Contagion in Currency Markets: What do we mean?[1]

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1 Introduction

In the past 8 years international financial markets have weathered 3 major financial market crises; the European Exchange Rate Mechanism (ERM) crisis of 1992, the Mexican peso crisis of 1994 and the current East Asian crisis beginning in mid-1997. In each of these instances the extent of exchange rate volatility has sprung into the limelight and provoked a flurry of research into understanding the causes of such crises. In discussions of the most recent crisis there have also been frequent references to contagion of the crisis between markets. Examples include the IMF (1998a,1998b), the Reserve Bank of Australia (1998), the popular press and academic literature (Krugman (1998), Glick and Rose (1998)).

However, the majority of this literature uses the term contagion loosely. There has been little attempt to formalise what is meant by contagion, or quantify its impact. The dictionary definition of contagion is "the transmission of disease by contact"[2], coming from the Latin *con*, meaning with, and *tangere*, meaning touch. Contagion in its true sense relates purely to the spread of the disease, and in the currency crisis literature the term can be used only as a metaphorical allegory. Given the lack of clarity over contagion in the literature it is interesting to note that sociology warns that confusion may result from assigning literal theories to metaphorical constructs (Berk (1974:p.16).

The existing literature has paid little attention to the definition of contagion, with a few notable exceptions (Eichengreen, Rose and Wyplosz (1995,1996a,1996b), Lowell, Neu and Tong (1998), Dungey and Martin (1998)). Most authors use the term

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[2] Concise Oxford Dictionary

to describe various aspects of the spread of financial crises, without specifying the vectors, or means, of that contagion. Further, most of the literature is concerned with contagion only during periods of financial crisis. If the medical metaphor is taken more seriously then it should be evident that contagion can occur in non-crisis situations as well – that is, a disease can be transmitted without an accompanying epidemic. Contagion may be more evident during a period of crisis, but should also be evident in non-crisis periods. However, most of the existing literature is theoretical or discursive and based on the literature on currency crises.

In this paper I examine the development of the literature on contagion beginning with a short overview of models of currency crisis in Section 2. Section 3 considers the existing work on contagion. It examines and contrasts the empirical results of Eichengreen, Rose and Wyplosz (1995, 1996a, 1996b), Lowell, Neu and Tong (1998) and Dungey and Martin (1998). A reconciliation of this literature is provided in Section 4; followed by Section 5 which concludes and summarises.

2 Currency Crises

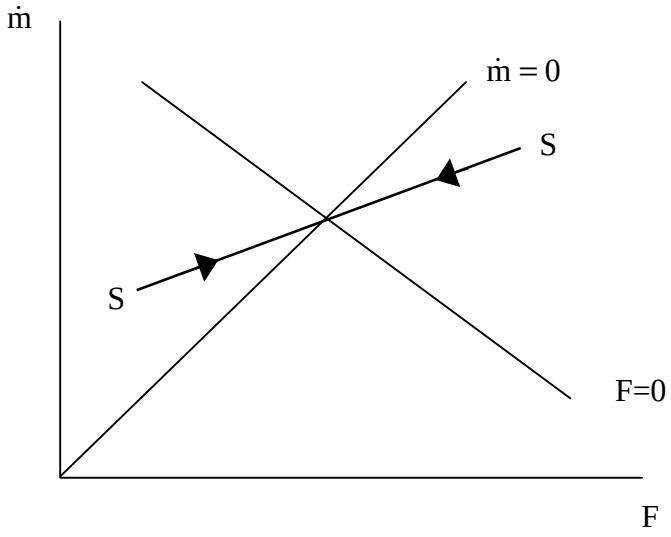
Models of currency crisis can be divided into two types; first generation models associated with Krugman (1979) and second generation models of which the most usual example is Obstfeld (1986). A good overview of the this literature and the more recent examples of currency crisis theories provoked by the East Asian currency crisis can be found in Flood and Marion (1998). The following provides a brief overview of the Krugman first generation model and some discussion of second generation models.

2.1 First generation – the Krugman (1979) model

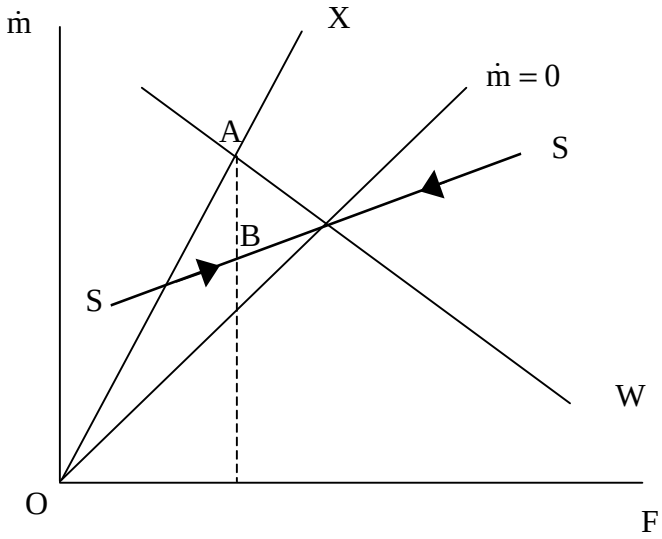
First generation models are designed to explain currency crises in a fixed exchange rate regime, where the breakdown is modelled as a balance of payments crisis. A fixed exchange rate regime is defended against speculative attacks, but is ultimately unsustainable due to the exhaustion of foreign exchange reserves. For simplicity Krugman assumes that the peg is maintained by direct intervention in the foreign exchange market. The important contribution of this article is to show how a

speculative attack on a fixed exchange rate may represent rational investor behaviour well before foreign exchange reserves are exhausted.

Graph 1: figure 2 from Krugman (1979)



Graph 2: figure 4 from Krugman (1979)



Consider the following system. The exchange rate is represented using absolute purchasing power parity, s=P/P*, where s is the exchange rate expressed as units of domestic currency per unit of foreign currency, (a rise in the exchange rate represents a depreciation of the domestic currency) and domestic authorities defend a particular nominal exchange rate using foreign exchange reserves. There are two types of investors in the model; domestic investors who hold both domestic (m=M/P where M

is the nominal money supply) and foreign (F) money assets and foreign investors who do not hold domestic money. The domestic investors are interested in acquiring more overseas assets as their wealth increases, and hence the domestic authorities run down reserves to accommodate this choice.

In a floating exchange rate regime the mix of foreign and domestic assets held by the domestic investor will be given by the intersection between a curve representing a stable real money supply ($\dot{m} = 0$) and stable supply of foreign assets (F=0). Graph 1 shows these curves in (m,F) space. The dynamics of this system are such that there is only one sustainable path given by the curve SS (see Krugman (1979) for details). As there is only one stable path the standard solution for this type of problem applies, and the exchange rate is allowed to jump to gain the stable solution. (See Leonard and Long (1992) for further details on solutions to dynamic systems.) In graph 2, the domestic investors are on the expansion path OX, representing their desire for increasing m and F assets. In a fixed exchange rate regime the intersection of this curve with the wealth curve, W, representing the current state of wealth in the economy, will give the mix of portfolio assets chosen within the fixed rate regime.

The addition of the curve SS, the stable path solution for the floating exchange rate system, to graph 2 helps to explain behaviour when a fixed exchange rate regime breaks down, and why speculative attacks may occur. Under the fixed exchange rate regime the economy is moving along OX accumulating both domestic and foreign assets as wealth increases, and consequently running down reserves. At some point reserves are suddenly depleted and the economy must attain floating regime equilibrium. To achieve this m must jump suddenly (from A to B) which can only be achieved by a jump in the price level, given a fixed short–run nominal money supply. As the exchange rate is determined by purchasing power parity, this implies a sudden depreciation of the local currency. The sudden rise in the price level has decreased the value of the investor's portfolios. Consequently, if the exhaustion of reserves can be forseen, investors will have an incentive to accelerate the process of transferring their portfolios to foreign assets to avoid this loss. This process results in a speculative attack and pressurises the exchange rate prior to the exhaustion of reserves. Further, if there is uncertainty about the extent of reserves, or the commitment of authorities to sustaining intervention, then bouts of speculative attacks and recovery may be

observed. Speculative attacks will be temporarily ended by the commitment of extra reserves, but ultimately will continue until the exchange rate target is abandoned. A key point in Krugman's argument is that this process can be fuelled further by Government policy running budget deficits. Once foreign exchange reserves are exhausted increased Government expenditure can only be funded by nominal money supply growth, and hence increasing domestic prices. This point became a keystone in later studies attempting to identify macroeconomic indicators consistent with currency crises in empirical work.

2.2 Second generation – multiple equilibria models

Second generation models were also primarily designed to explain crises in fixed exchange rate regimes. However, the principles involved can more easily be related directly to the problems observed in floating exchange rate regimes. These models essentially concern the existence of multiple equilibria in the market. To make this point more poignant, the problem that these models are often set up to analyse is that of a policy trade off problem inherent in macro regimes. That is, although policy makers may recongise that in the long run the current stance of policy (such as an expansionary fiscal policy) is not sustainable and will cause macroeconomic instability such as a currency crisis, in the short-run the policy delivers benefits to the economy. It may be difficult to implement an adjustment mechanism to transfer the economy to a more sustainable policy platform.

An important feature of the second generation models is that they usually establish the mulitple equilibria through the inclusion of one or more non-linearities in model behaviour, particularly on the part of government authorities (Flood and Marion (1998)). The models classified in this stream of literature include information cascades, information asymmetry and policy rules with escape clauses (such as devaluing the currency). These will not be detailed here, but the interested reader is referred to Flood and Marion (1998) for a good overview.

Krugman (1998) has recently suggested that a third generation of currency crisis literature has now developed. His hypothesis is that the focus on speculative bubble models and hazard models of currency crises (canvassed in Radelet and Sachs

(1998b)) represents a new direction in this literature, deserving of new categorisation. However, as yet, there is little evidence of a consensus on this issue in the literature.

2.3 Modern Crisis literature

In response to the Mexican peso crisis and the recent East Asian crisis there has been a renewed spate of literature on the origins of currency crises. Most of the recent literature focuses on discussions of the issues raised about the causes of the crisis (Corsetti, Pesenti and Roubini (1998a,1998b), Radelet and Sachs (1998a, 1998b)) while some develop theoretical models along the lines of second generation models (Edwards (1998)). A few of these papers examine crises empirically and these have focussed on the role of macroeconomic and sociopolitical fundamentals in determining crises, as indicated by the theoretical literature (Sachs, Tornell and Velasco (1996), Frankel and Rose (1996), Glick and Rueven (1998)). Some general conclusions are that poor banking systems, high domestic credit growth and poor macroeconomic fundamentals are most commonly associated with crises.

A useful aspect of the modern literature is the growth in taxonomies of crisis. Despite the fact that we may often not be able to distinguish different types of crisis empirically we now recognise more than one type. For example, Radelet and Sachs (1998b) consider five types of crisis, which encompass and extend the first and second generation literature outline above. Importantly, the types are not mutually exclusive, and probably not exhaustive. The five types of crisis identified by Radelet and Sachs are: (i) Macroeconomic policy induced, as per Krugman (1979); (ii) Financial Panic, where multiple equilibria may be in evidence; (iii) Bubble Collapse, when speculators purchase above some fundamental value of the asset, with the full knowledge that a collapse in prices is expected at some future unknown time; (iv) Moral Hazard Crisis, which result when financial institutions have some implicit or explicit public guarantee; and (v) Disorderly Workout when a ‘credit grab race’ results from the lack of an orderly process for dealing with illiquid or insolvent firms. Four features of crises can then be used to differentiate these types of crises. Each of the crises differs in the degree to which it is anticipated, whether it destroys real economic value, whether it involves mostly officially backed debtors and whether there is a case for official intervention. Table 1 shows this information in more detail. Almost all crises can be anticipated in this taxonomy, with the exception of financial

panic. The role of official intervention is limited in the case of two types of crises, those induced by moral hazard or bubble collapse, both of which are also relatively non-destructive in terms of economic activity. On the other hand official intervention in the form of better public institutions or policy may be helpful in avoiding or ameliorating crises created by financial panics or disorderly workout as well as crises induced by inappropriate policy stance.

Table 1: Distinguishing among Financial Crises

adapted from Radelet and Sachs (1998) Table 1

feature → **crisis type ↓**	**anticipated?**	**destroys real activity?**	**lending with moral hazard?**	**support official intervention?**
policy induced	high	not necessarily	no	macro adjustment
financial panic	low	high	not necessarily	lender of last resort
bubble collapse	know its probable	low	high	no
moral hazard	high	low	low	no
disorderly workout	high	high	high	public institutions

The currency crisis literature is reasonably well developed. However, the issue of how crises are transmitted from one economy to another is less well explored. In most of the literature surrounding the East Asian crisis contagion has been mentioned as major concern, but little attempt has been made to define what is meant by contagion. The following section canvasses the literature which has examined this issue, and in particular focuses on those studies which have attempted to quantify the impact of contagion in various currency crises.

3 Contagion Studies

There is relatively little empirical work which specifically examines contagion in currency crises. Eichengreen, Rose and Wyplosz (1995, 1996a, 1996b) conducted a

series of studies on contagion and provide the first definition of contagion in this market. Their definition is characterised by the fact that contagion between economies does not have to be observed to be in existence. In contrast, Lowell, Neu and Tong (1998) define the existence of contagion through the observation of overlapping crises, and examine the properties of several currency crisis episodes. Finally, Dungey and Martin (1998) consider contagion through observed volatility transfer between currencies and divide it into two types; fixed contagion, resulting from the common response currencies may have to a shock and variable contagion, relating to individual currency responses. This section of the paper considers each of these studies and contrasts both their definitions and empirical results on contagion.

3.1 The Probability of a Currency Crisis

Eichengreen, Rose and Wyplosz (1995,1996a,1996b) conduct the first systematic study of contagion in currency crises. This work established the precedent of allowing the observed data to determine the appropriate crisis periods, rather than previous ad hoc studies of particular time periods. The cornerstone of this choice is an index of speculative pressure on the exchange rate. This index is made up of a weighted average of changes in exchange rates, interest rates and holdings of international reserves relative to some numeraire country. The exchange market pressure index (EMP) is defined as:

$$EMP_{i,t} = \alpha\%\Delta e_{i,t} + \beta\Delta(i_{i,t}-i_{0,t}) + \gamma(\%\Delta r_{i,t}-\%\Delta r_{0,t})$$

where e_i is the exchange rate of currency i against the numeraire, 0; i_i is the interest rate in country i, and r_i is the ratio of reserves to money supply in country i (Eichengreen et al use a ratio of reserves to M1). Using the EMP index a crisis is defined as a bivariate variable,

$$\text{Crisis} = 1 \text{ if } EMP_{i,t} > 1.5\ \sigma_{EMP} + \overline{EMP}$$
$$= 0 \text{ otherwise}$$

where σ^2_{EMP} is the variance of EMP and $\overline{EMP}$ is the mean. The definition of a crisis period is obviously sensitive to the relative weighting of the variance in the crisis index and the choice of weighting parameters (α,β and γ) in constructing the EMP.

Eichengreen et al conduct sensitivity analysis on the choice of weighting parameters, but settle for weighting by variances, so that the volatility of each component is equalised.

Using a selection of macroeconomic and political variables Eichengreen et al attempt to discover which fundamentals are associated with currency crises. They hypothesise that contagion is consistent with a non-zero impact of foreign crises on the probability of a domestic currency crisis. Hence, they capture effects of contagion which do not manifest themselves as a currency crisis. The estimation is of the form:

$$Crisis_{i,t} = \omega D(Crisis_{j,t}) + \lambda\, I(L)_{i.t} + \varepsilon_{i,t} \qquad i \neq j$$

where L is the set of fundamentals and ε_i is a random error term. Contagion is consistent with $\omega \neq 0$. The results of this estimation find evidence in support of contagion, with the increase in probability of a crisis in country i of almost 8% when there is a currency crisis elsewhere.

There are several shortcomings in this approach. The first of these is the *ad hoc* selection of fundamental variables, which decreases the possibility of predicting future crises using this analysis. The second weakness is that the contagion is investigated only under a crisis situation, although it should be possible to conduct the analysis as a spillover effect for non-crisis periods.

3.2 A Taxonomy of Contagion

Lowell, Neu and Tong (1998) also investigate contagion as a phenomenon of currency crises using an ad hoc selection of macroeconomic fundamental variables as explanators. In this work a crisis is defined as a period of 'excess' volatility in markets, defined as a movement outside a two standard deviation band on the mean movement. Lowell, Neu and Tong put forward three reasons why crises may occur contemporaneously in different markets: coincidence, a common external shock and a loss of confidence due to an external financial crisis. They demonstrate by example that the probability of independent contemporaneous currency crises is extremely low, and hence define contagion by the existence of overlapping crises. In this respect, Lowell et al expand on previous work by Edwards (1998) who incorporates a time delay aspect to modelling contagion. In the Eichengreen et al studies the impact of

crises on each other occurred contemporaneously; Lowell et al incorporate a trigger event and its effects in later periods on other markets.

Lowell et al hypothesise four different theoretical descriptions for the transmission of volatility or contagion. This taxonomy of contagion seems to be unique to the literature, although as with the Radelet and Sachs taxonomy of crises outlined in Section 2.3, the categories are not mutually exclusive and may not be exhaustive.

The first model of contagion Lowell et al put forward is the economic linkages model. In this model a crisis in one country affects fundamentals in another. The most common example of this in the literature has been in trade effects. Consider the East Asian crisis: when the Thai baht depreciated this had a direct terms of trade effect on the export-competing markets of Malaysia and Indonesia and put pressure on their currencies, leading to a competitive devaluation. The impact of trade effects has been shown in the literature in Sachs, Tornell and Velasco (1996) and more recently Glick and Rose (1998). The importance of this link has led rise to a dichotomy between schools of thought on the East Asian crisis, with one group holding that the rapid escalation of the crisis is due to fundamental links while the other group attribute it to a rapid change in expectations (Corsetti, Pesenti and Roubini (1998a)).

The hypothesis of a sudden change in expectations as a cause of contagion (put forward in Radelet and Sachs (1998b) for example) is an example of Lowell et al's second model of contagion, the heightened awareness model. In this model the economic fundamentals have not changed from the pre-crisis to crisis period, but investors suddenly become sensitive to a particular policy issue and withdraw funds on that basis. Examples of this type of behaviour include the focus on banking systems in the East Asian crisis and on current account deficits in the Mexican peso crisis.

The third model of contagion is the portfolio adjustment model. This model is related to modern financial investment management patterns, and to some extent is relevant to the recent calls for reform of the international financial sector (RBA(1998)). The portfolio adjustment model argues that many portfolios are 'grouped' in sets of assets which are similar to some degree (such as 'Asian Tigers'). The portfolio groups cannot be cross subsidised from other portfolios during times of crisis. If one currency

(asset) in a portfolio devalues sharply, and the portfolio has liabilities to meet, those obligations will result in the withdrawal of funds from some other asset in the portfolio. If, as Lowell et al postulate, there are sufficient funds of similar structure, then a crisis in one country, may cause a sufficient rundown in funds in another country to cause a crisis there. Lowell et al present empirical evidence of contagion in East Asian and Mexico to support this case. The problem has also been referred to by the IMF (1998a, 1998b). This problem could be much reduced if there was more diversification in the portfolios offered by international investment companies or if cross-subsidisation were allowed, although both of these solutions suffer from well-known incentive problems.

The final model of contagion is herd behaviour where movements in portfolios occur in response to the perceived actions of investors. Herd behaviour differs from the heightened awareness model because it does not necessarily involve weak fundamentals, but is based purely on perceptions.

Many of the current usages of contagion in the discussion of currency crises can be categorised into these four streams: economic linkages, heightened awareness, portfolio adjustment or herd behaviour. However, these are not uncontentious. The Reserve Bank of Australia, for example, does not consider economic linkages as a means of contagion, but rather as a separate feature of currency markets in itself (RBA (1998)).

Radelet and Sachs have provided us with a taxonomy of currency crises and the possibility of predicting and preventing crises on this basis (Table 1). Lowell et al provide a similar breakdown for contagion; Table 2 breaks down the four models of contagion by predicability and preventability.

The economic linkages model should be easily predictable, as the linkages will be well known. However, it will be difficult to prevent a crisis transmitted this way, as the linkages are generally not short-term in nature. Transmission by heightened awareness may be more preventable. Under this model contagion occurs through countries with similar fundamentals, so that contagion may be predictable by examining the fundamentals of the economy in crisis (although it is never clear in advance which fundamentals will be the focus of the market). The keys to prevention

of contagion by heightened awareness are good fundamentals and readily available good quality information on the state of the economy. Better information may also be helpful in preventing contagion through herd behaviour. Lowell et al hypothesise that economies are at greater risk of both herd behaviour and portfolio adjustment contagion in the presence of relatively unsophisticated investors. Portfolio adjustment contagion may be more predictable than herd behaviour in the presence of knowledge about the structure of international portfolios, but given the nature of international capital markets, prevention of contagion through this avenue seems difficult.

Table 2: Predictability and Preventability of Contagion

adapted from Lowell, Tong and Neu (1998)

model →	**economic linkages**	**heightened awareness**	**portfolio adjustment**	**herd behaviour**
predictability	good	fair	good	fair
preventability	poor	good	poor	fair

Lowell et al use this taxonomy to present a detailed examination of currency crises since the 1970s. They present estimates of the impact of 'trigger' events on other countries in crisis contemporaneously and hypothesise about the means of transmission on the basis of individual crisis characteristics. The fundamentals they use in this analysis are, as per the Eichengreen et al studies, chosen on an ad hoc basis, although with some justification from observation and theory. Despite this empirical work, neither Lowell et al nor Eichengreen et al quantify the impact of contagion on individual currencies. The issue of what proportion of volatility arises from contagion during a crisis is not addressed in these studies. This is the focus in Dungey and Martin (1998).

3.3 Quantifying the Impact of Contagion

In common with Lowell et al, Dungey and Martin (1998) also define contagion in terms of volatility. Contagion is identified through the transfer of volatility across markets. This encompasses the Lowell et al definition, but misses some of the

richness of the Eichengreen et al definition. However, unlike the other studies, contagion is not confined to crisis periods in Dungey and Martin. Instead high frequency data is used to analyse the transfer of volatility between markets across various periods. This is possible because the model of exchange rate volatility has a latent factor structure – there is no selection of appropriate variables to represent the impact of fundamentals on the currency crisis. While this has the advantage of a more flexible structure, it results in an arbitrary choice of crisis and non-crisis periods compared with the Eichengreen et al approach, and does not aid in determining early indicators of currency crises.

The definition of contagion in Dungey and Martin is further refined to fixed and variable contagion. Fixed contagion results from a common response in a range of currencies to a common shock (a response to a *fixed* shock), and variable contagion represents individual currency responses to shocks. Changes in the exchange rate are modelled as a linear combination of contagion effects and an individual country factor as follows:

$$s_{i,t} = \phi_i C_{i,t} + \delta F_t + \lambda_i V_t$$

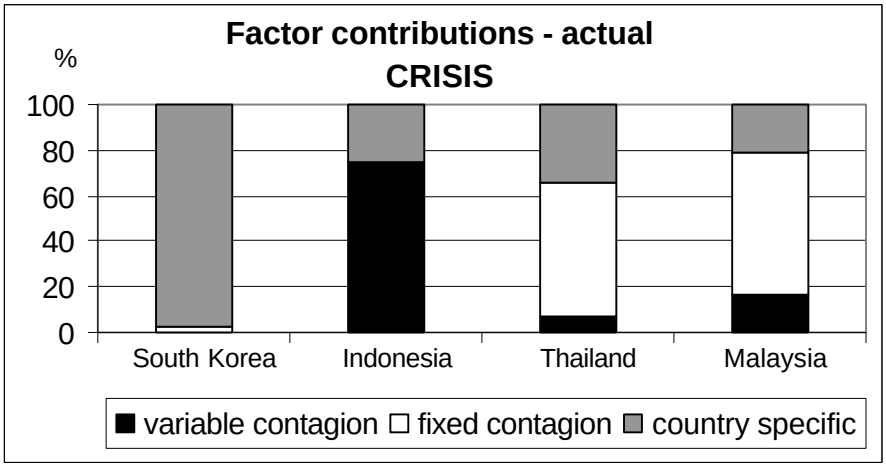
where s_i is the change in the log exchange rate i, C_i is the individual country factor and F_t and V_t are the fixed and variable contagion factors respectively. The fixed factor has a loading parameter δ which does not vary across exchange rates, whereas the loading parameter on variable contagion λ_i does. The breakdown of contagion into fixed and variable components is supported by the literature calling for some differentiation between common shocks and individual country responses (Dooley (1997), Edwards (1998), Eichengreen et al (1996a)). However, Glick and Rose (1998) recognise only contagion not resulting from common shocks, analogous to variable contagion.

The model of contagion postulated in Dungey and Martin has been applied to the recent East Asian crisis to produce a decomposition of the effect of contagion on exchange rate volatility for the Thai baht, Malaysian ringgit, Indonesian rupiah and South Korean won over the period December 1997 to August 1998. The resulting decomposition into contagion and non-contagion effects is shown in Graph 3. The chart clearly differentiates the effects of contagion on Malaysia, Indonesia and

Thailand (called the MIT countries by Krugman (1998)) from that on South Korea. Krugman (1998) hypothesised that contagion between the MIT countries could be understood due to the trade linkages, a form of Lowell et al's economic linkages model, but that contagion to South Korea was less obvious. The results in Graph 3 support this hypothesis. The total impact of contagion for the MIT countries ranges from 66% for Thailand to 78% for Malaysia, but only 3% for South Korea. The breakdown of contagion into variable and fixed components in the MIT countries also provides an interesting focal point. In Malaysia and Thailand fixed contagion dominates. In Indonesia variable contagion has a larger influence. Under Glick and Rose's (1998) definition of contagion as essentially only the variable contagion component, the breakdown of the MIT contagion supports the Radelet and Sachs (1998) hypothesis that Indonesia is the economy most clearly affected by contagion in the region.

Graph 3: Contribution of contagion

Chart 11 in Dungey and Martin (1998)



4 Reconciling the Existing Definitions and Results

The definitions of contagion in the three papers examined above are not inconsistent. Unfortunately no one definition encompasses the others, and all are subject to ad hoc decisions in various aspects. To see this consider a restatement of the critical parts of the definitions: (i) Eichengreen et al accept that contagion is evident when the probability of a domestic crisis is affected by a foreign crisis; (ii) Lowell et al point out that coincidental contemporaneous crises are unlikely to be common so that evidence of overlapping crises is consistent with contagion; (iii) and Dungey and

Martin decompose the transfer of volatility between exchange rates into fixed and variable contagion effects associated with the effects of common shocks. Each of these definitions has common features. First they are all concerned with the volatility of currency markets, in Eichengreen et al this is evident through the construction of the EMP index. Second, all methods are guilty of some ad hoc process in the approach. In Lowell et al and Eichengreen et al this appears in the definition of a crisis period, as opposed to some 'normal' trading volatility. It also appears in the fundamental variables chosen as crisis indicators. Dungey and Martin avoid the problem of choice of fundamentals but define the crisis period exogenously from the model itself. There are also significant differences between the methodologies. The Lowell et al approach addresses the issue of a trigger event and *subsequent* effects on markets elsewhere. Eichengreen et al consider a range of different lag structures but note no significant difference in their estimate of the probability of a crisis as a result, and Dungey and Martin consider only contemporaneous shocks, although the latter could be easily modified to incorporate time delays. Only the Dungey and Martin paper explicitly considers the existence of contagion outside crisis periods, although this information could be extracted from the Eichengreen et al approach.

5 Conclusion and Summary

Research into contagion in currency crises is still relatively scarce. Whilst there are a large number of studies examining the determinants of crises and preconditions for crises there are relatively few works examining the vectors by which crisis information spreads between markets. Three broad definitions of contagion have been examined. Eichengreen et al hypothesise that evidence of increased probability of a domestic financial crisis as the result of an offshore crisis is consistent with contagion, and finds evidence of contagion during a broad range of crises. Lowell et al (1998) point out that the likelihood of coincidental contemporaneous and independent crises is very low and hence consider avenues of contagion whenever there are periods of contemporaneous crisis in several markets. Dungey and Martin (1998) consider contagion as the transfer of volatility between exchange rates in the form of common responses to shocks across currencies (fixed contagion) and individual currency responses to common shocks (variable contagion). The definition of variable contagion is broadly consistent to the definition of contagion implied by Glick and

Rose (1998) who wish to exclude the impact of common shocks from their consideration of contagion.

In understanding the means of transmission of contagion, Lowell et al proposed four main channels: economic linkages, heightened awareness, portfolio balance adjustment and herd behaviour. These are not entirely uncontentious. Most of the existing literature can be interpreted as supporting the economic linkages argument, with trade links identified as particularly important in Glick and Rose (1998) and Sachs, Tornell and Velasco (1996).

The quantification of the impact of contagion on currency markets has not, as yet, proceeded particularly far. Most of the empirical work has concentrated on understanding the causes of currency crises rather than their transmission. The main exceptions are Eichengreen et al (1995,1996a,1996b), Lowell et al (1998) and Dungey and Martin (1998). In terms of empirical results, Eichengreen et al provide the most general finding, with the conclusion that offshore crises raise the probability of a domestic crisis by about 8 percent. Both Lowell et al and Dungey and Martin examine particular crisis periods, although Lowell et al cover several and Dungey and Martin only the East Asian crisis. Dungey and Martin provide a quantification of the impact of contagion for four currencies in the East Asian crisis, concluding that there is some support for the importance of economic linkages, particularly trade links, in understanding contagion in that crisis.

Overall, this is an underdeveloped area of research. It is, however, an important one. Understanding the means by which information is transmitted between currencies, both in times of crisis and non-crisis, will provide better information on which to formulate policies to insulate economies from the damage which may occur as the result of a currency crisis.

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