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THE SLOW SPREAD OF THE GLOBAL CRISIS*

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We argue that the depth and breadth of the spread of the current crisis from the US subprime market across the globe was due more to the buildup of substantial financial vulnerabilities prior to the crisis than to irrational panic during the crisis. We examine how these developments explain the belated recognition of the severity of the crisis and its slow spread through various channels of contagion. We also discuss lessons for policy and research.

Keywords: Financial crisis; contagion.

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1. Introduction

Every crisis is different in some way, but the current global financial crisis is especially different from the crises of the past decade (for reviews of earlier crises, see Kindleberger and Aliber (2005) and Reinhart and Rogoff (2009)). From the Mexican crisis in 1994–1995 through to the crises early in the millennium in Argentina and Turkey, the epicentres were emerging market countries and in most of these cases sticky exchange rate regimes and inadequate oversight of financial liberalisation were major causal factors. This crisis, however, started in the United States, a country with a highly flexible exchange rate and supposedly the most sophisticated financial system in the world. Another unusual feature was the slowness of the spread of the crisis, across both countries and parts of the financial and ultimately real sectors. Typically financial crises, once they hit, spread quite quickly, but the current crisis has played out in slow motion. Explaining the slowness of the spread of the crisis is one of the main objectives of this paper.

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The rash of emerging market crises in the mid and late 1990s and their spread beyond their originating countries has resulted in an outpouring of research and analysis on contagion, with sharp disputes over the mechanisms at work in a number of cases. For example, was the spread of the Asian crisis due more to irrational responses in financial markets that devastated innocent victims or due more to severe financial sector problems in these countries that had gone largely undetected by officials and the financial markets until the Thai crisis generated a forceful wakeup call that led to major revaluations of the riskiness of a number of currencies? And why did the crisis in Argentina in 2001 not generate the massive contagion that many officials had feared, based on the experiences of the Asian and Russian crises?

While there is no unanimous agreement on such deep questions, the recent literature on contagion has helped clarify a number of issues. It is now generally recognised that there are a number of different, potentially important channels of contagion and that the relative importance of these can vary from one episode to another. It is also clear that contagion can come with various degrees of severity. Thus, for example, it is quite true as the journalists reported that the ripples from the catastrophe in Iceland were felt in markets across the globe, but in most cases what was felt were just mild ripples. In terms of welfare costs, these bore no comparison to the effects of the capital flight from Indonesia that followed in the wake of the Thai crisis.

Thus in our analysis of the spread of the current crisis, we need to keep in clear focus both the multiple mechanisms or channels of contagion and the magnitudes of their effects. We begin in Section 2 with a brief review of the major channels of contagion. Section 3 offers our interpretation of the origins of the crisis and discusses the slowness with which the severity and global nature of the crisis was recognised. In Section 4 we discuss the transmission of the crisis to emerging market and developing economies. Section 5 concludes with a brief summary and discussion of some important lessons for policy and for future research.

2. Concepts of Contagion in Previous Crises

There is no single, generally accepted definition of contagion. All concepts have in common, however, the general idea of developments in one market or country affecting those in another (for further discussion and references, see Claessens and Forbes (2001) and Willett and Liang (2008)). While contagion often carries the connotation of the irrational transmission of shocks from one country to another, a broader definition that is also frequently used applies to any transmission effect, including those through trade flows where a recession in one country is transmitted to others through the real sector.

2.1. *Trade contagion*

Often labelled economic interdependence, such fundamentals-based contagion is perfectly consistent with fully efficient financial markets and may be considered the

polar opposite of irrational contagion transmitted through market hysteria or other types of market inefficiencies.

Such contagion through the trade channel helps explain why much contagion is regional in nature, since most countries trade more heavily with their neighbours. Recession in one country leads to a fall in demand for imports and thus transmits deflationary pressures to its trading partners. This was a major feature of the Great Depression in the 1930s. The severe recessions in the advanced economies during the current crises likewise led to sharp declines in exports of other countries, thus affecting even those countries who had few direct financial ties with the advanced economies.

2.2. *Rational financial contagion*

Between these extremes of trade-based fundamentals contagion and irrational panic are a host of possible types of at least partially rational transmission mechanisms operating through financial sectors. Losses in one market, margin calls and calculations from mathematical models of risk management can all result in a crisis in one country, leading to capital outflows from another country even though it otherwise has little connection to the crisis country. This financial interdependence operates similarly to trade interdependence and gives rise to the prospect of countries being "innocent victims" of crises in other countries. Generally, however, these forms of contagion are relatively mild unless a major trading partner or financial centres are involved. Thus, for example, while the Argentine crisis of 2001–2002 had detectable influences in markets in Asia, its major effects were on immediate neighbours. Russia's crisis had much broader effects because these came largely through its effects on the major financial centres like New York (Kaminsky, Reinhart and Vegh, 2003). Indeed Liang and Willett (2008) find stronger evidence of contagion affecting Asian bond prices during the Russian crisis than during the Asian crisis itself. In our interpretation these effects were so strong because they forced a major re-evaluation of a key operating assumption of the international financial markets — that Russia was too big or too nuclear to fail. The most relevant aspect of the Russian crisis was not the depreciation of the currency, which had been widely anticipated by the market, but the default on government debt, which was not. When such mental models are broken they typically lead to a strong flight to safety (Willett, 2000) and this is what happened in the Russian crisis. The limited financial fallout from the Argentine crisis, on the other hand, was largely due to its having been widely anticipated.

2.3. *Wake-up call contagion*

The strength of the contagion from the Russian crisis to most emerging market countries was intermediate, between the relatively mild ripple effects of the Argentine crisis on Asia and the devastating capital flight from Indonesia generated by the Thai crisis. While both the Thai and Russian crises broke important aspects of the markets' mental models, they generated strong capital flight and/or speculative attacks primarily

on countries, which following the "wake-up call", were seen to have important similar characteristics as the original crisis countries. After the Russian crisis, only a fairly limited number of countries suffered such attacks. The major effect on the majority of emerging market countries was a substantial increase in borrowing costs and/or temporary exclusions from the international capital markets. While not as harmful as a major speculative attack, the social costs involved would typically be considerably greater than, say, a five or ten per cent fall in stock market values. As we will discuss later, we see a similar pattern for emerging market countries in the current crisis.

In the Asian crisis, the strength of the spread of crisis was due in considerable part to the similarities of the financial sector vulnerabilities in the countries that were hardest hit by the crisis. Because of the initial failure of policy officials to recognise how much of the Asian contagion was due to the wake-up call from Thailand's crisis leading to the "discovery" of similar problems in other countries, fears of the severity of the contagion likely to be generated by future crises were for a time greatly exaggerated. The failure of much severe contagion to follow from the crises in Brazil and Argentina helped dampen these excessive fears.

As we will argue in the following section, in the current crisis we see strong similarities with the Asian crisis in that much of the breath of the crisis was due to the buildup of large financial vulnerabilities across many sectors of the financial system and many countries, particularly the advanced economies. For the typical emerging market country, the financial effects were more like the fallout from the Russian crisis.

2.4. *Contagion from market imperfections*

Shifts in the markets' appetite for risk are somewhat akin to wake-up calls and broken mental models resulting from recognition by investors and borrowers that they had not done sufficient homework and/or had been operating on the basis of false assumptions. The former explanation can be consistent with rational behaviour under costly and incomplete information. Sharp changes in risk aversion — as opposed to shifts in perceptions of risk or uncertainty — are much harder to square with rational analysis, but despite the intellectual discomfort that this may give some of us, we must recognise that there are at least occasionally, and perhaps much more frequently, sharp shifts in market behaviour that are hard to explain on other grounds. We certainly must acknowledge the possibilities that markets may at times become excessively optimistic or pessimistic and that there is sometimes a fairly rapid transition from one state to the other (Park and Song, 2001). While there is still disagreement about how difficult it is to identify bubbles in assets markets ex ante, there is now fairly widespread agreement that we have seen in recent decades a number of major bubbles that have been identified ex post (see, for example, Malkiel (2007). On identifying bubbles ex ante, see Caverley (2009), Smithers (2009) and Sornette (2003)).

It is also quite easy, however, to exaggerate the importance of irrational mood swings. It is quite convenient for bankers to argue that mark-to-market rules should be abandoned

during crises because the market is putting unduly low prices on assets and for officials to argue that market skepticism about their policies is due to unfounded pessimism. It is far from clear in the current crisis, however, that market prices for distressed assets are in general further off from the "true value" than the levels at which banks want to carry them on their books. Rather than the market initially overreacting the to Lehman Brothers' bankruptcy, Taylor (2008) has shown that the rise in risk spreads immediately afterwards were much less than occurred in the following days and weeks.[1] Taylor consequently places more emphasis on subsequent policy failures that generated increased uncertainty than on the Lehman bankruptcy per se. The continued climb in the risk spreads is consistent with herding behaviour where fear feeds on itself, but it certainly is not consistent with the view of initial panic and overreaction.

While discussions of the interrelationships between crises and market imperfections typically focus on undue pessimism and panic during crises, we believe that frequently more important is excessive optimism and poor analysis before crises. While undoubtedly there is overreaction during some crises, often the major factor at work is the popping of a bubble of excessive enthusiasm before the crisis; the ensuing panic often involves much more rational behaviour than during the good times before the crisis. In previous work the senior author has argued that this hypothesis fits the Asian crisis rather well (Willett *et al.*, 2005) and helps explain the extent of the contagion from Thailand. The excessive international borrowing and other forms of capital inflows to Thailand had been duplicated in several other Asian countries, so the wake-up call from the Thai crisis had quite powerful effects. In the current crisis the key vulnerability of the financial system was the high levels of leverage and excessive reliance on short-term borrowing. Thus, even investors holding good assets had difficulty rolling over financing when the subprime market got into trouble. In the Asian crisis a key vulnerability had been the huge amount of unhedged foreign currency borrowing. When the belief that there would be no large Asian currency depreciations was shattered, there was a quite rational scramble to cover open positions which led to huge capital outflows. Likewise, many foreign investors realised that they had put too much emphasis on the strong macro conditions in these countries and not enough on financial sector weaknesses.

3. The Crisis in the Advanced Economies

3.1. *An interpretation of the origins of the crisis*

3.1.1. *Overview*

We believe that this type of story of the buildup of substantial vulnerabilities across a number of markets and countries has considerable explanatory power with respect to

[1] We will follow the convention of referring to this stage of the worsening of the crisis as the Lehman Brothers bankruptcy, but this was only the most dramatic of a series of disasters that became apparent within a few days of each other, the problems with giant insurance company AIG being one of the most important.

the current crisis as well. If the US subprime market were the only source of problems, then there is no way to explain the magnitude of the global impact of the crisis except through irrational panic on an unprecedented scale. The price of risk had fallen to excessively low levels in a wide range of markets and countries as a result in part of strong growth and low inflation in most economies and the vast expansion of liquidity on a global scale. Early warnings came from a number of economists, including Martin Wolf of the *Financial Times*, international organisations such as the Bank for International Settlements (BIS) and even the Institute for International Finance, the organisation of major multinational banks. For example, in the concluding chapter of its 2004 Annual Report, the BIS, after praising "technological advances and deregulation" and "better risk management" for helping to make financial markets "more efficient and more resilient" (BIS, 2004), warned that the recent long period of economic and financial stability might be encouraging "imprudent lending behaviour" and noted with considerable foresight that "one structural vulnerability evident almost everywhere is the shortage of accurate information required to assess the health of corporations, that of institutions that have lent to them, and the resulting financial vulnerability of the economy as a whole" (BIS, 2004).

Some experts suggested that while the innovations in financial instruments and practices made the financial system more resilient in the face of small and medium size shocks, this might not hold true for large shocks. This view was proved to be all too true. However, the markets and national policy officials paid little attention and even those issuing such warnings about bubbles and the under-pricing of risks generally had little idea of the full magnitude of the risk that had built up in the system. Markets for securities such as asset-backed securities (ABS) and credit default swaps (CDS) had grown so swiftly that few were aware of their enormous scope. That the global wake-up call from the subprime crisis moved in such a slow fashion is due, in our interpretation, to the failure of most financial experts in the public, private and academic sectors to appreciate even approximately the amount of risk that had built up in the system.

While the massive financial innovations of the past decade had led to considerable diversification of risk, the degree of the resulting risk reduction had been greatly exaggerated and the opacity of many of the complex financial instruments and the moves by banks to create off-balance-sheet vehicles resulted in no one being fully aware of the extent to which institutions had become overextended.[2] Lax financial regulation and opportunities for regulatory arbitrage in the US and a number of other advanced economies, combined with widespread monetary ease, allowed financial institutions to greatly increase leverage. This allowed them to maintain good returns in the short-run despite the downward pressures that the global liquidity glut had put on yields. While looking good in the short-run, such strategies left these institutions highly exposed to longer-term risks.

[2] For a particularly good explanation of the nature of mortgage-backed securities and how their complexity and opacity effectively destroyed huge amounts of important information, see Gorton (2008).

3.1.2. *Regulatory and management failures*

One of the most blatant examples of regulatory and management failure was the treatment of CDSs. These were essentially insurance contracts that would pay off in the event of a default, thus allowing investors to hedge against the risk of default on bonds they had purchased. In themselves, these CDSs were quite a useful financial innovation. The problem was that unlike the sales of traditional insurance, where regulators require capital to back insurance sales, it was ruled against economic logic that CDSs were not legally insurance and thus not subject to regulation. As long as a crisis did not hit, the fees from selling CDSs could be quite profitable. In the case of AIG, the senior management seems to have had little understanding of what its CDS unit was doing and, as a result, AIG issued hundreds of billions of CDS contracts for which little provision for payouts was set aside. When the crisis hit this small unit (in terms of personnel), it generated such huge losses that they more than offset the solid performance of all of AIG's traditional businesses.

As the crisis gathered steam, there was a long stream of surprises about how widely toxic assets had been spread throughout the global financial system and how much leveraged risk had been taken on. A number of false beliefs or deficient mental models had led many of the participants in the housing and financial markets to greatly underestimate the amount of risk they were taking on. The grossly excessive ratings given to many exotic securities by the ratings agencies were an important contributor to this process.

False assumptions ranged from the simple but widespread notion at the national level that house prices could never fall to more sophisticated, but equally wrong, assumptions that modern financial engineering had conquered risk (Willett, 2009). The resulting hubris led to inattention and the buildup of dangerous positions throughout the financial systems of most of the advanced economies. Housing bubbles were not limited to the United States (Shiller, 2007). Many of the exotic securities were purchased by buyers across the globe.

3.1.3. *Excessive leverage and credit system vulnerability*

The key to why the current crisis has had much greater effects than the bursting of the dot-com bubble is not that the initial loss of wealth in this crisis was larger, but that the initial damage done to the operation of the credit system was so much greater. This in turn was due both to large exposures of financial institutions to subprime mortgage-backed securities and to the high levels of leverage. The implosion of some hedge funds and the bankruptcy of some mortgage companies — the first public signs of the emerging financial crisis — were not in and of themselves of great importance. What they did, however, was to begin to sow the seeds of distrust throughout the credit system. And in a system that had become much more highly leveraged and opaque than many regulatory officials had recognised, this was a highly dangerous development.

Problems escalated greatly when the positions of major financial institutions came under question. It was belatedly recognised that there were a lot of highly toxic assets spread throughout the system, but no one knew just where. As a result the market shifted from virtually ignoring possible risks to seeing them everywhere. While initially opacity and excessive faith in financial alchemy led investors to generally underestimate risks, the wake-up calls of the earlier stages of the crisis led many to, if anything, overestimate the risks. With the complicated financial structure including large off-balance-sheet operations that had accounted for so much of the recent growth of financial markets, there was little useful information available to allow sensible evaluations of counter-party risks. A major argument for the US government putting in billions of dollars to meet AIG's obligation to counterparties was to calm such fears, but this strategy was far from fully successful (of course, the situation might have grown even worse without the bailout). Under conditions of such extreme uncertainty, it is quite understandable that market participants became extremely risk-averse which led to a number of types of credit markets virtually ceasing to function.

The increasing recognition of the severity of problems in the credit system is closely mirrored by movements in the TED spread — the spread between euro currency and US Treasury bill rates (Fig. 1). This is a widely used measure of the degree of perceived combined credit and liquidity risks in the credit system.[3] Note in Fig. 1 that US stock prices do not begin to react until much later than the TED spread.

In the early stages, officials, financial market participants and economists generally failed to foresee the magnitude of the emerging disaster because they understandably focused on the likely magnitude of losses resulting from mortgage defaults. It was not generally recognised the extent to which numerous financial institutions had become leveraged and dependent on short-term borrowing to finance illiquid longer-term investments. Much of this high leverage and dependence on short-term financing was due to the proliferation of off-balance-sheet special purpose vehicles (SPVs) and conduits created by financial institutions to help reduce capital requirements and "enhance" their returns from asset-backed securities and other new financial instruments. With the high leverage of these, SPVs were enormously profitable as long as growth remained strong and short-term credit remained cheap and easily available. But they were likewise highly vulnerable to any downturn. Particularly damaging was that the paper from the Deutsche Industriebank (IKB) — a mid-sized bank in Dusseldorf — had been highly rated. While faith in the credit ratings was beginning to fall, threats of sales of asset-backed securities held as collateral against loans led to increased recognition of how thin and illiquid the market for many of these securities really was.

[3] The spreads among other types of financial instruments can be used to approximately break down these combined risks into their liquidity and credit risk components. While officials initially tended to emphasise the lack of liquidity, it became clear that it was concerns about credit risks that were generating the lack of liquidity and that in many cases this flight to safety was based on plausible concerns about solvency, not just irrational market panic.

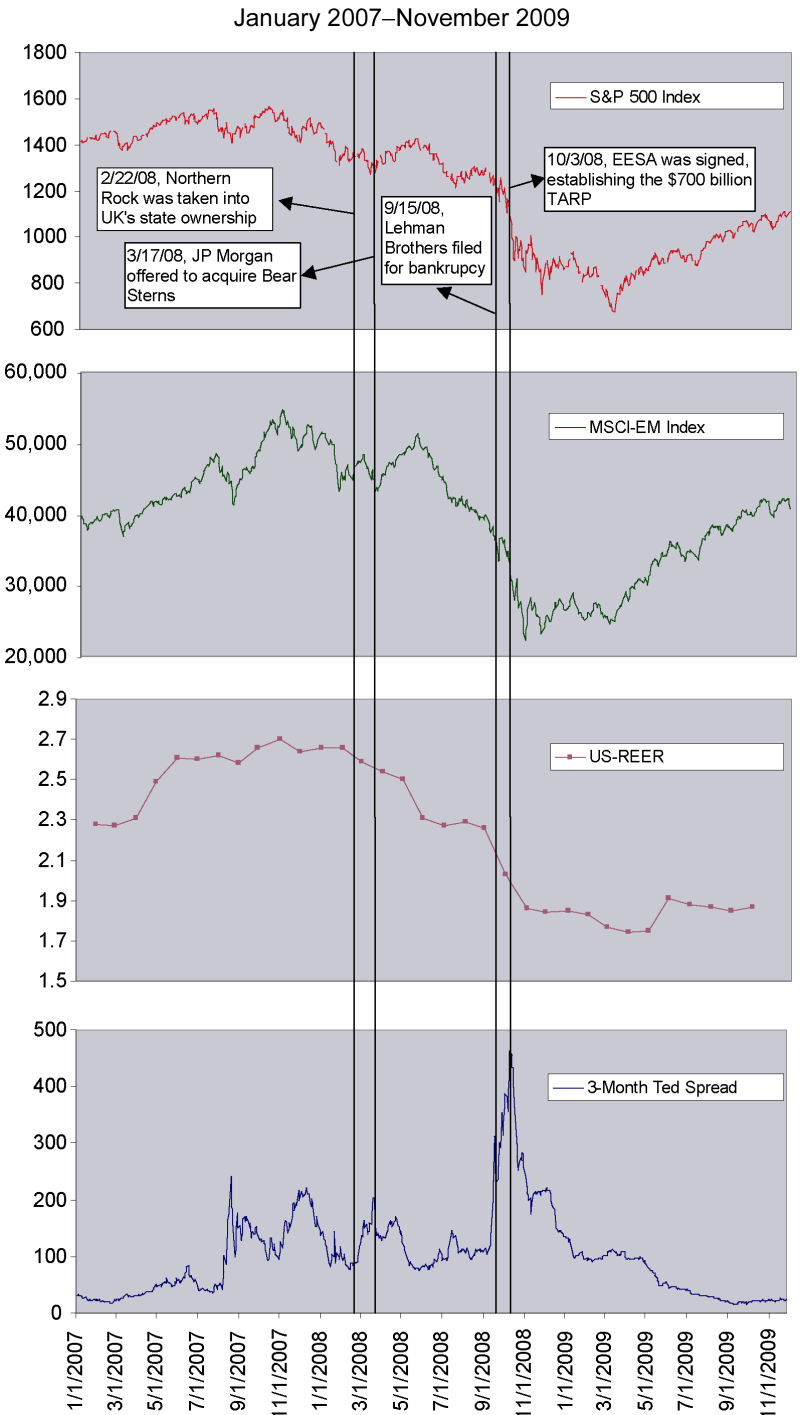

Figure 1. The S&P 500, MSCI-EM Index, US real effective exchange rate (REER) and three-month TED spread

Source: Bloomberg. MSCI-EM (Standard Core, local currency); US REER (36 trading economies weighted).

3.2. *A chronology of the start and spread of the crisis*[4]

The initial stages of the end of the housing bubble made little impact on perceptions except for those most directly concerned with real estate and its financing. The Case–Shiller index of US house prices peaked in July 2006. Concerns in these sectors began to mount in the fall of 2006. In October of that year, the homebuilder Kara Homes filed for bankruptcy and Karen Weaver, an analyst at Deutsche Bank in New York, put out an influential report warning of the coming housing crunch. By this time, some individuals and institutions like Goldman Sachs had begun to bet on a housing crash, but many institutions such as Bear Stearns, Lehman Brothers and Merrill Lynch remained quite bullish. Within the bullish institutions, warning signals were sometimes raised by careful analysts, but these were generally ignored by the top policy makers. And the bulls were typically making highly leveraged bets. For example, Merrill Lynch's leverage doubled from 16 in 2001 to 32 in 2007.

In the spring of 2007, Treasury Secretary Paulson told Congress that the subprime problem "appears to be contained" (Tett, 2009). The Dow Jones Industrial Average closed above 14,000 for the first time in its history on July 19, 2007. During the same month, Fed Chairman Ben Bernanke estimated that the losses related to the subprime crisis would be within the $50 to $100 billion range and told Congress that "we see no broader spillover to banks or thrift institutions from the problems in the subprime market" (Tett, 2009). At this point, it was still generally believed that the losses from the subprime crisis would fall primarily on the United States.

In June 2007, however, news broke about trouble at hedge funds run by Bear Stearns that were heavily into subprime mortgage-related securities. These were the first signs to which the broader financial system paid much attention. In Europe in July 2007, troubles were recognised at two of the investment vehicles of IKB funds. This was significant because these operations were funded heavily by the issuance of short-term commercial paper, which had been considered a safe conservative place to park short-term money. As a result, investors in the asset backed commercial paper (ABCP) market began to grow nervous.

In mid-July, Bear Stearns announced the closure of its two troubled hedge funds and in the following months the large French bank BNP Paribus froze redemptions from three of its hedge funds. By this time the volatility of stock markets had begun to increase but there were no sharp plunges in the advanced economies. In August there was a brief but sharp unwinding of the carry trade in which investors borrow in low-interest-rate currencies and invest in what are expected to be high-yield currencies.

More ominously, rumours began to circulate in London that one or more large European banks were about to collapse. This had strong effects in debt markets, which

[4] A number of valuable articles and books on the crisis have now been published and our account draws heavily on them. See Bamber and Spencer (2008), Barth *et al.* (2009), Calomiris (2008), Cassidy (2009), Cohan (2009), Faber (2009), Gelinas (2009), McDonald and Robinson (2009), Munchau (2009), Posner (2009), Shiller (2008), Sorkin (2009), Soros (2008), Sowell (2008), Tett (2009), Tibman (2009), Wessel (2009) and Zandi (2009).

caught officials by surprise and led to unusually large injections of liquidity by the European Central Bank (ECB). In September the growing problems were brought to the attention of the wider public with the runs on Britain's Northern Rock. This shattered the widespread assumption that the problems would be limited just to housing and the shadow banking system of bank-sponsored hedge funds and special investment vehicles (SPVs).

Downgrades of MBSs escalated and volumes in the ABCP markets began to fall sharply. There was still little appreciation of the magnitude of the toxic assets that had become spread throughout the financial system, but it became much more widely recognised that problems were serious. By mid-October the lowest investment-grade rated MBSs were selling at only 30 cents on the dollar and even the top-rated AAA securities were selling at a 10 per cent discount. By this point the auction rate securities market started to seize up and auctions began to fail, converting what had been one of the most liquid markets, favoured especially for investments by states and municipalities for placing funds in the short-term, into a highly illiquid one. In mid-November problems with the investment fund that the state of Florida operated for its municipalities became public and toward the end of the month Florida was forced to freeze redemptions from the fund. By this time 80 subprime lenders in the US had closed and the heads of Merrill Lynch, Stanley O'Neil, and of Citigroup, Charles Prince, had resigned.

In February 2008 the first public signs of trouble at the giant insurer AIG emerged, when it admitted that its auditors had found "material weakness" in its low levels of capital reserves against its sale of credit default swaps (CDSs). The big drama around this time, however, was the "run" on Bear Stearns. As an investment bank Bear Stearns did not take deposits, so this did not take the form of a traditional bank run. Rather, its stock price plunged and, more disastrously, other financial institutions began to reduce their willingness to lend to Bear Stearns, even in the short-term, and began to require greater collateral when they would lend. Since Bear Stearns had become highly dependent on short-term borrowing to finance longer-term investments, being closed out of the interbank borrowing market was a death sentence which soon came to pass. While top officials at Bear Stearns continued to maintain that they were the victims of false rumours and greedy short sellers who were generating a self-fulfilling speculative attack on a sound institution, it looks ex post like the speculative attacks were well-justified.

Tense weekend negotiations in March led to the takeover of Bear Stearns by JP Morgan Chase. This limited the amount of immediate fallout on the financial system compared with the subsequent bankruptcy of Lehman Brothers in September. While the summer of 2008 passed without major disasters, the situation at the US quasi-governmental mortgage lenders and insurers, Fannie Mae and Freddie Mac, continued to worsen and on September 8, they were effectively nationalised. The fallout from this was fairly mild, however, compared with that from the failure of Lehman Brothers soon after, on September 15. There has been considerable debate both on why the US

government did not save Lehman and whether this was a wise or disastrous decision, but there is no question that the effects of it, combined with the huge government bailout of AIG a few days later, generated a new phase of the crisis.

Other unsettling developments during this week were the Bank of America's acquisition of Merrill Lynch, which was widely viewed as a reflection of the weakness of Merrill Lynch, and subprime securities losses at a major money market fund (MMF) that had caused it to "break the back", the first time investors in supposedly super safe MMFs had lost money. The Federal Reserve stepped in fairly quickly to limit the damage to confidence by offering a temporary guarantee for MMFs, but confidence in other parts of the financial system continued to fall.

A whole new dimension of concern about counterparty risk for trades with the major banks themselves had been added to the system. And by this time, mounting estimates of losses had led to rising concerns about solvency as well as liquidity throughout the financial system. Since highly leveraged investment structures based on extremely faulty assessments of risk were so widespread throughout the system, a relatively small set of initial problems escalated through the system and heavily damaged the networks of trust on which the credit system operated. This feedback loop led to limitations on credit availability to the real sectors, which in turn led to recession and the resulting increases in payment problems with business and consumer debt.

With high leverage, a small underlying loss is greatly magnified, in many cases causing even super senior AAA tranches of structural securities to lose substantial value.[5] The reason that the bursting of the dot-com bubble had such little effect on the real economy was that there was a good bit less leverage and it did not seriously impair the functioning of the credit system. This crisis did, and as a consequence even super easy monetary policies could have only limited effects in protecting the real economy from a severe downturn. The result of the extreme lack of information and understanding about how overextended many financial systems had become led to the slow speed with which the crisis spread. In our judgement, this explains much more of the progress of the crisis than any swing to excessive pessimism by market participants.

It is useful to remember that while the general use of the word "panic" refers to psychologically motivated behaviour, behaviour during financial panics may be quite rational. There are collective action problems at work and individually rational behaviour can lead to collectively destructive outcomes. In earlier stages of the crisis, when many officials believed that the problem was primarily one of illiquidity and not of insolvency, it was plausible to conjecture that psychology was playing a major role. It has become increasingly clear, however, with the passage of time that official views, perhaps in part influenced by wishful thinking, initially greatly understated the true magnitude of the problems and that what has been at work has been the corrections of excessive optimism preceding the crisis rather than excessive pessimism during the crisis.

[5] These were the safest portions of the securities and would be the last to take losses.

A major irony of this widespread flight to safety was that it led to a substantial strengthening of the US dollar. Although the crisis had clearly started in the United States, US government paper was still viewed as the safest global asset to hold. As a result, international as well as US investors switched heavily to US government bonds and especially short-term Treasury bills, and the risk spreads on other US and global financial assets generally went sky-high. It was at this point also that strong effects from the crisis began to hit many emerging market and developing countries. This process will be detailed in Section 4.

3.3. *The slow escalation of estimates of financial and output losses*

As projections of US losses mounted, so did recognition of the vulnerability of financial institutions in other advanced economies. Not only was there considerable direct exposure to securities based on US subprime mortgages, many other assets were also beginning to lose value. And as effects began to be seen in the real sector, heavy losses on a wide range of loans and credit card debt were anticipated. In April 2008 the IMF was estimating global financial system losses of close to $1 trillion, with about half of this being due to direct exposure to the US subprime mortgage market. These estimates were progressively raised as the crisis deepened, reaching a high of $4.1 trillion. In the April 2009 *World Economic Outlook*, losses of $2.7 trillion were estimated for the US and $1.3 trillion for Europe and Japan (IMF, 2009a).

At the same time as estimates of losses rose, projections of economic growth declined. Table 1 shows the progressive revisions of IMF estimates for aggregate world growth and for the US, the euro area and the aggregate of emerging market and developing economies for 2007, 2008 and 2009. These projections were typical of a wide range of forecasters and, with few exceptions, showed a steady lowering of projections for the US and euro area as we proceeded through 2008. This continued on through mid-2009. Table 1 also shows a slight downward trend in the IMF's growth estimates for emerging market and developing economies beginning in the fall of 2008. The projections for 2009 fell from 6.7 per cent in July 2008 to 1.6 per cent in April 2009.

As the crisis began to hit the real economy, most governments in the advanced economies responded strongly with monetary and fiscal stimulus as well as with non-traditional measures such as guarantees of banking sector debt and the creation of numerous special financing facilities.[6] While there has been considerable debate about the forms of these responses and whether stimulus packages were too large or too small, they have clearly been an important factor in keeping the severe recessions in the advanced economies from turning into another Great Depression as some had

[6] For discussions of these responses, see various issues of the IMF's *World Economic Outlook*. A particular useful discussion of the policy responses in the US is given in Wessel (2009). On the responses in Asia, see ADB (2009) which estimates that the fiscal stimulus adopted by eleven major Asian countries averaged a little over 7 per cent of GDP.

Table 1. Periodic Projections of World Economic Growth by the IMF

	2007					2008									2009							2010	
	Projection				Actual	Projection								Actual	Projection							Projection	
World output	Sep-06	Apr-07	Jul-07	Oct-07	April-09	Sep-06	Apr-07	Jul-07	Oct-07	Apr-08	Jul-08	Oct-08	Nov-08	April-09	Apr-08	Jul-08	Oct-08	Nov-08	Jan-09	Apr-09	Oct-09	Jan-09	Apr-09
World		4.9	5.2	5.2	5	4.9	4.9	5.2	4.8	3.7	4.1	3.9	3.7	3.2	3.8	3.9	3	2.2	0.5	−1.3	−1.1	3.0	1.9
Advanced economies	2.7	2.5	2.6	2.5	2.7	2.7	2.7	2.8	2.2	1.3	1.7	1.5	1.4	0.9	1.3	1.4	0.5	−0.3	−2	−3.8	−3.4	1.1	0
United States	2.9	2.2	2	1.9	2	3.2	2.8	2.8	1.9	0.5	1.3	1.6	1.4	1.1	0.6	0.8	0.1	−0.7	−1.6	−2.8	−2.7	1.6	0
Euro area	2	2.3	2.6	2.5	2.7	2	2.3	2.5	2.1	1.4	1.7	1.3	1.2	0.9	1.2	1.2	0.2	−0.5	−2	−4.2	−4.2	0.2	−0.4
Japan	2.1	2.3	2.6	2	2.4	2	1.9	2	1.7	1.4	1.5	0.7	0.5	−0.6	1.5	1.5	0.5	−0.2	−2.6	−6.2	−5.4	0.6	0.5
United Kingdom	2.8	2.9	2.9	3.1	3	2.5	2.7	2.7	2.3	1.6	1.8	1	0.8	0.7	1.6	1.7	−0.1	−1.3	−2.8	−4.1	−4.4	0.2	−0.4
Emerging-market and developing economies	7.2	7.5	8	8.1	8.1	6.9	7.1	7.6	7.4	6.7	6.9	6.9	6.6	6.1	6.6	6.7	6.1	5.1	3.3	1.6	1.7	5	4
Central and Eastern Europe	5	5.5	5.7	5.8	5.4	4.8	5.3	5.4	5.2	4.4	4.6	4.5	4.2	2.9	4.3	4.5	3.4	2.5	−0.4	−3.7	−5.0	2.5	0.8
Russia	6.5	6.4	7	7	8.1	6.1	5.9	6.8	6.5	6.8	7.7	7	6.8	5.6	6.3	7.3	5.5	3.5	−0.7	−6	−7.5	1.3	0.5
Developing Asia	8.6	8.8	9.6	9.8	10.6	8.3	8.4	9.1	8.8	8.2	8.4	8.4	8.3	7.7	8.4	8.4	7.7	7.1	5.5	4.8	6.2	6.9	6.1
China	10	10	11.2	11.5	13	9.5	9.5	10.5	10	9.3	9.7	9.7	9.7	9	9.5	9.8	9.3	8.5	6.7	6.5	8.5	8	7.5
India	7.3	8.4	9	8.9	9.3	7.1	7.8	8.4	8.4	7.9	8	7.9	7.8	7.3	8	8	6.9	6.3	5.1	4.5	5.4	6.5	5.6
ASEAN-5*	5.6	5.5	5.4	5.6	6.3	6	5.8	5.7	5.6	5.8	5.6	5.5	5.4	4.9	6	5.9	4.9	4.2	2.7	0	0.7	4.1	2.3
Brazil	3.9	4.4	4.4	4.4	5.7	3.9	4.2	4.2	4	4.8	4.9	5.2	5.2	5.1	3.7	4	3.5	3	1.8	−1.3	−0.7	3.5	2.2
Mexico	3.5	3.4	3.1	2.9	3.3	3.5	3.5	3.5	3	2	2.4	2.1	1.9	1.3	2.3	2.4	1.8	0.9	−0.3	−3.7	−7.3	2.1	1

Notes: *Projections made on or before October 2007 are for ASEAN-4; projections made after October 2007 are for ASEAN-5.

feared. Strong stimulus packages in emerging market economies such as China and South Korea have also had an important influence.

By the summer and fall of 2009, conditions had begun to stabilise and many analysts began to believe that the worst was over. In its October 2009 *World Economic Outlook*, the IMF revised upward many of its growth projections, ending the two-year pattern of progressively worsening projections. Estimates of financial losses were likewise revised downward, from $4.1 to $3.4 trillion. On a more pessimistic note, however, the IMF estimated that only about half of the losses to industrial country banks had been recognised on their books to date.[7]

4. Transmission to Emerging Market and Developing Economies

4.1. *Overview*

With this background, let us turn to a brief overview of the transmission of the crisis from the United States and Europe to emerging market and developing economies. Mimicking expectations about the effects on the US, the initial view was predominantly that Asian and other emerging market countries would be little affected by the subprime crisis. Unlike the European banks, most emerging market financial institutions had little direct exposure to the US housing market and many of these countries had accumulated large international reserve positions and had adopted fairly flexible exchange rate regimes. The pricking of stock market bubbles in some emerging markets such as China appear to have been primarily caused by internal factors (Liang, Ouyang and Willett; Sun and Zhang, 2009). Discussions of decoupling were all the rage.

As the crisis in the advanced economies began to hit the banking sectors, however, this optimistic view was dashed. While only a limited number of highly vulnerable countries were hit by strong speculative attacks, a much broader range of countries were hit both by a substantial reduction in international capital flows and a sharp fall-off in exports as the advanced economies moved into recession and trade credit dried up.

4.2. *Real transmission and the decoupling debate*

The meaning of decoupling varied from one commentator to another, in some discussions referring to financial markets and in others to the real economy. The general idea, which had some truth, was that with the emergence of strong regional trade integration in some groups and the strong growth performance of the BRICs (Brazil,

[7] For an argument that by 2009 opinion had swung too far in the other direction and exaggerated the amount of toxic assets on the books of financial institutions, see Milne (2009). His worst-case scenario yields projections of losses to the advanced economies' financial sectors of roughly the same magnitude as the IMF's, but Milne argues that roughly half of these are due to illiquidity problems.

Russia, India and China), the global economy was less dependent on the United States to be an engine of growth than in the past. As is so often typical with popular hypotheses, the importance of these new developments tended to be greatly exaggerated. For example, while intra-Asian trade has grown enormously, much of this has been sales of intermediate products to China, which processes them and re-exports them to the US and other advanced economies. Thus, these other Asian economies are more dependent on Asian exports to the US than their bilateral trade flows would suggest (Athukorala and Kohpaiboon, forthcoming; Eichengreen and Park, 2008; Pula and Peltonen, 2009).

The debate is also complicated by past tendencies to exaggerate the importance of the US for growth in the rest of world. While the results of relevant empirical studies are somewhat mixed, they generally support views that lie between the US dominance and extreme decoupling views (for useful evidence and reviews of other studies, see IMF (2007) and Kose *et al.* (2008)). This IMF study suggests that the mild slowdowns in the US historically have had very little effect on growth in emerging market and developing countries, but that severe US recessions have had large impacts. This suggests that during the initial stages of the crisis, some moderate versions of decoupling arguments made considerable sense, but when the full magnitude of the crisis became apparent, the substantial impacts abroad which had occurred should have been expected from past experience.

As one looked around internationally to see which countries were likely to be most vulnerable to the fallout from the growing financial problems in Europe and the United States, Asia was generally off the radar screen. The quality of the banking and financial systems in Asia had in general improved substantially since the crisis of 1997. The only initial concern in Asia was with Korea. Despite having over $200 billion in international reserves, Korea had two perceived sources of vulnerability: the high proportion of foreign ownership in the sagging Korean stock market and the high level of short-term borrowing by banks in Korea (for a detailed analysis of the Korean case, see Willett *et al.* (2009)). As the extent of the troubles in the US and European financial systems became more apparent, it became clear that there would be economic downturns in Europe and the United States. At this point there remained many advocates of the view that the BRICs would serve as a replacement engine of growth. However, the sharp falls in exports of many emerging markets as the crisis progressed have shown that to be a seriously over optimistic view. There has clearly been substantial contagion of the fundamental variety through international trade.

US imports tend to be strongly procyclical so that strong US slowdowns tend to lead to quite large falls in imports. This historical pattern has held up in the current crisis. Studies suggest that while the strength of real spillover effects of US growth to other countries vary substantially across regions, its effects are especially strong on other advanced economies, Latin America and, to a somewhat smaller extent, Asia and that these effects are transmitted rather rapidly (again, see the analysis and references in IMF (2007) and Kose *et al.* (2008)). This pattern has continued during

Table 2. Output Growth and Trade Growth

		2006	2007	2008	2009**
A. Output Growth					
World		5.1	5.2	3.0	−1.1
Advanced Economies		3.0	2.7	0.6	−3.4
United States		2.7	2.1	0.4	−2.7
Euro area		2.9	2.7	0.7	−4.2
Japan		2.0	2.3	−0.7	−5.4
Emerging and Developing Economies		7.9	8.3	6.0	1.7
Brazil		4.0	5.7	5.1	−0.7
Russia		7.7	8.1	5.6	−7.5
India		9.8	9.4	7.3	5.4
China		11.6	13.0	9.0	8.5
Mexico		5.1	3.3	1.3	−7.3
B. Trade Growth					
World	Trade	9.1	7.3	3.0	−11.9
Advanced Economies	Exports	8.6	6.3	1.9	−13.6
	Imports	7.6	4.7	0.5	−13.7
Emerging and Developing Economies	Exports	11.0	9.8	4.6	−7.2
	Imports	12.4	13.8	9.4	−9.5

Source: IMF World Economic Outlook October 2009; trade includes goods and services.
Note: **IMF estimates.

the current crisis (see Table 2). Consistent with the experience of previous recessions, close neighbours of the advanced economies were particularly hard hit, as shown in Table 2. The difference in growth rates between 2007 and 2009 for the United States' neighbour, Mexico, was over 10 per cent, from 3.3 to −7.3, while the average for emerging and developing economies was 6.6 per cent, from 8.3 to 1.7, close to that of the advanced economies which as a group fell by 6.1 per cent, from 2.7 to −3.4. It is ironic that the United States, which bears the largest albeit far from exclusive blame for the crisis, has borne a below average fall in growth of 4.8 per cent, from 2.1 to −2.7 (IMF, 2009b).

Of course, too much should not be made of these exact numbers. The fall pain of the crisis will not end with the beginning of 2010 and comparisons with 2006 are as reasonable as with 2007, but the qualitative story is unlikely to change substantially with different comparisons.

Table 2 indicates that there is some validity to a mild version of the decoupling in that China and India have been able to maintain substantial lower growth rates in 2009, but we also see that not all of the BRIC countries are the same. Russia has suffered one of the largest growth collapses, from 8.1 per cent in 2007 to −7.5 in 2009. Table 2 also

shows the substantial fall-off in the growth of international trade in 2008 as the crisis worsened, and the contraction of international trade by over 10 per cent in 2009.

4.3. *Varieties of financial contagion*

The transmissions through the financial sectors have been more complex. For stock markets, Dooley and Hutchison (2009) point to May 2008 as the end of any plausible decoupling view.[8] Up to that point there had been rather steady falls in the US stock markets but strong performance in many of the emerging markets. By summer 2008, however, many emerging market stock markets began to fall as it became clear that their economies would not escape the global recession. As capital flows to emerging markets began to fall substantially, so did these countries' exports.

The main areas of initial concern were the Baltic and Central and Eastern European states that had large current account deficits and huge foreign liabilities, especially to Western European banks. Iceland also fit into this category. These countries, along with Korea and a few others, developed strong speculative pressure against their currencies. Globally, however, such speculative concerns were the exception. The majority of emerging market and developing economies were hit instead by a milder but still quite painful form of contagion, a general flight to quality and portfolio rebalancing that was largely unconnected to developments in their economic and financial sectors (Rose and Spiegel, 2009). This is often referred to as the common lender channel of contagion. As discussed in Section 2, such contagion can be quite rational, but it still leaves many innocent victims in its wake.

After the Asian and Russian crises 1997 and 1998, there was a sharp fall-off of private capital flows to emerging market and developing economies, with net annual flows averaging below $100 billion until 2003. From 2004 through 2006, these net flows averaged over $200 billion and then surged to over $600 billion in 2007. As the crisis worsened, however, there was a general flight to safety, which generated a sharp cutback in these flows to a little over $100 billion in 2008 and an estimated net outflow in 2009 of almost $200 billion (Rajan, 2009; IMF, 2009a). Especially hard hit were countries using short-term borrowing to cover substantial current account deficits.

Over this period, net direct investment to emerging market and developing countries continued to rise until 2009, when it fell over $100 billion but still remained above $300 billion. Both portfolio and bank flows turned negative in 2008 and continued to do so in 2009, with net outflows of almost $400 billion in portfolio flows and over $400 billion for other private capital flows (largely bank flows) in the two years

[8] Several other studies have focused on specific aspects of the spread of the crisis. Eichengreen *et al.* (2009) look at effects on the rates on credit default swaps for major banks, while Frank and Hesse (2009) look at the effects on sovereign bond spreads. Dooley and Hutchison (2009) look at both CDS spreads and equity market correlations. Several other studies, including Angkinand *et al.* (2009) and Psalida and Sun (2009), also look at equity market relationships and Fratzscher (forthcoming) and Melvin and Taylor (2009) analyse exchange rate movements. Developments in fixed-income markets are analysed by Dwyer and Tkac (forthcoming).

combined. Some of the fall-off in capital flows was cushioned by the use of international reserves, with the aggregate accumulation of reserves for the group falling from over $1,200 billion in 2007 to below $900 billion in 2008 and an estimate of under $300 billion for 2009. Still, the effects on many of these countries were quite substantial.

While this issue will require thorough analysis as more data becomes available, especially on gross as well as net flows, it appears that there was a broad-based cutback in capital flows to emerging market and developing countries consistent with a general flight to safety caused by increased perceptions of risk combined with a need for more capital at home to offset losses, margin calls and the drying up on liquidity. Superimposed on this general scaleback, however, was a good deal of differentiation based on market perceptions of which countries were most vulnerable. Thus, for example, the Baltic states with huge current account deficits and large bank borrowings were especially hard hit, as was Korea in Asia. And of course the implosion of Iceland was in a class by itself (on Iceland, see Boyes (2009) and Jonsson (2009)).

5. Conclusion: Some Lessons for Policy and Research

In our interpretation, the spread of the current crisis from the US subprime market across the globe was due much more to overextensions of leverage and excessive risk-taking in many markets worldwide than to irrational panic. There was certainly plenty of panic, but much of it was quite rational. We argue that the current crisis has a strong similarity with the Asian crisis a decade before in that while there were substantial inefficiencies in the operation of financial markets, these inefficiencies, while less readily apparent, operated much more strongly in the booms and bubbles prior to the crises than during the crises themselves.

The global wake-up call from the subprime crisis moved in such a slow fashion because of the high degree of opacity and interconnectedness in the financial system. With the explosion of derivatives such as asset-backed securities and credit default swaps, no one — whether trader, risk manager, hedge fund manager, regulator or academic expert — understood the huge magnitude of exposed financial positions that had been built up in the system and the extent of their interdependence. The scope of these vast interconnections only became apparent as the crisis spread from one segment of the financial system to another. Through these financial channels, most emerging market economies initially escaped harm. Only those viewed as being highly vulnerable because of such factors as large current account deficits and heavy short-term foreign borrowings felt strong initial effects. As the crisis began to hit the real sectors in the US and Europe, however, most emerging markets were hit hard through the trade channel. Thus the full force of the crisis on real sectors only began to be felt in late 2008 and 2009. While there may be some truth in some of the milder versions of the decoupling hypothesis, the strong versions have clearly been discredited by the global crisis.

5.1. *The simple "government versus the market" debate is seriously flawed*

It is extremely important that appropriate lessons be drawn from this crisis. Of course, any phenomenon as complex as this global crisis has many facets. Despite the understandable urge to find a single dominant cause, such a search will be successful only within the excessively narrow confines of strong ideologies or wholehearted commitments to strong forms of particular theories within economics. Already, in the political arena, some are arguing that the crisis was due primarily to too much government intervention in the US pushing for more home ownership for minorities while others argue that the main cause was too little government intervention as manifested by financial deregulation. Both of these views contain elements of truth as partial explanations, but such single-factor explanations are bound to miss much. In our interpretation, debate on the level of government intervention is irrelevant because the real problem with government policy in this area was too much government intervention of the wrong kind and not enough of the right kind.

One of the most clear-cut casualties of the crisis is the belief, in recent years most famously associated with Alan Greenspan, that financial markets will generally be self-regulating and provide their own discipline (Willett, 2009). But there has been massive evidence of gross regulatory failure as well. So simple calls for more regulation are of little help if we do not find ways to make regulation work better. This will be no simple matter, but the failure that contributed to the crisis gives us many clues about the directions to investigate. For example, the love affair with "sophisticated" risk models clearly shows the dangers of focusing only on data from the recent past. It is clear that toward the tops of booms, the standard Value at Risk measures signal falling risks for individual assets just as systemic risk is building. These sophisticated models also proved easy for financial sector participants to game. This suggests that we should focus more on cruder measures like leverage ratios that are less easy to game.

The well-known problems of discretionary regulatory oversight suggest that it is wise to try to rely on market discipline as much as possible. But this requires careful analysis of the conditions needed for market discipline to operate effectively. At the minimum, this requires both good information and incentives for market participants to act on this information. Clearly, neither of these conditions held sufficiently in the run-up to the crisis. Of particular concern is the possibility that short-run competitive pressures generated strong incentives for lenders and investors to run with the herd to keep their market share even in the face of concerns about the longer-run risks being taken (see the analysis and references in Willett (2009)). What is needed here is careful theoretical and empirical research, not ideological debates about government versus the market.

There is clearly a strong need for financial regulators to substantially increase their capabilities for economic analysis so as to pay more attention to incentive structures. Prior to the crisis, many regulators seemed to be in awe of the talent and money that the large financial institutions had put into their risk management units and paid insufficient attention to their incentives to use their analysis to game the system.

5.2. *Defective mental models*

Likewise, while bad incentives induced by government policies certainly contributed importantly to perverse behaviour in the private sector, the private sector itself often created perverse incentives within large financial institutions and operated on the basis of seriously defective mental models or beliefs and engaged in poor managerial oversight and control (Willett, 2009). In some cases these defective mental models affected broad segments of the public, financial institutions and regulators alike. The housing bubbles in the US and a number of other countries were significantly affected by unrealistic expectations that housing prices would continue to rise rapidly and indefinitely, which affected individuals from all sectors. Such excessive disregard of risk was reflected in the underpricing of risk in broad categories of assets across the globe. As the IMF puts it in its report on "Initial Lessons of the Crisis", "at the root of market failure was optimism bred by long periods of high growth, low real interest rates and volatility, and policy failure in financial regulation… macroeconomic policies… and global architecture…" (IMF, 2009c).

Also important was the excessive faith that developed in the innovations in financial engineering and risk management and the consequent widespread belief that financial risk had been largely conquered. This led many financial institutions to believe that they could safely take on substantial increases in leverage.

5.3. *Critiques of economics*

Much criticism has been levied against economists for failing to predict the crisis, but much of this criticism is misplaced. A number of economists and financial market participants did see the dangers looming and attempted to warn others, but these warnings generally fell on deaf ears. This was not information that leaders in the financial sector or government wanted to hear. This tendency to listen only to what we want to hear is a common human quality and has repeatedly caused colossal failures in many areas of endeavour. One important lesson highlighted by the crisis is the need for both private and public sector decision makers to attempt to develop safeguards against this tendency.

The crisis will surely increase the attention given by economists to the new fields of behavioural and neuroeconomics and finance. It is not yet clear whether behavioural biases of participants in financial markets are sufficiently systematic to allow behavioural finance-based investment managers to earn above normal returns, but there is considerable scope for investors to avoid some of the pitfalls such as overtrading and strong inhibitions on selling losses that lead to below market returns.[9]

The crisis also provides important data to help clarify some of the debates in macroeconomics. As the recent exchange between Paul Krugman (2009) and John Cochrane (2009) vividly illustrates, different interpretations are generated by strong

[9] On these issues, see Akerlof and Shiller (2009), Burnham (2008), Peterson (2007) and Zweig (2007).

commitments to particular theoretical as well as ideological perspectives. Thus in this exchange Krugman sees the crisis as further evidence of the failures of efficient market theory and new classical macroeconomics, while Cochrane sees Krugman's comments as further evidence of the inadequacy of Keynesian economics. In his criticism, Krugman focuses on the failure of most macroeconomists to foresee the crisis, but there is a good reason for this. As Cochrane emphasises, this was primarily a financial, not a macroeconomic crisis. Krugman's argument that macroeconomists have become on average too concerned with the beauty of their models at the expense of concern with real world relevance is one with which we have considerable sympathy, but as Cochrane argues, many of the recently developed mathematical models yield important insights into the crisis. But most of these are micro and/or finance oriented rather than traditional macro models.

5.4. *Macroeconomists should pay more attention to the financial sector*

For international macroeconomists, a key lesson from the Asian crisis for our professional work was the importance of financial sector considerations for international macro analysis. But this realisation made much less headway into the minds of economists focusing on domestic macro issues in the advanced economies. We trust that this crisis will remedy the problem. From this perspective, it was as much — or more — inattention by most economists rather than flawed models that led to the scarcity of warnings by academic economists and those in international organisations like the IMF.

Added to this tendency was the rapid pace of financial innovations and lack of good information that led regulators, private sector participants as well as financial economists to be ignorant of the buildup of financial interconnectedness and exposure to risks within the financial system. As the IMF report on the causes of the crisis argues, "The most basic [lesson from the crisis] is that flawed incentives and interconnections in modern financial systems can have huge macroeconomic consequences" (IMF, 2009c). There is widespread consensus that regulators need better information and need to pay more attention to system-wide (macro-prudential) considerations rather than just looking at each financial institution in isolation. Likewise, the major conflicts of interest in the ratings agencies have become widely recognised, although to date governments have not shown a willingness to take tough action in this area.

There are inherent limitations to how well crises can be predicted, but work to date shows that there is considerable scope for the development of early warning systems for financial vulnerability to both domestic and international factors (Berg *et al.*, 2005; Reinhart and Rogoff, 2009). On the possibilities of identifying asset bubbles, see Caverley (2009), Smithers (2009) and Sornette (2003). In assessing risks, financial institutions and their regulators should focus not just on particular financial institutions positions, but also on measures of the aggregate vulnerability of the financial system such as high rates of credit creation. Less focus should be put on measures of market volatility

in the recent past and more on the danger signs of things being too quiet. As noted above, market volatilities often fall as financial dangers build up. We just cannot count on financial market behaviour to give reliable early warning signals of increased financial vulnerabilities (Triana, 2009; Willett, 2000). One way of putting this is that governments and the private sector need to put less faith in financial engineering that assumes fixed relationships among financial variables and more on financial economics, which shows how relationships can vary enormously depending on the patterns of shocks (Willett, 2009). This recognises that both markets and government policies can display sharp regime shifts. This will be a rich area for further research.

From the standpoint of emerging market economies, the intensive study of the spread of the 2007–2009 crisis should yield important lessons about the best ways to safeguard against the dangers which active participation in the global economic and financial system bring along with the benefits. For example, while economic success is likely to bring large inflows of financial capital, such large inflows in turn increase the risk of sizeable capital flow reversals or sudden stops. How to find the best ways to deal with such issues is an important area for policy research. There is unlikely to be one simple strategy that is best for all economies. One part of the strategies for a wide range of countries is likely to be increases in precautionary international reserve holdings, but even with the component of strategy there is much research to be done on how much reserves should be held against different types of capital flows and the amount of attention to be given to gross versus net flows (for a recent discussion of some of these issues, see Willett *et al.* (2009)).

And even for countries like the United States there are serious questions about the extent to which large capital inflows contribute to the strength of the domestic bubbles. It's a convenient excuse for some US officials to blame the crisis primarily on the global savings glut and resulting large capital flows into the US. There are plenty of home-grown explanations for the excessive spending and deficient savings in both the private and public sectors in the United States. However, this does not mean that global imbalances were only a trivial problem, or that they have been eliminated by the crisis. There is a major need for further policy research on the best ways to reduce global imbalances and for dealing with surges and sudden stops of capital flows. There is also a clear need not just for better national financial regulation, but for better international coordination. Emerging market and developing countries have a strong interest in proper financial regulation in the advanced economies. Already in the advanced economies we are seeing strong lobbying by the financial sectors to water down reform proposals. In some cases their concerns are legitimate. It is possible to overregulate. But all too often the lobbying is to maintain privileged positions at the risk of increasing the dangers of future crises. Let us hope that with the broadening of the G7 to the G20 as the principal forum for international financial policy discussions, the leaders of the emerging market economies can play an active role in reform discussions and help to stiffen the backs of advanced economy leaders against special interest pressures.

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