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List of Abbreviations

ABS	asset-backed security
ALCO	Asset and Liability Management Committee
AMPS	Amplified Mortgage Portfolio Strategy
BASEL	Basel Committee on Banking Supervision
BIS	Bank for International Settlements
BoD	Board of Directors
BV	book value
CAO	Capital Adequacy Ordinance
CAR	cumulative abnormal returns
CDO	collateralized debt obligation
CDS	credit default swap
CEBS	Committee for European Banking Supervisors
CEO	Chief Executive Officer
CET1	common equity Tier 1 capital
CF	cash flow
CFO	Chief Financial Officer
CFTC	Commodity Futures Trading Commission
CoCo	contingent convertible bonds
CoE	cost of equity
COO	Chief Operating Officer
CRD	Capital Requirement Directive
CRO	Chief Risk Officer
CRR	Capital Requirement Regulation
DCF	discounted cash flow
DDM	dividend discount model
DRCM	Dillon Read Capital Management
EBA	European Banking Authority
EBITDA	earnings before interest, taxes, depreciation and amortization
EPS	earnings per share
ETF	exchange-traded-funds
FCIC	Financial Crisis Inquiry Commission
FCA	Financial Conduct Authority

FCF	free cash flows
FINMA	Swiss Financial Market Supervisory Authority FINMA
FX/CCT	Foreign Exchange/ Cash Collateral Trading
GDP	gross domestic product
GEB	the Group Executive Board
GIA	Group Internal Audit
GRSC	Group Executive Board Risk Subcommittee
HRCC	Human Resources and Compensation Committee
IB	Investment Bank (UBS division)
LIBID	London Interbank Bid Rate
LIBOR	London Interbank Offered Rate
MBS	mortgage-backed security
MCN	mandatory convertible note
NBI	New Business Initiative
NegBasis	Negative Basis Trading Strategy
OECD	Organisation for Economic Co-operation and Development
P/BV	price to book ratio
P/E	price to earnings ratio
P/S	price to sales ratio
PV	present value
RFL	risk factor loss
RMI	risk management index
RoE	return on equity
RVT	Real Value Trading Portfolio
RWA	risk weighted assets
SBC	Swiss Bank Corporation
SCAR	standardized cumulative abnormal returns
SFBC	Swiss Federal Banking Commission – since 2009 FINMA
SID	Senior Independent Director
SNB	Swiss National Bank
S&P500	The Standard & Poor's 500 index
SPG	Securitized Product Group
TRP	Total Reward Principles
TRPA	Transaction Requiring Prior Approval

TV	terminal value
UBS	Union Bank of Switzerland
VaR	value at risk
WACC	weighted average cost of capital
WRDS	Wharton Research Data Services

1. Introduction

The collapse of Lehman Brothers on 15 September 2008 marked the moment when the financial crisis fully erupted and came into the attention of the general public. Even 8 years after this date, legacy of the crisis continues to shape decisions of policymakers, financial firms and ordinary citizens alike. Gravity of the effects, which the financial crisis had on the global economy, demanded immediate identification and remediation of causes leading to this event. Reviews by supervisors, governments and independent researchers established that deregulation, long period of low interest rates, low quality of mortgage debt and securitization of these subprime assets, led to the multitrillion dollar losses once the housing bubble burst. Significant share of the blame was placed on individual large financial firms, which facilitated the securitization of subprime mortgages, down-played inherent risks of these complex securities and in turn assumed only limited responsibility for ramifications their actions. (FCIC 2011, pp. XV-XVIII)

What followed was a series of extensive financial industry reforms targeting especially the banking sector. Regulators assumed that portion of large banks was prone to excessive risk taking with the aim of profit maximization and they simply weren't able to safeguard their own long-term stability. Therefore tighter regulatory measures were placed on bank's operations. While the various banking reforms have been elaborately discussed in the literature, this thesis seeks to concentrate on changes banks adopted immediately after the crisis. Emphasis will be placed on the two main internal areas, which are recognized in the literature as relevant for bank's crisis performance: corporate governance and risk management.

This Master's thesis adopts qualitative research approach for studying the selected topic. Rationalisation behind this step is based on the availability of information, complexity of the subject and challenging quantification of given reform initiatives. However, before approaching the actual qualitative study, thesis commences with a literature review. For one needs to first understand the causes, which had to be remedied, and regulatory framework in which banks operated after the crisis.

Main body of the thesis is composed of the case study. UBS AG, a Swiss based bank with global field of operations, serves as its only object. Main advantage of analysing UBS's exposure to the crisis, its internal failings and subsequent reform process, is the wealth of available information. Additional factor, which makes UBS case even more interesting, is the conflict between the traditional conservative reputation of UBS and almost CHF 40 billion of crisis losses bank took. Swiss bank suffered one the highest losses among the large global banks both in absolute and relative terms. Danger of the bank failing alerted Swiss regulators, who in turn performed in-depth reviews of how losses developed. Since the situation was severe and shareholders lost sizeable portion of their wealth, UBS was forced to come clean about its internal shortcomings. For same reasons, the bank also formulated and adopted an extensive remediation plan.

Chapter 3 will analyse main causes of UBS write-downs and compare them to the existing empirical evidence from the literature review. Furthermore, measures adopted by the bank to mitigate its shortcomings will be reviewed and analysed with regard to their quality and trends in the industry in Chapter 4. Success of the overall post-crisis transformation and market's perception of this process are subjects of Chapters 5 and 6, where event study and financial valuation methods are applied. The task to determine success of UBS's reforms is challenging, because it is difficult to isolate such long-term process from other variables. Nevertheless, event study analysis takes closer look at events representing three different stages of the process. This may help establish what measures had positive or negative immediate effect on UBS shares. Valuation of financial firms is a topic that also warrants special attention, since structural and operational characteristics of these firms require application of specific valuation methods. Comparison of different valuation approaches enables us to gain insight into how market perceived UBS's value, at the point of time when the reform process was largely completed. Finally, this thesis connects results gained from the included reviews and analyses to establish holistic picture of bank's remediation.

Presented thesis's underlying aim is to determine, if studied bank was able to recognize its apparent failings and perform necessary reforms, and if these actions were recognized by the market as viable solutions. Since UBS's remediation plan was more elaborate compared to its competitors, this thesis might produce evidence of benefits associated with adoption of analysed corporate governance and risk management measures, and usefulness of their potential wider application. Even in 2016, study of the financial crisis remains relevant as

contemporary developments in the financial industry demonstrate. Not all large banks nor financial services firms, which were affected by the crisis, adopted reforms to the extent as UBS did. The case of Deutsche Bank's performance, which was questionable even before legal demands by US government against Deutsche Bank in September of 2016, documents well how the financial crisis and internal governance factors influence the industry to this very day. This thesis doesn't seek to draw generalizations overarching the whole industry. Rather its goal is to review improvements, made after the crisis, in single firm setting and promote the possibility of their wider recognition. Lessons learned in the practical application of concepts, which were established in the empirical research, might improve inner workings of financial firms, thereby promote sustainable performance and mitigate the probability of same deficiencies leading to another crisis of such magnitude again.

2. Literature Review

Immediately after the full extent of the financial crisis became apparent, authorities and academics strived to understand roots of the crisis. Presented thesis looks at the UBS bank as an example of efforts to identify the main causes and remedy internal weaknesses of large financial institutions after the crisis. Therefore, it is of great interest to review the relevant empirical and regulatory literature about the drivers of the 2008 financial crisis in the first part of the literature review. Only when the causes of the crisis are understood, can different remedial actions be analysed properly. Inquiries identified both macroeconomic as well as microeconomic causes of the crisis. However, this thesis and following literature review will focus on causes found on the corporate level of large global financial institutions before and during the crisis. Second part of the literature review discusses the regulatory reforms of internal governance in large banks. Regulations adopted in the United States, EU and Switzerland; all represent distinctive approaches to reforming too-big-to-fail financial institutions. Unfortunately, the search for literature resulted in only limited number of papers analysing post-crisis reforms in individual financial institutions. Nevertheless, the existing literature offers a valuable basis for the analysis of UBS's reform process.

2.1 Causes of the 2008 financial crisis

2.1.1 FCIC report

The financial crisis of 2008 originated in the United States and hit local financial industry particularly hard. Collapse of Bear Stearns and bankruptcy of Lehman Brothers made the possibility of a wide systemic failure spreading to the rest of large US banks real. Low capital base of these banks, when compared to the amounts of illiquid assets, made them susceptible to investors participating in an asset withdrawal. Developments in the financial industry forced US government to commit to the multibillion rescue plan for large financial institutions. With the large financial injection, GDP growth plummeting and unemployment rate rising; also the obligation came for detailed analysis of causes behind the outbreak of the financial crisis in the US. Report made by the Financial Crisis Inquiry Commission (FCIC) describes the chronology of the crisis and defines a range of factors and failures leading to it. According to the report, long period of deregulation coupled with low interest rates led to the growth of low mortgage-lending standards. In this manner the toxic collateralized debt build up, and spread by means of new financial derivatives and securitization throughout the financial sector. As the housing bubble burst, low quality asset-backed securities (ABS) became illiquid and the subprime crisis started. In the period before the crisis, regulators didn't perform necessary actions limiting growth of speculative risky behaviour. Besides the regulatory setting of the financial industry being perceived as one of the crisis factors, report also strongly emphasizes the failure of individual financial institutions to behave responsibly and how they used the systemic flaws, unamended by the regulators, to pursue the profit generation with disregard to inherent risks. (FCIC 2011, pp. XV-XVIII)

FCIC's criticism, towards financial firms creating or participating in CDO/ABS subprime portfolios, concentrates specifically on the weak corporate governance and risk management as prime sources of the failure to adequately assess the situation. The trend of letting financial firms to self-regulate themselves, FCIC report states, was based on the notion of firm's interest in safeguarding its wellbeing instead of participating in potentially destructive risk taking behaviour. Such thinking was popular in the Federal Reserve's board and in US administrations before the crisis. In an opposition to this belief, as the FCIC report argues, significant number of global investment banks participated in investments associated with

high risks, which were often underestimated, using the short-term financing from interbank markets. Investment banks and financial companies, among them Bear Stearns, Lehman Brothers, AIG and Fannie Mae, supported the mortgage lending and invested in the securitization process of related mortgage backed securities (MBS). These securities were backed ever more by subprime mortgages as there was not enough growth in traditional mortgage portfolio. Financial firm's balance sheet size and exposure to the housing bubble increased significantly. (FCIC 2011, pp. XVIII-XIX)

As FCIC report states, rapid growth of these investment banks made them not only too big to fail but also "*too big to manage*" responsibly, with not enough attention being attributed to the MBS investments. In addition, the risk assessment of investments in asset or mortgage backed security portfolios was regularly based on inadequate methods, which utilized flawed underlying assumptions. Finally, the decision making, of not only top management, but also managers at lower levels was heavily influenced by then valid compensation incentives systems, which were favouring short-term benefits from high volume trades over long-term stability and profitability. (FCIC 2011, pp. XIX)

There are significant overlaps between findings of the FCIC report with regard to the governance, risk management and compensation, and results of the UBS crisis causes review. The crisis performance, its causes and subsequent reforms of UBS are discussed in Chapter 3. Structural problems found inside the financial firms, affected extensively by the crisis, were also subject of prolific academic discussion. Number of studies concentrated on the link between financial firm's crisis performance on one side and variables such as corporate governance, compensation policy and incentives, risk management, ownership structure and board composition on the other.

2.1.2 Corporate governance and firm's performance

Predating the financial crisis of 2008, the study by Core et al. (1999) argued that the excessive compensation of CEOs could serve as a proxy for weak corporate governance and have a negative influence on firm's performance. Following board of directors and ownership structure variables were shown to be significant in predicting the excessive compensation and associated weak corporate governance: CEO as board chair, board size,

percentage of outside and inside directors, age of outside directors, number of extra firm activities of outside directors, CEO's ownership of firm's stocks, insider stock ownership, outside director stock ownership and finally concentration of stock ownership in hands of outside block holders. What is relevant for this thesis, further analysis demonstrated a significant positive relationship between the strength of corporate governance as a proxy of excess compensation and firm's return on assets and stock return. (Core et al. 1999, pp. 386-388, 393-395)

The eruption of a major financial crisis in Eastern and Southeast Asia in 1997 and subsequent study of its causes brought the relationship between corporate governance and crisis performance under further review. In the paper by Mitton (2002) 1997 Asian financial crisis served as setting for the study of corporate governance quality as a factor influencing firm's performance. Linear regression of firm's crisis period return on governance variables, ownership variables and variables defining corporate diversification was performed while controlling for country, size, industry and leverage ratio. The strength of firm's governance was measured by variables assessing firm's disclosure quality. Both corporate governance as well as ownership structure variables were shown to be statistically significant with regard to firm's crisis returns. Firms possessing higher quality of disclosure and higher percentage of outside ownership performed better during the Asian financial crisis. Findings made by Mitton (2002) supported the conclusion of Core et al. (1999) and demonstrated the relevance of corporate governance in the crisis setting. (Mitton 2002, pp. 223-229)

Similar paper by Johnson et al. (2000) also examined the noted relationship between corporate governance and performance. The quality of corporate governance was defined by a set of governance and legal environment variables. Empirical study, based on data from emerging markets in the 1996-1997 period, demonstrated that corporate governance differences across countries included in the dataset had stronger impact on the stock performance than macroeconomic factors (Johnson et al. 2000, p. 184).

Further empirical evidence about role of corporate governance in firm's performance can be found in e.g. Gompers et al. (2003), Cremers and Nair (2005), Core et al. (2006), Bhagat and Bolton (2008), Johnson et al. (2009) and Bebchuk et al. (2009). Moving from an all-industry setting to financial sector specifically, studies by Macey and O'hara (2003), Hanazaki and Horiuchi (2003), Caprio et al. (2007), de Andres and Vallelado (2008), supported the validity

of the relationship between corporate governance and performance also for financial firms. Since banks and other financial services firms possess notable differences in comparison to traditional firms: importance of liquidity provision, high leverage ratio, opaqueness of their balance sheets, deposit insurance and associated incentive distortion, agency problems between debt/equity holders and incumbent management, strict regulatory supervision, it could be argued that bank's characteristics warrant especially developed governance mechanisms to safeguard the interests of involved parties. (Mehran et al. 2011, pp. 3-5) (Mülbert 2010, pp. 10-14)

At the same time, regulators were quick to pick up the lessons from the Asian financial crisis regarding corporate governance. In 1999 the Basel Committee on Banking Supervision (Basel) published set of recommendations for banks to adopt viable corporate governance practices, which were inspired by OECD's Principles of Corporate Governance from the same year. New developments in the study of corporate governance and notable breakdowns of corporate governance and accounting principles experienced in large corporations, such as the Enron scandal at the beginning of 2000s, led the OECD to revision of its Principles (OECD 2004, p. 3). Accordingly, Basel updated its corporate governance guidance for banking organisations in 2006. In the publication Basel formulated 8 principles of corporate governance for banks, which largely concentrate on board of directors and its duties and responsibilities. Based on the Basel principles, members of the board need to possess sufficient professional qualification and understanding of corporate governance. Furthermore, they should enforce bank's strategic objectives, set clear responsibilities across the organisation, support the senior management in performing oversight functions, make use of internal and external control functions and adopt a compensation policy appropriate to bank's long-term objectives and structure. Final two principles are transparency of governance and "know-your-structure" principle. (Basel 2006, pp. 6-17)

Individual national supervisory bodies also adopted their own regulation of bank's corporate governance practices. Among them was also the Swiss Federal Banking Commission (SFBC), which is especially relevant for the case of the UBS bank. In 2006 SFBC published guidelines consisting of required corporate governance, internal control, supervision, risk management, risk control and compliance features to be followed by Swiss banks (SFBC 2006, p. 3). Therefore, it can be assumed that before the outbreak of the 2008/2008 crisis sound corporate governance practices in banks were generally demanded by their regulators.

2.1.3 Corporate governance in the 2008 financial crisis

During 2007 and early 2008 the inquiries of banking supervisors, responsible for the crisis assessment: e.g. IMF, G-20 Study Group and Senior Supervisors Group, hadn't attributed much attention to corporate governance as a relevant cause of then developing crisis (Mülbart 2010, pp. 7-8). However, in 2009 bank's weak corporate governance became recognized as one of important drivers behind the crisis. In February 2009 Kirkpatrick, as a member of OECD's Steering Group on Corporate Governance, published his paper on corporate governance lessons which should be taken from the crisis. Kirkpatrick concentrates on four main areas of corporate governance: risk management, remuneration and incentive system, board oversight duties and finally board composition (Kirkpatrick 2009, pp. 65-79). Although the official report of OECD's Steering Group on Corporate Governance from June 2009 describe the corporate governance regulation and guidelines valid at the time of the crisis as sufficient, it finds firm's implementation of these norms to be lacking (OECD 2009, p. 7).

Academic studies were quick to join the discussion about the role of corporate governance in the crisis with the aim of providing empirical evidence. Beltratti and Stulz (2011) look at the factors that might explain the variation of performance results for banks around the world between July 2007 and December 2008. Leverage is found to be a significant factor in influencing bank's performance. Banks with lower leverage had better stock performance during the crisis, but their stock returns were lower before the beginning of the crisis. In addition, banks which preferred short-term interbank financing, performed worse during the crisis. Cross-country regulatory differences had only limited effect on bank's performance. Large banks in countries, where bank activities are restricted by the regulation, performed comparatively better during the crisis. The study by Beltratti and Stulz (2011) however disputes the notion of weak corporate governance causing excessive risk taking practices as being one of the primary causes of bank failings. They show a negative relationship between board's shareholder friendliness in 2006 and bank's performance from the second half of 2007 until the end of 2008. According to the authors of the study, shareholder friendly board stands as a proxy for good quality corporate governance, and therefore based on the corporate governance hypothesis should limit the excessive risk taking. One potential explanation, given by Beltratti and Stulz (2011), assumes that shareholder friendly boards were set on maximizing shareholder's value under the pre-crisis conditions, such as investing

in super senior tranches of CDOs, at the time when these investments were perceived to be riskless. Only with crisis outbreak the associated unexpected risks became apparent. At this point, the narrow definition of corporate governance by Beltratti and Stulz (2011) warrants certain criticism, since it omits the importance of sound risk management duties, internal audit and control oversight mentioned in Basel's and OECD's corporate governance principles (Basel 2006, p. 21). (Beltratti and Stulz 2011, pp. 1-3)

Erkens et al. (2012) examine the influence of board independence, institutional ownership and large shareholder presence variables on financial firm's performance during 2007-2008 period in a global setting. Only the effect of first two variables, board independence and institutional ownership, proves to be statistically significant. Both higher institutional ownership and higher board independence have a negative influence on firm's stock returns during the crisis. In an interesting parallel, the study by Minton et al. (2014) found a negative relationship between higher financial expertise of independent directors and bank's performance during the crisis, even as financial expertise increased bank's pre-crisis performance (Minton et al. 2014, p. 353). Erkens et al. (2012) argue that institutional shareholders might be more willing to approve risky projects with high returns, since they don't bear the costs of failing to the same degree as managers. Going against the intuition and OECD's recommendation of sufficient number of non-executive board members is the negative influence of board independence (OECD 2009, p. 10). According to the authors, a possible explanation of this relationship might be the motivation of independent board members to raise new equity during the crisis in order to mitigate the risk of bankruptcy. On one hand, this decreased the stock return in the crisis period, but on the other hand, higher equity capital reserves increased the survival chance of respective firms. Finally Erkens et al. (2012) analyse the relevance of cross-country differences in corporate governance during the crisis, which were found to be insignificant. (Erkens 2012, pp. 389-391)

The study by DeYoung et al. (2013) concentrates particularly on the question, if CEO remuneration incentives significantly influenced performance of large financial institutions during the crisis. When comparing the total CEO compensation, paid from 1994 to 2006 in large US commercial banks, with CEO compensation of large US industrial firms, DeYoung et al. (2013) find relative remuneration amounts to be practically identical. However, the pay-risk sensitivity of CEOs in banks started to increase and differ significantly from CEOs in industrial firms, especially after year 2000. At the same time, the pay-performance

sensitivity between both groups of CEOs remained approximately the same. DeYoung et al. (2013) explain the divergent increase of risk taking incentives by the deregulation of financial industry at the end of 1990s and beginning of 2000s. Furthermore, they confirm that risk taking incentives in CEO compensation contracts have significant influence on bank's risk taking and business policies. Banks, whose CEO had strong risk incentives in their compensation contracts, were also keener to pursue risky investing policies. (DeYoung et al. 2013, pp. 165-167)

In the literature CEO compensation in form of company's stock is traditionally regarded as a viable tool, which aligns the incentives of CEOs with the interests of shareholders. Fahlenbrach and Stulz (2011) find that the alignment of CEO incentives with the interest of shareholders in banks before the crisis, not only didn't improve bank's crisis performance, but such banks actually performed worse. This corresponds with the findings of Beltratti and Stulz (2011). Moreover, the proportion of the cash and option compensation on the total compensation also didn't have significant influence on bank's performance. One possible explanation of CEO short-term orientation, in spite of their equity holdings, could be the market inefficiency, as was the case in the subprime market. If a market is inefficient, long-term business projects might not be valued correctly, which would also stimulate CEOs to prefer short-term speculative profits (Bolton et al. 2006, p. 578). According to Fahlenbrach and Stulz (2011), CEOs of banks most affected by the crisis weren't expecting the coming crisis, since they didn't sell their substantial holdings of bank stocks and options, thus suffering significant wealth losses upon the outbreak of the crisis. (Fahlenbrach and Stulz 2011, pp. 12-13)

However, the study by Bebchuk et al. (2010) shows there were at least two instances, US banks most damaged by the crisis Lehman Brothers and Bear and Sterns, where the executive directors were able to extract large volumes of wealth from their banks by means of cash bonuses and sales of assigned stock from 2000 to 2008, making their overall payoffs, despite losses in 2008, overwhelmingly positive. The difference between the largely positive outcome for the executive teams on one side and significant shareholder wealth losses on the other could point at the distortion of long-term incentives in favour of short-term gains by some of the largest US banks. (Bebchuk et al. 2010, pp. 7-9)

As previous review demonstrates, the alignment of shareholder interest with CEO incentives and board independence don't offer support the hypothesis of corporate governance as one of the causes of the crisis. However, this could be explained, as mentioned above, by the preference of short-run profits due to a market inefficiency, decision to maximize shareholder's value and lack of proper risk assessment regarding robustness of subprime MBS/CDO portfolios (see Beltratti and Stulz (2011), Fahlenbrach and Stulz (2011)). Still other aspects of corporate governance might offer more evidence for the relationship between corporate governance quality and financial institution's crisis performance. Risk incentives in CEO compensation contracts of large US bank's increased during the deregulation period before the crisis. CEOs were able to extract significant portions of their wealth by means of variable compensation with relatively low personal risks. The governance architecture, communication between internal control functions and BoD, distribution of responsibilities, presence of specialized committees in BoD and other variables describing deeper governance processes may represent viable areas of study with respect to the crisis performance. This more holistic view of corporate governance might provide better explanation of why senior management of various financial institutions allowed the situation to spiral out of control.

2.1.4 Risk management in the 2008 financial crisis

Another important field related to the corporate governance is the risk management. The study of how banks failed to recognize and manage the growing risks associated with ABS/MBS portfolios, is essential part of the crisis story. Aebi et al. (2011) focus in their analysis on the question, if risk management related aspects of corporate governance influence performance of banks during the financial crisis. They regress risk management and corporate variables, among them: presence of CRO on the executive board, existence of risk committee in the bank, frequency of risk committee meetings, reporting of CRO to either board or CEO, and other corporate governance variables: board size, board independence, board structure, percentage of directors with relevant experience from financial industry, insider equity ownership and corporate governance index used by Gompers et al. (2003), on bank's crisis performance. Most traditional governance variables don't influence bank's performance measures significantly with the exception of board independence and board size. The negative influence of board independence and the positive influence of board size

correspond with the findings of Fahlenbrach and Stulz (2011) and Beltratti and Stulz (2011). From all risk governance independent variables only the variable describing whether CRO is reporting to the board or to the CEO is significant. Banks, where the CRO reported to the board, performed significantly better than banks, where the CRO reported directly to the CEO. Therefore, Aebi et al. (2011) argue that the specific importance of how risk management is incorporated into the corporate governance structures represents a critical feature that distinguishes financial firms from non-financial ones. (Aebi et al. 2011, pp. 3213-3215)

The influence of financial firm's risk management on its overall risk taking is analysed in the study by Ellul and Yerramilli (2011). The quality and role of risk management in firm's governance structure is measured by specifically constructed risk management index (RMI). Importance of risk management in the organization is included into the RMI through information about CRO's position, whether he is a member of the executive board, how his compensation compares to the CEO, and whether he is among the five highest paid executives. The quality of risk supervision is determined based on the past experience of directors, who are sitting on a risk committee or equivalent risk oversight BoD committee in the banking industry, and the frequency of committee's meeting. Data from 74 bank holding companies supports the main hypothesis that strong and independent risk management lowers the enterprise-wide risk taking. Banks with a higher 2006 RMI value were less exposed to MBS, participated less in OTC derivatives trading, and had a lower ratio of bad loans during the 2008 crisis. Ellul and Yeramilli also found slightly stronger stock performance for banks with higher RMI values. (Ellul and Yerramilli 2011, pp. 1-4)

The question of how the existing risk management and corporate governance practices failed to control the exposure of large global banks to subprime securities, and how they couldn't stop the spreading of housing market crisis into the financial system, is the subject of the study by Lang and Jagtiani (2010). Although, according to the authors, there are several macroeconomic factors explaining the origin of the mortgage crisis, they don't explain the uninhibited transition of the shock to the financial system. Lang and Jagtiani (2010) see two potential causes of risk management failings in financial industry: moral hazard problem caused by "too-big-to-fail" self-perception of large financial firms due to government guarantees, and corporate governance related problems in risk management structures. Even while Lang and Jagtiani (2010) remain sceptical towards general acceptance of the first cause

for not only banks but also for all financial firms. They argue that problems with the transparency of subprime portfolio holdings, most of all CDOs backed by subprime mortgages, and lack of adequate risk management resources, significantly hampered firm's ability to soundly analyse not only the risks of these individual securities, but also the associated concentration risk. Hence, financial firms had often difficulties determining their true exposure to subprime portfolios before and during the crisis. According to Lang and Jagtiani (2010), the growth of subprime ABS/CDOs held on balance sheets of financial firms was fuelled by compensation incentives of business line managers, who were motivated to generate profits on short-run basis without the need to consider the long-term ramifications, such as high exposure to one market segment. Coupled with lacking oversight from risk management and risk control units this led to high concentration of subprime securities and unexpected losses during the financial crisis. (Lang and Jagtiani 2010, p. 310-315)

The review of the academic studies examining corporate governance has produced interesting results with regard to the influence of traditional corporate governance variables. Higher board independence, shareholder friendliness and CEO compensation in form of company stock had a non-intuitive negative influence on financial firm's crisis performance, as shown in studies by Erkens et al. (2012), Beltratti and Stulz (2011) and Fahlenbrach and Stulz (2011). On the other hand, increased pay-risk sensitivity of compensation contracts (DeYoung et al. 2013) and ability of CEOs to extract large amounts of compensation (Bebchuk et al. 2010) from their firms prior to the crisis outbreak, point out the role compensation incentives played in the financial crisis. Unfortunately, the influence of compensation incentives at lower positions: traders, business unit and business line managers, hasn't been analysed sufficiently in the literature despite its relevance.

However, the most important link between bank's corporate governance and the crisis performance seems to be the risk management aspect of corporate governance. The reporting of the CRO directly to the BoD (Aebi et al. 2011), CRO position in the governance structure, CRO's compensation incentives and finally the effectiveness and qualification of BoD's risk oversight committee (Ellul and Yerramilli 2011), are all examples of risk management factors, which help explain differences in excessive risk taking between financial firms. The findings of these empirical papers parallel the review of crisis causes by Kirkpatrick (2009) and other supervisors.

Chief among them, Senior Supervisors Group's report from 2009 proposes which areas of financial industry's risk management are in need of extensive reforms. Apart from improvements in the funding and liquidity risk management, mainly transfer pricing and contingency funding, the report defines fundamental weaknesses in senior management's incentives, corporate governance and IT infrastructure. Together, these factors led to diminished ability of risk control and risk management functions to properly assess and control risks. The mitigation of excessive risks was made significantly more difficult because of flawed risk assessment on the BoD level. There was a substantial discrepancy between BoD's risk perception and true risk exposure. In general, BoDs also didn't participate sufficiently in the active determination of an adopted risk policy. Moreover, on the executive level in firm's hierarchy senior managers in control functions tended to be overshadowed by the business lines managers with respect to their internal influence. The report further recognizes the role of compensation contracts, which offered incentives for profit maximization, but failed to encourage sound risk taking. Individual's performance wasn't measured based on the actual economic profit, since costs associated with risk and funding were often disregarded. As a solution the report proposes the inclusion of risk, capital costs and funding costs into the performance evaluation. Control functions should also be able to provide their own inputs into the process that determines variable compensation. (Senior Supervisors Group 2009, pp. 1-4)

The relationship between traditional corporate governance variables and how they influenced the quality and independence of risk management functions, provides a strong explanation for the differences in excessive risk taking among the large financial firms. This approach to the question of crisis causes on the corporate level diverges from the intuitive blaming of senior manager's compensation and creates a more complex picture. Yes, the incentives for profit maximization were there, but that was the case in all industries. What made the difference was the lack of overall risk control and management strategy, as well as insufficient risk control mechanisms, which should have put check to excessive risks pursued by some managers. Future research in the field of risk management and control will probably show, if the new measures put into the place after the financial crisis will create a sufficiently robust system to limit incidence of such behaviour.

2. 2 Post-crisis governance reforms

Tremendous losses caused by the financial crisis and need for multi-billion bank financial relief created pressure on the regulators to adopt new regulatory measures. Although, this thesis concentrates on reforms pursued by single bank during the period from the beginning of 2008 to the beginning of 2010, it is vital to review the financial regulation that was adopted in the reaction to the failings of bank's governance and management. The baseline for the post-crisis financial sector reform was set at the G-20 meeting in Pittsburgh, where G20's Financial Stability Board proposed new capital standards, compensation standards, risk management and OTC derivatives regulation (G20 2009, p. 2). Prime examples of the banking reform adopted after the financial crisis is the so called Dodd-Frank Act in the United States and series of EU regulation: annexes to capital requirement directives 2006/48 and 2006/49, and finally capital directive 2013/36 and regulation 575/2013 based on the Basel III framework. In Switzerland, base of UBS's operations, the federal regulator FINMA proposed tightening of capital requirements for banks, especially for systemically important institutions, in its update to the Capital Adequacy Ordinance. In addition, FINMA reviewed corporate governance, management compensation schemes, risk management and control frameworks of large Swiss banks by updating the relevant circulars in 2008 and 2013. Since main goal of this thesis is the analysis of UBS reform process, review of reforms in Switzerland and EU will be given more emphasis compared to the US.

2.2.1 USA

The Dodd-Frank Wall Street Reform and Consumer Protection Act is a comprehensive reform that significantly changes the regulatory setting of the financial industry. The so called "Volcker Rule", found in Section 619 of Dodd-Frank Act, effectively reintroduces elements of the Glass-Steagall Act of 1933 by prohibiting commercial banks from participating in proprietary trading, and investing in hedge funds or private equity funds. Apart from creating new financial supervisors, requesting stricter oversight, regulating the financial derivatives sector and setting rules for the liquidation of "too-big-to-fail" banks, the Dodd-Frank Act also incorporates changes to corporate governance of large financial institutions. Corporate governance related reforms can be found in several titles of the Dodd-Frank Act. The Subtitle E of the Title IX regulates executive accountability and

compensation. The Section 951 submits executive compensation and golden parachutes schemes of executive officers to the advisory shareholder vote. Furthermore, the Subtitle E requires all listed financial companies to have dedicated compensation committees composed of independent board members. The Section 953 prescribes the disclosure of additional information on executive compensation, such as pay-performance sensitivity and the comparison of CEO compensation to the median employee compensation. The Dodd-Frank Act also toughens up the claw back policy in the Section 954, which requires all executive officers of listed companies to be eligible for the loss of their incentive based compensation from up to 3 preceding years, if accounting restatement occurs. (Congress 2016, pp. 1620, 1899-1904)

With regard to the risk management related aspects of corporate governance, the Dodd-Frank Act Section 165 requires boards of financial institutions with assets larger than USD 10 billion to establish a risk committee responsible for the oversight over firm's risk management practices in accordance with the regulation of the Federal Reserve. At least one member of the risk committee should have experience with risk management of risk exposure in large financial firms. Additionally section 165 obliges the Federal Reserve to set leverage limits as well as risk-based capital requirements for nonbank financial companies and bank holdings with assets larger than USD 50 billion. (Congress 2016, pp. 1423-1430)

2.2.2 European Union

Compared to the US regulatory effort, legislation adopted in the EU was much more prolific. The process of updating the regulation started in 2009, when the capital requirement directives (CRD) 2006/48/EC and 2006/49/EC valid from 2006 were amended by the so called CRD II - the directive 2009/111/EC. In comparison to the preceding directives, CRD II requires stricter reporting of large exposure risk and generally focuses on required risk management practices and metrics (EUR-Lex 2016c, pp. 105-119). Consequently, CRD III 2010/76/EU directive argues that remuneration incentives contributed to the excessive risk taking in the financial crisis of 2008. According to CRD III, authorities of the member states should require all credit institutions to adopt robust corporate governance practices: clear organizational structure with well-established lines of accountability and responsibility, effective risk management, proper internal control and reasonable compensation policy

which offers incentives for sound risk management. CRD III focuses particularly on remuneration of senior management as well as other employees in critical internal control and risk management functions and obliges them to follow sound remuneration principles. Their compensation shouldn't provide incentives to create excessive risks for the given institution. (EUR-Lex 2016d, pp. 9)

On the contrary, according to the directive remuneration should be aligned with financial institution's long-term strategy and objectives. Members of control functions should be rewarded based on their function's performance with regard to the fulfilment of control objectives and not on overall business performance of the institution. The percentage of fixed compensation on total compensation should be sizeable enough to ensure that management is sufficiently compensated even if no variable compensation might be attributed. Performance metrics used to determine the variable component of compensation have to take into account all associated risks, both short-term and long-term. At least half of the variable compensation should be paid in shares or other non-cash forms. Pay of minimum 40 % of variable compensation has to be deferred for at least 3-5 years. In case of leaving the institution before retirement, employee's discretionary pension should be held by the company in form of stocks or non-cash instruments for the period of at least 5 years. Also upon retirement, discretionary pension is paid in firm's equity and has to be subjected to the retention period of 5 years. Total variable compensation should closely follow institution's performance. In case of negative performance, current as well as past variable compensation should contract by means of malus or claw-back policies. Large and complex credit institutions should establish a remuneration committee consisting of independent board members. The remuneration committee is responsible for overseeing the remuneration practices, especially ones of the senior management and the staff of risk management and control functions. Incentives originating from the given remuneration policy have to be examined by the remuneration committee with respect to their influence on management of institution's capital, liquidity and risk. (EUR-Lex 2016d, pp. 16-18)

CRD III places new disclosure duties on credit institutions, which have to disclose information about fulfilment of capital requirements, methodology of internal models for calculation of capital requirements, description of stress-testing procedure, and finally daily as well as stressed value-at-risk measures for all sub-portfolios. Banks participating in securitization and re-securitization activities have to disclose the underlying strategy based

on which securitization is performed, information about risks originating from securitization activities, description of credit and market risk management in securitized portfolios, accounting standards used in securitization activities and total amounts of securitization exposures on trading books as well as on non-trading books of the institution. CRD III also demands the disclosure of remuneration policies by credit institutions to enable proper oversight from the responsible authorities or supervisors and to inform bank's shareholders and the public. The institution has to disclose information about the decision process determining the remuneration scheme, composition of remuneration committee, pay-performance sensitivity, characteristics of remuneration system – performance and risk measures, form of fixed and variable remuneration, deferral of the payment, detailed information on remuneration broken down by business lines, and individual remuneration paid to senior management or other staff with influence over institution's risk taking. Parts of CRD III which amend remuneration policy of the credit institutions and existing capital requirements were implemented by the 1 January 2011 with rest of the provisions being implemented until the end of 2011. (EUR-Lex 2016d, pp. 22-25)

The European Parliament and the European Council aimed to unite the post-crisis capital requirements directives for banks and investment firms into new regulation, making it clearer and more accessible. In doing so they repealed the directives 2006/48/EC and 2006/49/EC and incorporated their amendments, CRD II and III, into the new directive 2013/36/EU (CRD IV) and regulation No 575/2013 (Capital Requirements Regulation). Reforms of existing corporate governance regulation are addressed in the directive 2013/36/EU. CRD IV emphasizes the role of management body in supervision of institution's operations and risk taking. The management body should acknowledge its responsibility for the whole organization, its strategic objectives, risk strategy, accounting and financial standards, oversight of senior management and fulfilment of legal obligations. A chairman of the management body shouldn't fulfil the role of a CEO at the same time. Large and complex institutions should set up a nomination committee consisting of non-executive directors with the advisory role in the process of selecting members to the management body. Moreover, the nomination committee should periodically assess the functionality and structure of the management body and give recommendations for improvements. The management body should include sufficient number of independent directors, be gender diverse, limit the "group thinking" and offer viable independent opinions on operational and supervisory matters. (EUR-Lex 2016e, pp. 344-346, 384)

Additionally, CRD IV tasks member states with ensuring that the management body spends sufficient time assessing and managing risks their institution might be subjected to. If size and complexity of the institution are significant, member states should see to the establishment of a risk committee in the institution consisting out of non-executive members of the management body with relevant risk management experience. The risk committee should advise the management body on the formulation and implementation of firm's risk strategy. According to the CRD IV, actual risk management functions in the institution should possess sufficient resources, authority, be independent from the business activities, and be able to present their findings to the management body. A chief manager of the risk management function should be an independent senior manager. For large credit institutions CRD IV advocates shift from a reliance on external credit ratings of an asset or entity to utilization of internal risk assessment, and development of internal ratings based approach used for calculating own fund requirements. The methodology as well as results of these internal calculations should be made available to the supervising authorities. Authorities should also oversee the risk identification and risk management practices of credit risk, residual risk, concentration risk, securitization risk, market risk, operational risk, interest risk from non-trading book assets, liquidity risk and risk of excessive leverage in the institution. (EUR-Lex 2016e, pp. 379-383)

Amendments regarding determination of institution's remuneration policy, establishment of the remuneration committee, remuneration deferral, limits to the variable compensation and the disclosure of remuneration policy's structure and amounts, formulated in the directive 2010/76/EU, were largely taken over into CRD IV and regulation 575/2013 (CRR). Updates of corporate governance and risk management included in CRD IV are corresponding to the content of the regulation. However, in an addition to the directive, CRR regulation introduces new leverage disclosure duties for all large institutions. In order to elaborate the present governance regulation and support the implementation of new regulation, CRD IV obliges the European Banking Authority (EBA) to publish internal governance guidelines in accordance with general governance principles mentioned in the Article 74 of the 2013/36/EU. (EUR-LEX 2016e, pp. 378-389)

EBA Guidelines on internal governance were published in January 2011 and offered an extension of former guidelines by Committee for European Banking Supervisors (CEBS),

predecessor of the newly established EBA. In comparison to previous set of internal governance guidelines, the updated 2011 version introduces a chapter on risk management, recognizing the role it played in the financial crisis. Based on CEBS survey EBA identified primary causes of the crisis in financial institutions as lack of corporate governance arrangements balancing the complexity of bank's products and operations, weak oversight by management and lack of proper application of risk management and internal control mechanisms. However, EBA doesn't see the need for an overhaul of existing corporate governance rules, but rather advocates their more profound implementation. (EBA 2011, pp. 7-9)

2.2.3 Switzerland

The systemic importance of large banks is stronger in Switzerland than in other comparable developed countries. The main reason is the high contribution of the banking industry to the Swiss GDP and relative size of bank's assets to the Swiss economy. In 2008, the banking sector was responsible for 7.6% of the value added and employed 136,000 people (SwissBanking 2009, p. 1). Therefore, it is of no surprise that Swiss government's reaction to the risk of its two major banks, UBS and Credit Suisse, potentially failing had to be swift.

In the autumn of 2008 the Swiss Federal Banking Commission, from 2009 on known as FINMA, adopted stricter capital requirements for the two "too-big-to-fail" banks. In an expectation of the future regulation, banks were obliged to increase their capital buffer from 20% of minimum capital requirement to upwards 100% (UBS 2009d, p. 54). In addition, Swiss regulators declared the minimum leverage ratio to be 3%. The minimum capital requirements were overhauled in 2012 with the update to the existing Capital Adequacy Ordinance (CAO) applicable from January 2013. Apart from the adoption of Basel III principles, the Swiss regulation followed the practice of requiring additional capital reserves in line with the tradition of the so called "Swiss Finish". From 2013 on, Swiss systemic important banks are subjected to the minimum capital requirement corresponding to 8% of bank's risk weighted assets (RWA), from which at least 4.5% has to be held in form of the common equity Tier 1 capital (CET1) and at least 6% are defined as the core capital. Complementing the minimum capital requirement, systemically important banks are obliged to keep a capital buffer amounting to 8.5% of institution's RWA, the buffer consists of at least 5% of RWA in CET1 and remaining 3% can have the form of contingent convertible

bonds (CoCos) or other similar instruments. The last part of the capital requirements framework is the anti-cyclical buffer in form of CET1, which equals to 2.5% of bank's RWA. The anti-cyclical buffer reserves don't have to be held by banks at all times, only when the Swiss National Bank sees it necessary. In total, UBS and Credit Suisse are obliged by CAO to hold capital reserves amounting up to 19% of their RWA. FINMA set the deadline for the fulfilment of aforementioned requirements at the end of 2018. The size of the capital reserves demanded by Swiss regulators has a potential to support the robustness of their financial system. However, the costs associated with procuring the sufficient capital might significantly hamper competitiveness of Swiss banks on the international field. (SB 2012, pp. 17, 46, 48)

Besides the regulation of capital requirements, FINMA addressed the issues of bank's corporate governance and risk management. In November 2008 the circular 2008/24 defined new standards for supervision and internal control of banks. According to this publication, a BoD is responsible for the supervision, organisation and evaluation of bank's internal control function. Furthermore, the BoD must make sure that systematic risk analysis is performed, and all relevant risks are recognized, managed and overseen by the internal control. The 2008/24 circular sets criteria for independence and qualification of BoD members. The BoD has to create an internal audit function subordinated to the BoD or the audit committee. This regulation makes the audit committee obligatory for large financial institutions with assets over CHF 5 billion. The audit committee supervises and evaluates the workings of the internal control and the internal audit. Bank's internal audit is responsible for planning and performing the analysis of risks the institution is subjected to. Finally, the circular defines the role and qualities of compliance and risk control functions. (FINMA 2012, pp. 5-16)

In 2013 FINMA updated its circular 2008/21, introducing corporate governance measures to improve the risk management and the risk control of operational risks. One of the measures is a clear distribution of roles between the BoD and executive managers. The former is responsible for the approval and supervision of a complex risk management plan, which is created and implemented by the latter. On the group level, the risk management function should collect and analyse internal as well as external data relevant to institution's risk profile. Indicators measuring risk and performance are to be applied in the risk assessment. Effects of different scenarios, even extreme ones, on risky positions have to be taken into the consideration. Results of distinctive analytical approaches should be compared

together with an aim of more holistic overview of the risk situation. In addition to these risk management approaches, FINMA emphasizes the role of IT systems, which according to the circular must guarantee the access to reliable data and maintain the security, stability and transparency of the system. Risk management should be an integral part of the IT system. (FINMA 2013, pp. 17-20)

As discussed in the literature review, the presumed relationship between manager's compensation incentives and excessive risk taking came into the focus of regulators during the post-crisis period. FINMA circular 2010/01 from October 2009 formulates the minimum requirements remuneration schemes, which Swiss banks have to fulfil. Based on this circular, a BoD is the primary source of firm's compensation scheme design and oversees its implementation. The remuneration policy has to be designed in order to be transparent and promote long-term stability of the financial institution. FINMA recommends the participation of internal control, internal audit and third party experts on the formulation of senior management's remuneration policy. Fourth principle elaborates on the need for risk-sensitive compensation especially for senior executives. Combined with the risk control function, the compensation policy should limit the excessive risk-taking and the participation in risks that don't correspond to institution's risk appetite. In order to align the interests of senior managers with the long-term sustainability, variable compensation should be distributed over longer periods of time and funded from future long-term profits. When formulating the remuneration policy, the BoD and control functions should take into consideration the sustainability of profits and associated risks. The 2010/01 circular also creates a basis for the introduction of claw-back mechanisms and bonus-malus systems. Another risk controlling incentive supported by FINMA is deferred remuneration, which in the case of senior managers should be deferred for at least 3 years. A special case of remuneration policy are the employees in risk control and management, internal audit, internal control, compliance and other control functions. The variable compensation of these employees should not be linked to the performance of units they are supervising, so the potential conflicts of interests are mitigated. Finally, the remuneration policy and its implementation have to be periodically assessed by the BoD. Results of the assessment and all information about the remuneration design and payments are to be made public. (FINMA 2015, pp. 6-10)

If we compare the three distinctive post-crisis regulation frameworks, it is apparent that the regulatory activity, its scale and scope were higher in Europe. While the Swiss regulation tends to be less complex and strict than in the EU, it is still more detailed and touches a wider range of firm's internal governance practices than is the case in the US. For instance, in contrast to the EU regulation, the Swiss remuneration regulation doesn't prescribe any hard limits on percentage of variable compensation being deferred. In general, the Swiss post-crisis corporate governance regulation leaves more interpretation room to banks themselves. Swiss banks are not specifically obliged to establish a remuneration committee, nomination committee and risk committee as part of their governance structure. However, FINMA defines similar set of tasks, as to ones falling in the EU regulation under these two committees, to a BoD or to control functions answering to the BoD. Therefore, there are significant overlaps in regulatory updates to the corporate governance. Still, the EU regulation is much more extensive and discusses the different governance and risk management aspects into greater detail.

One possible cause of the slightly more flexible approach in the case of Switzerland could be that there are only two systematically important banks, UBS and Credit Suisse. Direct communication between FINMA and the two banks enables solutions being proposed on a case-to case basis. From the reports on the crisis write-downs, it is clear that there has been significant volume of communication between Swiss regulators and their two major banks. On the other hand, FINMA is planning to adopt a new circular, which will extensively overhaul standing corporate governance practices, and make changes to previous governance relevant regulations. In the spring of 2016, this regulation is still in the phase of consultation. To summarize, a recognition of how the regulatory setting changed for the large banks following the crisis is of out-most importance, especially when reviewing their performance and the adaptation to the post-crisis environment. Changes adopted by UBS AG, be it voluntary or mandatory, offer us interesting glimpse into the real world implementation of theoretical concepts analysed in this literature review.

3. Case of UBS AG

Why has UBS been chosen as the object of this case study? The Swiss bank represents an institution with a long tradition of a conservative approach to the banking. However, after several years of high growth, it suffered tremendous losses during the heights of the financial crisis due to its accumulated exposure to mortgage backed securities. Since the bank needed to be financially relieved by the Swiss government, and it had to regain shareholder's trust, a significant effort was put into the identification of causes which lead to the losses. The shortcomings present in UBS at the time are well documented in the Shareholders Report on UBS write-downs, which offers us a unique insight into the state of UBS before and during the crisis. For the same reasons as stated before, the bank also formulated and adopted a complex remediation plan against the perceived internal weaknesses. Therefore, UBS represents the perfect object for the qualitative analysis of factors that exacerbated the crisis losses and subsequent reform process. The concepts discussed in the literature review can be compared and applied to the actual developments in the single bank setting.

3.1 UBS AG before 2007

In its current form, UBS AG was founded by a merger between Swiss Bank Corporation (SBC) and Union Bank of Switzerland (UBS) in 1998. Both banks were also results of 150 years of mergers and acquisitions in the Swiss banking industry. According to Allen, the main driver behind the merger were the USD 400-700 million losses incurred by Union Bank of Switzerland, which may have led the management of UBS to accept the merger with SBC (Allen 2003, p. 59). By means of the merger, the new entity became the largest universal bank in Switzerland, as well as world's leading wealth and asset managing bank. (UBS 2015, pp. 14-16)

In years following the merger, UBS's management formulated the goal of achieving the top ranking position also in the investment banking sector. With this aim in mind, UBS continued to pursue the strategy previously set by SBC, which in order to grow its investment banking business acquired London-based investment bank S. G. Warburg & Co. in 1995 and American investment bank Dillon, Read & Co. in 1997 (Bloomberg 2016c). Both purchased

banks were merged into Warburg Dillon Read, forming the investment banking branch of UBS (UBS 1998, p. 14). In 2000, UBS further increased its US market share with the acquisition of PaineWebber, American stock brokerage and asset management firm. The period from 2000 to 2006 was marked by an expansion into the developing countries, Asian-Pacific area and improving its position at the US market. With regard to the investment banking business expansion, UBS shifted its focus from acquiring prospective firms at whole to headhunting the most qualified bankers, salesmen and traders, spending as much as USD 700 million in the process (Bloomberg 2016c).

In order to support its investment management business and enable third party investors to participate in bank's alternative investment strategies, UBS created its own internal hedge fund, Dillon Read Capital Management (DRCM), which became operational in second half of 2006 (Anderson 2016). One area, in which UBS was found lacking in comparison to its competitors, was the Fixed Income business of UBS's Investment Bank division. A review by external consultants recommended a larger participation of the Fixed Income unit in growing market niches, among them especially asset-backed securities, mortgage-backed securities and adjustable rate mortgage products (UBS 2008b, p. 11).

The growth strategy of UBS, driven by acquisitions and organic growth, was associated with a strong record of profitability. Since its founding in 1998, UBS presented in its annual reports net profit for each year up until 2006, as shown in the Figure 1 on the next page. The net profit of UBS significantly increased in last 4 years before the subprime mortgage crisis, rising from CHF 6,236 million in 2003 to 12,257 million in 2006.

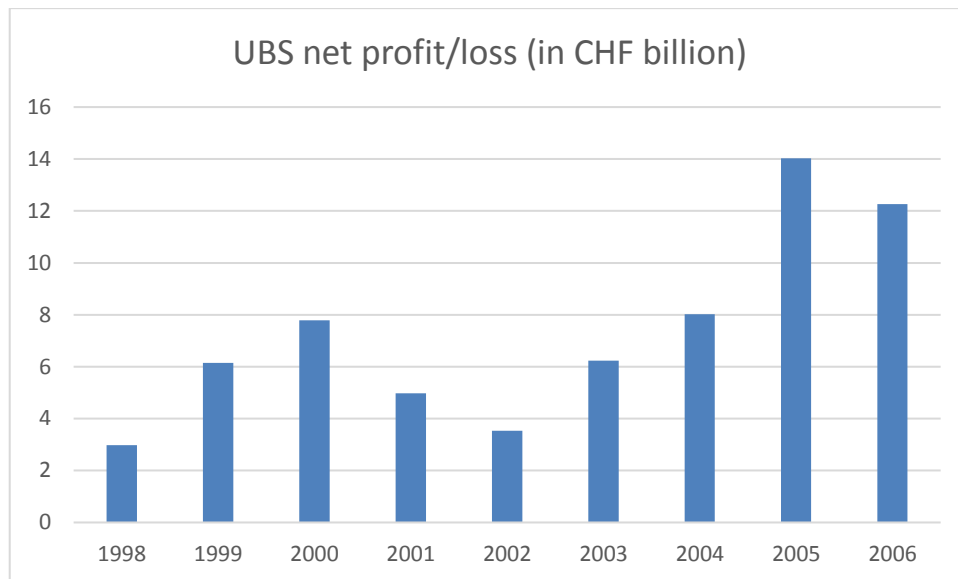


Figure 1: UBS net profit/loss 1998-2006

Source: Own representation based on UBS annual reports 1998-2006

Share prices of UBS AG also increased significantly in the final years preceding the financial crisis. Figure 2 particularly illustrates the general growth trend between the second quarter of 2003 and the second quarter of 2007, when UBS shares reached its zenith. During this period UBS share price almost tripled.

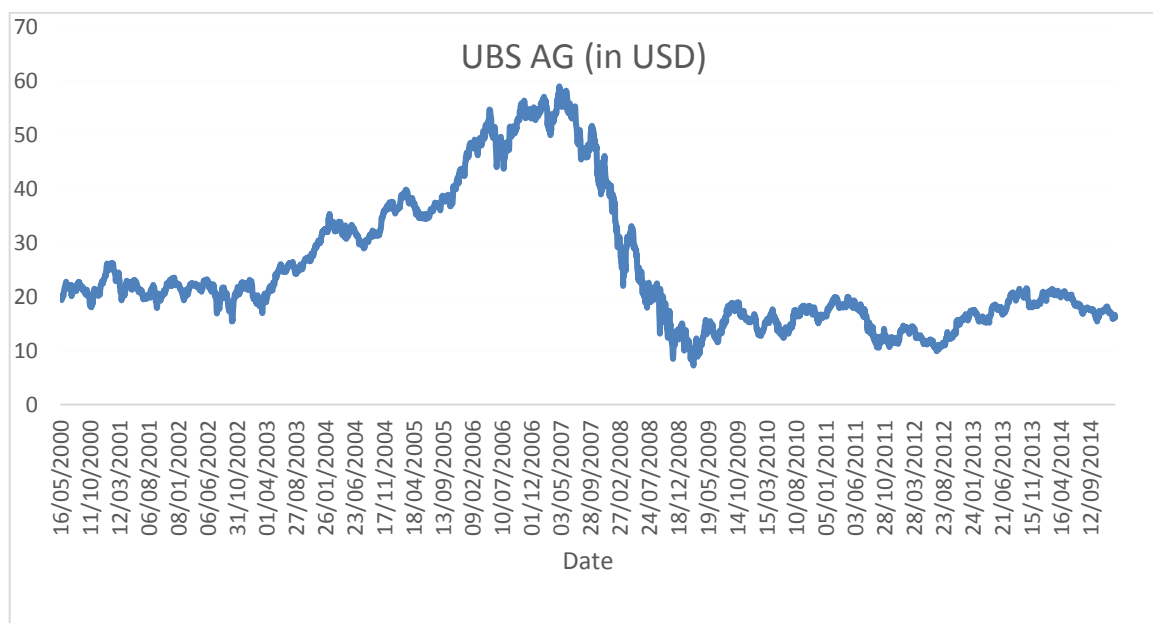


Figure 2: UBS AG adjusted daily share price 2000-2014

Source: Own representation based on data from the CRSP database

At the end of 2006, UBS was firmly positioned as one of world's leading wealth management banks with a strong position also in the investment banking. Bank's balance sheet extended greatly during the post-merger period, and in 2006 total assets of UBS amounted to CHF 2,396,511 million, more than the double of the 1998 value. Structurally, USB consisted of four business divisions: Global Wealth Management & Business Banking, Global Asset Management, Investment Bank (former Warburg Dillon Read) and Corporate Centre. Therefore, the structure mirrors the positioning of UBS as a universal bank, offering its clients private banking, wealth management and asset management services under one roof, as well as striving to compete with large multinational investment banks. (UBS 2007b, pp. 2, 9)

Global Wealth Management & Business Banking and the Investment Bank were in 2006 responsible for approximately 90% of operating income from continuing operations before taxes (UBS 2007b, p. 107). In 2006, UBS's net trading income amounted to CHF 13,318 million, significant increase from CHF 7,996 million in the previous year (UBS 2007b, p. 22). The growth of trading income correlated with the increase of trading assets on UBS's balance sheet, most of all asset-backed securities and collateralized debt obligations backed largely by subprime mortgages. In its 2008 shareholder report, UBS estimated that 80% of balance sheet usage was demanded by the Investment Bank (UBS 2008b, p. 26). However, it is difficult to determine UBS's exact exposure to the US mortgage backed securities since these assets were divided among the business units of the Investment Bank and DRCM. Moreover ABS/CDOs positions were not listed as a separate category of assets on balance sheets of group nor individual business divisions. On the other hand, based on the analysis of the loss exposure in 2007 and 2008 and results of Swiss Federal Banking Commission's report, we can assume UBS's asset-backed securities net exposure to be USD 100 billion at the beginning of the subprime mortgage crisis. (SFBC 2008, p. 13)

UBS promoted and relied on its reputation of a stable conservative bank. For that reason, UBS maintained traditionally high Tier 1 capital ratio. In 2006, it amounted to 11.9%, well above the current Basel III minimum of 6%. In spite of the significant balance sheet expansion and the large exposure to mortgage backed securities, UBS retained high grade ratings: AA+ by Fitch and Standard & Poor's and AA2 by Moody's. It should be noted that real estate backed securities were largely given low risk ratings before the outbreak of subprime mortgage crisis, explaining the perceived low risk exposure (FCIC 2011, p. XXV).

Based on the results of its growth oriented strategy, synergies from 3 different business groups working as an integrated business, diversified presence in global market and tight risk control UBS formulated positive outlook for 2007 with expectations of continuing long-term growth. Such expectations contrasted strongly with the developments which followed during the financial crisis of 2008, and demonstrate the lack of awareness by the UBS leadership. (UBS 2007b, pp. 2, 27)

UBS AG is governed by a dual management body consisting of the Board of Directors (BoD) and the Group Executive Board (GEB). According to UBS's 2006 Annual Review, the Board of Directors formulates firm's midterm and long-term business strategies and goals, appoints the top management, defines UBS's risk bearing capacity and fulfils the supervisory duty over group's activities. As of 31 December 2006, out of 12 members of the BoD only three of them were executive directors, with remaining 9 directors classifying as independent. Only 4 out of 9 independent directors had financial background or professional experience with the financial industry. The Group Executive Board implements business strategies into the praxis and is responsible for an integrated cooperation between all business divisions. In 2006, UBS's GEB was composed of the Group CEO, Group CRO, Group CFO, three Business Group CEOs, as well as heads of important businesses or regional markets. At the end of 2006 GEB had 10 members. UBS governance structure also included an audit committee, nomination committee and compensation committee. Non-executive BoD directors participated in afore mentioned committees. The BoD together with the Chairman and the audit committee supervised the function of the external auditor Ernst & Young Ltd. as well as the Group Internal Audit. UBS internal audit function reported only directly to the Board Chairman. However UBS's BoD didn't include a separate risk committee. (UBS 2007b, pp. 32-37)

In 2006, UBS relied on two main principles of its compensation policy: creation of shareholder value and pay for performance. UBS senior executives were remunerated with a basic salary and variable performance related compensation. Importance of the variable element was particularly emphasized by UBS as a significant incentive for superior performance of bank's business units. In addition to the base salary, UBS senior executives could obtain performance related incentive awards, options on firm's stock and other benefits. In order to align interests of executives with the ones of UBS, 50% of incentive awards were paid in form of deferred UBS shares. The vesting of these shares proceeded in

same rates over period of 5 years. Stock option awards were granted independently from incentive awards based on assessment of individual's contribution to firm's performance. Seeking alignment of shareholders interest with executive's incentives, UBS designed the stock options in a way so they would create profit for their owners only if the share price would increase by 10%. An interesting parallel could be made between significant share ownership of UBS executives with incentives for share price hike, and findings of Fahlenbrach and Stulz (2011) and Beltratti and Stulz (2011), who found a negative relationship between executive share ownership and firm's performance. On the other hand, non-executive members of BoD receive only the fixed basic salary. (UBS 2007b, pp. 32-33)

The UBS corporate governance structure at the end of 2006 appears to be well designed. It fulfilled existing corporate governance guidelines and even, to large extent, Swiss and EU regulation adopted after the crisis. At first sight, not many weaknesses appear when reviewing the then valid governance and compensation frameworks. One of the drawbacks is the reporting of the Group Internal Audit solely to the BoD Chairman. This limited the flow of relevant information between the audit function and other BoD members. Nevertheless, under the surface there were critical flaws present particularly in the risk control, risk management and compensation relevant performance measurement. How the bank and its governance system fared during the financial crisis of 2008 will be analysed in following chapters.

3.2 UBS during the crisis

This chapter will demonstrate how UBS was affected by the formation of the crisis in 2007, when it finally fully erupted in September 2008 and in the period that immediately followed. The chronological summary of the bank's crisis years can help us to better understand underlying causes and most of all management's reaction to the negative developments.

3.2.1 UBS in 2007

In its last pre-crisis year, year described in the 2006 annual review as the best in UBS's history, UBS showed strong performance and no signs of slowing down (UBS 2007b, p. 2).

Picking up with the positive record of growth and profitability, at the beginning of 2007 UBS's senior management continued to follow the strategic initiative formulated in the previous year for the period 2006-2010: *"...to aim for significant revenue increases whilst also allowing for more cost expansion. However the Group's risk profile in 2006 was not predicted to change substantially, with a moderate growth in overall Risk Weighted Assets (RWA)."* (UBS 2008b, p. 8). UBS's strategic focus didn't account for the disturbances in the subprime market and their influence on bank's risk profile.

First signs of subprime crisis emerged already in December 2006, when subprime specialist Ownit Mortgage Solutions Inc filed for Chapter 11 citing housing market slowdown as the main cause (Reckard 2016). The Chapter 11 filing of Mortgage Lenders Network USA Inc. followed in February 2007 (Reuters 2016a). Negative performance of subprime lenders, rising interest rates and data showing housing market slowdown caused Freddie Mac to restrict its buying of subprime mortgages (Morcroft and Schroeder 2016). Since major global investment banks were significantly involved in providing funding for subprime lenders and selling subprime mortgages in securitized form to other investors, the crisis of subprime lenders spread also to the banking sector.

In May 2007, after the previous long record of profitability and growth, UBS declared 6% decrease in its net profits to CHF 3.275 billion for the first quarter. Furthermore the DRCM division declared loss of CHF 150 million during the same period. In a reaction, UBS announced reintegration of DRCM into the Investment Bank. The costs associated with the reintegration process were estimated to be USD 300 million. On the other hand, the pre-tax net profit of the Investment Bank continued to rise by another 3%. (BBC 2016a)

During the summer of 2007, UBS's BoD made management changes for the positions of Group CEO and IB's head of fixed income business line (UBS 2008b, p. 6). Diverging from the previous negative trend, August 2007 brought surprisingly positive results for the second quarter as other banks already begun to feel the effects of the subprime crisis. UBS announced the net profit attributable to the shareholders as CHF 5.622 billion. The figure was significantly influenced by the sale of UBS's stake in Swiss private bank Julius Baer. Nonetheless, even without this transaction UBS's net profit, compared to the same period of the previous year, increased by 14%. Even as UBS saw rise in net fee and commission income, the bank recognized unsatisfactory results in fixed income and net trading income.

In the same report, UBS's new Group CEO Marcel Rohner expressed following opinion towards bank's initiatives to grow European and American wealth management business and invest in IB's fixed income business: *"The underlying strategy of these initiatives remains unchanged. In implementing them, we need to balance revenue opportunities with operational and economic efficiency. Thus, while the direction and cornerstone of our strategy remain unchanged, the tactics involved in executing will continue to be adapted to varying market condition."* There was no mention of UBS's overexposure to the subprime market and need to control it. On the contrary, UBS continued to pursue its pre-2007 investment strategies, which lead to further increase in its exposure to subprime assets. (UBS 2016a)

On 1 October 2007 UBS announced expectation of overall net loss in the third quarter due to write-downs on subprime positions. In the same declaration, further management changes were announced: Group CEO M. Rohner took over also the position of IB CEO and Chairman, Group CFO C. Standish retired and new Group CRO was named. At the end of October UBS confirmed previous loss expectations. Investment Bank's fixed income, currencies and commodities business area had suffered write-downs worth CHF 4.2 billion and group net loss of CHF 726 million. A plan to declare 1500 jobs redundant was made public (Reuters 2016b). On 10 December 2007 UBS announced further USD 10 billion in write-downs. As a reaction to its decreasing capital base, UBS formulated a plan to issue mandatory convertible notes worth CHF 13 billion to two investors. In February 2008 the total extent of preceding year's losses became apparent. For the first time since its founding through the merger in 1998, UBS declared overall net loss in its 2007 full-year results. Apart from the CHF 4.4 billion net loss in 2007, UBS announced final total of the 2007 write-downs on US housing market related portfolios to be USD 18.7 billion. (UBS 2008b, p. 6)

3.2.2 UBS in 2008

After the announcement of full-year results for 2007, UBS shareholders pushed for a general meeting. Due to the write-down losses UBS's capital base decreased significantly. At the end of the first 2008 quarter the BIS tier 1 ratio amounted to 6.9, representing significantly low value particularly when compared with the BIS tier 1 ratio of 11.6 for the same period one year before (UBS 2008a, p. 12). Based on this capital base decrease, a majority of shareholders approved the plan to establish conditional share capital for issuance of

mandatory convertible notes (MCNs) to two investors, Government of Singapore Investment Corporation and unnamed Middle-Eastern investor (UBS 2016b). The first issue took place on 5 March 2008, when MCNs worth of CHF 13 billion were raised. The conversion of these notes into the UBS stock was set to happen up to the 2 years after the issuance. Thereafter, based on the inquiry from the Swiss Federal Banking Commission (SFBC), UBS agreed to start an internal investigation to determine the causes of the US mortgage related securities write-downs. (UBS 2009a, p. 29)

UBS's situation continued to further deteriorate in 2008. In March the size of mortgage related write-downs doubled when UBS announced additional USD 19 billion to be written off (BBC 2016b). Adding to the 2007 write-downs, the total sum of UBS write-downs increased to almost USD 38 billion. New wave of write downs manifested in UBS's first quarter net loss of CHF 11.5 billion. In reaction, UBS long-time Chairman M. Ospel declared he will not seek re-election on the annual shareholder meeting in April. On the annual meeting shareholders approved the plan to strengthen UBS's capital base. Perpetual preferred securities worth CHF 1 billion were issued. UBS also raised CHF 15.6 billion in new equity rights issue. (UBS 2008a, p. 2)

The second quarter of 2008 saw stabilization of losses and the third quarter even modest profit of CHF 296 million; however UBS plunged deeper in the fourth quarter following the bankruptcy of Lehman Brothers on 15 September 2008. According to the 2008 UBS annual report, overall yearly net loss amounted to CHF 21.3 billion. Majority of the losses were attributed to the Investment Bank division, which closed 2008 with CHF 34.3 billion in losses. Although, the net interest income was positive (CHF 5.992 billion), it was outweighed by the net trading loss of CHF 25.820 billion. The report specifically mentions real estate trades and associated securitization products as factors most influencing the high loss of investment bank, corresponding with continuation of subprime mortgage crisis and beginning of the global financial crisis. Figure 3 documents quarterly net profits/losses attributable to UBS shareholders from 2007 to 2009. (UBS 2009a, pp. 39-40, 73)

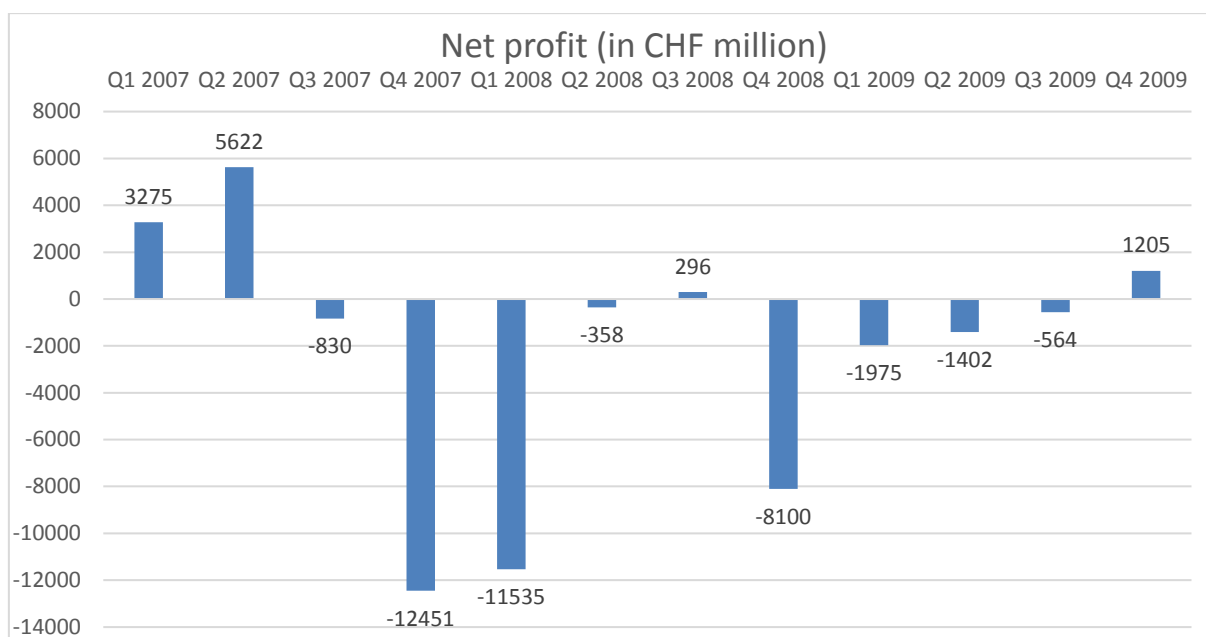


Figure 3: Net profit attributable to UBS shareholders 2007-2009
Source: own representation based on UBS quarterly reports 2007-2009

After additional losses in the second half of 2008, now illiquid assets related to the US real estate market continued to pose a threat and risks to future UBS performance. Furthermore, the capital base continued to decrease. In this situation, on 16 October 2008 UBS signed deal with the Swiss National Bank (SNB), under which provisions illiquid and other affected assets of up to USD 60 billion will be transferred to newly created fund under the supervision of the SNB. Upon the transaction taking effect on 16 December 2008 of proposed USD 60 billion only USD 38.6 billion were claimed or expected to be transferred. Asset transferred to the fund, named StabFund, served as collateral for the loan of equal amount provided by the SNB to UBS. The fund was fully owned by the SNB, which also had the right to assign 3 out of 5 directors to fund's BoD. UBS provided investment advice under the supervision of fund's directors. The transaction with the SNB stabilized UBS's operations, set limits for future potential losses, decreased RWA and balance sheet size, lowered UBS's risk exposure and gave UBS time to regain shareholder and client's trust. In a connection to the SNB transaction and with aim to strengthen its Tier 1 capital base, UBS proposed to issue MCNs worth CHF 6 billion to the Swiss Confederation. The issue of MCNs with a maturity of 30 months took place on 9 December 2008. Although the transaction with the SNB and MCNs issue to the Swiss Confederation resulted at the beginning in CHF 4.5 billion of net losses, due to the different valuation of transferred assets by the SNB and fees connected with the transaction, the overall effect of the bail out by the Swiss Confederation enabled UBS to

stabilize its financial situation, improve risk bearing capacity and perform necessary reforms. (UBS 2009a, pp. 16-17)

3.2.3 UBS in 2009

In 2009, UBS continued to be affected by the ongoing crisis in the financial markets. The first quarter resulted in CHF 2.0 billion net loss for UBS shareholders. On the other hand, the bank set on the course of stabilization and restructuring. In the first quarter, the bank managed to make its Wealth Management profitable and Global Asset Management showed only minor loss caused by goodwill impairment. Despite overall IB operating loss of CHF 6 billion, revenues from IB's client oriented businesses, excluding residual risk positions, started to increase as well. In 2009, UBS pursued a strategy of risk exposure limitation. The balance sheet size as well as RWA decreased continually throughout the year. The bank formulated a goal to decrease its fixed cost base, cut operational expenses, adopt significant redundancies, and finally restructure and refocus its core businesses. In the process, UBS sold its Brazilian financial services business UBS Pactual on 20 April 2009. (UBS 2009b, pp. 2, 25, 33)

After the negative second and third quarter, CHF 1.402 billion and CHF 564 million respectively, in the last quarter of 2009 for the first time in 9 subsequent quarters UBS showed net profit once again (UBS 2009c, p. 1). In August UBS managed to sign the agreement with the US government in the case of cross border tax evasion, paying CHF 917 million in the settlement. Shortly thereafter, the Swiss Confederation converted its position, which it gained during the MCNs issue in 2008. Although, restructuring processes were associated with significant costs in 2009, the overall efficiency of UBS's operations improved. At year's end UBS achieved its goals in fixed cost base reduction by CHF 3 billion and personnel decreased by 12,250. The capital base strengthened and the BIS Tier 1 capital ratio increased from 10.5 % at the end of the first quarter to 15.4% at the end of 2009. During 2009 UBS decreased its balance sheet size by 33.5 % and RWA by 31.7 %. (UBS 2010b, pp. 2, 10)

Through quick optimization of operational efficiency and bringing existing legal or structural issues to the closure, UBS tried to regain trust of its shareholders and regulators. On the Investor day in November 2009 the bank announced its new strategic plans to position

UBS as a leading firm in wealth management and client oriented investment banking. Furthermore, UBS recognized its reliable and conservative reputation as its most valuable asset. Prudential requirements adopted by the bank were meant to safeguard it. In 2009, UBS started formulation of new ethics and conduct principles, aimed to be adopted at the beginning of 2010. UBS ended the year 2009 on a positive note expecting to come out of the crisis in 2010. However, how effective the promised changes were, will be analysed in Chapter 3.5, which discusses the success of UBS reforms from the post crisis perspective. (UBS 2010b, pp. 2-4, 58)

3.3 Causes of the UBS crisis

The internal UBS audit, ordered by the new leadership, produced a detailed report on the causes leading to 2007/08 write downs, which was presented to the regulating authority Swiss Federal Banking Commission (SFBC) for a review in April 2008. The abbreviated version of the original report was made public shortly thereafter with the intention to inform bank's shareholders. In an answer to UBS's inquiry, the SFBC published its own investigation report in September 2008, which largely supported the findings asserted in UBS's report (SFBC 2008, p. 4). This chapter will use the two aforementioned reports as a starting point for the assessment of the main drivers behind UBS's losses.

3.3.1 Growth orientation and DRCM's founding

Before the crisis, UBS extensively pursued a growth strategy based on penetration into the investment banking business, improvement of Investment Bank's fixed income business and a global expansion. Thus question arises, if such strategy could have influenced the write-downs during the crisis. According to the investigation report by the SFBC, the growth strategy wasn't the primary cause behind the write-downs, however it created additional pressure on the senior management of both Group and main business divisions, most of all the Investment Bank (SFBC 2008, p. 6). The increased performance requirements caused the management to look more on the profit generation and less on the sustainability of such business model, which only aggregated existing structural and organizational flaws in UBS. (UBS 2008b)

Related to the growth orientation of UBS was the announcement of DRCM's founding in June 2005. According to the SFBC's report, the founding process was performed under time duress and didn't enable UBS's to create a sound structural basis for DRCM's operations, which originally should have involved the intermediation of UBS's investment opportunities to third party investors, but later on changed to involve substantial volumes of proprietary trading (SFBC 2008, p.8). Newly created alternative investment business led to outflow of experienced managers, traders and brokers from the Investment Bank to DRCM. Additionally, DRCM created further pressure on UBS's risk control and management resources, depriving them from other business lines of the Investment Bank. DRCM's founding also submitted UBS to a complex regulatory oversight and complicated organizational arrangements due to the untraditional business model. (UBS 2008b, p.33)

Problems became apparent when after a year of solid performance, DRCM announced USD 150 million in losses for the first quarter of 2007. These losses were caused by adverse developments of the US real estate sector. UBS's leadership recognized the lacking control over the DRCM's investment policies and John Fraser, CEO of UBS's Global Asset Management cited the high costs and complexity of DRCM's operations as the main reasons for its cancellation (Werdigier 2016). In general, it can be said that ill timing of DRCM's founding and its challenging fit with UBS's main operations created additional problems for UBS's senior management, which significantly decreased their ability to react properly to first signs of the subprime mortgage crisis. (UBS 2008b, p.33)

3.3.2 Portfolio

An essential aspect of the UBS crisis is the composition of portfolios, on which write downs occurred and how corresponding portfolio strategies were formulated. Following 2005 declaration of growth orientation, UBS significantly increased its exposure to subprime US ABS and CDOs, reaching estimated USD 100 billion (Bloomberg 2016a). Main business divisions affected by subprime losses in 2007 and 2008 were DRCM, managed by Global Asset Management up until its reintegration, and the Investment Bank. DRCM's subprime ABS/CDO positions losses constituted 16% of UBS's 2007 losses. The rest of the losses could be attributed to the Investment Bank's subprime positions located in the Fixed

Income's Rates business and in the Foreign Exchange/Cash Collateral Trading (FX/CCT) business. (UBS 2008b, p. 7)

Subprime mortgage and asset-backed CDOs concentrated particularly in Investment Bank's Rates business, where CDO desk was located. This unit purchased and securitized CDOs. The CDO securitization began with an initial agreement between the bank and CDO manager on behalf of whom UBS acquired necessary collateral assets, in this case mortgage and asset-backed securities, and accumulated them in the CDO Warehouse before the final securitization. Due to the period between the initial agreement and CDO issuance, the Warehouse was subjected to a prolonged market risk. Newly created securities were moved to the CDO Special Purpose Vehicle and then divided into tranches, based on their debt seniority. Lower tranches of securities were then sold off to investors, while the AAA CDOs (super senior) were retained on IB's books. Since the return on super senior CDOs was low but higher than internal funding rate of UBS, IB could create profit perceived as almost riskless by investing into super seniors, taking advantage of the spread and simultaneously support the securitization process. Further super seniors were also purchased from other CDO sponsors as part of hedging for existing securities. The CDO desk was major source of UBS's losses, since 16% of 2007's subprime losses were attributed to securities in CDO Warehouse and 50% to super seniors retained on IB's books. (UBS 2008b, p. 13-14)

As part of the ABS Relative Value strategy, DRCM purchased subprime and Alt-A mortgage-backed securities, and hedged them with credit default swaps (CDS). Additionally, Reference Linked Notes desk purchased ABS with an intent to hold them long-term, securing them with reference linked notes sold to external investors. DRCM participated also in short-term CDO and ABS trading, using carry trades to invest in AAA rated securities. After the reintroduction of DRCM into IB, subprime positions of DRCM were transferred to the Securitized Product Group (SPG) of the Fixed Income. The SPG owned limited subprime ABS positions purchased through carry trades. For that reason the SPG losses, disregarding further losses on DRCM positions, contributed to the overall UBS's losses only with 1.5%. (UBS 2008b, p. 12-15)

At the beginning of the financial crisis, the Foreign Exchange/ Cash Collateral Trading (FX/CCT) business of the IB was performing liquidity managing function, served as central treasury for the Group and enabled access to the cash markets. Furthermore the FX/CCT

generated profit through the investment of available liquid funds into the Real Value Trading Portfolio (RVT), comprising also ABS securities. The ABS Trading Portfolio, as part of the RVT, consisted of AAA or AA rated ABS backed mostly by US mortgages, credit card debt, home equity and student loans. Positions held in the ABS Trading Portfolio had to meet low risk rating and high liquidity criteria. Since ABS seemed to fulfil these criteria, even providing higher yield than government bonds, the FX/CCT invested significant funds into the ABS positions. According to the SFBC's investigation report, the ABS portfolio amounted to USD 30 billion in June 2007, for which SFBC criticized the IB's leadership as the division didn't recognize the risks in the market and instead of reduction, further increased its ABS exposure (SFBC 2008, p. 6-7). In total, ABS Trading Portfolio was responsible approximately for 10% of UBS's losses in 2007. (UBS 2008b, p.16)

3.3.3 Risk management and control

From aforementioned UBS's portfolio description, it is apparent that UBS's risk management and control functions didn't sufficiently assess the risk originating from significant involvement in the subprime ABS/CDO trading strategies. Thus enabling the aforementioned business lines to overextend their exposure to these positions. It is noteworthy, since at the time UBS had put relatively complex risk management and control frameworks in place, which were following five main principles: risk accountability of business group's management, independent control of risk taking, risk disclosure, protection of earnings and finally safeguarding UBS's reputation as the stable traditional wealth manager (UBS 2008b, p.17). Following paragraphs will review the factors which caused UBS's senior management not to recognize the risk associated with overexposure to ABS and CDOs until it was already too late, in August 2007.

In order to analyse and control market risk on portfolio level, UBS's individual business divisions relied on two main methods, the value at risk (VaR) and stress loss testing. As business division with the largest share of balance sheet resources, estimated to be 80%, the Investment Bank was also assigned corresponding proportion of VaR and stress loss limits. However, according to the SFBC's report, the use of VaR methodology especially at the CDO desk in the Fixed Income business area didn't produce accurate information regarding market risk of the CDO portfolio (SFBC 2008, p. 11-12). UBS's market risk control didn't

analyse the risk profile of CDO's underlying assets by looking at their respective FICO scores, year of asset's origin or their lien status. This fundamental information was not included in the data feed from front office systems. Furthermore, the VaR analysis relied on time-series data from last 5 years before the outbreak of the subprime crisis (UBS 2008b, p. 38). Pre-crisis period was a high-growth setting, where household prices continued to increase steadily, which made wide-spread mortgage defaults highly unlikely. Insufficient risk assessment was particularly apparent in the over-reliance on the AAA-rating of super senior CDOs at the CDO desk. As discussed previously, ratings published by the Big Three failed to cover the true risk profile of these highly complex securities. The SFBC's report states that the UBS risk control regarded AAA rated super seniors to be at par with government or corporate bonds sharing the same rating (SFBC 2008, p. 11). Following this way of thinking, super seniors were perceived to be practically riskless, which meant they were incorporated into the VaR limits only to a limited extent. (UBS 2008b, pp. 19-20)

The issue of super seniors skewed risk assessment was further aggravated by applied hedging strategies. Based on the used hedging approach, super seniors were divided into three categories: Negative Basis (NegBasis), Amplified Mortgage Portfolio (AMPS) and unhedged super seniors. NegBasis securities were fully insured against any losses by counterparty insurers. In contrast, the AMPS possessed only protection for approximately 2%-4% of its nominal value. The low degree of hedging was rationalised by the analysis of past value changes, in a similar way as the growth-biased historical data was used in VaR models. An occurrence of larger losses on a massive scale was deemed highly unlikely by employees of the risk control function. For this reason and even despite only such a small percentage of total position being hedged, the management recognized these super seniors as fully hedged. Finally, unhedged super seniors were securities intended to be hedged by AMPS trades, which however hadn't been performed yet at a given moment. Since UBS kept low-yield AAA tranches on its books and CDO securitization took several months to be completed, the exposure to super seniors as well as other securities grew consistently with time. Furthermore, the hedging through NegBasis or AMPS trades took also significant time to complete. The result was an increased percentage of unhedged or weak hedged super seniors. As UBS's shareholder report states, in September 2007 approximately 54% of all super seniors held on UBS's books were hedged through AMPS or unhedged. Write-downs suffered on these positions were unproportionally high when compared to the percentage of losses in NegBasis super seniors. (UBS 2008b, pp. 14-15)

With fundamental risk metrics being flawed and overreliance on AAA ratings, other risk control methods also became overoptimistic. The Group Executive Board made its risk management decisions based mainly on results of the stress testing, which also relied on overly optimistic assumptions. Furthermore, the senior management assessed the portfolio positions solely on a net basis, meaning that super seniors perceived to be fully hedged were left out. For these reasons senior risk management and risk control managers weren't able to recognize the true extent of UBS's risk exposure to adverse market developments. (SFBC 2008, pp. 11-13)

Portfolio's concentration risk was measured and controlled by implementation of the risk factor loss (RFL), issuer risk and operational limits into the risk assessment process. Especially the operational limits, set to limit risk not included in the VaR calculation and to ensure that given portfolio remains at an appropriate risk level, weren't adopted for all of UBS's subprime portfolios. Although the Investment Bank adopted individual operational limits for subprime securities in DRCM, different super seniors and ABS portfolios, there were no operational limits for assets accumulated in the CDO Warehouse nor for overall Investment Bank's exposure to subprime positions. In a similar manner, limits to the overall notional value of subprime ABS/MBS were also missing. In stark contrast to the sound judgement, as late as in May 2007 CDO desk proposed to further increase limits for its super senior portfolio strategies. This proposal was however rejected due to the already ongoing market disturbances. (UBS 2008b, pp.18-20)

In addition to portfolio risk limits, UBS's risk control utilized thorough risk assessment on individual investment basis in order to determine the viability and needed level of risk control for large investment projects. UBS's market and credit risk control played leading role in the evaluation and approval for New Business Initiative (NBI) and Transaction Requiring Prior Approval (TRPA) processes. Although both initiatives performed deep holistic risk assessment, NBI looked especially at the viability of the whole proposed portfolio trading strategy or investment. Therefore NBI usually produced more profound analysis of given project. In reviewing NBIs and TRPAs the risk control collaborated with the business unit control, which performed financial valuation of relevant assets. (UBS 2008b, p. 21-22)

Application of the NBI process in the Investment Bank was limited, fact criticized by the SFBC. In order to securitize CDOs or participate in Amplified Mortgage Portfolio trades, which were super senior trades with protection being purchased by UBS, only TRPA approval was needed. As the SFBC suggested for transactions of such magnitude, often above USD 1 billion, the NBI method would be preferable. This would however lead to further limits on CDO and super senior portfolio. The TRPA and NBI processes were often perceived by IB's management as lengthy and too cumbersome, which created additional pressure on fast approval clearing (UBS 2008b, p. 41). In some instances, risk control was asked to perform the TRPA for a CDO securitization only after collateral assets were already purchased and stored in the Warehouse (UBS 2008b, p.29). A potential refusal of the transaction would be then associated with unwind costs, making the TRPA decision making process less objective and often only solely retrospective. (SFBC 2008, pp. 10-11)

Growing risk concentrations of securities backed by US mortgages raised concerns in a part of UBS's senior management in the second half of 2006. However, there were no clear instructions given by the Group Executive Board to UBS's risk management to pursue the deep dive analysis of potential losses caused by adverse developments in ABS/CDO portfolios. The first thorough internal inquiry occurred in second quarter of 2007, as the negative quarterly results of DRCM had been announced. After the reintegration of DRCM in May 2007, the Group Internal Audit (GIA), as part of the risk control function, reviewed the causes of DRCM's write downs. The GIA recommended re-evaluation of the risk metric methodology for subprime securities and indicated the insufficient risk assessment of fundamental risks. Findings of the GIA inquiry were presented to the Group Executive Board Risk Subcommittee (GRSC), nonetheless there was no immediate reaction by the senior management (SFBC 2008, p. 11). (UBS 2008b, pp. 18, 35)

The risk management of the Investment Bank was significantly influenced by changes in IB's senior management following the announcement of DRCM's founding. According to UBS's shareholder report, the new IB management possessed expertise in growth oriented operations, but less so in the field of risk management. Moreover, the senior risk manager position in the Fixed Income business unit was left vacant since 2006. More insufficiencies in the risk management function could be found also on the lower levels. Managers of individual IB's businesses responsible for risk management, in general didn't see subprime assets as particularly risky, since ABS/CDO assets held on IB's books were in majority rated

AAA or AA. IB's businesses relied on the high grade credit ratings and formulated their exit strategies on the presumption of the high liquidity of ABS/CDOs backed by subprime collateral, which would make it possible to sell them off rather than to be subjected to any significant write-downs. As subprime market deteriorated, this assumption turned out to be false and made the losses inevitable. (UBS 2008b, pp. 37-40)

To summarize, UBS's risk management and risk control suffered chain of failings on all management levels, from the insufficient data submission in front offices to overly optimistic risk metrics and finally, the senior management failing to pursue the holistic risk assessment of UBS's risk exposure. Therefore significant information asymmetry occurred, leading to late recognition of inherent risks. Although, it is easy to see the crisis with the benefit of hindsight, especially UBS's risk management could have played more active role, demand reviews of portfolio's risk exposure and give more attention to the results presented by control functions, which indicated pessimistic outlooks.

3.3.4 Balance sheet management and funding

UBS's balance sheet soared in size during the growth period from founding of UBS to the outbreak of subprime crisis. The main reason behind the balance sheet extension was the decision to turn UBS's Investment Bank into the leading global player, pursued by then UBS Chairman Marcel Ospel and other senior executives (Bloomberg 2016a). In last two years before the crisis, UBS's balance sheet grew on average 17% annually and reached CHF 2,396,511 million at the end of 2006 (UBS 2007a, p.2). Assets attributable to the Investment Bank accounted for 80% of total assets from 2005 to 2007. In spite of the strong growth of balance sheet size, and particularly ABS and CDO positions, UBS's senior management was unwilling to set limits neither for balance sheet growth nor for risk weighted assets (SFBC 2008, p.8). Instead, UBS relied on its risk management and risk control to mitigate risks associated with the balance sheet's expansion. Therefore, UBS's balance sheet continued to grow mainly through IB's operations, even in the second quarter of 2007. (UBS 2008b, p. 26)

Before the crisis UBS enjoyed a comparative advantage in internal funding terms for its individual business groups (divisions), because of the well-established access to financial

markets, synergies from centralization of Group's Treasury and liquidity reserves in the FX/CCT business area. UBS set the internal funding prices more favourably than was the case in external markets. The internal bid price was well above the LIBID rate and offer price below the LIBOR rate (UBS 2008b, p. 25). However, UBS didn't differentiate between the business groups and offered same rate to every business line without assessing their investment projects. UBS's internal funding terms were criticized by SFBC's investigation report because of the lack of monitoring over respective portfolio strategies. Furthermore, the liquidity of funds provided didn't have to match the liquidity of purchased assets. UBS didn't see the need for selective internal funding terms and as was the case with the balance sheet usage, relied instead on the risk management and risk control functions to assess and monitor risk potential of given assets. (SFBC 2008, p. 9)

The low cost of internal funding enabled IB's business areas to invest in so called carry trades with super senior CDOs. Internal UBS funds borrowed on favourable conditions were used by the CDO desk to retain securitized super seniors or purchase them from other CDO underwriters. Subsequently super seniors risk was hedged through the NegBasis and AMPS trading strategies, making them almost riskless as perceived by UBS's market risk control. The relatively low cost of funding was essential in the profit generation because of the low yield offered by super senior CDOs. Due to the low yield, the nominal value of trades had to be substantially large in order to generate significant profits. Hence, internal funding terms became one of the reasons behind the large exposure to AAA-rated subprime CDOs in the Investment Bank. (SFBC 2008, p.10)

The support for the limitless balance sheet growth and non-selective internal funding terms was subjected to review by the Group Treasury in second half of 2006. At this point, the balance sheet size and concentration of potentially illiquid assets funded by short-term liabilities became a cause for discussion in Group's senior management. In March 2007, the Group Treasury presented a report to the Risk Sub-Committee of the Group Executive Board, which recommended to change the funding model, set hard limit illiquid assets in the Investment Bank and stop the growth of IB's balance sheet. UBS's executives agreed on adoption of the hair-cut funding model, where illiquid assets are funded by long-term liabilities and liquid assets by short-term funds. However, the Executive Board didn't support balance sheet limits and commissioned review of different risk mitigating strategies. With regard to the balance sheet management and funding, UBS's leadership seemed also

to lack the ability to comprehensively assess the risks involved in balance sheet growth, liquidity of assets on IB's books and react appropriately to adverse market developments. (UBS 2008b, p. 26)

3.3.5 Compensation

As demonstrated in the literature review, incentives included in the compensation contracts of senior managers are regarded in the academic literature, e.g. papers by DeYoung et al. (2013) and Bebchuk et al. (2010), as one of possible factors significantly influencing bank's performance during the financial crisis of 2007/2008. On the other hand, there is opposition disapproving the influence of traditional corporate governance variables and variable compensation on actions of senior managers. The findings of both groups can now be compared with the analysis of how the compensation systems fared in the case of UBS. In its shareholder report on subprime crisis write-downs, UBS recognized the influence of compensation incentives on the formulation of portfolio trading strategies. Before the crisis, UBS's compensation policy didn't differentiate between the profit generation through excess yield and making a profit through minimizing financing costs, as was the case with super seniors carry trades. The profit obtained through the purchase and retention of super senior CDOs was overwhelmingly dependent on the low cost of short-term internal funding. Therefore, UBS's compensation incentives together with internal funding terms increased the propensity of IB's business lines to participate in carry trades, which enlarged the mismatch between maturity of assets and funding involved in the transaction. (UBS 2008b, pp. 41-42)

An additional important feature of UBS's compensation scheme was the lack of the pay-risk sensitivity in the formulation of the contracts. The compensation of top management and traders didn't take into account the risk characteristics of acquired positions. In general, the key performance indicators used to ascertain the performance of individual senior managers didn't include risk characteristics or an adherence to risk management standards (UBS 2007c, p. 128). In this manner, IB's businesses had more incentives to invest in assets not only with the higher yield, but also with the higher risk attached. The limited recognition of risk indicators as a compensation incentive, corresponds with the findings of DeYoung et al. who regarded pay-risk sensitivity in compensation contracts of financial industry as a significant

factor influencing firm's risk taking and sustainability of performance (DeYoung et al. 2013, pp. 164-165). UBS's shareholder report mentions an example of the CDO structuring desk, which preferred the so called mezzanine CDO positions to CDOs with higher credit rating due to higher more profitable structuring fees of mezzanine tranches. Similar behaviour occurred also in the hedging of super senior CDOs in the Fixed Income business area. Although the AMPS hedge offered protection only on 2-4% of super senior positions, it was much preferred to the Negative Basis strategy, which offered 100% loss protection from insurer, because of lower costs of hedging. The divergence between portfolio's risk and profit was further augmented through calculation of compensation bonuses on the basis of first day profit/loss. The future development of acquired positions then became less relevant for compensation determination of responsible managers and traders. (UBS 2008b, pp. 14-42)

UBS's system of compensation incentives was generally oriented more towards supporting the growth and profit generation than long-term sustainability. One of viable tools to improve the alignment of employee's incentives with firm's long-term interests is a deferred compensation scheme. Albeit the bank adopted the deferred compensation as part of its compensation policy, the share of the deferred compensation on the total compensation was significant only at the most senior levels of UBS's management. Kirkpatrick (2009) mentions interesting discrepancy; even though 70% of UBS's CEO compensation was designed to promote stable long-term performance and the CEO was obliged to hold 5 times the amount of the average cash compensation in UBS shares, the bank still suffered substantial losses. Kirkpatrick further notes that the generally accepted recommendation for the CEO to hold several multiples of annual CEO compensation in company's shares isn't supported by actual empirical results. The study by Nestor Advisors (2009) showed that CEOs of the European banks, which were close to failure or suffered significant losses, had large share holdings at the time of the crisis. The negative relationship between higher equity holdings of senior managers and actual firm performance, although unintuitive is well documented also in the empirical literature. Therefore he argues, it is more relevant to look at additional compensation related factors: composition of total compensation, performance measurement and the pricing of options. (Kirkpatrick 2009, pp. 72-73).

Especially the option pricing might explain the inconsistencies in contractual incentives. The strike price of stock options attributed as rewards to UBS's senior managers was set at 110%

of the stock price at the granting date (UBS 2007c, p.126). Thus option holders were motivated to see to further hike in the stock price, so the options might become redeemable. The option pricing might contribute to the hypothesis proposed by Bolton et al. (2006) and Fahlenbrach and Stulz (2011) that senior managers preferred short-term profits over long-term benefits due to market inefficiencies. If managers do obtain substantial option grants, they might gain incentives to pursue investments leading to the stock price increase sufficient enough to exercise the options and sell it at a profit. On the other hand, short-term speculations were limited in scale by annually proportional 5 year vesting period.

Employees at junior positions, mainly the Fixed Income traders, were primarily incentivized by means of bonuses based on unit's performance in form of gross revenue after deduction of personnel costs. The asymmetry between employee's responsibility for valuation changes on the positions they acquired and the profit, they realized, created strong driving force behind the growth of subprime securities on UBS's trading books. UBS's compensation scheme didn't take into the account the fundamental characteristics of traded portfolios, for which the remuneration was applicable and therefore failed to protect UBS's stability in the long run. However, compared to the insufficiencies in its risk management and control, effect of compensation composition, incentives and measurement on UBS's crisis performance seems not to be the prime cause. Rather than that, the failings of risk relevant corporate governance made it possible for employees to follow short-term incentives found in the compensation contracts while ignoring the associated long-term risks. (UBS 2008b, p. 42)

3.3.6 Senior management governance

From the review of causes bringing about the UBS's crisis up to this point, it becomes apparent that a large portion of the responsibility lies with Group's Senior Management. A prime example of inadequate governance is the inaction of GEB Risk Sub-Committee (GRSC) when confronted with reports by the Group Internal Audit and risk control unit describing the high sensitivity of UBS's ABS/CDO portfolios to sudden subprime market changes (SFBC 2008, p.11). According to UBS's own report, although there was a discussion about US real estate market in the GRSC already in late 2006, its senior management didn't demand a sufficient independent insight into risk potential of subprime

positions and instead relied on reports made by IB's management and risk control functions. As mentioned in the chapter discussing bank's risk management and control functions, at this point risk control relied extensively on AAA credit ratings of subprime ABS/CDOs and other flawed risk metrics. Furthermore, IB's senior management made series of assurances to the GRSC about stability of IB's risk prospects, although it never performed an independent analysis of its own exposure to the subprime market. (UBS 2008b, p. 35)

UBS's governance problems don't seem to arise out of its governance structure, but rather out of inconsistent fulfilment of duties by different management teams and senior committees. Group's senior management didn't give the sufficient attention to the inquiries regarding UBS's subprime exposure. UBS's shareholder report states that subprime risk concentration in UBS, as an item of discussions in the senior management meetings, was relatively underrepresented in comparison to other risk related topics. Therefore, the results of such meetings were only general and didn't produce any relevant plan of further action. The low willingness of senior management to question the growing exposure to the subprime market might be significantly associated with UBS's strategic growth orientation enforced at the time. Based on the 2008 shareholder report this was particularly true in the IB, where the focus of discussion was the further growth of earnings and catching up to the competitors in an accordance with the plan formulated in 2005. Additionally, the shareholder's report criticises the ramifications DRCM's creation had on the succession planning in the IB. The outflow of most senior experienced managers caused the process of IB's leadership selection to be rushed without the proper long-term planning. (UBS 2008b, pp. 35-36)

A closer look at the BoD composition and structure points out three areas, which could have limited board's ability to properly assess and react to the situation at hand. First, UBS's BoD didn't include a separate independent risk committee and even after its creation the share of independent directors on the committee was only slightly above 30%. The qualification of board directors could also be criticised. Although in 2006 UBS's BoD was composed from 75% out of non-executive directors, a relatively high number in the industry at given time, only 44% of directors had any past experience with the financial industry. This might had limited their ability to form an independent judgement on complex financial issues. Finally, the long-term strategy decision making, supervision of compensation policies and UBS's risk profile, and reporting of the group internal audit all concentrated in the Chairman's office, run by UBS's Chairman and his Vice-Chairman (UBS 2008d, p. 13). While the

number of tasks placed upon the Chairman's office might have been manageable during the growth period, it certainly proved too much when the real estate market started to slow down. Therefore, it is highly likely that the office didn't have sufficient time resources to properly analyse reports about the subprime exposure submitted by the internal audit. (Kirkpatrick 2009, p. 80)

At the onset of the subprime crisis, UBS had well established governance structure with different committees managing risk on the group as well as the business line level. Additionally, the market, credit and finance risk functions controlled the risk UBS's was subjected to. However, these units didn't cooperate and looked at given trades and transactions individually missing on a potential viable exchange of information and results. This silo approach, lack of cooperation and communication between units responsible for risk management and risk control, made it harder for the senior management to recognize the extent of UBS's subprime exposure. Coupled with more focus given to fulfilling set growth objectives, UBS's senior management became biased against actions to independently investigate and mitigate the exposure to subprime securities in time. (UBS 2008b, p. 35-40)

3.4 UBS post-crisis reforms

Previous chapters demonstrated the large extent to which was UBS affected by the financial crisis of 2008 and causes responsible for such development. Since UBS was severely hit by the crisis and its losses were above the average in the industry, the bank quickly recognized the need for deep reforms. The main shortcomings of the pre-2008 UBS, as defined by UBS in its annual report, were: lacking risk management and risk control, compensation system, set performance goals and inefficient corporate governance (UBS 2009a, p. 2). In reaction to the named flaws bank's new leadership formulated a series of changes transforming UBS's business model, management responsibility, portfolio, business divisions, compensation and risk control. Each of the aforementioned areas subjected to reform is connected to the potential crisis causes already discussed in the review of the academic literature and previous chapters. The approach of UBS to these self-implemented reforms will be thoroughly described and analysed in following paragraphs.

3.4.1 Governance and senior management changes

As the subprime crisis hit UBS with record losses and pressure from the shareholders mounted, bank's senior management had to take the responsibility. Following the news of DRCM closure in May 2007, changes in leadership were also announced. On 6 July 2007 the shift in the Group CEO position was made public. Peter Wuffli, UBS's CEO since 2003, was succeeded by then CEO of Wealth Management Marcel Rohner on behalf of the Board of Directors. Thereafter, in August 2007 also IB's business unit Fixed Income, which was significantly affected by ABS and CDOs write downs, got the new chief manager André Esteves. More considerable changes in the senior management followed in October 2007 when IB's Chairman and CEO Huw Jenkins, man behind the expansion of IB's Fixed Income business since 2005, stepped down and was replaced by Marcel Rohner as the interim CEO. Furthermore, the Group CFO Clive Standish announced his retirement, having former UBS Executive Vice Chairman Marco Sutter taking over. At the same time new Group Chief Risk Officer Joe Scoby was appointed. (UBS 2008b, p. 6)

The publication of UBS's negative annual results for 2007 on 14 February 2008 sparked a new wave of changes on the senior level of bank's management. J Johansson was appointed to lead the IB as its Chairman and CEO. With ongoing announcements of record losses for the first quarter of 2008 it became clear that the leadership changes might affect even the long-time UBS Chairman Marcel Ospel. On 1 April 2008 shortly before the annual general meeting Mr. Ospel announced he won't be seeking re-election. This change marked an end of the era, since Mr. Ospel was accredited with formulating and pursuing UBS's goal to become world's leading investment bank. (UBS 2008b, p. 7)

As part of corporate governance reform, UBS made changes to composition and structure of both GEB and the BoD. On 1 July 2008 UBS adopted a new corporate governance structure. Main hallmarks of the corporate governance change was a more distinct separation between duties and responsibilities of the BoD and GEB. Board of Directors prime responsibility is to promote bank's success while safeguarding sustainable interests of UBS's shareholders. In order to achieve this ultimate goal, the BoD should set UBS's overall strategy, based upon recommendations from the Group CEO, and ensure strategy is pursued well under control constraints formulated by the board itself. Moving to a practical implementation, BoD determines what financial, personnel, organisational or other resources can be used for the

execution of the strategy and what is the acceptable risk capacity of the Group. The Board should continuously review and give the approval to the ongoing business strategy, accounting practices, management compensation, financial statements, and supervise the performance of internal control functions. In comparison to pre-crisis UBS, the supervision framework was enhanced by a shift of the oversight responsibilities from the abolished Chairman's office towards individual BoD committees. (UBS 2014b, pp. 7-8)

In July 2008, the risk committee was established as part of the BoD, with the role to formulate appropriate risk management as well as risk control principles, and supervise their application. The risk committee focused particularly on three main functions of UBS: risk management and risk control, bank's liquidity management and finally balance sheet management. On the ground of UBS's reliance on its conservative reputation, the risk committee took into account also the reputational risk arising from the three main functions under risk committee's supervision. The strategy committee established at the same time was tasked to cooperate with the Group CEO to prepare a review of UBS's strategy and also analyse how it is being implemented by GEB. Results of the strategy monitoring by the strategy committee were to be presented to the BoD. The strategy committee should collaborate with the risk committee on analysing UBS's strategy to deal with potential high risks from existing sources. Both committees are composed of only independent directors and invite external advisors to review their results. (UBS 2009a, p. 204)

In 2008 the Chairman's office, consisting of UBS's Chairman and Vice-Chairman, was dissolved. Its responsibilities and duties were assigned to existing as well as newly created BoD committees (risk and strategy). Thus the previously concentrated duties and responsibilities of the Chairman's office: risk management and risk control supervision, determination of risk limits, formulation of standards for risk control, supervision of Group Internal Audit, formulation of corporate governance principles, succession planning of the BoD and GEB, strategy planning proposals; were distributed equally among the committees composed of predominantly non-executive directors (UBS 2008d, p.12).

The final change to the BoD's structure is the inclusion of a Senior Independent Director (SID). Position of the SID can be regarded as akin to the chairman of independent directors. The SID calls for a meeting of all independent BoD directors without the present of Group's Chairman twice a year. Even though the Chairman and the CEO are main representatives of

governing bodies responsible for communication with media and shareholders, the SID offers shareholders opportunity to contact an independent director directly. Both the SID and Group's Chairman have to be informed, if there has been a case of the CEO overruling the majority GEB resolution. From the authority placed on the SID it is apparent, that his position was intended to reduce Chairman's sway over the Board, increase its independence, and create new communication channel between shareholders and independent directors. (UBS 2014b, pp. 9-12)

In the corporate governance framework, adopted in 2008, GEB is primarily responsible for the proposal and execution of strategies adopted by the BoD. Apart from the executive management GEB is in charge of overall risk management and risk control on all levels. The former GRSC committee has been disbanded and GEB now represents in its secondary role Group's risk council. Based on the directions from the BoD, GEB formulates risk management and risk control principles, and supervises how they are implemented in Group's relevant management and control functions. The risk council and BoD work together to determine UBS's desired risk profile. Duties of the risk council are overseen by the CRO, who in turn ultimately answers to the Group CEO. Another issue addressed even before 2008, was the balance sheet and liquidity resources management, which is discussed in greater detail in Chapter 3.4.4. Nevertheless, relevant for GEB is the delegation of duties to the Group Assets and Liability Management Committee (ALCO) and its incorporation into GEB. The ALCO committee is responsible for ensuring assets and liabilities resources are used in accordance with approved strategy, regulation and relate to the long-term interests of UBS's shareholders. (UBS 2014b, pp. 12-14)

With regard to the specific composition, positions at the BoD and GEB remained highly volatile during 2008 and 2009. All members of the GEB in 2006 have left their roles by the beginning of 2009. GEB also increased in size from 10 members in 2006 to 13 members in 2009. In 2007 a new GEB position, Chief Operating Officer (COO) of Corporate Center, was created. COO's role was designated as a coordination of UBS's shared services integrated into the Corporate Center on the group level. The number of GEB members also increased, because of inclusion of regional Chairman and CEO for Middle East and Africa and splitting of the Wealth Management into two separate divisions. The BoD similarly underwent significant personnel changes. The percentage of non-executive BoD directors increased from 75 % in 2006 to almost 92 % in 2009. Moreover the percentage of BoD non-

executive directors with a previous professional financial expertise increased from 44 % in 2006 to 91 % in 2009.

A controversial aspect of the post-crisis aftermath in UBS is the responsibility of the senior management and the BoD. In 2009, UBS's then BoD decided not to press charges against former GEB and BoD members. The question of actual financial and legal responsibility is relevant, since it has been demonstrated by this thesis and SFBC report that bank's leadership failed to evaluate risks associated with bank's portfolio and react properly once the markets shifted. UBS's senior management didn't sufficiently analyse the situation particularly the developments in the US housing market, nor the ramifications of significant ABS/CDO concentration on UBS's balance sheet. Only in late July 2007, UBS's management managed to recognize the oncoming danger. In October 2008 UBS's BoD launched series of investigations both internal as well as external. According to BoD's findings no criminal conduct based on the Swiss criminal law could be proven to the former executives and BoD members. (UBS 2010a, pp. 51-58)

The SFBC argued that UBS as whole made transgressions against reasonable banking practices, however no blame could be directly attributed to any responsible executive. No evidence that managers willingly tried to damage the bank or pursued overly risky investments with aim to increase their variable compensation has been found in the review by regulator. While this thesis agrees that all evidence from the case study overview together with results of the literature review points towards the UBS write-downs being caused by combination of factors: chief among them being failings in the risk control, compensation incentives and management reaction; the thesis asserts that senior management should be made answerable for its lack of judgement, if not in criminal terms than in financial ones. Presumably, UBS's new leadership wished to avoid a lengthy legal action against their former colleagues. Such action would only remind the public and shareholders of the past failings without any significant benefits to be gained for the bank. In this regard, the decision to not pursue any actions seems reasonable. (SFBC 2008, pp. 5-6)

UBS's post-crisis governance framework is characterized by a shift towards a greater distribution of supervision duties in the BoD, overall leadership personnel changes and new pronounced risk management and risk control responsibilities of GEB. UBS managed to identify and improve critical areas, which contributed to the development of the write-downs.

Nevertheless, despite declared changes it is difficult to make an objective judgement about the quality of corporate governance reforms especially supervision of control functions on lower levels in UBS's governance hierarchy, which are opaque from the outsider perspective. The presented analysis shows that based on existing evidence UBS improved its already solid governance, increased built-in checks and balances, improved supervision mechanisms, introduced new oversight committees and improved the protection of shareholder's interests.

3.4.2 Repositioning and operational rationalization

The first recognition of changes UBS needed to make in its business model took place already in 2007 as a reaction to the outbreak of the subprime mortgage crisis. On 3 May 2007 UBS decided to close and reincorporate Dillon Read Capital Management (DRCM), the internal hedge fund with a large exposure to mortgage-backed US securities, back into the Investment Bank, citing the losses in the first quarter of 2007 and high complexity of the hedge fund as reasons for its premature closure (Werdigier 2016). Furthermore, since the IB incurred in 2007 pre-tax loss of CHF 15,525 million, UBS was under pressure to reposition its trading business. The Fixed Income Currencies and Commodities business unit, as part of the Investment Bank, was repositioned from the proprietary trading to a more client oriented business. With regard to the real estate market, UBS management proposed to concentrate on offering intermediating services for clients willing to participate in the real estate securitization investments instead of committing UBS's own assets. (UBS 2008e, pp. 12-13, 134)

In general, it could be said that UBS decided to abandon the rapid growth strategy, pursued by the former UBS Chairman Marcel Ospel who wanted to make UBS into world's leading investment bank (Bloomberg 2016a). In 2007, UBS's new leadership formulated strategic shift from previous investment banking orientation to more traditional conservative banking, seen as one of the main UBS strengths. According to this move UBS should concentrate more on participating in client driven businesses, offering its clients credit, financial services and intermediating their investments, paralleling the change adopted in the IB. The long-term growth and financial stability should be achieved through the continual expansion of its loyal client base, supported by UBS's comparative advantages in the traditional banking business, mainly the reputation. (UBS 2008e, pp. 12-13)

In the financial report for the second quarter of 2008, UBS management introduced the cost base reduction as a measure to increase bank's strategic flexibility (UBS 2008f, p. 2). Throughout the 2008, but with greater intensity in 2009, UBS continued to reduce its cost base by lowering the employee count and fixed costs. In 2008, UBS's personnel headcount decreased by 6.9 % and in 2009 by further 16.1 % to 65,233. In comparison with the previous year, UBS managed to reduce its fix costs base by CHF 3 billion fulfilling its targets already for 2010. This optimization of expenses is in accordance with the general strategic shift of abandoning the expansion plan. UBS abandoned the trend of large acquisitions in the pre-crisis period. In April 2009, the bank sold its Brazilian financial services company UBS Pactual to BTG Investments, LP. Transaction was associated with significant restructuring costs of up to CHF 1.4 billion, but facilitated the decrease of bank's outstanding liabilities and increased bank's ability to focus on its traditional core businesses. (UBS 2010b, pp. 2, 10, 32)

Besides the repositioning and optimization of the cost base, UBS enhanced its strategic decision making process. The formulation of strategy decisions was distributed between GEB, BoD and IB's CEO as part of the governance reform, while the BoD retained ultimate approval right for new strategic initiatives. As mentioned before GEB adopted the role of UBS's risk council. In line with fulfilment of this function, GEB was tasked with periodical risk assessment reviews based on market conditions, macro-economic factors and portfolio sizes of standing as well as new initiatives. GEB will give special attention to the review of IB's projects, in this GEB will work together with IB's CEO to prepare estimates of expected earnings, required liquidity, financial and control resources, and how strong UBS's position is compared to main competitors in the given sector. Changes have been made also to project's post-approval period. The IB has adopted new set of governance and project management guidelines for strategically significant projects, whose management should fall under strict review process. (UBS 2008c, p. 5)

Out of all reviewed strategic and operative changes, UBS's future performance has been most influenced by the shift from the concentration on the proprietary trading, as part of the investment banking expansion, towards more intermediating and client oriented model. UBS recognized that traditionally conservative risk appetite doesn't create a well balanced mix with the resource intensive investment banking focus. The importance of IB's strategic repositioning will be further documented in Chapter 4, where the event study results demonstrate how the market reacted to the announcement of this change.

3.4.3 Risk management and control

Among the most prominent direct causes of UBS's write-downs are according to the SFBC report, shortcomings of risk management and risk control as discussed in Chapter 3.3.3. While UBS was not alone to misjudge risks associated with the subprime housing market securities, it stands out from among other banks by the total exposure to the ABS/CDOs and most of all the late recognition of the danger originating from a reversal in the housing market. Instead of performing a deep analysis, how increase in mortgage default rates will affect UBS's substantial portfolio of mortgage-backed securities, the bank actually continued to increase its exposure even in the first half of 2007. The continuation of the expansion strategy points towards the underlying problem, the cluelessness of the senior management with regard to Group's actual risk exposure. (SFBC 2008, pp. 4-6)

The mismatch between perceived and actual risks was caused by the inaccurate risk assessment on the business unit level and even in senior management's risk committees. The strategy, resources, methodology and the governance of risk management and control proved to be insufficient to cope with the complex issue at hand. UBS's risk control measured risks based only on partial information about underlying assets and preferred growth-oriented modelling to more pessimistic scenarios. The profit generation held precedence over the risk control in bank's internal hierarchy. Hence reviews of new initiatives were rushed or performed only retroactively. The risk management and control adopted risk ratings of assets from external credit rating agencies especially for complex derivatives such as CDOs, which only furthered the distortion in management's risk perception. Since UBS's leadership wanted to combine low levels of risk appropriate for bank's conservative reputation with the high growth performance, the bank held large quantities of super senior securities. This affected risk management's exit strategies, which again proved to be too optimistic. (SFBC 2008, pp. 4-7)

Therefore, in reaction to these shortcomings and based on internal and external reviews, UBS dedicated significant effort to reforming its risk management and risk control functions. The underlying principles of risk taking, assessment and control were fundamentally updated. From 2008 onwards, the positions held by UBS are to be recorded, valued and underwent risk, as well as profit/loss assessment, based on their group wide presence, not

just individual businesses units portfolios (UBS 2010b, p. 27). All business units have to act in accordance with the risk management standards and requirements formulated by IB's CEO and CRO. In line with these standards, head managers of business units should identify risks, determine business limits, set sensible objectives corresponding to the level of risk and achieve deep understanding of their unit's balance sheet. Furthermore, business units have to be able to justify their holdings of respective balance sheet, non-balance sheet and risk positions and produce explanation of how they influence business unit's overall risk and profitability. Limits on the length of position's holding period have been established. Trading desks are required to monitor the age of its positions and maintain the set limits. Each business unit has to prepare a risk portfolio review, consisting of a holistic risk assessment, which offers clear transparent look at the risks associated with portfolios, their limits and potential exit strategies. (UBS 2008c, p. 7)

The limited resources and time attributed to the approval processes for NBI/TRPA, mentioned in Chapter 3.3.3, significantly hampered the ability of the risk management functions to sufficiently assess the risk impact of new business initiatives or transactions. Therefore, the NBI/TRPA approval processes have been enhanced, to be applied to all new businesses or extensions of existing businesses, whereby transactions or initiatives with higher inherent risk are analysed more thoroughly than less risky ones. The adoption of the initiative or transaction is followed by the post-implementation review. IB CRO reviewed the functionality of models and metrics used in the NBI/TRPA processes. The mitigation of risks originating from the increased concentration of same type of transactions or initiatives was addressed by the Group CRO. The NBI/TRPA processes have been further enhanced by the inclusion of additional decision variables. New review framework integrated the identification of concentration risk, maximum holding limits, limits for each asset class and stress tests into the process. (UBS 2008c, p. 7)

Finally, the risk management function has become part of UBS's long-term strategic planning. Uniform criteria for evaluation of business plans in the individual business units and the Group as a whole were created. Submitted plans and feasibility of their targets are periodically reviewed by the CEO and members of GEB. Reviews submitted to the senior management compare results of individual business units, mainly the actual income and expenses, with projected values. By performing the regular systemic checks senior

management can identify negative developments and risks in UBS's individual business units. (UBS 2010a, p. 28)

UBS's risk control function is tasked with supervising the fulfilment of the plans set by the risk management. In order to promote the efficiency of its operations, the senior management made several changes. Firstly, the issue of overly-complex risk control organisational structure was addressed. The separation of risk control function on the basis of market and credit risk was discontinued. Members of the two teams merged to form one single risk control unit following a more integrated and efficient approach. The integration of risk control systems aimed to minimise the effects of the silo mentality. Furthermore, the IB decided to mitigate risks originating from unrecognised high concentration of its portfolio holdings by creating portfolio risk teams. Risk control checks started to be performed holistically not only for portfolios, but also for individual products, where data from the front-office systems serves as the starting point for the risk review. (UBS 2008c, p. 8)

The chain of reporting in the risk control has changed as well. Before the crisis, risk control analysts in a business unit had to answer to the business unit head manager and to the risk control specialist higher on the hierarchy. In contrast to the situation after the remediation plan was adopted, potential reporting conflicts were mitigated by simplification of the reporting structure. In the new system, business unit's CROs answer to the Group CRO as their only supervisor. Thus the risk control function has been made independent of the business division's management. In addition to aforementioned reporting improvements, the finance function of UBS started to perform the profit-loss reporting with higher frequency. Deriving from all the sources of the reporting structure UBS's senior management obtain the so called monthly performance update, an integrated form of management information, which described bank's actual performance, its immediate exposure to internal as well as external risks and financial information across business units. (UBS 2010a, p. 7)

Workings of the risk control were revisited and led to improvements in the risk control standards and methodology, which have been seen as prime causes for the late recognition of UBS's significant exposure to the subprime risk. Among the addressed areas of risk control methods were the VaR calculations, stress-tests, risk model monitoring and the aggregation of the risk. UBS chose to improve the stress testing to become more flexible and dynamic, analysing the losses from even the most extreme potential scenarios at individual

portfolio levels. Group wide stress tests are performed monthly (UBS 2010a, p. 28). In order to precede a similar concentration of unrecognized risks as was the case with the MBS/ABS securities, the Group CRO commissions regular deep analyses of individual portfolios. These analyses should verify all of the properties, assumptions and data available about the given portfolio at the underlying level. Furthermore all assumptions used in the risk control models and valuation models are to be evaluated at regular intervals. The financial function of UBS also pursued reform of the pricing models used for the trading portfolios. Based on the criteria formulated in the remediation plan, the price testing of portfolios should be independent, appropriate and occur in timely fashion in order to help decision makers to clearly evaluate the validity of the models and risks associated with the application of the models. (UBS 2008c, pp. 8-9)

The entry of UBS into new business sectors and initiatives is, according to the remediation plan, subjected to a stricter set of controls. The adoption of new large business initiatives has to be approved by the newly created risk committee of the BoD (UBS 2010a, p. 7). Additional commitment committees were established on all levels of UBS's hierarchy, tasked with supervising and approving the processing of large transactions and analysing their effects on UBS's risk appetite. Finally, UBS identified the need for improvements in the utilization and further adoption of technical and business IT systems. Each currently used or planned IT system has to be attributed clearly to a unit, manager or business function responsible for its performance. Thus, the diverse IT systems used in risk control and finance functions can interchange information and cooperate together more efficiently. However, the problems with UBS's business IT systems persisted even after the remediation process was fully adopted. This was the case in the so called Adoboli scandal in 2011, which is discussed further in Chapter 3.5. (UBS 2008c, p. 9)

To summarize, both risk functions were given profound treatment in the remediation period. UBS's leadership, guided by the series of reviews, addressed the main weaknesses. Reforms improved the standing of the risk management and control in the hierarchy of business units and increased the quality of risk assessments. Risk managers gained the organisational independence from business units heads. The separation from the profit generation was enhanced through new compensation principles, where employees of the risk functions are remunerated independently from performance of the unit they oversee. The evidence from

the recent years shows that risk reform effectively mitigated similar large risk build up as during the crisis from reoccurring.

3.4.4 Balance sheet management and funding

The ability of UBS's individual business units to finance their operations on more favourable terms by utilizing the internal funding rates, was perceived by the 2008 Shareholder report as a significant driving force in the accumulation of AAA rated ABS derivatives on UBS's balance sheet. Moreover, the funding decision process didn't take into account the liquidity or maturity of the assets, acquired through the funding. Therefore, UBS's funding framework at the time of the crisis enabled traders to perform positive-carry trades and show profit on trades, which shouldn't be profitable when using interbank funding. The lack of hard aggregate limits for balance sheet usage and RWA growth in IB's business units have given sufficient funding space for IB's traders to pursue their profit maximization incentives. The growing concentration of positions with mismatched low priced short-term funding and illiquid long-term assets had increased UBS's risk exposure. (UBS 2008b, p. 36)

In order to remedy the funding and balance sheet framework UBS has adopted set of actions in 2008 and 2009. The bank has introduced limits on the balance sheet growth as well as total RWA for the Group and also for the IB. Similarly, as was the case with the risk control function, reporting structure and processes of the funding management have been improved significantly. The fulfilment of set funding and balance sheet limits within the IB is monitored at the level of portfolios and business units. In contrast to the pre-crisis funding pricing, UBS made the internal funding cost dependent on liquidity, maturity and risk of assets intended to be purchased. (UBS 2008c, p. 9)

The newly established Asset and Liability Committees have been introduced as part of the financial resources governance at the group level. ALCO is tasked with overseeing the allocation of balance sheet resources to business divisions and monitoring how the allocated target values, formulated by the BoD, GEB and regulators, are being met. Moreover, Group ALCO monitors and analyses division's usage of funding, capital and liquidity of their positions with respect to the prevalent market conditions and division's risk profile. The Investment Bank has its own ALCO committee, put in place because of expected higher balance sheet usage, funding needs and risk exposure (UBS 2008c, p. 9). The Group

Treasury function submits monthly overviews of actual financial resource usage. Therefore, ALCO has necessary information to analyse the fulfilment of set targets at given moment as well as make assumptions about expected developments, minimizing risk of unrecognized overexposure to certain risk. (UBS 2011, p. 146)

Reform processes affected also the internal allocation of capital. New equity attribution principles were formulated by the Group CFO. The allocation of capital was closely linked to the changes in the evaluation of unit's performance. Based on the reformed standards unit's performance was assessed by means of RoE, which was adjusted by the overall risk level of the business unit. Balance sheet limits and notional limits have been adopted following the review by the Group CRO. UBS's limit structure was designed to be dynamic, regularly updated depending on market fluctuations, risk factors and bank's performance. (UBS 2008c, pp. 7-8)

UBS's leadership adapted the balance sheet management to the new strategic orientation of the bank that relies on lower balance sheet size. Limits were put into the place of previously unregulated areas such as the balance sheet usage and overall RWA. The emphasis on the dynamic adaptation of the limits to the changing external as well as internal conditions improves the effectiveness of the system while maintaining the possibility of strict control over the changes in assets and liabilities.

3.4.5 Compensation

As discussed in Chapter 2, compensation incentives of the senior management before the crisis were seen by number of researchers and authorities as at least partially relevant causes of the crisis on the corporate level. Although, both the SFBC's report and UBS's own shareholder report (see Chapter 3.3.5) argued that incentives included in compensation policy of the senior management weren't directly responsible for the losses suffered, UBS decided to adopt changes to its compensation framework.

In accordance with the strategic shift discussed before and under the pressure from its shareholders, UBS made changes to its top management compensation. The main point of the compensation reform was the change of compensation principles from providing

incentives to pursue a growth strategy, to supporting sustainable profitability, long-term stability and shareholder's value. Reforms of the compensation framework were guided by the BoD. UBS's human resources function and BoD's reformed Human Resources and Compensation Committee (HRCC), before 2008 known simply as the compensation committee, reviewed the pre-crisis senior management compensation system and made recommendations to the BoD. However, the 2008 remediation plan mentions significant limitations to changes in compensation size and conditions of senior management due to the existing competition for human resources in the banking and financial services industry. (UBS 2008c, p. 9)

Nevertheless, balancing between remaining competitive and adapting to calls for remuneration assessment based on the sustainability, the compensation reform took place. The compensation framework was significantly influenced by the adoption of the Total Reward Principles (TRP) by the BoD in September 2009. The Total Reward Principles are an underlying compensation basis for all UBS employees. Main aims of the TRP are given as follows:

- “- align reward with sustainable performance;*
- support appropriate and controlled risk taking;*
- foster effective individual performance management and communication; and*
- attract and engage a diverse, talented workforce.” (UBS 2010c, p. 4)*

The TRP framework widened the scope of factors coming into the assessment of overall business division performance. Besides the financial profit, additional factors such as: use of capital resources, level of risk, market power and shareholder opinions, are also included. The process of variable compensation determination for a business division starts with the recommendations made by division's CEO after discussion with the Group CEO, who is advised by the CFO, Group HR and CRO. Afterwards HRCC reviews the proposed compensation policy and submits it to the BoD for the final decision. In its second main point, TRP emphasizes inclusion of the risk assessment into the performance review of individuals or business unit. Profits are analysed from a long-term perspective based on the sustainability, liquidity and maturity of products, industry specific factors and expected market developments. The compensation of the risk management, risk control and

compliance units is calculated independently from the business performance of units or products they review. Individual's performance is as well not determined only by economic results, but by diverse range of factors similar to the assessment of business unit's compensation. For instance the adherence to UBS's corporate principles, protection and improving of bank's reputation, building of relationship with clients and business leaders, interpersonal management skills and the following of sound risk practices are recognized by UBS's HR function as valuable personal employee inputs and rewarded in that manner. (UBS 2010c, p. 4)

UBS sought to create overlaps in interests of senior managers and bank's shareholders. Performance determinants of the variable compensation were changed to include the profit before tax of the business unit minus the associated pro rata cost of capital. By recognizing the cost of capital in the performance evaluation, certain degree of risk weighting is included into the compensation determination in a given business unit. UBS also adopted an interdisciplinary approach to the process assessing performance and meeting of objectives by individual managers, particularly in the IB. The risk control and risk management functions will assess the effects of individual's performance on the risk level, thereby limiting the incentives for high yield high risk trades and investments. (UBS 2010a, p. 29)

As discussed in Chapter 2, the remuneration in form of firm's own shares distribution is widely perceived as one of potential tools used to align interests of firm's employees with firm's long-term objectives, despite the fact that supporting empirical evidence is limited. In 2009, UBS adopted the notion that 60% of the variable compensation of senior managers should be paid in form of shares or other equity instruments. UBS's post-crisis variable compensation may include also the malus component or full clawback provision, which are activated in case of large loss occurrence or significant balance sheet adjustments. Additionally, if employee acts in contradiction with UBS's compliance or risk management principles, malus clause might be activated. The variable compensation of UBS employees in form of equity instruments is not paid immediately, but rather it is subjected to a deferral over the period of at least 3 years (can be extended up to 5 years). During the vesting period the amount of deferred shares expected to be paid out might appreciate or depreciate based on further developments of the profit criteria, on which compensation was attributed. For the performance equity plan, the number of vested shares can move between zero and two times the number of originally granted performance shares, where two performance indicators, the

economic profit and the total shareholder return, are used to evaluate the fulfilment of performance targets. The cash component of the variable compensation is also divided into the immediate pay-out and deferred cash compensation. At least 40% of the cash variable compensation have to be deferred for up to 2 years. (UBS 2009e, p. 6) (UBS 2010a, p. 29)

Even before the crisis, UBS's compensation framework featured various methods supporting the alignment of top executive's incentives to shareholder's interests. Although the compensation wasn't the most important factor in development of UBS's write-downs, the remediation process managed to address the low sensitivity of the compensation related performance measurement to risk and long-term sustainability. A major contribution in this area of compensation incentives is the inclusion of assumptions about the characteristics of attained earnings, project's capital intensity, effects on UBS's reputation and long-term risks. This multi-factorial model of compensation determination could represent a better tool for alignment of employee's incentives with shareholder's interests than traditional share option grants. As literature review showed, firms with high executive shareholdings didn't perform any better and actually their performance was comparatively even worse. The future research in the field of compensation could look deeper into the optimization of long-term compensation incentives by inclusion of variables promoting sustainability into the measurement process, as was the case in UBS.

3.5 UBS after the crisis

The following chapter will offer an overview of how UBS's situation developed after the period of crisis turmoil and subsequent internal reform. Chapter 3.2 ended with UBS successfully on the track to improve its financial stability. The bank strived to rebuild its image of a Swiss conservative bank and regain the shareholder's trust by focusing on improvements of bank's performance and governance. Upon the ascension to the position of UBS's CEO, Mr. Grüber announced his target for the 2014 pre-tax profit to be CHF 15 billion (Bloomberg 2016d). First positive signals in line with this target appeared in 2010, when UBS achieved annual net profit for the first time since 2006. As in the preceding year, balance sheet optimization, decrease of RWA, cost base reduction and building of capital reserves continued to remain in focus of the senior management. On the whole UBS's

leadership emphasized the strong performance of the Wealth Management division, Global Asset Management division and positive expectations after the restructuring of the IB business. (UBS 2011, pp. 2-4).

However in 2011, the bank's performance was influenced by the series of negative developments. The outbreak of the European sovereign debt crisis combined together with the global macroeconomic slowdown, led to the decrease in demand for financial services and lower trading activity. The regulatory framework also underwent changes. The eminent adoption of Basel III capital base requirements increased bank's cost of capital through the higher demand for capital reserves. UBS, as a Swiss systematically relevant bank, has to follow specific "too-big-to-fail" rules formulated by FINMA, which add to the Basel III capital requirements. Under the 2011 conditions, UBS's total capital requirement amounted to 19 % (UBS 2013, p. 30).

In addition to the difficult conditions in the industry, over the summer of 2011 UBS also suffered an unexpected losses of CHF 1.8 billion in a case of rouge trading by bank's employee. Mr. Adoboli, an equity trader in UBS's London office, caused the loss by unauthorized trades while disregarding the agreed risk limits, using off the books secret accounts to camouflage the losses and performing failed-to-deliver trades in order to produce a fake lower risk exposure (Economist 2016). In the aftermath of the scandal, UBS's then CEO Mr. Grüber resigned under the pressure from major shareholders. Nevertheless, UBS still showed net profit at the end of the year and the management emphasized the significant influx of new net money into the bank, reduced RWA, stronger capital base and increased operational efficiency through announced cost base reductions. In August 2011, as part of its cost saving measures, UBS announced a plan to cut CHF 2 billion in costs. UBS reformulated its strategy, in which the Wealth Management and to a lesser degree the Global Asset Management played leading roles. The IB should supplement the needs of the two main divisions and exit capital intensive initiatives such as the Fixed Income business. (UBS 2012, pp. 2-5)

The profit recovery was interrupted in 2012, year UBS closed with the net loss of CHF 2.48 billion attributable to the shareholders. Despite the general improvements of performance in the business divisions, UBS showed negative profit mainly due to the goodwill impairments in the IB, ongoing operational restructuring and settlement of UBS's involvement in the

LIBOR manipulation scandal (UBS 2013, p. 73). In December 2012 the US Commodity Futures Trading Commission (CFTC), UK's Financial Conduct Authority (FCA, formerly FSA) and Swiss FINMA (formerly SFBC) found UBS guilty of not only participating in but actually leading the rigging of LIBOR rates, with the aim of obtaining unfair advantage in trades on securities related to the LIBOR rate. UBS agreed on settlement with the CFTC and FCA that reached the total of USD 1.8 billion. (Enrich and Eaglesham 2016)

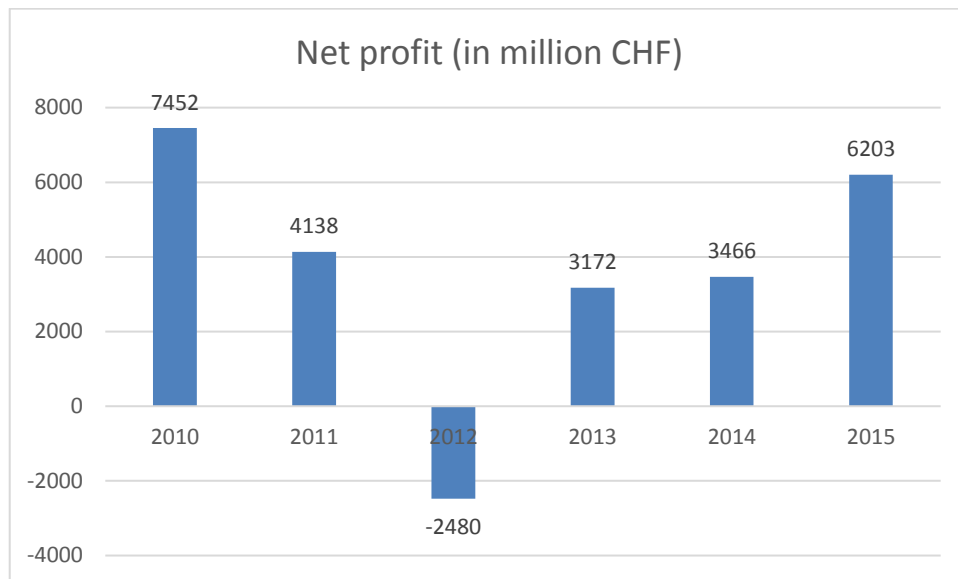


Figure 4: Net profit attributable to UBS shareholders 2010-2015
Source: Own representation based on UBS annual reports

Still in the subsequent years, UBS once again returned to profitability, although not to the degree the former UBS CEO Mr. Grüber wished for. Figure 4 illustrates the sequence of net profit/loss results in the post crisis period from 2010 up to the 2015. While 2013 and 2014 brought stable net profits of around CHF 3.1-3.4 billion, 2015 saw significant increase in the profitability reaching a new record value for preceding 5 years. The post-crisis period can be characterized by the continuing increase in profitability of UBS business divisions, decrease of RWA, capital base strengthening and cost base savings. On the other hand, with the exception of meeting the capital requirements and RWA reduction targets, UBS was struggling to consistently meet its profitability targets (Bloomberg 2016e). Since 2014 the macroeconomic and geopolitical setting presented UBS with series of challenges such as the regulation of the financial industry, crisis in Middle East, Eastern Europe, slowing of Chinese economy, high corporate debt in the US, possibility of Brexit, stagnating EU growth and low commodity prices. These factors increased market volatility and decreased the

trading volume. Despite the challenging environment for financial firms, UBS senior management expects further improvements in bank's profitability and cost efficiency beyond 2016. (UBS 2016c, pp. 2, 37)

3.6 Evaluation of UBS reforms

The remediation and reform process of UBS extends to the current day. Therefore, the proper analysis of process's success doesn't have the benefit of sufficient hindsight. On the other hand, the majority of structural changes, and corporate governance as well as risk management reforms have been performed between second half of 2008 and end of 2009. Further changes could be described as continuation of already set trend, which focused on ongoing improvements of the operative efficiency. When looking on bank's stock performance, there is a clear reversal in the UBS stock price trend after the first quarter of 2009. During this period bank's profitability improved significantly. Perception of regulators changed as well, when the Swiss National Bank effectuated its MCNs holding in UBS. The conversion of notes into UBS equity signals the regulator deemed UBS's progress sufficient and regained trust in bank's operations.

The question arises, how UBS reforms compare to the trends in the industry? In 2010, Nestor advisors, private corporate governance consulting company, performed an analysis of corporate governance quality present in the European banking industry. Building on their previous overview of corporate governance crisis causes in similar sample group, Lawton and Nestor describe the trends in bank's corporate governance and formulate set of recommendations how the governance of banks can be improved. UBS fulfils the majority of the recommended actions proposed by the authors. Among the already adopted recommendations are improvements in the risk management, concretely the determination of bank's risk appetite by its board ex ante and the inclusion of the CRO into GEB. As recommended by Nestor advisors, UBS adjusted its compensation framework to take into account not only performance, but also risk associated with the activities of employees or business units. Key performance indicators now include series of risk measures and additional non-performance variables. UBS also increased the frequency of its stress testing utilizing holistic approach, whereby underlying assumptions are also subject to sensitivity analysis. Authors of the Nestor advisors study suggest that banks ask following question:

What could destroy the bank? Such reverse stress testing is missing in UBS. On the other hand, the bank has improved the scope of stress testing and after the crisis recognizes relevancy of the extreme scenario testing. From the board governance perspective, UBS distributed the board rights and responsibilities more equally from the abolished Chairman's office to the BoD committees. In accordance with Nestor advisor's recommendation, UBS's BoD consist of directors from all walks of life, with wide spectrum of careers offering different valuable perspectives for problems on hand, but still majority has financial experience in common. In the post-crisis system UBS's BoD has taken on stronger, more decision making oriented role. However UBS BoD's functionality has still room for improvement. Frequency of BoD evaluations could be increased, as well as the incentive structure for BoD members. (Lawton and Nestor 2010, pp. 4-6)

Despite UBS taking significant steps in the right direction, the fulfilment of promises made in 2009 wasn't successful at all levels of UBS functions. As previously discussed, during the post-crisis period UBS suffered extraordinary losses caused by the illegal actions of some UBS employees. The so called Adoboli trading scandal, Libor manipulation and series of other smaller incidents all demonstrate significant problems in UBS's internal control and risk management functions. UBS strived to persuade its shareholders and regulators that it should regain their trust through implementation of measures promoting long-term sustainable performance. However, aforementioned incidents question the validity of such statements at least with regard to the internal control at lower business levels.

Mr. Adoboli was performing trades on the exchange-traded-funds (ETF) desk worth of billion dollars and successfully managed to hide the true risk exposure, which before the incident came to light, was around USD 12 billion. What is more interesting, Mr. Adoboli reported that allegedly his colleagues on the ETF desk utilized same mechanisms to increase their profitability. Additionally, he emphasized the contrast between official messages from senior management supporting reasonable long-term oriented risk taking while simultaneously putting pressure on traders to significantly increase profits. The management's push for higher profitability might be associated with formulation of new long-term performance targets by then UBS CEO Mr. Grüber (Bloomberg 2016d). In the case of Libor manipulation, responsible UBS managers might had been similarly motivated to increase the profitability through unfair advantage over other investors in the market. The main point taken from these cases is the inability of the internal control to discover such

illegal behaviour in a timely manner. The location of given offices, which particularly in the Adoboli case was distant from UBS's main offices in Switzerland, could increase the difficulties of the central internal control function in monitoring actions of respective business units. (Economist 2016)

While UBS tried to excuse the late reaction to fraudulent trades by Mr. Adoboli's use of fictitious FTE trades to offset the risk exposure created by his unauthorized trading activity, such argumentation was perceived as questionable by major shareholders and researchers alike. Michael Schrage argued in his article for the Harvard Business Review that UBS's risk management, if run correctly, should have been able to notice the inconsistency in Mr. Adoboli's trading activity at the moment of trade's execution. To make the matter worse, according to Schrage, risk management of respective unit either didn't create overlapping risk controls to eliminate any possibility of the fictitious trades or didn't use them properly. The contrast between thorough recognition of causes behind the UBS's write-downs, risk management and risk control being chief ones among them, and actual application of the lessons learned is summarized by Schrage in following statement:

“Any serious review (accent on serious) of what UBS risk managers and traders were actually doing, as opposed to planning, in the realm of risk control would have revealed the shameful inadequacies that invited this multibillion dollar loss. The Swiss did an excellent job of diagnostics; they did a miserable job of taking their medicine.” (Schrage 2016)

The lesson acquired from the two fraudulent incidents is the need for thorough implementation of the agreed remediation plan and subsequent periodical evaluation of reformed systems. UBS's senior management recognized its responsibility, when the UBS CEO Grüber stepped down. After 2011, UBS also declared new round of improvements in the risk management and control functions. The review of the post-crisis UBS developments showed that well prepared reform plan has to go hand in hand with significant support from the senior management. The rogue trading incident demonstrated that formulation of new governance and risk management principles isn't enough to guarantee adherence from the side of junior employees. Heads of business units have to actively endorse the application of official guidelines into the actual working performance. It would be also advisable for the management to increase the integration of units controlling risk throughout the hierarchy. Furthermore, robust system of checks and balances should be put into place even at business units with lower amount of trading volume or further from the main centre of activity. UBS

management should analyse the existing IT systems based on their compatibility and look for solutions aiming to improve the transparency of control systems. (UBS 2012, pp. 2-4)

The unfinished restructuring of the internal control functions disregarding, UBS has gone long way from standing on the edge of bankruptcy to the relative successful stabilisation of its financial situation. The risk management and risk control improved significantly on the firm-wide scale. UBS substantially decreased its RWA and balance sheet size. The stricter balance sheet usage and asset class limits were put into place. The operative efficiency increased through reduction of cost base. Compensation incentives of executives as well as traders promoted sound risk consciousness. The list could continue as previously discussed, nonetheless it is not easy to approach the question of how successful UBS reforms were from the quantitative perspective.

Following two chapters will aim to produce an empirical evidence for the effectiveness of UBS post-crisis reform process and its reception by the market. Although, both of the chapters look on the market valuation of UBS's stocks, they differ significantly in their methodology. Firstly, the event study will analyse the effect of events associated with adoption of structural reforms on UBS's stock return as an indicator of market's trust and perceived market value. Results of the event might shed more light on how different reform actions were perceived. Subsequently, chapter 5 produces valuation of UBS which is then compared with the market value at the point of time, when structural and strategic reforms were already adopted and effects of financial crisis subsided.

4. Event Study

The method of event study represents first applicable approach to the analysis of UBS's reform success. More specifically, the influence of events associated with the reform process on UBS's stock performance. It should be stated that this thesis recognizes significant difficulties in applying the event study method to the crisis setting. The crisis years 2008-2009 were characterized by the periods of high volatility and uncertainty. The crisis volatility makes long-term predictions less reliable, which is apparent in the post-event window estimates. Moreover, with regard to the definition of events, the adoption of reforms and

further structural as well as strategic changes can't be exclusively attributed to a single event. The assessment of the overall reform success, as viewed by the market, is made even more difficult due to the significant time passed between declaration of given measure and its full successful adoption in majority of cases. Nevertheless, three events chosen in this event study represent main stages of the UBS remediation.

The following event study uses the standard methodology as described in the paper by MacKinlay (1997) with a slight adjusting. The subject of the event study is a single firm, UBS AG. Daily data necessary for the study have been downloaded from the Wharton Research Data Services (WRDS) database. In order to capture the whole process of reform changes in the bank, and compensating for the difficulties with the event definition, three event studies have been performed. UBS suffered losses by the beginning of 2008, afterwards identification of internal failings and their remediation followed occurring the in second and third quarter of the same year. The first event, analysed by this study, occurred on 12 August 2008, when the official remediation plan detailing planned adoption of the major corporate governance, risk management, internal control reforms as well as strategic repositioning has been made public (UBS 2008c, p. 3).

Little more than a month after the first event Lehman Brothers announced its bankruptcy. In reaction to the once again increasing losses, UBS announced extraordinary general meeting of its shareholders. Main items of the meeting, which took place on 2 October 2008, was the approval of changes to UBS's corporate governance framework and the election of 4 new BoD members. At the same time personnel changes were made on position of the Group General Counsel, Group CFO and Group CRO (UBS 2008g, p. 2). On the next day 3 October 2008, UBS announced strategic repositioning of the IB. These two days constitute the second event analysed in the study. Third event, the Investor Day on 17 November 2009, represents the latter phase of the remediation process. On this day, UBS presented the new strategy and targets for the Groups, improvements in performance, and also reviewed the progress made in the adoption of reforms detailed in the remediation plan (UBS 2010d, p. 4).

The methodology used in the event study will be illustrated on the example of the first event. Remaining two events have been analysed with the same framework with only small differences in length of the estimation and post-event window. The adjustments to the length of respective windows has been made with the aim to exclude other major events which could influence the estimation. For the first event on 12 August 2008, the estimation window

was set from 3 January 2008 to 31 July 2008 encompassing 146 trading days. The event window lasts 4 days from 11 August to 14 August 2008. The post-event window starts on the last day of the event window and finishes on the 9 September 2008, just 6 days prior to the Lehman Brothers bankruptcy. The length of the post-event window is 18 days. This study uses Market model to estimate the coefficients for the prediction of normal returns in the event and post-event windows. The Market model is defined as follows: (MacKinlay 1997, p. 18)

$$R_{it} = \alpha_i + \beta_i * R_{mt} + \varepsilon_{it}$$

where R_{mt} is represented by the S&P500's market return. Calculations necessary for the event study are performed with the help of the EViews 8 software. The abnormal returns for event and post-event windows are calculated as the difference between actual UBS daily returns and predicted normal returns based on the Market model OLS regression from the estimation window. Abnormal returns are summed up over the length of respective windows creating cumulative abnormal returns (CAR). CAR of the first event window amounts to – 4.5% and post-event window CAR to 20%.

This event study uses the T-test statistic to determine the significance of calculated CAR values. The standardized cumulative abnormal returns (SCAR) are calculated based on the formula shown below:

$$\widehat{SCAR}_i(\tau_1, \tau_2) = \frac{\widehat{CAR}_i(\tau_1, \tau_2)}{\sigma_i(\tau_1, \tau_2)}$$

The symbols τ_1 and τ_2 are representing the beginning and the end of the analysed period, in this case the event window from 11 August to 14 August 2008. The estimated CAR of the event window -4.5% is divided by the standard deviation of UBS's returns. The resulting SCAR value, - 6.87 for the first event, is compared with the critical value of T-distribution. The corresponding critical value for the two-tailed test with $\alpha = 0.05$ and 16 degrees of freedom ($df = T - 2 = 18 \text{ trading days} - 2$) is ± 4.30 . Since SCAR is negative and its value is less than the critical value the null hypothesis, formulated as no impact of the event on UBS returns, can be rejected. Therefore the results are significant, showing negative relationship between the event and UBS share performance.

The direction of this relationship is counterintuitive to the presumed positive impact, publication of comprehensive remediation plan should cause. It is difficult to find a concrete explanation behind market's immediate negative reception of the plan. Particularly interesting are results of the post-window analysis, where positive abnormal returns have been tested to be statistically significant. The cumulative value of these returns is 20.01%, which is substantial over such short period. One explanation of the delayed event's impact could be lack of trust in UBS management. The plan then necessitated longer period of time to gain acknowledgement from the investors. On the other hand, as already mentioned before, the estimation might be significantly influenced by the highly volatile crisis setting and omitting of further potentially relevant variables in the model.

		12.08.2008	02.10.2008	17.11.2009
Event window	CAR	-4.50%	33.26%	-4.71%
	SCAR	-6.87	35.38	-7.86
	CV	±4.30	±4.30	±4.30
	Significance	Yes	Yes	Yes
	Length in days	4	4	4
Post-event window	CAR	20.01%	2.94%	-8.65%
	SCAR	14.40	1.15	-5.35
	CV	±2.12	±2.05	±2.05
	Significance	Yes	No	Yes
	Length in days	18	30	29

Table 1: Event study results

Source: Own representation

Table 1 above summarizes the event study results for all three event and post-event windows. Only the second event caused significant positive impact on UBS's share performance during the event window. The confirmation of changes to bank's corporate governance framework and senior leadership, as well as newly declared strategic orientation of the Investment Bank, seem to be well received by the market. Over the 4 days of the event window calculated CAR amounted to 33.26%. However, the analysis of the subsequent post-event window showed no significant abnormal returns. Thus it seems the impact of the event was concentrated around the event dates and its influence on the market valuation can be

distinguished from other developments. The final event, the Investor Day on 17 November 2009, is associated with negative significant impact on UBS's share performance. Different to the first event, negative significant abnormal returns are repeated also for the post-event window.

It is of interest to note that events connected to either the formulation of UBS's reform process or subsequent evaluation of its adoption, actually significantly influence UBS's share returns in negative manner. On the other hand, the extraordinary meeting was characterised by the sole positive significant impact, which was also strongest in absolute values. Based on this event study analysis, it seems that in the case of UBS AG its shareholders positively perceived adoption of concrete measures, which might be better observable for the market. In contrast, the remediation plan and announcements on the Investor Day were more uncertain, future oriented and complex in the nature, presenting investors only with limited possibilities to analyse the true level state of internal workings properly. To conclude, this chapter tried to look on the reception of UBS reform process by the market. Based on three distinctive events, it is safe to assume that the reforms were accepted with certain degree of scepticism and concrete more directly observable provisions were preferred.

5. Valuation of UBS AG

The following chapter will discuss the valuation of UBS AG at the end of 2010. A time, when the majority of post-crisis corporate governance and risk management reforms were, as declared by UBS management, successfully adopted (UBS 2011, pp. 2-4). Results of this thesis's valuation analysis should offer more insight into the question, if UBS was valued by the market adequately or if there were significant differences in the value. A comparison of valuation results with the real data, could also show which assumptions about valuation estimators correspond best with the market valuation at the time.

5.1 Valuing financial firm

The valuation of financial firms presents a great challenge due to the underlying structural as well as regulatory differences between them and ordinary firms. In Chapter 2.1.2 of the literature review, major differences influencing corporate governance of banks from Mehran et al (2011) are named. These specifics of financial firms carry over by a large degree also into the valuation. Damodaran (2009) gives three main characteristics of banks which create difficulties in their valuation:

1. Financial service firms utilize debt in a very different manner to ordinary firms. Damodaran likens the use of debt in banks to a “*raw material*” instead of just source of capital, as is the case with both debt and equity in a non-financial firm. Additionally, the definition of debt is less clear than in traditional companies. Should checking account deposits be defined as debt owed by bank to the depositors? Such definition would cause misrepresentation of real operating expenses for a bank. Balance sheets of banks are opaque and the capital structure is harder to determine. Finally financial service firms operate with high leverage usually between 85% and 90%. (Damodaran 2009, pp. 7-8)
2. Because of financial service firm’s systemic importance for economic stability, they are subjected to stricter regulatory framework than non-financial firms. Damodaran names capital requirements, restrictions to investment activities and entry to the market as main examples of financial industry regulation. The regulation in general increases uncertainty for firms and makes the predictability of firm’s future growth, dividends and capital structure more difficult. (Damodaran 2009, p. 5)
3. Lastly, financial service firms follow different accounting rules as is the general praxis in the non-financial sector. Since large portion of financial firm’s assets are financial instruments actively traded on financial markets, where their values fluctuate significantly, these firms favour mark to market recording (at the fair value) instead of looking back at the original inputs. The logic behind the preference for market value is the relatively objective valuation by the market without a need for estimation. However, the mark to market creates difficulties in the relative valuation, mainly book value multiples and RoE. Furthermore, banks create loss provisions and average losses over the years to minimize the influence of sudden one-time downturns on their earnings sheets. (Damodaran 2009, pp. 6-7)

As previously noted, regulation limits the investment possibilities of financial firms. Damodaran states that the lack of clarity with regard to reinvestment, particularly measuring of net capital expenditure and working capital, is persisting for financial firms. Therefore, without information about reinvestment, it is challenging to calculate firm's free cash flows (FCF) and make assumptions about their future growth rate. The valuation is furthermore aggravated by the high leverage, coupled with ambiguous broad definition of financial firm's debt and the low cost of borrowing. These factors cause cost of capital to be unrealistically low. (Damodaran 2009, pp. 8-10)

5.2 Valuation methods

Aforementioned specifics of financial firms and situation of UBS at the time of valuation have to be taken into consideration, when choosing proper method by which the bank should be valued. The difficulties with the cash flow (CF) estimation and WACC calculation make standard Discounted Cash Flow (DCF) firm valuation based on FCF not applicable in the bank setting. Second approach to the DFC is equity valuation. This valuation strategy is more preferable in case of financial firms, since it limits need for debt definition and WACC calculation. In normal setting free cash flows to equity (FCFE) are discounted by bank's cost of equity (CoE), see formula bellow. (Damodaran 1994, p. 10)

$$Value\ of\ Equity = \sum_{t=1}^{t=n} \frac{CF\ to\ Equity}{(1 + k_e)^t}$$

However, it is difficult to estimate the FCFE without net capital expenditure and working capital. One possibility to solve this problem is the Dividend Discount Model (DDM). This approach works with dividends as representations for CF to equity, which are discounted by CoE. Dividends serve as a sound representation of cash flows primarily in companies with stable dividend payout policy and moderate growth. On the other hand, company may be currently paying overly high dividends e.g. intending to raise the stock price or limiting its dividends payouts to save extra cash for investing in viable projects which could increase value in the long-term. In both cases DDM based on current dividends produces over- and undervaluation respectively. UBS at the end of 2010 is far away from an example of a

moderate growth bank with stable conditions. Moreover, UBS at the time was subjected to changing regulatory setting following the adoption of Basel III criteria. In its 2010 annual report, UBS declared it wouldn't be paying out dividends in the immediate future (UBS 2011, p. 26). Therefore it wouldn't be optimal to pursue valuation relying mainly on dividend payouts and their estimated growth rates. Following this line of reasoning DDM doesn't seem to be the preferred method of UBS valuation. (Damodaran 2009, pp. 10-15)

Second variation of equity valuation changes the formula how FCFE is calculated to circumvent the problem with missing net capital expenditure and working capital. This model is closer to the original equity valuation DCF. The reinvestment as part of the FCFE formula is defined for banks differently. Instead of using net capital expenditure and working capital, reinvestment is defined as reinvesting in regulatory capital, see formula bellow.

$$FCFE = Net\ Income - Reinvestment\ in\ Regulatory\ Capital$$

The rest of the calculation follows the way of traditional DCF model. Nevertheless, at the time of this valuation UBS was subjected to significant changes in its regulatory framework. Therefore, the model would require series of assumptions to be made about the development of capital requirements which UBS was obliged to fulfil. (Damodaran 2009, pp. 21-22)

After the comparison of three equity valuation approaches from Damodaran the final so called *excess return model* was chosen for the UBS valuation. Firm's equity value at the time of valuation is calculated as follows: (Damodaran 2009, p. 22)

$$\begin{aligned} Value\ of\ Equity &= Currently\ Invested\ Equity\ Capital \\ &+ PV\ of\ Expected\ Excess\ Returns\ to\ Equity\ Investors \end{aligned}$$

From the formula it is apparent that model needs two main inputs: current invested equity capital and excess return on equity investments. Book value of equity can be used as a viable measure for the first input, since particularly in financial firm, as discussed before, the gap between book value and market value of assets is small. Excess equity return is defined by the difference between RoE and CoE, see formula bellow. (Damodaran 2009, p. 23)

$$Excess\ Equity\ Return = Invested\ Equity\ Capital * (RoE - CoE)$$

The present value of the excess returns, which are discounted by the CoE, from the given valuation period is added to the terminal value of excess returns. Formula for the terminal value is defined in following way:

$$\text{TV of Excess Returns} = \frac{\text{Net income}_{T+1} - (\text{CoE}_{T+1} * \text{BV of Equity}_{T+1})}{\text{CoE}_{T+1} - \text{Expected Growth Rate}}$$

The “ $T + 1$ ” lower index stands for the next year after the valuation period, when PV of excess returns was calculated. In the final step beginning BV of equity for the first year of the valuation is added to the sum of excess returns PV and TV. The resulting equity is divided by the number of shares in order to calculate the implied share value. (Damodaran 2009, p. 25)

The excess return model limits the need for precise assumptions about changes in capital structure. Although it still accounts for dividends, the calculation doesn’t rely solely on dividends as in DDM and can proceed with a dividend payout ratio of zero. In addition to the excess return model valuation, UBS will be valued independently with ratio multiples. Relative valuation will be based on P/E and P/BV multiples. Afterwards the results from the two different approaches will be compared and may potentially offer further insight into the UBS valuation.

5.3 Excess return model

Following valuation will be inspired by the model presented in Damodaran (2009). The valuation period goes from 2011 to 2015, followed by the calculation of the terminal value. As a first step in the setting up of the model, the equity invested at the end of 2010 has to be determined. UBS’s 2010 annual report gives the book value of equity on 31.12.2010 as CHF 51,868 million. The end value of equity in 2010 and thus beginning value for 2011 is multiplied by the estimated RoE to predict the net income for 2011. The estimated equity cost, product of CoE and BV of equity, has to be subtracted from the net income. The difference is defined as excess return which is to be discounted by the respective cumulative CoE. The beginning BV of equity for the successive year is computed from the preceding year’s beginning value plus retained earnings after dividend payouts. The process repeats

itself until year 2015, after which the terminal value is calculated. In order to proceed with the calculation inputs of the model: CoE, RoE and dividend payout ratio, have to be estimated. (Damodaran 2009, p. 24)

5.3.1 Cost of Equity

The calculation of CoE follows the standard formula with risk free rate, beta and market premium, values for all which have to be found in order to proceed: (Berk and DeMarzo 2014, p. 401)

$$\text{Cost of equity} = rf + \beta * (E[r_{Mkt}] - rf)$$

The Swiss treasury bond with the maturity of 10 years issued in 2010 has been chosen as a measure of the risk free rate. The interest rate on the given t-bond is 2% (SNB 2016). Same rate applied also for the issue in 2011 and at the end of 2010 Germany issued comparable federal treasury bonds at the similar rate of 2.25% (BDF 2016). Therefore the 2% risk free rate seems reasonable for the Swiss based bank.

Next, the measure of systematic risk, so called beta, was to be estimated. The basic procedure of calculating beta is the slope regression. Following values for UBS beta were calculated by regressing UBS daily stock returns on SP500 daily returns:

Regression period	Beta
2008-2010	1.83
2009-2010	1.87
2010	1.62

Table 2: UBS regression betas
Source: Own representation

From the regression betas above, it is clear that UBS stock returns had higher volatility compared to the whole market during the crisis period of 2008-2009 than in 2010. It appears UBS's beta has been changing significantly after the effects of financial crisis have subsided.

The reasons for it may be the decreased market volatility itself, structural changes in UBS, decrease of IB's exposure and higher capital ratios. Therefore, it is preferable to not include the crisis-influenced data into the regression, when determining beta for 2011-2015. Furthermore, one problem with the use of daily returns in the regression is the fact there is more noise than with weekly or monthly data. However, the weekly data was not available in the CRSP database used as a data source. Since decision was made to concentrate on the year 2010 for calculating the beta, and the monthly data didn't possess sufficient frequency, daily returns have been chosen as the best data for the regression.

Damodaran recommends use of so called *bottom up* betas, where beta is computed for each industry firm is active in and then weighted average of the individual industry betas is calculated (Damodaran 2009, p. 16). Nevertheless, this valuation uses simpler variation of bottom up betas and instead looks at the average beta of UBS's peer group used later in the relative valuation. Bank's daily returns from 2010 were regressed same as UBS before. Table 3 shows the individual betas of banks from the peer group and the group average of 1.5. Logic behind the use of the average from these banks is that they provide on average a good approximation for the business mix of UBS since the bank itself recognizes them as its direct competitors (UBS 2011, pp. 78, 226). When comparing the individual regression UBS beta with the average of the peer group the values are relatively close. Moreover Damodaran gives the average beta of European banks at the end of 2011 as 1.5 as well (Damodaran 2016). In the light of at the time ongoing improvements of UBS's capital base the value of 1.5 is a better estimation as the regression output of 1.6, therefore the former value is used in the CoE calculation for the first 5 years. The beta used in the calculation of terminal value's CoE has to be lower than the original value, because of the stricter capital requirements and UBS's own declaration of plan to keep the Tier 1 capital even higher than minimal requirements. The long-term beta would be further influenced by management's decision to limit the size and risk of the investment banking business. When looking at the trend how UBS's beta developed from 1.8 in 2008-2010 to 1.6 in 2010, the long-term beta is expected to trend towards 1.2, which is the value used for terminal value beta in the model.

Peer Group	Beta
Bank of America	1.57
Barclays	2.32
Citigroup	1.44
Credit Suisse	1.61
Deutsche Bank	1.89
Goldman Sachs	0.93
HSBC	1.09
JPMorgan Chase	1.33
Morgan Stanley	1.32
Average:	1.50

Table 3: Peer group betas
Source: Own representation

The final part of the CoE formula is the market risk premium, defined as the difference between the expected market return and the risk free rate. This valuation doesn't proceed with the estimation of historical market risk premium, since as Damodaran states the historical premiums are backward looking and don't provide reliable future oriented perspective. Instead he proposes the use of implied risk premium that is defined as required RoE on current market investment (e.g. S&P500 index) yielding expected dividends in the future. Damodaran proposes two DCF model based methods of the implied premium calculation. First method uses the actual dividends paid on given market index, mainly S&P500. Future dividends are predicted based on several years of historic dividend data. Second method uses potential dividends measured by free cash flow to equity instead of actual ones. The logic behind this approach is that according to Damodaran firms tend to accumulate excess cash to finance the stock buybacks and only half of the FCFE is paid in form of actual dividends. Therefore, he proposes to add the stock buybacks to the paid out dividends. The following valuation will utilize results of Damodaran's own calculation of implied premium with the FTE approach for the year 2010. The 2010 value of implied market premium in developed markets, based on USA, is 5.2% (Damodaran 2016). Since the majority of UBS's business activities lies in Europe and USA this valuation uses the implied premium value of developed markets without further country-specific premiums. (Damodaran 2015, pp. 66-70)

Inserting all aforementioned estimates into the CoE formula leads following results:

$$\text{Cost of Equity} = 2\% + 1.5 * (5.2\%) = 9.8\%$$

The CoE value of 9.5% is used in the model for first 5 years, from 2011 to 2015. In the long-term UBS's beta is expected to decrease further to 1.2 as argued before. With the other two inputs remaining the same the terminal value's CoE calculation yields:

$$\text{Cost of Equity (TV)} = 2\% + 1.2 * (5.2\%) = 8.24\%$$

5.3.2 Dividend Payout Ratio

In 2010, UBS didn't pay out any dividends despite the positive EPS of CHF 1.99. Moreover, bank declared in its 2010 annual report, it won't be paying out dividends in the near future (UBS 2011, p. 26). At the same time UBS had to adapt to the stricter capital requirements prescribed by the regulators. In this setting the estimation of dividends for the valuation period 2011-2015 doesn't yield a straightforward answer. The average UBS dividend payout ratio from 2002 to 2006, time when dividends were paid out, was 48.02% and the average payout ratio from 2002 to 2010 was 33.80%. With regard to the expected zero dividend payment for 2011 and possibly 2012, followed by then expected return to the pre-crisis dividend policy in order to improve shareholder's relations, the payout ratio of 30% seems to be a reasonable approximation. Long-term dividend payout ratio used in the terminal value should correspond to the continuation of pre-crisis dividend payouts. Therefore, the terminal value calculation uses the dividend payout ratio of 50%.

5.3.3 Return on Equity and Growth

Whereas the inputs of the CoE calculation can be estimated with reasonable precision, same cannot be said about UBS's RoE. This profitability measure is highly dependent on UBS's future performance which in turn is affected by bank's efficiency, global economic developments, situation in the financial industry, changes to the relevant regulation and even potential legal conflicts. As the analysis later shows, the RoE is the most sensitive element of the model. Uncertainty about the RoE during the valuation period creates need for

consideration of different scenarios. The basis for the formulation of these scenarios will be historical RoE developments. Table 4 shows the historical RoE in last 10 years before the valuation year.

Year	RoE	Year	RoE
2001	14.8%	2006	26.5%
2002	13.9%	2007	- 10.5%
2003	20.9%	2008	- 58.7%
2004	24.3%	2009	-7.5%
2005	27.7%	2010	16.7%

Table 4: UBS historical RoE

Source: own representation based on data from UBS annual reports 2001-2010

The arithmetic average RoE from 2001 to 2010 is 6.81%. Since the average is significantly influenced by the losses UBS suffered between 2007 and 2009 and the value of 6.81% is low in comparison to the pre-crisis RoE and UBS's long-term targets, the scenario using this value is defined as conservative. Still in the long run, UBS's RoE would be expected to increase further even if not reaching the pre-crisis levels, which were influenced by UBS's participation in the subprime bubble. The terminal value RoE of 10% is a reasonable estimation of UBS's long-term performance based on the historical record and bank's own target declaration. Moving from the conservative scenario as the base line, the moderate scenario works with the assumption of slightly higher RoE of 9% from 2011 to 2015 and 11% for the terminal value calculation. Finally, the optimistic scenario is based on the targets proposed by UBS's then CEO Oswald Gröbel, who set the expected 2015 target to be 15% with further increase up to 20% (Reuters 2016c). In this scenario the 2011-2015 RoE is set at 11% with terminal value RoE being 13%. The highest RoE estimates are still lower than UBS's 2010 RoE of 16.7% and also lower than the targets set by Mr. Gröbel. Reasons for the sceptical approach to UBS's RoE prediction are: uncertainty following the sovereign debt crisis, regulatory pressure to increase the Tier 1 capital ratios, strength of IB's performance, UBS's post-crisis legacy costs and pending lawsuits in the cross-border tax evasion case. The reliance of the model on RoE estimation is the biggest limitation of this valuation, since it causes high sensitivity of the results to changes in this input variable. On the other hand, the rest of the model is based on reasonably rationalised assumptions and it enables us to model different performance scenarios in a very direct tabular manner during

times which were significantly volatile. Table 5 summarizes the scenarios with their respective RoE values.

Final variable to be estimated is the long-term growth of net income used in the terminal value formula. Using the equation for the growth rate in net income from Damodaran (1994, p. 84):

$$g = \text{Retention ratio} * \text{RoE}$$

where retention ratio is defined as $1 - (\text{TV dividend payout ratio of } 0.5) = 0.5$. Following long-term growth rates can be calculated respectively for the three scenarios: 5%, 5.75% and 6.5%. In the light of this valuation's decision to incorporate potential long-term risks and uncertainties in which UBS has to operate, the long-term stable growth results have been reduced by 0.5%, 0.75 and 1%. The growth rate values are shown in Table 5 below.

	Conservative	Moderate	Optimistic
2011-2015 RoE	6.81%	9%	11%
TV RoE	10%	11.5%	13%
TV Growth Rate	4%	5%	6%

Table 5: RoE and growth estimates

Source: Own representation

5.3.4 Results

The results of the conservative scenario during the 2011-2015 valuation period are demonstrated in Table 6.

	2011	2012	2013	2014	2015
Net Income	3531.87	3700.24	3876.63	4061.42	4255.03
Equity Cost	5082.57	5324.86	5578.70	5844.63	6123.25
Excess Return	-1550.70	-1624.63	-1702.07	-1783.20	-1868.22
Cumulated CoE	1.098	1.206	1.324	1.454	1.596
PV of Excess Returns	-1412.30	-1347.56	-1285.79	-1226.85	-1170.62
Beginning BV of E	51,863	54,335.31	56,925.47	59,639.11	62,482.11
CoE	0.098	0.098	0.098	0.098	0.098
Equity Cost	5082.57	5324.86	5578.70	5844.63	6123.25
RoE	0.0681	0.0681	0.0681	0.0681	0.0681
Net Income	3531.87	3700.24	3876.63	4061.42	4255.03
Div. Payout Ratio	0.3	0.3	0.3	0.3	0.3
Dividends Paid	1059.56	1110.07	1162.99	1218.43	1276.51
Retained Earnings	2472.31	2590.16	2713.64	2843	2978.52

Table 6: Excess equity return model 2011-2015 (in CHF million)

Source: Own representation

The sum of excess equity returns present values for the conservative scenario equals CHF - 6443.13 million. Next the terminal value was calculated. The beginning BV of equity in 2016, the underlying year for the terminal value, is product of 2015 beginning BV of equity and the stable terminal value growth. The net income in 2016 is calculated in the same manner as before as product of given RoE (10%) and that year's BV of equity (CHF 64,981.39 million). Result of the terminal value calculation in CHF million:

$$\text{TV of excess returns} = \frac{\text{Net income}_{2016} - (\text{CoE}_{TV} * \text{BV of Equity}_{2016})}{\text{CoE}_{TV} - g_{TV}}$$

$$= \frac{6,498.14 - (0.0824 * 64,981.39)}{0.0824 - 0.04} = 13,879.48$$

In the final step the equity value of UBS in CHF million and the implied share price at the end of 2010 are calculated for the conservative scenario:

BV of Equity on 31.12.2010	51,863
PV of Excess Returns	- 6,443.13
TV of Excess Returns	13,879.48
Σ = UBS Equity Value (in CHF million)	59,299.35
Number of Shares Outstanding	3,830,840,513
Implied Share Price (in CHF)	15.48
Actual Share Price (in CHF)	15.35

Table 7: Results of the conservative scenario

Source: Own representation

The implied share price CHF 15.48 resulting from the conservative scenario lies remarkably close to the actual share price of CHF 15.35 observed on the 31 December 2010. Therefore it could be assumed that the conservative scenario represents a sound approximation of the valuation by the market at the time. Since the real and the implied value are almost identical, investors probably worked with assumptions corresponding to the conservative scenario. Same valuation process as demonstrated above has been performed for the remaining two scenarios. Table 8 below summarizes the results of the valuation based on excess return model.

	Scenarios		
	Conservative	Moderate	Optimistic
2011-2015 RoE	6.81%	9%	11%
UBS Equity value (in CHF million)	59,299.35	77,598.98	97,317.99
Implied Share price (in CHF)	15.48	20.26	25.40

Table 8: Scenario results of the excess return model

Source: Own representation

The valuation of UBS AG using the excess return model yields results ranging from CHF 15.48 to CHF 25.40 per share. This valuation favours the moderate scenario with the implied share price of CHF 20.26, which should represent realistic valuation of the bank. Since the two main factors of the excess return model are cost of equity and return on equity, the model outputs are highly sensitive to changes in these variable's values. Whereas in this model CoE can be estimated with reasonable degree of accuracy, RoE as mentioned in chapter 5.3.3 is significantly open to uncertainty. Table 8 shows how a 2% change in expected mid-term RoE leads to changes of almost CHF 5 in implied UBS share price. Nevertheless, the RoE values used in the scenarios are results of conservative estimation with respect to historical data and information published by UBS. Therefore the excess return model valuation supports the assertion that UBS was valued sceptically by the market and presumably undervalued. Lack of confidence in bank's reform process and future performance parallels the findings of the event study.

5.4 Relative valuation

The following chapter will describe a different approach to the valuation of UBS AG, namely the relative valuation using multiples. The aim of this valuation is to provide additional results which can be used for comparison with the outputs of the excess return model. The discussion about the significant differences between financial and non-financial firms is also relevant for the determination of which multiple ratios should be applied to the valuation. Damodaran recommends use of equity multiples instead of ones based on firm value and EBITDA, because estimation of latter variables for financial firms presents significant challenges. In his 2009 paper Damodaran lists three most viable equity multiple ratios in general: price to earnings (P/E), price to book value (P/BV) and price to sales (P/S). Since the estimation of revenues/sales is difficult for financial firms, Damodaran advocates use of P/E and P/BV as preferred multiples for the relative valuation in the financial industry. Firstly, average of UBS's peer group multiples will be used to calculate bank's value. The second approach is one based on estimating the ratio from fundamentals. (Damodaran 2009, pp. 27-29)

5.4.1 P/E and P/BV peer group

The basis for the formulation of the peer group is the recognition of bank's main competitors with respect to product portfolio, geography and size. In its 2010 annual report, UBS lists main competitors for each of the three main business activities: investment banking, wealth management and asset management. By cross-checking these three groups of banks we obtain the total of 10 relevant multinational banks. Among them are also banks, whose core business is investment banking. Institutions such as Goldman Sachs, JP Morgan & Chase and Deutsche Bank are included in the peer group, since in 2010 UBS still remained significantly active in the investment banking business. More than 70% of UBS's total assets were attributed to the IB division. Furthermore, all of the mentioned investment banks also incorporate wealth management and asset management businesses. After the first round of multiples calculation, the group was further reduced by elimination of outliers, Bank of America and HSBC. The final peer group consisting of 8 banks, individual price to earnings and price to book value ratios and average group multiples are presented in Table 9.

Financial institution	P/E	P/BV
Barclays	8.55	0.55
BNP Paribas	7.52	0.86
Citigroup	12.78	0.84
Credit Suisse	9.66	1.33
Deutsche Bank	12.69	0.74
Goldman Sachs	11.88	1.30
JP Morgan & Chase	10.66	0.99
Morgan Stanley	10.30	0.86
Peer Group Average	10.51	0.94

Table 9: Peer group multiples

Source: Own representation

The implied UBS share price and equity value are calculated based on the P/E and P/BV peer group multiples. P/E multiple of 10.51 leads to the share price of CHF 20.91 and corresponding UBS's equity value amounts to CHF 80,095.12 million. The implied share price calculated with the P/BV multiple is CHF 12.67 and the value of equity is CHF 48,520 million. In comparison with the actual share price on 31 December 2010, the P/E multiple

based valuation shows UBS shares to be undervalued by the market and overvalued in the case of P/BV multiple.

The relatively low price resulting from the P/BV multiple valuation could be explained by the specific situation of UBS at the time of valuation. During the crisis years 2007-2009 significant write-down losses and subsequent removal of non-performing portfolios decreased UBS's total assets substantially. The book value as the difference between total assets and total liabilities decreased accordingly. The lower book value per share leads to lower price when multiplying with the P/BV multiple. Therefore due to its inherent tendency for undervaluation in the case of UBS, the P/BV gives way to the P/E multiple as preferred instrument of relative valuation.

5.4.2 P/E from fundamentals

The second approach used in this relative valuation focuses solely on UBS's fundamentals and how they influence the P/E ratio. Relevant fundamentals used in the calculation of P/E ratio are same as in the classical DCF model. Based on Damodaran (1994), Gordon growth model formula for value of equity can be adapted, where the dividends per share are expressed as earnings per share, multiplied by the dividend payout ratio and by expected long-term growth rate in dividends: (Damodaran 1994, p. 198)

$$P_0 = \frac{EPS_0 * Payout Ratio * (1 + g_n)}{r - g_n}$$

R stands for the required rate of return on equity which equals the cost of equity. Finally, the formula can be rewritten as P/E through the division by earnings per share. The fundamentals already calculated in the excess return model valuation are applied to the formula. Necessary long-term growth rates in dividends will correspond to the estimated net income growth rates. The uncertainty in the growth predictions warrants use of multiple scenarios also for this P/E valuation. The summary of used fundamentals and resulting P/E ratios as well as implied share prices can be found on the next page.

	Scenarios		
	Conservative	Moderate	Optimistic
EPS (in CHF)	1.99	1.99	1.99
Div. Payout Ratio	0.50	0.50	0.50
Expected Growth Rate	4%	5%	6%
CoE	0.098	0.098	0.098
P/E	8.97	10.94	13.95
Share Price (in CHF)	17.84	21.77	27.76
Equity Value (in CHF million)	68,347.48	83,380.64	106,325.99

Table 10: Results of P/E valuation based on fundamentals

Source: Own representation

While other fundamentals remain constant, 1% change in the expected growth rate creates significant differences in the resulting P/E multiple, implied UBS share price and corresponding equity value. Share price ranges from CHF 17.84 to CHF 27.76, for conservative and optimistic scenario respectively. The moderate scenario share price lies at CHF 21.77. At this point it is important to consider the limitations of fundamentals being used to express the P/E multiple. Fact that Gordon growth model formula works with dividends per share, makes the approach less viable for the post-crisis setting. After the crisis, banks were subjected to heightened uncertainty and new set of capital requirements making dividend policy less consistent. Nevertheless, despite these limitations second approach to relative valuation produces results paralleling the outputs of the excess return model, even if slightly more optimistic. The difference between two distinctive valuation methods could be partially explained by significantly conservative underlying assumptions present in estimates of the excess return model. If one would choose less conservative assumptions for the first valuation, results of both methods would be even closer to each other. The comparison of two independent valuation methods and three distinctive approaches may improve the outlooks of result's validity.

5.5 Results

How was UBS AG perceived by the market at the end of 2010? The comparison of different valuation approaches applied in this chapter gives support to the assessment that UBS was being valued sceptically by the investors. The actual share price of CHF 15.35 corresponds closely to the conservative scenario of the excess return model. The conservative scenario represented a continuation of the weak late-crisis performance. Based on the actual earnings developments, internal reforms and UBS's historical performance, this valuation prefers the moderate scenario of CHF 20.26 per share as more viable at the time of valuation. The market undervaluation shown in the excess return model was further corroborated by the P/E multiple valuation. The peer group P/E approach gives the implied share price as CHF 20.91. In this case, if only taking the earnings performance into the account, UBS was significantly undervalued compared to its peers. Use of fundamentals to calculate the P/E multiple results in slightly higher share prices compared to the excess return model for the three scenarios.

All in all, if we consider valuation of bank's financial performance, the share price of approximately CHF 20 seems to be the realistic pricing of UBS's equity at the end of 2010. This estimate can be further supported by the share price developments in the first half of 2011, when the price increased steadily to around CHF 18, reaching high point in June 2011. However, the positive trend was interrupted by the occurrence of Mr. Adoboli's rogue trader scandal. Ultimately the market's sceptical appreciation of UBS's results proved to be reasonable given large losses associated with the failings of UBS's internal control system.

Valuation of financial firms poses substantial challenges due to their specific nature. Nevertheless, the combination of valuation techniques can provide better understanding of firm's actual value based on its financial performance. The presence of a significant difference between this financial oriented valuation and valuation by the market points towards the perception of additional information recognized by the market as critical. For UBS it could be hypothesized that market remained sceptical towards the sustainability of 2010's positive performance, and the possibility if UBS will manage to avoid further crisis of its management. Results of the valuation chapter overlap with the tendencies discovered in the event study analysis. Both analyses capture to a certain extent investor's prudent behaviour towards the bank. Ultimately, developments of UBS after the crisis can teach us

a valuable lesson, that the valuation based solely on financial data creates only partial picture of firm's actual state. Internal strategic, control and governance decisions, as well as their implementation, prove to be essential for firm's performance in the long run.

6. Conclusion

Over the course of this work, connection between the empirical literature, crisis causes and their subsequent reform in the bank setting has been established. The suitability of choosing UBS for the case study is apparent, since crisis story of the bank encompasses all the main themes and their mutual relationships. The review of existing literature about crisis causes on corporate level, mainly report by Kirkpatrick (2009), fits particularly well with the actual developments in UBS. In contrast to the general narrative of the crisis being aggravated by the irresponsible senior management of banks, seeking to maximize their compensation incentives without regards for shareholder's wealth and risk of immense losses, synthesis of reviewed literature and analysis of internal deficiencies of UBS, point towards a combination of factors. True, corporate governance certainly played a significant role in the crisis, but the losses couldn't solely be attributed to it. The evidence rather shows, that quality of risk management and internal control features can explain the differences in crisis performance of large financial services firms.

This thesis documents, how the risk management function in UBS failed to properly assess and mitigate risks included in the subprime ABS/CDO portfolios. The methodology of bank's risk control proved to be insufficient in measurement of developing risks. If the risk exposure to a group of securities remains unknown, it is impossible for management to formulate an effective risk mitigation strategy. Nevertheless, review of UBS's crisis years gives credit to a lesson that senior management should always remain vigilant about expected as well as highly unlikely extreme risk developments, critical with regard to risk assessment and invest sufficient resources into the cooperation with the risk management and other control functions. In a case when these functions fail to fulfil their duties properly, employee's incentives to maximize their compensation might lead to an increased concentrated exposure to a given trading activity, which is perceived as riskless and

reasonably profitable at the same time. This is what happened in UBS with the high concentration of ABS and super senior CDOs during the years leading to the crisis.

The review of the UBS case supports the need for different functions of a financial firm to cooperate in managing risks. Apart from risk management and risk control; balance sheet management, funding and liquidity management also contribute to the safeguarding of firm's sustainable performance. Limits on growth or notional value of given portfolios mitigate concentration risks and complement standing risk limits. The internal funding rates played crucial role in providing the stimulus for carry trades on super senior securities, which were profitable thanks only to the advantageous funding rates. Especially the limited recognition of other factors than economic profit in the measurement of employee compensation, led to distorted incentives for risk seeking behaviour. Furthermore, the review gives hints of a duality between profit maximization on one side, and risk management and control on the other. Imbalance between these two sides in pre-crisis UBS, led to risk management and control officials being overlooked by the management and staff of business units. Lesser position of control functions in UBS's hierarchy made it difficult for first cautionary signals about subprime exposure to be recognized by the senior management. Even when it might seem as limiting to the pursuit of growth at the time of a bull market, risk managing and controlling functions should be promoted as equally important as the units they oversee.

UBS demonstrated a strong sense of self-awareness, following the crisis, in addressing majority of the issues. The reforms of risk management and control, and the improvements in compensation framework warrant a positive appraisal. UBS adopted the holistic approach to risk assessment and increased the scale as well as scope of deep risk reviews. Moreover, the inclusion of additional financial as well as non-financial variables into the performance measurement for variable compensation increases the alignment of employee incentives with sustainable firm performance. With regard to the alignment of senior management's incentives with shareholder's interests, the literature review of several studies indicates that the higher alignment doesn't necessarily improve firm's crisis performance. Understanding of this phenomenon would benefit from further empirical study, results of which could certainly be applicable to the formulation of variable compensation policies.

The analysis of the UBS's post crisis years shows that the remediation of a firm affected by significant losses requires resolute senior management and sufficient time to regain

shareholder's trust. The management indeed needs to communicate the adoption of changes univocally to firm's employees in order to achieve maximal effect. Contradicting signals by the leadership, where the senior executives announced return to conservative client oriented model on one side and pressure the junior traders to increase the profits on the other, might have contributed to the incidents such as rouge trading by Mr. Adoboli and the LIBOR manipulation. Failings of the internal control prove that modern financial services firm must place a great emphasis on keeping its control and IT infrastructure robust and up to the highest standards.

The consistency of post-crisis reform is essential for improving the relationships with shareholders and investor's attitude towards the firm. Despite the extensive overhaul of relevant areas inside the bank, markets remained wary of UBS future performance. The event study analysis implies that investors preferred clearly observable remediation activity, for instance change in the senior leadership and strategy shift. On the other hand, UBS share price reactions to events associated with the remediation plan, evaluation of its fulfilment and presentation of future performance estimates, were all significantly negative in the immediate aftermath of the event. The valuation chapter supported the notion that markets remained sceptical to UBS's activities through demonstrating, that bank's shares were with all likelihood undervalued at the end of 2010 by around CHF 5 per share. Another contribution of the valuation chapter is the application of the excess return model to the valuation of financial firm in post-crisis setting. Relative closeness of the results produced by excess return model and relative valuation indicates validity of the model under aforementioned conditions.

In the end, the post-crisis remediation of shortcomings found in UBS was generally successful. Bank restructured its IB business and after short relapse in 2012 returned to profitability. It might not be correlated, but UBS has been performing better than its Swiss rival Credit Suisse, who shares many similarities with UBS, in the recent period 2014-2016. In comparison to UBS, Credit Suisse suffered lower losses during the financial crisis and wasn't bailed out by Swiss government. The declining share prices of Credit Suisse parallel to certain degree the situation in Deutsche Bank. Did the analysed remediation contribute to the difference? This question can't be answered with certainty, but this thesis presumes so. Surely, major factor in UBS's return on the track was also the change in leadership following

the failings of internal control in 2011. Nevertheless, UBS still faces challenges. However, majority of these are now related to general insecurities in the financial industry.

The study of how banks reacted to the crisis failures, enables us to learn a lesson from the past. Naturally, each bank had its specifics going into the crisis, but there are patterns which can be recognized. The complexity of current world of finance, repeating business cycles and government's monetary and fiscal policies as a reaction to them, will irrefutably lead to another crisis of financial industry in the future. By recognizing the internal flaws contributing to the crisis last time, financial firms may improve their resiliency. Even when the next crisis will come from an unexpected direction, strong corporate governance and risk management might increase firm's chances of navigating through it.

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Appendix

Appendix 1: Abstract (English)

The 2008 financial crisis dramatically transformed the setting of financial industry. While there has been significant focus on the adopted regulatory measures for banks, this thesis focuses on bank's own reaction to the crisis. The main body consist of a case study whose sole subject is UBS AG, Swiss bank which suffered extensive losses during the crisis. Results of the literature review point towards the combination of factors on corporate level leading to the crisis. Main two areas influencing bank's crisis performance are corporate governance and risk management. Review of UBS crisis losses supports this assertions, whereby risk management, corporate governance, limit structure and compensation are characterised by major shortcomings. In the aftermath of the crisis, UBS managed to perform overall remediation of bank's risk management, risk control, compensation and corporate governance. Adopted reforms remove identified deficiencies and correspond to the recommendations by Basel and other supervisors. Nevertheless, UBS was subjected to failings of internal control, relevance of which has to be emphasized in modern complex financial industry. Reform of a bank, which was subjected to significant losses, is a difficult and time consuming task. The event study analysis as well as financial valuation demonstrate ongoing sceptical perception of investors towards UBS's performance potential. However, the continuation of the plan under the new executive management since 2011 has led to improved stability of bank's performance. Critical review of UBS's reform process might provide inspirations for banks seeking improvements in their supervision process, risk management, risk control and compensation policy.

Appendix 2: Abstract (German)

Die 2008 Finanzkrise hat die Bedingungen in der Finanzindustrie dramatisch verändert. Während sich die öffentliche und akademische Diskussion auf die Regulationsmaßnahmen

für die Banken signifikant konzentriert hat, widmet sich die vorliegende Arbeit den eigenen Reaktionen von Banken auf die entstandene Krise. Der Hauptteil besteht aus einer Fallstudie deren einziges Subjekt ist UBS AG, eine schweizerische Bank, die extensive Verluste während der Krise erlitten hat. Die Ergebnisse der Literaturrecherche zeigen auf eine Kombination von Faktoren auf dem Firmenniveau, die zur Krise geführt haben. Die zwei Hauptbereiche mit dem Einfluss auf Bankenkrisenleistung sind Corporate Governance und das Risikomanagement. Die Studie der Krisenverluste von UBS unterstützt diese Aussage, wobei die Bereiche von Risikomanagement, Corporate Governance, Grenzwertstruktur von Portfolios und Managemententlohnung durch bedeutsame Mängel charakterisiert sind. In der Krisennachwirkung hat UBS bewältigt, eine umfangreiche Reform von Risikomanagement, Risikokontrolle, Entlohnung und Corporate Governance durchzuführen. Die angenommenen Maßnahmen verbessern die identifizierten Mängel und entsprechen den Empfehlungen von Basel sowie auch anderen Aufsichtsorganisationen. Jedenfalls war UBS weiteren Versagen von interner Kontrolle ausgesetzt. Die Bedeutsamkeit von interner Kontrolle muss in der modernen komplexen Finanzindustrie ständig hervorgehoben werden. Die Reform von einer Bank, die signifikante Verluste erlitten hat, ist eine anspruchsvolle und zeitintensive Aufgabe. Die Eventstudie sowie auch die Unternehmensbewertung weisen an eine länger bestehende skeptische Unterschätzung von UBS Leistungspotential seitens der Investoren. Dies abgesehen, die Fortsetzung des Reformplanes, seit 2011 unter dem neuen Vorstand, hat zu einer verbesserten Stabilität der Bankenleistung geführt. Eine kritische Auseinandersetzung mit dem UBS Reformprozess kann eine Inspiration für die Banken anbieten, die sich auf der Suche nach Verbesserung im Bereich von Aufsicht, Risikomanagement, Risikokontrolle und Entlohnungsgestaltung befinden.

Appendix 3: Curriculum Vitae

Personal details

Name:	Matej
Surname:	Petroci
Date of birth:	20.07.1991
Nationality:	Slovak
Contact:	+421949323426 matej.petroci@gmail.com

Work experience

04/2014 – dato	COMPOSTELA s.r.o. (LLC equivalent), Bratislava, Slovakia - Member - Management and staff coordination - Communication with authorities
03/2015 – 09/2015	University of Vienna, Faculty of Business, Economics and Statistics - Teaching assistant for Univ.-Prof. Thomas Gehrig, Ph.D., Department of finance
07/2010 – 07/2013	MUDr. Vladimír Petroci, Poprad, Slovakia - Translation from English and German - Search engine optimization - Administrative work

Education

10/2013 – dato	Master's degree studies: Business Administration University of Vienna
07/2013	Russian language course at Pushkin-Institute, Moscow, RF
10/2010 - 08/2013	Bachelor's degree studies: International Business Administration University of Vienna
09/2005 – 05/2010	High School: bilingual Slovak-German section Gymnazium Dominika Tatarku, Poprad, Slovakia - Completed with German high school diploma
09/2001 - 06/2005	Junior High School: Gymnazium Dominika Tatarku Poprad, Slovakia
09/1997 – 06/2001	Primary School Pod Lesom, Slovakia

Language skills and personal profile:

Native language:	Slovak
Other languages:	Self-evaluation based on Common European Framework of Reference for Languages (*)

	Understanding		Speaking		Writing
	Listening	Reading	Spoken interaction	Spoken production	
German	C1	C1	C1	C1	C1
English	C1	C1	C1	C1	C1
Czech	C2	C2	C1	C1	B2
Spanish	B1	B1	B1	B1	B1
Russian	B1	A2	A2	A2	A2
Korean	A1	A1	A1	A1	A1

(*)<http://europass.cedefop.europa.eu/en/resources/european-language-levels-cefr>

Driving license: - Category B (granted in July 2011)
PC software: - MS Office (very good skills)
- SPSS (very good skills)
- TYPO 3 (very good skills)
- HTML (basic knowledge)

Free time interests:

Learning of languages, travelling, reading, foreign policy, history, climbing

Vienna on 28.10.2016

Matej Petroci