

Jean-Claude Trichet: Systemic risk

Text of the Clare Distinguished Lecture in Economics and Public Policy by Mr Jean-Claude Trichet, President of the European Central Bank, organised by Clare College, University of Cambridge, Cambridge, 10 December 2009.

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Ladies and Gentlemen,

I am delighted to have been invited by Clare College, Cambridge, to give this lecture in economics and public policy.

One of the greatest challenges for economics and public policy at this time is to restore financial and economic stability, and to improve the future functioning of financial systems. A pre-condition for meeting this challenge is a deep understanding of the nature of systemic risk. And that is the topic I have chosen for this lecture.

Systemic risk in Europe's financial system is a very important issue for the European Central Bank. And as an institution of the 27, through its General Council in particular, the ECB is one of the continent's guardians of economic stability. We are charged in particular with maintaining price stability in the euro area over the medium term. But the ECB is also an active participant in the new agenda of financial stability. As you will be aware, restoring financial stability and containing systemic risk in the future are at the heart of the supervisory and regulatory reforms currently being discussed here in Europe and elsewhere.

I am particularly pleased to give this lecture at Cambridge University, which has been an intellectual "powerhouse" for centuries. It is said that the university has more Nobel Prize winners associated with it than any other institution.

Perhaps the most well known Nobel Laureate from Clare College is James Watson, who, together with Francis Crick, derived the structure of DNA. DNA incorporates the building blocks of life. As the recent instability illustrates, we economists still need to achieve as clear an understanding of the building blocks of financial systems – not simply the institutions small and large that populate them, but also the fundamentals of the rules and incentives that drive their behaviour; and, particularly, how they combine and interact with each other in the presence of amplification mechanisms stemming from leverage and other forces.

Let me mention two more recent Nobel laureates in economics whose work relates to my topic today. In 1996, James Mirrlees of Trinity College won the Nobel Prize for his contributions to the economic theory of incentives under incomplete information. In 2001 Joseph Stiglitz, who spent time in Cambridge in the 1960s, won the Prize for his analysis of the functioning of markets when information is asymmetrically distributed.¹ I shall argue in my lecture that such information problems and the incentives that they provide for economic behaviour are one important element in the phenomenon of systemic risk, and therefore in the wide transmission of financial instability.

The nature of systemic risk

So what is systemic risk? In the context of our natural environment, it is the threat that the actions of millions of individuals, all acting in pursuit of their own interests, can cause a breakdown of the world's ecosystem, a global catastrophe which will ultimately damage

¹ Stiglitz, J.E. and A. Weiss (1981), "Credit rationing in markets with imperfect information", American Economic Review.

everyone. This, of course, is the topic of the international climate change negotiations this week and next in Copenhagen.

Similarly, in the context of our economic environment, it is the threat that developments in the financial system can cause a seizing-up or breakdown of this system and trigger massive damages to the real economy. Such developments can stem from the failure of large and interconnected institutions, from endogenous imbalances that add up over time, or from a sizable unexpected event. A seizing-up of the financial system (or large parts of it) is what we experienced last autumn. The consequence was an economic freefall, a surge in unemployment and a massive increase in public debt.

So what is it about financial systems that make them prone to systemic risk?

The financial system is composed of intermediaries, markets and the infrastructure of payment, settlement and trading mechanisms that support them. Intermediaries are connected with each other through direct transactions, as in interbank markets, and through similar investment and financing decisions with third parties such as other intermediaries or end investors.

Financial markets, in turn, are connected with each other through the trading activities of financial intermediaries and through end investors active in more than one market. Systemic risk within the financial system relates to the risk that these inter-connections and similarities render emerging financial instability widespread in the system. Even if the original problem seems more contained, important amplification mechanisms can be at work.

This complex network of financial connections is extended through the savings and financing needs of all economic sectors, notably non-financial firms, households and the government. By reallocating savings from individuals and sectors with a surplus of funds to individuals and sectors in need of funds, the financial system plays a central role in the economy. So, systemic risk, in a broader sense, relates to the risk that widespread instabilities in the financial system translate into adverse effects on growth and welfare in the economy at large.

How is it that financial instability can be triggered by initially self-contained events, which are then transmitted so widely that the fallout ultimately reaches systemic dimensions?

ECB research by Philipp Hartmann and others, which has investigated systemic risk for at least a decade, suggests that there are three particularly important ways in which this can happen.²

The first is contagion. The failure of one financial intermediary can lead to failures of other financial intermediaries, even when the latter have not invested in the same risks and are not subject to the same original shock as the former.³

Second, widespread financial imbalances can build up over time and then unwind abruptly. Hyman Minsky described how in good times consumption and investment increase, generating income, which fuels the financing of more consumption and investment but also the neglect of increasing risks. Even small events can then lead to a re-pricing of risk and an

² See de Bandt, O. and P. Hartmann (2000), "Systemic risk: A survey", ECB Working Paper, no. 14, November, de Bandt, O., P. Hartmann and J. Peydro (2009), "Systemic risk in banking: An update", forthcoming in ECB Working Papers and Berger, A., P. Molyneux and J. Wilson (eds.), Oxford Handbook of Banking, Oxford University Press, 2009, and the references therein.

³ Allen, F. and D. Gale (2000), "Financial contagion", Journal of Political Economy; Freixas, X., B. Parigi and J.C. Rochet (2000), "Systemic risk, interbank relations and liquidity provision by the central bank", Journal of Money, Credit and Banking; Chen, Y. (1999), "Banking panics: The role of the first-come, first-served rule and information externalities", Journal of Political Economy.

endogenous unravelling of the credit boom, which then adversely affects many intermediaries and markets at the same time.⁴

Third, negative aggregate shocks can adversely affect intermediaries and markets simultaneously. Historical research has shown that many banking crises were related to economic downturns.⁵ Note that the three mechanisms can happen independently or they can reinforce each other.

There are a number of features of financial systems that make them particularly prone to these forms of systemic risk. Let me just highlight three key ones.

The first pervasive feature of financial systems is what we call externalities. They particularly relate to the complex and dynamic network of exposures among major intermediaries. What in tranquil times is an efficient mechanism to share risk, can, in times of stress, become a dangerous channel for transmitting instability. Two contracting parties do not have an incentive to take account of the effects of their risk-taking on third parties. As a consequence, the risk at the level of the system may be higher than the sum of individual risks.

The second key feature of financial systems is asymmetric information. Financial systems allocate funds from agents who have them but possess no specific knowledge about promising investment opportunities, to agents who have knowledge about the opportunities but not the funds to engage in them. This creates an agency problem between the two parties, which may be handled more or less well through the underlying financial contracts. If contracts are incomplete and negative news arrive on some of the investment projects, but information asymmetries do not allow lenders to judge whether this also affects other investment projects, funding may evaporate for all projects alike.

The special nature of financial systems is not simply characterised by the presence of these two imperfections. Externalities and information problems are also present in other economic sectors. The additional problem in the financial system is that they can result in the third feature: powerful feedback and amplification mechanisms, which render their implications more severe and widespread. Illiquid assets, maturity mismatches between assets and liabilities and leverage amplify the force with which problems of one intermediary are pushed through the complex network of exposures. Sizable amounts of debt relative to capital and short-term funding have more dramatic effects in situations of stress.

For example, intermediaries' losses can trigger "fire sales" of already largely illiquid assets, which reduce their values and cause losses to other intermediaries, as for example described in research on contagion by Hyun Shin and his co-authors.⁶ Moreover, funding and market illiquidity can reinforce each other, leading to vicious liquidity spirals multiplying the initial shocks.⁷

These effects are further amplified due to asymmetric information. In the aggregate, they lead to the nonlinear adjustments that are so characteristic of financial instability. The fact that such adjustments are nonlinear is particularly important for research and makes

⁴ Minsky, H. (1977), "A theory of systemic fragility", in Altman, E. and A. Sametz (eds.), *Financial Crises: Institutions and Markets in a Fragile Environment*, Wiley; Kindleberger, C. (1978), *Manias, Crashes and Panics: A History of Financial Crises*, Macmillan.

⁵ See, for example, Gorton, G. (1988), "Banking panics and business cycles", *Oxford Economic Papers*.

⁶ Cifuentes, R., H. Shin and V. Ferrucci (2005), "Liquidity risk and contagion", *Journal of the European Economic Association*.

⁷ Brunnermeier, M. and L. Pedersen (2009), "Market liquidity and funding liquidity", *Review of Financial Studies*.

modelling extremely difficult.⁸ Such adjustments may cause violent regime changes, pushing the system from a state of tranquillity to a state of turmoil.

One key element in phases of turmoil and crisis is speed. The rapidity of unfolding developments is often not modelled explicitly, but it is one of the greatest challenges for policy makers. Financial crises are by no means new phenomena, but the speed of their transmission has accelerated tremendously over the past few decades. While the unfolding of the sovereign debt crises in the 1980's occurred over the course of years, the Asian Financial crisis developed, at its peak, over months rather than years. The last intensification of the present crisis, starting in mid-September last year, has spread around the globe in the course of half-days. Many factors have contributed to this acceleration, including the process of global financial integration, the increasing leverage in institutions, the technological advancements that allow for an instantaneous transmission of information world-wide and the accumulation over a long period of time of unsustainable global imbalances.

In the eco-systems of our natural environment, feedback mechanisms are often prevalent, too. As soon as one part of the system is adversely affected, this can take the form of an adverse feedback loop destabilising the system as a whole.

Amplification effects are not only important in the transmission of instability, but also in the build-up of imbalances that sow the seeds of systemic risk. A very important phenomenon in this regard is herd behaviour in investment. For example, investment managers and loan officers may sometimes ignore valuable private information in order to mimic others when their own evaluation, their own remuneration or their own external reputation depends on their performance relative to the rest of the market.⁹

This behaviour is individually rational but socially wasteful. Here at the University of Cambridge, the famous analogy that John Maynard Keynes made between newspaper beauty contests and financial market behaviour comes to mind.¹⁰ I am also convinced that one of the main reasons behind herd behaviour in financial markets in general, particularly in times of crisis, is a lack of transparency. The fostering of transparency as concerns financial institutions, financial markets and financial products is therefore one essential policy lesson from the present crisis.

Our latest experience with systemic risk

Let me now apply the relevant elements of this framework on how to think about systemic risk to the present crisis. A particularly relevant source of systemic risk was the build-up of widespread financial imbalances – the second form of systemic risk I described – in the period of 2003 to 2007. The years prior to 2007 were characterised by low financial market volatility and risk premia, rapid financial innovation in credit markets, low interest rates across the maturity spectrum and ample liquidity conditions.

In particular, rapid financial innovation led to securitisation techniques with thus far unknown complexities and to long and uncontrollable chains of intermediaries between originators and final investors. Ratings agencies gained global power as the pricing of securitisation tranches was largely based on their assessment, while leverage mounted ever higher and a shadow banking system developed up largely unregulated.

⁸ For a recent example, see O. Castrén and I. Kavonius (2009), who study non-linear adjustments in a risk-based network of exposures based on euro area flow of funds data ("Balance sheet interlinkages and macro-financial risk analysis in the euro area", ECB working paper, no. 1124, December).

⁹ Scharfstein, D., and J. Stein (1990), "Herd behaviour and investment", *American Economic Review*.

¹⁰ He noted that competitors did not have to pick "those faces, which he himself finds prettiest, but those that he thinks likeliest to catch the fancy of the other competitors" (Keynes, J.M. (1936), "The General Theory of Employment, Interest and Money", Macmillan Cambridge University Press).

At the same time, mark-to-market accounting rules became increasingly widespread, while unsustainable external deficits and surpluses in some major economies paved the way for macroeconomic imbalances at the global level. Information began to flow instantaneously around the globe and raised competitive pressure on all financial market participants.

In this environment, banks and other investors engaged in a “search for yield” with the help of the new credit products and investment vehicles, circumventing existing regulations. The pace of this herd behaviour into ever more complicated forms of securitisation far exceeded the market’s capacity to solve a number of open issues of valuation, risk management and incentives.

The result were widespread financial potential instabilities in the form of a highly complex, opaque and – as it turned out later – illiquid system of credit risk distribution. Many investors were either ignorant or imprudent with regard to the risks that they had acquired. Contrary to conventional wisdom, this distribution led to much less diversification than thought and to some surprising concentrations of risks in a number of large and complex financial institutions. While mortgage market exposures, including those in US sub-prime mortgages, were part of the problem, it later turned out that the problem of bad assets was much more widespread.

The underlying risks started to materialise when house prices declined, delinquencies in US sub-prime mortgage markets rose, and the so-called “special purpose vehicles” that held highly concentrated exposures to these markets came under pressure. In June and July 2007, credit default swap premia started to increase sharply, rating agencies downgraded a large number of asset-backed securities and collateralised debt obligations. Even AAA-rated CDO index tranches declined below par value.

The eventual instability became systemic for the first time when money markets became impaired in early August 2007. The re-pricing of risks made the major intermediaries active in interbank markets aware that they might experience further losses in the future and that the same might apply to their counterparties. Given the lack of transparency of the credit risk distribution system, asymmetric information was omnipresent. It became difficult for intermediaries to distinguish good assets and counterparties from bad ones.

This led banks to hoard liquidity as a protection against the risk of their own assets and counterparties becoming illiquid, rather than lending available funds in money markets.¹¹ Such malfunctioning of the interbank markets makes the problem immediately systemic, as all major banks depend on those markets. For central banks, there was no alternative to making sizable liquidity interventions aimed at keeping the system afloat.

While this first phase of what we described at the time as “market turmoil” was indeed very challenging, the dramatic transition to a full-blown systemic crisis happened in September 2008. The failure of a very large US investment bank, in conjunction with other news and a series of events that increased uncertainty, led to a widespread loss of confidence in the financial system.

As a consequence, the economic outlook worsened dramatically. The economic models in use were not able to predict the sharp downward revisions of growth figures that followed over the subsequent seven months.

The events of September 2008 clearly showed that in economic policy, we have no good understanding of the very rapid transition to an eventual systemic crisis. In this sense, we

¹¹ See, for example, Cassola, N., M. Drehmann, P. Hartmann, M. Lo Duca and M. Scheicher (2008), “A research perspective on the propagation of the credit market turmoil”, ECB Research Bulletin, no. 7, June; Heider, F., M. Hoerova and C. Holthausen (2008), “Liquidity hoarding and interbank market spreads: The role of counterparty risk”, November, forthcoming ECB Working Paper; and various issues of the ECB Financial Stability Review.

were left alone. Policy-makers had to rely on informal information, real-time data releases and their own wisdom and judgements on how the situation was evolving.

What have we learned from this experience in terms of identifying those structural trends in financial systems that are important for systemic risk?

First, we need much more analysis of the implications of the business models of major intermediaries for the system as a whole. Some of the crucial factors, whose relative importance has shifted over time, include originate-to-distribute models, rising maturity mismatches and the combination of proprietary trading and investment advice.

Second, in line with previous experiences we have been reminded that the very fast growth of innovative financial instruments and new financial intermediaries, in particular off-balance sheet vehicles, can imply significant risks.

Third, financial integration needs to be accompanied by reform of supervisory and regulatory approaches and institutions. Major reforms in this area are currently being discussed in the European Council and European Parliament, including the establishment of a European Systemic Risk Board.¹²

Fourth, advancing financial consolidation raises the question of how to regulate and, in the event, wind down large and complex financial intermediaries whose disorderly failure could pose systemic risks.

Fifth and finally, as financial sectors develop, households may take greater risks, for example in mortgage markets and, more broadly, in their pension investments. While this also raises issues of consumer protection, from a systemic perspective, it becomes increasingly important to know how resilient the household sector and consumption can be in such a situation.¹³

Macro-prudential supervision: a policy response to systemic risk

I have discussed the nature of systemic risk and our latest experience of it in the present crisis. Let me now turn to the question of how policy-makers can respond to systemic risk. Today, I want to focus particularly on the challenges for policy-makers of detecting risks of systemic instability materialising in the future, and of then containing these risks.

Detecting systemic risks early is the task of macro-prudential supervision. I would like to focus on the analytical issues underlying this policy and stress three approaches, linking them to the three forms of systemic risk I discussed at the start of my lecture.

First, there are large and complex financial intermediaries, or like-minded clusters of financial institutions, that play prominent roles in the financial system. We can describe them as particularly important “nodes” in the financial network, which stand out through their risk, size and interconnectedness.¹⁴ The full understanding of their individual on- and off-balance sheet exposures and their lending and borrowing to each other is a crucial element in assessing and containing risks of contagion.

¹² High-level Group on Financial Supervision in the EU (2009), “Report”, Brussels, 25 February (de Larosière Report); EU Commission (2009), “Proposal for a regulation of the European Parliament and the Council on Community macro prudential oversight of the financial system and establishing a European Systemic Risk Board”, 23 September.

¹³ Ferguson, R., P. Hartmann, F. Panetta and R. Portes (2008), “International financial stability”, 9th Geneva Report on the World Economy, November, discuss the structural trends that preceded the crisis.

¹⁴ See Leitner, Y. (2005), “Financial networks: Contagion, commitment, and private sector bailouts”, *Journal of Finance*, for an application of network theory to the problem of financial contagion.

Second, the extent and diversity of investment practices across all segments of the financial system requires particular attention. For example, fast-growing credit to similar sectors or regions could be a sign of vulnerabilities building up. The imbalances might become unsustainable later and unravel in a disorderly fashion. This risk requires looking at early-warning signals in current market data. For example, aggregate credit might grow at a pace that is disproportionate to the credit required to finance sustainable investment and consumption. The complete set of important intermediaries, markets and instruments also needs to be checked for early-warning signals, since similar risks could be hidden in different parts of the financial system.

Third, current market data may not give the full picture of all relevant future scenarios. Detecting systemic risks early also requires stress-testing the system against extreme events and shocks that would surprise markets. Such macro-stress tests help to make an assessment of the resilience of financial systems against shocks that have a low probability but a highly destabilising power.¹⁵

Compared to the vision of systemic risk that I have outlined so far, two weaknesses of the supervisory and regulatory approach that we had before the crisis stand out.

For one thing, the old approach focused too much on individual risks and too little on interconnections across intermediaries and markets.

For another thing, it generated a lot of information about some types of intermediaries but much less on others (including the shadow banking system). This made it difficult to understand fully the pro-cyclical behaviour of the system in the aggregate.

Even if we understand the nature of systemic risk and know the basic approaches for detecting its different forms, there are very important challenges for macro-prudential supervisors.

One challenge is to be able to collect all the information that is necessary to identify systemic risks early. It requires combining some micro-level data with and aggregate data from components of the financial system. This means covering major types of intermediaries, in particular large and complex ones, key markets and wholesale market infrastructures. To contain systemic risk, macro-prudential supervisors need to have a good understanding of all parts of the financial system that are relevant for the risks of contagion, the endogenous build-up and unravelling of widespread imbalances and macro shocks.

Some of these data are more difficult to compile and bring together than others. There are some financial sectors about which considerably less is known than about others. Compare, for example, banks or insurance companies with non-listed highly leveraged institutions. Although nowadays individual hedge funds do not seem to be a source of significant systemic risk, it is very important that the relevance of this industry for the overall cyclicity of the financial system is assessed. A particularly complicated topic is measuring the interconnectedness among the systemically most important intermediaries.

The implication is that an effective exchange of information between the functions of macro-prudential supervision and micro-prudential supervision is an essential element of identifying and containing systemic risk. There will be strong demands on micro and macro-prudential supervisors to ensure smooth exchange of information under the post-crisis regulatory and supervisory regime we are striving to establish.

Another challenge is more of an analytical nature. The economic models we have at our disposal at present do not capture necessarily all relevant dimensions of systemic risk. For example, despite progress in developing macro-stress testing frameworks, there are still

¹⁵ Sorge, M. (2004), "Stress-testing financial systems: An overview of current methodologies", BIS Working Paper, no. 165, July.

limitations in how economic analysis captures the two-sided interaction between financial instability and the performance of the broader economy. Standard macroeconomic models often do not have a well developed financial sector and are linear in nature. As I have noted, systemic instability involves major nonlinearities and, in any case, cannot be analysed without proper representation of the financial sector.¹⁶

There are many good finance approaches to the topic of financial instability, but they are often not aggregate enough to capture realistic features of the macroeconomy, including for example the conduct of monetary policy. Speaking here in the intellectual “powerhouse” of the University of Cambridge, I therefore call on the academic research community to make major efforts towards a better integration of financial and macroeconomic analyses to address these limitations.¹⁷

A final challenge is given by the policy instruments available to contain systemic risks beyond monitoring and warning about them. Macro-prudential regulation is a relatively new policy area. We have much experience of how micro-prudential regulation affects the stability of financial intermediaries and markets. A much more complex matter is using regulatory tools to stabilise the financial system as a whole.

Having said that, I nevertheless see very encouraging discussions and progress on this front. For example, the 2009 Geneva Report on the World Economy on “The fundamental principles of financial regulation” points the way to how regulators can determine higher capital requirements for financial intermediaries that exhibit features enhancing systemic risk.¹⁸ Additional capital for interconnectedness, leverage, maturity mismatch and asset growth will limit the scope for the externalities I was discussing before.

New initiatives are also under way to enhance the transparency of financial activities. These will help to limit the adverse effects of imperfect and asymmetric information on systemic stability. Overall, a great deal of work is going on at the Financial Stability Board, the Basel Committee on Banking Supervision and at other competent bodies to strengthen the macro-prudential dimension of financial regulation.

As with climate change, an effective policy response demands international coordination. Global warming has been called the biggest market failure ever; the present crisis has been perhaps the biggest *financial* market failure ever. We know from basic theory and practice that addressing market failure requires a major and coordinated policy response, both immediate and in the longer term.

Systemic risk and macroeconomic stabilisation policies

I have identified the endogenous build-up and subsequent unravelling of financial imbalances, as driven for example by herd behaviour in investment, leverage to finance investment exposures and complex and opaque financial contracts, as a particularly relevant

¹⁶ It should be mentioned that the macroeconomic currency contagion literature discussed the transmission of breakdowns of fixed-exchange rate regimes with some nonlinear elements. See, for example, Eichengreen, B., A. Rose and C. Wyplosz (1996), Contagious currency crises: First tests, *Scandinavian Journal of Economics*; Buitier, W., G. Corsetti and P. Pesenti (1998), “Interpreting the EMS crisis: Country-specific and systemic issues”, *Princeton Studies in International Finance*; Masson, P. (1999), “Contagion: Macroeconomic models with multiple equilibria”, *Journal of International Money and Finance*; Drazen, A. (2000), “Political contagion in currency crises”, Krugman, P. (ed.), *Currency Crises*, National Bureau of Economic Research and Chicago University Press. Exchange rate surveillance as such, however, is typically outside the scope of macro-prudential supervision.

¹⁷ *The Economist* (2009), *The state of economics*, 16 July; Krugman, P. (2009), “How did economists get it so wrong?”, *New York Times*, 2 September.

¹⁸ Brunnermeier, M., A. Crockett, C. Goodhart, A. Persaud and H. Shin (2009), *The fundamental principles of financial regulation*, 10th Geneva Report on the World Economy, July.

form of systemic risk. While macro-prudential supervision is at the forefront of preventing severe asset bubbles from emerging, this may not be sufficient, given the macroeconomic components of cycles. Therefore, macroeconomic stabilisation policies need to make their contribution to reducing pro-cyclicality.¹⁹

Macroeconomic authorities have faced the challenge posed by financial booms and busts in two ways.

First and foremost through solid institutions: the pre-emptive arm against system instability. Stability-oriented macroeconomic frameworks have ensured price stability and economic prosperity in all developed countries for the last quarter of a century. Demand and real incomes have grown steeply, but steadily. Their steady course has instilled a wide sense of security in investors and savers.²⁰ The European stability culture can be seen as vindicated by the crisis.

However, macroeconomic stability has not been a sufficient condition for financial stability. It cannot eliminate systemic risk altogether. Macroeconomic authorities have therefore been frequently called on to provide *remedial action*, once booms have turned into busts. The aim of their action has been precisely to avoid the transformation of individual financial risks into systemic risk.

Ex post remedial action has often been activated as soon as the financial firestorm has threatened the stability of the economic system. But such action risks raising expectations that macroeconomic policy will always insure against tail risks, no matter how large. Expectations of this sort can contribute to an under-pricing of financial risk in subsequent phases of the financial cycles. They can encourage concentration of market positions in the financial scene.

At the same time, the instruments of counter-cyclical policy have been used so intensely – and more so from one financial cycle to the next – that authorities might have tested the extremes of their control procedures. I am borrowing here from dynamic control theory. Repeated attempts to fine tune a mechanical or electronic system after a shock sometimes leads to “instrument instability” that makes the system spiral out of manageable bounds.²¹ Economic and financial systems, I suspect could have some structural similarities with physical systems, leading to the same kind of “instrument instability”.

Moral hazard and policy instrument instability pose questions to which we are not in a position to a firm answer at this point in time. I would like to see these questions studied and debated in eminent academic institutions like this.

Turning to actual developments, as I mentioned already, we saw perhaps the most appalling manifestation of such a threat in the autumn of 2008. In the early phase of the present financial crisis, precautionary hoarding of liquidity brought to a complete seizure of many segments of the market for credit. At the same time, panic sales of assets made market liquidity disappear. Market liquidity is high when traders can easily find a price, and that price

¹⁹ See also Viñals, J. (2009), “On Monetary and Financial Stability – Past, Present And Future”, keynote speech delivered at the at the 28th SUERF Colloquium on “The Quest for Stability” at the Utrecht University School of Economics.

²⁰ I have discussed the two-way interactions between steady macroeconomic conditions and trends in financial prices elsewhere. See Trichet, J.-C. (2008), “Risk and the Macro-economy,” keynote address at the Conference “The ECB and its Watchers X,” Frankfurt, 5 September 2008.

²¹ I am referring in particular to control theory as applied to economics by the engineer A. W. Philips in the 1950s. See Philips, A.W. (1957), “Stabilisation policy and the time form of lagged responses,” *Economic Journal*, 67, 265–277. But I do not forget that a very early attempt to import the phase transition notion into social science resulted in Friederick Engels’ famous “law of the transformation of quantity into quality”, described in his (circa 1883) work *Dialectics of Nature*, which provides some insight into early attempts to grapple with concepts now considered reasonably well understood.

is very close to what every other trader pays for the same asset at the same time. In early October 2008 the market could simply not find a value for many of those securities that had been so highly priced only few weeks before.

To avoid a cascade of counterparty defaults, governments offered generous financial guarantees and injected fresh capital into the system. Central banks increased their lending to replace the withdrawal of private lending – in interbank transactions and, sometimes, in the broader market for capital. This concerted intervention very much attenuated the downward part of the cycle and blocked channels of financial contagion. In short, it provided catastrophe insurance.

There is no doubt that macroeconomic policy-makers' interventions have had a stabilising effect. Market compensation for risk has gradually returned to more normal levels. The free-fall of the economy has been halted and turned around. The financial crisis has not precipitated the extreme spiral of falling prices, rising debt burdens and chain bankruptcies that some economists had feared.

For what concerns monetary policy, conditions are now stable enough that we can start to withdraw some of the excess support that is now not needed to the same extent as it was in the past.²²

Concluding remarks

Let me draw to a close. An English proverb, echoed in many other languages, warns that sometimes, “you can't see the wood for the trees”. Systemic risk is about seeing the wood, and not only the trees. Macro-prudential supervision, supposed to detect systemic risk and propose remedial action, has been devised because in a highly integrated and complex financial system, micro-prudential supervision alone can no longer guarantee financial stability. The main challenge in systemic risk analysis is therefore to integrate all relevant perspectives, including those of economists, supervisors, regulators, accountants, securitisation experts, rating experts, risk managers and many others to take a holistic view on the system, its dynamics and its interlinkages.

As we have seen, small things can make a big difference and seemingly self-contained initial events can lead to a system collapse. We therefore need a detailed understanding of each part of the financial system. At the same time, their complex interactions mean that we need to keep the big picture in sight, too. We must not allow the understandably narrow focus of detailed knowledge to hamper insight into the system as a whole. Like researchers on the climate and the natural environment, we need to combine the micro and macro perspectives.

The academic research community can make a significant contribution in supporting policy-makers to meet these challenges. It can help to improve analytical frameworks for the early identification and assessment of systemic risks. And it can contribute to discussions on the further identification and optimal use of macro-prudential regulatory instruments.

Macro-prudential supervision is an important tool to contain systemic risks and thereby contribute to sustainable growth and prosperity. The proposed establishment of a European Systemic Risk Board next year is a very important initiative in this regard. Ensuring systemic stability will also alleviate undue pressures on monetary and fiscal policies to extend financial safety nets. The standard macroeconomic stabilisation policies can then focus more clearly

²² I have drawn out the ECB's strategy in the face of the financial crisis and our strategic plans on the way back to normalisation on several occasions in the past few months. On the ECB's approach to the crisis, see for example my keynote address at the University of Munich, “The ECB's enhanced credit support,” Munich, 13 July 2009. On the phasing out, see my speech entitled “The ECB's exit strategy,” at the ECB Watchers Conference, Frankfurt, 4 September 2009.

on their primary objectives and thereby make their own best contribution to growth and well-being.

Thank you very much for your kind attention.