through aforementioned Currency Board Arrangement. Assuming that after a considerable passage of time the economy finds itself in disequilibrium conditions. Consequently, it may require expansionary monetary policy. It is precisely at this point that the exchange rate enters multiple equilibrium of crisis where the commitment of the authorities becomes crucial. Moreover, there are expectations that the exchange rate regime might be changed, for example exit from a Currency Board Arrangement. Also, if the authorities' balance sheet comprises domestic currency and foreign currency assets and liabilities (which is the case in this arrangement), there is always a risk of solvency.<sup>29</sup>

A pure-flexible exchange rate regime, on the other extreme, is defined as one in which the authorities sets monetary policy exogenously and independently of any exchange rate developments. The authorities are not supposed to influence exchange rate irrespective of large variations or swings, zero intervention in the foreign exchange market. However, in practice countries that label themselves as free-floaters in fact suffer from “fear of floating”, the fact that countries with exchange rate regimes classified as flexible maintain exchange rates within a narrow band with respect to some anchor currency.<sup>30</sup> This intervention of the authorities induces expectations about the potential devaluation of the currency. Thus, under favorable circumstances for devaluation investors might take positions.

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<sup>29</sup> Caprio et al. (1996).

<sup>30</sup> Calvo and Reinhart (2000).

Krugman (1997), while contemplating on how to prevent the currency crises notes that the main point of the second-generation models should be restated as the real cause of currency crises being the suspicion of financial markets on what you *want* to do and not what you are actually doing. In line with this observation, the discussion of this review is quite suggestive. It indicates the dynamics of the processes that give rise to the situation of multiple equilibrium. A brief review of each feature strengthens this hypothesis.

The main contribution of the traditional models of currency crises is the identification of certain economic fundamentals whose variation in a certain trend may help to foresee a potential crisis. However, the apparent confusion of these models to explain a currency crash is due to the lack of agreement on the exact identification of fundamentals. A greater deterioration of fiscal balances supports the predictions of the first-generation models. On the other hand, a greater deterioration of non-fiscal balances supports the second-generation line of approach. Nevertheless, there exists a general consensus that fundamental's imbalances do precede a crash. Thus, a question may arise as to why there is inconsistency that results in adverse fundamentals, or how well the authorities are committed to the exchange rate regime? Thus, the major answer to this question lies in certain factors that undermine the sustainability of an exchange rate peg. These factors, as discussed, are the notion of market euphoria, political factors (elections and devaluations, war of attrition, political instability and deficit bias, delegation), facility of a lender-of-last-resort, and the phenomenon of contagion. Massive capital inflows and their abrupt outflows at the onset of crisis is evidence to these forces. Furthermore, tools of microstructure finance (order flow and inventory) can play a significant role in measuring these (mainly) non-economic factors.

There is a broad consensus that a currency crash is a result of inconsistent policies with regard to the internal and external objectives of the authorities. As a result of inconsistent policies in several cases, deterioration of fundamentals has predicted the outcome. Therefore, the task involved is to understand the political processes that lead to the inconsistencies of policies, make the conditions favourable for, and determine the timing of any speculative attack. In other words, the current literature lacks a model that bridges the gap between the economic and non-economic determinants of currency crises.

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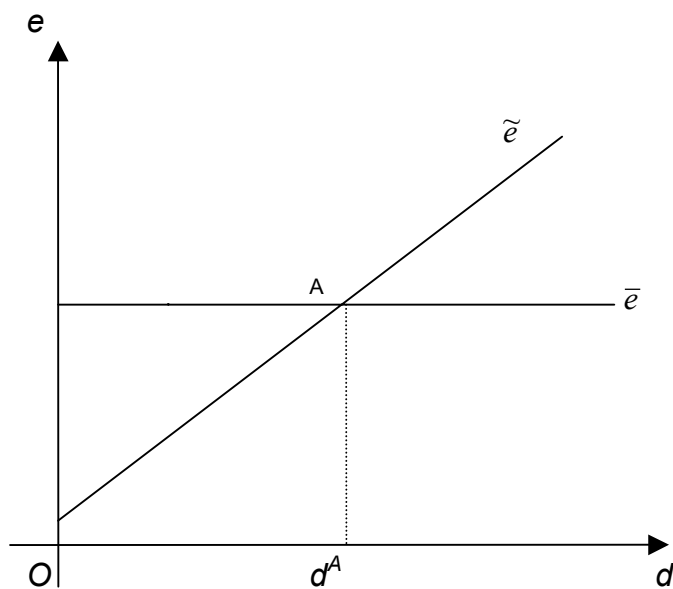
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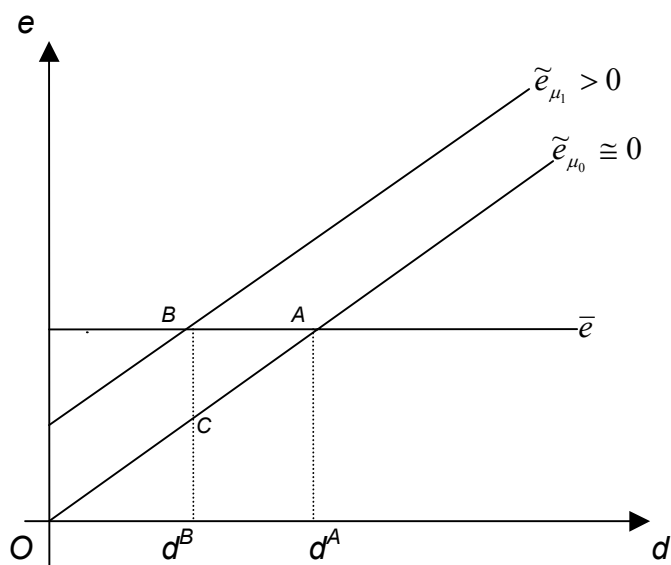


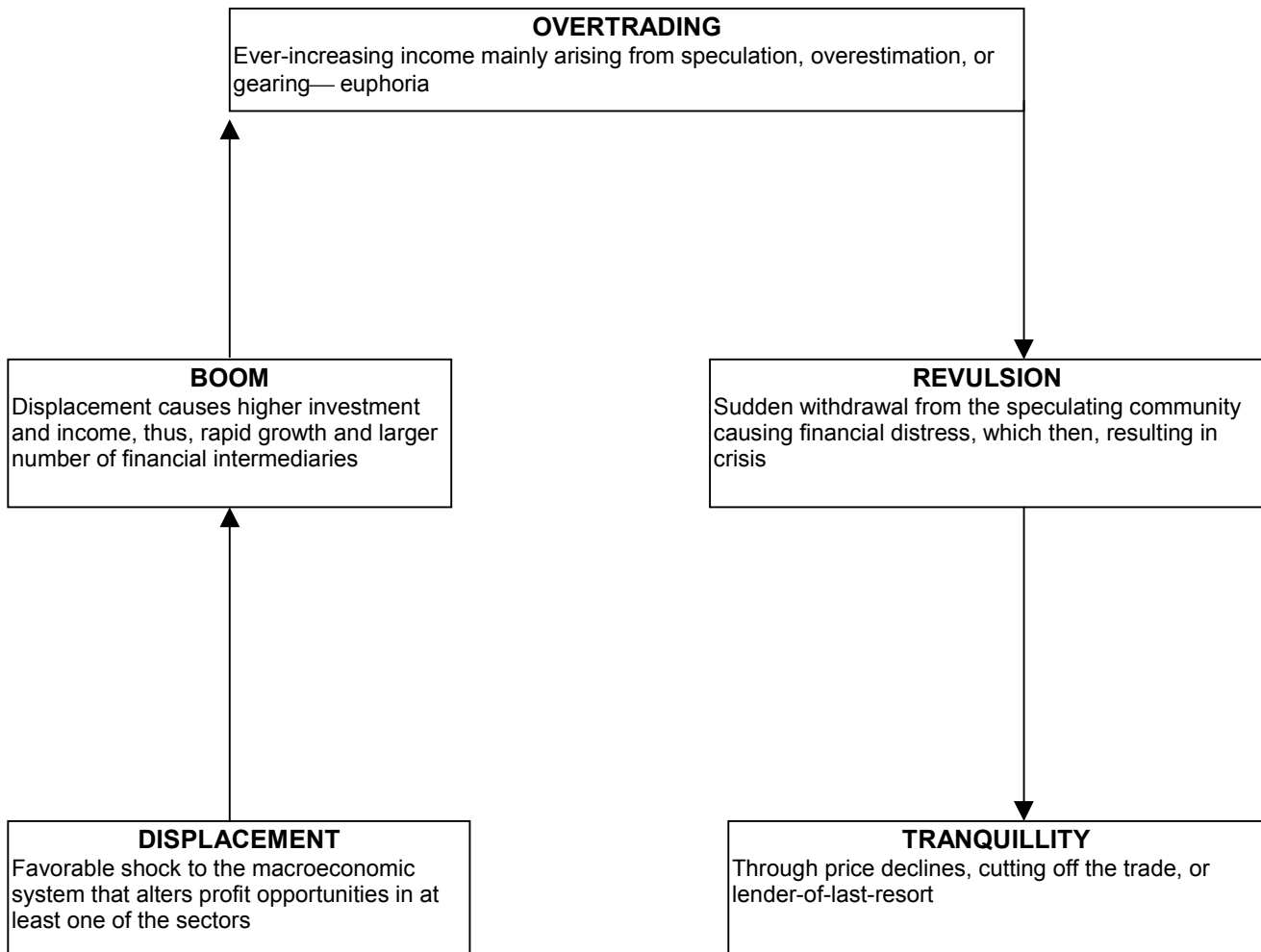
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**Figure 2.1: Attack time in a First-Generation Model**



**Figure 2.2: Extension of First-Generation Model with Multiple Equilibrium**



**Figure 2.3: Kindleberger-Minsky View of a Typical Financial Crisis**

**Table 3.1 Indicators of Currency Crises: Single-Country Literature**

<b>Study</b>	<b>Indicator(s)</b>	<b>Comments</b>
Blanco and Garber (1986) [Mexico, 1973-1982]	(1) Domestic credit growth	Very significant
Cumby and Van Wijnbergen (1989) [Argentina, 1978-1981]	(1) Domestic credit growth	Very significant
Goldberg (1994) [Mexico, 1980-1986]	(1) Domestic credit growth; (2) Exchange rate misalignments; (3) Relative prices; (4) External credit; (5) Demand for money	Very significant: (1), (2); Significant: (3), (4), (5)
Pazarbaşıoğlu and Ötker (1997) [Mexico, 1982-1994]	(1) Domestic credit; (2) Real exchange rate; (3) Foreign reserves; (4) Real output growth; (5) Inflation differential; (6) Expansionary monetary and fiscal policies	Very significant
Ötker and Pazarbaşıoğlu (1997) [1992-1993 ERM crisis: Belgium, Denmark, France, Ireland, Italy, Spain]	(1) Domestic credit; (2) Budget deficit; (3) Unemployment rate; (4) Foreign price level	Significant: (1)-(4) for all except Denmark

**Table 3.2 Indicators of Currency Crises: Multi-Country Literature**

Study	Indicators	Comments
Frankel and Rose (1996) [Over 100 countries, 1971-1992]	(1) Debt composition [commercial bank, concessional, variable-rate, short-term, FDI, Public sector]; (2) External variables [international reserves to monthly imports, current account, external debt, real exchange rate]; (3) Domestic macroeconomic variables [government budget, domestic credit growth, real output per capita growth]; (4) Foreign interest rate; (5) Developed countries growth rate	Significant: FDI, international reserves, domestic credit growth, foreign interest rate, real exchange rate; Not significant: government budget, current account
Klein and Marion (1997) [17 countries, 1957-1990]	(1) Macroeconomic variables [real exchange rate, net foreign assets, multiple exchange rate]; (2) Structural factors [openness, geographical trade concentration]; (3) Political factors [executive transfers, coups]	Significant: real exchange rate, openness, geographical trade concentration, executive transfer
Esquivel and Larraín (1998) [30 countries, 1975-1996]	(1) Seignorage; (2) Current account balance; (3) Terms of trade shock; (4) Real exchange rate; M2/Reserves; (5) Per capita income growth; (6) Contagion effects	Significant: seignorage, real exchange rate, terms of trade shocks, contagion, current account balance, international reserves, income growth
Kaminsky, Lizondo, Reinhart (1998) [20 countries, 1970-1995]	(1) International reserves; (2) Domestic credit; (3) Domestic inflation; (4) Real exchange rate; (5) Credit to public sector; (6) Trade balance; (7) Money growth; (8) Fiscal deficit; (9) Export performance; (10) Real GDP growth	Very significant: (1)-(5); Significant: (6)-(10)