Reflections on the Crisis and on its Lessons for Regulatory Reform and for Central Bank Policies

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When the music stops, in terms of liquidity, things will be complicated. But as long as the music is playing, you've got to get up and dance. We're still dancing‡

Abstract

This paper surveys the problems exposed by the global financial crisis in the areas of financial regulation and supervision and possible solutions. It also discusses a number of lessons for central bank policy as well as some international dimensions. The discussion is based on the view that suggestions for regulatory reform must be firmly anchored in prior understanding of the confluence of regulatory and supervisory factors that triggered the crisis. Specific issues include the growth of a poorly regulated shadow financial system, shortermism in executive compensation packages and consequent adverse incentive effects, the too big to fail problem, procyclicality in the behavior of financial institutions, conflicts

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‡Interview with Citigroup CEO in the Financial Time, July 9 2007.

of interest in the rating agencies industry and the tradeoff between transparency in the valuation of assets and broadening the scope of intermediation through securitization.

Once a crisis erupts the central bank is akin to a firefighter. But in the longer term its liquidity injections and related losses create a tradeoff between price and finacial stability, and may compromise central bank independence. The crisis has clearly demonstrated the advantages of a unified world financial regulatory system. But, in a world of nation states aiming at full common regulation is impractical. Coordination appears to be a more achievable second best. Possible benefits of international coordination designed to limit exchange rate variability are also discussed. The paper concludes by pointing out inherent difficulties in distinguishing **exante** between a fundamentals based expansionon and a "bubble".

1 Introduction

The global financial crisis (GFC) has exposed numerous problems of moral hazard and of asymmetric information in financial intermediation. In good times such problems are not as salient because various excesses like exagerated commissions, large compensation packages, biased financial advice and outright fraud are overshadowed by the generally good performance of the economy. When everybody is making money and credit is plentiful the general public, as well as politicians, are not inclined to be inquisitive and various excesses are more likely to be glossed over. Easy access to credit makes it possible to maintain such excesses and even outright fraud over long periods of time.[1]

Many of those problems call for substantial reforms in the regulation and supervision of financial institutions and some reconsideration of the way central bank policies operate. Paradoxically, a benefit of the crisis is that it has exposed the fact that in a world with serious

[1] A salient example is Madoff's case.

asymmetries of information, vigorous financial innovations and incomplete regulatory frameworks "self regulation" does not work. This realization will, no doubt, induce institutional changes designed to reduce the likelihood of systemic crises through reforms of the current regulatory and supervisory systems. Some of this process is already taking place. The crisis also presents new challenges for recent conventional wisdom regarding monetary policy procedures.

This paper takes the view that suggestions for reforms must start with an identification of the factors that contributed to the erruption of the subprime crisis in the US and then to its transformation into a GFC. Many reasons like inadequate regulation of financial institutions, overly expansionary monetary policy and a global savings glut have been suggested.[2] With an eye to potential reforms in the regulation of financial institutions section 2 focusses mainly on the first class of reasons. Contrary to the great depression both fiscal and monetary policies in the US, and to a lesser extent in Europe, have responded swiftly and vigorously to the crisis and are likely to be maintained and even intensified for some time. Although warranted by the seriousness of the crisis those policies create a new state of affairs in which the central bank holds a large (and more risky) share of debt in the economy and in which the share of public debt in GDP is expected to increase substantially. This is particularly notable in the case of the Fed. When the world ultimately emerges from the crisis this new state of affairs will make the tradeoff between price stability and financial stability more acute.[3] In addition, due to bailouts, the equity capital of the central bank is likely to be reduced and may even be negative endangering the effective independence of the bank. Section 3 discusses the short and long run implications of those developments.

The globalization of financial flows and of trade in conjunction with the central role of the US in both of these areas contributed to the quick transformation of the subprime crisis into a GFC. Thus, along with its substantial benefits, globalization also contributed to a quick

[2] See respectively Roubini (2008), Taylor (2009) and Bernanke (2005).
[3] Cukierman (1998), ch. 7.

transmission of the adverse effects of the subprime crisis to the rest of the world. This suggests that, although the crisis originated in the US, other countries may have to adapt their institutions as well. In the presence of globalization regulatory reforms should not be confined to the US and better be sufficiently coordinated in order to prevent regulatory arbitrage.[4] The onset of the crisis dramatically increased volatility on forex markets. In times of global crisis, when much of the world is hit by a common shock, there may be room for beneficial coordination of monetary policiies among major central banks in order to offset some of this volatility. Those international dimensions are discussed in section 4. This is followed by concluding thoughts including interalia some conjectures about the relation between the likelihood of bubbles and the effectiveness of regulation and supervision.

2 Regulatory problems exposed by the subprime crisis in the US and potential remedies

This section reviews the contributions of regulatory and supervisory forbearance and of regulatory incompleteness to the emergence of the crisis. as a strarting point for possible remedial measures in those areas.[5] It centers mainly on the US for two reasons. First, the crisis originated in that country. Second, the swift adoption and spreading of financial innovations in the US, many of which were driven by regulation avoidance, quickly led to an increasing gap between the sophistication of private financial operators and the abilities of financial supervisors to effectively regulate the financial system. This occured through several channels like the emegence of lightly regulated shadow banking institutions, compensation packages that encour-

[4] The April 2 2009 declaration on **strenghening the financial system** following the London summit of the G20 is well aware of this requirement. But its translation into specific recommendations is only partial at this stage.

[5] An informative precursor to some of the discussion in this section appears in Roubini (2008).

aged shortermism and excessive risk taking, various conflicts of interest related to the operation of rating agencies and of financial research departments within investment banks, and overly sophisticated financial assets whose fundamental values became more and more opaque as the state of the real economy gradually moved from boom to recession.

2.1 The growth of poorly regulated segments of the financial system

Parts of the US financial system, like commercial banks are subject to reasonable levels of regulation and supervision while other parts like hedge funds are very lightly, or not, regulated at all. The Glass Steagell Act of 1933 separated commercial banking from other financial activities like underwriting, brokerage and securitization that were performed by institutions like investment banks. As long as the act was in force commercial banks were largely confined to narrow banking. Bowing to pressures from the financial community, the 1999 Gramm-Leach-Bliley Act effectively repealed this separation, widely opening the door for universal banking and the growth of a shadow banking system. This led to significant regulatory arbitrage that transferred a significant fraction of financial intermediation to non-bank financial institutions such as broker dealers and hedge funds. Commercial banks also participated in this expansion by setting up special investment vehicles (SIV), conduits and other legal entities that allowed them to shift a rising fraction of their business away from tightly regulated activities into less tightly regulated activities.

The growth of the shadow financial system had the following consequences. First, the fraction of intermediation not subject to capital requirements increased. Second, many institutions in this segment of the market did not have access to the lender of last resort facility making them potentially subject to runs – not by bank depositors who are insured by the Federal Deposit Insurance Corporation (FDIC) – but by the, more sophisticated, holders of their liabilities. Third, like banks, many institutions in the shadow system had liabilities whose average maturity

was shorter than that of their assets. This created a liquidity risk akin to the classic liquidity run analyzed in Diamond and Dybvig (1983). Fourth, some of those institutions, such as hedge funds, engaged in highly leveraged operations. Finally, with light or non existent regulation, the shadow banking institutions could afford to be opaque and even secretive about their assets and liabilities.

The main lesson for regulatory institutions is that the scope of regulation should be extended to **all** financial institutions. Extending regulation and supervision to **all** financial institutions is essential for the minimization of regulatory arbitrage. Construction of such a system is not an easy task. But it is essential for restoring the shattered credibility and normal functionning of financial institutions in the US and world financial markets. Although the details of the extended regulation may have to be taylored to the different types of financial intermediaries the general principles, like maintainance of risks, and particularly of systemic risks, below critical levels and assurance of adequate levels of disclosure and transparency, better be uniform. The new regulation of Credit Defaults Swaps (CDS) and other financial derivatives proposed to the US Congress by Geitner on May 13 2009 constitute an encouraging first step.

2.2 Compensation packages that encourage shortermism and excessive risk taking.

The crisis has drawn public attention and anger to the large compensation packages of senior and mid level financial executives. In addition to their size, which often appear exaggerated on distributional equity grounds, those packages raise two principal-agent issues and another one regarding their implications for systemic stability. The first principal-agent question is whether the compensation packages are justified in view of the contribution of those executives to the long run performance of their respective instutions. The other concerns the effect of those packages on the incentives of top managers to make decisions leading to risks/return patterns that are

in line with the long term interests of their shareholders. Those microeconomic questions are discussed in this subsection and the, macro type, implication of existing compensation packages for systemic stability in the following subsection.

A typical renumeration package is composed of a fixed payment plus yearly bonuses paid for performance above a threshold level. Above the threshold, the bonus increases with the performance of the institution. As a consequence financial executives are renumerated in good years but not fined for poor performance in other years. This creates a structure of incentives that encourages short run profit maximization at the expense of longer term average returns as well as excessive risk taking. Actions that increase the current year's performance, even if quite costly in terms of longer run risks and returns, are individually rational since executives get extra pay now and are not fined for subsequent bad performance. Furthermore, this structure of incentives is likely to lead to decisions that increase the variability of profits and the overall risk of the financial institution over time.

This has important consequences for the chosen leverage ratio. The main instrument through which executives control the distribution of risks and returns is leverage. By raising leverage, they raise profits in case of success but also the magnitude of losses in case of failure. The typical compensation package lowers the individual executive's downside risk below that of the financial institutions leading to leverage ratios that are excessive for shareholders. Furthermore, bonuses often take the form of options on the stock of the institution. Since, by design, options are highly leveraged instruments relative to the institution's profits, the overall incentive of financial officers to aim at quick large profits is even higher. Shortermism was further encouraged by the relatively high turnover of skilled financial individuals in the US.

How should financial regulation be devised to reduce those distortions? The general principle is that executive compensation should be aligned, as much as possible, with the long term performance of the institution for which they work. In particular bonuses should be based on average performance over several years. Should regulation of those matters be applied only

to top executives or also to mid-level managers? One view is that it should suffice to align the incentive of top managers with those of shareholders since it would then be in their interest to design packages with similar features for mid-level portofolio managers as well. The issue clearly deserves further thinking.

2.3 Systemic or Macro risks and the "too big to fail problem"

Even when compensation packages are such that the incentives of shareholders and of managers are perfectly aligned, the latter take excessive risks from a social perspective because they do not internalize the impact of their actions on the likelihood of a systemic crisis. Although, for small financial institutions this negative externality is negligible, it is sizable for large institutions. Managers of large institutions expect therefore that, if they fail, government will come to the rescue and bailout their institution. As a consequence they choose portofolios that carry risk levels higher than the socially optimal levels, not only because they do not internalize systemic risks, but also because they expect to be bailed out. This is the "too big to fail problem". The large amounts of funds used by the Fed to keep AIG and citibank afloat, as well as the financial markets disruptions induced by not rescuing Lehman Brothers, dramatically illustrate the dilemma of the Fed and of the treasury. Those authories found themselves between a rock and a hard place. By bailing out large failing institution they assumed high risks on behalf of tax payers. But, when they did not, they were faced with a severe crisis of confidence in financial markets.

Once a crisis develops it is likely that bailouts of systemically important institutions is preferable to the financial disruptions that would otherwise occur. But appropriately devised (and tightly enforced) regulation of financial institutions can reduce the probability of a crisis exante. Two natural classes of regulatory instruments for this purpose are adequate capital requirements and absolute limits on the amounts of leverage and of risks that an institution can

assume through derivatives (CDS's for example). Alternatively, internalization of systemic risks can be achieved by imposing a tax schedule whose structure is proportional to the systemic risks induced by the decisions of individual financial institution. Since larger institutions generate higher systemic risks they should pay higher taxes. The burden of this tax could be structured so that it is higher during expansions, when financial institutions tend to assume higher risks, and lower during recessions, when financial institutions are naturally more cautious. By collecting a larger share of the tax during expansions such a schedule would offset at least part of the procyclical risk taking tendencies of financial operators (see next section).

In devising detailed recommendations for regulatory reform one has to keep in mind that there generally is a tradeoff between tighter regulation and undisturbed functionning of financial intermediation. Tighter regulation reduces the likelihood of crises but may also reduce the scope and efficiency of financial intermediation and is also costlier to implement. Due to this tradeoff one may consider applying the full package of recommendations above to large financial institutions that impose larger systemic risks on society and loosen them, either gradually or below a certain cutoff, as the size of the institution gets smaller.

2.4 Procyclicality in the behavior of financial institutions and investors

The decisions of financial institutions and of investors tend to be procyclical. During the upper phases of the cycle they accept higher risks in order to increase expected returns and during the down phases the reverse happens (in markets' language there is a "flight to safety"). As a consequence credit and leverage expand during expansions and contract during recessions. This widely observed phenomenon is caused by economic and psychological factors as well as by some features of existing financial regulation. Among the economic factors are.

1. The countercyclical behavior of the external finance premium (EFP). The EFP is the

difference between the cost of external finance and the alternative cost of own funds.[6] It goes down during booms leading to the expansion of leverage and up during recessions leading to the contraction of credit and leverage. Related to that is the procyclical behavior of collateral also known as the "balance sheet effect". During expansions the value of collateral goes up, raising the willingess of lenders to extend credit while during contactions the opposite occurs. This reenforces the procyclicality in leverage. An additional reenforcing factor is the Basel II requirement to mark collateral to market.[7]

2. Evaluation of risks by financial institutions tends to be based mainly on developments during the preceding several years. As a consequence, after several years of expansion, statistical measures of risk are likely to be biased downward. With the benefit of hindsight it appears that this was the case during the second half of the subprime crisis. On the other hand, following the downfall of Lehman Brothers the markets' risk evaluations jumped to levels which turned out to be exagerated (at least with the benefit of hinsight). It appears that dramatic bad news like the downfall of Lehman Brothers induce violent fluctuations in the risk assessments of financial institutions and other market participants. The impact of such news appears to be stronger when they come following a substantial buildup of leverage. How much of the resulting waves of optimism and pessimism are due to changes in economic fundamentals and how much to human psychology is a widely open question. Some observers like Shiller (2006, 2008) attribute such fluctuations to "irrational exuberance" or "social contagion". But more traditional economic thinking could argue that these wide gyrations are rational in a world of highly imperfect and asymmetric information. As a matter of fact frameworks like those of Morris and Shin (2002, 2005), in which fully rational individuals overreact to public information because they know that everybody else has access to the same information, go a long way toward

[6] Due to asymmetric information and moral hazard problems between lenders and borrowers this premium is generally positive. For a quick survey see Bernanke (2007).

[7] A fuller discussion appears in chapter 4 of Brunnermeier et.al. (2009).

reconciliation of the two approaches. Nonetheless, it is likely that, the reactions of financial decision makers to unfolding events are affected by both economically rational calculations as well as by psychological considerations.

3. With the benefit of hindsight it became clear that an additional reason for the large risk evaluation mistakes made by financial officers prior to the eruption of the subprime crisis were due to their overreliance on evaluation of micro risks and relative disregard for macroeconomic risks created by systemic effect. As a consequence they underestimated the correlations between adverse states of nature across different segments of financial markets.[8] In particular, it is likely, that they underestimated the correlations between credit default at the level of a single institution and at the level of the entire economy. This is probably due to their better understanding of micro than of macro risks. Besides contributing further to the procyclical behavior of leverage this factor may also explain the speed with which the boom turned into bust following dramatically adverse news.

Although regulation and supervision alone cannot fully offset the cummulative procyclical impact of all those factors they can be devised in ways that may reduce them to bearable levels. By doing that, appropritely devised regulation of financial institutions can contribute to lowering the likelihood of bubbles and of the largely inevitable busts that follow their bursting. The general objective of regulation of financial institutions should be to provide built in mechanisms that would reduce the impact of procyclical behavior on the likelihood of a crisis. There are severals ways to achieve that. One is to raise capital requirements during booms and loosen them during recessions. Another, is to spread the systemic internalization levies discussed in the preceding subsection over the cycle so that most of them are collected in good times when financial institutions enjoy large profits and robust balance sheets. Regulators and/or the central bank should develop early warning signals for macroeconomic risks, particularly during

[8] This issue is a main theme of Brunnermeier et. al. (2009)

booms, and publish them. This may be supplemented, by imposing upper limits on the levels of credit and of CDS's, particularly in large institutions, when those levels appear to move into a dangerous area.

2.5 Regulation of rating agencies

The subprime crisis exposed an important conflict of interest between the public interest on one hand and securitizers (like investment and mortgage banks) and rating agencies on the other. Securitizers have an interest in embellishing the prospects of the financial assets that they repackage. Since rating agencies were paid by the securitizers they obviously had an interest in partially catering to those incentives of their clients within limits determined by the requirement that this did not visibly affect their exante credibility. The problem was compounded by the fact that regulators were using some of these ratings to determine the risk levels assumed by the regulated financial institutions. Interestingly, a similar conflict of interest that involved manipulation of information through collusion between the research and marketing departments of investments banks at the expense of the general public, emerged already in the mid eighties and was finally settled in 2003. Following lenghty investigations and litigation by the SEC and the NY Attorney General ten of the US top investment firms have settled enforcement actions involving conflict of interest between research and investment banking.[9] The fact that such conflicts of interest continued in another guise for several years after the settlement demonstrates that those measures did not suffice.

It is clear that rating agencies should not be allowed to be renumerated by any institution that has a stake in the assets that are being rated. It is less obvious how the problem should

[9] The settlement required payment of 487.5 million $ by the investment banks to fund independent research and investor education. Some of the investment banks involved were Bear Sterns, Goldman Sachs, Lehman Brothers, J.P. Morgan Securities, Merrill Lynch, Morgan Stanley and Citigroup. Further details appear in EC NewsDesk (2003).

be handled and different economists may have different views about this question depending on their apriori views regarding the ability of rating agencies to self regulate. My own view is that some public involvment in this matter is inescapable. Rating agencies should be monitored by appropriate public bodies and tightly regulated to detect conflicts of interests early on. They should be licensed by the regulatory authority and the latter should have the authority to revoke their license in case of unethical behavior. In addition serious consideration should be given to the creation of independent public rating agencies in parallel to the private ones. These rating agencies could have some authority to demand information from financial institutions and corporations. Their compensation should be totally divorced from the the conclusions of their research but may be tied to the expost accuracy of their predictions. If appropriately devised, such agencies may set a standard for the private rating agencies.

2.6 Securitization and the tradeoff between transparency and efficient intermediation

Securitization of mortgages was intially introduced in the US by the National Mortgage Association (Fannie Mae) already in 1981 by issuing Mortgage Backed Securities (MBS) backed by the "full credit" of the US government. Soon after, securitized products for prime loans without the backing of government emerged in the private US sector.[10] The main advantage of securitization is that it widens the scope for financial intermediation between final borrowers and final lenders. By repackaging mortgages (or other types of loans) it produces financial assets designed to better fit the risk/return preferences of different classes of lenders, thereby increasing the volume of intermediation and, presumably, its allocative efficiency.

However, by disconnecting the direct link between the mortgage originator and the final

[10]The European asset securitization market developed later during the nineties. Further details appear in Mizen (2008).

holder of the MBS, it makes the monitoring of the borrower and the evaluation of the fundamental value of the securitized asset difficult and opaque. This problem becomes more acute when market circumstances change. It is further compounded when there are several layers of securitization. The recent inability of highly sophisticated financial institutions to price the MBS's they owned clearly demonstrates that excessive, and poorly regulated, securitization also carries a cost. This cost which is related to opaqueness about the value of securitized assets was largely responsible for the drying out of the interbank market following the demise of Lehman Brothers. The upshot is that securitization creates a tradeoff between larger volumes of intermediation on one hand, and monitoring plus transparency with respect to the fundamental value of securitized assets, on the other.

An extreme solution to the consequent problems of monitoring and opaqueness is to forbid securitization alltogether. This amounts to "spilling the water in the bathtub along with the baby". I believe an 'optimal' solution should maintain the option to securitize and to assure adequate levels of monitoring and of transparency through appropriate regulation. How is this general principle translated into specific details is a difficult open question that requires further research and thinking. One possibility is to require that the originators of MBS's and other securitized instruments retain a substantial fraction of the equity tranche of those assets. This would leave the incentive to monitor final borrowers with the institution that has a comparative advantage in achieving this task. In addition, excessive levels of securitization should be limited by regulators. It is likely that beyond a certain level, the monitoring and transparency losses outweigh the benefits in terms of the volume of intermediation.

2.7 Independence and professionalism of regulatory authorities

Since their decisions have non negligible distributional consequences regulators are natural candidates for pressures from the financial sector (regulatory capture) as well as from politicians.

It is therefore important that, like central banks, regulators be given an adequate level of legal independence. In view of the potency of pressures and of potential temptations from the private sector additional safeguards are desirable. Individuals with authority within the regulatory establishement should be paid well, prohibited from moving to the financial community for some time after serving as regulators and have long enough terms of office. Finally they better be highly qualified professionals in their respective areas with substantial prior experience in the regulated sector. Other things the same, appointment of individuals that are not too far from final retirement could provide more assurance that they will not be lured by the temptations offered by the private financial sector.

3 Short and long run implications for CB policies

Although the subprime crisis was largely triggered by the 2006 reversal in the trend of prices in the US housing sector it is essentially a crisis of the financial system. Due to factors discussed in the previous section the flow of credit within the arteries of the financial system dried up. This was particularly dramatic after the downfall of Lehman Brothers in September 2008. Opaqueness about the value of assets in counterparty institutions made valuation of their assets highly uncertain. Banks and other financial institutions became reluctant to lend to each other, even for short periods of time. Well oiled and liquid financial markets like the interbank market and the subprime mortgage market dried up and banks became reluctant to lend to the real economy. Highly leveraged institutions like hedge funds were forced to engage in "fire sales" further decreasing the value of assets, increasing uncertainty about their valuation and reducing their liquidity. Those adverse effects quickly spread to derivatives like the huge CDS market further reenforcing the impact of the crisis on the financial system and on the supply of credit to the real sector of the economy.

The central bank (CB) constitutes the first line of defense against such swift adverse

developments and is naturally, and rightly so, expected to step in and react quickly. As a matter of fact the Fed was originally created in order to offset the adverse effects of periodic financial panics and to reduce their impact on the variability of interest rates and on liquidity.[11] However, those necessary immediate reactions also create new challenges for the central bank, when the economy returns to normal. This section focusses on lessons from the crisis and from the Fed's response to date for central bank (CB) policy during the crisis for the short run and intermediate run, while the impacts of the crisis are still substantial, as well as for the long run, when they subside.

3.1 Central bank response on impact and during the crisis

As we saw in the previous section the likelihood of a crisis' eruption is relatively high in the presence of persistent regulatory problems. These problems nurture serious credibility problem about the solvency and liquidity of financial institutions and lead eventually to the drying up of financial intermediation. Such structural problems can be handled only in the longer run leaving an important open question about the role of the CB in the short run. In this run the CB is akin to a fire fighter. It first has to put the fire out and let society worry about future prevention after the fire has been put out. In the context of the financial system the "fire" is the drying up of financial intermediation. In its role as lender of last resort the CB should, under such circumstances, step in and use its policy instruments to maintain adequate liquidity by assuming a greated share of financial itermediation in the economy. A byproduct of such policy is that it may restore some of the shattered credibility of the private financial system.

This lesson has been learnt the hard way after the great depression (Friedman Schwartz (1963)). Since September 2008 the Fed supplied huge amounts of short term liquidity and some

[11] See Meltzer (2003).

longer term funds to the economy demonstrating that it has internalized this distant lesson.[12] This policy prevented the level of financial intermediation from dropping at very fast rates in spite of deleveraging by the private financial sector. A substantial part of intermediation by the private sector was replaced by intermediation through the central bank and the interbank market (which dried up due to opaqueness about the credit worthiness of private financial institutions) was replaced by intermediation through the Fed. The fact that banks with excess funds abstained from lending to other financial institutions but were willing to do that through the intermediation of the CB facilitated this process. During the last month or two the cummulative impact of those policies appeared to start to pay off. The ECB responded in qualitatively similar ways.

3.2 Longer term implications for monetary policy

Once a crisis sets in the policy responses described above appear to be inevitable or at least a lesser evil. But they create longer term challenges for monetary policy and the standing of the CB within the public sector. Those challenges arise because, when the crisis starts to subside, there is a huge amount of liquidity in the economy and the CB finds itself holding a substantial fraction of private and public debt. This creates two potential problems. One is to identify the shifts in the relative risks of inflation and of financial instability in real time in order to decide when to start to remove liquidity from the economy and by how much. The objective here should be to maintain monetary policy as near as possible to an optimal tradeoff between those two risks. Success in achieving this goal depends mainly on the forecasting ability of the monetary authority. Qualitatively, this problem is no different from a similar problem during

[12] By contrast, during the first three years of the great depression, monetary policy was passive and became expansionary only after Roosevelt was elected in 1933 (Further detail appear in Cukierman (2009)). No doubt, a factor that contributed to the swift and vigorous reaction of monetary policy during the current crisis is the fact that its chairman devoted much of his early academic career to study the consequences of monetary passivity during the great depression (Bernanke (1983)).

normal times.[13] However, in the aftermath of a crisis, the public's mood is more volatile and uncertainty about the optimal response, therefore, substantial. This implies that the CB should devote more resources to monitoring the economy and possibly rely on additional indicators for evaluation of the state of the economy and for its mood, particularly within the financial community. This problem may be exacerbated if inflationary pressures develop before a sufficient level of stability has been restored in the finacial system.

The second problem concerns the ability of the CB to maintain its independence. As the crisis subsides, it is likely that the substantial increase in public debt required to finance the ongoing US fiscal packages will raise the temptation for government to partly alleviate the debt burden by means of inflation. This will raise, at least implicitly, pressures on the CB to be more lenient on inflation. In addition, the balance sheet of the CB will, very likely, show substantial accumulated losses due to various ongoing rescue packages. If substantial, such accumulated losses are likely to make it more difficult, politically, for the CB to implement anti-inflationary policies. The experience of CB's that have accumulated large capital losses which led to negative CB capital shows that, in such cases, CB independence is often compromised, making it more difficult to take a determined stance against inflation when the state of the economy requires it. Such institutional problems better be addressed sooner than later. In particular the political establishement (for example Congress in the US) should be made aware of the importance of recapitalization of the CB, if needed, when the economy returns to normal. With a view to the long run it would be desirable to implement such recapitalization by means of legislation. But if that turns out not to be politically feasible a long term recapitalization agreement between the CB and the treasury would be a second best. Further discussions of those and related issues appear in Stella (2005) and Cukierman (Forthcoming)).

[13] A discussion of the tradoff between financial stability and price stabilty during normal times appears in Chapter 7 of Cukierman (1992).

4 International dimensions

This section briefly discusses additional international isssues regarding regulatory reform and the future conduct of monetary policy. It is based on the presumption that globalization of financial markets is here to stay.

4.1 International aspects of regulatory reform

Due to globalization the reach of markets transcends that of nation states. Consequently, regulatory reform in one country leads to the creation of tax havens, regulatory arbitrage across borders and a race to the bottom in regulation. A world-wide unified regulatory system would, therefore, be a first best. The main practical impediment to such a solution is that nation states are unlikely to abrogate the priviledge to regulate financial activity in their respective jurisdictions. Also, experience shows that a national budget is the most likely source to finance a bailout when the need arises. This yields support to the view that the national government should also retain the prerogative to regulate. In addition, due to idiosyncracies in national financial systems the optimal modalities of regulation are likely to differ across countries. For all those reasons, cross border minimization of regulatory arbitrage will have to be achieved by international cooperation rather than by full unification of regulation.

One option is to coordinate the national systems by setting good practice guidelines for regulation and supervision, preventing regulatory competition and in extreme cases like tax havens and non cooperative jurisdictions, have authority to enforce sanctions. Here central banks and international bodies like the Financial Stability Forum (FSF) and the recently established Financial Stability Board (FSB) can play a useful role. The G20 meeting in April 2009 has engaged on this route (G20 (2009)). Although the G20 declaration on strenghening the global finacial system opens the way for many useful cooperative initiatives their ultimate test will be in their worldwide implementation. In addition, the declaration ignores some areas in which

future international cooperation may be needed under extreme circumstances. For example, the declaration is silent about the thorny issue of how will the costs of rescuing a worldwide systemically important financial institution of a small country be allocated across countries if, and when, such a course of action is required. It is interesting to note in this context that, as of November 2008, the assets of the two largest Swiss banks (UBS and Credit Suisse) amounted to roughly four and two and a half times Swiss GDP.

Obviously to the extent that they are at least partly responsible for regulation and supervision those considerations apply, interalia to central banks.

4.1.1 Implications for the European Community and the Euro Area

An important particular case of the previous issue concerns the future of financial regulation in the European Community (EC) and/or the Euro area. Unlike the US that comprises one monetary authority and one fiscal authority, the Euro area (and afortiori the EC) is composed of many national fiscal authorities. If and when a systemically important European financial instition needs to be bailed out this fragmentation of bailout authority is likely to set in motion dangerous processes for the stability of the European financial system. The absence of one fiscal body may lead to protracted negotiations between the different fiscal authorities about sharing the costs of the bailout. In the absence of prior agreement about a sharing rule such negotiations are likely to take time raising concerns about the liquidity and solvency of the entire system within the financial community. This may clog financial markets and trigger a financial panic.

Within the Euro area, the ECB can act as a first line of defense (as it did during the current crisis). However for systemically important financial institutions whose activities are well diversified over the Euro area this may not suffice. In case longer term bailouts are considered, national governments may object to bailouts conducted by the ECB on the ground that this involves fiscal decisions and that such decisions should be made by the democratically

elected national governments. Buiter (2009) points out that, the 'single passport' policy of the EU allows financial services operators legally established in one member state to provide their services in other member states without further authorization requirements. Since this faciltates cross border financial operations the need to bailout a large European financial institution with operations all over the community is likely to arise sooner than later.

Clearly, resolution of such potential problems better be coordinated in advance among member countries rather than expost under the menace of a financial panic. Clear and well publicized principles for sharing the burden of bailouts, if and when they become necessary are essential. One important byproduct of such agreements is that they reduce the likelihood of a financial crisis and the associated drying up of credit. On the regulatory front a first best would be a unified European system, preferably well coordinated with regulators outside Europe. In the absence of such a system national regulatory systems should operate under a similar set of conventions and have relatively tighter regulatory and supervisory system in order to partially compensate for the fragmentation in the fiscal area. A, not mutually exclusive measure, would be the establishement of a European bailout tax that would be collected from systemically important European financial institutions by a European wide organization whose proceeds would be used in case of a bailout. A remaining open question is by whom and how should a bailout decision be made?

4.2 Should central banks dampen exchange rate volatility under extreme circumstances?

As the crisis developed and gathered momentum volatility on exchange rate markets increased dramatically as can be seen from the Figure. Thus, between February and April 2008 the Euro/$ rate climbed from a range of 1.45 to around 1.60. It stayed in this range till the begining of July when it started a deep descent which culminated at a bottom of around 1.25

at the beginning of November 2008. In December of that year it managed to hit the 1.45 mark again and subsequently briefly revisited the 1.25 range at the end of February 2009. During the last week of May 2009 it was back in the 1.40 range. Some of those fluctuations were caused by unsynchronized changes in the monetary policies of the Fed and of the ECB and others by frequent shifts between flight to safety and risk appetite. While it may be argued that the first class of factors represent "fundamental" adjustments it is more difficult to defend this position with respect to the frequent shifts between risk appetite and flight to safety. It is noteworthy that some of those large fluctuations occured in the vicinity of major financial news, like the rescue of Bear-Stern in March 2008, the downfall of Lehmann Brothers in September of that year, the announcement of the Public-Private Partnership Investment Program (PPIP) for buying toxic assets from bank's balance sheets in March 2009 and the increase in yields on ten years US Treasury bills in May 2009.

4.2.1 Direct intervention

It appears that as the crisis intensified so did volatility on foreign exchange markets. This raises a difficult old question about whether central banks should try to dampen some of this volatility by direct intervention in the market. Although the answer may be positive for small open economies like Chile and Israel it is less clear for key currencies like the $ and the Euro.[14] Due to the large volume of trade in such currencies direct intervention is likely to be ineffective unless the respective central banks agree to cooperate via swap arrangements. As a matter of fact such arrangements were implemented during the last quarter of 2008 between the Fed and the ECB when the Fed provided Dollars to the ECB in order to satisfy a large temporary demand for $ in the Euro area.

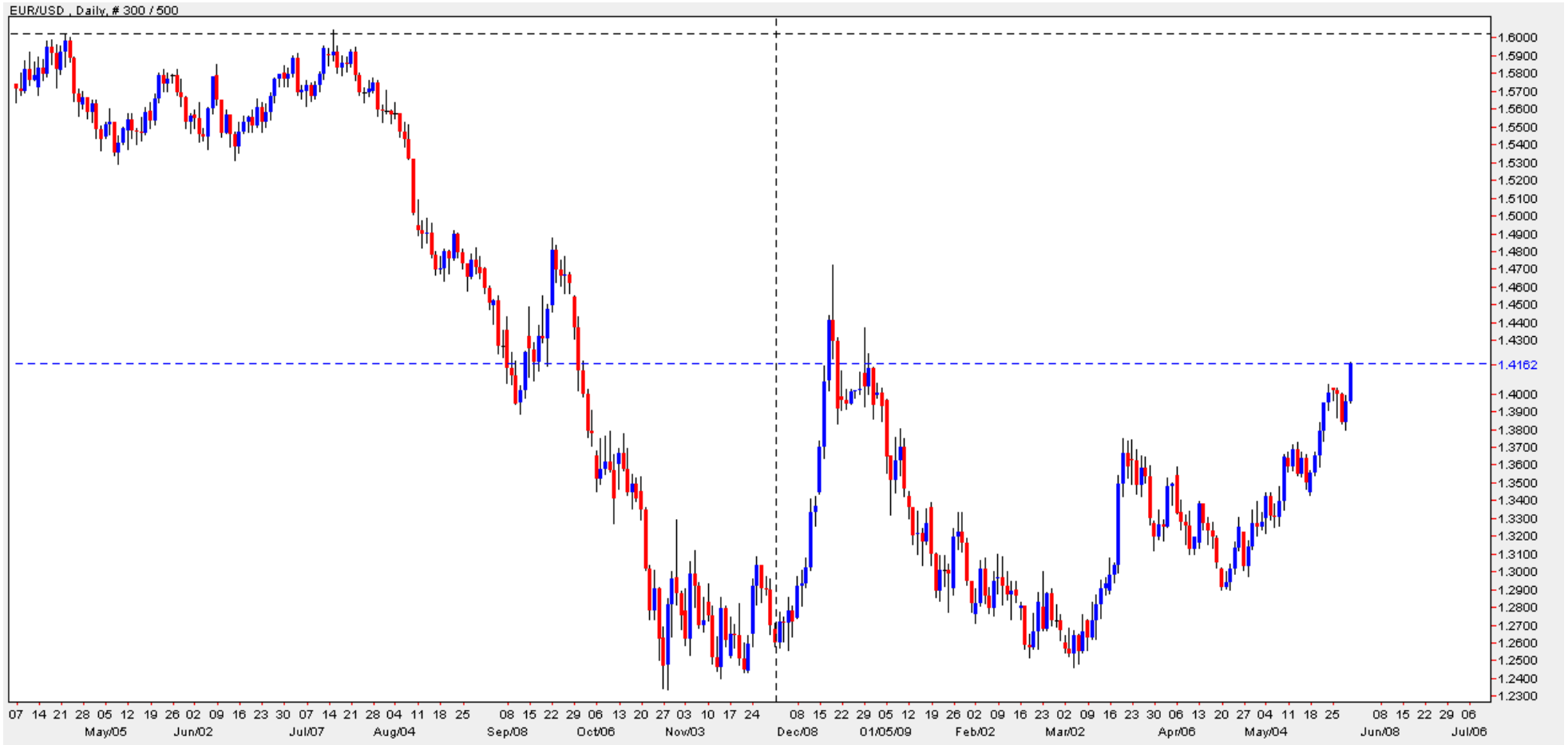
[14] Israel recently implemented a preannounced program of direct intervention designed to moderate the impact of capital inflows on the exchange rate of the Shekel. Since early July 2008 the bank of Israel has been buying 100 millions $ per business day.

Should such swap arrangements be utilized during periods of large exchange rate fluctuations due to excessive uncertainty on international capital markets? The answer probably depends on whether the two central banks involved are reasonably confident that sizable exchange rate fluctuations are temporary. If so intervention is indicated. Otherwise the question remains opens.

4.2.2 Synchronization of monetary policy decisions between key currencies

For key currencies like the Euro/$ rate a good part of the volatility during the last three years was due to asynchronization in interest rate (and quantitative easing) decisions between the Fed and the ECB. With the benefit of hindsight it turns out that the policies of those two institutions turned out to be strongly correlated, on average, during the last year. But since those decisions were not synchronized on a weekly, or even monthly basis, asynchronization of policy actions contributed to high volatility. Some of this volatility might have been avoided if the two central banks had put some effort into tighter synchronization of their policy decisions.

Most likely, such an objective is not practical for the agenda of national monetary authorities if economic developments in their respective economic areas are expected to be persistently different. But in periods like the past year, during which the US and the Euro area were hit by large common shocks to the financial and the real sectors of the economy, it was individually rational for the monetary policies of the two blocks to generally move in the **same** direction. Under such circumstances an attempt to increase synchronization of policy actions is likely to be beneficial for the following reason. When monetary policy decisions are asychronized, the forex market overreacts to new information about policy decisions and this raises short run volatility in the forex market. Morris and Shin (2002) have shown that traders tend to rationally overweight public information relatively to the social optimum implying that this volatility


EUR/USD , Daily, # 300 / 500
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May/05 Jun/02 Jul/07 Aug/04 Sep/08 Oct/06 Nov/03 Dec/08 01/05/09 Feb/02 Mar/02 Apr/06 May/04 Jun/08 Jul/06

reduces welfare.[15] Hence, when the policies of the two CB's are moving, on average, in the same direction synchronization of policy decisions reduces suboptimal short run volatility.

5 Concluding thoughts and open questions

In view of the large costs imposed by various aspects of incomplete regulation that led to the financial crisis, the task of appropriately reforming this system is of paramount importance. The discusssion in the paper is based on the premise that globalization is desirable and that it is here to stay. Financial globalization broadens the scope of intermediation thereby increasing the efficiency of flows between savers and investors. But the same efficient channels quickly transmit the adverse impacts of a crisis across countries. It is therefore important that regulatory and supervisory reform be sufficiently coordinated across countries. The remainder of this closing section is devoted to some conjectures triggered by the evolution of the crisis and open questions.

Can appropriately devised regulation and supervision reduce the probability of a crisis, and if so through which channels? The discussion in section 2 suggests that the answer is yes and points to several channels. First, by assuring adequate transparency about the valuation of assets, regulation can alleviate mutual suspicions among financial institutions, contribute to the unhibited flow of funds between them and reduce uncertainty and volatility. In particular, it is quite likely that in the presence of adequate transparency about financial assets the interbank market would not have dried up as it did during the last quarter of 2008. Second, direct and efficient regulation of **all** financial institutions and rating agencies would have reduced the leverage buildup and the subsequent bust induced by the unwinding of this leverage. Third, built in countercyclical measures of the type discussed in subsection 2.4 and in Brunnnermeier et. al. (2009) also operate in the same direction through their moderating effect on booms and

[15] The public information in this case concerns the highly advertised monetary policy decisions of the two central banks.

busts.

Financial crises usually occur following expansionary periods nurtured by overly optimistic expectations that induce financial institutions and the general public to assume higher risks. When this overoptimisim is sufficiently controverted by reality expectations become overly pessimistic and the boom turns into bust. In the jargon of economists the first phase is identified as a "bubble" and the second as the "bursting of the bubble". A widely accepted tenet of economic theory is that a bubble may develop through the interaction between self fulfilling expectations and economic developments when the possible range of paths for those expecations is larger than one. In the presence of opaqueness and a shadow banking system there potentially are many such self fulfilling paths since there are less constraints regarding expectations about feasible outcomes. By imposing tighter constraints on behavior and assuring adequate transparency regulation is likely to reduce the scope for "wild" self fulfilling expectations and with it the likelihood of booms and busts associated with bubbles. As a byproduct it also reduces the probability of errors on the part of financial institutions, policymakers and the general public. By reducing the magnitude of the positive interaction between expectations and cyclically oriented behavior, built in countercyclical regulation of financial institutions can also contribute to the reduction of "wild" self fulfilling expectations.

It would be highly desirable to have a procedure for identifying bubbles exante. Unfortunately economists do not possess a clear cut recipe for distinguishing between a bubble and a healthy expansion based on fundamentals for both conceptual and practical resons. The conceptual difficulty originates in the observation that (as far as theory is concerned) all expansions are driven by self fulfilling expectations blurring the distinction between what is a bubble and what is not. One possibility would be to rank self fulfilling paths as being "more bubbly" the larger is the amplitudes of cycles created through their booms and busts. Even if we accept such a notion, proven exante indicators for more bubbly paths do not currently exist. However, as we saw above, it is still possible to make statements about the relation between the institutional

framework, like regulation, and the likelihood of a bubble. It is also possible, based on the experience of past crises, to draw inferences about circumstances that increase the likelihood of bubbles. Jeanne (1997) proposes a systematic methodology for doing that in the context of a currency crisis.

I conclude this article by raising an old issue that, in view of the crisis, better be reexamined again: Should there be one or several regulatory institutions? In my view the answer is likely to vary depending on country size, other institutions and the importance of the domestic capital market. It is important, however, that in the presence of several regulatory authorities; 1. the limits and overlap of the responsibility areas of the different authorities be clearly specified and, 2. the flows of information among them be open and smooth. If, in the presence of more than one regulatory body, those requirements are difficult to achieve serious consideration should be given to the centralization of all regulation within a single institution.

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