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Beate Reszat*

Sources of Increasing Systemic Risk in International Financial Markets

In its annual report, published in June, the Bank for International Settlements (BIS) warned of increasing systemic risk in international financial markets. Competitive pressures will intensify in the years to come and financial institutions and regulators around the world appear ill-prepared to cope with the resulting challenges. The pressures are expected to grow for three reasons above all: the prospective "Big Bang" of the Japanese financial system, a further erosion of the Glass-Steagall restrictions in the United States and the preparations of financial institutions in Europe to position themselves for the introduction of the euro.¹

The move to a single currency in Europe, which already has become a driving force in the transformation of the European banking industry, has two aspects. On the one hand, observers expect a consolidation of some kinds of commodity-type business such as trading of government bonds, interest rate derivatives and spot currencies, and banks will need to find new sources of income in order to compensate for the resulting loss of revenues. On the other hand, with the exchange risk being eradicated and savers further diversifying their portfolios across European markets one main source of banks' competitive advantage so far, home currency, will disappear. This comes at a moment when deregulation and the abandoning of credit and capital controls in many European countries have already led to increased competitive pressures and narrowed margins.²

Intensified competition is also expected from the intended reform of the US banking system. There are proposals to abolish 65-year-old legislation and allow banks in the United States to expand into other financial services. So far, the 1933 Glass-Steagall banking act prohibits cross-ownership between banks, securities brokers, and insurance and properties companies. Recently, there were some mergers and acquisitions of securities firms by US commercial banks in anticipation of the expected changes watering down existing rules. Deregulation in

this field will not only mark a new phase of consolidation for the US industry but also provide more opportunities for European banks in the market thereby further increasing pressures on margins and revenues.³

Perhaps the biggest challenge for world financial markets in the near future will come from Japan. In December 1996, the Japanese government announced a "Big Bang" initiative, a fundamental liberalisation of Japan's financial system. The programme which is to be completed by the end of 2001 will not only lift the barriers between banks, securities houses and the insurance sector but also abandon the existing system of fixed brokerage commissions, allow for new financial products and services and put the industry's legal, tax and accounting systems in line with global standards. A foretaste of the things to come will be the liberalisation of Japan's foreign exchange market – the second-biggest market worldwide – in April next year.⁴ The dangers associated with these developments are twofold: with a bulk of bad loans, remnants from the breakdown of the speculative bubble of the 1980s, still in their balance sheets and a profitability which is extremely

¹ See Bank for International Settlements: 67th Annual Report, Basle 1997: 7.

² For detailed overview of the euro's possible impact on various market segments see, for example, Jean Dermine: European Banking with a Single Currency. The Wharton School, University of Pennsylvania, Financial Institutions Center, Working Paper 96-54, mimeo 1996.

³ Compare Gerard Baker: Banking on Diversity, in: Financial Times, 24. 4. 1997.

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low by international comparison Japanese banks appear particularly vulnerable to the strains of increased competition.⁵ And, as main lenders to other Asia-Pacific countries their mounting vulnerability increases the fragility of the region's emerging markets. For instance, their ability to provide support in cases such as the recent crisis of the Thai baht clearly depends on their performance at home.

Stronger competition among banks worldwide and narrowing margins have already led to a situation where risks are not always properly priced. This, in turn, heightens the systemic risk for the financial community as a whole. Systemic risk is defined as the potential impact of a failure of one or more large market participants on the financial system worldwide. The greatest danger here is looming in the large interbank payment and settlement systems which process several trillion dollars' worth of payments a day. They have the potential to amplify a crisis. That this danger is real has been demonstrated by several episodes in the past such as the failures of Drexel Burnham Lambert in 1990, the collapse of the Bank of Credit and Commerce International (BCCI) in 1991 or the Barings case in 1995.

The latter demonstrated that it need not be big involvement or large payments for a bank to get overtaken by the events. When Barings Brothers collapsed at the end of February 1995 one effect widely unnoticed was a difficulty arising in the ECU clearing system which threatened to block the settlement of ECU 50 billion of payments although Barings itself was involved in less than one per cent of those payments.⁶ On Friday, 24th February a clearing bank had sent a payment order of a comparably small amount to Barings' correspondent for value on Monday. When the disaster became known on Saturday the clearing bank which tried to cancel the order learnt that this was not possible under the rules of ECU-clearing. On the other hand, the receiving bank was not allowed to reverse the transaction either. This left the clearing bank with a net liability at the end of the day which under the rules would have prevented settlement for all 45 participants of the system. Clearing between all of them would have had to be cancelled and no payments whatsoever would have been settled on that day. The situation was

saved when under pressure of time the clearing bank agreed to borrow from a bank with a long position. Otherwise, things would have become very difficult, not only for the banks but also for their clients in the ECU markets and beyond. It is this kind of contagion observers and participants alike fear most.

With respect to financial institutions' recent activities the BIS in its annual report expressed particular concern about the possible impacts of a sudden downturn in asset prices as, during the last year, an increased appetite for risk and a pervasive search for higher returns had made exposure to shift in market sentiment rise. There are three phenomena which deserve a closer look in this context: a tendency for financial institutions to engage more strongly in proprietary trading to make up for lower returns elsewhere, the rise of derivatives trading and investors' rush into emerging markets. All three bear risks of their own.

Market Risk

Nowadays, most proprietary trading by financial institutions is short term by nature, taking the form of arbitrage. This may take place between markets, financial assets and maturities as well as market rates and prices. Traditionally, arbitrage is defined as a riskless strategy to take advantage of price differentials in different locations. In today's internationally highly dependent and information efficient markets those occasions have become rare. Instead, dealers are largely concentrating on exploiting differences of rates and prices in time. In these cases, the distinction between speculation and riskless profit-making in the traditional sense becomes blurred, since the transactions necessarily involve establishing and holding open positions which are exposed to market risk. These activities are driven by expectations. The problem is that market participants have only a very limited understanding of the influences and determinants of price and rate movements and are seldom aware of the true dangers. The same limits of knowledge are also the reason why recent official and private approaches to a better risk

⁴ For existing restrictions and planned changes see, for example, Mitsuhiro Fukao: *Nihon no Kawase Kanri to Kin'yū Shijō no Kūdōka*, in: Kazuo Ueda and Mitsuhiro Fukao (eds): *Kin'yū Kūdōka no Keizai Bunseki*, Tokyo 1996; and Beate Reszat: *The Japanese Foreign Exchange Market*, forthcoming, London and New York 1997, chapter 8.

⁵ For a detailed overview of the state of Japan's banking system see Richard Cookson: *A Whopping Explosion – A Survey of Japanese Finance*, in: *The Economist*, 28 June 1997; and for an analysis of the role of financial deregulation in tackling the bad-loan problem Mitsuru Taniuchi: *Recent Developments in Japan's Financial Sector – Bad Loans and Financial Deregulation*, Economic Research Institute, Economic Planning Agency, Discussion Paper No. 76, Tokyo, May 1997.

⁶ For the details of this and other cases see Bank for International Settlements: *Settlement Risk in Foreign Exchange Transactions*, Basle, March 1996.

management necessarily fall short of what ideally would be needed.

Market risk is the possibility of losses due to changes in market conditions and prices. In the latest amendment to its 1988 Accord⁷ the Basle Committee on Banking Supervision requires banks to hold capital against variations in prices and exchange rates from the end of 1997 onwards. The Committee's proposal contains a standardised framework for risk measurement, but the banks will be allowed to use their internal models instead if they satisfy a number of qualitative criteria specified by national supervisors.⁸

The industry's state of the art in risk measurement is a concept called Value at Risk (VaR).⁹ The Value at Risk is a number which is computed to answer the question of how much capital should be kept aside to cover potential losses from trading activities.¹⁰ It is denominated in currency units and expressed in terms of a confidence interval referring to the loss which is not exceeded in all but a small percentage – usually five or one per cent – of occurrences. The Basle Committee has chosen a confidence level of 99 per cent, but some banks are using lower levels.

There is no generally accepted method of estimating VaR so far. The various approaches range from historical simulations¹¹ through Monte Carlo simulations and scenario simulations to special techniques to deal with nonlinearities and unknown probability distributions. They are very demanding with respect to the mathematical skills and technical understanding needed¹² and differ widely with respect to their performance and the results found for different kinds of instruments and portfolios. The most simple

case is the computation of a VaR for a single financial asset whose changes in market price are approximately linear and for whom the relation between a change in the market price and its value is a linear one as well. The most complex case is a portfolio consisting of different instruments whose market prices in part follow strongly nonlinear patterns, such as stock prices and exchange rates, and/or for whom the relation between a change in the market price and a position's value is nonlinear which, for example, holds for options.

In the case of nonlinearities, the general knowledge of price behaviour and the ability to explain and predict the possible range of financial losses is highly unsatisfying. As hinted above, two cases have to be distinguished: nonlinearity in prices and nonlinearity in the relation between price changes and changes in position value. The first is a phenomenon which can be found in many financial time series and which so far is poorly understood.¹³ Attempts to give a theoretical explanation are rare and hardly convincing and, partly as a result of the lack of theoretical underpinning, its empirical investigation meets insurmountable obstacles. Research is divided into two broad strands, a deterministic and a stochastic one. Proponents of the deterministic view hold that observed nonlinearities are caused by deterministic influences which make market prices fluctuate in a seemingly irregular manner. Unfortunately, mathematical systems describing such a behaviour are highly sensitive to initial conditions which strongly limits their forecastability. The stochastic view assumes that the observed nonlinearities reflect a nonlinear dependence of stochastic influences in time, but does not ask for the forces behind those influences. Recent ARCH- and GARCH-type models¹⁴ are often used to try to capture their effects, so far with mixed results.

⁷ For the details see Basle Committee on Banking Supervision: Planned Supplement to the Capital Accord to Incorporate Market Risks, Basle 1995.

⁸ Those are, among others, the existence of an independence risk control unit, active involvement of senior bank management in risk control, the consideration of stress tests for formulating policies and setting limits and the independent review of risk management systems carried out regularly in the bank's internal auditing; compare Patricia Jackson: Risk Measurement and Capital Requirements for Banks, in: Bank of England Quarterly Bulletin, May 1995, p. 183.

⁹ The concept and its applications to different financial instruments and portfolios are explained in Philippe Jorion: Value at Risk, Chicago 1997. A detailed discussion of VaR concepts can also be found in JP Morgan: RiskMetrics™ – Technical Document, New York, 21 November 1995.

¹⁰ Compare Thomas Ridder: Basics of Statistical VaR-Estimation, Paper presented at the 6th Karlsruhe Econometrics Workshop on "Risikometrie, Ökonometrie und neuronale Netze", Karlsruhe, 19 March 1997.

¹¹ Under historical simulation, portfolios are valued replicating one specific historical path of market behaviour. In contrast, Monte Carlo simulation is a concept where many paths are generated by means of a stochastic process. See JP Morgan, op. cit., 1995, p. 27.

¹² An impression of the challenges imposed by those methods both to the banks' management as well as to bank supervisors is given by a recent paper co-authored by a staff member of the German Federal Banking Supervisory Office (Bundesaufsichtsamt für das Kreditwesen) comparing the empirical performance of candidate models for forecasting losses for one of the simpler cases – a portfolio of (assumed) linear instruments. See Rakhai D. Davé and Gerhard Stahl: On the Accuracy of VaR Estimates Based on the Variance-Covariance Approach, paper presented at the 6th Karlsruhe Econometrics Workshop on "Risikometrie, Ökonometrie und neuronale Netze", Karlsruhe, 19 March 1997.

¹³ See for example Edgar E. Peters: Chaos and Order in the Capital Markets, New York 1991; and for a detailed overview of the following with a focus on foreign exchange rates see Beate Reszat, op. cit., chapter 5.

¹⁴ ARCH stands for Autoregressive Conditional Heteroscedasticity. See for a description of this and related concepts, for example, Terence Mills: Time Series Techniques for Economists, Cambridge 1992.

If the Value at Risk for an asset or a portfolio of assets with nonlinear price behaviour is estimated using traditional variance-covariance approaches based on the normality assumption the results cannot be trusted. If the respective time series of returns are characterised by long-term memory and an infinite variance, which holds for a wide variety of financial instruments, this assumption does not hold. Among the stylised facts the series exhibit their probability distribution shows fat tails and skewness. The first means that there are far more outliers than predicted by a normal distribution and, on the other hand, far more small variations. The second stylised fact describes an asymmetry with more or larger occurrences in the left half of the distribution. To give an example: when on Monday, 23rd September 1985, the day after the Plaza Agreement, the US dollar fell against the D-mark by 5.75 per cent, under the normal distribution a change of this magnitude could be expected to occur only once in about 70,000 years.¹⁵ The bias is felt the more the smaller the confidence level chosen. On a 99 per cent level the results for different candidate models for VaR estimation differ widely. One possibility here is to calculate the VaR in terms of quantiles gained from historical simulations without referring to the underlying distribution, computing the loss which in the past was not exceeded on 99 per cent of occasions, but the results are not necessarily more reliable since, particularly in case of nonlinear price patterns, the past need not be a good approximation of the future.

The Pitfalls of Leverage

High uncertainty and low reliability of estimated losses also prevail when the relation between the market price of a financial asset and its value is a nonlinear one. This is the case with options. An option is a contract sold for a premium which gives the buyer the right, but not the obligation, to buy (in case of a call option) or sell (in case of a put option) a financial asset in the future at a specified price. One advantage of those instruments is that they allow an unbundling of price risks. A firm that wants to get rid of an unwanted risk of price changes of an underlying asset can hedge its exposure at low cost while an investor who is taking the risk is gaining flexibility in structuring trading and investment positions. Another advantage is the low capital amount needed due to the leverage of those instruments which allows the holder to get the same potential return as the buyer of the underlying asset but on a much smaller amount invested. But leverage is a double-edged sword

because potential losses, seen in relation to the amount invested, are amplified as well.

With options, the risk of loss is an asymmetric one since, in contrast to other financial instruments, they are based on the insurance principle. For example, the worst that can happen to the buyer of a call option is that expectations do not fulfil and that in not exercising his option he loses his premium. The seller who has the obligation to deliver if the option is exercised is in a different situation. If, for him, prices move in the wrong direction and he does not already own the underlying asset he needs to buy it in the market and his loss can become, in principle, unlimited.

The value of an option contract is not constant but dependent on a variety of influences which may change very rapidly. Current valuation methods are only of limited use in grasping these influences. The model most widely used in options pricing is the Black-Scholes approach.¹⁶ Based on several assumptions – such as continuous trading, no price jumps, no transaction costs and log-normally distributed prices of the underlying asset – the option price is determined by a formula containing the current price of the underlying instrument, the option's exercise price, its remaining life time, the level of interest rates and the projected volatility of the underlying instrument. Those factors combine in a way that the relation between the position value and the market price is nonlinear and it is no longer possible to calculate expected changes in value by multiplying estimated changes in rates by constant sensitivities of the positions as in traditional risk analyses.¹⁷

There are several measures of sensitivity and risk in options trading. The most important one, the delta, measures the change in the price of the option resulting from a small change in the underlying asset. A delta hedge is a strategy to buy as many options as necessary to keep the value of a portfolio immune to such price changes. The more an option is in the money¹⁸ the more sensitive is its price to that of the

¹⁵ See Juergen Kaehler: On the Modelling of Exchange-Rate Dynamics by Stable Paretian Distributions, paper presented at the Jahrestagung der Gesellschaft für Wirtschafts- und Sozialwissenschaften – Verein für Sozialpolitik –, Lugano, 2-4 October 1991, p. 2.

¹⁶ See, for example, David A. Dufresne: Options and Financial Futures: Valuation and Uses, New York 1992, chapter 7.

¹⁷ For the following in greater detail see, for example, Julian Walmsley: International Money and Foreign Exchange Markets, Chichester 1996, pp. 216-220.

¹⁸ An option is in the money if the current price of the underlying asset is greater than the strike price of a call option, or below that of a put option.

underlying asset. In a sense, the delta measures the probability that the option is exercised. But, as just mentioned, the change needs to be small for the measure to be reliable because the delta is a linear approximation to a nonlinear phenomenon. For larger price jumps the deviation of this approximation from the true price reaction is no longer tolerable.

The next important measure is the gamma which describes the sensitivity of the delta to a change in the price of the underlying asset. It is highest when the option is at the money, i.e. the option's strike price equals the price of the underlying asset, since in that situation smallest price changes trigger large responses of the delta.¹⁹ Some risk measures use a second order approximation taking the sum of both the delta and the gamma values. However, as can be shown, in the case of price jumps these are not necessarily more reliable than the delta. Beside these two, there are several other measures taking into account changes in implied volatility, time until maturity and other factors influencing an option's value. The delta-plus method used in the Basle Committee's standardised framework includes the vega, which shows the impact of a change in volatility in addition to the delta and gamma. Besides, the Committee mentions other risk measures such as the rho, the rate of change in value of the option with respect to the interest rate, and the theta measuring the sensitivity with respect to time until maturity as well. Although the Committee does not propose inclusion of capital charges for the latter at present, it expects banks with considerable options business to at least monitor such risks closely.

In options valuation, volatility plays a key role. The problem here is twofold. On the one hand, for many financial time series the variance is not constant but changing over time, and on the other, the calculation method used differs from firm to firm. In principle, there are two ways to measure volatility: either to estimate it from historical data or to calculate so-called "implied" volatilities from the observed option prices of other market participants. Both have their drawbacks. For historical probabilities the results differ depending on the time series chosen, on its length and on if and how more recent observations

are weighted. On the other hand, implied volatilities do not always exist and if they do they may include price elements that cannot be separated such as transaction costs, risk premia or earnings components.²⁰

One effect of the nonlinear nature of options is that intuition and "feeling" for risk based on experience, which in traditional financial areas allowed one to look at a few key variables to understand the pricing process, have become worthless, and relying on them in this area is more than negligent. For example, there have been simulations for call options on the German DAX index where standardised price variations consistently led to profits while potential losses would have occurred only in the non-simulated intervals in between.²¹ The situation is further worsened by the dealers' scope in choosing a pricing model as a British bank, NatWest, painfully learned earlier this year. The dealer, who lost the bank £50 million on options trading was reported to have miscalculated volatility.²² Those miscalculations are hard to detect for two reasons: one is "model risk". Often traders are allowed to use more sophisticated models than the controllers who check their books and therefore are not able to trace the basic assumptions behind their calculations. The second is a phenomenon known as "volatility smile". Options which are far in or out of the money have much higher implied volatilities than others. Since markets for those options are highly illiquid implied volatilities cannot be observed and traders try to more or less guess these by taking the known volatility of liquid options and then adjusting the numbers respectively. The curve they derive in this way looks like a broad smile which explains the name.²³

In derivatives trading two basic assumptions of options pricing models are violated regularly: that of continuous trading and the absence of price jumps. Experience shows that uncertainty becomes incalculable in periods of market stress and low liquidity when markets easily dry out. One recent dramatic example is the crisis in the copper market in reaction to Sumitomo's business losses in 1996. On 13 June 1996, Sumitomo Corporation, the big Japanese general trading house, announced that its chief copper trader had been running up estimated

¹⁹ Compare Arturo Estrella et al.: The Price Risk of Capital Options Positions: Measurement and Capital Requirements, in: Federal Reserve Bank of New York Quarterly Review, No. 2, 1994, p. 30.

²⁰ See for a detailed discussion Ralf Goebel: Ansätze zur Risikomessung und -steuerung des Derivategeschäfts in Kreditinstituten und Nichtbanken, in: Axel Bertuch-Samuels and Wiebke Störmann (eds): Derivate Finanzinstrumente: Nutzen und Risiken, Stuttgart 1995, pp. 67-70.

²¹ Compare Ralf Goebel, *ibid.*, pp. 65-67.

²² A description of the case is given by John Gapper: When the Smile is Wiped off, in: The Financial Times, 9 March 1997.

²³ A detailed discussion of the reasons for this phenomenon can be found in: Hans Peter Steinbrenner: Bewertungen im professionellen Optionsgeschäft, Stuttgart 1996, pp. 290-292.

losses of \$1.8 billion in unauthorised trades at the London Metal Exchange (LME).²⁴

There is a market for copper derivatives which largely consists of producers who buy put options from banks to protect themselves against falling copper prices. Those options put the seal on the banks' fate in the Sumitomo case. As soon as the first rumours about Sumitomo's losses circulated the price of copper started to fall and soon reached a level at which the put options could be exercised. Facing possible claims from clients the banks turned to delta-hedging with copper futures.²⁵ This led to further pressures on the copper price and the banks got trapped in a vicious circle. In the end, risk models told derivatives dealers that they had to sell contracts for about 500,000 tonnes for every \$100 drop in the price which drove the market into a free fall. It turned out to be a classical example of a "gap risk": market liquidity dried up and hedging became impossible. Some of the banks were said to have lost amounts up to \$10 million on this occasion. Calculations by a JP Morgan trader suggested that the volatility he observed on one of those days according to his model should be repeated once every 4.7 million trading days, or every 19,000 years. However, the next day he observed the same volatility, a succession which had a probability of being repeated every 70.5 billion years.²⁶ This gives a vivid example of the reliability of risk models in times of stress.

Emerging Market Fallacies

The last point leads directly to another source of concern, which is the rally of international investors in all kinds of emerging market paper that could be observed during the last year. These markets are often illiquid, volatile and lacking transparency, and model assumptions such as continuous trading and the absence of price jumps must be expected to be violated at the first signs of crisis. Ample cash and low

margins worldwide have led to a kind of ruinous competition for investment opportunities. Emerging market borrowers are now raising funds very cheaply. For example, there are US dollar bonds from Slovenia yielding less than half a percentage point over the equivalent US Treasury paper. Billions of dollars of long-term bonds are bought from countries that only a few years ago were regarded as "disaster areas".²⁷ Nervous investors are offered "sweeteners" such as the "credit sensitive" provisions a recent Thai eurobond carried as additional attraction.²⁸ Emerging stock markets are booming. Whoever thought that Hong Kong's return to China would have negative impacts on the Hang Seng index erred. In the weeks surrounding the event share prices of red chips from mainland China soared. In loan syndication, international banks nowadays often appear more concerned with securing future market prospects than with the risks they take.²⁹ The results are mispricing and a growing disregard for underlying creditworthiness everywhere.

Three principal forces can be identified behind the current financial rush into emerging markets.³⁰ The first is the development of privatisation and free markets in former communist countries which provide new opportunities for international investors. The second is liquidity. As studies have shown, easy monetary policy in international creditor countries has led to a flood of idle cash which considerably contributed to the recent surge in international capital flows.³¹ With low interest rates in major industrial countries investors' risk preferences changed and they turned their attention to more exotic alternatives. Even institutional investors such as pension funds have begun to invest regularly in emerging markets. The third force is the globalisation of world markets and firms' financial activities. The creation of a single market in Europe, the North-American Free Trade Agreement (NAFTA), the Uruguay Round and the dynamic growth in South-East Asia all contributed to

²⁴ For the details of the case see Beate Reszat, *op. cit.*, pp. 113-114.

²⁵ A future is a standardised forward contract to buy a financial instrument or a commodity at a specific point in the future at a price agreed now. The banks' aim in this case was to establish short positions which would gain with a falling copper price thereby partly compensating their expected losses.

²⁶ The Financial Times: Summing-up Sumitomo, 21 June 1996.

²⁷ The Financial Times: An Emerging Bubble, 10 July 1997.

²⁸ They guaranteed a higher coupon should the borrower's international credit rating decline. The bonds, whose issuer is a partially state-owned body, were priced to yield in two tranches 1.2 and 1.12 percentage points more than US Treasury bonds respectively which was considered a comparatively high spread. See Edward Luce: Sweetened Thai Bond Issue Woos Nervous Investors, in: The Financial Times, 1. 8. 1997.

²⁹ A particularly lucid example is again the Hong Kong market where banks are seeking to establish business with Chinese companies that they expect to become powerful in the near future. Compare The Economist: The Wild West of the East, 12 July 1997.

³⁰ Compare also The Financial Times: A Ride on the Rollercoaster, 12 July 1997.

³¹ For example, low interest rates in Japan seem to have been one reason for the recent growth of the Japanese samurai market. Samurai bonds are yen-denominated bonds issued by foreigners in Japan with so diverse borrowers as the National Bank of Hungary, the Republic of Greece, Argentina and Mexico. For recent concerns about the rise of this market see Frank Packer and Elizabeth Reynolds: The Samurai Bond Market, in: Federal Reserve Bank of New York: Current Issues in Economics and Finance, Vol. 3, No. 8, June 1997.

the globalisation of manufacturing in recent years. One side-effect is that companies are increasingly diversifying their financial portfolios also across countries and regions with emerging markets taking a growing share.

As a result of these forces, capital flows into developing countries increased dramatically. While in 1970, according to the World Bank, net long-term capital flows into low and middle income countries were \$11.1 billion, in 1994 they had risen to \$227.4 billion, an increase which was much faster than that of all developing countries' nominal GNP.³² The bulk of this increase took place in the 1990s, in the wave of investors' recent emerging markets fad. A large and growing part of the flows in these years were directed into East Asian countries which after the experiences in Latin America during the 1980s appeared particularly attractive to foreigners. Firstly, East Asian dynamism had secured sustained high economic growth since the second half of the 1980s. Secondly, some of the countries such as Hong Kong and Singapore had sophisticated financial centres with promising prospects and, in addition, new financial markets were established in the region which attracted investors' interest.³³

An increasing number of Asian countries were considered to be creditworthy. When Mexico was at the height of its financial crisis in 1995 the country appeared very different from East Asian nations, as Asian authorities emphasised time and again. Two years later the picture has completely changed. The complaints of the BIS about "financial fragility in Asia" in its latest annual report³⁴ demonstrate how rapidly perceptions may alter and how much those markets are still lacking the transparency on which sound investment decisions should be based. As the recent crisis of the Thai baht showed there are worrying similarities between some of the region's countries such as large current-account deficits, overheated property markets and sluggish exports which are strongly reminiscent of the Mexico case, raising fears of systemic contagion.

What makes a country vulnerable to financial crisis? In a recent study covering a broad range of countries³⁵ three factors were identified: a large appreciation of the real exchange rate, a weak banking system and low levels of foreign exchange reserves. There is widespread agreement that in the Mexico case, these factors, and not its fundamental economic conditions at that time, made the country subject to a self-fulfilling speculative attack in late December 1994 triggered by panicking peso holders

who suffered extraordinary losses. After this crisis, which took investors entirely by surprise, they nervously began to test other markets for signs of similar weakness. Panic spread and the result was a "tequila effect": in early 1995, several countries such as Argentina, Brazil and the Philippines succumbed to speculation.

Two aspects are worth noticing in this context. First, the crisis did not affect all countries to the same extent. For example, while a distant country like the Philippines suffered heavily, Mexico's neighbours Chile and Columbia witnessed only slight and transitory effects. Second, countries which appeared strong enough to resist speculative attacks at that time later proved extremely vulnerable to financial crisis as well. Their economies were by far not as strong as they appeared to be. It turned out that at the time of the Mexico crisis investors were simply not aware of their weaknesses, which only became visible later on.

Thailand is the best example for the lack of transparency which saved the country from contagion during the Mexico crisis but offered no protection in the longer run. In summer 1997, it became obvious that the country met all three criteria mentioned above. Considering its current account deficit the baht appeared strongly overvalued in real terms because it had been tied firmly to the US dollar for too long. Its banking system looked more and more fragile after the failed merger of Finance One, formerly the country's largest finance company, drew attention to the state of Thailand's other 90 finance companies, at least half of which were said to be technically insolvent as the result of a credit bubble. In addition, in face of a high level of short-term foreign debt, with estimates ranging between \$40 billion and \$66 billion coming due in the following months,³⁶ its \$33.3 billion of foreign exchange reserves, although not low by international comparison, appeared far too low to withstand a speculative crisis.

³² The capital flows increased 20.5 times over that period, developing countries' GNP 7.7 times. For a detailed analysis of these developments see Megumi Suto and Noboru Haki: *Capital Flows and International Financial Centers*, QRI Working Paper, Quick Research Institute, Tokyo, March 1997.

³³ An overview of recent developments in Asia's financial markets is given in: Beate Reszat: *Japan als Finanzzentrum Ostasiens?*, in: Manfred Pohl (ed.): *Japan 1995/96*, pp. 178-209.

³⁴ Bank for International Settlements 1997, pp. 107-117.

³⁵ Jeffrey D. Sachs, Aaron Tornell and Andrés Velasco: *Financial Crises in Emerging Markets: The Lessons from 1995*, in: *Brookings Papers on Economic Activity*, No. 1, 1996, pp. 147-198.

³⁶ Ted Bardacke: *In the Eye of the Storm*, in: *The Financial Times*, 9 July 1997.

The reason why the real exchange rate and the level of official reserves matter is that they influence exchange rate expectations and thereby may cause capital flight. Investors expecting a large nominal currency depreciation to take place soon will flee the currency to avoid short-term capital losses.³⁷ They continuously try to assess the likelihood that capital inflows reverse, which could trigger a devaluation. The larger the real overvaluation, so the argument, the larger the gap between current account deficit and a sudden reduction in the capital account that needs to be filled. In principle, with enough foreign exchange reserves this should be no problem. But as soon as reserves are exhausted there are only two ways in which an adjustment can take place: a fall in domestic absorption, either in consumption or investment, or a depreciation of the real exchange rate which, in the short run, inevitably means a nominal depreciation. The depreciation will be the greater the more unwilling the government is to endure the effects of a further overvaluation and high interest rates on the economy. This is the moment where the third factor, the robustness of the banking system, comes in. The weaker the banking system, the more bad loans in banks' balance sheets, the less likely is the government to steer the economy into a recession almost inevitably generating bankruptcies.

There is one additional influence which makes the situation in emerging markets precarious. This is investors' widespread irrationality. In this context, irrationality does not necessarily mean that chances are not taken, or dangers are not shunned, whenever this appears reasonable, but rather that the information to properly judge an involvement is often lacking. The analysis described above does not explain why investors begin to flee a currency and what causes a shift in market sentiment. As the developments in Mexico and Thailand demonstrated countries in very similar circumstances may suffer very different fates. In general, investors engaging in emerging markets have far less information, and rely far more on intuition, than in many other financial environments. The health of the banking system, which has been identified as crucial for a country's

ability to withstand a currency crisis, may serve as an example. Although in many countries there has been some drive towards greater disclosure in the course of recent banking crises, in emerging markets transparency in the financial sector in general is still low.³⁸ Another example is the transparency of the political process. For instance, in Thailand, the political system where "vote buying and corruption is routine"³⁹ often hinders rational policy choices which strongly contributes to investors' overall uncertainty.

Lack of transparency and insufficient information helps explain the obvious signs of irrational behaviour so often found in emerging financial markets. In many cases, there is simply not enough data to get a reliable picture of the situation, let alone calculate probabilities on which decisions can be based in a sensible manner. As a consequence, changing perceptions rather than changes in economic fundamentals are the reasons behind many capital flows in and out of these markets. More than elsewhere, international investors follow fads and fashions and get blinded by phantasies of the "Asian miracle" and similar myths and by the growth prospects the countries promise although experience shows that those are often very limited and rarely holding for more than some regions and a few sectors of an economy. As easily as investors fall for the idea of unexploited opportunities in distant unknown countries, just as easily are funds withdrawn as soon as expectations do not come true. No economic indicator or "fundamental" can prepare for the moment at which this will occur. The exact timing of market shift depends, more than elsewhere, on a mixture of news, rumours and sentiments.

In its annual report the BIS emphasises the need for reform to improve transparency in emerging market countries. One aspect is better disclosure for keeping banks prudent. Another is strengthening the role of credit-rating agencies.⁴⁰ This demand reflects the fundamental change in the nature of both lenders and borrowers in international financial markets in recent years. In former times, large banks were the main providers of foreign capital. They could be expected to have, and mostly had, the capacities to assess and monitor country creditworthiness independently. Further, borrowers in developing countries who tapped private sources of capital were predominantly from a small group of countries and well-known, usually governments. By the 1990s, institutional investors became major providers of private capital. On the one hand, those investors had many emerging market countries represented in their diversified

³⁷ For the following see also Jeffrey D. Sachs et al., op. cit., p. 149.

³⁸ For instance, many countries allow their banks to hide the full scale of losses on securities holdings and non-performing loans, an aspect which proves fatal considering the recent bubble in stock and property markets some of them are facing. Compare Bank for International Settlements 1997, pp. 114-115.

³⁹ The Financial Times: Ailing Tiger, 6 August 1996.

⁴⁰ For the following in more detail compare Bank for International Settlements 1997, p. 115.

portfolios and on the other hand, they had little experience to assess these many countries' credit-worthiness. At the same time, the circle of borrowers widened with both governments and private institutions which had little or no credit history. This created a greater need for an independent credit rating. However, so far, in emerging markets in general, and in the troubled Asian markets in particular, ratings do not count much and given the opaqueness of decision processes and business relations there rating agencies face huge difficulties in assessing the risks.⁴¹

Conclusions

As diverse as the described risks appear, they have at least three things in common: First, they all add to the current instability of world financial markets and the related systemic risk. Second, all are highly dependent on market sentiment. Third, in all cases, provisions have been taken which are supposed to contain the risks. However, at a closer look the effectiveness of those measures depends on circumstances and is lowest in times of market stress lulling both investors and observers into a false sense of security.

With respect to financial institutions' proprietary trading it is the Value-at-Risk concept, an allegedly powerful analytic tool for measuring market risks, which, above all, may contribute to this illusion. VaR has several drawbacks limiting its usefulness. Critics hint at the fact that being merely a statistical measure, interpreting a VaR figure requires a full knowledge of the method used and the assumptions behind it, which, given the technical complexities, may be difficult, in particular for senior management, with the consequence that some risks may go unnoticed in many firms.⁴² Second, particularly for those financial instruments which bear the greatest uncertainties, whose explanatory foundations are weakest and whose price developments are understood least, namely the wide class of instruments which are nonlinear in prices, there is only one certainty: that currently applied Value-at-Risk concepts provide estimates which may be strongly biased.

Uncertainties rise considerably as soon as portfolios include derivatives, in particular, options. This is not only because of the often cited leverage which, in

relation to the amounts invested, exposes the holder to comparatively high risk, but, above all, because of the indeterminacy resulting from the nonlinearities in the relation between price changes and changes in the position value. Options valuation methods become highly unreliable as soon as the assumptions on which they are based are violated. In times of market stress, when those models are needed most to judge the risks involved, the possibilities of price jumps and frictions and halts in trading render them entirely useless. Again, the feeling of security provided is treacherous.

An illusory feeling of security is probably also the main explanation why so many investors nowadays turn their attention to emerging markets. One general measure aimed at sheltering an investor from risk is pricing. The less reliable a borrower, the higher the price of lending. However, obviously this principle no longer holds in a world of fierce competition where ample liquidity exists even for extremely low-quality borrowers. Another means to contain risk is diversification. But this fails if markets are highly correlated, as is the case among emerging markets but also between markets in emerging and industrial countries. As recent examples from Latin America and Asia show diversification does not protect against the "tequila effect" of contagion when differences between countries no longer count in investors' decisions and all emerging markets are just lumped together. Similarly, it does not help in cases where diverse financial markets worldwide are driven by the same kind of influences. For instance, strategies that use emerging market papers as a hedge against a potential Wall Street collapse must fail when both are fuelled by the same source of liquidity, as has been the case during the last months, and this source dries out suddenly.

The phenomena described have existed for many years. Thus, the question is perhaps why they have become such a worry now. The answer is that the sheer volume of trading in each category has grown so fast, and the environment in which this trading takes place has changed so dramatically, that the risks and uncertainties related to them can no longer be neglected. Market actors and regulators have only recently become fully aware of them. The approaches to improve risk monitoring and risk management they are developing now appear encouraging in many respects. Nevertheless, given the described conceptual deficiencies, there is an urgent need for financial institutions and investors worldwide to show more responsibility in order to contain systemic risk.

⁴¹ A detailed description of the role of credit rating agencies in Asia and the related difficulties can be found in: *Asiamoney: Rating the Rating Agencies*, March 1996, pp. 15-19.

⁴² See, for example, A. Jones: *Puzzled? Here's what you do*, in: *The Banker*, September 1996, p. 88.