József Móczár

Anatomy and Lessons of the Global Financial Crisis

Is US Consumption Financed by Chinese Savings?

Savings and investments in the American money market by emerging countries, primarily China, financed the excessive consumption of the United States in the early 2000s, which indirectly led to a global financial crisis. The crisis started from the real estate mortgage market. Such balance disrupting processes began on the American financial market which contradicted all previously known equilibrium theories of every school of economics. Economics has yet to come up with models or empirical theories for this new disequilibrium. This is why the outbreak of the crisis could not be prevented or at least predicted. The question is, to what extent can existing market theories, calculation methods and the latest financial products be held responsible for the new situation. This paper studies the influence of the efficient market and modern portfolio theory, as well as Li’s copula function on the American investment market. Naturally, the issues of moral risks and greed, credit ratings and shareholder control, limited liability and market regulations are aspects, which cannot be ignored. In summary, the author outlines the potential alternative measures that could be applied to prevent a new crisis, defines the new directions of economic research and draws the conclusion for the Hungarian economic policy.

The 2007–2010 global financial crisis, estimated to have led to trillions of dollars of loss all over the world, was not caused by a war or a major recession, but rather by the shadow banking system of the United States of America, i.e., the ‘animal spirits’ of the investment banks, hedge funds and supermarket-owned banks, as well as the elegant mathematical models that are based on irrelevant premises and were not even truly understood by most financial managers. The Americans presented the whole story very simply and with less transparency by claiming that the crisis was caused by the liquidity shortage of the American banks, which was the result of the overvaluation of assets. In other words, they do not mention the most important thing, which was the focus point of the anatomy of the crisis, namely, that greedy and irresponsible Wall Street investment companies transformed hardly documented sub prime mortgage loans, designed for clients with weak credit rating into exotic and poisonous financial products through multiple leverage. Practically they sold completely unfounded expectations and unsecured stocks (shares short) to non-creditworthy middle-class investors for huge amounts, and earned astronomical amounts with proprietary trading. The leverage trade in the derivatives of the real estate mortgages was extensive even when the falsified rating of these derivatives by the American Moody’s, S&P, Fitch etc. became
obvious and it was increasingly likely that the American real estate market bubble was going to burst.

However, according to latest analyses, the global financial crisis was directly caused by the ineffective market allocation of foreign, primarily Chinese, savings flowing into the US. The huge liquidity abundance accumulated in the American financial sector was used to enhance American living standards and finance the disproportionately high consumption of Americans instead of productive goals or the effective transformation of the struggling American industry’s production structure, for example by making the American steel production or motor industry more competitive. The bursting of the IT bubble in the second half of the 1990s, followed by significant cuts in IT investments were an additional factor in this tendency. In fact, this process and many of its interim developments finally led to the credit crisis on the real estate mortgage market as well as the credit card market. First a minor economic recession occurred in the American economy and then the world was pushed into a financial crisis by the huge risk appetite of investors from all parts of the world (almost only Americans on the real estate market).

These days we know very little of the IMF’s role or activities during the crisis, because a lot of financial experts previously doubted the need for its existence, but the IMF undertook an exponentially larger role in the management of the crisis (see Csáki, 2009) and presumably pocketed even higher proceeds than during the Bretton Woods era. Consequently, if we may say so, the IMF is one of the winners of the crisis.

Obviously, by now the circumstances have changed so much that the objectives of Keynes concerning the establishment of IMF as the central bank of the world, co-ordinating the financial system and negotiating between countries with balance of payments surplus and deficits is now an obsolete idea. Keynes’ IMF encouraged countries with sufficits to conduct an expansive monetary policy, while persuaded those with deficits to apply a restrictive monetary policy. In the current situation, Germany would be encouraged to accept a higher budget deficit and conduct an expansive monetary policy in order to purchase more commercial articles from its partners. On the other hand, these days IMF works more or less like a cartel of creditors. (Dean Baker’s articles in The Guardian) These days, the IMF operating on the former ideas of Keynes follows the Chicago school, Milton Friedman: the government must be reduced, companies need to be privatised and strict budget policy needs to be conducted in order to have solid growth.

The crisis and its management were analysed by numerous articles, books and media products both in Hungary and abroad. They are mostly dominated by macroeconomic papers and discussions, focusing primarily on the role of the contradictory Keynes and neo-classic schools and the crisis of economic science (Leijonhufvud, 2009; Móczár, 2010/a). Mellár (2010) undertook an even greater assignment when he briefly (without formalisation) described all textbook macro models, including DSGE, and reached the right conclusion: as these models did not include the financial sector, they could not predict the financial crisis.

It is obvious that the causes of the financial crisis can only be explained on the level of microeconomics, through one of its segments to be precise, by studying financial innovations and the trade of new financial products. Naturally, there is a large number of such articles as well; e.g., Losoncz – Nagy (2010), analysing the responses of commercial banks to the crisis by quoting international examples and statistical data. In this paper we look at the crisis both at macro and micro levels based on the measures of the shadow banking system. We shall refer to those economic theories and mathematical
models that misled the financial innovations of Wall Street and can, to a certain extent, be held responsible for the crisis. The frequent use of the radiation and basic concepts of the theories and models, often requiring complicated mathematics, has a very special role in this.

The macroeconomic consequences of the financial crisis can in fact be understood only if they are embedded into the applicable micro-economic correlations. This is what this paper intends to prove as well. In our analysis, we assume that the contents and functions of the latest global financial innovations and financial products are known, and we shall also ignore the formalised correlations between the various theories and models.

WHAT CAUSED THE TERRIBLE FINANCIAL CRISIS, WHICH SWEPT ACROSS THE WORLD?

There is wide consensus that this crisis could not have developed without any prior events. However, opinions differ as to how long we should go back in history. Michael Lewis, a bestseller author, who writes for the general public about scandalous American finances would go back to the broker poker (Liar’s Poker), revealing the Wall Street of the 1980s in his latest book (The Big Short, 2010) (Lewis, 1982), when the bombastic deal of securitisation of mortgages, invented by the Salomon Brothers took off, saturating the markets by the mid-1990s. On the other hand, one of the few economists, who warned about the forthcoming crisis, Raghuram G. Rajan (2005) from Chicago, would go back only to the crisis waves sweeping across the emerging markets of the 1990s. These waves caused the collapse of the economies of East Asia, made the stock exchange and real estate market twin bubble burst in Japan, rendered Russia insolvent, and created considerable financial difficulties for Argentina, Brazil and Turkey. The emerging countries opted for the simplest possible solution in order to avoid the crash: they became a lot more cautious in external borrowing, their governments and companies cut back on capital investments and their households spent less. With such restrictions, these emerging countries soon turned from net importers into net exporters of financial investments. The latter group was joined by China, which is one of the largest investors on the American securities market.

It is clear that the net savings generated in one region of the global world financed the deficit of other regions. At the beginning, the shareholding companies of the industrial countries absorbed these savings and used them to fund capital investments, especially IT development. When the IT and dot.com bubbles burst in the second half of the 1990s, these investments were also cut heavily.

At that time, the world did not fall into deep recession yet, as it could be avoided with the low interest rates of the central banks. The relatively cheap funds stimulated housing demand in many countries of the world which then gave a boost to the construction of residential pro-perties. However, the price increase was not the largest in the US. House prices compared to rent or income were higher in Ireland, Spain, Holland, the United Kingdom and also in New Zealand. And this brings us to one of the most important issues: why did the crisis occur first in the US? Diamond and Rajan (2009) answered this question in the simplest possible way: the US pushed financial innovations the furthest, thus attracting the most consumers to the market, who were still credit-worthy. We all know that supply and demand could still have functioned properly on the money market and it should not have had to inevitably lead to a financial crisis. The key to the puzzle is in the financial innovations, as it will be explained later, i.e., in the new financial
products, which the quantitative analysts (or ‘quants’ in the American jargon) priced according to the theory of efficient markets and modern portfolios, using David X. Li Gauss’ copula formulae in their calculations, which all failed and led to a crisis and, last but not least, also gave in to the distortion of moral restrictions.

We can accept the argument of Losoncz – Nagy (2010) according to which global liquidity surplus on the housing market, huge risk appetite of investors, market processes and optimistic expectations about the prices of capital market instruments were all factors contributing to the development of the price bubble.

The real estate mortgage loans were attractive primarily for domestic American investors. (Luckily, none of the American credit banks came up with the idea of involving properties abroad into the securitisation.) Another factor contributing to the development was that in the US the interest on mortgage loans is deductible from the tax base. In the meantime, investment banks and hedge funds also realised that they could significantly mitigate the risk by packaging these mortgages with mortgages originating from other fields, thus creating a diversified product. Furthermore, the most risky receivables in the package could be sold to those who had sufficient capacity for valuation and undertook the risk of these securities as well. Thus the most secure securities with AAA-rating were held for foreign investors. As the demand of international investors for securities with AAA rating increased, the banks created packages of securities with lower ratings and securities with AAA ratings and sold them on the market as Collaterised Debt Obligation (CDO).

The banks could process only the credit score and loan/value ratio of the real property owners in the mortgage collateralised securitisation, i.e., they could not obtain information which would have been important for assessing the actual creditworthiness of the borrowers. As real property prices were continuously rising, the banks did not worry about the repayment of the loans, because the rise in prices represented sufficient ‘capital’ for repayment. (The simplest technique for this was the renewal of the outstanding loans by the borrowers every 3–4 years.) Nothing stopped them from getting increasing involved in predatory lending, in which, as we know, the prey became liquidity.

As other debts were added to the original mortgage packages, extremely complicated securities appeared on the financial markets, which made the situation even more complicated. In fact, they were time bombs at the banks, which was not detected while housing prices kept rising. However, as soon as the rise in prices stopped and insolvency began to grow, bankers also felt the imminent risk immediately. It is surprising that even despite this they kept many Mortgage Backed Securities (MBS) in their portfolios.

The question is why they were kept by the issuing banks. In addition, they contained not only MBSs with lower ratings, but there were also better rated MBSs for which there was demand all over the world. According to Diamond and Rajan, bankers thought that these securities were valuable investments despite their high risks. An investment into MBS seemed part of the excessive risk culture, which was adopted by the banks. In this culture, it is very difficult to predict in the short term, primarily in relation to new financial products, whether the finance director can generate additional yield with the risk assumptions, or the current yield is simply the compensation for the risk which will materialise later.

The performance of chief executive officers at American banks is assessed partly on the amount of profit generated by them compared to other CEOs. As certain leading banks can legally earn high profits, to a certain extent it
also encourages other banks to keep up with them. Therefore, the latter banks assume even greater risks and by doing so they would even pump up their share prices, thus increasing their personal reputation.

Top managers are interested in maximising the income of the bank in the long term, therefore they must come up with incentives and rules which also push staff members in the same direction. On the other hand, many payment schemes pay out on the short-term risk bearing capacity. This gives an incentive to trading partners to also assume endogenous risks, which are not recognised by the system, through which they can generate an income even if in fact it is only a risk premium (market risk premium). A classic example for this is when insurance is charged in rare cases such as insolvency, which was managed as a ‘fat tail’ risk. Dealers who bought MBSs with AAA ratings were willing to extend these instruments to corporate securities, ignoring the endogenous insolvency risk, inherent in these non-tested securities.

Investors could demand very high risk premium for the financing of a bank in the long run, due to the extremely diversified activities of the risk bearer bank and its potential internal regulatory inconsistency. On the contrary, they are inclined to have short-term demands, because thus they can either gain a higher premium, or they will have an opportunity to exit if the bank clearly struggles. Banks also consider short-term receivables more attractive than long-term receivables, because banks try to avoid illiquidity. Diamond and Rajan (2009) refer to the fact, which they also formally showed in a previous study, i.e., that the liquidity of institutions trading in multiply leveraged securities falls parallel with the future expectations of lower interest rates. Lower interest rates made the yield curves steeper, as the difference between short and long-term loan interest rates increased. The banks are interested in the spread, which is the difference between the cost of deposits and loan interest. It should be noted that the US was not in a bad position in the loan-deposit ratio, i.e., the ratio of deposits actually placed out as loans: its 83 per cent is higher than Canada’s 78 per cent, but it is lower than the UK’s 96 per cent.18

While financial markets prospered, bankers shared the opinion that a short-term debt was still cheaper than a long-term debt and the cost to stop illiquidity. On the other hand, it cannot be ignored either that markets prefer banking structures that are shorter and multiply leveraged. But when ‘things are not going as well as we wish’, it is unlikely that bankers assume too large risks and the markets focus on investments.

The high ratio of the mortgage-based securities in the banks’ portfolios, which were financed with a short-term debt-based capital structure, made the crisis inevitable, especially when house prices stopped rising and began to fall. The value of MBSs dropped, it became more difficult to price them, and their prices became more volatile. Banks became illiquid, starting with Bear Sterns, which was acquired by JP Morgan in March 2008: the shares were purchased for USD 2 each. It cost an USD 30 billion loan to Fed, and JP Morgan benefited from the transaction, but this was the only way for the Fed to protect the American financial system from the crash.

The Fed gave new preferences, which enabled banks to lend despite their illiquid position. Fannie Mae and Freddie Mac were directly instructed to acquire mortgage securities with low ratings, which represented 25–30 per cent according to some estimates. As more and more banks got into difficulties due to the falling prices, concerns about illiquidity turned into potential insolvency, because they did not have money to pay off the debts.20 Bankruptcies began with the bankruptcy of the Lehman Brothers, which led to a worldwide
panic. Communication errors made the situation even worse, including the announcement by Barack Obama on national television in September 2009, stating that ‘financial markets are close to collapsing…’ Those who have not yet withdrawn their short-term deposits form Citigroup, now rushed to do so. ‘On what planet do markets not crash after that?’ – asks John Cochrane. Inter-bank lending froze, with only the overnight loans remaining, and certain funds completely dried up. Severe liquidity problems first led only to a credit squeeze, which was soon followed by a credit crunch. Panic-stricken investors rushed to withdraw their capital.

Below we shall go through the premises, philosophy and statements of a few elegant mathematical models, in terms of their relevance to the financial crisis, which were somehow used as the basis for the creation of the financial innovations, i.e., the new poisonous financial products.

**EFFICIENT-MARKET HYPOTHESIS**

The research of Paul A. Samuelson contributed to the establishment of two great theories used in the analysis of money markets: the efficient market hypothesis and the option pricing. He published a study in 1965, explaining that on well-informed speculative competitive markets prices develop accidentally after a certain period – this was the initial theoretical origin of the efficient market hypothesis, which was fully described later by Eugene Fama (1965, 1970). The early pioneer work of Louis Bachelier (1900), whose theories later supported the Black – Scholes option pricing model, was recommended to actuaries by Kolmogorov (1931) and to financial economists by Samuelson (1972). Bachelier suggested also the assumption that the random movement of share prices followed the geometric Brownian motion, which made the model effective. The same thought was elaborated further by Robert Merton, who worked together with Fisher Black and Myron Scholes (1973) on option pricing, for which they were later awarded the Nobel Prize.

According to R. Jarrow and Ph. Protter (2004), the mathematical modelling of the Brownian motion stems from three sources. The first relates to T. N. Thiele (1880), who came up with a potential model for the Brownian motion during the study of the time series in Copenhagen; the second is associated with L. Bachelier (1900), who studied the Paris Stock Exchange based on the Brownian motion; and finally, the third relates to A. Einstein (1905), who proposed a model for the movement of small particles observed in liquids mainly for the purpose of convincing other physicians of the molecular structure of materials.

Samuelson knew of the work of Einstein (1905) and Thiele (1880), but appreciated Bachelier’s study (1900) the most, in which he described the theory of speculation with mathematical formulae, thus making mathematical finance one of the branches of applied mathematics. Mathematical finance was the origin of the mathematical or numeric models, proposed in financial economics: while a financial economist studies the structural reasons why one company has a particular share price, an actuary considers the share prices as given data and tries to define the value corresponding with the derivatives of the shares with a stochastic calculus. In other words, there is considerable, but not full overlap between these two separate scientific disciplines, which can and could lead to several misunderstandings. Anyhow, it is clear that mathematical finance is a segment of applied mathematics and requires mathematics which is a considerable challenge for economists, but the use of the various formulae does not require a deeper theoretical mathematical background.
Fama defined the efficient market first (1970, p. 383): “A market, on which the prices «fully reflect» the available information, is effective.” In other words, the expectations of the actors of the efficient market are reasonable and represent all available information to price the assets properly. An efficient market can exist if there are no market actors who consistently give better evaluation to the available information than the information implicitly included in the prices.

In finances, the efficient market hypothesis states that in the long run, it is impossible to achieve a yield higher than the average yields, weighted with risk, provided that publicly available information exists at the beginning of the investment. As Fama, the father of the efficient market hypothesis stated: “markets cannot be beaten.” What happened to the credit markets in the recent financial crisis was the confirmation of the theory, argues Cochrane, because it showed that investors generally cannot beat the market without assuming major risks. (Those, who manage to beat it, follow the modern portfolio theory, which will be described in the following section.)

Three versions of the hypothesis can be distinguished depending on how the prices reflect the information. In weak-form efficiency, prices of traded assets (bonds, shares, properties, etc.) already reflect all the publicly available historic information. In semi-strong-form efficiency, prices satisfy the criteria of weak-form efficiency, yet they change immediately, if any new information also becomes public. Strong-form efficiency requires prices to reflect the hidden or “insider” information also. While there are test results for and against the weak and semi-strong forms, the strong-form failed in each test. What is most contradictory is that low priced shares have higher yield than other shares. (Basu, 1977; Rosenberg, Reid and Lantsein, 1985)

The efficient market hypothesis required reasonable expectations from market actors, which theory became the new orthodoxy from the 1980s, led by Robert Lucas, integrating into the equilibrium models, and partly dynamising them. However, it should be noted that the entire financial sector was left out from these models and their stochastic versions, i.e. the DSGE models which excluded them from the analysis of the financial markets, saturated with new products.

The dominant view is that markets are efficient, which means that even an investor not having any information can trust the market, because in theory the price of any securities reflect all potential information, which is relevant for its value. Practically the same approaches are still dominant, as they form the basis from pension fund investments to the evaluation of securities by financial analysts.

While it is easy to define sufficient conditions for the hypothesis, it is a lot more difficult to define the necessary conditions, which are often disputed. E.g., if all information is freely available, the market is free of transaction costs and all market actors reach the same conclusion by using the available information, then it is obvious that the market is efficient. In other words, the inconsistency of investors, the transaction cost and unavailable information may be the sources of failure of market efficiency.

According to the efficient market hypothesis, the capital market boom starting in the second half of the 1990s reflected the economic foundations, and therefore financial authorities, more specifically the Fed, did not have to intervene. Market fundamentalism is the belief that markets adjust themselves and financial markets aim at an equilibrium, while any discrepancy is accidental. This is exactly what many doubt, including George Soros (2008) claiming that the investment bubbles reflect the false equilibrium of financial markets.

The market fundamentalism theory led to the deregulation of the markets, which was
initiated by *Thatcher* and *Bush Sr.*, and which ultimately led to the current crisis. Due to abundant liquidity, prices began to rise, which, together with falling loan interest rates, created a euphoric and unreasonably optimistic mood among investors: in the hope of huge returns, more and more investors appeared on the investment market, which gave a further boost to prices. This spiral in fact contradicted market efficiency. This is why George Soros (2010) states that markets are reflexive, i.e. they reflect the irrational expectations of market participants in the form of irrational profit opportunities, which created bubbles, first on the real estate market, and then on the highly levered credit markets. The low interest rate-based cheap financing increased the demand for real estates, which raised real estate prices through the automated market mechanisms. The latter gave a boost to the lending of the banks, and was also supported by the appreciation of the real estates that secured the loans. This spiral diverts the prices from the market foundations, and the increasing discrepancy finally burst the bubbles.

The true test of the efficient market hypothesis was the events of 2007–2010, in which the hypothesis failed. It failed because the assumptions of the hypothesis did not reflect the true investor’s conduct, and it was also true for the attributes of the stock exchange processes. In his excellent study *Min Deng* (2009) also reached a conclusion that efficient market theory was far from a reasonably close approximation to the stock market realities, and its scientific content was close to zero. (While the former conclusion is acceptable, the latter statement can be strongly doubted.) Interpreting the warning of *Joseph Stiglitz* in relation to the crisis, we may also say that the hypothesis does not describe the investors and the investors’ markets as they are, but as it wishes to see them.

**MODERN PORTFOLIO THEORY**

The modern portfolio theory is one of the most important and influential economic theories dealing with finances and perfect investments (high yield and low risk). Its mathematical model was development by *Henry Markowitz* (1952). The theory states that it is not enough to consider the expected risk and yield of one share, because by investing into more than one shares, the investor may gain a much higher yield as a result of diversification. It practically captures a very simple popular wisdom: “If you want to take home other than cracked eggs, then do not put all your eggs into one basket”.

When purchasing shares, most investors undertake a risk of the yield being lower than expected. In other words, the risk is the deviation from the average yield. Another way of putting it is that the investment is a *trade-off* between the risk and the yield. In general, the higher risk is associated with a security, the higher yield it may generate.

The risk of a portfolio of various individual shares is smaller than the risk inherent in any of the various shares (provided that the various shares do not relate to each other directly, i.e. the correlation coefficient is zero for each pair). As a simple example, let us take a portfolio, which contains two risky shares: one pays out when it rains, the other pays out when it does not rain. The portfolio, which consists of these two shares, always pays out irrespective of whether it rains or not. The addition of a risky investment to another may reduce the total risk of the portfolio which corresponds to both kinds of weather.

The portfolio risk consists of two types of risks: the systematic risk, which is permanent, irrespective of the number of securities contained in the portfolio and the non-systematic risk, which gets lower as the number of securities in the portfolio increases. The examples for
the first one are interest rates, recession and wars, while the latter one is the individual risk of the securities, which may be mitigated with diversification. The difference between the risk levels of the individual securities determines the risk of the total portfolio. These two approaches practically offer themselves for writing a primal-dual algorithm, which is the mathematical quadrature of the modern portfolio theory.

In other words, Markowitz showed that a good investment is not only the collection of shares, but the selection of the right combination of shares, one of which is the “egg in the nest”. The modern portfolio theory specifies for a specific risk amount how to choose the portfolio, which will have the highest potential yield. Or, on the contrary, based on a specific expected yield, the theory helps select the portfolio, which involves the lowest potential risk.

The modern portfolio theory assumes that investors are risk averse, meaning that given two portfolios that offer the same expected yield, investors will prefer the less risky one. Thus, an investor will take on increased risk only if compensated by higher expected yield. Conversely, an investor who wants higher expected returns must accept more risk. The exact trade-off will be the same for all investors, but different investors will evaluate the trade-off differently based on individual risk aversion characteristics. The implication is that a rational investor will not invest in a portfolio if a second portfolio exists with a more favourable risk-expected yield profile – i.e., if for that level of risk an alternative portfolio exists which has better expected yields.

Every possible combination of the risky assets, without including any holdings of the risk-free asset, can be plotted in a coordinate system \((x, y)\) where \(x\) is the portfolio risk and \(y\) is the expected yield. The collection of all such possible portfolios defines a region in the positive quarter of this space. The left boundary of this region is a hyperbola (“Markowitz bullet”), and the upper edge of this region is the efficient frontier. A portfolio lying on the efficient frontier represents the combination offering the best possible expected yield for given risk level. When a risk free asset (e.g., US treasury bills) is introduced, the half-line shown in the figure is the efficient frontier (capital allocation line – CAL), which is tangent to the hyperbola. The introduction of the risk-free asset to the portfolio improves its efficiency, because everywhere, except at the tangency portfolio, the half-line gives a higher expected yield than the hyperbola does at every possible risk level. The tangency portfolio is known as the “one mutual fund theorem” in the literature. (For more details, see Merton, 1972)

The risk, yield and correlation, used in the modern portfolio theory are estimated values, which, in very simple terms, means that they are mathematical statements about the future. When we determine the volatility of the yield and the specific variables, we use historic time series, and the calculated estimated values do not reflect new market conditions which did not exist in the past, and therefore they cannot be reflected in the applied time series. The lack of structure can also be observed here, which is also a generally strong criticism against any analysis based on the own time series of various macro economic variables.

The mathematical figures of risk may be accepted also with certain reservations. The modern portfolio theory uses unbiased variance for measuring the risk and this can be justified equally to yield with elliptic distribution, ordinary distribution, but other risk measurements (e.g., coherent risk measurements) may reflect better the preferences of investors for general yield distribution. As the unbiased variance is a symmetric measure, it calculates the abnormally high yields as risky as the abnormally low ones. In relation to this, some
experts in literature claim that investors are in fact interested only in losses, and they do not care much about the distribution or tightness of the higher than average yield. However, more and more people share the intuition that in terms of its nature, a risk requires more of an asymmetric measurement.

All these show that the modern portfolio theory does not model investment markets very well, and that their risk calculations can only be accepted with strong reservations. This conclusion is also supported by the latest research results of Hubbard (2009). George Soros (2010) also identifies the problem with risk calculation. In his opinion, risk calculations are made with false premises, i.e. under the assumption that modern money markets (similarly to commodity markets) are always cleared up, they are generally in balance, and any swing is only accidental.

However, in the recent financial crisis investment banks that manage mortgage loans issued bonds with various risk ratings, secured against mortgage loans, and supported by the credit rating agencies, relying specifically on the modern portfolio policy. The bonds with the lowest BBB rating bore the default risk up to 5–7 per cent of their face value, bonds with BB ratings bore risk up to a further 5 percent, and this continued all the way to bonds with AAA ratings, the risk free nature of which terminated only at 20 per cent or higher default. Following the modern portfolio theory, the credit rating agencies used the assumption that only less than 5 per cent of mortgage debtors would not be able to repay their debts, and the risk can be further mitigated with a portfolio containing a large number of mortgage loans.

However, the “animal spirit” of the issuers demanded more than that. The riskiest mortgage agreements with the lowest ratings were taken out of the portfolios and put into new portfolios in order to obtain a higher rating. The CDO bonds were issued secured against these loans. Credit rating agencies, such as Moody’s and S & P, which saw a huge business in the secondary mortgage bond craze, let themselves be convinced, based on the modern portfolio theory, that the default risks of sub-prime bonds in the same portfolio will cancel each other out, and therefore a lot of CDO-s were given AAA ratings, too.36 Pension funds, as well as Japanese and European banks purchased these securities in good faith, believing that they were investing into bonds, which were as secure as the OECD papers. In this way, American mortgage bonds reached other countries of the world as ticking bombs, thus the latent American financial crisis escalated into a word-wide phenomenon.

DAVID XI LI’S GAUSSIAN COPULA FUNCTION

While working for JP Morgan Chase, Li published a study in 2000 under the title of On default correlation: A copula function approach in The Journal of Fixed Income. (In statistics, the Latin word copula means the correlation of the behaviour of two or more variables.) Based on Wall Street standards, he used relatively simple mathematics to model the default correlation without taking into account the former default data. Instead, he used the market prices of Credit Default Swaps (CDS) in the calculation of this correlation.

These days, investors have a choice: they either lend to borrowers, or sell credit default swaps (CDS) to investors, i.e. insurance against the same default borrowers. In this sense, the investment risk is a product, which is measurable, and for which insurance may be taken. Whichever transaction they choose, they earn regular income (interest or insurance premium), but if the borrower does not pay, they will lose a lot of money in both cases. Both business strategies result in similar income, but since an
unlimited number of credit default swaps\textsuperscript{37} can be sold against each borrower, i.e. the supply of swaps is not limited in the same way as the supply of bonds, the CDS market grew particularly rapidly, and soon it became larger and more liquid than the bond market, on which it was based.

When the price of CDSs is rising, it means that the default risk has increased. Li’s breakthrough was to use CDS market data instead of waiting until enough data on the number of actual defaults were collected, which hardly ever happens in the real world. In other words, Li’s model used the prices instead of the actual default data, relying on the implicit assumption that the default risk is priced generally correctly by the financial markets, and especially correctly by the CDS markets. We can also say that in a way this assumption also reflects the efficient market theory.

Li also simplified the procedure to manage the problem: he did not calculate the almost infinite number of correlations between the loans forming the pool. He did not check what happened if the population of the pool increased, or if negative correlations were mixed up with positive correlations. The only important thing for him was to have a final correlation value, which is a pure simple figure, satisfying everyone and summarising everything.

Wall Street quants saw a huge business in Li’s formulae. In the first step, they produced a huge amount of brand new securities with AAA ratings. The use of Li’s copula procedure also meant that rating agencies, such as e.g., Moody’s, or anybody else who intended to model the risk of a segment, no longer had to think about the rating of the underlying securities. Based on the correlation figure, they could easily receive an indicator showing how safe or risky a particular segment was.

Almost anything could be combined and classified into a bond with AAA rating – corporate bonds, bank loans, mortgage securities, etc. These were the CDO-s, and the production procedure was “CDO squared”, which doubled the number of CDO-s on each occasion. After a while, it was impossible to identify the securities, which formed the basis of the issue. By the end of 2001, the value of CDSs on the market reached USD 920 billion, which went up to more than USD 62 trillion by the end of 2007. In 2000, the CDO market was worth USD 275 billion, which increased to USD 4.7 trillion by 2006.

The CDO section of shareholding corporations only trusted Li’s copula correlation model. This was the case despite the predictable damage. Even before Li’s article was published, several people had warned about the instability of the correlations between financial quantities. In addition, Li’s correlation is a constant value, which in fact should have followed mercury type movement. Although investors know that there are few activities on the financial market, which are not risky, there is nothing they hate more than uncertainty.\textsuperscript{38} Consequently, the correlation indicator gained from the copula formulae gave them some reassurance.

Li’s copula function was used for pricing mortgage-collateralised CDOs for hundreds of millions of USD. As CDS prices were used for calculating the correlation, they looked at the period in which the credit default swaps (CDSs) existed. The period when real estate prices soared was shorter than ten years. At that time, the credit default swap correlation indicators were very low. However, when the mortgage boom suddenly ended and house prices began to crash, the correlation indicators soared. The old saying was confirmed that if everybody acts the same way on the financial markets, it is a classical recipe for a bubble and its inevitable burst. On this market, everyone referred to the copula formulae, and when the copula-driven computer models fell apart, ‘mea
culpa’ excuses were made, the mortgage loans defaulted, banks lost trillions of dollars, and there was also a considerable threat to the survival of the global banking system.

GREED AND RISKING OF GOOD MORALS

We define moral risk as a special case of asymmetric information, when in a transaction one party has more information than the other. The party exempted from the risk generally knows more about the operation and intentions of the transaction than the party, who bears the negative consequences of the risk. More generally, moral risk appears when the party with more knowledge of the operation and intentions of a transaction does not behave fairly towards the other party who has less information, which may also have a negative impact on his prospect. It is clear that moral risk is very difficult to eliminate, because according to these definitions, it may be present almost everywhere in the daily relationships between people and institutions, not mentioning surveillance, tapping of phones, etc., which truly exceed the boundaries of good morals and simply fall in the category of crime.

The financial bailout of credit institutions by governments, central banks and other institutions may encourage risky lending in the future, if the risk-assuming institutions think that they will not need to bear the total loss. The “too large to default” credit institutions may approve more risky loans than smaller ones, because smaller ones are more prudent, as they cannot expect to be bailed out. These perverse encouragements may result in the concentration of the financial service industry into an oligopoly, and taxpayers often have to pick up part of the bill containing the consequences of the risky financial decisions of credit institutions. As Dowd (2009) says, moral risk is an inherent and inevitable attribute of the financial system and the economy, and in his opinion it had a major role in the development of the current financial crisis. Summers (2007) goes even further, when he talks about moral risk fundamentalism.

This crisis may have stemmed from the securitisation of the mortgage loans, which was the first financial activity on Wall Street that assumed considerable moral risk and finally led to the bankruptcy of Lehman. Many people identify it as the primary cause of the financial crisis of the subprime mortgage market, which occurred in 2007–2008.

Banks living on mortgage deals built their business strategy on home-buyers with low credit rating. This is why they eased their lending terms and closed their eyes to loan applications submitted with minimum or false documentation. The infamous Ninja loans appeared in 2008. (No Income! No Job! No Assets!) The subprime loans were offered with special instalment payment preferences, at so-called teaser rates. In the first two years of repayment, most subprime loans had a low fixed rate, but this changed into a higher variable rate from the third year. The default of these loans was inevitable: many debtors were unable to repay them. While assets of property owners decreased with crashing real estate prices, the vicious spiral was reversed. As long as prices were rising, the value of real properties was increasing, which made repayment easier. As the captain of the Titanic would say: everything was hunky dory until the iceberg appeared. However, crashing prices devalued the real properties and made repayments more difficult. According to estimates, today approximately 15 percent of American property owners have a larger mortgage debt than the value of their real properties.

Hedge funds were the first to recognise around 2005 that the CDOs were time bombs, therefore they purchased default insurance policies from banks for the most risky CDOs
with AAA ratings. As banks also saw a good deal in this, they sold the insurance policies and when they were sold out, they added new synthetic CDOs (created with new portfolios) into the insurance. They could do so without any problem, because real estate prices were still climbing and bankers felt safe. In fact, they were playing a very risky Ponzi scheme without punishment. Should default have occurred, they could still reschedule the loans or auction the residential properties.

Banks were not bothered by questionable credit ratings, because they put the securities into portfolios and sold them to investors in the form of bonds with higher ratings. The more risky tranches of the portfolios, for which there was no demand, were sold as CDOs. These latest products of financial innovation were so new and complicated, as well as non-transparent that even bank managers could not understand them, but seeing definite profit, they gave in to their greed.

Interestingly, the ownership structure of the largest investment banks could also have contributed to the higher moral risk. This means that banks like Salamon Brothers, Goldman Sachs or Lehman Brothers were owned by the active managers, the partners. This shareholding structure practically secured the long-term shareholders’ interests. Retiring partners could expect only a proportionate amount of the accumulated equity. Looking for ways to increase equity, some of the partners realised in the 1980s that they could not only earn huge amounts, but also raise external funds, if they listed their banks on the stock exchange. This idea was especially attractive for them, because by trading the raised funds, they earned higher commission in their business speculations without assuming any risk as shareholders.

Another factor increasing the moral risk was the own account trading of large investment banks. By 2000, most of their profits were earned from revenues of such tradings. Own account trading was based on the recognition and exploitation of the pricing anomalies of the financial market, which is called arbitrage (risk free profit) in the financial jargon. E.g., if a share is underpriced on the futures market, then it should be sold and repurchased at a cheaper price on the futures market. Unsuspecting customers are often robbed on the specific deals in own account trading, or brokers use confidential information received from their customers. These deals also earned a lot of money for employed partners, who found it more difficult to say no than their partner predecessors. The securitisation of subprime mortgage loans and their sale as securities with AAA rating resulted in considerable risk free fee income, which also created an incentive for the employees in the form of distributed bonuses.

IS CHINA TRULY THE FUTURE?

The crisis is currently being evaluated. Theories of various schools confront each other and naturally reach different conclusions. Richard Posner of Chicago has strong doubts about market liberalism and thinks that the intervention of the American government again saved the world from a second Great Depression. Gary Bekker does not agree with him: he thinks that markets generally function well, but the Fed was too passive and should have done more to prevent such a drastic fall in money supply. He claims that new financial instruments, the derivative products are responsible for this situation. Neither their inventors, nor the parties trading with them understood clearly how derivatives should be assessed in various situations, this is why markets could not operate efficiently. In the future, a lot more government interventions will be needed to avoid similar crises, and a lot more needs to be revealed about the causes of the crisis – proposes Bekker, supported by many others.
The question is whether a financial institution in a bad shape should be bailed out only on the argument that "it is too large to go bankrupt." Views on that vary a lot: Gary Bekker would not permit bailing out bankrupt banks, similarly to the bail-out of Continental Illinois or Chrysler in the past. If that were the case, we would not let the Darwin principle prevail. Although if “you find one butterfly that looks weird, you don’t say, Oh, Darwin was wrong after all!”, argues Fama.

According to Cochrane, finances must be integrated into macroeconomics. This is also supported by George Soros’ interpretation of the development of investment bubbles: bubbles always start in the real economy, then continue on the market where the investors and creditors operate. Prices of all products begin to rise, speculation boosts demand, hoping for a higher return, which further increases the prices that consume loans, etc. Macroeconomics can only think in terms of credit rates and fails to analyse the impacts of borrowing or the risk premium. Robert Shiller has been arguing for 30 years that psychology should also be involved in economic studies. Richard Posner is not the only person, with quite a few followers in Hungary, who have re-discovered Keynes and his economic policy recipes.

However, Keynesian economics failed its test in 1970, when inflation hit, accompanied with unemployment. It is unable to interpret stagflation. Each individual dollar spent by the government is saved by someone, because they keep one eye on their future tax burden. This is the Ricardian equivalence hypothesis, which causes many not to believe in incentive packages. A different approach is required for unemployment today, due to the specialised workforce. If an accountant is fired from a bank, how is going to build a road in Montana going to help him, argues Cochrane.

Is there a new need for the Glass–Steagall law? As it is known, in the 30s of the last century, following the collapse of the banking system, commercial and investment banks were separated when this law entered into force. Commercial banks also traded a considerable volume of securities and when their prices began to fall, these banks also went bankrupt due to the crisis. As a result of the market liberalisation in the 80s, the difference between commercial and investment banks gradually disappeared again. By the ‘90s, they were merged again: practically recreating the situation of the 1920s. The commercial activities of banks extended to investment activities and new financial products created new challenges for them, because even their risk management departments could not fully understand the values and marketability of investments. When real estate prices began to fall, they realised it as they had to write off their rapidly devaluating securities as a loss, which imposed a risk on the entire financial system. This is why Fed had to take action fast, instructing Fannie Mae and Freddie Mac to purchase the securities.

Is it the end of corporate governance?, ask many researchers. They see the problem in shareholding corporations. One of the earliest and best critical remark about shareholding corporations was made by Adam Smith. His classic book, the Wealth of Nations states the following: “The directors of such companies [...] being the managers rather of other people’s money rather than of their own, it cannot well be expected that they should watch over it with the same anxious vigilance. Negligence and profusion, therefore, must always prevail, more or less, in the management of the affairs of such a company.” (Smith, 1776; quoted by Dowd, 2009, p. 153)

The problem stems from limited liability, which enables investors and corporate managers to enjoy all positive benefits of their risk assumption and be affected by any negative disadvantage thereof only to a limited extent.
Campbell and Griffin stated the following at the dawn of the Enron scandal: “Exceptionally, now we must say that the chief executive officer of large public companies are heavily exposed to the economic risk of bankruptcy, and are more or less completely closed up due to fear for the most fundamental market pressure, personal bankruptcy. By in this way distancing directors from the down-side of their decisions, the public company based on incorporation and limited liability severely handicaps or even eliminates the core function of the market.” (Campbell and Griffin, 2006; quoted by Dowd, 2009, p. 153.) These problems were anticipated more than 150 years ago by those who opposed the Victorian companies legislation that granted limited liability. To quote one contemporary, who was the author of a successful company law textbook: “The Law of Partnership hitherto has been […], that he who acts through an agent should be responsible for his agent’s acts, and that he who shares the profits of an enterprise ought also to be subject to its losses; that there is a moral obligation, which it is the duty of the laws of a civilised nation to enforce, to pay debts, perform contracts and make reparation for wrongs. Limited Liability is founded on the opposite principle” (Cox, 1857; quoted by Dowd, 2009, p. 154)

What could be a real alternative to withdrawn limited liability? According to Soros, global financial regulation could be a solution without any withdrawal, because financial markets have already become global. The Basle Accord, which sets out an obligation for the banks to keep minimum reserves, points to the same direction. Mishkin (2009) highlights that financial globalisation, with satisfactory regulations, enhances competition in developed countries and gives more space to market processes, reducing the concentration of government and local private interests (e.g., amakudari in Japan), and it can be another important factor in global economic growth, overcoming poverty and primarily in emerging market economies. Summers (2008) and Csaba (2010) also argue for regulation. Others would introduce more stringent penalties. Some consider the current banks are unsuitable for regulation, due to their large sizes, and would like to break them up into smaller units. Diamond and Rajan (2010) propose some potential interventions in their study, which could be effective, if they clarify the correlation between solvency, liquidity and lending.

The question is how an already established management structure can be improved with minor additions, to what extent researchers and economic politicians, who socialised to date on the above-analysed theories can take up a new approach and to what extent they are bound by old ideas, some of which could easily lead to a financial crisis, as it turned out recently. And these ideas have the same poisonous effect as CDOs. They entangle the financial markets of the developed world, leading international theoretical journals and the moderate financial and economic papers, i.e. very simply they entrap any new concept or idea. It is worth taking a look at the website of the Bank of Japan or ECB, or pick up the Financial Times or The Economist. The conferences of these banks are almost always attended by the same economists, whose articles can be read in the journals referred to above, and are interviewed by the global economic-financial papers, although they do not agree on everything. It seems that we hear the same arguments and ideas all over again, contradicting to each other. Some people think that there is very little chance for any renewal, and we have not seen any deeper analysis of the current crisis yet.

The situation will most probably not be made easier if more than 25 years later we read the publications by Hyman Minsky, which nobody was interested in at the time, and announce to the world that Minsky already predicted a potential crisis of the market econ-
omy in the 1970s. (Wray, 2008) It could not work, because the world economy at the time was completely different, financial products were not as diversified as they are now, and there was no such immoral risk assumption on the international financial markets as today.

Nobody is dissatisfied with the market itself, but with it operates or the way it is operated. More and more people, who are truly worried about global economy, choose to turn to China, the world’s second largest economy, which shows a new face to the world. It is successfully progressing in establishing a market economy, without giving up its own political structure. Export incentives have a surprisingly successful impact on the exchange rate of the yuan, the impacts of the global financial crisis are managed relatively well by China and it is also interested in regulation and supervision, aimed at the mitigation of the global financial risks44. Another argument for China is that its economic philosophy has not yet been fully influenced by the Keynesian or the liberal economic policy. We should follow the development of Chinese economy, learn and adopt any novelties that are useful for the global economy, primarily its managing tools in the real and financial sectors.45 At the same time, we must work on developing models and risk calculation procedures that are closer to reality, on the organic transformation of the Western banking system, and on its more extensive and effective regulation and production.

LESSONS FOR THE HUNGARIAN ECONOMIC POLICY

Not withstanding the strict criteria of comparing the two countries, let us take a quick look, only qualitatively, at cash flows, primarily in terms of capital investments and consumption during the last eight years of the American and Hungarian economies. The first surprising similarity is that consumption has grown in both countries: in the US at the expense of capital investments enhancing the efficiency of certain sectors (motor industry, steel production, etc.), and in Hungary instead of capital investments, aimed at the structural transformation of large distribution systems. While the increased consumption of Americans was financed by savings of foreign, primarily Chinese investors, held in American banks, in Hungary the same trend was financed by loans taken from the EU, the IMF and other countries, and in some cases by extremely expensive “carry trades”46. “Cheap” loans made home buying easier in both countries, which finally ended sadly for many households. While Americans fell victim to the extremely sophisticated predatory credit system of their own banks, Hungarians became victims of foreign currency, primarily CHF-based, bad Hungarian loan products. While in the US the real estate price bubbles led to the financial crisis, Hungary had to face severe liquidity problems due to the devaluation of its own currency. And finally in both countries, excessive liberal economic policy was the main factor (with different weight), which led to illiquidity and the collapse of the credit market.

The abovementioned dry facts demonstrate the economic policy errors, especially in terms of the Hungarian economy. Despite all this, can we learn anything from the crisis? What can be interesting in terms of the Hungarian economy? According to the analyses of this study, the most important lesson is that the financial system and real economic processes need to be analysed together, together with the strict regulation of the markets. The current Fidesz government has put in place some of the conditions for it because there is no separate Ministry of Finance, but real economy processes and financial matters are managed by one ministry, the Ministry of National Economy. The requirements of this principle cannot be ignored in the activities of the Hungarian
National Bank either. The National Bank must prepare models and empiric analyses to support its monetary decisions, which connect the real economy and the financial sector. DSGE models are not suitable for this, as it was explained before. Analysing individual financial variables (e.g., price or interest rate) of the time series without any structure and making projections, based on these analyses create even more doubt about the unilateral obsolete monetary policy. As the financial system is not connected to a multilateral and empirical structural macroeconomic analysis, the decisions of the Monetary Council are often not in line with the conditions of real economy growth. We must learn to conduct an effective economic policy even in situations without or only nearing an equilibrium. The analyses of this study suggest that this is the latest economic thesis, and the condition of a successful economic policy these days. More specifically, rising real estate prices and home-building activities did not decrease, but in fact increased the demand for homes and mortgage loans during the development of the crisis, which is contrary to the equilibrium theories of the previous economic schools. What happened here was that the disequilibrium of the market was further intensified by the increase in more favourable mortgage loans. In addition to the joint management of real and financial processes, more detailed and up-to-date understanding of the international financial institutional system, both in theory and in practice, is also needed for modern economic management.

Notes

1 The author wishes to thank László Csaba for his valuable remarks and recommendations, concerning this study. The author’s e-mail address: jozsef.moczar@uni-corvinus.hu. The usual remark applies to any potential error. The usual remark applies to any potential error.

2 On Wall Street, these sub prime mortgages were called reference securities as they sounded better.

3 Apart from American banks and hedge funds, such as, e.g., Lehman Brothers, Goldman Sachs, Salomon Brothers, J. P. Morgan, Citibank, Weels Fargo, AIG FP and Bear Stearns, several foreign banks operating on Wall Street, including the Swiss UBS, the German Deutsche Bank, the English Barclay’s, were also involved in these deals. Their global branch networks are equally situated in developed countries, e.g., in Japan, the United Kingdom, Germany, as well as in the emerging China, South Korea, etc.

4 The English equivalent of the Hungarian definitions of various financial innovation concepts and new financial products are also provided in brackets in order to clarify the translations published to date.

5 See the arguments by Eugene Fama or John Cochrane in Cassidy (2010)

6 Obviously, this can only be done within certain limitations due to the Maastricht criteria. However, the question itself points towards the lack of these limitations, i.e., various EU Member States can rely on such assistance within the EU only to a limited extent.

7 These are analysed and described by Báger (2010) and Király et al. (2008)

8 Here the classic meaning of short is short position: the investor sells securities, borrowed from a brokerage firm on the market agreeing to return it by a specific date, and therefore he must repurchase them on the market by then. If during this period the price of the securities decreases, the investor can repurchase it at a lower price and earns profit. Otherwise he has a loss. [In other words, the short position should not be mistaken for futures transactions.] In a different correlation, e.g., the Hungarian currency loans are also in the short, as they aimed at short positions, which brought a loss for them.

9 However, according to the Italian Finance Minister, Giulio Tremonti, Pope Benedict the 16th was the first to predict a crisis in the global financial system as early as in 1985. [Bloomberg News, Nov 20, 2008, quoted by Lewis (2010, p. 226)
10 Fama also confirms this. According to him, the Chinese supplied capital to the world, which the US consumed without any consideration. [See in Cassidy (2010)]

11 See Losoncz – Nagy (2010)

12 For Standard & Poor’s, AAA was the best rating, while Moody’s used Aaa for it. In this paper we follow the former one.

13 Synthetic CDOs contained only CDSs which involved subprime mortgage bonds with BBB rating.

14 There is interesting correlation between predatory lending and predatory pricing. The latter is analysed intensively by Török (2010) with a theoretical and empirical approach.

15 If we try to capture this correlation with a (even limited) Lotka-Volterra model (see Móczár (2008)) then, although loans and liquidity vary in cycles, no crisis occurs ever and we move along a dynamic balance course like mercury.

16 Suddenly, property owners had negative equity: the net real properties of households turned into a debt, because the principal debt of their loans was higher than the market value of their real properties. By 2008, the number of such households reached 8.8 million.

17 For more details, see Móczár (2008, pp. 196–199)

18 See Losoncz – Nagy (2010)

19 Fannie Mae (Federal National Mortgage Association) was established in 1938, Freddie Mac (Federal Home Loan Mortgage Corporation) was founded in 1970 for the trade, securitisation and guarantees of mortgage loans. Both institutions began as government sponsored enterprises (Government Sponsored Enterprise – GSE). The first stopped being a public company in 1968 and was followed by the other in 1971; they both became investment banks only. Fannie Mae issued the MBSs, and Freddie Mac issued participation certificates (PC) secured against mortgage loans without state guarantees. [A separate company, Ginnie Mae (Government National Mortgage Association) secured and guaranteed them.] In 1995, both investment companies were licensed to trade in subprime mortgage loans. As the crisis deepened, they were transferred under state supervision on 7 September 2008, which made it possible for the Fed to issue such instructions. [The mortgage institutions are described in detail in a book by Fabozzi – Modigliani (1992).]

20 Obviously, the US Security and Exchange Commission (SEC) should also be criticised for this.

21 See Cassidy (2010)

22 For details see Móczár (2010/a)

23 Bachelier (1900) observed the prices of securities listed on the stock exchange and found, as the first contribution to the currently mainstream behavioural finance, that they did not have any behaviour, suitable for prediction. In 1933, Alfred Cowles reached a similar conclusion (Móczár, 2008, p. 290), by stating that the exact movement of the stock market could not be predicted. In 1953, a British statistician, Maurice Kendall looked at the prices of shares and consumer goods and found no systematic changes in their random movement. In the 1950s, mathematician Leonard Jimmie Savage found the long forgotten work of Bachelier in a library and asked his mathematician friends on a postcard whether they had heard of Bachelier. One postcard reached Samuelson, who soon laid down the foundation of his efficient market hypothesis.

24 See Móczár (2008)

25 The efficient market is a very vague concept itself, therefore it should be put into some structure for an empirical study. The empirical testing of market efficiency also means the testing of this structure. This is called the joint hypothesis problem. As the definition of the efficient market hypothesis is not constructive, only the specific models can be tested and the general description of efficiency cannot. Testing requires an equilibrium model of efficiency, investor conduct and information structure. Market equilibrium is described with expectations based on the sets of information, prices were described with the martingales related to the information series, while the yields following each other periodically and yields independent of the set of information were described with the random walk model. The analysis of these exceeds the framework of this study.

26 Fama’s definition was followed by several versions. E.g., Michael Jensen (1978) gave the fol-
following definition for the efficient market: “Prices reflect information to the point where the marginal benefits of acting on information do not exceed the marginal costs.”

27 The investment successes of Warren Buffet, John Templeton, John Neff etc. strongly contradict this statement. Samuelson commented this as follows (1989, pp. 4–5): “Those lucky money managers who happen in any period to beat the comprehensive averages in total return seem primarily to have been merely lucky (…) broadly speaking, the case for efficient markets is a bit stronger in 1989 than it was in 1974.” Then he adds: “On the whole, I side with Shiller and Modigliani and am prepared to doubt Macro Market Efficiency.” (quoted by Min Deng, 2009)

28 Ibid.

29 See Móczár (2008)

30 However, even if the financial sector could be organically integrated into the model, it would still not be suitable for predicting crises. The simple reason is that the model is an equilibrium model, which would definitely fail in a test using data of extremely unstable money markets. Colander et al (2008) reached similar conclusions in their study.

31 Naturally, Fama does not admit this. In his opinion, what happened on the real estate lending markets was recession and not a financial crisis, and it was a consequence of the government policy and not the failure of the market. It has been confirmed that bonds were not viable financing instruments, and he considers this to be consistent with market efficiency. (For more details, see Cassidy (2010)

32 See The Guardian, December 20, 2002

33 Here we do not deal with the CAPM and the so-called value at risk (VaR-) models. The premises and objectives of the models are described by Móczár (2008). We also note that the Varga – Rappai (1997) study presents the applicability of CAPM on the Hungarian Stock Exchange.

34 According to standard studies, the efficient frontier may be differentiated. Dybvig (1984) showed that if there is a kink on the efficient frontier, the expected yields on the securities of the related portfolio are identical, but the statement cannot be reversed. Vörös et al. (1999) gave a sufficient condition for the existence of the kinks. They wrote a quadratic programming task for their analyses to minimise the risk level depending on the expected yield. With the quadratic target function, they accept the above anomaly, yet they do not recognise that risk would require asymmetric measurement. We should notice that these analyses consider the risk a dependent variable, while in the standard model the yield is the depending variable. For mathematical considerations both are correct, because both involve primal dual algorithms and both approaches can be sufficiently justified also economically, accepting the symmetry. The question is whether the positive definite condition based on the co-variance matrix is enough to make sure that the target function also contains the systematic risk. The other interesting feature of the quadratic programming task written for the portfolio with risk securities, and not covered by the authors, is that the conditions of the task reflect exactly the definition of the efficient market given by Eugene Fama (1970). Managing the problem can come closer to reality, if the programming task is written in an explicit stochastic form.

35 It should be noted that according to Deng (2009, p. 11) Keynes was mistaken to state that the movement of share prices was motivated by the “animal spirit”. In his opinion, the movement of share prices reflected the balance between the investors’ reality-based aspirations and their expectations.

36 The rating of securities was decided based on FICO points. The FICO scoring system was developed by the Fair Isaac Corporation in the 1950-s: the highest score is 850, the lowest is 300. The US median was 723. Moody’s and S & P did not request the FICO points of creditors individually, only using the average FICO points of a pool for their ratings. If it reached 615, then all loans contained in the pool were granted AAA ratings. And this average was calculated from low FICO points of almost uncreditworthy creditors and the FICO points of highly creditworthy creditors. In 2007, more stringency was introduced into the rating system. (For more details, see Lewis, 2010, pp. 99–101)

37 Swap means a swap deal, but in the Hungarian literature it is referred to as a swap. There are vari-
ous types of swaps, e.g., an interest rate swap means that one participant of the deal pays a fixed interest rate, but still the other one pays a variable rate. According to the pay-as-you-go credit default swap, the insurance buyer does not pay the premium in one lump sum, if and when all mortgages go bankrupt, only gradually, as the individual home owners become insolvent.

38 The introduction of risk and uncertainty into economics is related to Knight (1921). Bélyácz (2010), focusing on the theory of Ramsey (1926) and Keynes (1921, 1936) gives a very deep philosophical and partly psychological synthesis of these concepts, embedded in the latest results. At the same time, it should also be noted that unfortunately the author did not cover the logical relationship between subjective probability and inductive logic, or the book published by Rudolf Carnap in 1950 under the title of Logical Foundations of Probability, or the results of Ludwig Wittgenstein (1918). (About those, see Móczár, 2008, pp. 78–80) It is clear from the article though that what is important for us now is that risk is measurable with risk premium, and uncertainty cannot be measured, it falls in the category of a surprise, which may even be shocking. In fact, this is the reason why investors are basically afraid of any uncertainty.

39 The importance of hedge funds grew in the financial sector in the 1990s. One of the first ones, Quantum was founded by George Soros in 1993. Compared to traditional investment funds (mutual funds), hedge funds follow an aggressive investment strategy (high leverage, short and long positions, futures and options both on national and foreign markets), and can manage the funds of no more than 100 rich people under more lenient supervisory control. Hedge fund investments have low liquidity, because they work with a minimum one-year investment period. According to estimates, by 2008 the assets of hedge funds reached USD 2,500,000 billion.

40 Employees of credit rating agencies are very similar to public employees, primarily because they are underpaid. Consequently, most of them did their best to move on to a Wall Street company, for which they assisted companies turning to them in these manipulations. (Lewis, 2010)

41 And in fact they pocketed incredible amounts. Dowd (2009) reported in detail on the most extreme cases. Here we only refer to the remuneration of Richard S. Fuld Jr., CEO of the bankrupt Lehman Brothers: Between 2000 and 2007, he earned USD 350 million (roughly HUF 7 billion). At his Congress hearing, he considered it rather natural that he deserved that much for his work, even if the “result of his efforts” cost USD 700 billion for the taxpayers when they had to save the economy. The then US Finance Secretary, Henry Paulson, convinced the Congress about it in September 2008. This is how TARP (Troubled Asset Relief Program) was established.

42 See Cassidy (2010). Although it had to be done, because the crisis was caused by the American financial system, which also relates to Posner’s opinion.

43 Ibid.

44 See Inotai (2009, pp. 24–28)

45 Some people think that the future of the international financial system will be determined by the US and China together. “These two countries keep each other hostages, as American overconsumption and Chinese overproduction had already assumed each other. By now, this mutual dependence has extended to the financial and monetary sector. The American dollar can retain its central role only and to an extent, if and as much as China is willing to support the American economy (also including the huge economy boosting projects). At present, China does not have any other reasonable views, but to continue to support the dollar.” (Inotai, ibid., p. 30.) Of course the situation is not so simple because China has huge USD reserves. Consequently, it is also interested in protecting the dollar, but with speculation it may also turn the yuan into the leading currency. The question is whether the US would be able to prevent this using its substantial gold reserves. Another question is for how long the huge US budget deficit can be maintained. (This is analysed by Bertant et.al., 2009) Furthermore, we must not forget Japan either, although today it seems complies with the requests of the Fed. Consequently, the international financial situation is extremely complicated and fragile. A new global financial crisis may break out at any time, potentially leading to severe economic conflicts.

46 Carry trade: primarily used by the hedge funds. A creditworthy investor takes a loan in a country
where interest rates are low, then invests this amount in another country where a high return can be achieved, even from government securities. In other words, creditworthiness is also a product, which may generate profit.

47 This should not be confused with the short-lived disequilibrium theory of 1980s, which mostly expressed its models in static disequilibrium systems. The disequilibrium models and theories are described by Móczer (2008). Another direction is shown by Aoki – Yoshikawa (2007).

LITERATURE


LITERATURE


773


MÓCZÁR J. (2008): Fejezetek a modern közgazdaságtudományból (Stochasztikus és dinamikus nem egyensúlyi elméletek, természettudományos közelítések) [Chapters from modern economic science (Stochastic and dynamic disequilibrium theories, natural science-based approaches)], Akadémiai Kiadó, Budapest, 2008, p. 608


SOROS, GY. (2010): The Soros Lectures at the Central European University, *Public Affairs*
STUDIES – Focus on the crisis


SUMMERS, L. (2008): The Pendulum Swings toward Regulation, Financial Times (26 October)

THIELE, T. N. (1880): Sur la compensation de quelque serreurs quasisystématiques par la méthode des moindres carrés, Ritzel, Copenhagen


