Financial Contagion

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1 Introduction

In this survey we discuss what is called financial contagion or simply contagion. Contagion in the economic domain is a fairly recent research topic that has been spurred in the aftermath of the numerous crises that hit developing countries (but not exclusively as we shall see) during the 1990’s.

In order to explain what contagion means (or what it does not mean) it is important to take a few preliminary steps, intended to facilitate the analysis.

First, one has to be sure what triggers contagion, this is not to be confused with the transmission channel but the initial cause of which contagion is the effect. The cause, that gives rise to contagion in the first place is either a banking, currency or debt crisis or a combination of these. Without this predecessor contagion is not possible since the term generally refers not to ordinary shock transmission but to the transmission of out of the order events.

Second, we will give a brief account of the various crises that hit emerging markets during the 1990’s and that gave birth to the contagion debate, veraciously held in governments, universities and the press.

Third, we devote considerable time and space to the remarkable disagreement among researchers regarding the appropriate definition of the term. Indeed, as to date, there does not seem to exist a unanimously agreed upon definition, with opinions spread widely on the whole spectrum of potential meanings.

The disparity of opinions is crucial for the understanding of empirical studies and proposed policy measures as remedies for financial contagion.

In this paper we will follow the rough confinement of the term contagion found in the literature and concentrate on the explanation of the transmission of a crisis in one country to other countries. A feature we do not discuss is the link between the financial sector and the real side of the economy within a given country. Obviously, the latter subject is just the flip side of the same coin: financial crises are considered as crises in the first place as they have severe repercussions on real variables such as output. To be more precise, a banking crisis, for example, is usually followed by significant drops in output and a rise in unemployment etc. The exact channel of this interdependence is therefore not our concern here, since it is simply not called contagion.

It is important to notice that the biggest part of the contagion literature is descriptive and empirical in nature. The reason is the following. As it seems, research emphasis has been for the most part on policy relevance. That is, the prevalent approach has been to search for evidence of contagion in the data,
according to the working definition chosen - an explanation of the fact that a considerable part of contagion studies is conducted by IMF, World Bank or ECB staff.

In comparison with journalists, economists have not automatically accepted the presence of contagion in events like the Asian crisis and the Russian crisis. The more so, as journalists often refer to irrational investor behaviour as explanation for the crisis propagation mechanism among countries. Investor irrationality generally results from market imperfections that economists are often reluctant to admit if equally plausible rational explanations are at hand. Therefore empirical studies try to discriminate between alternative transmission channels and gauge the importance of contagion during episodes of financial turmoil in the 90’s.

The remainder of the paper is structured as follows. Section 1 attempts to shed light on the contagion debate by explaining it’s historical origins and giving a short typology of financial crises. Section 2 discusses possible definitions of contagion whereas in section 3 we highlight the most common contagion theories in several dimensions and some depth. In section 4 considerable space is devoted to the presentation of formal models of contagion. In section 5 empirical findings are presented and section 6 concludes with a short discussion of policy issues.

2 A Brief History of Recent Financial Crises

A financial crisis is a situation in which financial markets are unable to function properly. Williamson (2004) points out that this dysfunction prevents funds to be channeled to those with the most productive investment opportunities, leading to domestic (and in the case of contagion also foreign) recessions. The immediate source of financial crises are usually explained as crises in the banking sector, currency crises or (external) debt crises. Often a financial crisis is not confined to one of those three domains but starts in one domain and then triggers a second one as in the case of a so-called ”twin crisis”, a simultaneous occurrence of both a banking and currency crisis.

A banking problem turns into a crisis when the ratio of non-performing assets to total assets rises dramatically (that is, when the number of outstanding loans that will not be repaid gets sufficiently large so as to endanger the proper functioning of the banking system within a country). Incidents of public sector crisis management such as deposit freezes, bail-outs etc. are also signs of crisis. Bank runs are a further possibility, where deposit withdrawals can surpass short-term liquidity available to banks.

Currency crises are defined as periods of ‘large’ changes in a country’s fixed or pegged exchange rate such as involuntary devaluations which go hand in hand with a dramatic decrease in international reserves as the central bank tries to defend the peg against market pressure. However, Kaminsky and Reinhart (2000) argue that a compelling definition should also include unsuccessful attempts of speculation, i.e. speculation that does not lead to devaluation. After all, a loss of reserves in any case and high interest rates in some, are necessary to defend
the exchange rate, hence, are indications of foreign exchange pressure and can also lead to domestic recessions. That is, even if not successful, these events can have much of the same effects as in the successful case.

Debt crises in contrast usually concern sovereign debt defaults which are different from mere private defaults since a sovereign by definition cannot go bankrupt and foreign (private) creditors can in general only seize a part of the collateral. Signs of a debt crisis are default, as pointed out, but also international debt restructuring agreements.

The 1990’s saw four severe crises with international repercussions.

First, the collapse of the European Exchange Rate Mechanism (ERM) in 1992. Following the floatation of the Finnish markka, other ERM countries became victims of speculative attacks. The most notorious attacks were on the British pound and the Swedish krone. This crisis is usually explained with the help of a “second generation” currency crisis model. As it were, ERM countries agreed to peg their currencies to the German mark in order to establish anti-inflation credibility and set preconditions for the eventual adoption of the euro in 1999.

But beginning in 1990, Germany had to start pursuing an expansionary fiscal policy to pay for the reunification. This created an upward pressure on the mark and resulted in overvalued ERM currencies. Consequently, France and Britain run into deep recessions.

This was the background of the ERM crisis, at the heart of which seems to have been speculator belief that government promises to defend exchange rate pegs sounded hollow.

Mexico’s so-called ”Tequila” crisis unfolded late in 1994, when reports of political instability after the murder of the presidential candidate and rumours over worse-than-believed fundamentals sparked an international confidence crisis. In the event not only Mexico suffered severely but also other Latin American countries, with Argentina and Brazil being hit very badly.

In 1997 Thailand suddenly devalued her currency, the baht. By fall that year most countries in the region plunged into recession, with the exception of Singapore and Hong Kong. This crisis really initiated the contagion debate since the channels of transmission from Thailand to Korea and Indonesia are/were mysterious. Yet, that there was contagion is evident.

The last severe crisis started with Russia first devaluing the ruble in the summer of 1998 and shortly afterwards declaring default on domestic bond debt. It was significantly exacerbated by the bankruptcy and eventual orchestrated IMF bailout of the LTCM hedge fund that was heavily invested in Russia and other developing countries. As the crisis spread globally, diverse countries like Hong Kong, Mexico, Brazil and Argentina were harshly affected, too.

3 Defining Contagion

The purpose of this section is to discuss the contagion phenomenon. By so doing we split the task into discussing the variety of definitions present in the
literature and possible transmission channels. First, we present many of the various contagion definitions encountered in the literature and mention some transmission channels only in passing, as this facilitates the description considerably. We deem a clear exposition of the definition issue essential towards understanding and thus postpone the discussion of transmission channels until the next section. Even if this comes about with a loss of expositional clarity and possible initial comprehension problems on the part of the reader.

In the introduction we pointed out that as subject of economic research, contagion lacks as yet a unanimously agreed upon definition. Given the absence of agreement on a positive definition, some researchers have even tried to define the term negatively. That is, presenting what contagion in any case does not mean.

Due to Karolyi (2003) contagion in its original context is a mathematical theory that epidemiologists use to predict the spread of virulent diseases. Most researchers take implicitly this insight into consideration when acknowledging that in order to have contagion there must be a crisis (a disease), a host and a victim.

Putting this definition into use Williamson (2004, p. 830) forcefully declares that ”the common sense meaning of contagion is that B gets a disease because A had it.” In reply to differing definitions of contagion he also discusses the implications which his definition has towards other interpretations. In his opinion defining contagion the way he does precludes the following meanings.

First, contagion does not mean that the sensitivity of the transmission channel between countries A and B increases because of the crisis. Or, in less abstract terms, contagion does not necessarily entail ”excess co-movements” in financial and economic variables in times of crisis. That is, higher correlations of stock market returns or stronger business cycle co-movements across borders can be a consequence of contagion but they do not have to.

Second, contagion does not exclude the transmission via fundamentals such as the balance-of-payments.

Third, in his opinion, contagion can also operate with a lag and thus does not merely deal with immediate impacts. That is, when country A is hit by a currency crisis for example, but the attack on country B (or whatever the repercussions might be) does not take place within a short time interval of hours or days, this does not preclude that country B is not the victim of country A’s crisis in the first place. These negations are important since they exactly address the major modifications researchers have proposed for the term contagion. Other authors, in contrast have chosen more narrow definitions.

Fatzscher (2002) defines contagion as the transmission of a crisis that is not caused by the affected country’s fundamentals. In that he follows an often cited dichotomous definition by Calvo and Reinhart (1996). If the transmission mechanism is via fundamentals (to be explained below) then they call it ”fundamentals-based contagion” or ”spillovers”, whereas in the case of a non-fundamental-based transmission they apply the residual definition ”true contagion”.

Moser (2003) adopts this latter definition in pointing out that spillovers
created by interdependent fundamentals often can be seen as financial market responses to anticipated changes in those fundamentals. That is, in his opinion financial markets only speed up the convergence to a new equilibrium (e.g. a new set of bilateral exchange rate pegs after a currency crisis) that would come about in any case. Thus the financial market response is not the cause of the spillover, which collides with the notion of contagion as a causal relationship.

He emphasizes that Information and domino effects lie at the heart of "true contagion".

Information effects are cases in which new information can trigger rational or irrational chain reactions with investors drawing out funds not only from the original crisis country but also from countries that share macroeconomic or financial similarities with it or lie in geographical proximity. Domino effects, in contrast, means mechanical transmission where banks or other financial institutions are adversely affected by defaults on debt in the crisis country and therefore may suffer insolvency themselves. Another domino effect theory is called portfolio rebalancing. Investors such as mutual funds might be obliged to change their exposure to risk or raise liquidity as they face margin calls and hence have to draw out funds from other emerging market countries when they suffer portfolio losses in the crisis country. By so doing they may spread stock market crashes regionally or even globally.

This definition suffers from the drawback that it is in practice hard to discriminate between anticipated responses to changes in fundamentals and "true contagion" when both phenomena have the same effects. Yet, the distinction is vital when it comes to gauge the occurrence of contagion empirically.

Notice that "true contagion" in Moser's definition is essentially a market imperfection phenomenon. Either information is not properly evaluated by investors or not gathered at all so that a rumour (new information available) might cause disproportionate market disturbances.

Karolyi (2003) agrees in principle with Calvo and Reinhart's (1996) dichotomous definition but finds that when it comes to study "true contagion" researchers have to limit their attention to high-frequency data (i.e. data such as stock market returns or bond yields that are sampled on a daily or even more frequent basis whereas low-frequency data are sampled at monthly, quarterly or yearly intervals, in rare cases even less frequently. Examples of low-frequency data are price-levels and unemployment rates). Evidence of "fundamentals-based contagion" would show up in low-frequency data such as trade flows whereas "true contagion" is measured primarily as "excess co-movements" with the help of high-frequency data. Karolyi therefore distinguishes the notion of "true contagion" further by dividing it into "rational investor-based co-movements" and "irrational co-movements" and confines contagion to the latter sub-category. He cites financial panic, irrational herd behaviour, loss of confidence and increases in risk-aversion as possible "irrational contagion" causes.

Kaminsky, Reinhart and Végh (2002) refine the basic definition along another line. They stress the near simultaneity of events as necessary conditions for contagion. Contagion occurs when a crisis in one country triggers an immediate adverse chain reaction across regions and where the reaction is what they
call "fast and furious". That is, they effectively exclude lagged transmissions, i.e. transmissions that do not happen within hours or days, from their definition. Note also that they propose a lower threshold for repercussions within countries below which the transmission is treated as spillover but not contagion. They stress that a fast and furious contagion leads to sharp declines in asset prices, increases in the cost of borrowing on international capital markets (following a crisis, risk premiums demanded by international investors increase) which leads to a significant credit crunch and ultimately to painful recessions. They further distinguish between unlimited events such as the Asian flu of 1997 and the Russian crisis in 1998 where repercussions were felt across whole regions or even globally and limited events such as Brazil's devaluation on January 13th 1999, that had a similar contagion potential but did not immediately trigger reactions across the region or where reactions were only gradually felt. Following this distinction they note that historically there were "...far more crises without significant international consequences than crises that have given rise to fast and furious contagion." (Kaminsky, Reinhart and Végh, 2002, p. 8)

In an attempt to explain the spatial pattern of contagion, Kaminsky and Reinhart (2003) notice that financial turmoil only spreads globally when asset markets in world financial centers are affected. Otherwise, contagion remains confined to the region where the crisis originated. In order to explain this casual observation they extend the definition by explicitly considering spatial transmission patterns. This distinction is necessary to discriminate between common shocks and spillovers/contagion. That is, they identify the source of the shock that stimulated the crisis.

According to this logic one can distinguish between three spatial transmission patterns.

First, periphery to periphery: in this story an idiosyncratic shock (a shock that is proper to a particular country and not common to a set of countries) is transmitted from the host country to another country through bilateral trade or finance without affecting a center country (think of a center country as a large open economy that hosts an important financial center such as London, New York, Tokyo or Frankfurt). In this case the crisis remains regional.

Second, periphery-center-periphery: here, a shock that originates in a country of the periphery is transmitted to another periphery country through a world financial center. This happens when bilateral trade flows between the two periphery countries are feeble. Transmission mechanisms include trade competition for exports to the center and portfolio rebalancing as investors might be obliged to withdraw funds from other periphery countries. Financial markets in the center experience turmoil and investors suffer losses due to global integration which is why one can call this global contagion.

Third, center to periphery: this is the no-contagion case since the source of the shock is a center country and can thus be treated as a common shock. Common shocks are by definition non-contagious as will be explained below.

Moser (2003) emphasizes a crucial distinction whereby the mere simultaneity of a financial crisis is not a sufficient condition for contagion. Indeed, there has to exist a causal connection, that is, a crisis in country B is the effect of which
the crisis in country A is the cause. Simultaneous crises can also result from so-called common shocks.

Common shocks are, for example, a rise in US (world) interest rates, oil shocks, an alteration of exchange rates between major currencies, commodity prices or recessions in big open economies etc. that originate not within the country that first exhibited crisis symptoms but are completely exogenous to it. Common shocks affect countries within a given region in essentially the same way, so that the eventual occurrence of crises can be both simultaneous and similar in consequences. Thus researchers are unanimous in excluding crises due to common shocks from the definition of contagion.

4 Theories of Contagion

In what follows we will concentrate on currency crises propagation. Three potential transmission mechanisms can be identified. Crises can become contagious due to financial and real interdependence between countries as well as due to sunspot phenomena (sunspots are exogenous shifts in investors beliefs). We discuss each in turn.

4.1 Financial Linkages

Many scholars have discussed financial markets as possible transmission mechanisms. Common to all explanations is the emphasis on strong connectivity either between countries or through a third market, necessary to establish a direct or indirect link that is sufficient to transmit a full-blown financial crisis.

Following Fatzscher (2002) financial interdependence can be split into direct and indirect linkages.

The degree of stock market integration between countries is the canonical example of a direct financial linkage. With large cross-border securities holdings countries become vulnerable to stock or bond market developments in the other country. The problem is exacerbated when stock market returns are highly correlated across countries. Yet, successful attacks have usually unfolded against economies with highly liquid markets where funds can easily be withdrawn, suggesting that deep stock market integration is merely a necessary condition for contagion.

Moser (2003) discusses counterparty defaults as a further possibility of contagion through direct financial linkages. Failures of banks and firms can potentially create a cross-border banking crisis when banks are highly exposed to troubled debtors and have to declare insolvency in turn.

The case of direct financial linkage among crisis countries is intuitive but the crises experience of the 90’s points into a different direction. In some, if not all, of the most malignant episodes direct financial linkages were virtually absent (e.g. the Russian Crisis and Brazil’s subsequent devaluation).

The evidence suggests that indirect linkages that connect two crisis countries through a financial center are more important in reality than direct linkages.
The story comes in several disguises.

During the 1990’s developed world lending to emerging markets has surged without precedent. Financial intermediaries (banks and mutual funds as well as insurance companies) have been on the forefront of this movement which reached its climax in the wake of the Mexican and Asian crises with large capital holdings established.

To understand the contagion potential of foreign lenders, consider what happens to international investors assets when an emerging market country such as Thailand suddenly devalues its currency. Depending on the size of the devaluation and if foreign debt is denominated in baht, foreign banks face huge exchange rate losses and might arguably start withdrawing from Thailand altogether by calling in outstanding loans and drying up credit lines. These measures exacerbate the initial situation by increasing pressure on the baht further and causing a domestic (Thai) credit crunch. If, on the other hand, as has been the case in Thailand, a large part of Thai sovereign and private debt to foreign lenders is denominated in US $ rather than local currency, a devaluation does not entail exchange rate losses to foreign banks but lets the baht equivalent of this debt explode causing insolvency among Thai companies and eventually default. The effect on foreign lenders is essentially the same as in the first case.

Kaminsky and Reinhart (1999) point to an essential ingredient to the whole story: loans must be of short-term maturity, so that they can immediately be called upon bad news. They call this “sudden stop”. It leads to a flow reversal when a prior capital inflow suddenly turns into an outflow within hours or days.

There are many possible ways of how such a situation can cause contagion. Kaminsky, Reinhart and Végh (2002) describe the importance of a common highly leveraged lender for fast and furious contagion. Hedge funds, for example, often belong into this category. They are leveraged because they too rely heavily on short-term loans and thus face margin calls when the market price of an asset in which they hold a large position decreases. In order to meet margin requirements they have to raise collateral by selling assets but logically not the one whose price already declined but assets in other markets, thereby causing stock market declines there as well. It has to be pointed out however, that such a destabilizing effect on non-crisis countries stock markets is only possible in the presence of information asymmetries. Assuming unchanged fundamentals in those countries, Calvo (1998) argues that if potential buyers cannot distinguish whether sellers sell because they want to raise liquidity or because they have undisclosed information about fundamentals, assets have to be sold at “firesale” prices (the situation is similar to Akerlof’s (1970) ”lemons problem” on used car markets: buyers cannot distinguish whether a used car is of the good or bad type. Having to take into account the possibility of acquiring a bad car, buyers willingness to pay for any used car is lower than the expected value of a good car. Knowing this, in equilibrium only sellers of bad cars are present on the market - a market imperfection).

In a similar story, called portfolio rebalancing due to capital constraints (Moser, 2003), banks are forced to rebalance their portfolios due to internal risk exposure guidelines. When banks suffer heavy losses in crisis country they
could be obliged to re-scale their portfolio positions in countries that have the same risk classification as the crisis country although ex ante they do not yet experience a crisis. Given the relative importance of foreign funds in emerging markets, re-scaling can have dramatic effects on affected securities markets and result in massive contagion.

Allen and Gale (2000) draw attention to the inter-banking system as a possible source of financial contagion. They build a model of bank networks where banks hold interregional deposits with each other in order to enable optimal risk sharing against liquidity preference shocks (situations in which people suddenly want to increase the amount of currency they hold). They show that if the structure of interregional bank claims is incomplete such that not every bank holds claims onto each and every other bank across regions, already a small liquidity shock in one region can trigger a bank run that spreads from region to region as banks are not instantaneously able to satisfy the public’s demand for liquidity.

4.2 Real Linkages

By the same token, real interdependence is divided into bilateral trade links and trade competition in third markets.

With bilateral trade links a recession in one country can cause a recession in another country because of declining demand for imports in the crisis country. The decrease in import demand is sometimes called an income effect.

In contrast, the competition in third markets theory maintains that even in the absence of direct trade linkages, trade can still be the cause of contagion. Suppose two countries exports compete for the same third market and one country devalues it’s currency. Then the other country faces a decline in export demand due to a loss in competitiveness creating an incentive to devalue as well, in order to regain some of it’s lost competitiveness. For this reason the theory is often called “competitive devaluation”.

Glick and Rose (1999) note that the plausibility of this theory depends crucially on short-run nominal price rigidity. A devaluation can only bring about a competitiveness gain when the law of one price fails to hold (the law of one price "LOP" maintains that the prices of identical goods across countries corrected for the bilateral exchange rate should be equal - an arbitrage argument). That is, due to price stickiness prices cannot adjust to the change in the exchange rate in the short run and thus make exports from the devaluation country temporarily cheaper in the third market with respect to the export competitor.

Numerous empirical evidence suggests that indeed the LOP as well as it’s aggregate counter-part the purchasing-power-parity PPP do not hold in the short to medium run. However, we add that price stickiness is not the only explanation for the empirical failure of the LOP. In general, the so called “exchange-rate pass-through” measures to what degree an exogenous shock to the nominal exchange-rate is passed onto prices. A pass-through of 0 indicates that prices are not changed whereas a pass-through of 1 would be a complete passing on to prices. Empirical studies mostly observe a pass-through near 0 for most traded
goods (one possible explanation is called "pricing-to-market", PTM, which establishes that there is no need to pass on exchange-rate changes to prices when firms can exert market power across borders).

Kaminsky and Reinhart (2000) establish a set of preconditions which have to be fulfilled that crises can become contagious through trade linkages. They note that the trade story is only compelling when either bilateral or third party trade volumes are high. Otherwise, trade linkages simply do not provide a credible explanation for the occurrence of contagion. Developing this line of thought further they also remark that one should not only look at the relative part of trade that goes to infected or third party countries, but also at that country’s trade-to-GDP ratio and the composition of trade. This is particularly true for the competitive devaluation theory. Countries with feeble trade-to-GDP ratios and/or with exports to third party countries belonging to different commodity classes have little to no incentive to follow suit after the other country devalued it’s currency. The argument becomes even more convincing when one takes into account that central banks often face a non-negligible reputation cost of abandoning an exchange-rate peg.

4.3 Sunspot Phenomena

As discussed in section 3, many researchers do not take “fundamentals-based contagion” that is transmitted through channels presented in the preceding two subsections as evidence of “true contagion”.

This subsection closely follows Moser (2003). He emphasizes the importance of information effects by explaining that agents take new information encompassed in a crisis in one country as a signal to update their information on other countries as well. Information gathering can result in adverse chain reactions when capital is withdrawn from other countries on the basis of this information. The presence of information effects is a sign of market imperfection since information is asymmetric with some well informed and some ignorant investors. Asymmetry is a result of the fixed cost of information gathering which entails rational ignorance on the part of globally diversified investors.

All models of information effects share the common feature that information gathering is a reassessment of objectively unchanged fundamentals. That is, ex-ante there is no problem with a country’s fundamentals but investors are assumed to be partially uncertain about them. Uncertainty leaves room for ex-post vindication of ex-ante fears when a self-fulfilling prophecy brought turmoil to healthy countries.

Karolyi (2003) proposes to differentiate between rational and irrational information effects.

One explanation for rational information effects is the so-called “wake-up call” hypothesis. A crisis in one country can lead investors to reassess other countries fundamentals that are similar to those in the crisis country. If this process makes them aware of similarities and risks incorporated in investments they did not see before, contagion can occur. Note that contagion is “rational”
in the sense that investors discovered accurate information that justifies their actions.

"Signal extraction failures" tell a different story. Here too, incomplete information about the true relevance of a crisis in one country on other countries is assumed. But whereas the "wake-up call" hypothesis presents a rational response to new information available, signal extraction failures are irrational, in that agents either falsely assume interdependence of fundamentals (such as strong macroeconomic or trade links so that a crisis must necessarily spread from one country to the other) or "lump" together countries on the basis of easily conceivable categories such as whether they run current account deficits, face large debt burdens or are simply situated in the same region. Lumping together results in the conviction that similar countries must face similar problems. In both cases countries that otherwise would hardly be threatened with contagion, ultimately become victims.

Yet another argument is called "expectations interaction". Financial crises are modeled as self-fulfilling prophecies with crowd psychology playing a major role. If a bank run or a speculative attack is expected to occur every agent will find it both rational and advantageous to participate, even if the affected countries' fundamentals are not inherently unstable. However, the theory only works if the ex-ante probability of success is positive. That is, there must be a perceived temptation on the part of the government or the central bank to renege on an exchange-rate commitment. Similarly, successful speculative attacks often seem to unfold against already shrinking international reserves.

5 Formal Models of Contagion

In this section we present some formal models of contagion that draw mainly upon the qualitative description given in the last section. Whereas real and financial linkages explanations are intuitively rational, this is not automatically the case for sunspot phenomena. We find it therefore necessary to give some impressions how economists have tried to model and rationalize information effects in a formal way.

5.1 Diversification and Signal Extraction

5.1.1 Rational Ignorance

Calvo (1996) presents a simple model of rational ignorance to information. He recognizes that financial globalization can reduce investors' incentive to acquire costly country-specific information as diversification possibilities grow.

The model builds on the following ingredients: there are $J$ countries with each having investment opportunities that pay iid returns equal to $r^j$. The mean and variance of these random variables are $\mu$ and $\sigma^2$, respectively. Assuming that the investor choosing in which of the possible $J$ countries to invest has one unit of wealth, the optimal allocation must be equal across all countries and the overall portfolio mean and variance are $\mu$ and $\sigma^2/J$ (the allocation is
optimal since it permits minimal overall portfolio variance which is essential to a risk-adverse investor).

In what follows, Calvo considers how the optimal portfolio allocation changes with new information becoming available.

If a credible rumour spreads to the effect that a single country’s new mean value of return is now \( r \), instead of \( 
\frac{\sigma^2}{\gamma^2} \), but the variance remains \( \sigma^2 \), the investor might consider altering her portfolio allocation in response. Denoting \( \theta \) the share of her wealth invested in all other countries with unchanged mean returns, \( (1-\theta) \) will be the share invested in the country with a different return. The investor’s objective is to determine \( \theta \) optimally.

Assume that the investor has a quadratic von Neumann-Morgenstern utility function. Then her utility is a linear function in two terms:

\[
EU = \left[ \theta \rho + (1-\theta) r \right] - \frac{\gamma}{2} \left[ \frac{\theta^2}{J-1} + (1-\theta)^2 \right] \sigma^2, \gamma > 0. \tag{1}
\]

The first term on the right-hand-side is the new portfolio’s expected return and the term in brackets is the portfolio’s variance scaled by the coefficient of risk aversion, \( \gamma \). That is, the more risk-averse the investor is, the less she tolerates a high portfolio variance.

Choosing the optimal share of wealth allocated to all other countries, \( \theta \), is of course tantamount to maximizing equation (1) with respect to that same variable. The first-order condition is given by

\[
\theta = \left[ \frac{J-1}{J} \right] \left[ 1 + \frac{\rho - r}{\gamma \sigma^2} \right]. \tag{2}
\]

Note that if \( \rho = r \) one gets the initial situation of equal portfolio shares. Consider now a situation where a rumor spreads to the effect that the expected return \( r \) is marginally different from \( \rho \). This results in a marginal change in the optimal portfolio share \( \theta \)

\[
\frac{\partial \theta}{\partial r} = -\frac{J-1}{J} \frac{1}{\gamma \sigma^2}. \tag{3}
\]

As \( J \to \infty \) this expression goes to \( -1/\gamma \sigma^2 \). That is, the change in the portfolio share allocated to the country with a different return can potentially grow without bound as new information becomes available. Calvo (1996, p. 21) emphasizes that “...as the opportunities for diversification increase, the impact of 'news' on the allocation of investment funds (relative to initial allocation) grows without bound.”

What is the potential effect of such an event on emerging markets? In the case of short-maturity debt, investors may react to even small changes in the quality of a country’s investment opportunity and start pulling out funds altogether or refuse to roll over debt. In some cases this can create massive debtor insolvencies and therefore financial crisis.

Until now the model does not treat the possibility of acquiring costly information in order to learn about the expected return \( r \) with certainty.
Suppose now that the investor can spend a fixed cost $\kappa$ to learn about $r$. Whether to do this or not will depend on the net return from this information gathering. When the investor chooses to pay the information fee $\kappa$, she will learn $r$ with certainty. In this case the variance of $r$ is zero. Taking account of this, the first-order condition (2) modifies to:

$$\theta = \frac{D - r}{\gamma \sigma^2 (J - 1)}.$$  \hfill (4)

If $r \geq \rho$, the investor will optimally concentrate all her wealth in the market which pays the certain return $r$. If on the other hand, $r < \rho$, the investor diversifies across countries (i.e. $\theta > 0$). One can show that the minimum value of $r$ such that $\theta = 1$, denoted $r_{\text{min}}$ is equal to:

$$r_{\text{min}} = \rho - \frac{\gamma \sigma^2}{J - 1}.$$  \hfill (5)

The above expression is increasing in the degree of diversification possibilities $J$ and converges to $\rho$ as $J \to \infty$. That is, an investor faces less incentives to gather costly information as diversification possibilities grow. This is due to the fact that effective diversification decreases the variance of the portfolio. In the limit costly information gathering is only rationally plausible if $r \geq \rho$ (not even taking the cost $\kappa$ into account). Hence the main result of the model stated above: financial globalization makes information acquisition less profitable and a certain degree of ignorance rational.

The contagion predictions of the model are presented in Calvo and Mendoza (1999). They extend the baseline model by adding the expected return difference of holding an individual portfolio or merely imitating an arbitrary market portfolio. As the model above shows, utility-maximizing investors will find it optimal not to pay for information that is relevant for their portfolio decisions and choose to imitate the arbitrary market portfolio instead.

A virulent market rumour can then lead to contagion such as capital flow reversals from several emerging markets due to massive investor herding when all investors choose to follow the "market". A situation that can be called a self-fulfilling prophecy, since the rumour does not even have to be credible for investor fears to be justified ex-post.

### 5.1.2 Signal extraction failures

Calvo (1998) offers a different model based on the dichotomy of informed and uninformed investors. It too concentrates on costs of information gathering but emphasizes that uninformed investors try to interpret investment decisions of informed investors. The model falls into the "signal extraction" category outlined in the last section.

The distinction between informed and uninformed investors is motivated by the observation that fixed costs to gathering and processing information creates economies of scale that can be exploited by professional investors. Because
information advantages create incentives to borrow to finance investment opportunities, informed (professional) investors are assumed to be highly leveraged. As it turns out, this assumption is crucial.

Imperfectly informed but rational investors can observe portfolio decisions of informed investors but cannot infer whether the decision is due to a change in fundamentals or because of margin calls. In other words, investment decisions are a noisy signal.

Consider the portfolio decision of an informed investor, denoted $y$ (e.g. a sale of emerging markets bonds). The reason for action $y$ can lay in combinations of two unobservable variables: $s$ and $m$ (unobservable to uninformed investors). Variable $s$ is the current state of portfolio fundamentals, such as the real return. Variable $m$, in contrast, is a variable that only concerns informed investors, such as margin calls. Calvo assumes the following functional form for the relationship between $y$, $s$ and $m$:

$$y = s - m.$$  \hspace{1cm} (6)

It is the objective of uninformed investors to predict $s$ on the basis of available information, i.e. $y$. Uninformed investors are assumed to know the unconditional distributions of $s$ and $m$: $s \sim N(s^*, \sigma^2)$ and $m \sim N(0, \tau^2)$. That is, both variables follow a normal distribution with mean $s^*$ and 0 and variance $\sigma^2$ and $\tau^2$, respectively. From the observation $y$ uninformed investors can infer the conditional distributions of $s$ and $m$. Assuming stochastic independence of $s$ and $m$, uninformed investors can use OLS in analogy to Lucas’ (1972) Island Model to get the conditional distribution for the signal $s$: $s \sim N(\theta y + (1 - \theta)s^*, \theta \tau^2)$ where $\theta = \frac{\sigma^2}{\sigma^2 + \tau^2}$.

The result can be interpreted in the following manner. Let the variance of noise $m$ be close to zero, i.e. $\tau^2 \approx 0$. Then, $\theta \approx 1$ and the observable variable $y$ is an almost perfect signal for fundamentals $s$. If however, the variance of $m$ is large, $y$ serves as a deeply biased signal for $s$.

A more important case occurs when $\theta \approx 1$ with $\tau^2$ large (for that to happen, the ratio $\sigma^2/\tau^2$ has to be large, too). Here, uninformed investors respond strongly even though the shock might be due to a margin call.

This is clearly a contagion case in which uninformed investors pull out funds from emerging markets as they mistakenly take the change in the signal $y$ as evidence for deteriorating fundamentals, even though fundamentals $s$ remain objectively unchanged.

5.2 Models of Herd Behaviour

The models presented so far, assume herd behaviour but do not explicitly model it.

A different set of models achieves exactly this goal. We discuss two of them in detail. The first one is simple and abstract but the complexity and connection to financial markets and real investor behaviour increases towards the second model.
5.2.1 Pure Herd Behaviour

This model is due to Banerjee (1992, p. 798). He defines herd behaviour as a situation where "everyone is doing what everyone else is doing, even when their private information suggests doing something quite different".

The model is based on sequential decision taking, with decision makers who observe the action of their predecessors, receive interpretable signals and try to maximize their independent personal profit.

More formally, suppose there is a population of $N$ investors, each of them maximizing the same utility function depending on asset returns, only. There is a continuum of assets, indexed on the real interval $[0, 1]$, paying a physical return $z(i)$. There is a unique $i^*$ such that $z(i) = 0$, $\forall i \neq i^*$ and $z(i^*) = z$, where $z > 0$. This specification is introduced to be sure that there is one asset which pays a strictly greater return to the owner than all the others. However, nobody knows the identity of $i^*$. Additionally, investors receive a signal with probability $\alpha$ informing them that the true $i^*$ is some observable $i^0$. The signal is true with probability $\bar{\alpha}$ and false with probability $(1 - \bar{\alpha})$, where the last probability is by assumption uniformly distributed on $[0, 1]$. This means that a false signal reveals no information about the true $i^*$, at all.

The decision making is sequential, one investor chosen randomly takes her decision first with no delay possible. The following investor, chosen randomly as well, can only observe the actual decision of her predecessor but not her received signal. The game continues the same way, with investors at each stage assumed to be perfectly informed of the complete history of the game.

To reach an equilibrium, three assumptions are needed:

1. Whenever an investor has no signal and everyone else has chosen $i = 0$, she always chooses $i = 0$.

2. When investors are indifferent between following their own signal and following someone else’s choice, they always follow their own signal.

3. When an investor is indifferent between following more than one of the previous investors, she chooses the one with the highest value of $i$.

Defining an equilibrium in this game:

The first investor chooses either $i = 0$ or follows her signal as prescribed by the assumptions. The second investor, if she does not have a signal, follows the first one but if she has a signal and the first investor has not chosen $i = 0$ she has a problem because now she has to make a judgement between her signal, or more precisely, her interpretation of the signal and the action of the first investor.

Notice, in that situation the investor is indifferent between the two options, there is no rational reason to prefer one to the other and hence she follows her own signal (assumption 2). The third investor finally has four possible outcomes to observe which will not be discussed in detail here. A general remark on the third investor: it has to be mentioned that if the first and the second investor
have chosen some \( i \), the third investor should do the same, regardless of his possible signal because it will always be his best option.

This latter discovery also tells us what should be done, each time several options other than \( i = 0 \) have been chosen by just two investors. Assuming that these two investors received the same signals and the current decision maker received a different signal which does not match with any of the already chosen options (if so, she of course has to follow her signal; assumption 2) he’s always better off following them, because their common probability that they discovered the true \( i^* \) is higher than the single probability of the decision maker. This solution is independent of the quality of the option chosen by the two predecessors, that is, regardless, if it is the highest \( i \) or not.

After the third investor, the same possibilities of outcomes and adequate reactions repeat themselves ad infinitum. This leads us to the following equilibrium:

Under assumptions 1, 2 and 3, the unique (Nash) equilibrium decision rule that everyone will adopt is decision rule D given below:

1. The first investor follows her signal if she has one and chooses \( i = 0 \) otherwise.

2. For \( k > 1 \), if the \( k^{th} \) investor has a signal she will choose to follow her own signal, iff (a) holds, or if (a) does not hold, (b) holds:

   (a) Her signal matches some option that has already been chosen

   (b) No option other than \( i = 0 \) has been chosen by more than one person

3. Assume that the \( k^{th} \) investor has a signal. If any option other than the one with the highest \( i \) has been chosen by more than one person, the \( k^{th} \) investor will choose this option unless her signal matches one of the other options that has already been chosen, in which case she would choose the latter option.

4. Assume that the \( k^{th} \) investor has a signal. If the option with the highest \( i \) has been chosen by more than one investor and no other option (except \( i = 0 \)) has been chosen by more than one investors she will choose this option as well unless her signal matches one of the options already chosen. In the latter case she would follow her signal.

5. Assume that the \( k^{th} \) investor has no signal. In this case she will choose \( i = 0 \) if and only if everybody else has chosen \( i = 0 \). Otherwise she chooses the option with the highest value of \( i \) that has already been chosen by unless one of the other options (except \( i = 0 \)) has been chosen by more than one person. In this case she would choose this latter one.

Equilibrium properties:
In equilibrium we find extensive herding. As can be seen in the description rule above, investors abandon their own signals, if they don’t match with already
chosen options, to follow the others except the first two investors. The first one always follows her signal if she has one and the second one as well (assumption 2). The intuition of the equilibrium found is best understood with the help of the following example due to Banerjee, which we present in a slightly altered way.

There are 100 people who want to dine in a restaurant. There are two restaurants (A and B). 98 people get signals to go to restaurant B and 2 people get signals to favour A. Now, assume that the first two decision makers, the only persons who independently follow their signals if they have received one, are the two favouring Restaurant A. Well, the story comes quickly to an end because starting with the third decision maker, everybody decides against his signal and 100 people end up eating in Restaurant A. A result which is surprising if we have a look at the a priori preference distribution. That is herding.

If we reconsider the model, it can happen that at the equilibrium nobody has chosen the best option \( i^* \), meaning that herding may lead to a suboptimal outcome. This can happen under the following condition: everybody chooses a different option and the following investor does not receive a signal. Then this investor chooses the option \( i \) with the highest value (assumption 3). Clearly, all following investors will do the same unless their signals match with an already chosen option, which can only be the case when the optimal option \( i^* \) is among the chosen options. Intuitively, the probability of a suboptimal herding outcome depends crucially on the quality of the signal. If the probability \( \beta \) of a true signal is low, the suboptimal outcome occurs almost surely.

5.2.2 Herd behaviour and Investment

Scharfstein and Stein (1990) present a model that explicitly takes into account interactions between investment and herding.

It includes some very interesting elements like risk sharing, labour market, image/reputation and distortion of incentives which were not present in the model above.

The basic idea is that investors may be reluctant to follow their own information because they fear that contrarian behaviour compared to market tendencies will damage their reputation as sensible decision takers. The reputation element can be summarized as follows: failing conventionally is better than succeeding unconventionally. Note, that even if this behaviour is clearly socially inefficient, it can be defended as an action taken by rational investors.

The model:

The economy of the model consists of two firms (A and B), run by managers (A and B, as well). These managers invest sequentially, A moving first. The duration of the game is of 3 periods and on date \( t=3 \) there are two possible market developments, either the markets went up (with prior probability \( \alpha \)) and the investment yields a profit of \( xH > 0 \), or the markets went down and the corresponding yield is \( xL < 0 \). As in Banerjee (1992), investors receive signals, but here every investor receives a signal. The difference is how they interpret it. The signal is either good (\( sG \)) or bad (\( sB \)) and the manager is either dumb
or smart with the prior probability $\theta$ of being smart. The manager, however, does not know if he is dumb or smart. This probability is reviewed after having executed his investments and denoted as $\theta'$. For herd behaviour to develop, the prediction errors of smart investors need to be at least partially correlated with each other. This means that there are systematically unpredictable factors affecting the future state that nobody can know anything about. It is exactly this common component of prediction errors which makes the model interesting. Investors actively try to influence the bias in their favour by following others.

Further, it is assumed that the labour market judges investors by their investment decision and is able to adjust these judgements after the investment has been executed. Following assumption 3, there is a linear relation between investors wages and $\theta'$. So, as a homo oeconomicus the investor has some incentive to rather create high values of $\theta'$ than to invest efficiently in the first round. And, due to assumption 6 the maximization problem can be reduced to maximise expected wages.

A selection of assumptions:

1. Labour market judges investors by their investment decisions only.
2. The investment game is played once more after $t=3$.
3. The investors spot market wages are set by competitive markets taking into account their investment decision/results only.
4. An investor invests if and only if he observes the good signal (only valid for the first round).
5. Investors maximize a weighted average of expected profits and their future compensation.
6. Investors are risk neutral.

Equilibrium:

At the equilibrium we remark that if Investor A invested, B invests as well regardless of his signal and the characteristics of the investment. Hence, if his signal was of the bad type and $(xL + xL) < 0$, the investment will be inefficient. Note that the order in which information arrives is crucial.

No subgame perfect equilibrium exists in which manager B's investment decision depends on the signal he received. On the other hand, there does exist an equilibrium if investor B always mimics investor A.

Herd behaviour is, as shown in this model, one possible explanation for excessive volatility and massive capital inflows into emerging market countries up until their financial systems collapsed. Members of a herd will tend to amplify exogenous shocks to financial markets.
In this section we review some of the numerous findings from the empirical literature on contagion.

As Kaminsky, Reinhart and Végh (2002) note, the most important question to be addressed is why in some cases crises result in contagion whereas in others repercussions are limited to one country only. However, a definite answer cannot be provided. This is for two reasons: first the above article is literally the only one that attempts to give an answer to this type of question. Second, other authors concentrate on either the detection of contagion in their data sets according to the definition adopted or an empirical evaluation of possible transmission channels presented above.

In a study on the propagation of currency crises, Glick and Rose (1999) try to assess why currency crises are often confined to one region instead of spreading globally. Contrary to prevalent theories of currency crises that stress the importance of macroeconomic and financial similarities among crises countries, such as real-exchange-rate overvaluation, banking system weaknesses or low international reserves that increase the likelihood of speculative success, they argue that macroeconomic phenomena are not regional, whereas trade patterns are. They start from the hypothesis that currency crises are regional because they affect clusters of countries tied together by international trade. Their argumentation draws on the trade linkages theory in that a successful speculative attack on one country necessarily leads to an economic downturn at it’s trading partner, which increases the probability of speculative success and therefore attack on the latter country. Contagion is the inevitable result.

More precisely Glick and Rose (1999) find evidence supporting the importance of trade linkages. They emphasize that crises are regional because strong trade linkages require geographical proximity. They also remark that those countries that are most adversely affected by competitive devaluations are expected to be hit next. Notice however, their findings are not necessarily regarded as evidence for contagion when one chooses a more narrow definition of contagion excluding ”fundamentals-based contagion”.

Kaminsky and Reinhart (2000) disagree with this interpretation on the basis that a discrimination between transmission mechanisms is difficult in practice. That is, a credible distinction between trade and financial linkages might be hard to establish since countries that extensively trade with each other, are usually also deeply financially integrated.

They find the following results: 1) in accordance with Glick and Rose (1999) they consider contagion a regional and not a global phenomenon, cautioning however, that the pattern could change with deepening financial globalization, i.e. growing inter-regional asset trade. 2) the probability of a domestic crisis is largely conditional on, and augmenting with, the number of countries already infected. This is a clear piece of evidence for "true contagion", since effects of fundamentals have been accounted for. Here, a country might be infected just because most other countries around it are already infected. 3) financial linkages are found to have more explanatory power than trade linkages. This
is particularly true for cases of contagion where bilateral and third party trade linkages were absent (e.g. Russia and Brazil).

They conclude by noting that much of what has been identified as trade linkage in previous studies should rather be regarded as financial sector linkages.

Searching for similarities among fast and furious contagion episodes, Kaminsky, Reinhart and Végh (2002) describe three empirical regularities that they find are present in all contagion situations where crises spread intra- or even inter-regionally: large capital inflows, a highly leveraged creditor and surprise. First, virulent contagion entailed sudden stops of capital inflows when they were at its peak, exhibiting the capacity of swift and drastic reversals. In their view, "...financial crises that have not set off major international dominoes have usually unfolded against low volumes of international capital flows." (Kaminsky, Reinhart and Végh, p. 5). A precondition is that debts have short-maturities so that banks and other lenders can quickly refuse to roll over debts and start calling in loans. The role of a highly leveraged common creditor has already been discussed in detail. Finally, surprise seems to be an essential feature for fast and furious events. If, in contrast, crises were anticipated, investors could gradually re-scale their exposure to the affected countries or hedge their positions so that crises would lose their furious element or maybe even stop spreading altogether. Less exposure, of course, entails less scope for detrimental portfolio rebalancing.

The above cited studies conducted empirical analysis with the help of low-frequency data, such as annual international capital flows to emerging markets or bilateral trade flows.

As explained in section 3, there exists a different strand of empirical literature which proposes the use of high-frequency data instead. Advocates of this view argue that it is the only reliable way to gauge the existence of contagion. These studies make use of the "excess co-movements" definition. Accordingly, contagion should be detected in data on asset prices, nominal exchange rates or interest rates. Another difference with low-frequency data studies lies in the fact that contagion can potentially be a short-lived phenomenon, too. That is, an adverse shock that dissipates rapidly but otherwise conforms to the definition of excess co-movements is regarded as contagious.

Kaminsky and Reinhart (2003) conduct a study in this spirit. Starting point is the hypothesis that financial turmoil can only spread globally, when asset markets in world financial centers are affected. Otherwise, spillovers are confined to the region of origin.

In order to measure the impact of idiosyncratic financial shocks on world asset markets they make use of two ubiquitous definitions in finance, weak-form and strong-form globalization. Weak-form globalization entails anomalous asset returns in a country following an extreme event (e.g. an asset return that is below/above the 5th/95th percentile of its distribution) in another country, i.e. the distribution of returns in the affected country changes but the magnitude of the change does not have to be extreme. With strong-form globalization, in contrast, an extreme event leads to another extreme event, too. That is, turmoil is spread through asset markets. Notice the crucial notion of simultaneous or
shortly-lagged events in their definition.

As to results, they find that turmoil in the US triggers weak-form globalization in Latin-America but not in Asian countries, whereas turmoil in Japan stimulates weak-form globalization in Asia but not in Latin America. Turmoil in Germany, in contrast, has the potential to cause weak-form globalization in Latin-America as well as Asia. As they point out, interestingly this spatial pattern of transmission matches exactly the emerging markets exposure of financial institutions in Japan, Germany and the US, suggesting that the pattern of global contagion hinges crucially on which financial center is affected in the first place.

With regard to strong-form globalization they find that the probability of an extreme asset return shock in an emerging market economy spreading globally is conditional on a simultaneous extreme shock (on the same day) in one or more of the world financial centers. Otherwise it is more likely that spillovers are confined to the same region. That is, they conclude that the Russian Crisis, for example, could only develop major global repercussions as London and Frankfurt were simultaneously adversely affected. These occasions usually coincided with frequent market rumors in financial centers, leading one to conclude that the effect of idiosyncratic emerging markets shocks was significantly magnified by new information available to international investors. This evidence lends support to the theory of rational or irrational cross-border shock propagation.

A last lesson can be drawn from their findings: they discover that events where repercussions are negative are more frequent than when they are positive suggesting that the propagation mechanisms work way better with adverse than with positive shocks.

Karolyi (2003) presents findings conducted with the same methodology but leading to dramatically different conclusions.

He too, searches for excess co-movements in high-frequency data. First he tries to assess the effect of international capital flows on emerging markets asset returns. In so doing he addresses the question whether the variability of these flows is in itself destabilizing for those markets or not. In case of "true contagion" the answer would be yes. However, his results point into a different direction. If there is an effect at all, then it is comparably small. He also reports results from a different estimation method called "co-exceedances", conceptually related to the one utilized by Kaminsky and Reinhart (2003). Co-exceedances are essentially the same as strong-form globalization in that they measure the number of days in which more than one country simultaneously exhibits extreme values of exchange rates, stock returns or interest rates. The aim of the empirical analysis is then to determine the conditional probability that a certain number of countries within a region such as Latin America or Asia exhibit co-exceedances on a given day (estimation is carried out with the help of a multinomial logistic procedure; we do not go into detail here). Considering results, Karolyi concludes that "Lttle contagion is detectable. For example, during the period of the Asian financial crisis, the incremental explanatory power of Asian co-exceedance events increased the goodness-of-fit in Latin America from 7.84% to 8.80% and that in the USA from 6.16% to 6.57% [i.e. the marginal effect
of an increase in Asian extreme events on the probability of extreme events in Latin America augmented the *Pseudo R*\textsuperscript{2} measure, comparable to OLS *R*\textsuperscript{2}, by ca. 1%; *sic*).

\section{Concluding Remarks}

We hope that the central message of this survey became clear: whatever evidence for contagion there may be, identification is conditional on the working definition chosen.

When it comes to potential policy measures against contagious financial crises this insight is crucial. All researchers agree that in case of contagion policy measures have to be adopted. However, researchers disagree about the threshold definition of contagion that justifies intervention. On the "fundamentals-based" side of contagion, Glick and Rose (1999) propose a more active role for the IMF as lender of last resort, given their finding that a currency crisis is very likely to spread to adjacent countries in the same region. In particular they advocate the need for a redefinition of the IMF’s conditional lending prerequisites. From this point of view, the IMF should provide extensive crisis management because countries might enter a crisis despite evident virtue, i.e. healthy fundamentals.

This critique takes up an often mentioned criticism against the IMF’s role during the Asian crisis. According to many economists the measures that the Fund imposed on Asian countries, such as higher interest rates were plainly counterproductive and even exacerbated the original problem without solving it.

On the other side of the spectrum, Karolyi (2003) fails to find evidence for his (very reduced) contagion definition. Therefore, he remarks that no urgent institutional changes are needed, since financial markets work properly.

More generally, one often proposed instrument to stop financial crises or in any case contagion, are capital controls. Nowadays, many economists regard this instrument with sympathy, since it can limit the variability of cross-boarder capital flows in times of crises. As an instrument over the long run, economists consider it unsuitable as it effectively denies a country the temptations of the world capital market.

Kaminsky, Reinhart and Végh (2002) have pointed out the role common leveraged lenders can play in fast and furious contagion episodes. They propose, and many economists agree, that governments should prohibit foreign currency denominated debt and limit the part of short maturities debt, both of which have played a detrimental role in the Asian crisis.

They conclude by observing that what is unfortunately needed to measure the efficacy of the proposed remedies is yet another round of contagious financial crisis.
References


