

5. THE DEVELOPMENT OF FINANCIAL MARKETS AND FINANCIAL THEORY – 50 YEARS OF INTERACTION

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5.1. INTRODUCTION

The second half of the 20th century up until the onset of the financial and economic crisis in 2007 was marked by a very dynamic development in financial markets and banking. This has to be seen against the background of a general trend, starting after World War II, towards liberalisation and the global integration of financial markets and banks, and towards increasing sophistication, complexity and inter-connectedness. All these development would not have been possible without the intellectual underpinning of economic arguments for free markets, international division of labour, globalisation and without advances in financial theory and the related improvements in statistical estimation methods. But the influence worked also the other way round: practical needs and the drive for market share and earnings spurred the development of new analytical tools and techniques to price new products and their risk.

Banking has always tended to be regulated more than many other areas of the economy, because of its inherent “dangerous” nature, which has been recognized for long. However, this was less so for other areas of financial markets. Moreover, the overall post World War II belief in the benefits of free markets and the drive towards privatization, liberalisation and globalisation implied that regulation of banking and financial markets did not keep pace with the rapid evolution of banks and financial markets. That being said, regulation and taxation also motivated the creation of new products and vehicles to circumvent limitations and to “optimize” taxation in a global context.

This article starts from the notion that financial theory, the practice of banking and financial markets and financial regulation and supervision mutually influence each other. They did so both in the drive towards globally liberalized, ever more sophisticated banking and financial markets, and they have been doing so in reaction to the global financial crisis. Academia, financial practitioners and regulators/supervisors are all important players in this development. In order to better grasp the milestones in each of these three areas, the article analyses in

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three parts, milestones in financial theory (Section 5.2), milestones in European financial market regulation (Section 5.3) and a helicopter view of 50 years of financial markets (Section 5.4). Section 5.5 draws these three threads together by identifying lessons and challenges concerning financial theory and financial markets, and Section 5.6 draws some more general conclusions for the future. In an annex to this chapter some powerful and useful data sources are listed and described that might be useful for any future follower of structural trends in financial markets.

5.2. MILESTONES IN FINANCIAL THEORY

Financial theory has developed very dynamically in the last 50 years. There has been a remarkable interaction between theory and practice. Academic research has contributed to our understanding of investor behaviour and the functioning of financial markets. Academic research has also stimulated financial innovation and led to development of new financial instruments and markets. Particularly important financial research areas in the past five decades have been portfolio theory, capital asset pricing theory, interest rate structure theory, capital structure theory, agency theory, efficient markets theory, and option pricing theory. The number of research articles and books published is very large. Below, a small selection has been made including several contributions from Nobel Prize winners in Economics.

5.2.1. Portfolio Theory

Harry M. Markowitz published in 1952 a path-breaking article (Markowitz, 1952), in which he argued that the traditional application of one-dimensional investment criteria such as the Net Present value (NPV) criterion should be replaced by two dimensions: Expected returns and risk defined as the standard deviation of the return distribution. In the following decades he expanded his model and used it in a famous book (Markowitz, 1991). He argued also that investors should not look at securities individually. It is unrealistic to assume that investors or investment advisors can predict the future return of individual stocks. However, based on empirical analysis of the co-variation of the returns of several securities, it is possible to make portfolio decisions, in which the incomplete correlation between the securities can be exploited for diversification. The focus of investors should be on the effect of combining securities. In a realistic setting, investors must make a trade-off between expected returns and risk. The available investment universe is represented by an efficient frontier with a slope and shape that reflects the interplay in the financial market between all investors with a varying degree of risk-aversion. If an individual investor wants a higher expected

return, he must accept a higher risk. It is an old saying that one should not put all one's eggs in one basket. In 1990, Markowitz received the Nobel Prize in economics for having developed a strong analytical basis for that wise recommendation, which can be followed by individuals, firms, mutual funds and institutional investors.

In 1989, J.P. Morgan decided to develop a portfolio model, which was able to measure and explain the risks of the firm on a daily basis. In 1992, J.P. Morgan launched the RiskMetrics methodology to the marketplace for free (J.P. Morgan/Reuters, 1996). The staff of the firm made daily updates of spot prices, volatility estimates and correlation estimates accessible through the internet. They explained that they did so because the firm was interested in promoting greater transparency of market risks, they wanted to establish a benchmark for market risk measurement and to use the RiskMetrics methodology to help clients to understand their portfolio risk. In 1993-1994, J.P. Morgan revised their technical document and popularized the concept Value-at-Risk (VaR) as portfolio risk measure to be applied by financial institutions in the capital adequacy calculations to be presented to financial regulators. VaR is a downside measure estimated by means of historical statistics on volatility and correlations among a sample of financial assets and focussing on the probability of suffering losses. For a given portfolio, probability and time horizon, VaR is defined as a threshold value, which can be used to instruct the portfolio manager to keep the probability of suffering losses below a certain level. VaR actually became the standard for the measurement of portfolio risk with official endorsement in the 1993 proposal from the Basel Committee as well as in the Capital Adequacy Directive (93/6/EEC) from the European Commission. *Philippe Jorion* has contributed to the popularity of VaR as portfolio risk measure (Jorion, 2006).

The Basel capital adequacy recommendations and the related EU Directives are explained and discussed in Chapter 7 on financial regulation. One of the lessons of the financial crisis after 2008 is that several large banks in Europe came into financial difficulties in spite of the fact that they used the most advanced internal risk-management models including VaR measures to determine capital adequacy. The statistical techniques used to measure volatility appeared to be inadequate to capture all the dimensions of the relevant vulnerabilities and lead in many cases to lower capital requirements. Like all other economic models, portfolio models can never be more than approximations of the complex real world. On page 1 of the technical document referred to above, J.P. Morgan reminds their clients that no amount of sophisticated analytics will replace experience and professional judgment in managing risks. In 2011, Mark Kritzman marked the upcoming 60th birthday of the original Markowitz model by writing an editorial comment in *Journal of Portfolio Management* (Kritzman, 2011). Referring to a comprehensive empirical study of hedge fund returns he

concluded that mean-variance optimization is still relevant. The 60-year old model is a long way from retirement.

5.2.2. Capital Asset Pricing Theory

William F. Sharpe published in 1964 an article (Sharpe, 1964) based on the Markowitz Model but supplemented with additional assumptions. One of the difficulties with the Markowitz Model is that it requires the estimation of a variance-covariance matrix, which becomes very big if the number of available securities in the investor's investment universe is high. Sharpe simplified the cumbersome estimation procedure by assuming that the returns of individual securities are only interrelated through their sensitivity to a common factor, typically the return of a broad market index. Sharpe further assumed that all investors are able to lend and borrow at the risk-free interest rate, that they agree on the shape of the efficient frontier, and that transaction costs are absent. Under these simplifying assumptions, all investors will select a combination of the market portfolio and the risk-free asset (or borrow at the risk-free interest). All portfolios will lie on the "Capital Market Line", and the slope of this line indicates the price of risk as determined by the market. Sharpe's "Capital Asset Pricing" model (CAPM) became the backbone of a lot of studies of pricing of assets in financial markets. The "betas" of the model, which measure the sensitivity of the individual stock to movements in the return on the stock market as a whole, became widely used by financial analysts and stock brokers. The so-called "Sharpe Ratio", defined as the historical return of a portfolio minus the risk-free interest rate and divided by the standard deviation of the portfolio return is used by investment advisers and mutual funds all over the world. Together with other indicators, the Sharpe Ratio is used in evaluation of the performance of mutual funds and other portfolio managers.

The CAPM has been subject to empirical testing in many studies over the years. (Roll, 1977) has in strong words even questioned the testability of the model. The outcomes of tests have been mixed, and some authors have expressed doubts above the usefulness of the model (Ross, 1978). A serious weakness is that the market participants in the model are assumed to look only one period ahead in time. It has also been criticised that it uses a single risk factor and that this is not quite enough for describing the cross-section of expected returns in the financial market (Miller, 1999). Several authors have tried to overcome such weaknesses by including other risk factors besides the market factor and to cover more than one period (Cox *et al.*, 1985 and Merton, 1973a). Other authors have argued that the CAPM should altogether be rejected. In (Dempsey, 2013) the author argues that after the experiences of the recent financial crisis the CAPM and the theory

of efficient markets may need to be replaced with a paradigm of markets as vulnerable to capricious behaviour.

Some authors have adjusted the assumptions behind the CAPM to include foreign exchange risk in an international environment. In an international capital asset pricing model (ICAPM), investors are assumed to take not only the time value of money and the premium for taking risks on the market portfolio into consideration but also the exposure to foreign exchange risk. The ICAPM assumes that the international capital market is integrated. A test of the performance of the ICAPM has been carried out by (Engel & Rodrigues, 1989). The authors find that the ICAPM performs much better when variances are not constant over time, nevertheless the model does not perform as well as less restricted models of asset pricing.

5.2.3. Interest Rate Structure Theory

Owners of bond portfolios are exposed to many risks. Relevant types of risk are interest rate risk, inflation risk, default or credit risk, currency risk and political risk. Issuers of bonds are also exposed to most of these risks but the sign of the potential impact of risk events is normally the opposite. The interest rate structure at a given date reflects the overall evaluation by the market participants of all these risk factors.

The term structure of interest rates is defined as the pattern of interest rates on bonds with different maturities at a given time. The term structure of interest rates has been subject to studies by outstanding economists for many years. In the 1930s and 1940s John Maynard Keynes, John R. Hicks, Irwin Fisher, Frederick R. Macauley and Friedrich A. Lutz contributed with important publications. They wanted to explain the structure of prices on fixed-income securities as well as the links between monetary policy and real economic activity. Central banks operate traditionally mainly in the market for short term instruments, while real economic activity is assumed via the investment behaviour of firms to be related to long-term interest rates. It is therefore – also from a monetary policy perspective – crucial to understand the factors which influence the relative yields on securities with different maturities. *B.G. Malkiel* and *Angelo Melino* have, in 1966 and 1988 respectively, published excellent overviews of the development of interest rate structure theory (Malkiel, 1966 and Melino, 1988). According to the “Expectations Hypothesis Theory” forward interest rates are determined by the expectations of the market participants concerning the future development in short-term interest rates plus an appropriate risk premium. Disagreement on how to model expectations has been widespread. Some authors but not all have adopted the assumption of “Rational expectations” (Muth, 1961). In the absence

of rational expectations, the expectations hypothesis implies that term premia are time invariant. When rational expectations are adopted, the implication is that the term premia are increasing with maturity. In 1962, (Meiselman, 1962) defended the expectations hypothesis. He argued that one could not conclude from poor forecasts based on forward rates that they did not represent the market's interest rate expectations. Most empirical studies including an influential study by *J.Y. Campbell* and *R. Shiller* show that the steeper the interest curve is, the higher is the expected excess return on bonds with long maturity. (Campbell and Shiller, 1991). It is thus difficult to support the expectations hypothesis empirically. Based on the idea that the term structure should be based on absence of arbitrage opportunities, (*Vasicek*, 1977) developed a single-factor model in which the short-term interest rate is assumed to follow a stochastic process. His model was later expanded with additional factors by (*Dai and Singleton*, 2000). In recent years, investment banks have used stochastic interest rate structure models for pricing not only of bonds with different maturities but also of interest related derivatives such as bond options. The main idea behind arbitrage-free pricing is that any derivative can be replicated by a dynamic trading strategy in the underlying assets and that the value of the derivative is equal to the replicated portfolio. Derivatives markets are discussed in Chapter 13 of the present volume.

There are other theories about the interest rate structure than the expectations theory and the theories based on arbitrage-free models. The "Liquidity Preference Theory" with roots going back to Keynes and Hicks, argues that the maturity premium is determined by the maturity preferences of respectively investors and borrowers in the market. *James Tobin* was awarded the Nobel Prize in Economics in 1981. In the motivation by the Nobel Prize Committee, the 1958 article (Tobin 1958) is accentuated because it combines Keynes's liquidity preference theory with Markowitz's portfolio theory. Investors have a preference for short term assets because of their high liquidity, but they are ready to buy long-term bonds if they are compensated by a higher interest rate. In contrast, borrowers tend to prefer long-term debt and are ready to pay a higher interest rate in order to establish a more permanent debt structure. The interest rate structure observed in the market reflects the relative importance of the strength of these preferences among the two groups. In 1967, *F. Modigliani* and *R. Sutch* integrated several of the elements of the models (Modigliani and Sutch, 1967) in a so-called "Preferred Habitat Hypothesis". They explained how heterogeneous groups of borrowers and lenders preferred securities of different maturities.

Many studies of the term structure of interest rates have ignored credit risk. The interest rates observed in the market reflect, however, also the perceived probability of losses in case the bond issuers default on their contractual payments of principal and interest. The portfolio decisions by the investors determine market risk premia for the circulating bonds. Investors do not often

make their own estimates of probabilities of losses on bonds. Many investors rely on credit ratings provided by rating agencies as Moody's Investor Service, Standard & Poor's or Fitch Ratings. Bond issuers pay the agencies a fee for this service. Institutional investors subscribe to current information from the rating agencies. If rated bond issuing companies, banks or Governments come into financial difficulties, the agencies can downgrade them and this may cause the investors to sell their bonds. Portfolio managers in insurance companies, pension funds and other institutions are often instructed by their boards to invest in only high-rated bonds. The presence of such institutional restrictions on portfolio investments has an impact on the interest rate structure, which has been called a "Market segmentation effect" (Van Horne, 1990).

5.2.4. Capital Structure Theory

Franco Modigliani and *Merton H. Miller* published in 1958 an article on the irrelevance of a firm's capital structure in an abstract economy without transaction costs and taxation (Modigliani & Miller, 1958). The message of the authors was that the value of a firm defined as the sum of the market values of its equity and its debt is independent of the size and composition of the debt, if financial markets are perfect and in equilibrium. Under these ideal conditions, the average cost of capital is also independent of the leverage of the firm. The explanation of this surprising theorem is that the shareholders under the given assumptions are able, without any cost, to compose their portfolios in such a way that they realise the return/risk profile, which they prefer. When investors can do this themselves, they have no incentive to pay more for shares in companies, where the managers try to adjust the capital structure according to what they think the shareholders want. The "Irrelevance Theorem" had a strong influence on later contributions to capital structure theory in the 1960s and 1970s, where researchers focussed on the importance of taxation, transaction costs, cost of default etc. i.e. all the financial market characteristics that had been assumed away by Modigliani and Miller. Almost all researchers felt obliged to refer to the 1958 article and to explain why a firm's capital structure within their model framework was relevant.

The irrelevance theorem has been criticised by another Nobel Prize winner *Joseph E. Stiglitz* (Stiglitz, 1969). Modigliani and Miller assumed that there was no default risk and that there were no information asymmetry problems between the investors and the company managers. These two assumptions are according to Stiglitz unrealistic and if they are removed, the capital structure becomes important. It becomes then possible to discuss a company's funding decisions and the interplay between shareholders, creditors and company managers and the implied corporate governance problems in a much more relevant way.

Stewart C. Myers has written an excellent overview article on other capital structure theories (Myers, 2001). He explains the “trade-off theory”, which says that firms seek debt levels that balance the tax advantages of additional debt against the costs of possible financial distress. The “Pecking order theory” argues that the firm will borrow, rather than issuing new equity, when internal cash flow is not sufficient to fund capital expenditures. Firms prefer internal to external finance in order not to be dependent on creditors or new shareholders. Finally, the “Free cash flow theory” says that the choice of capital structure is related to the conflicts between managers and shareholders. The owners might prefer higher dividend payments if the company has a good liquidity, but the managers prefer to keep the money in the company and invest in internal expansion. Thus, there are close relations between some capital structure theories and agency theory.

5.2.5. Agency Theory

One of the most frequently quoted articles in the finance literature is an article by *Michael C. Jensen* and *William H. Meckling* (Jensen and Meckling, 1976). In the article, the two authors develop a theory of ownership structure for the firm. Referring to the long discussion of separation of ownership and control of listed companies, they analyse the implications of potential conflicts of interest between company managers, shareholders, creditors and other company stakeholders. Agency relationships arise when persons (principals) engage other persons (agents) to perform some service on their behalf, which involves delegating some decision making authority to the agents. The contract between the parties will typically contain a set of incentives in order to limit divergences between their interests. In order to ensure desirable outcomes, the principals will also pay monitoring costs and bonding costs. Issues associated with the separation of ownership and control are intimately associated with agency problems. It follows that capital structure theory and agency problems are related. Jensen and Meckling investigate the incentives faced by the parties involved.

A company can be seen as a nexus for a set of contracting relationships among individuals. The firm is a legal fiction, which serves as a focus for a complex process in which the conflicting objectives of individuals are brought into equilibrium within a framework of contractual relations.

Agency theory has inspired many contributions to the corporate governance literature and the regulation of listed companies. The analysis of potential conflicts of interest supports the formulation of rules concerning shareholder rights, investor protection, disclosure and transparency.

Asymmetric information is important for the distribution of power between managers and shareholders, because managers always know more about the company

than the external owners do, but asymmetric information plays a broader role in financial markets. *George Akerlof*, published in 1970 a very influential article on the market for “Lemons”, which is American slang for bad used cars (Akerlof, 1970). In the market for used cars, the seller is almost always better informed than the potential buyer. The price will typically reflect the average quality of similar cars in the market, which is higher than the value of a lemon. So the owner of the bad used car is happy to sell. In contrast, owners of good used cars will not want to sell. Consequently few good used cars will be offered at the market. The bottom line is that the market for used cars will not function well.

The “lemons problem” arises often in financial markets. Sellers of financial assets or products are as a rule better informed than potential buyers. A buyer of a corporate bond is willing to pay a price for the bond which reflects the average default risk of similar companies. Decision makers in well-run companies with a very low default risk will, however, not want to sell bonds at a price, which they know is too low. It is therefore unlikely that good companies will want to borrow in the market. In contrast, high-risk companies will want to offer their bonds. If bond investors are aware of this, they will probably look for alternative investment opportunities. The bottom line is that the market for corporate bonds will not function well.

Adverse selection problems in financial markets due to asymmetric information can be reduced in several ways. Rating agencies can provide potential investors with analyses of bond issuing companies and classify those companies according to credit worthiness. After the financial crisis, the market’s confidence in the objectivity of ratings has been shaken, and regulatory steps concerning the rating agencies are under way. As discussed in Chapters 7 and 8 in the present volume, politicians, financial regulators and supervisors can apply disclosure rules to force firms to give reliable information about themselves to the market. This can reduce but not remove information asymmetry.

5.2.6. Efficient Market Theory

The “Efficient Market Theory” (EMT) states that the prices of securities in financial markets reflect all information, which is available to the investors. An early contribution to EMT is an article by *Sidney Alexander* in a book on the random character of stock prices (Alexander, 1964). Market efficiency can be tested in different ways. A test for “weak-form efficiency” uses only past price data in order to predict future prices of the financial asset in question. In a test for “semi-strong-form efficiency”, the information set is expanded to include not only past price data but all publicly available information. Finally, a test for “strong-form efficiency” includes not only publicly available information but

also insider information, which can be possessed by company managers, employees, bankers and auditors. *Eugene F. Fama* has written a famous survey article on tests for market efficiency (Fama, 1970).

EMT is important in the context of investment advice and portfolio management. If EMT holds in the semi-strong form, investors or advisers without inside information are unable to find unexploited profit opportunities through securities trading. EMT also implies that the use of technical analysis to predict future stock prices is waste of time. EMT is also important in the context of disclosure requirements for listed companies and rules concerning insider trading. Press releases with new information about companies' growth or profit expectations must be given to the market participants simultaneously in order to minimise problems of asymmetric information.

EMT assumes that investors are rational. This implies that they currently follow the flow of information, which is relevant to the pricing of the securities they hold. It implies also that they currently adjust the composition of their portfolios, when new relevant information is disclosed. In the real world, it is, however, not easy to define what relevant information is. Every day, investors and their advisors are confronted with an enormous amount of new information, which may or may not have an influence on the pricing of the financial assets they own or have the opportunity to buy. Investors may have ideas about the effect of new events or political decisions on their portfolios, but they can never be sure and errors are unavoidable. Fischer Black has described investors that react to random and unpredictable shocks and try to profit from them as "Noise traders" (Black, 1986). It is probably realistic to interpret the actual stock price development and volatility as the combined result of the behaviour of rational investors, who follow the "fundamentals" i.e. profit announcements, dividend announcements and other disclosures from listed companies, and noise traders, who try to profit from any kind of new information that they believe to be relevant. It is also important to evaluate the realism of the EMT in the light of transaction costs. If rational investors decide to adjust their portfolios because new information has affected their expectations, they must pay fees to their bank or stock broker, bid-ask spreads and other transaction costs. The existence of these costs may cause some inertia in the portfolio composition and delay market reactions to new information.

5.2.7. Option Pricing Theory

In 1973, *Fischer Black* and *Myron S. Scholes* published an article (Black and Scholes, 1973), which revolutionised financial theory and laid the foundation of a phenomenal growth in derivatives markets in the following decades. The

so-called “Black-Scholes Formula” determines the value of a European call option as a function of the exercise price, the market price of the underlying asset, the time distance to exercise, the risk-free interest rate and the volatility of the underlying asset. The formula is based on the assumption that investors are able continually to adjust their portfolios. Since investors cannot do that in practice, the formula is an approximation. In spite of the simplifying assumptions, the formula has proved to be highly useable in the real world. It is today applied on all markets for derivatives in the world. Information in annual reports from listed companies on the value of stock options awarded to members of the company management is in most cases based on the Black-Scholes Formula. In 1997, *Myron S. Scholes* and *Robert C. Merton* were awarded the Nobel Prize in Economics for their research. In cooperation with Black and Scholes, Merton expanded option pricing theory with a view to several practical applications. (Merton, 1973). He used the formula in capital asset pricing, management of pension funds and management of mutual funds. In 1993, Merton was one of the initiators in the establishment of the fund Long-Term Capital Management (LTCM), which, after heavy losses, was reconstructed through a crisis package in 1998. The LTCM failure was in itself a milestone in the sense that it showed that even highly qualified financial researchers could be responsible for financial distress. The failure provided important lessons to learn for financial regulators with responsibility for derivatives markets.

A common assumption behind the theoretical models explained above is that persons and institutions are assumed to behave in a rational way. They have a goal or a preference function and they try consistently through their decisions to optimise their income, wealth or utility within the possibilities they are confronted with in the financial market. In the field “behavioural finance”, researchers question the rationality assumptions in conventional financial theory and try through a multidisciplinary approach to understand financial behaviour in the context of psychology, sociology, anthropology etc. In the 2012 volume of the *Journal of Behavioral Finance*, the authors write about psychological influences on market fluctuations, risk perceptions of investment products, risk-seeking behaviour of troubled firms etc. Some authors belonging to this group have argued that the recent unsatisfactory performance of the financial system documents that there is a need for a revolution in financial thinking (Gippel, 2012).

5.3. MILESTONES IN THE EUROPEAN REGULATION OF FINANCIAL MARKETS

Abolition of obstacles to freedom of movement of goods, services, capital and persons has been the aim of the European Economic Communities right from the

beginning. Approximation of the laws of the member states followed soon. Over the years, the legal construction of the EC and later the EU under the headlines trade liberalisation, freedom to provide services, the right of establishment and liberalisation of capital movements has fundamentally changed the legal framework within which financial markets in Europe operate. There are a very large number of EU measures, which directly or indirectly through implementation in the national legislation in the member countries determine this framework. Important milestones related to liberalisation of cross-border capital movements, deregulation and the introduction of the Euro are discussed in the Chapters 1, 3, 6 and 7 of the present volume. These political decisions and events have of course a profound impact on the number of investors and borrowers who have access to financial markets and on the currency dimension in financial instruments. In the present chapter, the focus will be restricted to a sample of the many EU measures that are related to organized financial markets as stock exchanges.

Of particular relevance in the 1970s and 1980s were the Admission Directive, the Listing Particulars Directive, the Interim Reports Directive, the Major Holdings Transactions Directive and the Insider Trading Directive.

The aim of the Admission Directive (79/279/EEC) was to remove obstacles to the interpenetration of securities markets that may be caused by divergent admission conditions on stock exchanges. Companies that wanted to list their equity securities on a stock exchange should fulfil a number of requirements concerning market capitalisation, publication of financial statements, negotiability of the securities etc.

The Listing Particulars Directive (80/390/EEC) prescribed detailed disclosure requirements that had to be fulfilled prior to approval of the listing. Companies should provide information on persons responsible for preparing the listing particulars and for auditing the financial statements, the capitalisation of the issuer, the principal business activities, assets and liabilities, profit and losses and business prospects.

The Interim Reports Directive (82/121/EEC) aims at keeping investors informed regularly about the current development in listed companies. One requirement was that semi-annual reports had to be published in widely distributed newspapers.

The Major Holdings Transactions Directive (88/627/EEC) aimed to provide publicity regarding transactions through which the control of listed companies could change between different investor groups. The Directive contained a number of thresholds that released the obligation to disclose information to the public.

The aim of the Insider Trading Directive (89/592/EEC) was to prevent abuse of information asymmetries among investors and company insiders. The Directive

required member states to prohibit any persons who have access to inside information from taking advantage of that information by trading in securities. The Directive also prohibits insiders from using the information to recommend trades by third parties.

In 1999 the European Commission launched an ambitious Financial Services Action Plan (FSAP) to integrate financial markets in Europe through new legislation. (European Commission, 1999). In March 2000, the Lisbon European Council agreed to implement the FSAP by 2005. Referring to the name of the Chairman of the Committee of Wise Men, Alexandre Lamfalussy, the plan followed a so-called “Lamfalussy Approach” and the legal documents issued under the FSAP were often referred to as “Lamfalussy Directives”. The EU Directives, which were gradually adopted on the basis of this approach, fall into two categories: “Level 1 Directives”, which set out framework principles, and “Level 2 Directives”, which set out the implementation measures that allow these principles to be put into practice. Four “Level 1 Directives” have been adopted: 1) the Directive on Markets in Financial Instruments, 2) the Market Abuse Directive, 3) the Prospectus Directive, and 4) the Transparency Directive. All four are crucial parts of the legal framework within which European financial markets operate.

1) The Markets in Financial Instruments Directive (MiFID) (2004/39/EC), which amended Directives (85/611/EEC), (93/6/EEC) and (2001/12/EC), creates a “single passport”, which allows investment firms to operate across the EU whilst ensuring a high level of protection for investors. The Directive applies not only in the European Union but also in the other member countries of the European Economic Area. In 2007, MiFID replaced the Investment Services Directive (ISD) (93/22/EEC). MiFID retained the principles of the “passport” introduced by the ISD but introduced the concept of “maximum harmonisation”, which places more emphasis on home state supervision.

2) The Market Abuse Directive (MAD) (2003/6/EC) replaced the Insider Trading Directive (89/592/EEC). MAD is aimed at both preventing and punishing different forms of behaviour involving exploitation of inside information. It covers also manipulation of the market through dissemination of false information or various types of sham transactions. Issuers of listed financial instruments are obliged to make public disclosure of any inside information as soon as possible. Issuers are also obliged to keep updated lists of insiders i.e. people with access to inside information.

3) The Prospectus Directive (2003/71/EC) sets out the initial disclosure obligations of issuers of securities that are offered to the public or admitted to trading on a regulated market in the EU. Issuers are obliged to publish a prospectus, which must contain a summary which conveys the essential characteristics and risks associated with the issuer, any guarantor and the securities in a non-technical

manner. Some transactions are exempted from the obligations in the Directive. Offers of large denominated securities or with high minimum subscriptions addressed to qualified investors are exempted.

4) The Transparency Directive (2004/109/EC) requires issuers with securities admitted to trading on a regulated market in the EU to comply with obligations for periodic and ongoing financial and non-financial reporting. Issuers are obliged to publish annual and semi-annual reports containing IFRS financial statements, information on significant shareholders (owners with more than 5 % of the share capital) and to ensure effective dissemination to the public, throughout the EU, of information disclosed by the issuers in compliance with the Directive.

Since the implementation of the FSAP, the EU Commission has followed the progress made by the member states in transposing the “Lamfalussy Directives”. On the Commission’s website, the stage of implementation (“state of play”) in individual countries of the different directives is regularly presented in large tables. The Commission has also commissioned a study of the economic impacts of the FSAP (Malcolm & Tilden, 2009). Progress towards harmonisation and convergence of the regulatory framework for financial markets has been significant. Transaction costs in cross-border transactions have been lowered and important steps towards a single capital market have been taken. However, the fact that some of the measures have the characteristic of being partial, optional or have minimal harmonisation provisions means that complete uniformity of regulatory conditions in the financial markets in the EU has not yet been achieved.

5.4. A HELICOPTER VIEW OF 50 YEARS OF FINANCIAL MARKET DEVELOPMENTS

Researchers have access to an incredible amount of data concerning the development of financial markets. Interestingly, however, financial market data spanning the whole 50 years are not so readily available. This reflects, on the one hand, that financial markets evolved gradually only, with some segments, such as derivatives markets, virtually being non-existent 50 years ago. On the other hand, it also reflects that awareness of the need for comprehensive financial market data sets also only evolved over time, with some international institutions, such as the Bank for International Settlements, the OECD or the IMF, and for the EU, the ECB, the European Commission and Eurostat playing key roles in this respect. Some of the European institutions producing statistics did not even exist before 1998.

Within the space of the present chapter, it is out of the question to try to summarise trends in all financial market segments in all countries. The authors have therefore decided to present in this section a “helicopter view” of the development of a few key financial variables in relation to GDP in a sample of major countries, while providing references to some useful sources on more detailed data and information in the annex to this chapter. The reader can also find some observations of important financial trends in the annex. An analogy might help to explain the approach chosen. In some maps of a country, there are only main roads between the biggest cities, while smaller roads and villages are ignored. Such maps are useful to get a rough overview of the country. Other maps provide detailed information on secondary roads and small cities, which is useful for local traffic. The graphs used below to provide the helicopter view of the financial market development correspond to the first category of geographical maps, while the references to more detailed sources in the annex correspond to the second category.

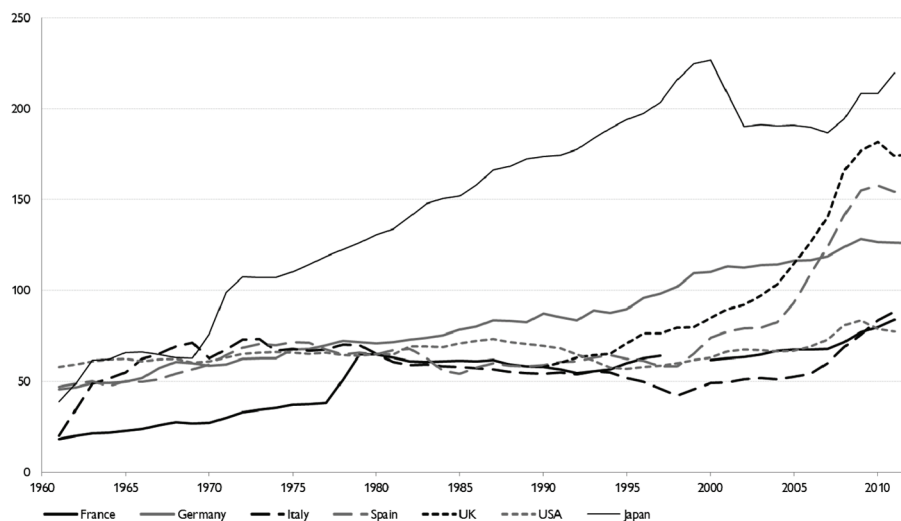
Goldsmith (1969) is the classical book on the relation between financial structure and development and economic growth. He decided to analyse how and to what extent differences in financial structure have been responsible for differences in the rate and character of economic growth. He used long time statistical series from 35 countries. Assets of financial institutions were confronted with GDP numbers in order to explain the interrelations between the financial sector and each country's aggregate production and income. Studies of a similar nature have later been made in particular by researchers attached to the World Bank (Demirgüç-Kunt & Maksimovic, 2002 and Demirgüç-Kunt, Feyen & Levine, 2011).

Since the 1960s, the aggregated level of financial assets has grown strongly and at the same time the structure of the financial system has changed. The relative importance of money markets, markets for bank deposits and loans, bond markets, stock markets and derivatives markets has changed.

Figure 5.1 shows the development since the 1960s in the ratio between aggregate bank deposits and GDP in a sample of important countries.

In all the countries included, GDP has grown over the five decades but with annual variations in the growth rate. The first observation to make in Figure 5.1 is that the bank deposit/GDP ratio has moved upwards in all countries through time. Growth in income and production has been accompanied by an even stronger growth in bank deposits that are owned by firms, households and financial institutions. *Goldsmith* uses the expression that the income elasticity of the issues of financial institutions is above unity. This seems still to be the case. There are country differences in the ratios in Figure 5.1. Already around 1970, the ratio begins to increase rapidly in Japan and in the late 1990s, the Japanese ratio

Figure 5.1: Bank deposits to GDP

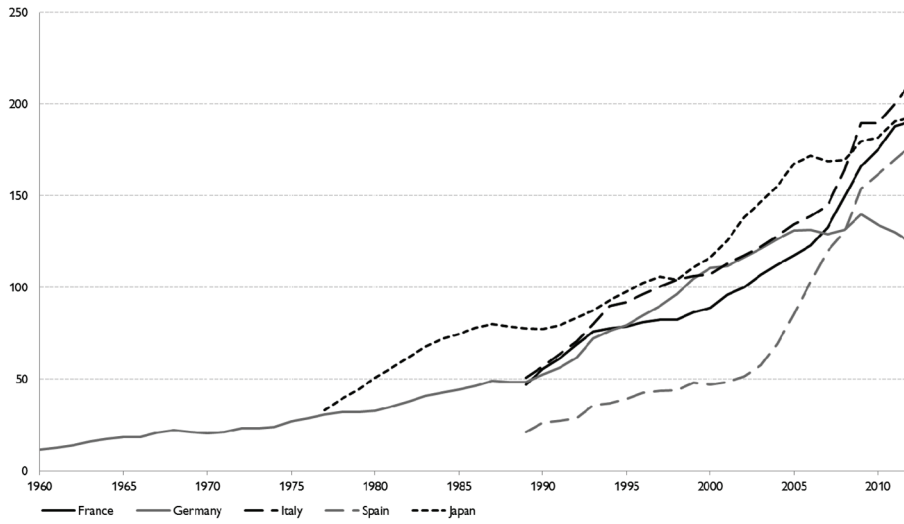


Source: The World Bank, OECD, Deutsche Bundesbank, Statistisches Bundesamt, Bank of England, ECB, own calculations.

exceeds 200 % of GDP. In the other countries, the bank deposit/GDP ratio shows a fast increase from a level of 50-100 % of GDP in the 1990s and reaching a peak around 2008.

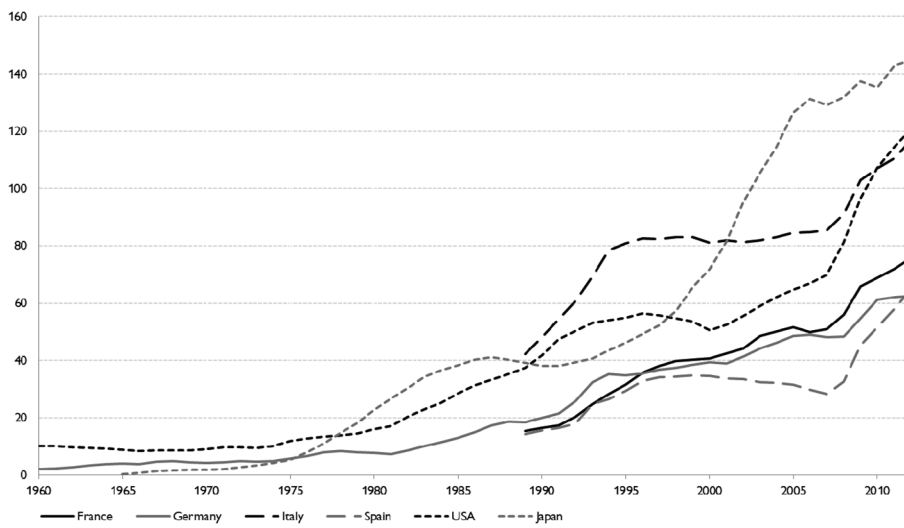
Figures 5.2, 5.3, 5.4 and 5.5 present data from the bond markets in five important countries. The ratio between the total amount of outstanding bonds and GDP has been increasing through time everywhere up to 2008.

Figure 5.2: Bonds outstanding to GDP



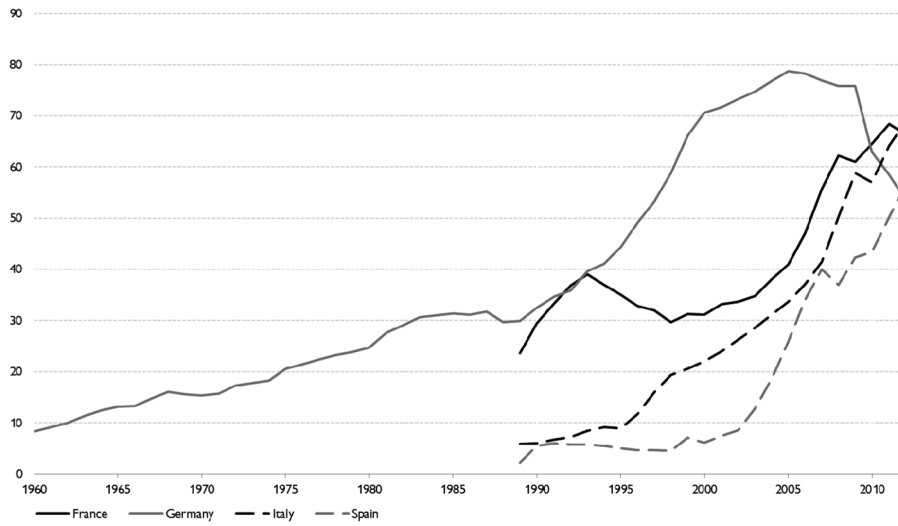
Source: ECB, Deutsche Bundesbank, Datastream, OECD, Statistisches Bundesamt.

Figure 5.3: Government bonds outstanding to GDP



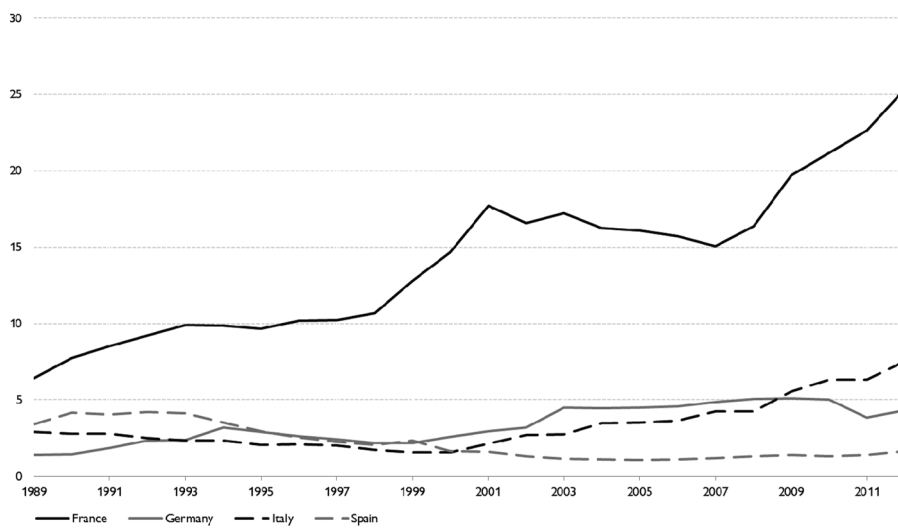
Source: ECB, Deutsche Bundesbank, Datastream, OECD, Statistisches Bundesamt.

Figure 5.4: MFI bonds outstanding to GDP



Source: ECB, Deutsche Bundesbank, OECD, Statistisches Bundesamt.

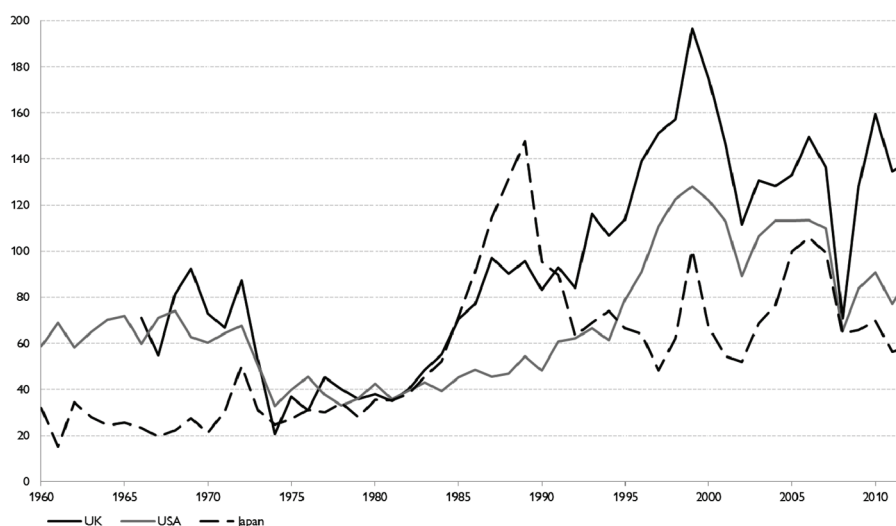
Figure 5.5: Non-financial corporations Bonds outstanding to GDP



Source: ECB, OECD, Statistisches Bundesamt.

In all countries except France, the growth in the ratio has continued after 2008. In 2010, the bond/GDP ratio was typically between 150 and 200 %. Figure 5.3 shows that the increase in the bond markets since the 1990s has been strongly affected by the issue of government bonds. At the end of the data period, the Japanese government bond/GDP ratio was above 140 % while the ratios for the other countries were between 60 % and 120 %. In Figure 5.4 it can be observed that the outstanding amounts of bonds issued by MFIs increased strongly from the middle of the 1990s but that a stagnation or decline started in 2008. Bonds issued by non-financial corporations have played a relatively modest role as it is documented in Figure 5.5. Figure 5.6 – Stock market capitalisation to GDP – shows by far the strongest volatility of all the graphs presented here.

Figure 5.6: Stock market capitalization to GDP

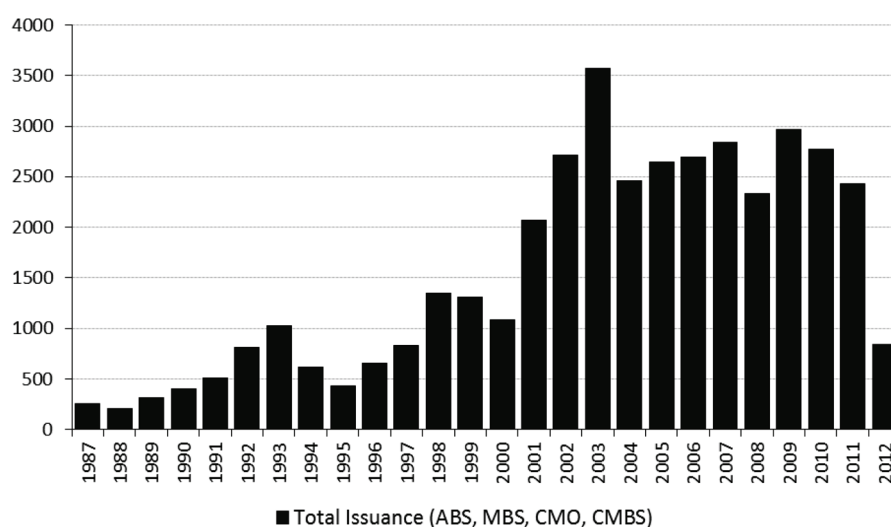


Source: Global Financial Data, OECD, Main Economic Indicators.

In the Anglo-Saxon countries, the ratio between stock market capitalisation and GDP lies traditionally at a much higher level than in the continental European countries. (Demirgüç-Kunt and Maksimovic, 2002). The observed volatility of the ratio in the figure is the combined effect of variations in GDP, increases and decreases in the equity capital of listed companies, new listings and delistings and stock price volatility. Spectacular events such as the OPEC announcement of oil price increases in October 1973 have a strong impact on stock prices. The effects of the so-called “Black Monday” on 19 October, 1987 can also be observed. So can the burst of the dot com bubble in 2001. The stock market capitalisation/GDP ratios tend to rise in expansion periods as 1993-1998 and 2007-2008 and to fall when recessions occur. The curves are difficult to interpret as they

reflect both investor behaviour and the behaviour of the share issuing companies. Alan Greenspan coined the famous expression “irrational exuberance” to describe the mood of participants in the stock market. Robert J. Shiller wrote a best-selling book on the topic (Shiller, 2000). Andrew Crockett explained how stock market volatility presents a challenge to monetary policy (Crockett, 2001).

Figure 5.7: Structured Finance Issuance in United States (in USD billion)



Source: Securities Industry and Financial Markets Association

Asset-backed securities, mortgage-backed securities and other types of structured finance instruments developed very strongly after the year 2000. Figure 5.7 shows that the annual issuance in the United States of such instruments reached a peak of USD 3,500 billion in 2003 and remained around USD 2,500 billion until a strong decline took place after 2009. As explained in greater detail in Chapters 11 and 12, this dramatic development in the market for structured finance was a crucial element in the financial crisis.

5.5. LESSONS AND CHALLENGES CONCERNING FINANCIAL THEORY AND FINANCIAL MARKETS

5.5.1. Models are Simplified Approximations

Most of the models from financial theory are worked out from a normative perspective. The researchers try to explain what a rational decision maker should do in order to optimise his or her situation under the given market and institutional

circumstances. Some researchers go further and analyse equilibrium under the assumption that rational decision makers dominate the financial markets. In reality many decision makers do not optimise and many decision makers are not rational. This becomes evident when theoretical models are confronted with data. No model can capture reality completely. No matter how many resources there are used in order to develop convincing models that incorporate the most sophisticated theories and apply the most advanced estimation methods, models can never be more than simplified approximations of the real world. This does not mean that models are useless. The alternative to making decisions with models is to ignore what we know about behaviour, risk determinants and interrelations between financial institutions and other market participants. Thus, theoretical models can support private decision makers as well as policy makers, but both groups should be well informed about the assumptions and limitations of the models. Researchers and analysts should be obliged to explain the simplifying assumptions behind their models. The experience during the recent financial crisis shows that this obligation should include the limitations of statistical estimation techniques and the reliance of risk measures on the assumed form of distributions of crucial variables.

It follows from the text above that interest rates, exchange rates and asset prices are essential variables in financial theory. So they are in economic and monetary theory. This is illustrated by the fact that these financial variables are also discussed in most other chapters of the present volume.

They are, however, mostly discussed in the context of monetary policy, financial regulation and financial (in)stability. There are references to portfolio theory in Chapters 4, 7, 9 and 13. One illustrative example is found in the discussion of the monetary policy transmission channel – portfolio re-balancing – in Chapter 4. There are references to asset pricing theory in Chapters 4, 6, 7, 9 and 12, and in particular, for example, in relation to the discussion of market risk in Chapter 7. Interest rate structure theory is used or mentioned in almost all chapters. An important example is found in the discussion of credit default swaps in Chapter 13. Capital structure theory is referred to in Chapters 6, 7, 9, 10 and 11. The discussion in Chapter 6 of the implications of rising leverage in banks followed by a period with deleveraging is very illustrative here. There are references to agency theory in Chapters 8, 9 and 13. One example is the discussion of the role of monitoring in financial supervision and the need for good corporate governance of banks in Chapter 8. Efficient market theory is mentioned in Chapters 3, 6, 9 and 13. Thus, the increasing belief in the years up to the financial crisis in the efficiency of financial markets is mentioned in Chapter 3. There are references to option pricing theory in the Chapters 6, 9, 10 and 13. The importance of the development of option pricing theory for financial innovation and the emergence of credit derivatives is discussed in Chapter 9.

5.5.2. Liberalisation, Deregulation, Risk and the Role of Models

The past five decades have been characterised by liberalisation and deregulation. Different aspects of these two important trends are analysed in most chapters of the present volume. An important implication is that people and institutions have experienced more freedom. They have been allowed more and more to define and follow their own goals within the framework of laws and regulations. In deregulated financial markets, the market participants are allowed to try to maximise profits, wealth or utility or whatever goal they may have, and the market development must be understood as the result of their efforts to do so. Unconstrained optimal behaviour of investors, company managers, banks, institutional investors and households is exactly what financial theory is about. As mentioned, normative financial models aim at explaining what rational market participants should do in order to optimise their portfolio or their utility. A basic assumption in financial theory is that people react to incentives. Incentives play a role in all the research areas, which are listed above. The legal infrastructure is full of incentives. Below, an attempt is made to explain developments in the financial markets by combining incentives with financial models. Before that, however, some remarks are needed about the role of risk in financial markets.

The world is characterised by uncertainty and risk. People and institutions are confronted with risk in some form, whenever they make transactions in financial markets. Several financial markets and institutions provide opportunities to transfer risk. Due to financial innovation, these opportunities have been improved tremendously in the last five decades. Insurance companies owe their existence to the presence of risk-aversion. Even though informed people know that the average holder of an insurance policy over his lifetime will pay premiums that exceed the expected losses incurred, they still buy insurance. Banks also partly owe their existence to the presence of risk-aversion. Depositors are willing to accept an interest rate, which is considerably lower than the interest rate paid by borrowers to the bank. They do it because the bank carries the default risk on the borrowers.

Credit default swaps and other derivatives are designed to transfer risk between seller and buyer. Risk does not disappear, when it is traded. It is moved from one market participant to another at a price. Such risk transfers increase the welfare of the society as risk-averse market participants improve their own utility by paying risk-willing counterparties to carry the risk.

Some people are protected against risk in financial markets, because a majority of politicians want them to be. Deposit guarantee systems have been improved and expanded several times in the last decades. Risk-averse depositors support of

course deposit guarantees. But again: The risk does not disappear. It is moved to somebody else. If the deposit guaranty system is funded by contributions from the banks, they (i.e. their shareholders and or customers) will bear the losses. If the system is funded by the Government, the tax payers have to pay.

Risk-takers play an important role in financial markets. Banks carrying the default risk on their borrowers have a strong incentive to monitor the performance of them. Credit evaluation by bankers is indispensable. The wealth of shareholders is exposed to the performance of the companies in which they own stakes. They have an incentive to monitor the managers and board members and to intervene at shareholder meetings if things are going wrong. The corporate governance literature explains that shareholders have not only rights. They are also supposed to follow the companies and to influence them to do better. The whole concept “Market Discipline”, which is applied in the Basel capital adequacy framework, relies on the behaviour of risk-exposed depositors and shareholders.

5.5.3. Substitution between Markets

Financial theory helps us to understand substitution between markets. The empirical evidence referred to in the present chapter documents that there in recent years has been a considerable substitution between markets for different types of assets. A fitting characterization is in most cases that market participants react to arbitrage incentives. The way they react can often be related to financial theory. Let us take a look at substitution between respectively: 1) bond markets and stock markets, 2) markets for foreign currency interbank deposits and domestic currency interbank deposits, 3) markets for individual shares and markets for shares in mutual funds, 4) markets for short-term bonds and markets for long-term bonds, 5) markets for on-balance sheet items and markets for off-balance sheet items, 6) property markets and bond markets, 7) bank loans and securitised assets, 8) institutionalised forms of saving for retirement and individual saving for retirement.

Concerning Substitution 1: More sophisticated investors hold a portfolio consisting of both bonds and shares. If they are risk-averse, bonds represent a large part of the portfolio. If they have more risk appetite, they own more shares. The trade-off between the two types of securities is affected by both return and risk evaluations. Portfolio theory provides a nice explanation of their substitution between bond and share markets. A decline in the market interest rate makes shares relatively more attractive and gives an arbitrage incentive to move more into shares. In the context of the capital asset pricing model, a lower risk-free interest rate reduces the slope of the capital market line, which makes the market portfolio of shares more attractive.

Concerning Substitution 2: The interest rate parity theory is explained in Chapter 6 of the present volume. In a highly integrated world, dealers in banks are supposed to react promptly to arbitrage incentives that may arise, when the difference in money market rates in different currencies adjusted for the premium or discount in the market for forward exchange becomes different from zero.

Concerning Substitution 3: When investors buy shares in individual companies, they are exposed to risks related to the dividends, profits and prospects of these companies. By investing in shares in mutual funds they can in accordance with portfolio theory diversify their portfolio. In periods with volatile share prices, risk-averse investors may prefer to contribute to the administrative costs of mutual funds in order to obtain portfolio diversification. The wealth under administration of mutual funds (UCITS) has increased considerably in recent decades. Several empirical studies have looked at the performance of mutual funds. A classical article is (Jensen, 1968). Most of the studies use American data. The majority of the studies conclude that after deduction of the costs of running the funds, they obtain a return in line with the relevant index. Fund managers seem to be able to realise a higher return than the market portfolio before costs, but that this from the point of view of the investors is neutralised by the costs of running the funds.

Concerning Substitution 4: Term structure theory is an important type of interest rate structure theory. When central banks conduct open market operations, they traditionally buy or sell securities in the short end of the bond market. This has an impact on the shape of the yield to maturity curve and creates arbitrage incentives for investors to adjust their balance between short-term and long-term bonds.

Concerning Substitution 5: Chapter 11 of the present volume deals with shadow banking. In the years up to the crisis, banks and securities firms sponsored structured off-balance-sheet investment vehicles that constituted a shadow banking system. One of the motivations for building these fragile structures was that they were associated with very modest capital requirements. The involved parties reacted to incentives to regulatory arbitrage.

Concerning Substitution 6: In statistical tables illuminating the balance sheets of institutional investors, it is documented that many of them own portfolios with a mix of financial assets and real estate. Typically financial assets dominate. The main features of their behaviour can probably be captured by portfolio theory. Their interest in portfolio adjustments between the property market and the bond market can therefore be assumed to reflect risk-return considerations. They follow closely the long-term interest rate on the bond market. If they find it appropriate, they can finance their real estate by mortgage debt as genuine real estate companies do. As explained in Chapter 7, booms and busts in property

markets and their spillover to markets for mortgage backed securities have played an important role during the recent financial crisis.

Concerning Substitution 7: Blommestein *et al.* (2012) wrote an article on the substitution between securitised assets and other assets. In the years prior to the crisis, securitisation was used at increasing scale for transfer of risks away from the banking sector to bond holders. As explained in chapter 11, the substitution from the market for bank loans to the market for securities could to some extent be considered as regulatory arbitrage. Global securitisation issuance peaked at an amount close to USD 4 trillion in 2006. The authors point out that securitisation issuance has slumped considerably recently. Many bond investors have left the market because of experienced losses on structured bonds of different kinds related to the US subprime crisis. In the view of the authors, the entire securitisation sector was unfairly tarnished by the fallout of the US subprime crisis. Not all securitised products are toxic and opaque. Statistics show that structured finance default rates have been much lower in Europe than in the US. In accordance with interest rate structure theory, the yield on low-rated securitised bonds increased in relation to higher-rated securities. Significant steps are now being taken to improve transparency of the market and adjust previously skewed incentives. If investor confidence can be re-established, the authors expect securitisation to return as an important channel for lending. While the level of securitised issuance declined during the crisis, the market for covered bonds was more resilient. Relatively high issuance has continued. This segment of the bond market benefitted from the perceived higher risk related to some sovereign bonds and a relatively favourable regulatory treatment. Bond investors like the built in protection with underlying loans ring-fenced and retained on the issuers' balance sheets. The switch from securitisation to covered bonds is analysed in more depth in Chapter 11.

Concerning Substitution 8: In almost all European countries, pension saving through pension funds, insurance companies and banks has for many years grown faster than individual saving for retirement. This is one of the explanations why households' pension related claims on institutions have increased more than individual saving deposits. The most important arbitrage incentive is here a favourable tax treatment of pension saving via institutions.

5.5.4. Other Applications of Financial Theory

Portfolio theory has also been useful in the context of capital adequacy requirements. Under the Basel II requirements, the eligible capital is a function of the Value-at-Risk of the held portfolio of marketable assets. Kaplanski and Levy (2013) have studied the impact of the Basel Value-at-Risk market risk regulation

on the investment policy of banks. They use portfolio theory in order to evaluate if this type of regulation may give an incentive to change the risk profile of the bank's portfolio. When a risk-less asset is available does VaR-based regulation induce the institution to reduce risk.

There are, however, also challenges in relation to portfolio theory. An obvious question when making the trade-off between return expectations and risk is how risk is measured. The Markowitz-model assumed that risk should be measured as the standard deviation of the portfolio return, i.e. by volatility. According to Sharpe, the investor could accept the more simple measure of beta. Jorion (2006) recommended the use of Value-at-Risk. Experience shows that investors relying on all three types of advice can suffer losses. In extraordinary times, the model assumptions concerning the shape of statistical distributions do not hold and the calculations can give misleading results.

Before the liberalisation of capital movements in the 1960s and 1970s, the portfolios of institutional investors and other investors were dominated by securities issued by companies and borrowers located in the home-country of the investors. Also in the first years after the introduction of more liberal rules for cross-border investments, many investors continued to look for local securities, which they knew better. So their portfolio choices were characterised by some "home-country bias". Gradually the investors became convinced may be by studying portfolio theory and capital asset pricing theory that international diversification could help them to better performance. Statistics on the currency and country composition of the portfolios of institutional investors show a growing tendency to internationalise the choice of securities. An interesting implication of this trend is that the international portfolio diversification benefits have been reduced somewhat. Some studies do also show that the interdependence between stock markets tends to be higher during crisis periods. (Avounyi-Dovi and Neto, 2004).

The relative importance of factors that influence the interest rate structure changes through time. An illustrative example is the changing interest rate structure of European government bonds since the 1990s. In the years prior to the introduction of the single currency, the interest rate differences in the market between bonds issued by Governments of the coming members of the Euro area narrowed gradually. The reduction of the interest rate differentials must be interpreted as a reflection of the expectation by the market participants that the EMU plans would actually be implemented. The currency risk was expected to disappear. After 2007, when the European fiscal crisis developed, interest rate differentials between bonds issued by Governments in peripheral euro member countries and Germany widened. This time, market participants under the influence of the rating agencies reacted to a perceived increase in the probability of default and/or exit from the euro area. The investors' concern for currency risk

went down in the period in which the euro was introduced and their concern for default by some governments went up during the fiscal crisis.

5.6. CONCLUDING REMARKS

The recent crisis documents that the performance of our financial system is unsatisfactory. In Europe, millions of particularly young people are unemployed. There are several causes, but weaknesses in the financial system are among them. Who has the responsibility for that? The present chapter deals with the participants in financial markets and researchers who have contributed to the development of financial theory in the last 50 years. It deals also with the legal framework for financial markets and the incentives that this framework provides for market participants. Substitution between markets is often driven by arbitrage incentives. So, when looking for the responsible people, financial practitioners, politicians, regulators and academics are all potential candidates. Most of the criticism has been directed at bank managers. This is in many cases justified. Compensation and other incentive systems in financial institutions have contributed to excessive risk-taking by bankers in a number of cases. This is, however, not the only explanation. Insufficient understanding of the risks they accepted on behalf of their bank is also important. In big institutions, the responsible board members have typically been provided by their staff of analysts with the output of complex financial models designed to capture the bank's risk-profile. They have accepted the advice based on model calculations as relevant decision support without asking for or understanding the assumptions on which the calculations were founded. Similar considerations seem to be relevant in relation to regulators. Financial innovation takes place in the research departments of big private financial institutions and at universities. Financial regulators are always behind regarding knowledge of the risk attributes of new financial instruments even when they use a lot of efforts to keep themselves up to date. Martin Hellwig has discussed the relation between financial innovation and the increasing risk in the financial system (Hellwig, 1996). He is concerned about the efficiency of the allocation of risks. Financial innovation has improved the scope for risk diversification. Derivatives have expanded the scope for reallocating all types of risk. As it is explained in Chapter 11 of the present volume, securitisation makes it possible to transfer risks to the security holders. This reduces the incentives of the arranging bank to carry out a credit worthiness analysis of the borrowers. When mortgages of different credit quality are combined in large packages, it becomes extremely difficult for investors (even for rating agencies) to evaluate the risk profile.

It is the task of analysts and researchers to analyse and understand. It is also their task to explain the results of their work to their superiors, colleagues, clients or students. Many have failed on both accounts. Above, contributions from many outstanding researchers in finance have been surveyed. They have developed impressive models. They have improved our understanding of financial markets and they have provided useful decision support to portfolio managers of various kinds. But some of them have also contributed to financial complexity and therefore indirectly to the crisis.

People react to incentives. As explained above, that important lesson of the last fifty years applies to bankers, depositors and investors. As mentioned in Chapter 8, it also applies to supervisors and regulators. It follows as an important lesson that considerations about incentives are of crucial importance when the framework for financial markets shall be designed. In this context, there has been limited focus on academics. Incentives are also relevant to them. Researchers at universities should have incentives to work with applications oriented research projects and to teach and consult in order to contribute to improving the financial literacy of market participants in the financial markets. Presently, practical relevance of research projects and communication of new knowledge to financial practitioners are not primary criteria in relation to promotions at universities. Perhaps they should be.

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ANNEX TO CHAPTER 5: SOME USEFUL REFERENCES TO FINANCIAL MARKET DATA

This annex offers detailed references to websites, where comprehensive and up-to-date, charts and tables are accessible. The annex also includes a few observations of recent important financial market trends. Currently updated detailed empirical information about financial markets can be found on the websites of ECB, BIS, Eurostat, OECD, IMF, the World Bank, World Federation of Exchanges and national central banks and statistical offices.

Annex 5A.1. ECB Monthly Bulletin and ECB Statistical Data Warehouse

At the time of writing, the latest available version of the ECB Monthly Bulletin is from July 2013, with each month's Monthly Bulletin available at www.ecb.int/pub/mb/html/index.en.html. Longer runs of data are available in the Statistical section of ECB's website. The reader can also access ECB's Statistical data Warehouse on <http://sdw.ecb.europa.eu>. One should be aware of the fact that series on financial market statistics for the euro area cover those EU member states that had adopted the euro at the time to which the statistics relate. Statistics on securities issues is an exception to this, however. In the statistical section of the July 2013 Monthly Bulletin, Chapter 4 deals with financial markets (page S35 ff.). In Section 4.1. with data starting in the 1990s one can find tables and graphs with information on securities other than shares classified by original maturity, residence of the issuer and currency. It can be observed in the tables and graphs in the July 2013 version that total gross issues of securities had their maximum in 2008, but that the total outstanding amount grew until spring 2013. Section 4.2. contains a sectoral breakdown of outstanding amounts, gross issues and net issues for issuers resident in the euro area in line with the ESA 95. In recent years outstanding amounts have been dominated by issues by MFIs (including the Eurosystem) and issues by Central Governments. The long period with fiscal deficits in Europe is reflected in the tables in Section 4.3. that show a strong increase in the growth rate of issues by general governments in particular from 2008 to 2011. After 2011, a decline in this growth rate can be observed. The growth rate of Government short-term securities has even become negative since 2010. The growth rate of issues by non-MFI corporations peaked in 2009 and declined fast towards zero from 2010 to 2012. Recently the interest of non-financial companies in borrowing in markets for corporate bonds seems to have risen. Section 4.4. shows the outstanding amounts of quoted shares issued by euro area residents broken down by issuing sector. Since 2008, the growth rates for quoted shares issued by MFIs have been very volatile. The numbers are to some

extent influenced by the structure of the bank rescue packages, which are discussed in some detail in the Chapters 9, 10 and 12 of the present volume. Section 4.5. presents statistics on all the interest rates that MFIs resident in the euro area apply to euro-denominated deposits and loans vis-à-vis households and non-financial corporations resident in the euro area. Euro area MFI interest rates are calculated as a weighted average of the euro area countries' interest rates for each category. The interest rate statistics are broken down by type of business coverage, sector, instrument category and maturity, period of notice or initial period of interest rate fixation. The interest curves for the last ten years all show a similar pattern. From 2004 until the autumn of 2008 interest rates of deposits and loans increase year after year. After 2008 and until late 2009, all interest rates show a dramatic decline and in the following years a modest increase. Section 4.6. presents money market interest rates for the euro area, the United States and Japan. For the euro area, a broad spectrum of money market interest rates are covered, ranging from interest rates on overnight deposits to those on twelve-month deposits. In January 1999 the basis of the interest rate data was changed. Before January 1999, all series were based on LIBOR, London Interbank Offered Rate. After January 1999, euro area interest rates on one, three, six and twelve-month deposits are based on EURIBOR. For the United States and Japan, interest rates on three-month deposits are still based on LIBOR. All the diagrams with money market interest rates show a declining trend since the 1990s but with strong fluctuations. There are temporary peaks in 2001 and in the autumn of 2008. Since 2009, the diagrams document that we are living in a low-interest world. Chapter 4 on unconventional monetary policy of the ECB during the financial crisis explains the background of this situation on the money markets. Section 4.7. shows end-of-period rates estimated from nominal spot yield curves based on AAA-rated euro-denominated bonds issued by euro area central governments. Fitch Ratings has provided the ratings used by ECB in the calculations. In most years, the euro area spot yield curves have been increasing with the maturity of the bonds. Changes in the shape of the yield curves over time have taken place and should be understood in the context of the use of monetary policy instruments. Of particular importance is the balance between short-term and long-term securities in the central bank's open market operations. The reader is referred to the discussion of these topics in Chapters 3 and 4 of the present volume.

Annex 5A.2. Eurostat

Eurostat is the statistical office of the European Union. Its task is to provide the European Union with statistics at the European level that enables comparisons between countries and regions. When the European Community was founded in 1958, Eurostat became a Directorate General (DG) of the European Commission.

The European Statistical System (ESS) is a partnership between the Community statistical authority, which is the Commission (Eurostat) and the national statistical institutes (NSIs). The partnership also includes the EEA countries. The ESS functions as a network in which Eurostat's role is to contribute to harmonisation of statistics in close cooperation with the NSIs. The names and addresses of the national statistical institutes can be found on the ESS website at http://epp.eurostat.ec.europa.eu/portal/page/portal/pgp_ess/ess/ess_news, which can open the way to more detailed statistics on financial markets in the individual countries. The European Statistical Office Eurostat and the NSIs produce a broad series of statistical databases and tables of relevance to financial markets. In order to help users, Eurostat has developed a Data Navigation Tree².

In the list of contents on the website, tables are grouped by themes, and one of the themes is "Economy and finance". Relevant sub-items under this theme are interest rates and "Monetary and other financial statistics". The section on interest rates provides information on euro yield curves by maturity (1, 5 and 10 years), long-term interest rates, EMU convergence criterion series, long-term government bond yields, central bank interest rates, day-to-day money market interest rates, 3-month interbank interest rates and other short-term interest rates. The section on Monetary and other financial statistics has tables on the size and composition of the money supply, respectively M1, M2 and M3 and share price indices plus stock market capitalisation. Eurostat cooperates with ECB, and there is a considerable degree of overlap between the tables presented in ECB publications and in Eurostat tables and graphs. Many of the observations on recent trends in relevant series included in the preceding section on ECB's Monthly Bulletin can also be made on the Eurostat website. In both sources, there are detailed information on assets and liabilities of monetary financial institutions (MFIs), which are defined as financial institutions which together form the money-issuing sector of the euro area. In the tables, the MFIs include the Eurosystem, resident credit institutions, other financial institutions whose business is to receive deposits and/or close substitutes for deposits from entities other than MFIs and, for their own account, to grant credit and/or invest in securities, as well as electronic money institutions that are principally engaged in financial intermediation in the form of issuing electronic money, and money market funds, i.e. collective investment undertakings that invest in short-term and low-risk instruments. The broad monetary aggregate M3 comprises M1 (currency in circulation plus overnight deposits held with MFIs and central government), and M2 in which deposits redeemable at a period of notice of up to and including three months and deposits with an agreed maturity of up to and including two years are added to M1, plus marketable instruments, in particular repurchase agree-

² http://epp.eurostat.ec.europa.eu/NavTree_prod/everybody/BulkDownloadListing?file=table_of_contents_en.pdf.

ments, money market funds shares and units, and debt securities with a maturity of up to and including two years issued by MFIs. Tables with the components of M3 are useful in studies of the development in markets for bank deposits.

Annex 5A.3. BIS Quarterly Review

The BIS Quarterly Review's statistical annex contains rich statistics on the international banking market, securities markets and derivatives markets – the most recent edition having been published in June 2013. BIS's locational reporting system collects quarterly data on the gross international financial claims and liabilities of banks resident in a given country. The main purpose of the statistics is to provide information on the role of banks and financial centres in the intermediation of international capital flows. In Chapter 7 of the present volume, the creation and development of the Eurocurrency market which motivated this part of the BIS statistics is explained. The reporting system covers currently 44 countries. The tables provide, however, through data on counterparties relevant financial information from all over the world. The consolidated banking statistics report banks' on-balance sheet financial claims vis-à-vis the rest of the world and provide a measure of the risk exposure of lenders' national banking systems. The reporting technique allows the allocation of claims to the bank entity that would bear the losses as a result of default by borrowers. This information is of course very important to financial supervisors. The locational statistics has been produced quarterly since 1977, while the consolidated statistics has been produced quarterly since March 2000. While the locational statistics are appropriate for measuring lending flows in a given period, the consolidated statistics are more suited to gauging the size of banks' country and liquidity risk exposures. More detailed data can be found in BIS Quarterly Review www.bis.org/publ/quarterly.htm and a full set of historical time series are available on the BIS website under www.bis.org/statistics/bankstats.htm.

Since 1963, interbank markets have become more and more global. Under free short-term capital movements, the place of residence or nationality of a counterparty bank is unimportant for arbitrageurs in the individual banks. Normally, arbitrage ensures that the covered interest rate parity holds in combined spot and forward markets, as explained in Chapter 6 of the present volume. From the publication of BIS's interbank statistics started forty years ago, the tables on aggregated international positions, positions vis-à-vis all sectors, vis-à-vis other banks, vis-à-vis non-bank sectors, local positions, with and without currency breakdowns have been a major source of information. Successive tables with currency breakdowns of the reporting banks' cross-border positions document how the dominance of USD in the 1970s and 1980s has gradually been reduced and

the role of EUR has increased. Other important currencies in the international interbank market are GBP, JPY and CHF.

The section on securities markets in BIS Quarterly Review contain tables with a wealth of information on international debt securities issued by borrowers in developed countries, developing countries and off-shore centres. Detailed tables provide information on nationalities and residence of issuers and on maturity. There are separate tables for international debt securities issued by banks and other financial corporations. In recent years, banks resident in the United Kingdom, United States, the Netherlands, France, Italy and Germany have been the largest issuers of securities in the market. More detailed data and a full set of historical time series are available on the BIS website under www.bis.org/statistics/secstats.htm.

The BIS Quarterly Review provides finally a comprehensive overview of developments in derivatives markets. There are numbers for notional amounts outstanding and gross market values of the most important derivatives. In a table on amounts outstanding of OTC derivatives by risk category and instrument, the relative importance of different contracts can be followed through time. Ranked according to size as measured by notional amounts outstanding at the end of 2012, the most important contracts were respectively interest rate contracts, foreign exchange contracts, credit default swaps, equity linked contracts and commodity contracts. Within the category of foreign exchange derivatives, the largest items were outright forwards and foreign exchange swaps and options. The most important currencies used in (one side of) foreign exchange derivatives are USD, EUR and JPY. At the end of 2012, the aggregated notional outstanding amounts of OTC single-currency interest rate derivatives reached USD 489.703 billion. The largest contributions to this number came from swaps, then forward rate agreements and options. A currency breakdown of the amounts outstanding of OTC single-currency derivatives showed that contracts based on EUR were larger than USD, JPY and GBP. More detailed data and historical time series on derivatives are available on the BIS website at www.bis.org/statistics/derstats.htm. Developments in derivatives markets are analysed in Chapter 13 of this volume.

Annex 5A.4. OECD iLibrary

OECD provides subscription-based access to a rich set of data to users, via the internet. The main address of the relevant website is www.oecd-ilibrary.org. Subscribers must add their name and nationality in order to access the relevant material, in this context the finance and investment tables. This subset of the database consists of OECD Banking Statistics, OECD Institutional Investors Statistics, OECD Insurance Statistics, OECD International Direct Investment

Statistics, OECD Pensions Statistics and OECD Statistics on Measuring Globalisation. Banking statistics provide information on bank assets and liabilities, income statements and balance sheets. Institutional investor statistics include a detailed break-down of investment funds, insurance companies and pension funds, and other forms of institutional savings. Financial assets included correspond to the assets requested in the previous data base (prior to 1980) on institutional investors, i.e. currency and deposits, securities other than shares, loans, equities and other financial assets. Total non-financial assets are also included. Data are reported in millions of national currency and in current price terms.

OECD's insurance and pension statistics document the growing role of insurance companies and pension funds as sellers of protection against risks and old age benefits. The statistics also documents the role of these institutional investors in markets for bonds and property. Customers pay premiums in order to reduce or completely remove the risk, and the insurance companies accumulate reserves in order to be able to absorb the losses and to pay the expected claims to the policy holders. Pension funds provide benefits to the customers when they retire. Data from OECD is an important source, when the growing importance of insurance companies and other institutional investors in European capital markets is analysed.

Annex 5A.5. World Federation of Exchanges – Monthly Report

The global stock exchange structure has changed fundamentally since the 1960s. The number of independent national stock exchanges has fallen and multinational exchanges operating through entities in several countries play today a dominant role. The majority of the large exchanges are today members of WFE, World Federation of Exchanges. Research in markets for listed securities is facilitated considerably by the WFE-publications since the organisation is committed to issue reliable and comparable market statistics based on data provided by the member exchanges. The annual query tool allows retrieving data since 1975 and includes all the indicators published in the WFE annual report, some of which are only available on an annual basis. The relevant websites are www.world-stock-exchanges.net and www.world-exchanges.org/statistics/monthly-reports respectively.

Recently WFE published a 10 year review covering the years 2000 to 2009³. In the review, the growth during the decade in aggregated market capitalisation measured in USD trillions of listed shares in the member countries (+33%), the growth of the total value of share trading in all exchanges (+66%), the growth of the total number of trades (+700%), the total number of listings (+41%) and the

³ [www.world-exchanges.org/files/file/10 Year Review.doc](http://www.world-exchanges.org/files/file/10%20Year%20Review.doc).

volatile development in investment flows i.e. capital raised by issuing shares on the exchanges are documented. The growth rates of the WFE series have varied from year to year. Growth has not been monotonous. The explanation why the growth of the total number of trades has been much higher than the growth of the value of share trading is that the average size of transactions has fallen. This trend has been observed in all regions over the world. On the WFE website the organisation has also published the minutes of a 2008 workshop on market structure and statistics, in which the participants discuss the trends that affect the exchange industry. Among the relevant trends are the IT-evolution, improvements of electronic platforms, easier access to international market places, creation of new products, regulatory pressures (FSAP in Europe is mentioned here), the impact of the Euro, which has reduced currency risks for many market participants, increasing transparency across European countries, consolidation in the banking industry and the fact that competition is no longer limited to the group of exchanges themselves but also concerns new trading venues.

The most recent monthly report from WFE at the time of writing is the June 2013 report. It provides statistics on the domestic market capitalisation of shares in 54 member exchanges all over the world. The member exchanges are presented in three groups: The Americas, Asia-Pacific and Europe-Africa-Middle East. Aggregated by region, the market capitalisation at the end of June was in the Americas: USD 24,919 billion, in Asia-Pacific: USD 16,724 billion and in Europe-Africa-Middle East: USD 14,463 billion. The total figure for all WFE members was USD 56,106 billion. The monthly report has also tables showing the number of listed companies at the end of June 2013 (45,380 in total), the value of share trading in first half year of 2013 (USD 27,702 billion), the number of listed bonds at the end of June 2013 (148,090), the value of bond trading in first half year of 2013 (USD 12,161 billion) and statistics on derivatives markets from the member exchanges that provide trading facilities for options and other derivatives. At the end of June 2013, the total number of derivatives contracts traded on the exchanges was 326,838,157. The WFE website provides links to the websites of member exchanges where more information including numbers denominated in local currencies can be found.

Annex 5A.6. International Monetary Fund

The IMF provides a comprehensive set of statistics on financial markets through various channels, including the World Economic Outlook Databases, International Financial Statistics, Principal Global Indicators, the Financial Access Survey and Financial Soundness Indicators, many of which can be accessed free of charge at the IMF's website www.imf.org.