FSM – Finance & Strategic Management

Master Thesis

"The impact of assets write-downs on banks' share price. The case of subprime mortgages and leveraged loans."

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0. Executive Summary

The global financial markets experienced a trend reversal in August 2007 which led to a drastic slow down in the first stage, and later to a recession in the global economy.

During the summer 2007, the global financial markets started to realize the consequence of home loans' defaults in their structured portfolios.

That was just the beginning of the current global crisis. When the housing bubble started to deflate, more and more foreclosures appeared. As we will see, this had a domino effect given the nature of securitization of mortgage loans.

Banks experienced huge losses due to asset write-downs in their structured portfolios. The whole financial system is in troubles. The write-downs and losses extended to the whole system due to repackaging and financial markets globalization.

What was a crisis limited to one industry in the US is driving several national economies into recession.

The following Master Thesis treats an aspect of the current financial markets hot topic. What we have focused on is the root of the crisis, poor financial risk management.

We demonstrate how an imprecise assessment of credit risk may change the value of debt and as a consequence of banks' assets. In particular we stressed the strong link between risk and return.

We used various models to show how the risk assessment affects the value of the debt and how risk can come in different forms, as standalone or as portfolio risk.

What we found out is that, some of the risk management principles have been ignored. In particular, the basic risk-return principle has been violated. We can confidently say that mispriced risk was the initial cause of the financial crisis.

We also looked at the market reaction to the asset write-downs and the credit risk discovery in a period between Quarter 3 2007 and Quarter 2 2008.

The stock market had a general negative reaction. However, until that time, market participants did not understand the "system write downs" and the domino effect which was to come after.

Finally, we have a positive comment on the current actions taken to recapitalize banks and stimulate the economy. Furthermore, we propose some longer term measures.

We briefly focus on some regulatory measure, but even before defining the regulation frame. We think that we need to reconceptualise the financial sector.

If we slow down for second and think about that, we would probably agree on the following: a good financial sector is focused on serving the business. Lending to the business sector must be one, if not the main, role of the financial sector.

We hope you will enjoy reading this Master Thesis.

1. Introduction to the choice of the topic

After five years of steady growth, the global financial markets experienced a trend reversal in August 2007 which led to a drastic slow down in the first stage and later to a recession in the global economy. The factors that drove the crisis are manifold, but one of the core factors is represented by the US subprime mortgage crisis.

More and more signs are showing that what, at the beginning, was a crisis limited to one industry in one country is driving several national economies into recession. Different actors played a major role in this crisis.

In the first place you find the banks, which apparently have made errors that evolved into this credit crunch.

Today it is astonishing to realize how many banks did not know or did not want to understand the risks they were taking on and why the creation of this speculative bubble had not been interrupted in an earlier stage.

This question arises especially now that the market value of most of the financial institutions is heavily contracted and it seems quite clear that the ones that got affected the most by their unconscious and irresponsible behaviour were the banks themselves.

Given our interest in the financial markets in general and the wish to analyse the root of a current issue, we decided to have a closer look at this global financial crisis. Indeed, this crisis spread from a relatively isolated crunch from a geographical and industrial point of view.

The fact that the negative effects spread so quickly over to different industries and countries shows that financial markets have never been so closely linked to each other and that globalisation is driving correlation both of return and risks.

Trying to understand what were the major errors that have been made, the first and most often mentioned variable is the bank's risk management.

As it seems, the management of banks had a hard time understanding and quantifying the risk they were incurring. This applies especially to securitized products.

Probably, the revenues generated by the credit cycle were considered to outweigh the risk, also from a shareholder point of view. However, the recent correction in share prices of banks and the heavy negative returns show once more that there is nothing like free lunch. In other words, the past returns were not sustainable and the risks were underestimated.

It is, indeed, our aim to assess how higher risk impacts the value of banks' assets and consequently the value of the bank itself. In particular, we are taking a shareholder's point of view, and looking how an unexpected drop in assets' value is going to affect the stock holders' wealth.

1.1. Problem Identification

Started in summer 2007, the banking sector has experienced an overthrow during the last year and a half. Banks' assets, that originally experienced a very strong growth in volumes and were valued at relatively high prices, showed sharp drops in their value and the issuance of structured products basically stopped.

The financial products that suffered from high volatility and falling prices were to a large extent securities that were collateralized by the cash flows from a specified pool of underlying assets, so-called asset-backed-securities.

Banks were heavily issuing these securities that on one hand allowed them to get rid of certain risks, and on the other hand, provided them with revenues from commissions (Whalen 2008). For the backing of these securities mortgage subprime loans had been used frequently.[1]

At the bottom of this process stood very lax issue practices used by the lenders and borrowers who entered into loan arrangements they could not meet. Borrowers were driven by exaggerated growth expectations after seeing the sharp price increase of real estate (Gieve 2008).

Lenders, on the other hand, did not fear the risk they were incurring with new loans, because they were able to sell them off through the beforehand mentioned asset-backed-securities.

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[1] In brief, subprime loans are loans that are offered at a rate higher than the prime rate because of borrowers with low credit ratings

Given these conditions trading volumes and prices were driven up. Prices went far beyond the level that the intrinsic value of assets would suggest. From 1997 to 2006 real home prices in the US have increased by 90 percent, which could not be explained by any economic fundamental like real income, migration, interest rates, and demographics as Roubini[2] argues.

These were the basic ingredients for a speculative bubble, which soon or later had to burst. The tipping point was then the downswing in the US real estate market.

The real estate price decrease began because of the oversupply (Papadimitriou et all. 2007). Mostly private owners were faced with the fact that their assets' value was much lower than their debts' value and they got into distress.

The resulting inability to pay back their loans not only had an impact on the banks' loan portfolios, but especially on the securities held by banks that were backed by these assets. Hence, mortgage-backed securities were the first assets to experience a strong price correction.

The returns of these asset-backed-securities are covered with the interests that are paid by the borrowers of the single underlying loans. Under normal market conditions loans are priced in a way that a certain amount of expected losses can be covered by the interest that is charged on top of the funding rate for the bank.

The bank, when issuing a loan, is following the idea of expected returns that equal a certain rate of return that the bank wants to put in its pocket. High risks therefore require also higher interest rates (Sironi, 2007). Hence, an error in the estimation of the risk might results in a wrong pricing and unexpected losses on the bank's balance sheet.

For losses exceeding the expected amount, the bank has to adjust the loan-loss provisions in the balance sheet. In the case of banks carrying the credit risk in form of an assets backed by these loans, the balance sheet is adjusted by writing down assets.

That is what happened very frequently during the last 18 months. Until 19 August 2008 the credit losses suffered by global banks totalled 505.1bn$[3].

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2 Interview with Nouriel Roubini, professor of economics at the Stern School of Business at NYU, by New York Real Estate, 24.09.2006.
[3] Extracted from Bloomberg on 19 August 2008

Probably there has been a great misunderstanding of the risk these products were carrying. Through the 'repackaging' of securities into new securities and the low visibility of the underlying risk, it became very difficult to understand what the real risks were.

Investors had to base their investment decision mostly on the credit ratings provided by the rating agencies. Also for the rating agencies themselves, the highly complex structure and the resulting difficulties in the evaluation process made it very difficult to understand the real risk exposure.

As it seems, the sharp drop was therefore mostly caused by an overvaluation of these assets beforehand and therefore can be interpreted partly as an adjustment of prices to the risk level.

In general, a listed company is obliged to announce information that could have a significant effect on its share price in form of ad-hoc announcements. This was the case for banks in the event of devaluation of the asset-backed-securities and the consequent write-downs.

The information about write-downs appears to represent asymmetric information from management that was not known by investors until the disclosure.

When the value of the assets held by a company decrease - in other words the stream of expected cash flows provided by these assets is reduced - also the value of the company itself should decrease (Brealey, Meyers & Allen, 2004). Given the size of these write-downs, the impact on the value of the bank itself should be a similar amount.

In our empirical analysis, we want to investigate how these losses in asset value impact on the value of the bank. In order to analyse this problem, an event study will be carried out.

More in detail, through this event study we will see if the stock price experiences positive or negative abnormal returns. For the analysis we will consider the time frame from Quarter 3 2007 to Quarter 2 2008.

The write-downs are simply bookkeeping adjustments. In efficient markets, significant reactions should not be expected in the moment of the announcement and the lower value should already be reflected by the actual stock price before the announcement.

However, there are several studies (Strong & Meyer, 1987, Musumeci & Sinkey, 1990) that find statistically significant abnormal returns around the announcement day. Thakor (1997) argues

that changes in the share price are not to be explained by the announcement itself, but by the signalling effect the announcement has regarding events to come.

Bartov et. al. (1998) instead, mentions that write-downs are challenges for investors because of the rarity and the ambiguousness. A write-down may show the management's intent to revise the business and can be interpreted as good news. Contrary, it may simply transfer information about a loss in asset value or be the announcement for even deeper trouble yet to come.

In our analysis, the magnitude of the impact will be of major interest. This will be analyzed in relation to certain time windows surrounding the announcement day. Furthermore, the volatility around the announcement day will be considered together with the share price behaviour of peers.

Sometimes the announcements are published together with other sensitive information. This impacts the investors' reaction and might have to be considered as well.

The investor reaction to write-downs had been analysed in different past studies (Bartov, 1998, Dockings et al., 1997). This thesis will cover the most current data. Given large amount of total write-downs and the number of banks involved in the recent crisis, this thesis might deliver new insights.

In the context of an increasing integration of international financial markets, especially the analysis of the stock-price behaviour of peers is expected to show interesting results. The outcome of this study is of great interest for both investors and managers.

Both, short-term and long-term investors can gain insights on how the investment decision can be improved in the case of write-down announcements.

Because of the rare occurrence of these announcements investors usually are not very familiar with these situations. Short-term investors might be more interested in the short-term price reaction and the stock price changes of peers.

For long term investors the measurement of the signal effects of an announcement in relation with future price developments is crucial. On a qualitative basis, we will also try to demonstrate that especially long term investors should be interested in banks with a well-functioning and conservative risk management.

Given size of the price changes also managers should be concerned about the reaction of investors to write-down announcements. Disclosures can be managed properly knowing how the context affects the share price and the way announcements are made.

Finally, a clear understanding of the negative impacts will push them to better decision making in order to avoid the need of announcements.

1.2.Model and Structure

This thesis has two major goals: First to observe how share prices reacted upon the banks' write-downs disclosures. Second, draw conclusions on the findings and give some recommendations for investors and managers.

The Structure

Figure 1

Source: own elaboration

However, before looking ahead to consider how the current subprime mortgage crisis is reshaping the banking industry, we will reflect on the conditions that led to this point. Revisiting the circumstances that led to this crisis is an important part of understanding what to expect to result from it.

In order to be able to draw the conclusions, an overview and description of the of the bank's activities that were critical for the crisis is needed.

In addition, a thorough understanding of important factors in credit valuation is crucial. In the final part, the awareness of these facts will allow the establishment of links with possible causes.

The analysis will in turn lead to final recommendations. All chapters are concluded with a small conclusion that sums up the essential of the respective chapter.

In the following chapter we will discuss the functioning of banks and its role in the financial market. Secondly, the bank's balance sheet with a focus on the securities as its major part of assets will be explained.

In the main section of this chapter we will focus on the securities that played a major role in the recent crisis. Most of the write-downs were related to the devaluation of leveraged loans and ABS. Since ABS are highly complex products, the structure and the basic idea behind these products will be laid out.

Finally, the issuing process and hence the pricing issues will be discussed. The way these securities are booked as assets is also briefly considered. Given the decisive role of mortgage-backed and corporate loan-backed securities, in the second part of this chapter it will be mainly referred to these types of ABS.

The third chapter instead, focuses of the value of the securities. In the first section we will briefly introduce the concept of the risk-return relationship. This is crucial for the understanding of the different valuation methods that we will hereon describe.

Discussing the different credit valuation models, we want to find the factors that have major impact on the value of credit.

Like in chapter number two, also in chapter three the attention will be on ABS. Their complex design will require further notice. Given the fact that ABS include a large number of single securities the introduction of a portfolio-based valuation methods is necessary.

These models are also of great interest when looking at the bank's balance sheet's asset side as a whole, which is basically a large portfolio of many single securities.

In portfolios, the risk and therefore the value is determined by the risk of the single assets on one hand, and, on the other hand, by the correlation of these assets. Hence, here the analysis of the role of correlation will be particularly important.

Summing up, in the first part of the chapter possible models for standalone valuation will be described and commented. The second part discusses the valuation of pools or portfolios.

Chapter number four provides the basis for the empirical analysis that is the core of the successive chapters. Therefore we will first take on the accounting standards regarding financial assets that have already been discussed in chapter two and look at how the impact on the disclosure obligations of listed companies.

This section includes a discussion of the relationship of book value and market value of securities, whose understanding will be crucial for the correct interpretation of the empirical analysis. We will also discuss briefly the relationship between asset value and share price. The chapter finishes with a literature review about previous event studies.

Here we will focus on event studies that analyse the impact of company announcement on the share-price. Write-down announcements are obviously of major interest.

Chapter number five is a literature review on write downs announcements. In this section we provide a definition of the write downs and an interpretation the different kind of write downs. Write downs may send diverse signals to the market, as we will see.

In chapter five we also review the financial impact of asset write downs and the theoretical background behind that.

Chapter numbers six and seven are the core of this thesis and includes the empirical analysis. The empirical analysis is a so-called event study.

Event studies are used for the analysis of stock price behaviour in the course of publication of previously confidential share-price-sensitive information. In our case the bank's announcements of asset write-downs affected by subprime crisis and consequent credit crunch are the information we will consider.

The chapter number six deals with data and methodology. We will explain the selection of the banks to be analysed and the choice of the time window. The assumptions and the calculations will also be explained in this part of the chapter. The chapter number seven will show the results of the analysis and comment them.

In the last chapter we will draw our conclusions regarding this topic and also list the interesting questions that might require further research.

1.3. Delimitations

As mentioned in the problem statement, this thesis is looking at the problem and its implications from a shareholder perspective.

It is plausible that in our final considerations we will consider also the management perspective, given that the management is supposed to act in the shareholders interest.

However, as the corporate finance approach (Brealy, Mayer, Allen 2004) suggests we will focus on value creation as the solely objective for shareholders, both in short term but also in long term.

In other words, our analysis attempts to find how investors could behave in the short term when there is the risk of write-downs. In addition we will make suggestions also on the value creation over the long term.

Here also the management, especially the risk management perspective steps in. It might seem obvious that also the bondholder's perspective should be included in the analysis by looking also at the bond price reactions. The extension of this thesis does not allow to consider this either.

Many issues that are of major interest and play fundamental roles cannot be addressed within the bounds of this thesis and might be addressed only briefly in the conclusions. For example,

regulatory matters are of major interest and importance, but will not be the core of our analysis.

In particular, if we look at the control of risk and the stability of the financial system as two of the major goals of regulators, the discussion of limitations to the banks' activities introduced by regulators would be a crucial point.

Seeing the global effect of the crisis that goes across almost all industries and geographic regions, also ethical issues should be raised. Here you can think of the over-indebtedness in the US, caused partly by these teaser loans, but also about the economic downturn in general with all its impacts on social aspects.

Approaching the topic from a behavioural-finance perspective might also deliver many insights and provide interesting knowledge. However we will stick to the assumption of a semi-strong form of efficiency.

That means that share prices adapt to publicly available information (Brealey, Meyers & Allen, 2004). Therefore we do not consider the actions by the operators that might have been driven by social or emotional biases.

Another important issue we will not discuss in this thesis, or just touch upon briefly, is the badly modelled incentive structures that might also have had an impact on the crisis.

Especially in connection with the problems regarding the rating by rating agencies that delivers the base for the pricing. Agency-theory approaches might come in handy to analyse these issues.

2. The Bank's Assets

2.1. The nature of the bank

A bank is a financial intermediary and participates in the payment system and finance entities. A bank moves funds from parties in financial surplus to entities in financial deficit.

The traditional activity of a bank is selling liabilities with certain characteristics of liquidity, risk, size and return on one side. The proceeds are used to buy assets with a different set of characteristics.

This process is called asset transformation, which means that a bank usually borrows short and lends long (Jorion 2005 and 2007). Like any other business also banks are performing well when they are able to acquire funds at low prices and sell at high prices. More details about the structure of assets and liabilities of a bank will be described later in this chapter.

Banks do not only generate profits from the so-called interest spread. There is a large band of business lines in the banking industry that generates that major part of its income from fees.

For example investment banks originate most of their income in form of fees for services they offer (O'Brien et all. 2006). With regard to the type of the activities, the management, and also the risks a bank is facing, change.

The overview of the different types of banking in the following paragraphs should briefly introduce the way banks and the related risks differ. This general view however does not consider the peculiarities in different countries, which are affected by history and legislation (Christoffersen et all. 2005).

Depending on their business model banks may focus on certain products, certain markets or diversify by combining different products and markets.

2.1.1. The different types of banking

The most mass oriented and industrial type of banking is retail banking, where you have large numbers of transaction and you are dealing mostly with relatively small customers.

Both products and customers are grouped regarding certain criteria and managed mostly with statistical tools and not on an individual basis. Major product families are consumer loans, credit cards, and leasing.

Medium and large corporate borrowers instead, require a different treatment. Because of their size it is not sufficient to apply mechanical rules for the assessment of the risk.

The actual credit standing is determined on the basis of individual transactions with more sophisticated tools and periodical reviews (Berkowitz et all. 2002). Also the relationship with the customer is much closer and with generating multiple services.

Large transactions are the stage for investment banks. These transactions are customized to the need of big corporate of financial institutions. The services range from activities with standard practices, such as export and commodities financing, to structured financing.

Structured finance includes structuring and assembling of customized products for making large and risky transactions feasible in the context of single projects. Structuring makes use of the whole range of financial instruments and often includes very peculiar contractual clauses.

With their trading activities investment banks are also very active on the secondary markets. Market transactions cover all basic compartments, fixed income, equity and foreign exchange trading, including derivatives from standard swaps and options to exotic and customized products.

Trading involves proprietary trading and trading for third parties. Other activities such as private banking, or asset management and advisory services can also be core of a banks' activity. Here the income is generated by fee charged on the performed services and not directly related to traditional banking risks.

For this thesis, and especially for the empirical part of this paper, banks that were involved certain investing activities on their own account will be of major interest.

The securities involved in these operations, asset backed securities, will be presented in detail at the end of this chapter. Very frequently the banks issuing asset-backed-securities are at the same time investors and keep a share of the issued product.

Something that all business lines share is the common goal of risk-expected return enhancement. For a bank it is not hard to attract customers and generate attractive revenues from risky borrowers in form of high interest incomes (O'Brien 2006).

Since there is nothing like a free lunch, the price the bank is paying is the higher risk it is taking on, which might materialize in losses because if the borrowers default.

A conservative bank, on the other hand, nor does enjoy high revenues in the first stage, neither has to face excessive losses. The two policies cannot be compared given the two different risk-return profile.

In other words, returns are always to be considered in the context of the risk the business line has to take on in order to achieve certain returns.

In the following part, we will therefore look at the different risks a bank is facing and have to be considered by the management.

2.2. The bank risks: which are the risks a bank is facing?

Another way of defining banks is found by Bessis (2002) who calls them 'risk machines'. Risk machines because the banks take risk, transform them, and embed them in banking products and services.

There is a large number of different risks banks are dealing with in their operations. Knowing, understanding and quantifying these risks is essential for a good management, but also required from regulators, because the capital requirements are based on this information (Christoffersen et all. 2005).

The recent credit crisis is an example where risk was not understood well and the lack of management of these risks led to huge losses for shareholders. Therefore, in the context of this paper, it is essential to understand the concepts of banking risks and financial risk management.

Banking risks are defined as the adverse impact on profitability of several distinct sources of uncertainty. The following paragraphs illustrate the risks related to banking.

Six major risks can be identified: credit risk, interest rate risk, market risk, liquidity risk, solvency risk, foreign exchange risk and operational risk whereas the last two are not highly relevant in this context of this paper and will therefore be explained only briefly.

2.2.1. Credit Risk

Credit risk is the most important and also most obvious risk. Credit risk is the possibility that an unexpected change in counterparty's creditworthiness may generate a corresponding unexpected change in the market value of the associate credit exposure (Resti and Sironi, 2007).

Credit risk is not only limited to the possibility of the counterparty's default which would trigger a total or partial loss of the amount loaned to the borrower. The decline in the creditworthiness also constitutes a form of credit risk.

Such decline does not imply default, but an increase of probability of default. This results in a decrease of the value of the loan given to the counterparty (Caouette et all 1998).

The increase of risk requires a higher market yield as compensations, which results in a corresponding reduction in present value. This risk is also called migration risk.

Another type of credit risk is the spread risk which refers to the risk of a rise in spreads by the market because of increased risk aversion by investors. In this case, the market value of securities declines, without any reduction in the issuer's credit rating. We will have a deeper look at this topic in chapter three.

Resti and Sironi (2009) raise two more important concepts that are often dismissed when discussing credit risk.

First, the deterioration in creditworthiness has to be unexpected. Expected negative developments in the situation of the borrower are taken into account in the original pricing. The risk is that the deterioration is unforeseen and the initial evaluation proves to be incorrect (Ong 1999).

The second concept refers to credit exposure, which is not limited to the traditional forms of credit granted. Also off-balance-sheet transactions like guarantees or derivative contracts bear credit risk. We will come back to this issue later in this chapter when we talk about the banking and the trading book.

2.2.2. Interest rate risk

Banks' assets and liabilities generate revenues and costs that are driven by interest rate. Instability in earnings is therefore partially affected by the fluctuation of interest rates. In a very broad sense, interest rate risk can be defined as the risk that changes in market interest rates impact the profitability and economic value of a bank (Cox et all. 1985).

On average banks investments in loans or bonds have a longer maturity than the liabilities used to finance these investments. When the maturity of a liability is shorter than the one of an asset, the bank is exposed to refinancing risk.

The bank risks not being able to refinance the investments at the same rate and might suffer a spread reduction. Variable loans may eliminate the risk, however only when the rate reset are perfectly matched with changes at the liability side (Cox et all. 1985).

Reinvestment risk instead is the risk the bank is exposed to when the assets have a shorter maturity than the liabilities.

The mentioned risks are directly affected by interest rate changes. An indirect, but still very important, effect of interest rate changes is the change in negotiated volumes (Sarig et all. 1999). Interest rates risk is also present when banking fixed rate products have included a prepayment option, and the borrower has the chance to refinance his loan.

2.2.3. Market risk

Market risk is the risk of changes in the market value of an instrument or portfolio of financial instruments, connected with unexpected changes in market conditions (O'Brien et all. 2006).

Market risks are generally identified as the risks inherent in the trading portfolio. This means that market risk is relevant only for positions that are taken for a short time horizon (trading portfolio) with the objective to benefit from changes in market prices.

As Resti and Sironi (2009) underline, in reality the market risk concerns also all the other assets and liabilities held by a bank, including the ones held for investment purposes with a long holding period.

Profit or losses in the trading portfolio are arising from positive or negative price differentials for a certain holding period of a financial instrument. Any decline of the value and therefore the price of a security results directly in a loss. Hence, market risk is 'generated' by several risks that affect prices:

- exchange rate risk: when the market value of a position is sensitive to changes in exchange rates (i.e. foreign currency denominated financial assets, liabilities or derivatives contacts)

- interest-rate risk: when the market value of a position is sensitive to changes in interest rates (i.e. bonds, forward rate agreements, interest rate futures, interest rate swaps)

- equity risk: when the market value of a position is sensitive to equity market performance (stocks, stock-index futures, stock options)

- commodity risk: when the market value of a position is sensitive to changes in commodity prices (i.e. cash and forward purchases/sale of commodities, swaps, commodity futures)

- volatility risk: when the market value of a position is sensitive to changes in the volatility of any of the variables considered above (typically options)

Market risks' role had been increasing over the last decade. First because of the increasing use of securitization, that creates a liquid secondary market for per se illiquid assets.

Secondly the increasing use of financial derivatives makes the connotation of market risk more relevant.

Third, the new accounting standards require the so called mark-to-market valuation of short-term investments in the accounts, and make market risks much more visible (Resti & Sironi, 2008)[4]

2.2.4. Liquidity Risk

For banks, liquidity risk appears in three different dimensions that are related to different contexts: raising funds is excessively expensive, market liquidity risk, asset liquidity risk (Wagner 2004).

The first type of liquidity risk relates to the inability of a bank to raise funds at normal cost. This depends on how the market perceives the institution looking for funding. Besides the bank's credit standing, also the bank's behavior in terms of signaling matters.

An institution coming to the market with unexpected and frequent needs for funds sends negative signals, which might restrict the willingness to lend to this institution.

The market liquidity risk instead is determined by liquidity crunches caused by low trading volumes. The situation in the financial market in 2008 is a very good example for this type of risk.

Low volumes increase transaction costs and make prices more volatile, sometimes including high discounts when there is no counterparty willing to trade. Like for the first type of liquidity risk, market liquidity risk results in the inability to raise money at a reasonable cost.

Finally, asset liquidity risk is caused by the lack of liquidity for a certain type of asset and does not have to be related to market liquidity in general.

2.2.5. Solvency risk

Banks that face the risk of not being able to absorb losses with the available capital are facing the solvency risk. This risk is a joint outcome of available capital and of all risks.

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[4] Chapter 4 will touch upon this topic in more detailed way

2.2.6. Foreign exchange risk

Foreign exchange risk is the risk of experiencing losses because of changes in the exchange rates. These losses can come for holdings of instruments whose earnings are indexed to movements of exchange rates (Jorion 1995a).

Losses related to exchange risk can also come from the change of the values of assets and liabilities that are denominated in foreign currencies.

The conversion risk results from the need to convert all foreign currency-denominated transactions into a base reference currency.

2.2.7. Operational risk

Operational risk the risk of loss resulting from execution of a company's business functions. The risk can come from inadequate internal processes, human errors and failure of systems or from external events (Cruz et all. 1998).

2.3. Balance Sheet

After the major banking risks, the following part will show how that balance sheet of a bank is structured and what the most important items are. In a simplified view, the balance sheet includes four basic levels, in addition to the off-balance sheet.

- Treasury and banking transactions
- Intermediation (lending and collecting deposits)
- Financial assets (trading portfolio)
- Long-term assets and liabilities: fixed assets, investments in subsidiaries and equity plus long-term debt

Figure 2: Simplified balance sheet

Assets	Equity and Liabilities
Cash	Short-term debt
Lending	Deposits
Financial assets	Financial assets
Fixed assets	Long-term debt
	Equity
Off-balance-sheet (contingencies received)	Off-balance-sheet (contingencies given)

Source: Bessis, 1998

The relative weights of the major compartments vary from one institution to another, depending on their core businesses (Stoughton et all. 2005).

Equity is typically low in all banks' balance sheets. Lending and deposits are traditionally large in retail and commercial banking.

Investment banking, including both specialized finance and trading, typically funds operations in the market. In European banks, 'universal' banking allows banking institutions to operate over the entire spectrum of business lines, contrasting with the separation between investment banking and commercial banking, which prevailed in the United States.

2.3.1. Liabilities

Banks obtain their financing from different sources: Customers, institutional investors, the interbank market and shareholders.

Resources from customers are usually collected trough savings accounts with daily callable money. Certificates of deposits (CD) are another way of collecting short-term funds. CDs are financial instruments with usually a fixed interest rate and fixed term and are normally held until maturity. Both instruments are insured up to a certain amount and therefore virtually risk free.

Another way of raising fund from customers is the issue and placement of bonds. The bank issues bond with a certain interest rate and maturity and sells them both to retail customers and to institutional investors.

Given the normally very good credit standing of banks, these bonds are considered as relatively safe investments. Funds are obtained also from other banks through the interbank market or directly from the central bank.

Finally, the shareholders' funds, that equal the difference between total assets and liabilities, build the backbone of a bank's financial structure. It is a cushion against an unforeseen drop in the value of assets.

2.3.2. Assets

As for every business, assets can be classified by its holding period.

There are different types of short-term assets. The most liquid assets are the cash reserves that banks are holding in form of a deposit in an account at the central bank. Regulation requires holding these reserves that can be used by the bank to meet its obligations when funds are withdrawn.

Other very short-term assets are interbank loans and money market loans. These loans are mostly overnight loans and allow banks to employ liquidity on short-term.

In the long term assets, we find loans and fixed-income securities (bonds). These are the traditional core assets of banks and often provide a great share of the banks revenues (Stoughton et all. 2005). Depending on the type of loans or bonds and the existence of a secondary market these assets are more or less liquid.

Counterparties are usually the public sector, companies and households. Loans also have a higher probability of default than other assets. Because of the lack of liquidity and higher default risk, the bank earns its highest return on loans.

Depending on their business model, most of the time banks specialize on a certain type of loans.

2.4. The banking and the trading books

The banking book groups and records all commercial banking activities. It includes all lending and borrowing, usually for traditional commercial activities. The 'trading book' groups all market transactions tradable in the market.

The major difference between these two segments is that the 'buy and hold' philosophy prevails for the banking book, contrasting with the trading philosophy of capital markets. Accounting rules differ for the banking portfolio and the trading portfolio.

2.4.1. The Banking book

The banking portfolio follows traditional accounting rules of accrued interest income and costs. Customers are mainly non-financial corporations or individuals, although inter-banking transactions occur between professional financial institutions.

The banking portfolio generates liquidity and interests rate risks. All assets and liabilities generate accrued revenues and costs, of which a large fraction is interest rate-driven. Any maturity mismatch between assets and liabilities results in excess or deficit of funds.

Financial transactions serve to manage such mismatches between commercial assets and liabilities through either investment of excess funds or long-term debt by banks.

Asset-Liability Management applies to the banking portfolio and focuses on interest rate and liquidity risks. The asset side of the banking portfolio also generates credit risk. The liability side contributes to interest rate risk, but does not generate credit risk, since the lenders or depositors are at risk with bank. There is no market risk for the banking book.

Credit risk is critical in the banking book, since the default of a small number of important customers can generate large losses, potentially leading to insolvency (Picone 2002).

There are various default events. Delay in payment obligations, restructuring of debt obligations due to a major deterioration of the credit standing of the borrower or bankruptcies.

2.4.2. Trading book

The market transactions are not subject to the same management rules. The turnover of tradable positions is faster than that of the banking portfolio. Earnings are P&L equal to changes of the mark-to-market values traded instruments.

Customers include corporations (corporate counterparties) or other financial players belonging to the banking industry (professional counterparties).

The trading portfolio generates market risk, defined broadly as the risk of adverse changes in market values over a liquidation period. It is also subject to market liquidity risk, the risk that the volume of transactions narrows so much that trades trigger price movements.

Many market transactions use non-tradable instruments, or derivatives such as swaps and options traded over-the-counter. Such transactions might have a very long maturity. They trigger risk, the risk of a loss if the counterparty fails.

Capital markets value the credit risk of issuers and borrowers in prices. Credit risk is visible through credit spreads, the add-ons to the risk-free rate defining the required market risk yield on debts.

The capability of trading market assets mitigates the credit risk since there is no need to hold these securities until the deterioration of credit risk materializes into effective losses.

If the credit standing of the obligor declines, it is still possible to sell these instruments in the market at a lower value. The loss due to credit risk depends on the value of these instruments and their liquidity.

If the default is unexpected, the loss is the difference between the pre- and post-default prices. The faculty of trading the assets limits the loss if sale occurs before default. The selling price

depends on the market liquidity. Therefore, there is some interaction between credit risk and trading risk.

For over-the-counter (OTC) instruments sale is not always feasible; especially in moments of low liquidity. The bank faces the risk of losing the bale of such instruments when it is positive.

Since the value varies constantly with the market parameters, credit risk changes with market movements during the entire residual life of the instrument. Credit risk and market risk interact because these values depend on the market moves.

Credit risk for traded instruments raises a number of conceptual and practical difficulties.

What is the value subject to loss, or exposure, in future periods?

Since market prices normally anticipate future events, does the current price embed already the credit risk? And, since the market for such instruments might narrow when credit risk materializes, what is the discount from the current value?

Will the bank hold these instruments longer than under normal conditions?

2.5. Off-balance Sheet Transactions

Off-balance sheet transactions are contingencies given and received. For banking transactions, contingencies include guarantees given to customers or to third parties, committed credit lines not yet drawn by customers, or backup lines of credit. Those are contractual commitments, which customers use at their initiative.

A guarantee is the commitment of the bank to fulfill the obligations of the customer, contingent on some event such as failure to face payment obligations. For received contingencies, the beneficiary is the bank.

Given contingencies generate revenues, as either upfront and/or periodic fees, or interest spreads calculated as percentages of outstanding balances. They do not generate immediate exposures since there is no outflow of funds at origination, but they do trigger credit risk because of the possible future usage of contingencies given.

The outflows occur conditionally on what happens to the counterparty. If a borrower draws on a credit line previously unused, the resulting loan moves up on the balance sheet. 'off-balance sheet' lines turn into 'on-balance sheet' exposures when exercised.

Derivatives are 'off-balance sheet' market transactions. They include swaps, futures contracts, foreign exchange contracts and options. As other contingencies, they are obligations to make contractual payments conditional upon occurrence of a specified event.

Received contingencies create symmetrical obligations for counterparties who sold them to the bank. Banks engaged in international banking also conduct transactions in the foreign exchange market. All transactions in these markets are off-balance-sheet activities because they do not have a direct effect on the bank's balance sheet.

Recently banks have been more and more aggressive in gaining profits by engaging in off-balance-sheet transactions. Those involve trading financial instruments and generating income from fees and loan sales, activities that affect bank profits but do not appear on bank balance-sheets.

Indeed, off-balance-sheet activities have been growing in importance for banks. Being off-balance-sheet, the importance and especially the risk of these transactions is sometimes undervalued, although it still exposes the bank to a risk.

2.5.1. Generation of fee income

Another type of off-balance sheet activity involves the generation of income from fees that banks receive for providing specialized services to their customers.

Examples are making foreign exchange trades on a customer's behalf, servicing a mortgage-backed security by collecting interest and principal payments and then paying them out, guaranteeing debt securities such as banker's acceptances (by which the bank promises to make interest and principal payments if the party issuing the security cannot), and providing backup lines of credit.

Off-balance-sheet activities involving guarantees of securities and backup credit lines increase the risk the bank faces. Even though a guaranteed security does not appear on a bank balance

sheet, it still exposes the bank to default risk: if the issuer of the security defaults, the bank is left holding the bag and must pay off the security's owner, since it acts as guarantor.

Backup credit lines also expose the bank to risk because the bank may be forces to provide loans when it does not have sufficient liquidity or when the borrower is a very poor credit risks.

2.5.2. Loan sales

One type of off-balance-sheet activity that has grown in importance in recent years involves income generated by loan sales.

A loan sale, also called secondary loan participation, involves a contract that sells all or part of the cash stream from a specific loan and thereby removes the loan from the bank's balance sheet. Mostly a bundle of loans are 'packed' into a new security that is later sold off to investors.

These securities are called asset-backed-securities (ABS). Since this kind of financial product played a major role in the recent financial crisis, it will be explained more deeply in the next paragraph.

Banks earn profits by selling loans for an amount slightly greater than the amount of the original loan. Because the high interest rate on these loans makes them attractive, institutions are willing to buy them, even though the higher price means that they earn a slightly lower interest rate than the original interest rate on the loan (Gorton 2007).

The following paragraph discusses more details about the complexity of this product and the issuance process with the different parties involved.

2.6. ABS

The previous part was meant to provide the reader with an overview of banks' assets and liabilities. Given our aim to analyze the impact of assets write downs, the major focus is on the assets side. And within the assets, we are narrowing our analysis on leveraged loans, and asset backed securities using subprime mortgages as collateral.

It is now worth to explain what these instruments are and how they are securitized.

2.6.1. Leveraged loans and subprime mortgage loans

Leveraged loans are loans extended mostly to companies that already have considerable amounts of debt. Lenders consider these loans to carry a higher risk of default and, as a result, a leveraged loan is more costly to the borrower.

Leveraged loans for companies with debt tend to have higher interest rates than typical loans. These rates reflect the higher level of risk involved in issuing the loan. Leveraged loans are often used to finance leverage buy out in the private equity sector.

Subprime mortgages are a type of mortgage loans that is normally made out to borrowers with lower credit ratings (Immergluck 2008). As a result of the borrower's lowered credit rating, a conventional mortgage is not offered because the lender views the borrower as having a larger-than-average risk of defaulting on the loan (Mills and Lubuele 1994).

Lending institutions often charge interest on subprime mortgages at a rate that is higher than a conventional mortgage in order to compensate them for carrying more risk. We will come back to these loans when describing the securitization process.

2.6.2. Securitized assets

In order to describe the securitization process we will go through all the cycle, from the original lender to the final investor in the CDO.

We will use the subprime mortgage structuring to describe the whole process. The securitization for other assets is quite similar and, given their volume, the CDOs, with mortgages used as collateral represent a huge share of the structured finance market.

Only in America residential mortgage market consisted of some $10 trillion worth mortgage loans in 2007. Approximately 75% were securitized, mainly by the national agencies Fannie Mae and Freddie Mac. Most of this market involved little risk, either to the original lenders or to the subsequent investors in the lender-created mortgage pool.

The original lenders faced relatively low default risks because two thirds of the conventional (prime) mortgage borrowers enjoyed good credit score, have arranged an insured fixed-rate mortgage, and most important have a significant equity investment in their houses.

Concerning our analysis, mortgage loans have become the dominant asset class in the structured finance CDO sector.

In particular, the growing utilization of subprime residential mortgage-backed securities as collateral reached an all-time high in 2005 when they accounted for half of the total collateral among CDOs with a total amount of $515 billion issued according to Moody's (Assessing the Credit risk of CDOs).

In 2006, the share of subprime collateral decreased to about 40%, but the share of all residential mortgage backed securities as a combined category kept rising and surpassed 85%. These are just some numbers to get an idea of the size and the relevance of this market.

Beside the subprime mortgage backed securities there are different other types of ABS. We will briefly describe the main ones to give an overview of this market. They basically differ in the asset backing the securities.

At first, the ABS market developed quickly in the mid to late 1990s led by the high-yield collateralized bond obligations (HY CBOs) and high-yield collateralized loan obligations (HY CLOs). However, the poor performance of high-yield corporate bonds during 2000-2001 recession negatively affected the performance of HY CBOs and caused total ABS issuance to decline.

Most of the ABS issued during 1999-2002 were cash flow transactions backed by diversified pools of instruments such as CMBS (commercial mortgage backed securities), manufactured housing ABS, RMBS (residential mortgage backed securities), HY CBOs, and corporate debt. We will go into details concerning RMBS later in this chapter.

It could be now interesting to present three other classes of ABS which have become particularly interesting for securitization.

Securities collateralized by credit card receivables are one of the oldest segments of the ABS market, representing 14.3% of ABS issuance in 2003. Holders of credit cards may borrow funds,

generally on an unsecured basis up to an assigned limit, and pay the principal and interest as they wish, as long as they make a small required minimum payment on a regular basis.

Student loan ABS represented 8.1% of ABS issuance in 2003. As a group, student borrowers have relatively high default rates, but this reality is largely neutralized by government guarantee programs that cover most student loans.

Another comparatively small portion of the ABS market (1.5% of issuance in 2003) is represented by securitizations of leases for computers, telephone systems and other kinds of business equipment.

2.6.3. Securitization process

We will now illustrate how the securitization of subprime mortgages takes place. In particular, it is important to understand who is who in this process.

The first two entities involved are the mortgage borrowers and the mortgage brokers.

Subprime borrowers are usually individuals with poor or scarce credit history. They borrow up to over 90% (unofficially over 100%) of the value of their property (at least this is what happened in the US).

During the subprime boom subprime borrowers could have access to what appeared to be cheap loans (Demyanyk et all. 2008). Borrowers were encouraged by extremely low (or none) down payments, second mortgage financing (often), and adjustable rate mortgages with initially low, and generally tax deductible, interest rates.

In 2005, subprime borrowers (previously denied access to mortgage financing) accounted for one in five new mortgages and ten per cent of all new mortgage loans. Low short term interest rates earlier this decade led to an extensive use of adjustable rate mortgages (ARMs).

It is important to keep in mind that, payments on ARMs could increase substantially if interest rates rose. Some of the ARMs were know as "teaser" loans, given their initial interest rate of one per cent.

On the other side, there are the mortgage brokers. Their job is to place new mortgages to the lenders in exchange of fee for originating mortgages. It is, though, clear how keen are mortgages broker in originating new mortgage loans.

The new credit scoring technology also made easier and cheaper to generate and screen new mortgages. Computer system allows the broker to come up with a tailor-made borrower rating based on the inputs he/she inserts.

On the supply side there are the original lenders, banks, which receive the mortgages from the brokers.

Once the bank provided the mortgage loan, it then earned additional income by creating a pool of mortgage loans and selling it.

Financial institutions that originate loans turn their loans into marketable securities through a process known as securitization. The loan originators are commonly referred to as the issuers of ABS, but in fact they are the sponsors, not the direct issuers, of these securities (Bank for International Settlements, Consultative Document 2008).

These financial institutions sell pools of mortgage loans to a special-purpose vehicle (SPV), whose sole function is to buy such assets in order to securitize them. The SPV, which is usually a corporation, then sells them to a trust. Sometimes the original lender sells the pool directly to the trust.

The trust repackages the loans as interest-bearing securities and actually issues them. This is the actual structuring process. The loans are put together and securities on their future cash flows are issued (Lucas et all. 2007).

The "true sale" of the loans by the sponsor to the SPV provides "bankruptcy remoteness," insulating the trust from the sponsor. The securities, which are sold to investors by the investment banks that underwrite them, are "credit-enhanced" with one or more forms of extra protection.

These securities receive a rating which is independent from the initial lender rating. Rating agencies give a score to each tranche of the CDO. The rating, of course, varies with the seniority of the tranches.

Equity and Junior tranches, which absorb the first defaults, are more risky and of course sell at discount. The rating is based on individual default risk and correlation of the loans in the pool as we will see later in details.

ABSs are generally rated by one or more of the following rating agencies: Standard & Poor's Rating Services, Moody's Investors Service and Fitch Ratings. These agencies determine the amount of credit enhancement required to produce a credit quality comparable to that of a same-rated corporate bond (Mason et all. 2007).

The vast majority of ABS are issued in one of the top two generic credit rating categories, either triple-A or double-A.

Finally, once the tranches have been rated, the securities are issued and sold by investment banks to the final investors.

Investors bought ABS for a variety of reasons. Institutional and other investors were eager to purchase the securities issued by mortgage pools, particularly because they faced shortages of other attractive investment opportunities.

Among high rated fixed income ABS were offering the higher yields given maturity, and the high rating was interpreted as a guarantee.

Final investors in CDOs tranches range from hedge funds to pension funds, banks and insurance companies.
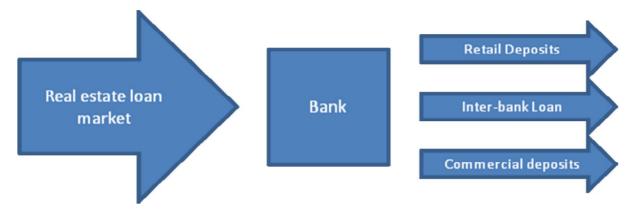
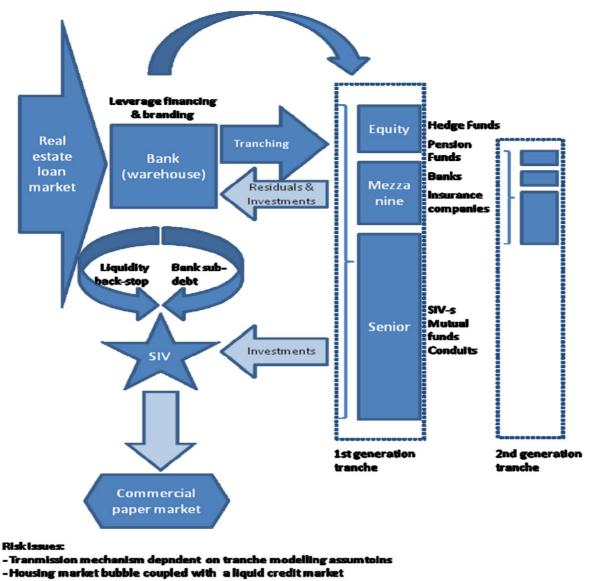Figure 3: Traditional credit transmission process

Source: Debunking the securitization myth, Wise (2008)

This was the finance industry's innovative "miracle" of securitization: in contrast with the past, when traditional loans financed by commercial and retails deposit bases sat on balance sheet for term (Fabozzi et all. 2007).

The figure above simply shows the traditional credit transmission process. The short term bank's liabilities represent the base for real estate loan financing.

The figure below, on the other hand, describes the complex securitization process mentioned before.

Figure 4: Securitisation loan model

Risk Issues:
- Tranmission mechanism depndent on tranche modelling assumtoins
- Housing market bubble coupled with a liquid credit market
- SIV term funding mismatch
- Relateness issue with banks

Source: Debunking the securitization myth, Wise (2008)

As long as the borrowers make their projected mortgage payments, the value of CDOs hold and investor principal is repaid with interest.

Having been through the securitization process, it is clear that CDOs are over the counter products (OTC), exchanged in private negotiation and not on a regulated exchange. In the final stage of the process there is an underwriter selling it to an institutional investor.

These products are generally priced when they have to be sold and they are not exchanged continuously.

Liquidity was not a concern in the booming period. It was extremely easy to place the different tranches of CDOs and the secondary market was fairly liquid as well. Institutional investors were very keen in purchasing CDOs.

However, liquidity in the secondary market is a big issue in crisis period. Even when there is a residual value, it is about impossible to find a bid for distressed CDOs tranches. We will see a practical consequence later in our analysis.

3. The value of Bank's asset

3.1. Risk and return

The main aim of our work was first to give an accurate assessment of banks' asset value. We then decided to focus of some particular assets (leveraged loans and subprime mortgage loans).

As all the fixed income instruments in general, the value of these securities is affected by different factors like interest rate, liquidity risk and default risk. The last one affects all debt instruments, except some government bonds, and it is also the most relevant for our analysis.

The general aim of chapter three is to give some guidelines on debt pricing and consequently banking assets valuation.

As mentioned, we would like to find out how a mispriced debt has an impact on the value of the bank's assets. In particular we want to stress the strong link between risk and return. We will see how the risk assessment affects the value of the debt and how risk can come in different forms, as standalone or as portfolio risk.

Unlike the government bond of most developed countries, holding a corporate bond (or a mortgage bond) exposes investors to credit risk, and in specific default risk. This is the risk that the issuing company will default on its bond's coupon payments or principal repayment, resulting in a loss to bondholders. Default may occur due to general financial difficulties.

However, what is more important for us is that the price of a corporate bond reflects the market's view of the credit risk with holding it.

We are basing the coming discussion on the bond yield and spreads. Just to recall the yield is negatively correlated with the value of the bond. In general, if risk increases, the yield goes up and the price decreases. Vice versa, if risk decreases the yield should decrease as well while the price should increase

If credit risk is perceived to be low, the spread of the issuer's bond over the equivalent maturity government bond will be low, while if the credit risk is deemed to be high, the yield spread will be correspondingly higher.

This yield spread is sometimes referred to as the credit spread. A 10 year bond issued by a highly rated borrower will have a lower spread than a 10 year bond issued by a borrower with a lower credit rating.

The higher yield on the bond issued by the lower rated borrower is the compensation required by investors for holding the riskier bond.

Bond issuers are also rated by investment houses' internal credit analyst and by formal credit rating agencies like Moody's, Standard & Poor's and Fitch. As mentioned before, it is primarily the market that assesses the credit risk.

Credits spreads over government yields and between corporate borrowers of different credit quality fluctuate with market conditions and in line with the business cycle. Spreads are highest when an economy is in a recession and corporate health is relatively weak.

A significant downward market correction also tends to widen credit spreads as investors embark on a "fight for quality" that depresses government bond yields. This is exactly the current situation we are experiencing.

At the height of an economic boom spreads tend to be at their narrowest, not only because corporate balance sheets are in healthy shape but also because investors become less risk averse in times of strong economy (Choudhry 2001)

As mentioned before, debt is a bank asset and its value is a negative function of credit risk. As we have seen, the higher is the credit risk the lower is the bond price and the higher the yield. Corporate bonds pay a spread over the risk free rate of interest and sell at a discount ("Nordea handbook on credit risk" 2007).

Throughout this chapter is important to keep in mind that we are going to deal with credit risk only to understand how it affects the value of the debt and consequently of the bank assets.

What we want to understand is how an imprecise assessment of credit risk may change the value of debt and as a consequence of banks' assets. We will deal with the stand alone credit risk of leveraged loans and mortgage loans, and the portfolio credit risk of a basket of loans.

3.1.1. Standalone credit risk

Standalone default risk is the expected loss on a security as a function of default and recovery. This is also defined as loss given default, as we will see it is an interesting issue in mortgage bonds.

The standalone default risk is defined by default probabilities of individual independent bonds. The way this kind of risk is treated generally differs between corporate leveraged loans and mortgage loans.

3.1.2. Corporate leveraged loans

The value of corporate leverage loans is of course affected by the intrinsic credit risk of the loans. There are two main models used to assess the default risk of individual corporate loans. The first one is based on financial statement ratios ("Nordea handbook on credit risk") and it is the traditional and "less sophisticated model".

While the second is based on the Merton's option valuation model. The latest is more advanced and takes a forward looking perspective. It includes both the financial statement data and the market data (Crosbie and Bohn 2003, and Lando 2004)

3.1.3. Financial statement and ratios:

This kind of analysis is based on data extrapolated from the financial statements and company's reports. The ratios are divided in two big groups, identifying two different kinds of risks:

- Financial risk – financial data (leverage, coverage, liquidity, profitability, asset turnover)

- Business risk – soft data (market penetration, sector analysis, state of the economy)

Each ratio has a weight depending on the industry and the context. Furthermore, each ratio is defined in a range depending again on the industry. For example a high leverage has different impact on a transport company than on a pharmaceutical firm.

Given the ratio and relative position in the range, a score is obtained. Each score is then weighted and a total average provides the final rating.

Financial ratios provide an overview of companies' ability to repay short and long term debt and to finance working capital. For example, coverage of 20% means a Baa in the manufacturing industry (Moody's) and it has a 5% over the total rating.

A final rating is then applied to the bond. The main rating agencies assign alphanumerical rating and classify the bonds. The rating is supposed to reflect a certain default probability, yield and price.

The main limit of this model is its static nature. The rating is based on the current situation of the company and does not take a market perspective. It lags the market in adapting to sudden events.

Furthermore, it does not take into account off balance sheet liabilities of the borrower and it is dependent on weight evaluation. Also, the business risk part is hard to estimate.

3.1.4. Option based models to find default probabilities and price debt (KMV)

The idea of this model is that the firm defaults when the total value of the assets drops below the value of book liabilities. So that the market value of the assets is not sufficient to repay the debt. It was originally developed by Kealhofer, McQuown and Vasicek (on Merton idea) and then used by Moody's for debt assessment (Crosbie and Bohn 2003)

The model is made so that the value of the assets of the company moves randomly around a mean and with certain volatility. The mean is the company's expected return (from historic data), the volatility is given by the assets' volatility and the random walk is given by a normal distribution.

The default probability is the probability that the value of the firm's assets will drop below the book value of liabilities (default point) over a certain period.

This model of course recalls the option valuation model where the equity is seen as a call option on firm's assets (underlying). The strike is the book value of liabilities. Equity holders will indeed get the residual when the bondholders have been repaid, while they are not obliged to repay the debt if the total value of the company is lower than the outstanding debt.

The debt value is its face value minus a short put option on the firm assets. Or simply the value of total assets minus the value of equity (Hanke 2003).

Given the option feature of equity and debt we can apply the most used model (B&S Merton model) to price equity and debt (Black and Scholes 1973).

The basic assumption of the model is that the underlying asset has a normal distribution. It means that given the value of the assets, the volatility and the drift (mean) we can easily find the default probability.

In other words, if future distribution of assets is known, the expected default frequency (EDF) would simply be the probability that the value of the company's asset will fall below the default point.
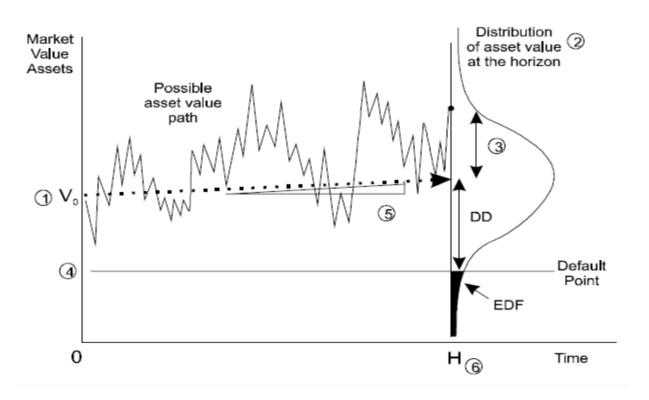
Figure 5: KMV Model

Source: "Modeling default risk" Crosbie and Bohn (2003)

1) Current asset value

2) Distribution of the asset value at time H

3) Volatility of the future assets value at time H

4) Default point or book value of liabilities

5) Expected rate of growth in the asset value over the horizon

6) Length of the horizon H

The figure above provides the reader with a graphical idea of the concept.

The model implies that the default probability is mostly driven by assets volatility (business risk) and leverage only amplifies this effect. This is an important feature since we know that business risk, and so assets' volatility, increases during crisis periods.

This is considered to be a very good model, based on strong economic and statistical basics. However, the most important feature is that it takes into account the potential market evolution. This is not to say that it is a perfect model, but it is probably the best we have.

A wrong input can change the output and the quality of the result, the estimation of assets' volatility is particularly critical. Another drawback is the normal distribution assumption.

Moody's circumvent this problem using a huge data base of historic defaults in different industries. This is a good alternative that involves a cumbersome work of data collection and might still be limited. In spite of these weaknesses this is still the most accurate model we can rely on to price debt.

Another issue regards the default point. As mentioned before, the company is assumed to default when the value of the assets drops below the book value of liabilities. In reality, the default point is slightly below given the different duration of the firm's liabilities and the company ability to keep servicing short term debt (Merton 1974).

3.1.5. Subprime mortgage loans

The value of mortgage loan is also driven by default risk. Many studies indeed, tried to find the main factors behind mortgage loan delinquency.

The principal ones are loan-to-value ratio, income-to-payment ratio, macroeconomic factors (interest and stock market) and also race and education of the borrowers. All these variables have some kind of relationship with the default of subprime mortgage.

However, loan-to-value ration is generally recognized as the most important one (Wong et all. 2004). This ratio indicates the value of the outstanding loan compared to the current value of the property (L/V).

It is proven (and logic) that the borrower will be more likely to default when the value outstanding debt becomes higher than the property value used as collateral. It is logic that if an individual can choose between paying 2 or giving away 1, he/she will choose the second[5].

As we know and we will see many borrowers have experienced negative equity during the last months. All the other factors (especially the payment-to-income ratio) can be considered as an "amplifier" of the loan-to-value ratio (Wong et all. 2004, Liu and Lee 1997).

That said the value of the mortgage loan is tightly linked to the asset used as collateral (Bordo 2005). Assuming transaction costs are not significant and the housing market is enough liquid, the loss incurred for the lender equals 0 as long as the value of the collateral outweighs the value of the loan. This is why the loan to value ratio gives an idea of the risk of mortgage loans.

All these studies are pretty useful to identify the main reasons of default, but they avoid the most important point in valuing the mortgage loans.

It is in fact crucial to assess the value of the collateral to imply the value of the loan for the bank. If the borrower defaults the lender is left with the collateral (property) (Cochrane 2000).

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5 The real estate market has experience a boom in recent years with prices skyrocketing. Many subprime borrowers have bought their property at the peak of the bubble, covering (up to 100%) the purchase with a mortgage loan. It is then easily understandable how fast these borrowers have experience negative equity. Once the price of the housing dropped, they found themselves immediately with a loan bigger than the value of their property ("The subprime mortgage market: familiar lessons in a new context")

This means that if the value of the property is above the outstanding loan, the lender will not experience a direct loss since the value of the property would act as a cushion (Joslin 2005).

On the other hand, if the property value is less than the loan value the lender will book a direct loss. This is why this section will be mostly dedicated to the property evaluation tools used in real estate finance.

It is worth to mention that this field of finance has been one of the less sophisticated. Other interests rather than the sound credit requirements have been driving the mortgage issues and valuations for some time.

Methods like borrower credit scoring and current value of the property have prevailed on more accurate models widely used to value other forms of debt.

We can identify three methods for property valuation, starting from the less accurate to the most evolved one:

The current market value

The "current market value" of the property is a widely used method to value a property. This method could be a good starting point, but it ignores one of the main requirements of valuation, which is sustainability (Hui et all. 2006).

During the 2006 the speculative bubble in the housing market reached its top. Housing price reached their pick which reflected their current market value at that time. Even though, that was the correct market value, it is now clear that it was not a sustainable value.

Another drawback is that this kind of valuation has been often based on "rules of thumb" derived from valuers' personal experience and their feel of the market.

This method has of course weak basis and lack of forward looking perspective. In spite of these clear drawbacks this is still one of the most used method in real estate finance (Biernet and Brunauer 2006) (Liu and Lee 1997).

Value at Risk (VAR)

Value at Risk (VAR) based valuation uses the current market value as starting point. Takes volatility from historical data, defines a time frame and a confidence level from a normal distribution. This method permits to find a maximum loss at certain confidence level.

The property value then used for lending purpose is the current Market Value – VAR. This is a good method which applied a well-developed and simple concept, the VAR, to a new field.

In other words, VAR assesses the potential maximum drop in the property value and consequently how loan-to-value ratio would change; or better how much that ratio will increase due to the reduced value of the property.

Just think about the 100% loan-to-value subprime mortgage issued in the US. Even a small decrease in the property value will imply negative equity (loan-to-value > 1) for the borrower, higher risk of default and higher potential loss give default (LGD) (Bienert and Brunauer 2006).

Although, a potential drawback is the normal distribution assumption, VAR remains a good method. It is particularly convenient because of its simplicity and its fast applicability.

Merton Model valuation

The last method is the most advanced and resembles the KMV method applied to the property value. In this case the value of the asset is the value of the collateral (the property).

The strike price is the nominal value of the outstanding loan. The value of property could be assumed to follow a random Wiener process with a defined drift and volatility taken from historical data. In this case the trigger point for default should be somewhere close to the nominal value of the outstanding debt.

This means that the borrower will default when the nominal value of the debt will exceed the value of their property. The default probability will still be the one of the property value falling below the value of the outstanding debt.

This conclusion makes sense in theory, but is a bit unrealistic. We think that the default point will be somewhere below the strike or nominal value of the debt. (Bienert and Brunauer 2006)

(Hui et all. 2006). The distance between nominal value of the loan and actual default point is determined by other factors like:

- payment-to-income ratio: the higher the payment of interest compared to the borrower income the closer will be the default point (Stansell and Millar 1976)

- interest rate: as mentioned most of the subprime loans have a variable interest rate, it means that when the interest rates increase the default point will move closer to the nominal value of the debt

- Other macroeconomic factors and state of the economy.

The aim here is to present the ideas, and we are aware that there is room for development of these last ideas. However, this is not the scope of this work.

It is, however, still important to have the main point clear. Negative equity is the main trigger for defaults and consequently the value of the property is the critical factor to keep into account when issuing a mortgage loan.

It is also worth to remark that, even though the current models have some drawbacks, they are quite accurate in estimating standalone risk, and consequently the value of single corporate loans. Regarding mortgage bonds the case is different.

There are couples of good models in place, but for some reason, poor and unsophisticated models prevailed on more accurate ones. In particular, the last two property valuation models presented seem to be the most adequate ones.

It is still important though to consider that also these models could be affected by the quality of the inputs. To give an example, many models implied a continuous growth in the real estate value, or at least not a decrease. If the input (the drift in our case) is based on this assumption the model could result faulty.

On the other hand, a long term average return could provide us with a more accurate result, taking into account past growth and decline in housing prices.

There is of course, a trade off between quantity of data an feasibility of the model.

Assumptions are used to bridge data limitations, forecast future experience or simplify complex circumstances. Often more important than the individual assumptions is the process for developing, vetting, evaluating and stressing assumptions used in financial models.

Disciplined assumption development and review of processes increase the understanding of both the implications and limitations of using a particular assumption.

3.2. Portfolio risk

We have seen in the opening section that a relevant part of bank assets in composed by debt. We have also seen how the individual loans have been aggregated in portfolios and the CDOs structure.

It is now time to define how portfolio risk affects the value of banks' assets. We will see how the standalone default risk becomes less relevant for significant loan portfolios.

What is in fact more relevant for bonds portfolio is the default correlations. This is the degree to which the default risks of borrowers and counterparties in the portfolio are related.

Correlation in general increase in crisis period and with correlation increases the total portfolio's default risk (Hikasado et all. 2008). A wrong assumption on correlation could result in an incorrect valuation of debt.

In order to understand the risk of a pool of loans (and for pricing the different tranches of CDOs), the effort is focused on methods for modeling correlation.

As we have seen, the default risk of individual issuers is fairly priced in the market (at the least for corporate bonds). In this sense, the "marginal" credit risk of each issuer in a pool is usually determined.

What affects the value of the total pool and the pricing of different tranches is therefore the varying correlation assumptions imposed to the model (Das et all. 2007).

If, for example, the loans are considered to have independent default probabilities we could use a simple binomial distribution to find the potential number of defaults.

Given this assumption, the senior tranches of a CDO will hardly be affected by the defaults. It is very improbable that the pool will experience a number of losses far from the mean (Rosch and Scheule 2004).

On the other hand, if defaults are correlated in same way there could be some case that would imply several loans defaulting together. Correlation assumptions are critical components of the CDO rating analysis (Grune et all. 2007).

Imperfect default correlation of assets is one of the main reasons why a CDO can normally offer tranches with wide range of risks from Aaa to Caa, regardless of the credit quality of the individual assets in the pool.

Finally, dependence modeling is necessary in trying to understand the risk of simultaneous defaults by, for example, financial institutions. Such simultaneous defaults could affect the stability of the financial system with profound effects on the entire economy (Lando 2004).

Given that the pool is not too inhomogeneous; the basic idea is that default probabilities are influenced by common background variables which are observable.

As in all factor models, we then need to specify the joint movement of the factors and how default probabilities depend on the factors (Schonbucher 2001).

We will only present some result and ideas without going too much into the statistical modeling.

The main idea of default correlation modeling is that default probabilities of a pool of bonds change with different scenarios. Given that, the crucial implication is that crisis scenario could result in a significant amount of loans defaulting all together.

3.2.1. Mixed Binomial Model

The Mixed Binomial Model catches the mentioned idea quite well.

Different scenario implies different default probabilities. The role of the mixture distribution is to induce dependence among defaults, mimicking a situation where a common background variable affects a collection of loans.

The chart below shows this idea. If the defaults are assumed to be independent a binomial distribution can efficiently describe the default probabilities of a pool of loans.

Correlation is equal to 0 and the most of the defaults are concentrated around the mean. It is very improbable that we will see defaults in the tails of the distribution. Which means that the senior tranches is hardly going to be affected.

To recall "equity", "junior notes holders", and "senior notes holders" each has a claim on a portion of the loan, but in such a way that defaults in the pool hit the payouts to the equity holders first. If enough defaults occur to make the equity worthless, the junior notes holders will start absorbing the defaults and so forth.

If we introduce correlations of defaults through a mixed binomial, things change.

Correlations of defaults means that we can see some scenario with very few defaults as well as an extreme scenario with such a significant amount of defaults to affect the senior trance.

This kind of scenario could result in contagion in which the actual default event causes a direct default of another entity or a deterioration of credit quality as a consequence of the default event (Lando 2004).
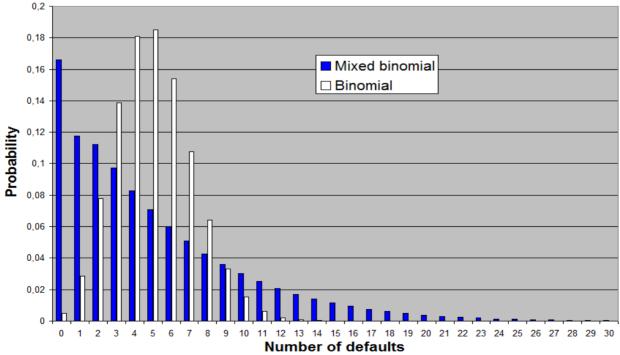
Figure 6: Default distributions

Source: Own elaboration

The chart above shows indeed how the probabilities of seeing many or few defaults increase including correlation in the model.

In fact, the mixed binomial model implied that the probability of having 0 defaults is higher than in the binomial model. On the other hand, the probability of having 15 or more defaults is also higher in the mixed binomial model.

The implication in pricing is direct; the increase in probability of seeing many defaults would decrease the value of the senior tranche. While the equity tranche value will increase given the higher probability of experiencing few defaults.

The mixed binomial model provides us with strong basics to price CDOs and to take into account correlation of defaults. The distribution is also convenient to work with but has limited economic content.

3.2.2. Merton Model and Mixing Distribution

This model applies the Merton Model to the previous framework to give an economic sense to the distribution.

As we have seen before each firm will default if the value of the assets will fall below the value of the debt. To recall the value of the assets follow a Brownian (random) distribution.

Lando includes correlation decomposing the Brownian motion into a common factor B_0 and a firm specific factor B_1. As a consequence of this, the assets values of the firms (or properties) are all correlated.

This model can be of course applied to a pool of mortgage loans as well, where the assets are the value of the real estates. Also, Moody's uses assets' correlation in its model (Hu 2007).

This model does not differ too much from Lando's approach. In Moody's opinion, assets' correlation is better treatable than default correlation.

Furthermore, they consider this approach quite natural in the structured finance context, where CDOs' performance clearly depends on the performance of the assets in the collateral.
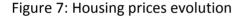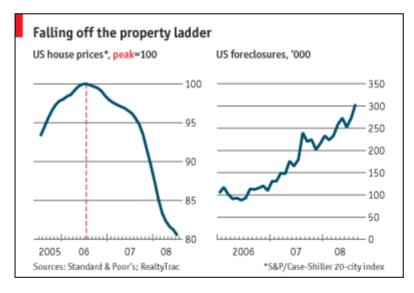
This last approach seems to be the most appropriate. The potential drawback is when they are applied to a inhomogeneous pool. In this case, it is harder to asses the correlation and how the collateral would be affected by a common background variable.

The last two sections provided us with a general understanding of how portfolio credit risk can affect the value of debt. Correlation in particular plays a crucial role in defining default probabilities and corresponding value of the CDOs tranches. An underestimation of default correlation can result in a misleading valuation of debt.

The effect could be extremely severe if we consider crisis scenario and contagion. When economy enters into recession default correlation grows exponentially and the losses mount together.

This effect could be amplified if the original standalone default probabilities have been underestimated (look at mortgage loans standalone risk section). If that is the case the securitization structure is a ticking bomb ready to explode if the housing market turns down.

Figure 7: Housing prices evolution

Falling off the property ladder

US house prices*, peak=100   US foreclosures, '000

Sources: Standard & Poor's; RealtyTrac   *S&P/Case-Shiller 20-city index

Source: Standard & Poor's Realty Trac

This is unfortunately what has happened after the pick in 2006. The chart above shows a Standard & Poor indexes that tracks housing price. Real Estate value lost about 20% since the 2006. This results in an significant amount of home owners experiencing negative equity and consequently in an increasing amount of mortgage loans delinquency.

4. Write-down accounting and Market Efficiency

4.1. Fair value measurement

Most of the accounting standards included in the international accounting standards board (IASB) are derived from FASB regulations.

A closer look at the FASB statements gives an overview over the key issues regarding fair value measurement. FASB statements no. 107, 133, 157 reflect on the method that has to be applied for the valuation of holdings of financial products and the disclosure requirements about value measurements.

In brief, the accounting rules require financial assets or liabilities to be kept in the books at their fair value.[6] The fair value is a market-based measurement and is therefore based on the price that market participants would use in a transaction when selling the asset.

Hence, if an asset is traded in an active market and there are market prices available, the value should be measured at the quoted price. This method is also called mark-to-market and it is considered the first level in the fair value hierarchy of accounting standards.

Level two – also called mark-to-model measurement – in the fair value hierarchy is used when there are no quoted prices available and the valuation has to be based on a model that uses observable inputs.

FASB statement no. 157 however underlines that the fair value determination has to be based on a model that considers all the risks that other market participants would include in pricing[7].

Level three fair value measurements refer to pricings that are based on unobservable inputs. These inputs are inputs that reflect the reporting entity's own assumptions about what market participants would use to price an asset or liability. This is the group of so called 'hard-to-value'

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[6] The fair value is the amount at which the instrument could be exchanged in a current transaction between willing parties, other
than in a forced or liquidation sale. (FASB Statement No. 157)
[7] One might think about the effect of a restriction on the sale o ruse of an asset or the non-performance risk in case of liabilities.

assets and liabilities and it is the most critical on banks' books, since the risk of an accounted value that is far from what is considered the fair value is very high.

4.2. The impact of mark-to-market on the banks' balance sheets

The beforehand introduced accounting rules require from banks that the assets held have to be measured and reported according to fair value. This is considered crucial to the functioning of transparent markets, given that also other investors like mutual funds or hedge funds have to reassess their holdings on a rolling basis.

However, some critique has been raised on this rule regarding banks' balance sheets after the market experiences a sharp deterioration of debt.

Marking to market is simple and provides also relatively well educated guesses about securities that are traded in active markets.

On the contrary, identifying the correct value can become a difficult task in case of thinly traded assets or assets where there is not a market (level 2 or level 3 securities) and the estimation has to be based on a few inputs, like a rating or the valuation of comparables. Examples for these kinds of assets can be ABS, corporate debt or venture capital investments.

When credit started to go bad, markets became more illiquid and valuations quite unstable, banks were required to write-down large shares of the value of their assets. Especially the new complex financial instruments suffered from increasing willingness to sell and the low volumes In some cases buyers disappeared completely, which caused irrational drops.

Therefore the suspension of this rule was required from different sides. Anyhow, given that book values are supposed to reflect the real value of assets, the market price might still be the best estimate for the real value of the assets

Furthermore, profitability measures based on market values are more reliable than the ones based on self-estimated book values (Brealey, Meyers, Allen, 2006).

Another argument for not suspending the rule is simply that if so, it should have been done also before when market prices rocketed. It is hard to recall any bank complaining about a positive mark to market valuation when the assets were overpriced.

4.3. Asset write-down and loan-loss reserve increases

Both asset write-downs and loan-loss reserves mean a reduction of book value on the balance sheet.

Banks are exposed to the worsening debt in two ways, not only being the lender to corporate and privates but also investing in ABS. On one hand, the bank is exposed to the risk as a lender on the other as an investor.

As a lender, the bank suffers when the borrower is expected to not be unable to cover the payback obligations with its cash-flows. In this case the loss is expected to be higher than initially estimated, and the loan-loss allowance[8] has to be increased.

The increase of loan-loss allowance reduces the available capital and impacts on the income statement as a non-cash expense.

In practice, defaulting loans losses are not being charged directly against net income, but reduce the loan-loss allowance. Only at the end of the period the amount of loan-loss allowance is reassessed and has, in case of a needed increase, a negative impact on the net income.

As investors, the banks suffer indirectly from an increase in credit risk and debt losing its value. The price of securities backed-up with loans decreases when the loans turn out to be riskier than expected.

As a consequence banks that invested in ABS are holding assets in their books that are worth less than before.

Accounting standards require that the book value of assets is assessed according to fair value measurement, which in the case of traded instruments is the market price. This forces banks to write-down assets values when the market price of these assets decreases.

The difference between the old and new value is carried as a negative item in the income statement. This is what we use to call asset write down.

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[8] Loan-loss allowance is an adjustment for risk of the value of loans in form of a contra-asset account.

4.4. Efficient Markets

Corporate finance theory defines the value of a company as the present value of future cash flows that are expected to be generated by investments in assets. If these assets are not able to provide the expected cash flows, the value of the company decreases, given lower net present value.

The change in expectations has therefore a negative impact on the stock price of the company, given that the net debt situation does not change.

In the case of banks, it is the loans and the investments in financial instruments that are expected to provide lower cash flow than initially estimated.

The increase in risk causes higher credit defaults and decreases the cash inflows for the bank. Indeed, these changes in expectations of future cash flows should have a negative impact on the value of the single assets held by a bank and consequently on the overall value and the stock price of a bank.

Under the assumption of markets with a strong form of efficiency[9] stock prices would immediately reflect these events, given that they are based on expectations that include all information and thus changes in market conditions should have an immediate impact on share prices.

This does not mean that under the assumption of the strong form of efficiency prices cannot fluctuate around an announcement.

Fama (1970 and 1998) observes, the market efficiency does not imply that price responses are always accurate. Indeed, errors in valuation can exist over the short time but on average should be zero. If not so, arbitrage opportunities exist.

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[9] Brealey, Meyer and Allen (2006) define three types of market efficiency: (1) In the w*eak* form of market efficiency share prices reflect the information contained in the record of past prices. (2) In s*emistrong* efficient markets prices reflect not just past prices but all other published information and hence will adjust immediately to public information. (3) Markets that are efficient in a *strong* form are based on prices that reflect all the information that can be acquired.

However, the assumption of strong efficiency is unrealistic since investors do not have access to all necessary information and the assumption of semi strong or weak form of market efficiency might be more realistic referring to the markets taken into consideration (Brealey, Myers and Allen, 2006).

On Jan 14th 2008 Citigroup expected to have to write-down assets worth 20-24 bn Dollars. They day after, the company announced an asset write-down of over 18 bn of dollars.

This example shows that not only investors do not dispose over complete information but also the companies themselves and the market analysts have a hard time understanding what the value of their assets is.

In the case of banks this issue applies only to assets that are not traded. The remaining assets of banks are mostly traded and therefore an investor that invests in banks' shares has already available a large chunk of information. But the beforehand mentioned example shows that in the current situation these factors do not support the pricing quality.

However, the big discrepancies between the announcements leave a big question mark regarding the roots of this valuation problem, and one might ask if the bank does not heavily make use of its discretionary power.

A good reason for doing so could be the fact that managers know that the company's shareholders pay considerable attention to book measures of profitability and naturally they think (and worry) about how major projects would affect the company's book return (Ross, Westerfield and Jaffe, 2005).

In its working paper from 2003, the Bank of Finland criticizes that, although accounting standards are harmonized on a international level, there is a lack of precise definition about how losses should be measured.

It defines the measurement of the extent of losses partly as science partly as art. The missing of definitive standards concedes decisive discretion to managers over an element that can have a large impact on a bank's reported net income.

5. Literature Review

5.1. The impact of write-downs and loss-loan allowances on the company value

Both asset write-downs and loan-loss reserves increases are adjustments in balance-sheet items with effects on the income statement in form of non-cash expenses.

As explained above, the accounting procedure differs – assets are written down, whereas loans are reduced by a contra-asset account, but the impact on the income statement is the same.

The major difference between asset write-downs and loan reserves is the discretion that bank's management has when it comes to measurement and accounting of loan-loss reserves.

An asset write-down is simply a downward revision in the value of an asset as it is recorded on the books. "Thus, the rich history of market efficiency studies would seem to suggest that, on an a priori basis, we should not expect any significant market price reaction to this bookkeeping adjustment." (Thakor, 1987).

Bartov (1998) argues that also under the assumption that the market is semi-strong efficient, at the time of the write-off announcement, the market would make an unbiased forecast of the future value for the firm, and abnormal stock price changes after that would average zero.

Musumeci et al. (1990) call it an 'act of recognition' that should not have any impact on share prices if market estimates of the real earnings are good.

If the market has good estimates about the company's situation, all the information from the announced adjustment should already be included in the share prices. Therefore significant market reactions to such announcements should not be expected.

Only in a strong inefficient form, where the true quality of assets and earnings was inside information, the market could react either favorable or unfavorable, depending on how estimates about write-down and loan-loss reserve were revised on the basis of the announcement.

However, many empirical studies suggest, that there is a reaction on write-down announcements. If a write-down or reserve decision has real economic significance and was a complete or partial surprise to the market, then it would have an effect on bank's stock prices.

In the following paragraphs different possible explanations for a stock market reaction on these announcements will be presented and references to relevant authors are included.

As mentioned before asset-write downs have their similarities with loan-loss reserves, but bank managers are rather restricted in determining the size and the timing of write-downs.

Most studies that analyze the impact of asset-write down announcements do not study banks.

In that case managers have a certain degree of freedom in the decision of size and timing of a write-down, since there are mostly no market prices available. Consequently write offs are discretionary because of the absence of authorial guidance for management with substantial flexibility in determining whether, when and how much to write-off (Francis, 1996).

For example, Hirschey (2003) finds a similarity in goodwill write-offs that, like loan-loss reserve adjustments, do not typically coincide with changes in the value of bank loan portfolios or with bank loan write-offs.

Given these conditions there will not be a strict distinction between asset write-downs and loan-loss reserve adjustments in this literature review. The fact that the events of interest for this study tend to be infrequent makes also the number of available source rather limited.

Another general difficulty of studies that try to understand the impact of write-down announcements is that the results they convey are ambiguous. In order to overcome this issue the following pages are providing a classified overview that illustrates from different perspectives possible explanations for the rather diverging results.

5.2. Accounting for write-downs

In the accounting for write-off, three issues are relevant:: timing, measurement and disclosure.

Listed companies are required to reassess the book value of the asset on their balance sheet when they publish a report. Stock market listed companies, in the case of this thesis banks,

have to comply to disclosure requirements and are required to disclose the key figures of their activities every three months.

Therefore also write-downs or loan-loss provision adjustments become public information the latest after three month. So, at least on a quarterly basis the fair value measurement of assets has to be carried out (Ohlson and Zhang 1998).

With the IASB, the assessment of the value of assets is very well defined and requires the companies to use the fair value measurement, which for the case of financial assets is explained above. However, as also already mentioned, there is some freedom for measurement if there are no market prices available.

5.3. The signaling of write-down announcements

Starting from the concept that write-downs are only accounting adjustments, that are not supposed to have an impact on market prices, Thakor commenting Strong et al. (1987) argues that write-downs do not mean much themselves, but signal future events to come.

In general, write-down announcements can have both positive and negative impacts on the stock price.

They make it hard for investors to evaluate future firm performance and value, because the earnings picture is usually distorted by packing large losses into one quarter.

Bartov (1998) finds two major ways for interpreting the results. A write-off may indicate good news if the market interprets it as a new start after the company got rid of unprofitable operations or assets.

The management can focus on the company's core competences and increase future profitability. Another explanation for a positive reaction is an investors' interpretation that the worst is over.

On the other side, a negative reaction might be the following interpretation of an announcement: the write-down is a precursor for more write-downs and more troubles to come. The investors interpret a write-off announcement as company managers' official

recognition that there is a severe and permanent downturn in the company's stock price rather than a transitory decline the value (Ragothaman, 1996).

Whereas studies did not find any significant impact on stock prices (Docking et al. 1997) – over the long-term, several studies found negative reactions on write-down announcements (Bartov. 1998, Hirschey et al. 2003, Rees et al. 1996).

Others had positive stock price effects as a result (Elliot et al., 1988 Musumeci et al, 1990, Ragothaman, 1996). Studies that show positive effects are mostly studies that analyze write-downs with operative implications that impact positively on cash-flows.

Other studies of these kinds are those that look at value adjustments interpreted by the market as a earnings management tool and not a required write-down. These examples are all related to a peculiar study that looks at certain types of write-down, industries, companies or markets.

In the next paragraphs introduce different variables that help explain the sign and the size of the impact.

5.4. Size of the time window

In the event studies the selection of the time window has a major impact on the type of results and especially the way these results have to interpreted.

Usually researchers study events' effects on different time windows. For example, a stock price reaction before an announcement suggests that the market has been able to anticipate the information that the firm conveyed (Lindahl 1991).

Investors can also anticipate a write-down, but not be fully correct in their estimates. For example, Hirschey et al. (2003) found in their study about the effect of goodwill write-downs that the investors only partially anticipated the write-down and have also long-term effects.

A sharp drop at the announcement day instead indicates that investors were not aware of the needed impairment of assets. Especially in the after-announcement period it is of major interest to look at different time windows.

A sharp drop during the days close to the announcement day indicates a simple adjustment. Whereas a gradual adjustment over a longer period after the announcement shows that the announcement has long term effects. This is especially true when write-downs have positive or negative implications for companies (Lindahl 1991).

On the other hand, a reaction in short term that is nullified over the long term suggests, that investors anticipated the asset impairment and the price change could simply be explained by normal market fluctuation. (Bunsis, 1997)

Another pattern that can only be found by including in the analysis different time windows is the relationship between the sign of the share price change at the announcement and the reaction in the following period. This information is major interest for investors.

Write-off firms are found to perform consistently poorly during the year following the announcement (Bartov, 1998).

5.5.Size of write-down and timing

Write-down that have large size relative to the total assets of a firm are expected to have a stronger share price effect.

Strong et al. (1987) find that large write-downs have a larger positive effect on share prices because they are communicating the worst to be over, that past problems have been dealt aggressively and the balance sheet is cleaned up.

Lingering a series of write-downs instead would erode confidence in management and induce declines in a firm's stock price. Hirschey (2003) supports this argument in his study about good-will write downs, by mentioning the fact of a write-off, not necessarily the size, is considered as important.

Zucca et all. (1992) instead argues that the size of write-downs depends on the goal of management. There are big bath announcements that are assumed to have operative effects and can be interpreted as a change in activities.

Whereas other announcements are used for earnings smoothing and do not have any additional implications. In this case instead of one big write-down a series of single write downs help smoothing earnings.

However, Bartov's (1998) study finds that a drift in stock price is observed for firms that frequently make write-off announcements.

Elliot et al. (1996) instead suggest that it might be worth making a write-down, but lower than the market anticipated more often, than one large. Strong et al. (1987) object on that.

5.6. The financial impact of write-downs

Bunsis (1997) relates stock price changes to write-downs by using the concept of the firm value being dependent on expected future cash flows. In his analysis he distinguishes between different write-downs.

As criteria for the distinction Bunsis uses the potential cash-flow effects of the write-down and classifies write-offs with a negative impact on future cash flows, write-downs not expected to have any impact on future cash-flows and write-downs expected to cause positive effects on future cash-flows.

The results proved group one and three, but not group two. Write-offs with no impact on cash-flows had still a negative impact on the stock price. Therefore the operative implications of a write-down matter for the stock price effect.

In this context the consideration of tax issues might be useful. Strong et al. (1987) use the capital budgeting perspective in order to assess the impact of write-downs on the firm value.

That depends on whether the firm can generate tax-associated cash flows. And if it can reinvest excess returns generated as tax shields present value. Sometimes companies adopt this kind of depreciation policy.

Since write-downs result in a one-time charge against earnings, tax considerations almost certainly play a major role. There is obviously the tradeoff between the use of a one-time tax shield versus a continuation of the previous depreciation policy.

In another study Datta et al. (2008) extend the event study from stock to bonds and analyze, in their study, both the stock and bond price response to write-down announcements.

The peculiarity of his analysis is the distinction between financially healthy firms and firms in financial distress. It shows that the stock and bond prices of healthy firms are not affected by asset write-downs, whereas the announcements have a strong impact on stock and bond prices of firms in financial distress.

The results imply that asset write-downs are interpreted by the market as negative information only in the case of firms in financial distress. On the other hand, it seems that for healthy firms asset write-downs are fully anticipated, which would be consistent with the semi-strong form of market efficiency.

These two more recent studies show that the events have to be considered not only in the context of time but also in the context of the current situation of the company itself.

6. Event Study

6.1. Intro to event study

This coming section aims to briefly introduce the reader to the event study methodology in general, before we actually present our event study.

The event study is a research method developed more than thirty years ago that is appearing more and more frequently in the financial sector studies to measure the impact of different events (Binder 1998).

During the last decades, the event study methodology gained widespread use and acceptance as an important research tool in the field of finance. The new information technology made event studies both popular and useful in examining the impact of any one of a myriad of "events" on stockholder returns (Wells 2004).

Event studies attempt to measure abnormal changes in stock prices of publicly traded companies that occur in conjunction with an "event" such as the announcement of a write-down.

Since the price of those stocks is set in an auction market that is as close as we can come to the economic concept of a "perfect market", the price of those publicly traded stocks should reflect the reaction of the financial markets to the introduction of the new information (Brown and Warner 1984). This is also referred as semi-strong form of market efficiency.

The purpose of the event study, then, is to detect whether financial markets react positively or negatively to new information.

Types of event studies vary in two big groups (Henderson 1990):

- Market efficiency studies assess how quickly and correctly the market reacts to a particular type of new information. Information usefulness studies are the type we are orienting to, and they assess the degree to which company returns react to the release of a particular bit of news.

- Accounting scholars have used the information usefulness concept to assess the value of the accounting information (Foster, 1973 and 1975; Watts, 1973 and 1978).

6.2. The Event Study Process

The purpose of event studies varies according to the perspective taken. However, after designating the information event of interest, most of the studies follow a common event study process. Henderson (1990) describes the steps are as follows:

1. Define the date upon which the market would have received the news
2. Characterize the returns of the individual companies in the absence of this news
3. Measure the difference between observed returns and "no news" returns for each firm in order to obtain the abnormal returns
4. Aggregate the abnormal returns across firms and across time
5. Statistically test the aggregated returns to determine whether the abnormal returns are significant and, if so, for how long.

The theoretical basis for the event study method is quite straight forward and it is based on certain assumptions. The two most important assumptions will be presented in the following paragraphs.

Analysts evaluate stock returns, defined as the daily change in value of the stocks traded in an open and regulated market. For instance, a stock that opens the trading day at Euro 200 and closes at Euro 210 will have a five percent return (Euro 10/ Euro 200 = 0.05) return for the day.

If the share price returned to Euro 200 the next day, then the stock would a -4.76 percent return (Euro -10/ Euro 210).

Given this arithmetic issue, analysts and researchers normally use logarithmic returns rather than normal percent changes. The natural logarithm of Euro 21/ Euro 20 is equal to the natural logarithm of Euro 20/ Euro 21 on absolute basis. The result is respectively 0.0488 and – 0.0488. So that, the average of the two day returns is zero.

The second assumption of the event study method is that individual stocks have an expected return based on past performance and on how correlated they are to the market's (or sector) performance.

Given this assumption, the researchers then observes the actual stock returns over the period of interest and compute the difference between the expected returns and the returns that actually occurred.

Stock returns are still subject to what is called statistical "noise", but the event study is looking for returns that exceed this normal level of variation. If the difference between expected returns and actual returns is found to be statistically significant (statistically different from 0), it may be concluded that the event had a real impact on the stock price (Wells 2004).

As mentioned, the first step is to identify the particular event and the time window definition over which to evaluate the stock returns. This process could result difficult because it is complicate to separate one event from others that may happen at the same time.

Another potential issue is that the market could anticipate the news. This issue results in a definition of more than one time window used to analyze the stock price reaction to the event. The date of the event is generally defined as day 0 and the windows should include both previous and following periods.

Second step is to characterize the normal expected returns. There are several approaches to define a company's normal returns (Dyckman et all. 1984). Some of the most widespread include: mean returns, market returns, control portfolio returns and conditional or risk-adjusted returns.

Mean returns: using this approach a share is expected to keep the mean return generated in a defined estimation period.

Market returns: following this approach, a company is expected to have the same return of the market in absence of any particular news.

Control portfolio returns: using this approach, the company's share is expected to have the same return of a group of similar firm in absence of news.

Conditional returns: this approach uses a regression model to predict expected returns for a firm. The historic stock prices are regressed against the market or a subsector in order to find the stock beta and the alpha. Abnormal returns and standard error are defined to be the difference between actual returns and the ones expected by the regression model.

The last one is the most accurate one, because takes into consideration the risk (volatility) of a particular share with respect to the market, when predicting the future returns. This is also the approach we are going to use in our analysis.

The third step was to calculate the abnormal returns. Abnormal returns are the arithmetic difference between actual returns observed in the market and the returns forecasted by the regression model.

Then the individual daily abnormal returns for the individual firms are aggregated across time and across all firms in the sample for each day. These abnormal returns are examined to determine whether, on average, the event produces returns that are different from the returns that would be expected.

Aggregation across firms generally involves a simple averaging of abnormal returns for all firms in the sample on a given day, where day are counted in event time (Henderson 1990). Abnormal returns are also aggregated over time to find the cumulative abnormal returns (CAR).

The last step in an event study is to test aggregated returns statistically. The aim is see if the abnormal returns are significantly different from 0. Parametric tests like the t-test are widely used to test cumulative abnormal returns.

6.3. Write-downs event study

Write-downs (defined as material, infrequent charges against earnings for asset revaluations or provisions for future costs) are important corporate events given the large amount of change in value usually involved.

There are two main types of write-downs. Asset write downs involve an accounting decision to reduce the value of some of the asset with no apparent change in operations, while other

write-downs are more an operating decision to change operations in connection with a charge against earnings.

In the first case, the write-downs simply convey information about reductions in asset values, which is basically a bad news. While operating decision convey different information like the effort to get rid of an unprofitable business beside a decline in earnings.

In theory write downs are mere accounting measures where the book value is adjusted to the lower market value by writing the prior down. One might therefore expect to measure no impact on the share price, given that the lower value of assets held should already be included in the share price. But write-downs are more complicate information which can be interpreted by the investors in different ways as mentioned in the previous chapter.

There is an extensive literature on write-downs event study (see chapter 5, Elliott and Shaw 1988; Strong and Meyer 1987; Heflin and Warfield 1995; Lindahl and Ricks 1991; Jennings, Martin and Thompson 1998) but, in sum, the research in this area shows that firms writing down assets perform poorly before and after the event. Furthermore, the market reaction is usually in the area of few percent of the firm's value.

6.4. Limitations

An event study around the write-down date is a good tool to evaluate the market reaction to an important corporate event. However, there are some key considerations to be taken into account that should be mentioned at this point.

First, we have already categorized the write-downs in two main groups, asset write-downs and write-downs resulting from strategic decisions.

Beside that, it often happens that a write-down comes together with some other relevant corporate news. In the case of banks' write-downs the event comes together with the quarter earning release.

This mixture of information does not allow market agents to make unbiased forecast of future firm performance and value. This stands at least for the short term. Indeed, Bartov, Lindhal and

Ricks prove that the relative small stock price reaction is an under-reaction at the time of the announcement.

This happens because the valuations implications of write-downs are not clearly interpretable at the time of the announcement. Instead, in the long term the researchers find an annual average of cumulative abnormal returns as big as -21% in the two years following the write-downs.

As mentioned in previous chapter, the market does not just under-react to write-downs, but it also "anticipates" the reaction. In their study Bartov, Lindhal and Ricks find that the stock price of troubled firms declines in period before the write-downs.

The market senses and recognizes the firm's trouble, and by the time of the write-down announcement there has already been some adjustment in the share price anticipating and including the information.

6.5. Event study of banks' assets write-downs

Our event study uses 10 large banks as research sample. Two main criteria have been used in the sample selection:

- Global banks with operations around the world
- Banks with the biggest write-downs in absolute terms until the cut off date

The banks considered for the event study are: Citigroup, Merrill Lynch, UBS, HSBC, Wachovia Bank, Bank of America, Deutsche Bank, Royal Bank of Scotland, Washington Mutual, Morgan Stanley.

The event considered are the write-downs published together with the results of four consecutive quarters, from Q3 2007 to Q2 2008.

The data used are extracted from companies' quarter result reports and Bloomberg.

As described in the previous paragraphs, we will look for abnormal returns resulting from the difference between expected and actual results. Expected returns are calculated using the market approach.

It has to be noticed that market expectations play a big role here. If the write-down happens to be in line with market expectations we would expect a limited price reaction after the event.

The price should have been already adjusted to the coming asset write-down. On the other hand, write-downs larger or smaller than expected should result in a significant price reaction after the event.

Given the market expectations, it is important to consider the price reaction before and after the event. Often happens that the market anticipates the event and the price reaction happens in a time window before the write-down.

In order to take account of this implication the event study's time windows should span from the period before the write down to the period after. We will use the following time windows: (-29; +1), (-1; +1), (-1; +29), (-29; +29), (-5; +5).

Another issue, mentioned before, needs to be recalled. All write-downs announcements come together with earnings release. Therefore, the price reaction can be influenced by both events.

If for example, the quarter result will be mixed (earnings better than expected and write-downs worse than expected), the write-down price reaction will be altered, and it will be hard to distinguish the price reaction to the two events.

Finally, it is important to keep in mind that one of the criteria used to define the research sample is "Banks with the biggest write-downs in absolute terms until the cut off date".

This means that the same write down, in absolute terms, should have a different effect on the banks with different market capitalization.

7. Empirical Analysis

In the following chapter we will first illustrate a few key findings regarding the overall data set that is analyzed. Besides the analysis of aggregated data, in the second part the most significant results for single events will be presented and commented.

7.1. Overall analysis

For the calculation of the expected return based on market returns we need to calculate two main parameters: the slope of the regression line, which is the β between stock returns and market returns; and the intercept of the regression line, the α.

In this analysis the slope is defined by 300 daily returns before the first day (29 days before event day) of time window taken into consideration for the analysis.

As market return indicator we used the DJStoxx 600 World Bank index. Based on this returns, expected returns are calculated by using slope and intercept calculated in the first place for each single event.

Abnormal returns are then calculated as the difference between the actual returns and the expected returns. The higher the abnormal return the higher the "overperformance" and the higher also the impact of information provided to the market.

As mentioned in the previous chapter, the information is hard to interpret. However, all the events considered are events related to a release of news to the market which at least partially contained information about asset write downs.

Abnormal returns of single events are then arithmetically averaged with the respective returns of other events. The obtained values are cumulated and tested statistically. The final results are shown in the table below.

Table 1: Accumulated results

Test window:	3Q07		4Q07		1Q08		2Q08		Overall	
	t-prob	CAR	t-prob	CAR	t-prob	CAR	t-prob	CAR	t-prob	CAR
t= -29 to 1	0,1065	-0,0458	0,5432	0,0365	0,8848	0,0078	0,8584	0,0222	0,7676	0,0123
t= -1 to 1	0,3550	-0,0217	0,3512	0,0411	0,2712	0,0263	0,6262	0,0319	0,0237	0,0231
t= -1 to 29	0,0041	-0,1170	0,5983	0,0333	0,5898	-0,0207	0,3002	0,0782	0,7893	0,0069
t= -29 to 29	0,0022	-0,1411	0,7136	0,0286	0,5282	-0,0392	0,6121	0,0685	0,9336	-0,0039
t= -5 to 5	0,0522	-0,0479	0,0587	0,0978	0,6683	0,0126	0,1263	0,1320	0,0039	0,0699

Source: Own elaboration

Events are presented both aggregated all together and clustered by quarters.

First a discussion of overall results is presented, and then the results clustered by quarters are shown and commented.

For the overall results it is conspicuous that the largest time window (-29 to29) has a slightly negative CAR (-0,39%) with 93,36% statistical significance, whereas for all other time windows the CAR is positive and not significant.

Especially around the announcement day (-1 to 1) and (-5 to 5) there is a higher concentration of positive abnormal returns. CAR for -1 to 1 is 2,31% and for -5 to 5 6,99%. The results are not statistically significant.

In order to get a more distinctive view on these discrepancies and to understand the impacting factors, the analysis by quarters below, might be interesting.

Looking at CARs of the different time windows for Q3 2007, the results clearly show that in general the announcements of asset write downs and the respective negative results have a negative impact on the returns. Average abnormal returns during the analyzed time window (-29, 29) are -14,11% and with 99,78% high statistical significance.

The results also show that a large part – around three quarters – of negative returns (-11,7% out of total -14,11%) are incurred during the 29 days after the event. The market therefore reacts strongly only after the asset-write down announcements and it only anticipated a small share of overall negative returns.

This is a finding that applies also to the following quarters where CARs are in some cases also positive, but a large part of the CAR can be allocated to the second half of the time window. (-1, 29)

The announcement of Q4 2007 results apparently has a positive impact on return both in the mid and the short term. For the time window -29 to 29 the CAR is 2,86%, whereas for the window -5 to 5 it is 9,78% and for -1 to 1 4,11%. None of the results are statistically significant.

The positive abnormal returns, although the Q4 2007 announced results were largely negative, might be due to two major reasons.

On one hand, there might have been an overreaction of the market beforehand, which became apparent when the results were announced.

On the other hand, banks themselves might have better managed the announcements by lowering the expectations of investor through pre-announcements which in several cases overstated the actual write-downs and lead finally to positive price reactions

Also Q1 2008 results do not show any statistical significance. Again there is a concentration of positive abnormal returns in the short span (-1 to 1, 2,63% and -5 to 5, 1,26%), whereas the CAR for -29 to 29 is negative with -3,92%.

A large share of this negative CAR in the period before and after the event can be ascribed to the negative returns after the event (-1 to 29, -2,07%). The market therefore only reacted after the event and investors have not been able to anticipate the write-downs.

For Q2 2008 again there are no statistically significant results. The pattern however is very similar to Q4 2007; there are positive returns for all time windows and a high concentration of positive returns around the event date.

One key result to be pointed out is the relatively high abnormal return of 6,85% for the time window -29 to 29.

Given the advanced stage of the crisis of banks, another interpretation of this result could be provided by putting a long term perspective on the events: Investors might interpret the continuous write-downs as a cleanup of balance sheets.

The expectations therefore move from being very negative, because of the bad situation in terms of asset values, to a more optimistic attitude where the write downs are interpreted differently.

The fact that banks continue to write down assets might be perceived as their willingness to get rid of all contentious elements that could affect future business and set in that way a solid basis going forward.

Summing up, it is very difficult to find a clear interpretation of aggregated results given many noises that affected price changes during the period analyzed by this study.

As mentioned earlier, write-downs were not announced separately, but mostly together with quarterly results. In addition we could experience also cases of expectation management where banks tried to lower the markets expectations in advance.

Furthermore, during the period of high volatility also the correlation of share prices played an important role by creating cross-sample interdependencies. In other words, changes in prices of one bank could be affected by write-down announcements related to another bank.

In addition to that, globalization of financial markets – and it seems that during this crisis it became for the first time apparent what it really means to have global financial markets – also changed the relevance of impacting factors on share price developments.

Increasing correlation across industries and especially across geographies made information about peers more relevant for the own stock price than it might have been in the past.

Regarding the timing of price reactions on announcements it seems that there is a very limited ability to anticipate results and mostly the markets reacts strongly after the announcements.

This could lead to a conclusion that investors had a very limited understanding/ limited knowledge about the banks' asset portfolios and consequently question about questionable sufficiency of transparency might be raised. However, as also mentioned in the introduction we will not further discuss regulatory issues in this thesis.

In the following chapter we will go a bit more in detail and discuss single events and respective outcomes of the analysis.

7.2.Discussion of significant results

The event study we performed showed some very significant result in statistical terms. In this sense, market volatility and hard to forecast results played an important role.

Here we would like to present the most significant results for each of the bank considered. Only results with a certain statistical significance (confidence level > 90%) will be presented.

It is worth to mention, once again, that expectations in the market play a crucial role in the event study. Stocks returns around an event, like an asset write-down or the quarter results release, are heavily affected by the market expectations about these results.

On top of that, write-downs on securitized product are very hard to predict given the complexity of the financial instrument in itself.

In efficient market, the stock price incorporates all information available in the market. If an event convey to the market new or different information, the stock price should react accordingly.

Another issue that needs to be recalled is that, write-down announcements come together with earnings release. This could create a mixed picture if the two results are not aligned.

Citigroup

Citigroup showed highly significant negative abnormal returns after the bank announced the Q3 2007 results.

In the time window -1 to +29, Citigroup experienced negative abnormal returns of -28.52%, this result is statistically significant at 98.4%. In the time window -29 to +29, the US bank had negative abnormal returns of -29.47%, this result is statistically significant at 97.2%.

Table 2: Citigroup, analyzed events

Test window:	t-probabilitie	CAR	t-probabilitie	CAR	t-probabilitie	CAR	t-probabilitie	CAR
t=-29 to 1	0,4860126	-0,0473714	0,8195175	-0,0225469	0,496053	0,1139594	0,3525926	0,1545789
t=-1 to 1	0,1647393	-0,0378547	0,5402712	-0,0298842	0,1936993	0,0465662	0,2858822	0,0528131
t=-1 to 29	0,0159236	-0,2852751	0,7832925	-0,0386544	0,7441183	0,0362475	0,3862377	0,138404
t=-29 to 29	0,0286725	-0,2947918	0,8499551	-0,0313171	0,5969576	0,1036406	0,2840561	0,2401699
t=-5 to 5	0,2522802	-0,0549617	0,9118926	-0,0116541	0,121975	0,091751	0,6651451	0,0589905

Source: Own elaboration

On October 15th 2007, Citigroup's shares dropped $1.63, or 3.4 percent, to $46.24 from $47.87 in composite trading on the New York Stock Exchange at 4:17 p.m. After 29 trading day Citigroup stock closed at $29.8, a drop of about 38% in absolute terms.

The results included about $6.5 billion of costs for fixed- income trading and underwriting losses and consumer loans gone bad.

UBS

UBS experienced strongly significant negative returns combined with Q4 2007 results. While the company showed significant positive returns after Q2 2008 results.

Considering Q4 2007, in the time window -1 to +29, UBS performed more than 30% worse than the peers, the result is significant at 99.2% confidence level. In the time window -29 to + 29, the Swiss bank showed abnormal returns of -35.53%, a result with a 98.1% statistical significance.

Table 3: UBS, analysed events

Test window:	t-probabilitie	CAR	t-probabilitie	CAR	t-probabilitie	CAR	t-probabilitie	CAR
t=-29 to 1	0,9364687	-0,0033819	0,3766356	-0,0972272	0,6277244	0,0958505	0,7537721	0,0435017
t=-1 to 1	0,7027209	0,0116664	0,4453084	-0,0431008	0,4495267	0,0327448	0,003377	0,0578928
t=-1 to 29	0,1891113	-0,0804803	0,0081171	-0,3012049	0,5152992	-0,0666424	0,0018608	0,2196667
t=-29 to 29	0,1735618	-0,0955286	0,019114	-0,3553313	0,9870411	-0,0035367	0,1759043	0,2052756
t=-5 to 5	0,8582066	0,0059442	0,3157714	-0,0735405	0,3792392	0,045269	0,0035299	0,1979771

Source: Own elaboration

On January 30th 2008, UBS AG posted the biggest loss ever by a bank after raising fourth-quarter write-downs on securities infected by U.S. subprime mortgages to $14 billion. The forecast was $10 billion.

Concerning Q2 2008 results, in the time window -1 to +1 UBS, performed 5.78% better than expected, the result is statistically significant at 99.6% confidence level. In the time window -1 to +29, UBS experienced positive abnormal returns of 21.96% at 99.9% confidence level.

On August 11th 2008, the Swiss banking giant UBS posted a second-quarter net loss of $329 million dollars and announced a further write-down of $5.1 billion on subprime-related positions.

In this case UBS beat the expectations of a $7.5 billion write-down, and the stock price increased significantly.

HSBC

HSBC stock had a significant drop combined with the Q3 2007 results.

In the time window -5 to +5 HSBC showed a negative abnormal return of -6.95%, this result is significant at 90.4% confidence level.

Table 4: HSBC, analyzed events

Test window:	t-probabilities	CAR	t-probabilitie	CAR	t-probabilitie	CAR	t-probabilitie	CAR
t=-29 to 1	0,775783032	-0,02008249	0,7184835	0,0646465	0,3586896	0,0438969	0,9500116	0,0056626
t=-1 to 1	0,719435231	0,007208134	0,7927663	0,0061674	0,7825374	0,0093988	0,6397051	-0,0236556
t=-1 to 29	0,726411687	-0,026914847	0,2226789	0,0979985	0,9626907	-0,0025167	0,7517232	-0,0243157
t=-29 to 29	0,595059571	-0,054205471	0,4186024	0,1564775	0,6314352	0,0319813	0,9639807	0,0050026
t=-5 to 5	0,096880257	-0,069503675	0,1694875	0,0884288	0,6639714	0,0134304	0,9328716	-0,0047661

Source: Own elaboration

On November 14th, the London-based bank set aside $3.4 billion in the quarter to cover U.S. defaults, $1.4 billion more than it forecast in July. In the five days after the write-down the stock tumbled from £139 to £131.8.

Bank of America

Bank of America experienced significant negative abnormal returns when it announced Q3 2007 results.

In the time window -5 to +5, The US bank reported negative abnormal returns of -5.65%, in this case the result is significant at 92.1% confidence level.

Table 5: Bank of America, analysed events

Test window:	t-	CAR	t-probabilitie	CAR	t-probabilitie	CAR	t-probabilitie	CAR
t=-29 to 1	0,456324	-0,035788351	0,4415202	0,0893519	0,7962881	-0,0380343	0,5977165	0,1520931
t=-1 to 1	0,1013884	-0,039673589	0,1052398	0,1269774	0,6262109	-0,0196492	0,2138859	0,1553253
t=-1 to 29	0,5953613	-0,050588332	0,3870845	0,1202473	0,5035442	-0,0562159	0,3966989	0,1928603
t=-29 to 29	0,6484406	-0,046703094	0,6046247	0,0826218	0,650892	-0,074601	0,5825703	0,1896281
t=-5 to 5	0,0789964	-0,056564182	0,4773285	0,0898797	0,8149999	-0,0120722	0,4430849	0,1993844

Source: Own elaboration

On October 18th 2007, Bank of America Corp., the second- largest U.S. bank, said profit declined 32% in the third quarter after trading losses, defaults and write-downs cost about $4 billion. While the previous estimate was $1 billion.

Deutsche Bank

Deutsche Bank showed positive abnormal returns combined with Q2 2008 results.

In the time window -5 to +5, the German bank had a +12.25% abnormal return at a 94.5% confidence level significance.

Table 6: Deutsche Bank, analysed events

Test window	t-probabilities	CAR	t-probabilities	CAR	t-probabilities	CAR	t-probabilities	CAR
t=-29 to 1	0,841354993	-0,0111034	0,855517223	0,019276	0,4202167	0,0400769	0,6984535	0,0466342
t=-1 to 1	0,403359949	0,0151468	0,286858098	0,0557317	0,6345404	0,00573	0,917182	-0,0048371
t=-1 to 29	0,977623797	-0,0014222	0,459562135	0,064247	0,9703267	0,002943	0,233506	0,0910972
t=-29 to 29	0,703619238	-0,0276724	0,827643647	0,0277913	0,685122	0,0372899	0,2970254	0,1425686
t=-5 to 5	0,882150881	-0,0034837	0,346469336	0,0649528	0,7505078	0,0101729	0,055991	0,1225163

Source: Own elaboration

On July 31st Deutsche Bank AG, Germany's largest bank, said second-quarter profit fell 64 percent as €23 billion in write-downs led to a second straight loss at its securities unit.

On the other hand, net income declined to €649 million, but earnings beat the €491 million median estimate of 19 analysts surveyed by Bloomberg.

Royal Bank of Scotland

Royal Bank of Scotland showed some significantly negative abnormal results combined with Q1 2008 results release. While the British bank experienced positive abnormal returns combined with Q2 2008 results.

With regards to Q1 2008 results we find three time windows with significantly negative results. In the time window -1 to +1 we record an abnormal return of -8.2%, this result is significant with a 99.5% confidence level. In the time window -1 to +29 RBS underperformed its peer by -26.35%, the result is significant at 98.3% confidence level. Finally, in the time window -29 to +29, the British bank experienced a -26% abnormal return at a 91.6% confidence level significance.

Table 7: Royal Bank of Scotland, analyzed events

Test window:	t-probabilitie	CAR	t-probabilitie	CAR	t-probabilitie	CAR	t-probabilitie	CAR
t=-29 to 1	0,8912191	-0,01886929	0,7371504	0,0415848	0,4840503	-0,0787134	0,6815716	0,0728982
t=-1 to 1	0,2296891	0,064387596	0,6435285	-0,0170649	0,0054497	-0,0820444	0,1743782	0,0740195
t=-1 to 29	0,4966754	0,061834988	0,468953	-0,0756959	0,0178235	-0,2635231	0,0637609	0,1347447
t=-29 to 29	0,8908026	-0,021421899	0,9141439	-0,0170462	0,0848975	-0,2601921	0,4651722	0,1336234
t=-5 to 5	0,9324475	-0,006507213	0,9533764	0,0038216	0,1513526	-0,1043248	0,004002	0,1893071

Source: Own elaboration

On April 22nd, RBS fell 3.9% in London trading after the company announced £5.9 billion of write-downs for U.S. mortgages, credit-related assets and leveraged loans. On the same day, Royal Bank of Scotland announced the sale of £12 billion of shares to investors in Europe's largest rights offer and cut the dividend.

Concerning Q2 2008, we found significantly positive returns in two time windows. In the time window -1 to +29 Royal Bank of Scotland outperformed thanks to abnormal returns of 13.47%, this result is significant at a 93.7% confidence level. In the time window -5 to +5 RBS experienced positive abnormal returns of 18.93% at a 99.6% confidence level significance.

On the 8th of August 2008, the Royal Bank of Scotland Group reported a half-year loss of £802 million, its first loss in 40 years, because of £5.9 billion in write-downs stemming from the American subprime credit crisis.

RBS had been expected to post a much larger loss with some analysts predicting the UK's second-biggest bank could see a loss of between £1.2bn and £1.7bn.

Washington Mutual

Washington Mutual showed some significantly negative abnormal returns with Q3 2007 results release. While the American bank experienced positive abnormal returns combined with Q4 2007 results.

We found two time windows with significantly negative returns, around Q3 2007 results release. In the time window -1 to +29, Washington Mutual experienced negative abnormal returns of -54.29%, this is significant at 96.6% confidence level. In the time window -29 to +29, the American bank showed -60.77% negative abnormal returns at a 97.7% confidence level significance.

Table 8: Washington Mutual, analyzed events

Test window:	t-probabilities	CAR	t-probabilities	CAR	t-probabilitie	CAR	t-probabilitie	CAR
t=-29 to 1	0,147829833	-0,1528281	0,965272019	0,0114079	0,8146932	-0,1028572	0,6884833	-0,2594831
t=-1 to 1	0,321753659	-0,0880622	0,653086092	0,0756253	0,4775138	0,0645723	0,3329142	-0,3557324
t=-1 to 29	0,034409416	-0,5429672	0,327070312	0,2880143	0,9550347	-0,0105	0,6295295	-0,2029907
t=-29 to 29	0,023147432	-0,607733	0,544065235	0,2237969	0,7022409	-0,1779295	0,8783634	-0,1067414
t=-5 to 5	0,132703777	-0,1349724	0,077893597	0,3883573	0,7454603	-0,0310447	0,7388678	0,1556405

Source: Own elaboration

The quarter results included $967 million set aside to cover more overdue loans and falling home values. Per-share results for the company, known as WaMu, matched the average estimate of 15 analysts surveyed by Bloomberg.

Concerning Q4 2007 result we found significant abnormal returns in one time window. In the period -5 to +5, Washington Mutual had positive abnormal returns of 38.83%,. This result is significant at a 92.3% confidence level.

On the 17th of January, Washington Mutual Inc WM.N, the largest U.S. savings and loan, suffered a larger-than-expected $1.87 billion fourth-quarter loss on Thursday, battered by mortgage defaults and write-downs of $1.96 billion.

In regular trading, they closed down 93 cents, or 7 percent, at $12.46 on the New York Stock Exchange. But, the share recovered and reached $16.95 five days later.

Morgan Stanley

Morgan Stanley experienced significant abnormal returns in one case. Combine with Q4 2007 release the American investment bank had significant positive abnormal returns.

Table 9: Morgan Stanley, analyzed events

Test window:	t-probabilitie	CAR	t-probabilitie	CAR	t-probabilitie	CAR	t-probabilitie	CAR
t=-29 to 1	0,7966005	0,031589637	0,4327416	0,119909	0,3390939	0,2049854	0,2526419	0,142613
t=-1 to 1	0,6536302	-0,040072739	0,532704	0,0532273	0,1178525	0,2377902	0,9852888	0,001273
t=-1 to 29	0,7834518	-0,030067524	0,5608399	0,0961723	0,3583698	0,1774895	0,9486369	-0,0115361
t=-29 to 29	0,7781422	0,041594851	0,4438808	0,162854	0,5464696	0,1446847	0,5366331	0,1298039
t=-5 to 5	0,8203569	-0,021945547	0,0391441	0,1814174	0,635745	0,0910444	0,6130279	0,0505848

Source: Own elaboration

In the time window -5 to +5, Morgan Stanley had a positive abnormal return of +18.14%. This result is significant at 96.1% confidence level.

On December 19th 2007, Morgan Stanley wrote down its subprime-infected mortgage holdings by a greater-than-expected $9.4 billion and received a $5 billion cash infusion from state-controlled China Investment Corp.

The second-largest U.S. securities firm rose 4.2 percent in New York Stock Exchange composite trading. The ``significant capital raise'' and write-downs might have suggested to investors that Morgan Stanley has put the worst of its subprime losses behind it.

8. Conclusions

8.1. The consequences and the causes of the crisis

Market reaction recognizes part of the past mispricing as it is confirmed by the event study results. However, market participants did not understand the "system write downs" and the domino effect which was to come after.

Write-downs have been considered as individual banks' event. It took some months, and some of the biggest banks gone burst, to realize that the write-downs were just symptoms a greater problem.

The whole financial system is in troubles. The write-downs and losses extended to the whole system due to repackaging and financial markets globalization.

After Lehman Brothers' crash the whole financial system fell into panic. Trust among financial institutions touched its lowest point during September/October 2008. Financial institutions were not willing to lend to any counterparty, and when banks find it hard to borrow, so do the rest of us.

Normally, money markets function efficiently and unseen, allowing investment institutions, companies and banks to lend and borrow trillions of dollars for up to a year at a time. They are only noticed when they go wrong. For some weeks the global interbank market has been effectively closed (Michael Hartnett strategist at Merrill Lynch).

The effect has been most significant in the overnight rate for borrowing dollars. Bank borrowing costs reached 6.88% on September 30th; this is more than three times the level of the US target rate. There were even banks willing to pay a remarkable 11% to borrow dollars from the European Central Bank (ECB).

Banks became so risk-averse that they deposited a record €44 billion ($62 billion) with the ECB on September 30th even though they could have earned more than two extra percentage points by lending to other banks.

A crucial question is why these markets matter?

- First, the rates on loans paid by many consumers (adjustable-rate mortgages, for example) and companies are set with reference to the money markets rate (Libor). Higher rates for banks mean higher rates for everyone.
- Second, if the markets are blocked for more than a week some companies may find it hard to get any finance at any price. That could mean insolvencies and more bankruptcies.
- Third, more banks could go bust if the blockage continues.

The way these lending rates are fixed is the following. Central banks set the level of interest rates in their domestic markets. But, the rate they announce is the one at which they will lend to the banking system.

When banks borrow from anyone else (including other banks), they pay more. Every day, this rate is calculated through a poll of participating banks and published as Libor (London interbank offered rate) or Euribor (Euro interbank offered rate).

Figure 8: Libor rate in 2008 (percentage points)

Source: Thomson Data Stream

Normally, these are only a fraction of a percentage point above the official interest rates. But that has changed dramatically after Lehman Brothers' bankruptcy (see chart above).

Take the cost of borrowing dollars. On October 1st banks had to pay 4.15% for three-month money, more than two percentage points above the fed funds target rate.

Instead, the width of the margin reflects investors' worries about the banks, not least because so many have faltered so quickly. In addition, banks were anxious to conserve their own cash, in case depositors make large withdrawals or their money gets tied up in the collapse of another bank, as with Lehman.

One way this risk aversion shows up is in the "Ted spread" (see chart below), the gap between three-month dollar Libor and the Treasury-bill rate. After being as low as 20 basis points (a fifth of a percentage point) in early 2007, the spread reached 3.3 percentage points. In other words, the relative cost of raising money for banks has risen 16-fold in the past 18 months.

Figure 9: Three month TED spread (percentage points)

Source: Thomson Datastream

All this background information is meant to provide the reader with an understanding of what we called "system write-down".

However, the general the lesson is still the same, never forget risk-return relationship (risk assessment). That is what brought us to this point.

We looked at the roots of the problem to identify the causes. These are different, but we can confidently identify the majors.

First of all, we identified the banks' risk management. Mispriced risk was the base of the current crisis.

We treated this point extensively, and we reached the conclusion that a big chunk of the current crisis responsibility falls on the financial institutions (Turnbull et all. 2008). Their short-sight approach and lousy risk management, created a clock bomb that eventually exploded (Johnson and Neave 2008).

Some people believe that more than a risk management issue this is a corporate governance problem. Risk management tools were in place and were well understood. They were just not understood at the right level. Risk management considerations were not among the most relevant inputs for corporate strategy (Wise 2008).

Another issue which took the public attention was low regulatory control. Governments were not there when they needed to be. Wall Street has been granted exceptional autonomy even because one of the strongest lobby (if not the strongest one) was the "bankers" lobby.

We still firmly believe in the free market. On the other hand, Government needs to be a strong presence in order to control and, in same exceptional case, limit reckless behaviour. We will come back on measure later on.

If we then take the crisis' causes to a higher level we can probably say that the society itself played its role. Individuals are today leveraged as never before. Of course, low interest and easy money was an enticing base, but ultimately we are the ones buying a property at 100% loan to value ratio (Moore and Brauneis 2008).

Furthermore, individuals assumed that asset classes, real estate in particular, would always go up in value. This has been proved to be unsustainable.

Some researchers (Padoa Schioppa 2009) indeed argue that the deeper layer of the current crisis is the western society idea of growth.

US model of growth during the last 40 years was mostly based on debt and consumption. While debt for investment fuels the real economic growth, debt for consumption is a death spiral.

Furthermore, the increase of assets' value eventually push for more debt and even more consumption.

People, companies and states which obtain credit have to repay it. It sounds like common sense, but, for some reason we ignore, this has not been considered.

The US kept consuming and growing while the other side of the world, Asia and China in particular, was fuelling the growth giving credit in form treasury bonds.

8.2. Immediate actions

We have been talking extensively about the causes of this crisis. Now that the problem is here, it is time to think about the solutions and next actions to take.

We think that Governments and Central Banks are in general moving into the right direction. We can pinpoint three major actions undertaken (or for now planned) by the authorities:

1. Protect the system stability through major financial institutions' bail out and cash injection
2. Interest rates cut to revitalize the economy
3. Plan to constitute a "bad bank" (or a public-private partnership) to temporarily absorb toxic assets.

In crisis like the one we are experiencing, it is probably essential to guarantee financial markets stability. It is safe to say that, until the trust is not restored in the money markets, the financial crisis will not be over. And until the financial crisis is over, the global economy may not recover.

We have seen the consequences of the Lehman Brothers' bankrupt. Something we would like to avoid is another crisis like that one. In a more fragile economy, it could result fatal.

Although, times are different we can find some similarities between this crisis and the first stage of the Great Depression. Some large, public bank failures particularly that of the New York Bank of the United States, produced panic and widespread runs on local banks. In that case the Federal Reserve sat idly by while banks fell.

President Herbert Hoover policy was mostly based on the "leave-it-alone" and "let-them-fail" approach. This created a domino effect, which eventually went out of control.

In our opinion, we should take the Great Depression as a lesson and avoid the same mistake. We see a proactive approach as the right one to restore trust and confidence in the market.

However, we understand the problem of creating a sort of counter-incentive for banks. If a bank is sure to be bailed out if things go bad, there could be an incentive to take additional risk.

On the other hand, we feel that the risk of creating a new Lehman case, and the consequent system crisis, is far more pressing.

Interest rate cut, could be a useful to stimulate economy. Lowering the base rate provides cheaper financing to Banks and consequently to other borrowers. However, this is only a temporary and non-exclusive measure.

Furthermore, we think that there is also a limit to rates cuts. Too low interest rates (too close to 0%) may create a disincentive for banks to lend to each other.

The third action, planned by the Government, is the creation of a sort of "bad bank" (centralized or not) which will buy, and temporarily hold, toxic assets laying on banks balance sheet.

The creation of a "bad bank" might have an advantage in the sense that it actually moves the assets off the banks' balance sheets, freeing up lending capacity.

At the moment, the main problem with these structured products is their liquidity and the difficulty to assess their value. The assets are mostly complicated financial instruments which are linked to sub-prime mortgages and commercial debts.

As mentioned, they are notoriously complicated and opaque, and are therefore difficult to value. Banks are likely to receive a fraction of the assets' original value from the Governments (and private sector ultimately).

However, a balance should be found. There are some good assets wrapped up with bad ones which may actually recover of some of their value. We now see private investment companies rushing to buy these assets.

On the other hand, banks are not willing to sell these assets at a too big discount because the consequent write-down could result in insolvency or close to it.

We think that if a market (with the necessary guarantee) is created, then supply and demand will play the role in finding the equilibrium. Finally, banks can free up capital and restore lending capacity.

It has to be noticed that we only refer to the idea of the "bad bank" or private-public partnership to buy toxic assets. We are leaving out details which could lead to further discussion.

8.3. Regulatory environment

In the previous section, we stated that it is essential to guarantee financial markets stability. On the other hand, we think that some regulatory base has to be set to avoid the past mistakes.

We think that four main measures have to be considered:

1. Restrict the leverage for mortgage loans. A 100% loan to value ratio is simply unacceptable (Altmann et all. 2003). It is too risky for the lender and provides the wrong incentive to the borrower.
2. Review the financial institutions' incentive system to avoid short sight and excessive and opportunistic behaviour. Long term incentives could play a role in this sense.
3. Establish regulated markets for the most used OTC derivatives and review margin. A regulated market will provide more transparency and price efficiency for credit derivatives. A reliable price of debt will also reduce dependency on credit agencies.
4. Define the primary role of banks as the engine of the payment system and the business lending. We will come back to this point.

Finally, it has to be created a comprehensive global regulatory environment to avoid country arbitrage and it has to include all kind of financial firms (private and public).

But even before defining the regulation frame. We should think about reconceptualising the financial sector.

It is probably the right time to ask: what is the role of the financial sector?

If we slow down for second and think about that, we would probably agree on the following: a good financial sector is focused on serving the business. Lending to the business sector must be one, if not the main, role of the financial sector.

It is ultimately the business that creates wealth, and today as never before, the business needs the financial sector support.

The crisis has evolved from a financial crisis into an economic crisis. We see the lack credit availability as the biggest risk for the corporate world.

Unfortunately, the financial institutions went (at least in part) out of scope, but the recent developments of the crisis can help to refocus on one of the core activities. Banks should dedicate to finance the business rather then get involved into speculative investments.

Speculative investment and excessive risk taking should not be part of bank activities!

We have other entities for investment and speculative activities. Hedge funds and other kind of financial institutions play an important role in guarantying liquid financial markets. Banks should rather focus on business lending and investment.

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10. Annex

Bank of America								
Event	3Q07		4Q07		1Q08		2Q08	
Date of announcement	18.10.08		22.01.08		21.04.08		21.07.08	
slope 300d	0,690901119		0,908992752		0,841298317		0,931858551	
interception 300d	-0,000504903		-0,000504903		-0,000413924		-0,000699722	
Returns:	expected	abnormal	expected	abnormal	expected	abnormal	expected	abnormal
-29	-0,01234	-0,00325	-0,00811	-0,01960	0,03349	0,03254	-0,01130	0,01164
-28	-0,00610	0,00488	-0,02701	0,01822	0,01664	-0,03510	-0,01916	-0,00718
-27	0,01094	-0,00098	-0,01359	-0,00730	-0,01489	0,01786	0,00344	0,01681
-26	-0,00059	-0,00062	-0,01961	0,00864	-0,02053	-0,01930	0,00700	0,00448
-25	0,00240	0,00707	-0,00059	-0,00422	-0,02823	0,03577	0,00694	0,01103
-24	-0,00398	0,00579	-0,00638	0,00854	0,04608	0,03328	-0,00075	-0,03552
-23	-0,00956	0,00071	-0,00434	0,00001	-0,00369	-0,00585	-0,01656	-0,01364
-22	0,01289	0,02087	0,01006	0,00218	0,01276	0,06935	-0,01589	0,00775
-21	0,01862	-0,02136	0,00581	0,00274	0,00312	-0,00312	-0,01332	-0,02434
-20	-0,00453	-0,00097	0,00189	-0,00189	0,00383	0,01017	-0,02047	-0,02559
-19	-0,00233	0,01115	0,00253	-0,00205	0,02709	-0,06258	0,00833	0,01987
-18	-0,00570	-0,00707	-0,00459	-0,01547	-0,01292	-0,01505	0,01345	-0,01382
-17	-0,00340	-0,00394	0,00047	-0,00919	-0,00004	-0,03055	-0,02447	-0,04557
-16	0,00332	0,00045	-0,00115	0,00504	-0,01127	-0,00359	-0,01174	0,00284
-15	0,00949	-0,00573	-0,00050	0,00050	-0,00199	-0,00222	-0,01154	-0,01818
-14	-0,00706	0,00051	-0,00754	-0,00957	0,03251	0,04243	-0,01680	0,01429
-13	0,01480	-0,00747	-0,00591	-0,00052	0,01778	-0,03158	-0,00127	-0,05355
-12	0,00838	0,01272	-0,01859	0,00737	-0,00246	0,00420	0,00888	-0,01511
-11	0,00518	-0,00112	-0,00740	0,00866	-0,00218	-0,02188	-0,01419	0,01419
-10	0,00377	0,00524	-0,00788	-0,03018	0,00352	-0,00124	-0,00715	-0,03246
-9	0,00557	0,00032	-0,00349	0,01204	-0,01342	-0,01534	-0,00024	0,08950
-8	-0,00583	0,00051	0,00171	0,01264	-0,01181	0,00001	0,00739	-0,07233
-7	0,00182	0,00085	0,00362	-0,02418	-0,00463	-0,00171	-0,00536	0,01887
-6	-0,00291	-0,00224	0,00533	0,01320	-0,00724	-0,01286	-0,02397	-0,00737
-5	0,00179	0,00050	-0,02993	-0,00484	-0,01731	-0,02020	-0,01543	-0,05729
-4	-0,00527	-0,00143	-0,01547	0,03663	0,00286	-0,00286	-0,03119	-0,05316
-3	-0,00915	-0,00341	-0,01105	-0,03605	0,02656	0,01204	0,04201	0,16018
-2	-0,01590	-0,00811	-0,01681	-0,00899	0,00414	0,00902	0,05567	0,10044
-1	0,00111	-0,00450	-0,04774	0,04774	0,01343	0,01525	0,02150	0,01518
0	-0,00395	-0,01992	0,02454	0,01417	-0,00118	-0,02377	0,00660	0,03158
1	-0,01129	-0,01526	0,01657	0,06506	-0,00522	-0,01113	0,01605	0,10856
2	-0,00799	0,01240	0,03835	-0,05500	-0,00750	0,00371	0,03252	0,00062
3	0,00726	-0,00726	0,00033	-0,01091	0,00411	0,02292	-0,01990	-0,06755
4	-0,00742	0,00112	0,00261	0,04004	0,01430	-0,00300	-0,02221	-0,01300
5	0,00052	-0,01068	0,01579	0,00201	0,01090	-0,01403	-0,02657	-0,02618
6	0,01191	0,00977	-0,00559	0,01200	-0,00583	-0,00259	0,00894	0,12930
7	0,00694	-0,00798	0,00398	0,04096	-0,00121	-0,00728	0,01776	0,02448
8	0,00143	-0,00123	0,01336	0,00638	0,00252	0,04559	-0,00260	-0,01875
9	0,00941	-0,00338	-0,00799	-0,01447	0,01457	-0,00446	-0,00841	0,02139
10	-0,02312	-0,03158	-0,03837	-0,00006	-0,00322	-0,01761	-0,01533	-0,00620
11	-0,01356	0,00034	-0,00783	0,00689	-0,00221	0,00911	0,03467	-0,00566
12	-0,01188	-0,00286	-0,00911	0,03338	-0,01167	-0,02044	0,00196	-0,00584
13	0,00560	0,01907	-0,01011	-0,01819	-0,00881	-0,00898	-0,02266	-0,03677
14	-0,01362	-0,03703	-0,01332	0,01284	-0,00995	-0,00843	-0,00449	0,02739
15	-0,00965	0,01402	0,02254	-0,00654	0,00575	0,01557	0,01873	0,01571
16	-0,01092	0,02189	-0,00223	0,01407	-0,00674	-0,01567	-0,02469	-0,04510
17	0,00195	-0,00195	-0,00346	-0,02202	-0,00094	0,00612	-0,04119	-0,03453
18	0,01695	0,03381	-0,01268	0,02352	0,00560	-0,00805	0,00613	0,03860
19	0,00577	-0,01751	0,00460	-0,00460	-0,00110	-0,01372	-0,00232	0,01940
20	-0,01604	-0,02071	0,00543	-0,00614	-0,00615	0,00421	-0,00939	-0,03728
21	-0,01028	0,01684	-0,01095	0,01795	-0,01184	-0,00803	-0,03555	-0,00698
22	-0,01514	-0,02042	0,00606	-0,02390	-0,01600	-0,00571	0,00635	0,03584
23	0,00483	-0,00599	0,00000	0,00920	0,00209	0,00079	-0,00810	-0,00047
24	-0,01735	0,00251	0,01782	-0,00987	-0,00994	-0,01337	0,01629	0,02321
25	0,00138	-0,00138	0,01614	-0,02128	-0,00566	0,00566	-0,01000	-0,03226
26	0,01341	0,01028	0,01025	-0,00651	0,00120	0,00585	-0,00658	0,00865
27	-0,00690	-0,02298	-0,01903	-0,01561	-0,00500	-0,00382	0,00553	0,01595
28	0,01030	0,01469	-0,02533	-0,01608	0,00137	0,01995	0,02849	0,02981
29	0,01821	0,02531	-0,01939	0,00520	0,00366	-0,02086	0,00697	-0,01624
30	0,00282	-0,00773	-0,01325	0,00299	-0,00922	-0,00351	-0,00070	0,00070

Test window:	t-probabilities	CAR	t-probabilities	CAR	t-probabilities	CAR	t-probabilities	CAR
t= -29 to 1	0,45632	-0,03579	0,44152	0,08935	0,79629	-0,03803	0,59772	0,15209
t= -1 to 1	0,10139	-0,03967	0,10524	0,12698	0,62621	-0,01965	0,21389	0,15533
t= -1 to 29	0,59536	-0,05059	0,38708	0,12025	0,50354	-0,05622	0,39670	0,19286
t= -29 to 29	0,64844	-0,04670	0,60462	0,08262	0,65089	-0,07460	0,58257	0,18963
t= -5 to 5	0,07900	-0,05656	0,47733	0,08988	0,81500	-0,01207	0,44308	0,19938

Citigroup

Event	3Q07		4Q07		1Q08		2Q08	
Date of announcement	15.10.07		15.01.08		18.04.08		18.07.08	
slope 300d	0,889332661		1,203623281		1,183620056		1,417804868	
interception 300d	-0,000310162		-0,001262686		-0,001914448		-0,001627347	
Returns:	expected	abnormal	expected	abnormal	expected	abnormal	expected	abnormal
-29	0,00331	0,00371	0,01100	0,02343	-0,02078	-0,03933	-0,03515	0,01195
-28	-0,01490	-0,01106	0,01370	0,00570	0,04578	0,04170	-0,01776	0,05088
-27	-0,00171	-0,00571	0,00342	-0,00458	0,02208	-0,03519	-0,02972	-0,02350
-26	-0,01555	0,01160	0,01633	-0,00302	-0,02228	0,01566	0,00466	0,03012
-25	-0,00752	0,00355	-0,02243	-0,02287	-0,03021	-0,03297	0,01009	0,01914
-24	0,01442	0,00113	-0,01133	-0,04309	-0,04105	-0,01938	0,01000	0,00695
-23	-0,00042	-0,00503	-0,03636	0,02163	0,06350	0,04288	-0,00170	-0,01622
-22	0,00343	0,00960	-0,01859	0,00854	-0,00653	-0,00806	-0,02576	0,02282
-21	-0,00479	0,01081	-0,02657	0,02884	0,01662	0,08087	-0,02474	0,01340
-20	-0,01196	-0,00120	-0,00137	-0,01138	0,00305	-0,00305	-0,02083	-0,02326
-19	0,01693	0,03266	-0,00904	0,00342	0,00406	0,02959	-0,03171	-0,00792
-18	0,02431	-0,02638	-0,00634	-0,00430	0,03678	-0,03036	0,01210	0,00394
-17	-0,00549	-0,01693	0,01273	-0,00109	-0,01951	-0,04077	0,01989	-0,01989
-16	-0,00266	0,00920	0,00710	0,01708	-0,00138	-0,01048	-0,03779	-0,02685
-15	-0,00699	-0,01256	0,00190	-0,00190	-0,01719	-0,02787	-0,01843	-0,00563
-14	-0,00404	-0,00199	0,00275	-0,02001	-0,00413	0,03206	-0,01812	-0,01070
-13	0,00462	0,00055	-0,00667	-0,02299	0,04440	0,06264	-0,02613	0,04797
-12	0,01255	-0,00549	0,00002	-0,00920	0,02369	-0,01616	-0,00249	-0,01459
-11	-0,00874	0,00426	-0,00212	0,00723	-0,00479	0,01885	0,01295	-0,01414
-10	0,01939	0,00286	-0,00126	0,00126	-0,00440	-0,00716	-0,02216	0,02216
-9	0,01113	-0,00820	-0,01058	-0,00724	0,00363	0,01774	-0,01144	-0,01385
-8	0,00700	-0,00638	-0,00842	0,00877	-0,02022	-0,01453	-0,00093	0,05954
-7	0,00519	-0,01063	-0,02522	0,00108	-0,01795	0,01034	0,01069	-0,06686
-6	0,00751	0,00645	-0,01040	0,01111	-0,00785	0,01335	-0,00873	-0,00105
-5	-0,00717	-0,00324	-0,01103	-0,02941	-0,01152	-0,00335	-0,03704	0,03149
-4	0,00268	-0,00645	-0,00521	0,01803	-0,02568	-0,01138	-0,02405	-0,03774
-3	-0,00340	-0,00673	0,00167	0,02063	0,00270	0,01010	-0,04802	0,00369
-2	0,00265	0,02208	0,00420	0,01168	0,03603	-0,00835	0,06336	0,05991
-1	-0,00644	-0,00292	0,00646	0,01089	0,00449	0,02036	0,08413	0,00303
0	-0,01144	-0,02321	-0,04022	-0,03553	0,01756	0,02640	0,03214	0,04184
1	-0,02013	-0,01173	-0,02108	-0,00525	-0,00299	-0,00020	0,00948	0,00794
2	0,00176	-0,00467	-0,01523	-0,03478	-0,00868	0,01227	0,02385	0,03531
3	-0,00475	-0,01401	-0,02285	0,00221	-0,01188	-0,00782	0,04892	-0,03797
4	-0,01420	-0,01992	-0,06381	0,06381	0,00445	0,04041	-0,03084	-0,07192
5	-0,00995	0,01583	0,03190	-0,03395	0,01878	0,01331	-0,03435	0,02327
6	0,00969	-0,01369	0,02134	0,05592	0,01400	-0,00613	-0,04100	-0,03732
7	-0,00921	-0,00551	0,05018	-0,01404	-0,00954	-0,00891	0,01304	0,04383
8	0,00101	-0,01522	-0,00016	-0,02541	-0,00303	-0,03768	0,02645	-0,00713
9	0,01567	0,01772	0,00286	0,03436	0,00221	0,02588	-0,00452	-0,00188
10	0,00927	-0,00787	0,02031	-0,01095	0,01916	-0,00389	-0,01335	0,02294
11	0,00219	-0,01586	-0,00799	0,00691	-0,00586	-0,01869	-0,02389	0,02176
12	0,01245	-0,01745	0,00467	0,00568	-0,00444	0,00909	0,05219	0,00409
13	-0,02942	-0,05495	0,01709	0,03546	-0,01775	-0,03748	0,00242	-0,01352
14	-0,01711	-0,00335	-0,01117	-0,00479	-0,01373	0,00635	-0,03504	-0,02943
15	-0,01495	-0,03477	-0,05140	-0,02577	-0,01533	-0,01263	-0,00739	0,05600
16	0,00754	-0,03065	-0,01096	0,00615	0,00676	-0,00634	0,02794	-0,00600
17	-0,01719	-0,03159	-0,01266	0,00445	-0,01082	-0,01532	-0,03813	-0,02863
18	-0,01208	-0,00331	-0,01398	-0,01143	-0,00265	0,01216	-0,06323	0,02306
19	-0,01372	0,01978	-0,01823	0,00974	0,00654	0,01389	0,00876	0,00629
20	0,00285	0,01125	0,02926	-0,01388	-0,00288	-0,02317	-0,00409	0,02975
21	0,02216	0,04495	-0,00354	0,00849	-0,00998	0,00434	-0,01486	-0,03658
22	0,00777	-0,00388	-0,00517	-0,01787	-0,01798	-0,02105	-0,05466	0,02995
23	-0,02030	-0,02105	-0,01739	0,00724	-0,02384	-0,02481	0,00910	0,00820
24	-0,01289	-0,00402	0,00549	-0,00549	0,00161	0,02925	-0,01289	0,01175
25	-0,01914	-0,04148	0,00660	-0,01290	-0,01531	-0,01270	0,02423	0,01341
26	0,00655	-0,02548	-0,01509	0,02178	-0,00930	0,00930	-0,01578	-0,01388
27	-0,02199	0,00042	0,00743	-0,02484	0,00035	0,02489	-0,01058	0,02355
28	0,00212	-0,00212	-0,00060	0,00339	-0,00837	0,00560	0,00785	0,00772
29	0,01760	0,01348	0,02300	-0,03825	0,00060	0,01957	0,04278	0,00884
30	-0,00854	-0,05327	0,02078	-0,01233	0,00381	-0,01064	0,01005	-0,01477

Test window:	t-probabilities	CAR	t-probabilities	CAR	t-probabilities	CAR	t-probabilities	CAR
t= -29 to 1	0,48601	-0,04737	0,81952	-0,02255	0,49605	0,11396	0,35259	0,15458
t= -1 to 1	0,16474	-0,03785	0,54027	-0,02988	0,19370	0,04657	0,28588	0,05281
t= -1 to 29	0,01592	-0,28528	0,78329	-0,03865	0,74412	0,03625	0,38624	0,13840
t= -29 to 29	0,02867	-0,29479	0,84996	-0,03132	0,59696	0,10364	0,28406	0,24017
t= -5 to 5	0,25228	-0,05496	0,91189	-0,01165	0,12198	0,09175	0,66515	0,05899

Deutsche Bank

	3Q07		4Q07		1Q08		2Q08	
Event	3Q07		4Q07		1Q08		2Q08	
Date of announcement	03.10.07		07.02.08		29.04.08		31.07.08	
slope 300d	0,889332661		1,203623281		1,183620056		1,417804868	
interception 300d	-0,00031016		-0,001262686		-0,001914448		-0,001627347	
Returns:	expected	abnormal	expected	abnormal	expected	abnormal	expected	abnormal
-29	0,00544	-0,02532	0,00002	0,00873	-0,00653	0,00582	-0,02083	-0,01769
-28	0,00063	0,00648	-0,00212	0,00212	0,01662	0,00661	-0,03171	0,02569
-27	-0,00229	0,00055	-0,00126	0,00126	0,00305	-0,00305	0,01210	-0,01021
-26	-0,01996	0,00390	-0,01058	-0,00849	0,00406	-0,00406	0,01989	-0,00282
-25	0,00367	-0,00533	-0,00842	0,00797	0,03678	-0,00393	-0,03779	-0,00034
-24	-0,00123	-0,00434	-0,02522	0,01548	-0,01951	-0,01265	-0,01843	-0,01519
-23	0,01062	0,00763	-0,01040	0,00982	-0,00138	0,01038	-0,01812	0,00807
-22	0,00219	0,00480	-0,01103	0,00120	-0,01719	0,00736	-0,02613	-0,01820
-21	0,00331	0,02577	-0,00521	-0,01534	-0,00413	0,00635	-0,00249	0,05377
-20	-0,01490	-0,00886	0,00167	-0,00167	0,04440	-0,00358	0,01295	0,00495
-19	-0,00171	0,00138	0,00420	-0,00420	0,02369	-0,00690	-0,02216	0,00389
-18	-0,01555	-0,00980	0,00646	0,00122	-0,00479	-0,00139	-0,01144	-0,01632
-17	-0,00752	-0,00074	-0,04022	0,00912	-0,00440	0,00057	-0,00093	0,00149
-16	0,01442	-0,00139	-0,02108	0,02254	0,00363	0,00744	0,01069	0,02578
-15	-0,00042	-0,00357	-0,01523	-0,01457	-0,02022	0,00968	-0,00873	-0,00218
-14	0,00343	0,01080	-0,02285	0,00265	-0,01795	0,00797	-0,03704	-0,00592
-13	-0,00479	-0,01010	-0,06381	-0,00209	-0,00785	0,00531	-0,02405	0,00769
-12	-0,01196	-0,00813	0,03190	-0,00370	-0,01152	-0,00892	-0,04802	0,03730
-11	0,01693	0,00748	0,02134	-0,05735	-0,02568	0,02157	0,06336	-0,04683
-10	0,02431	0,01165	0,05018	0,02594	0,00270	-0,00586	0,08413	-0,02008
-9	-0,00549	-0,01282	-0,00016	-0,04261	0,03603	-0,00643	0,03214	-0,01742
-8	-0,00266	0,00092	0,00286	0,01817	0,00449	0,00284	0,00948	0,01046
-7	-0,00699	-0,01603	0,02031	-0,01513	0,01756	0,01124	0,02385	-0,02963
-6	-0,00404	0,00069	-0,00799	0,00072	-0,00299	-0,00699	0,04892	0,00329
-5	0,00462	-0,00798	0,00467	-0,02096	-0,00868	-0,01372	-0,03084	0,01808
-4	0,01255	0,00203	0,01709	0,01163	-0,01188	0,00613	-0,03435	0,02519
-3	-0,00874	0,00742	-0,01117	0,00212	0,00445	0,01677	-0,04100	0,02761
-2	0,01939	-0,00336	-0,05140	0,00895	0,01878	-0,01420	0,01304	0,00103
-1	0,01113	0,00722	-0,01096	0,01839	0,01400	-0,00360	0,02645	-0,02748
0	0,00700	0,01206	-0,01266	0,04104	-0,00954	0,00110	-0,00452	0,01925
1	0,00519	-0,00414	-0,01398	-0,00369	-0,00303	0,00823	-0,01335	0,00339
2	0,00751	-0,00532	-0,01823	0,02684	0,00221	-0,00221	-0,02389	0,01605
3	-0,00717	0,00214	0,02926	-0,01745	0,01916	-0,00180	0,05219	-0,00393
4	0,00268	-0,00827	-0,00354	0,01624	-0,00586	0,00637	0,00242	0,01135
5	-0,00340	-0,00530	-0,00517	-0,01814	-0,00444	0,00711	-0,03504	0,03198
6	0,00265	-0,00564	-0,01739	-0,00110	-0,01775	0,00419	-0,00739	0,03051
7	-0,00644	-0,00226	0,00549	0,02230	-0,01373	0,01257	0,02794	-0,00688
8	-0,01144	-0,00312	0,00660	-0,01315	-0,01533	-0,00881	-0,03813	0,00996
9	-0,02013	0,01243	-0,01509	0,00784	0,00676	0,00375	-0,06323	0,02274
10	0,00176	0,00033	0,00743	-0,01607	-0,01082	0,00610	0,00876	0,00177
11	-0,00475	-0,00121	-0,00060	-0,00933	-0,00265	0,00606	-0,00409	-0,00627
12	-0,01420	-0,00312	0,02300	-0,01187	0,00654	-0,00589	-0,01486	-0,00282
13	-0,00995	0,00803	0,02078	0,01729	-0,00288	-0,00288	-0,05466	0,01677
14	0,00969	-0,01331	0,01298	-0,02460	-0,00998	0,01600	0,00910	-0,01893
15	-0,00921	-0,00070	-0,02580	0,00877	-0,01798	0,00153	-0,01289	0,00421
16	0,00101	-0,01705	-0,03413	0,00831	-0,02384	0,00576	0,02423	0,00402
17	0,01567	0,00561	-0,02627	0,01920	0,00161	0,00082	-0,01578	-0,00697
18	0,00927	-0,00360	-0,01814	-0,00814	-0,01531	-0,00760	-0,01058	0,01058
19	0,00219	0,00526	0,00167	0,00740	-0,00930	0,01617	0,00785	0,00236
20	0,01245	0,02590	-0,02405	0,01498	0,00035	-0,00999	0,04278	-0,02267
21	-0,02942	-0,01017	-0,01160	-0,00180	-0,00837	0,01389	0,01005	-0,01091
22	-0,01711	-0,00679	-0,02045	-0,00109	0,00060	0,00694	-0,00163	0,00163
23	-0,01495	-0,00836	0,04724	0,00919	0,00381	-0,06373	-0,00163	0,00163
24	0,00754	0,00301	0,02313	-0,01903	-0,01430	-0,01646	-0,00163	0,00163
25	-0,01719	-0,00190	-0,02197	0,00197	-0,01182	0,00432	-0,00163	0,00163
26	-0,01208	0,00035	-0,03004	-0,00470	-0,00775	0,00443	-0,00163	0,00163
27	-0,01372	0,01732	-0,04106	-0,00018	-0,00082	0,00564	-0,00163	0,00163
28	0,00285	0,00599	0,06528	-0,01040	-0,02858	-0,00662	-0,00163	0,00163
29	0,02216	-0,00683	-0,00596	0,00524	-0,02990	-0,00014	-0,00163	0,00163
30	0,00777	0,00572	0,01759	0,00564	-0,01538	0,01747	-0,00163	0,00163

Test window:	t-probabilities	CAR	t-probabilities	CAR	t-probabilities	CAR	t-probabilities	CAR
t= -29 to 1	0,84135	-0,01110	0,85552	0,01928	0,42022	0,04008	0,69845	0,04663
t= -1 to 1	0,40336	0,01515	0,28686	0,05573	0,63454	0,00573	0,91718	-0,00484
t= -1 to 29	0,97762	-0,00142	0,45956	0,06425	0,97033	0,00294	0,23351	0,09110
t= -29 to 29	0,70362	-0,02767	0,82764	0,02779	0,68512	0,03729	0,29703	0,14257
t= -5 to 5	0,88215	-0,00348	0,34647	0,06495	0,75051	0,01017	0,05599	0,12252

HSBC

	3Q07		4Q07		1Q08		2Q08	
Event	3Q07		4Q07		1Q08		2Q08	
Date of announcement	14.11.07		03.03.08		12.05.08		04.08.08	
slope 300d	0,421030008		0,422007313		0,43257059		0,39022962	
interception 300d	0,00003924		-0,000440286		0,00000844		0,00006435	
Returns:	expected	abnormal	expected	abnormal	expected	abnormal	expected	abnormal
-29	0,00264	0,00612	0,01119	-0,09564	0,01693	0,00027	0,00384	-0,00952
-28	0,00374	0,00826	0,00749	0,09960	0,00936	0,00983	0,00599	0,00211
-27	-0,00321	-0,00344	0,01760	-0,02450	-0,00104	0,00332	-0,00989	0,00989
-26	0,00146	-0,00212	-0,00005	0,04330	-0,00090	0,00090	-0,00456	-0,01252
-25	-0,00143	-0,00192	0,00100	-0,03476	0,00203	-0,00203	-0,00448	-0,00376
-24	0,00144	0,00856	0,00712	0,00227	-0,00668	0,00135	-0,00668	0,00668
-23	-0,00286	-0,00246	-0,00280	-0,00146	-0,00585	0,00509	-0,00017	-0,01903
-22	-0,00523	0,02439	0,00164	-0,01453	-0,00216	0,00977	0,00408	-0,01254
-21	-0,00934	-0,01651	0,00600	0,01625	-0,00350	0,00955	-0,00559	0,01405
-20	0,00102	0,00767	-0,00391	0,02567	-0,00868	-0,00726	-0,00264	0,00348
-19	-0,00206	0,00472	-0,01802	0,00132	0,00169	-0,00630	0,00026	-0,02499
-18	-0,00653	0,00653	-0,00384	-0,03828	0,01388	-0,01773	0,00345	0,02548
-17	-0,00452	-0,02993	-0,00444	0,00444	0,00235	0,00839	-0,00189	-0,00316
-16	0,00477	0,00071	-0,00490	0,00490	0,00713	-0,00942	-0,00968	0,01221
-15	-0,00417	-0,00337	-0,00639	-0,03484	-0,00039	0,01331	-0,00611	-0,01343
-14	0,00067	0,00071	0,01026	-0,00115	-0,00246	-0,00436	-0,01271	-0,01866
-13	0,00761	-0,00623	-0,00124	0,02010	-0,00363	0,00743	0,01795	-0,01972
-12	0,00458	0,02453	-0,00181	0,03506	0,00233	-0,01223	0,02367	0,01289
-11	0,00122	-0,00189	-0,00609	-0,00603	0,00757	0,00233	0,00936	0,01596
-10	0,00608	0,00520	0,00193	-0,02128	0,00582	0,00398	0,00312	0,03690
-9	-0,01374	0,01704	0,00232	0,01354	-0,00278	0,01100	0,00708	-0,00788
-8	-0,00791	-0,01673	-0,00529	-0,00968	-0,00040	0,00559	0,01398	0,01524
-7	-0,00689	-0,00942	0,00261	0,01062	0,00152	-0,00152	-0,00798	0,01650
-6	0,00376	-0,00102	-0,00021	0,00370	0,00771	0,00113	-0,00894	-0,00114
-5	-0,00795	0,00040	0,00807	0,00838	-0,00143	0,00143	-0,01077	0,00687
-4	-0,00553	-0,01394	0,00729	0,01981	-0,00092	-0,00276	0,00410	-0,01749
-3	-0,00631	-0,00357	0,00455	0,02751	-0,00578	-0,00533	0,00779	0,01106
-2	0,00153	-0,02958	-0,00904	0,00418	-0,00431	0,00877	-0,00073	0,00384
-1	0,01068	-0,00922	-0,01196	-0,00691	-0,00489	-0,01004	-0,00316	0,00703
0	0,00386	0,00844	-0,00921	-0,00246	0,00318	-0,00318	-0,00606	0,00606
1	-0,00943	0,00799	-0,00636	0,01554	-0,00325	0,02262	0,01488	-0,03675
2	-0,00592	-0,01299	0,00059	0,00190	-0,00026	-0,00121	0,00118	-0,00118
3	-0,00888	0,00372	-0,00843	0,01504	0,00310	-0,00680	-0,00913	0,02714
4	0,00329	-0,00550	-0,00406	-0,03026	-0,00034	0,00478	-0,00152	-0,01018
5	-0,01022	-0,01525	-0,00717	0,03572	-0,00294	0,00515	0,00820	-0,00116
6	0,00119	-0,01340	0,01656	0,00067	-0,00586	-0,00005	-0,00998	0,00920
7	0,00852	0,00294	0,00811	0,01043	-0,00801	0,00057	-0,01689	0,00591
8	-0,00386	0,01743	-0,00770	-0,01410	0,00130	-0,01407	0,00292	-0,01402
9	0,00662	-0,02629	-0,01053	0,01379	-0,00489	0,00186	-0,00061	-0,00418
10	0,01144	-0,02143	-0,01440	-0,02544	-0,00269	-0,00416	-0,00358	0,00037
11	0,00206	0,01856	0,02288	-0,00359	0,00084	0,00221	-0,01453	-0,00331
12	0,00811	-0,00962	-0,00209	0,01365	-0,00235	-0,00070	0,00302	-0,01371
13	-0,00202	0,00202	0,00617	-0,01524	0,00093	0,00136	-0,00304	-0,02294
14	-0,00610	0,00762	0,00133	-0,00133	0,00210	0,00170	0,00718	-0,00718
15	0,00433	-0,01192	0,00169	-0,00169	-0,00452	0,00224	-0,00383	0,03476
16	0,00527	0,01209	0,01336	0,03752	-0,00361	-0,00403	-0,00240	-0,01169
17	0,00168	0,02126	-0,00671	0,00907	-0,00212	-0,00018	0,00267	0,00564
18	0,00619	-0,02764	-0,00025	0,00104	0,00041	0,00877	0,01229	-0,01727
19	-0,00737	0,02881	-0,00589	0,00980	-0,00974	0,00974	0,00328	0,02381
20	-0,00348	-0,01274	-0,00123	-0,00741	-0,01022	0,01022	0,00006	-0,00006
21	-0,01224	0,00252	0,01607	0,00113	-0,00491	-0,02210	0,00006	-0,00006
22	-0,00602	0,00902	0,00869	0,01051	-0,00856	0,01247	0,00006	-0,00006
23	-0,00881	-0,01237	-0,00147	0,00375	0,00193	-0,02002	0,00006	-0,00006
24	0,00000	0,00761	-0,00133	0,00133	0,00358	-0,01717	0,00006	-0,00006
25	-0,00268	-0,00417	0,00153	-0,00153	0,00356	0,00844	0,00006	-0,00006
26	-0,00174	0,00327	-0,00697	0,00164	-0,00002	0,00240	0,00006	-0,00006
27	0,00493	0,00342	-0,00616	0,00539	-0,00735	0,00577	0,00006	-0,00006
28	0,00296	0,00006	-0,00256	0,01016	-0,00704	-0,00494	0,00006	-0,00006
29	0,00115	-0,00115	-0,00387	0,00991	-0,00585	0,00585	0,00006	-0,00006
30	0,00144	-0,00144	-0,00891	-0,00703	-0,00917	0,00353	0,00006	-0,00006

Test window:	t-probabilities	CAR	t-probabilities	CAR	t-probabilities	CAR	t-probabilities	CAR
t= -29 to 1	0,77578	-0,02008	0,71848	0,06465	0,35869	0,04390	0,95001	0,00566
t= -1 to 1	0,71944	0,00721	0,79277	0,00617	0,78254	0,00940	0,63971	-0,02366
t= -1 to 29	0,72641	-0,02691	0,22268	0,09800	0,96269	-0,00252	0,75172	-0,02432
t= -29 to 29	0,59506	-0,05421	0,41860	0,15648	0,63144	0,03198	0,96398	0,00500
t= -5 to 5	0,09688	-0,06950	0,16949	0,08843	0,66397	0,01343	0,93287	-0,00477

Morgan Stanley

Event	3Q07		4Q07		1Q08		2Q08	
Date of announcement	19.09.07		19.12.07		19.03.08		18.06.09	
slope 300d	0,889332661		1,203623281		1,183620056		1,417804868	
interception 300d	-0,000310162		-0,001262686		-0,001914448		-0,001627347	
Returns:	expected	abnormal	expected	abnormal	expected	abnormal	expected	abnormal
-29	-0,02375	-0,03255	-0,01719	0,06468	-0,01312	0,01156	-0,01578	0,00020
-28	-0,02175	-0,00747	-0,01941	0,02905	-0,01442	-0,02396	-0,01770	0,00645
-27	0,00464	-0,01116	0,00301	-0,01097	-0,01860	0,00320	0,00877	0,02734
-26	-0,01670	-0,01845	0,02915	0,00899	0,02810	-0,02388	-0,01230	-0,00977
-25	-0,01479	-0,00185	0,00967	-0,01416	-0,00416	0,01626	-0,00251	0,01000
-24	-0,00574	0,04623	-0,02832	-0,01467	-0,00576	-0,00845	0,00851	0,00734
-23	0,02778	0,02603	-0,01829	0,01132	-0,01777	0,01071	-0,00278	-0,00776
-22	0,00112	0,00577	-0,02675	-0,00728	0,00473	-0,00473	-0,01129	-0,01034
-21	0,00141	0,00225	0,00803	-0,02181	0,00582	-0,02563	-0,02088	-0,00990
-20	0,00537	0,01353	-0,03060	-0,00821	-0,01551	0,06397	-0,02789	-0,01568
-19	0,00544	-0,00202	0,00202	-0,00202	0,00663	-0,01540	0,00260	-0,00120
-18	0,00063	0,00294	0,02298	0,00508	-0,00126	0,02461	-0,01768	-0,00875
-17	-0,00229	-0,01034	-0,01240	-0,02726	0,02195	0,00242	-0,01047	0,01047
-16	-0,01996	-0,02760	0,01756	0,02029	0,01976	-0,02752	0,00109	0,00867
-15	0,00367	0,00355	0,03134	0,04033	0,01209	0,00883	-0,00936	0,02183
-14	-0,00123	-0,01607	0,00452	-0,02645	-0,02604	-0,00675	0,00138	0,02196
-13	0,01062	0,02545	0,02181	-0,01458	-0,03424	-0,01848	0,00523	0,00499
-12	0,00219	-0,00219	-0,00714	-0,00124	-0,02651	0,01360	-0,01646	-0,00942
-11	0,00331	0,02140	-0,01882	-0,02557	-0,01852	0,01297	-0,01349	0,00300
-10	-0,01490	-0,00676	0,01100	-0,00900	0,00097	0,00193	-0,00862	0,02513
-9	-0,00171	0,00075	0,01370	0,01521	-0,02432	-0,02005	-0,00031	0,02829
-8	-0,01555	0,01555	0,00342	-0,00129	-0,01208	0,01686	-0,03357	-0,05501
-7	-0,00752	0,01675	0,01633	0,03421	-0,02078	-0,01914	-0,03515	-0,00027
-6	0,01442	-0,00715	-0,02243	-0,06236	0,04578	0,05804	-0,01776	0,01369
-5	-0,00042	-0,00084	-0,01133	0,01970	0,02208	-0,05753	-0,02972	-0,02530
-4	0,00343	0,04772	-0,03636	0,03298	-0,02228	0,03657	0,00466	0,02845
-3	-0,00479	-0,00544	-0,01859	0,02058	-0,03021	-0,02032	0,01009	0,05692
-2	-0,01196	-0,00635	-0,02657	0,01114	-0,04105	-0,04249	0,01000	0,02001
-1	0,01693	0,03705	-0,00137	-0,02855	0,06350	0,10042	-0,00170	-0,03932
0	0,02431	-0,04615	-0,00904	0,05000	-0,00653	0,02020	-0,02576	0,02822
1	-0,00549	-0,03097	-0,00634	0,03178	0,01662	0,11717	-0,02474	0,01238
2	-0,00266	-0,00029	0,01273	0,04403	0,00305	-0,00305	-0,02083	-0,01747
3	-0,00699	-0,02694	0,00710	0,00388	0,00406	-0,02275	-0,03171	-0,00034
4	-0,00404	-0,01084	0,00190	-0,00190	0,03678	-0,02253	0,01210	0,01346
5	0,00462	0,02112	0,00275	-0,00221	-0,01951	-0,01464	0,01989	-0,02642
6	0,01255	0,01223	-0,00667	-0,02435	-0,00138	-0,04355	-0,03779	0,00179
7	-0,00874	-0,01556	0,00002	-0,00190	-0,01719	-0,00382	-0,01843	0,01516
8	0,01939	-0,00348	-0,00212	0,00005	-0,00413	0,02536	-0,01812	0,00053
9	0,01113	0,02100	-0,00126	0,00126	0,04440	0,02226	-0,02613	0,04072
10	0,00700	0,00652	-0,01058	-0,03094	0,02369	-0,01879	-0,00249	-0,01766
11	0,00519	-0,00355	-0,00842	0,00823	-0,00479	0,00051	0,01295	-0,01183
12	0,00751	0,01881	-0,02522	-0,00751	-0,00440	-0,02213	-0,02216	0,02216
13	-0,00717	-0,00686	-0,01040	-0,00989	0,00363	0,00662	-0,01144	-0,01223
14	0,00268	0,01410	-0,01103	-0,02931	-0,02022	0,01039	-0,00093	0,04062
15	-0,00340	-0,01943	-0,00521	0,03348	-0,01795	-0,01449	0,01069	-0,08166
16	0,00265	-0,00963	0,00167	0,01247	-0,00785	-0,02882	-0,00873	-0,00550
17	-0,00644	0,00927	0,00420	-0,00461	-0,01152	-0,00687	-0,03704	0,03494
18	-0,01144	-0,00581	0,00646	0,00402	-0,02568	0,01044	-0,02405	-0,02781
19	-0,02013	0,00795	-0,04022	0,00335	0,00270	0,01002	-0,04802	0,02412
20	0,00176	0,00602	-0,02108	0,02658	0,03603	0,00670	0,06336	0,05943
21	-0,00475	-0,00150	-0,01523	-0,03098	0,00449	0,01728	0,08413	0,00506
22	-0,01420	-0,04000	-0,02285	0,01976	0,01756	0,01111	0,03214	-0,02564
23	-0,00995	0,02022	-0,06381	0,06381	-0,00299	-0,00901	0,00948	-0,06574
24	0,00969	0,00663	0,03190	0,04117	-0,00868	0,00847	0,02385	0,03500
25	-0,00921	-0,00233	0,02134	0,04193	-0,01188	0,01590	0,04892	-0,03761
26	0,00101	-0,01527	0,05018	-0,05931	0,00445	0,05714	-0,03084	-0,01815
27	0,01567	0,02819	-0,00016	-0,04659	0,01878	-0,01363	-0,03435	0,02111
28	0,00927	0,01347	0,00286	0,01136	0,01400	-0,02871	-0,04100	-0,00894
29	0,00219	-0,01403	0,02031	-0,02294	-0,00954	-0,00968	0,01304	0,03007
30	0,01245	0,01422	-0,00799	-0,00893	-0,00303	-0,00435	0,02645	0,02949

Test window:	t-probabilities	CAR	t-probabilities	CAR	t-probabilities	CAR	t-probabilities	CAR
t= -29 to 1	0,79660	0,03159	0,43274	0,11991	0,33909	0,20499	0,25264	0,14261
t= -1 to 1	0,65363	-0,04007	0,53270	0,05323	0,11785	0,23779	0,98529	0,00127
t= -1 to 29	0,78345	-0,03007	0,56084	0,09617	0,35837	0,17749	0,94864	-0,01154
t= -29 to 29	0,77814	0,04159	0,44388	0,16285	0,54647	0,14468	0,53663	0,12980
t= -5 to 5	0,82036	-0,02195	0,03914	0,18142	0,63575	0,09104	0,61303	0,05058

Merrill Lynch

Event	3Q07		4Q07		1Q08		2Q08	
Date of announcement	24.01.07		17.01.08		17.04.08		17.07.08	
slope 300d	0,642099907		1,263631612		1,111379847		1,383502254	
interception 300d	-0,00059356		-0,000859267		-0,000878567		-0,001020242	
Returns:	expected	abnormal	expected	abnormal	expected	abnormal	expected	abnormal
-29	0,00210	0,02734	0,00405	-0,00259	-0,01042	-0,00429	-0,03219	-0,01633
-28	-0,00383	-0,00272	0,01761	-0,00500	-0,01860	-0,03481	-0,03373	0,00091
-27	-0,00901	-0,01540	-0,02308	-0,03641	0,04391	0,01853	-0,01676	0,02178
-26	0,01185	0,02817	-0,01143	0,01487	0,02165	-0,03667	-0,02843	-0,03943
-25	0,01718	-0,00897	-0,03770	0,02090	-0,02000	0,04940	0,00512	0,01774
-24	-0,00433	-0,01082	-0,01905	0,00178	-0,02745	-0,03384	0,01042	0,03590
-23	-0,00229	-0,00531	-0,02742	0,01735	-0,03763	-0,01741	0,01032	0,01463
-22	-0,00542	-0,00873	-0,00097	-0,01263	0,06054	0,06375	-0,00110	-0,02596
-21	-0,00328	-0,01812	-0,00902	-0,00513	-0,00521	-0,11254	-0,02457	0,01476
-20	0,00296	-0,00811	-0,00619	0,00198	0,01653	0,10593	-0,02357	0,02730
-19	0,00869	-0,01163	0,01383	0,00507	0,00379	-0,00379	-0,01976	-0,02751
-18	-0,00668	0,00304	0,00792	-0,03789	0,00473	0,02741	-0,03038	-0,00963
-17	0,01363	0,02206	0,00247	-0,00247	0,03546	-0,04647	0,01238	0,00256
-16	0,00767	0,01575	0,00336	0,00845	-0,01740	-0,05698	0,01998	-0,00864
-15	0,00469	0,00033	-0,00654	-0,01834	-0,00038	-0,05802	-0,03631	-0,03408
-14	0,00338	-0,01956	0,00049	-0,00483	-0,01522	-0,03294	-0,01741	0,00677
-13	0,00506	0,01990	-0,00176	0,01508	-0,00296	0,02304	-0,01712	-0,01363
-12	-0,00555	-0,02828	-0,00086	0,00086	0,04261	0,07927	-0,02493	0,04182
-11	0,00157	0,00153	-0,01064	-0,00664	0,02316	-0,03806	-0,00186	-0,03284
-10	-0,00283	0,01073	-0,00838	-0,00633	-0,00358	0,01564	0,01320	-0,01416
-9	0,00154	0,00431	-0,02601	-0,00724	-0,00322	0,01103	-0,02106	0,02106
-8	-0,00502	0,00250	-0,01045	0,00567	0,00432	0,02340	-0,01060	-0,01413
-7	-0,00863	-0,01274	-0,01111	-0,02717	-0,01806	0,00216	-0,00034	0,07673
-6	-0,01490	-0,01000	-0,00501	0,05185	-0,01593	-0,00131	0,01100	-0,10802
-5	0,00090	-0,00313	0,00222	0,02802	-0,00645	-0,02289	-0,00795	-0,02730
-4	-0,00380	-0,01822	0,00487	0,04499	-0,00990	-0,01251	-0,03557	-0,00350
-3	-0,01062	-0,04529	0,00725	0,01588	-0,02320	0,00471	-0,02290	-0,04181
-2	-0,00755	0,01072	-0,04176	-0,01257	0,00345	0,00722	-0,04629	-0,00078
-1	0,00663	0,00310	-0,02166	0,06015	0,03475	0,00039	0,06239	0,06341
0	-0,00702	-0,05284	-0,01552	-0,09248	0,00514	0,03460	0,08266	0,01037
1	0,00036	-0,03775	-0,02353	0,07131	0,01741	-0,00380	0,03193	-0,02609
2	0,01095	0,07084	-0,06653	0,06653	-0,00189	-0,01816	0,00982	-0,02055
3	0,00633	0,01360	0,03396	0,01421	-0,00723	0,00917	0,02384	0,08745
4	0,00121	-0,02918	0,02287	0,04152	-0,01023	-0,02456	0,04831	-0,05919
5	0,00862	-0,00163	0,05315	-0,06354	0,00510	0,06331	-0,02953	-0,12255
6	-0,02161	-0,03816	0,00030	-0,04461	0,01855	0,01317	-0,03295	-0,02081
7	-0,01272	-0,06952	0,00346	0,03875	0,01406	-0,01084	-0,03944	-0,08377
8	-0,01116	-0,01358	0,02179	-0,01935	-0,00804	0,00844	0,01329	0,06266
9	0,00508	0,00365	-0,00792	-0,01638	-0,00193	0,00213	0,02638	-0,00155
10	-0,01278	-0,03036	0,00537	-0,00057	0,00300	0,04710	-0,00385	-0,00586
11	-0,00909	0,00538	0,01841	0,01715	0,01891	-0,01282	-0,01246	0,01994
12	-0,01027	0,00056	-0,01126	-0,00028	-0,00458	-0,01380	-0,02274	0,00546
13	0,00169	-0,00319	-0,05350	-0,00408	-0,00325	-0,00451	0,05149	0,01555
14	0,01563	0,05267	-0,01104	-0,02102	-0,01574	-0,04177	0,00293	0,00695
15	0,00524	0,01268	-0,01283	0,02917	-0,01197	0,00077	-0,03362	-0,05435
16	-0,01503	0,00323	-0,01421	-0,01338	-0,01348	0,02406	-0,00665	0,03572
17	-0,00968	-0,01131	-0,01867	0,01348	0,00727	0,00707	0,02783	-0,04207
18	-0,01419	-0,02655	0,03118	-0,03969	-0,00924	-0,00903	-0,03664	-0,02607
19	0,00436	-0,00827	-0,00325	0,01676	-0,00157	0,01413	-0,06113	0,08966
20	-0,01625	-0,01884	-0,00496	-0,02342	0,00706	0,01519	0,00911	0,00562
21	0,00116	-0,00116	-0,01779	0,03577	-0,00178	-0,02089	-0,00342	0,01528
22	0,01234	0,02051	0,00623	-0,00623	-0,00845	-0,01516	-0,01393	-0,04684
23	-0,00654	-0,03757	0,00740	-0,03707	-0,01597	-0,01382	-0,05277	0,01487
24	0,00945	0,02584	-0,01538	0,04892	-0,02147	-0,00745	0,00945	0,01502
25	0,01680	0,06840	0,00826	-0,02656	0,00243	-0,01338	-0,01201	0,00914
26	0,00249	-0,00909	-0,00016	0,04153	-0,01346	-0,01249	0,02421	0,01131
27	0,01172	0,03141	0,02462	0,00088	-0,00781	0,00781	-0,01483	-0,02646
28	-0,00373	-0,01106	0,02228	-0,02449	0,00125	0,01340	-0,00975	0,00561
29	-0,00996	-0,02326	0,01409	-0,01575	-0,00694	0,00284	0,00823	0,03918
30	0,00595	0,00485	-0,02662	-0,02156	0,00148	0,00896	0,04232	0,04298

Test window:	t-probabilities	CAR	t-probabilities	CAR	t-probabilities	CAR	t-probabilities	CAR
t= -29 to 1	0,12801	-0,16814	0,61772	0,08649	0,83788	-0,04985	0,65276	-0,08810
t= -1 to 1	0,22309	-0,08749	0,82871	0,03897	0,48273	0,03119	0,60298	0,04769
t= -1 to 29	0,53459	-0,11144	0,82714	0,04721	0,73043	0,04112	0,92930	-0,02294
t= -29 to 29	0,33309	-0,19209	0,69241	0,09473	0,88063	-0,03992	0,61159	-0,15873
t= -5 to 5	0,45366	-0,08979	0,34574	0,17401	0,67534	0,03749	0,47183	-0,14054

Royal Bank of Scotland

Event	3Q07		4Q07		1Q08		2Q08	
Date of announcement	06.12.07		28.02.08		22.04.08		08.08.08	
slope 300d	1,254502793		1,468808169		1,517498423		1,64804454	
interception 300d	-0,000556127		-0,000563548		-0,000732729		-0,000594319	
Returns:	expected	abnormal	expected	abnormal	expected	abnormal	expected	abnormal
-29	0,02199	-0,02199	-0,02691	-0,00669	0,03002	0,00977	-0,01977	0,00707
-28	0,01296	-0,00511	-0,07690	-0,00835	-0,02684	-0,02025	-0,02908	-0,02348
-27	0,00296	-0,01376	0,03991	0,04534	-0,03701	0,01189	-0,00160	0,00160
-26	0,01744	0,00309	0,02702	-0,04527	-0,05091	-0,04001	0,01635	0,02682
-25	-0,04161	0,00663	0,06221	0,02587	0,08313	-0,01570	-0,02446	-0,00772
-24	-0,02426	-0,02349	0,00078	-0,02415	-0,00665	-0,02294	-0,01200	-0,01377
-23	-0,02121	-0,00273	0,00446	-0,02842	0,02304	-0,00813	0,00022	-0,03103
-22	0,01052	-0,02898	0,02577	0,02030	0,00564	-0,00564	0,01372	0,02572
-21	-0,02436	-0,01538	-0,00878	-0,02817	0,00692	-0,00692	-0,00884	-0,00531
-20	-0,01715	-0,03679	0,00668	-0,01514	0,04888	0,04039	-0,04175	-0,04822
-19	-0,01947	-0,01047	0,02184	-0,00433	-0,02329	-0,00779	-0,02665	0,01179
-18	0,00390	0,08398	-0,01265	0,05485	-0,00005	0,00809	-0,05452	-0,01864
-17	0,03114	0,00897	-0,06175	0,00467	-0,02032	0,01007	0,07494	-0,08876
-16	0,01084	0,00918	-0,01240	-0,00075	-0,00357	-0,00380	0,09909	-0,01490
-15	-0,02876	-0,01166	-0,01447	-0,02257	0,05865	0,00938	0,03866	0,05742
-14	-0,01830	-0,03201	-0,01608	0,02223	0,03209	0,02316	0,01232	0,01465
-13	-0,02712	-0,02707	-0,02126	0,00129	-0,00443	-0,03091	0,02902	-0,04891
-12	0,00912	0,01170	0,03668	0,00355	-0,00393	0,00865	0,05816	0,04779
-11	-0,03114	-0,00653	-0,00334	-0,00945	0,00637	0,00973	-0,03455	0,02548
-10	0,00287	0,00965	-0,00533	-0,01727	-0,02420	0,01952	-0,03864	0,01909
-9	0,02471	0,02085	-0,02024	-0,00855	-0,02129	0,00783	-0,04636	0,00479
-8	-0,01217	-0,00702	0,00768	0,02111	-0,00834	-0,01079	0,01645	-0,04350
-7	0,01907	0,00307	0,00903	0,00679	-0,01305	0,00404	0,03205	0,00583
-6	0,03343	0,01795	-0,01744	0,00785	-0,03120	0,01009	-0,00396	0,01947
-5	0,00548	-0,00830	0,01004	0,01912	0,00518	-0,01374	-0,01422	0,03059
-4	0,02350	0,01142	0,00025	0,01039	0,04792	0,02537	-0,02647	0,02532
-3	-0,00669	0,01699	0,02905	0,01999	0,00748	-0,03179	0,06196	0,00764
-2	-0,01886	-0,03543	0,02633	0,01440	0,02424	0,02376	0,00411	0,01204
-1	0,01222	0,04636	0,01682	-0,02531	-0,00211	-0,02829	-0,03943	0,03408
0	0,01504	0,01198	-0,03051	0,01080	-0,00941	-0,03029	-0,00730	0,03895
1	0,00432	0,00606	-0,04067	-0,00255	-0,01351	-0,02346	0,03377	0,00099
2	0,01778	-0,00441	-0,03108	-0,01069	0,00743	-0,01983	-0,04302	0,02884
3	-0,02262	-0,01217	-0,02116	0,01575	0,02580	-0,00187	-0,07220	0,00592
4	-0,01105	-0,01247	0,00302	-0,03695	0,01967	-0,00405	0,01148	-0,00934
5	-0,03713	-0,02652	-0,02837	-0,01112	-0,01050	-0,00013	-0,00346	0,01426
6	-0,01862	0,03066	-0,01318	-0,00683	-0,00216	-0,01435	-0,01597	-0,00243
7	-0,02693	-0,00429	-0,02398	0,01046	0,00456	-0,00169	-0,06224	0,00134
8	-0,00067	-0,00228	0,05862	-0,01490	0,02629	0,02785	0,01188	-0,01656
9	-0,00866	0,01161	0,02921	0,01059	-0,00579	0,00579	-0,01369	-0,00756
10	-0,00585	0,01577	-0,02584	-0,02126	-0,00397	0,00329	0,02946	0,02287
11	0,01403	-0,00072	-0,03568	0,01056	-0,02103	0,01831	-0,01704	0,01704
12	0,00816	0,01005	-0,04913	-0,04179	-0,01588	-0,00286	-0,01100	-0,00270
13	0,00275	-0,00275	0,08061	-0,01318	-0,01793	-0,01117	0,01042	0,00777
14	0,00363	-0,00363	-0,00629	-0,02330	0,01039	-0,01688	0,05103	-0,01450
15	-0,00619	0,01293	0,02244	-0,00754	-0,01215	-0,00836	0,01298	0,00745
16	0,00079	-0,00639	0,00560	-0,00560	-0,00168	-0,05468	-0,00059	0,00059
17	-0,00145	0,00145	0,00684	-0,00684	0,01011	-0,00288	-0,00059	0,00059
18	-0,00056	0,00056	0,04746	0,04181	-0,00197	-0,03307	-0,00059	0,00059
19	-0,01027	-0,00335	-0,02240	-0,00868	-0,01108	-0,02911	-0,00059	0,00059
20	-0,00802	0,01824	0,00010	0,00794	-0,02134	0,01346	-0,00059	0,00059
21	-0,02552	-0,01896	-0,01952	0,00927	-0,02885	-0,02160	-0,00059	0,00059
22	-0,01008	-0,00182	-0,00331	-0,00406	0,00379	0,00958	-0,00059	0,00059
23	-0,01074	0,01074	0,05691	0,01112	-0,01791	0,02604	-0,00059	0,00059
24	-0,00468	-0,02013	0,03121	0,02404	-0,01020	0,01020	-0,00059	0,00059
25	0,00251	-0,02231	-0,00414	-0,03119	0,00217	-0,02469	-0,00059	0,00059
26	0,00513	0,01835	-0,00365	0,00838	-0,00901	-0,00455	-0,00059	0,00059
27	0,00750	0,00945	0,00631	0,00979	0,00249	-0,02911	-0,00059	0,00059
28	-0,04116	-0,01948	-0,02327	0,01859	0,00661	-0,02073	-0,00059	0,00059
29	-0,02121	0,01932	-0,02046	0,00700	-0,01661	0,00561	-0,00059	0,00059
30	-0,01511	0,00159	-0,00793	-0,01120	-0,01343	0,09312	-0,00059	0,00059

Test window:	t-probabilities	CAR	t-probabilities	CAR	t-probabilities	CAR	t-probabilities	CAR
t= -29 to 1	0,89122	-0,01887	0,73715	0,04158	0,48405	-0,07871	0,68157	0,07290
t= -1 to 1	0,22969	0,06439	0,64353	-0,01706	0,00545	-0,08204	0,17438	0,07402
t= -1 to 29	0,49668	0,06183	0,46895	-0,07570	0,01782	-0,26352	0,06376	0,13474
t= -29 to 29	0,89080	-0,02142	0,91414	-0,01705	0,08490	-0,26019	0,46517	0,13362
t= -5 to 5	0,93245	-0,00651	0,95338	0,00382	0,15135	-0,10432	0,00400	0,18931

UBS

Event	3Q07		4Q07		1Q08		2Q08	
Date of announcement	01.10.07		30.01.08		18.04.08		12.08.08	
slope 300d	1,10462275		1,15224776		1,247615193		1,563626136	
interception 300d	-0,000419087		-0,000861645		-0,001742286		-0,001400754	
Returns:	expected	abnormal	expected	abnormal	expected	abnormal	expected	abnormal
-29	0,00136	0,00025	-0,00573	-0,00198	-0,02163	-0,01902	-0,02842	-0,02621
-28	0,00172	-0,01137	0,01253	-0,02117	0,04853	-0,01535	-0,00235	0,01799
-27	0,00664	0,00922	0,00714	-0,00714	0,02354	0,04003	0,01467	0,00454
-26	0,00673	-0,01063	0,00217	-0,00217	-0,02321	-0,01591	-0,02405	-0,00198
-25	0,00075	-0,00004	0,00298	-0,00298	-0,03157	-0,04564	-0,01222	-0,01300
-24	-0,00288	0,00854	-0,00604	0,02047	-0,04300	-0,10596	-0,00063	-0,00037
-23	-0,02482	0,00810	0,00037	-0,00423	0,06721	0,06701	0,01218	0,04197
-22	0,00452	-0,00524	-0,00168	0,00168	-0,00661	0,01380	-0,00923	-0,01480
-21	-0,00156	0,00228	-0,00086	0,00086	0,01780	-0,02861	-0,04045	-0,01299
-20	0,01316	-0,00833	-0,00978	0,00978	0,00349	-0,00349	-0,02612	0,02818
-19	0,00269	-0,00037	-0,00772	-0,01837	0,00455	-0,00455	-0,05257	-0,01248
-18	0,00407	0,01323	-0,02379	-0,00708	0,03905	0,03954	0,07027	-0,03642
-17	-0,01855	0,00604	-0,00961	-0,01663	-0,02029	-0,00880	0,09318	-0,01741
-16	-0,00215	-0,00336	-0,01021	0,02847	-0,00118	0,01337	0,03584	0,03777
-15	-0,01934	-0,00647	-0,00465	0,00258	-0,01784	-0,00669	0,01085	0,01075
-14	-0,00937	-0,00277	0,00195	-0,00080	-0,00408	0,00019	0,02670	-0,04830
-13	0,01787	-0,00811	0,00437	-0,00482	0,04708	0,06832	0,05435	0,00397
-12	-0,00056	0,00221	0,00653	0,00419	0,02524	0,02320	-0,03362	0,02066
-11	0,00422	0,00796	-0,03816	0,00986	-0,00478	-0,04366	-0,03749	-0,02531
-10	-0,00598	-0,00456	-0,01983	-0,01049	-0,00437	0,03681	-0,04482	-0,01136
-9	-0,01489	0,00424	-0,01423	-0,01283	0,00410	0,05209	0,01477	-0,05169
-8	0,02099	-0,00071	-0,02153	-0,03020	-0,02103	0,02800	0,02957	-0,01144
-7	0,03016	0,00538	-0,06074	-0,00877	-0,01864	-0,01114	-0,00459	0,02142
-6	-0,00685	-0,00086	0,03089	0,05694	-0,00800	0,00181	-0,01433	0,01433
-5	-0,00334	-0,00461	0,02078	-0,02539	-0,01187	0,00662	-0,02595	-0,01512
-4	-0,00872	0,00088	0,04839	0,02938	-0,02679	0,00250	0,05795	0,01594
-3	-0,00505	-0,00610	0,00020	-0,02545	0,00312	0,00693	0,00306	0,03331
-2	0,00570	-0,00987	0,00308	-0,01780	0,03826	-0,02830	-0,03825	0,03366
-1	0,01556	-0,01230	0,01979	0,00872	0,00501	0,00025	-0,00776	0,01965
0	-0,01090	0,01811	-0,00730	-0,00868	0,01879	0,03430	0,03120	0,02104
1	0,02405	0,00586	0,00482	-0,04314	-0,00288	-0,00181	-0,04165	0,01720
2	0,01379	0,01525	0,01671	-0,01494	-0,00887	-0,00056	-0,06934	-0,00592
3	0,00867	0,00563	-0,01034	0,00705	-0,01224	0,00145	0,01005	0,02553
4	0,00641	-0,00274	-0,04886	0,00736	0,00497	0,00867	-0,00412	0,01873
5	0,00930	-0,00416	-0,01015	0,00935	0,02007	0,01520	-0,01599	0,03396
6	-0,00894	0,01109	-0,01177	-0,01563	0,01503	0,01610	-0,05989	0,00498
7	0,00330	-0,00544	-0,01304	0,00620	-0,00978	-0,00777	0,01043	0,01557
8	-0,00426	0,00509	-0,01710	-0,01410	-0,00292	-0,01708	-0,01382	0,01382
9	0,00325	-0,00773	0,02836	0,00147	0,00261	-0,00261	0,02711	0,01945
10	-0,00803	0,01168	-0,00304	0,00112	0,02047	0,02965	-0,01700	0,01438
11	-0,01424	0,00460	-0,00460	-0,08246	-0,00590	0,00823	-0,01127	0,02607
12	-0,02503	0,01310	-0,01630	-0,02288	-0,00441	-0,04164	0,00905	-0,02210
13	0,00216	-0,00436	0,00561	-0,00280	-0,01843	0,00064	0,04758	-0,00305
14	-0,00593	-0,00617	0,00667	-0,01260	-0,01420	-0,03855	0,01147	-0,00065
15	-0,01767	0,00524	-0,01410	0,02562	-0,01588	0,00671	-0,00140	0,00140
16	-0,01239	-0,00460	0,00746	-0,00622	0,00741	-0,00741	-0,00140	0,00140
17	0,01200	-0,00971	-0,00022	-0,01882	-0,01113	0,00684	-0,00140	0,00140
18	-0,01147	-0,00667	0,02237	0,00192	-0,00252	0,00615	-0,00140	0,00140
19	0,00122	-0,00446	0,02024	-0,00558	0,00717	-0,00093	-0,00140	0,00140
20	0,01943	-0,02757	0,01277	-0,00252	-0,00276	-0,01408	-0,00140	0,00140
21	0,01148	-0,00822	-0,02435	-0,02548	-0,01025	0,01324	-0,00140	0,00140
22	0,00268	-0,01561	-0,03233	-0,00461	-0,01868	0,00262	-0,00140	0,00140
23	0,01543	-0,00576	-0,02480	-0,00914	-0,02486	-0,01051	-0,00140	0,00140
24	-0,03657	-0,00873	-0,01702	-0,01777	0,00197	0,00915	-0,00140	0,00140
25	-0,02129	-0,02179	0,00195	0,00295	-0,01586	-0,01824	-0,00140	0,00140
26	-0,01861	-0,01918	-0,02267	-0,02483	-0,00952	-0,05054	-0,00140	0,00140
27	0,00934	-0,00032	-0,01076	-0,00695	0,00065	-0,00407	-0,00140	0,00140
28	-0,02138	0,00305	-0,01923	-0,02142	-0,00855	0,00090	-0,00140	0,00140
29	-0,01503	-0,00364	0,04557	-0,01239	0,00091	-0,01094	-0,00140	0,00140
30	-0,01707	-0,02422	0,02249	0,04108	0,00430	-0,03103	-0,00140	0,00140

Test window:	t-probabilities	CAR	t-probabilities	CAR	t-probabilities	CAR	t-probabilities	CAR
t= -29 to 1	0,93647	-0,00338	0,37664	-0,09723	0,62772	0,09585	0,75377	0,04350
t= -1 to 1	0,70272	0,01167	0,44531	-0,04310	0,44953	0,03274	0,00338	0,05789
t= -1 to 29	0,18911	-0,08048	0,00812	-0,30120	0,51530	-0,06664	0,00186	0,21967
t= -29 to 29	0,17356	-0,09553	0,01911	-0,35533	0,98704	-0,00354	0,17590	0,20528
t= -5 to 5	0,85821	0,00594	0,31577	-0,07354	0,37924	0,04527	0,00353	0,19798

Wachovia Bank

Event	3Q07		4Q07		1Q08		2Q08	
Date of announcement	19.10.07		22.01.08		14.04.08		22.07.08	
slope 300d	0,791147703		1,071432286		1,034388222		-0,004698487	
interception 300d	-0,000435191		-0,000787233		-0,001112521		-0,002075467	
Returns:	expected	abnormal	expected	abnormal	expected	abnormal	expected	abnormal
-29	-0,00685	-0,00952	-0,00975	-0,02469	-0,01562	-0,01544	-0,00198	-0,03882
-28	0,01267	0,01939	-0,03203	0,02360	0,00141	-0,02721	-0,00210	0,01986
-27	-0,00053	0,00421	-0,01621	-0,01308	-0,02069	-0,02631	-0,00211	-0,05764
-26	0,00289	0,02011	-0,02331	0,03351	-0,01000	0,00304	-0,00211	-0,00119
-25	-0,00442	-0,00018	-0,00088	0,00746	-0,01760	-0,02097	-0,00208	-0,05291
-24	-0,01080	0,00799	-0,00771	-0,01009	0,04057	0,08789	-0,00200	-0,01446
-23	0,01490	0,02008	-0,00531	-0,00319	0,01985	-0,07970	-0,00200	0,05338
-22	0,02147	-0,01435	0,01167	0,00983	-0,01891	-0,01039	-0,00201	-0,01731
-21	-0,00504	-0,00951	0,00666	0,00041	-0,02584	-0,00009	-0,00198	-0,02772
-20	-0,00252	0,00643	0,00203	-0,00203	-0,03532	-0,00084	-0,00212	0,05619
-19	-0,00638	-0,01269	0,00279	-0,02080	0,05605	0,03855	-0,00215	0,00271
-18	-0,00375	0,00474	-0,00560	-0,01483	-0,00515	0,01082	-0,00196	-0,05267
-17	0,00395	0,00001	0,00036	-0,00639	0,01509	0,06696	-0,00202	-0,04023
-16	0,01101	-0,01061	-0,00155	0,00103	0,00323	-0,00323	-0,00202	-0,04145
-15	-0,00794	-0,00218	-0,00079	0,00079	0,00410	-0,01942	-0,00199	0,03990
-14	0,01709	-0,00185	-0,00908	-0,01379	0,03271	-0,03977	-0,00207	-0,04554
-13	0,00974	-0,00211	-0,00716	-0,00884	-0,01649	-0,05312	-0,00212	-0,03093
-12	0,00607	-0,00490	-0,02211	-0,00899	-0,00065	-0,03384	-0,00201	0,00201
-11	0,00446	-0,00348	-0,00892	0,00184	-0,01446	-0,02625	-0,00204	-0,06681
-10	0,00653	0,00084	-0,00948	-0,02372	-0,00305	0,04117	-0,00208	0,11433
-9	-0,00654	-0,00277	-0,00431	0,03353	0,03936	0,02899	-0,00212	-0,08174
-8	0,00223	-0,00028	0,00183	0,02268	0,02126	-0,03169	-0,00205	-0,08261
-7	-0,00319	-0,00934	0,00407	0,01166	-0,00363	-0,00479	-0,00196	-0,12712
-6	0,00220	0,00213	0,00609	-0,01213	-0,00329	-0,03846	-0,00200	-0,15736
-5	-0,00589	-0,00060	-0,03547	-0,00934	0,00373	0,00614	-0,00192	-0,07846
-4	-0,01034	-0,00138	-0,01843	0,02102	-0,01711	0,01856	-0,00229	0,15139
-3	-0,01806	-0,00455	-0,01322	-0,05950	-0,01512	-0,01813	-0,00236	0,24542
-2	0,00141	-0,00571	-0,02001	-0,02909	-0,00630	0,05219	-0,00219	-0,03341
-1	-0,00438	-0,00821	-0,05647	0,05647	-0,00951	0,00735	-0,00211	0,01817
0	-0,01279	-0,02403	0,02874	0,00667	-0,02188	-0,06288	-0,00216	0,24424
1	-0,00901	0,00987	0,01934	0,08163	0,00292	-0,00802	-0,00224	0,05220
2	0,00846	-0,01863	0,04501	-0,00911	0,03205	-0,03244	-0,00198	-0,11573
3	-0,00835	-0,00413	0,00020	-0,00321	0,00449	0,01268	-0,00197	-0,07691
4	0,00074	-0,00759	0,00288	0,02736	0,01591	0,03647	-0,00195	-0,05993
5	0,01378	0,01787	0,01842	-0,01047	-0,00205	-0,02813	-0,00212	0,14351
6	0,00809	-0,01326	-0,00678	-0,02619	-0,00703	-0,00171	-0,00217	0,08642
7	0,00178	-0,00894	0,00449	0,04340	-0,00982	0,00829	-0,00207	0,01313
8	0,01092	-0,01615	0,01555	-0,00804	0,00445	0,04113	-0,00204	0,09645
9	-0,02633	-0,02275	-0,00960	-0,07741	0,01697	0,03394	-0,00200	-0,10172
10	-0,01538	-0,00106	-0,04542	0,00668	0,01279	-0,01697	-0,00225	0,11018
11	-0,01346	-0,00778	-0,00942	0,01700	-0,00777	0,03222	-0,00209	-0,03261
12	0,00655	0,02329	-0,01093	0,03219	-0,00209	-0,00645	-0,00196	-0,07068
13	-0,01545	-0,05082	-0,01211	-0,00452	0,00249	0,02758	-0,00206	0,04828
14	-0,01090	0,00768	-0,01589	0,00951	0,01731	-0,01598	-0,00217	0,01767
15	-0,01236	0,02101	0,02638	-0,01338	-0,00456	-0,00546	-0,00195	-0,12743
16	0,00237	-0,00286	-0,00282	0,00911	-0,00332	0,01334	-0,00187	-0,07541
17	0,01955	0,05420	-0,00427	-0,03620	-0,01495	-0,03167	-0,00211	0,06745
18	0,00675	-0,03905	-0,01514	0,01811	-0,01144	-0,01969	-0,00207	-0,01323
19	-0,01822	-0,03189	0,00523	-0,00523	-0,01284	0,00562	-0,00203	-0,03793
20	-0,01163	-0,01708	0,00621	-0,00533	0,00647	0,01466	-0,00190	-0,04322
21	-0,01719	-0,00948	-0,01310	0,02164	-0,00890	-0,00646	-0,00211	0,04321
22	0,00567	0,00269	0,00695	-0,02860	-0,00176	-0,00365	-0,00204	-0,01488
23	-0,01972	0,02982	-0,00019	0,02916	0,00628	-0,00773	-0,00216	-0,01783
24	0,00172	-0,00172	0,02081	-0,00952	-0,00195	-0,00568	-0,00203	-0,02909
25	0,01550	0,04036	0,01883	-0,01653	-0,00816	0,00707	-0,00205	0,01063
26	-0,00776	-0,04168	0,01189	-0,03221	-0,01516	-0,00814	-0,00211	0,03779
27	0,01194	0,01458	-0,02263	-0,02975	-0,02028	-0,02058	-0,00222	0,09660
28	0,02100	0,01041	-0,03005	-0,02522	0,00197	-0,00627	-0,00211	-0,00416
29	0,00337	-0,00700	-0,02305	0,01617	-0,01282	-0,01818	-0,00208	0,00208
30	0,01473	0,02682	-0,01582	-0,01524	-0,00756	0,00756	-0,00208	0,00208

Test window:	t-probabilities	CAR	t-probabilities	CAR	t-probabilities	CAR	t-probabilities	CAR
t= -29 to 1	0,55789	-0,03245	0,72834	0,05163	0,44480	-0,15890	0,92466	-0,04857
t= -1 to 1	0,52598	-0,02237	0,15983	0,14476	0,42509	-0,06354	0,27465	0,31461
t= -1 to 29	0,43758	-0,10233	0,84258	0,03419	0,60689	-0,06574	0,55724	0,26723
t= -29 to 29	0,41822	-0,11242	0,76933	-0,05894	0,48920	-0,16109	0,87894	-0,09596
t= -5 to 5	0,24758	-0,04709	0,58876	0,07243	0,88487	-0,01620	0,28941	0,49049

Washington Mutual

Event	3Q07		4Q07		1Q08		2Q08	
Date of announcement	17.10.07		17.01.08		16.04.08		22.07.08	
slope 300d	1,000102674		1,54213593		1,519844093		2,027642474	
interception 300d	-0,000960599		-0,002541253		-0,00275764		-0,003450402	
Returns:	expected	abnormal	expected	abnormal	expected	abnormal	expected	abnormal
-29	-0,00253	0,00782	0,00345	-0,00869	-0,03153	-0,05292	-0,04363	-0,05378
-28	-0,01809	-0,00978	0,02000	0,02369	-0,01581	-0,07771	0,00555	0,08586
-27	-0,00907	0,00104	-0,02966	-0,10243	-0,02699	-0,03762	0,01331	-0,00880
-26	0,01560	-0,01043	-0,01544	-0,06585	0,05849	0,10979	0,01318	-0,00125
-25	-0,00109	0,00992	-0,04750	0,01780	0,02805	-0,04846	-0,00356	-0,07821
-24	0,00324	0,00608	-0,02474	-0,00389	-0,02891	0,07014	-0,03796	0,04437
-23	-0,00600	0,00515	-0,03496	0,01966	-0,03909	-0,09667	-0,03651	0,05078
-22	-0,01407	0,02610	-0,00268	-0,01422	-0,05302	-0,08336	-0,03091	0,03563
-21	0,01843	0,02989	-0,01250	-0,00469	0,08124	0,05608	-0,04648	-0,02162
-20	0,02673	-0,01148	-0,00905	0,02624	-0,00868	-0,06673	0,01619	-0,04340
-19	-0,00679	-0,03559	0,01539	-0,05502	0,02105	0,15310	0,02733	-0,07319
-18	-0,00360	0,00523	0,00817	-0,01529	0,00362	-0,00362	-0,05517	-0,03942
-17	-0,00847	-0,02356	0,00152	-0,00152	0,00491	0,02871	-0,02748	-0,02131
-16	-0,00515	-0,00133	0,00260	-0,00403	0,04693	0,00146	-0,02704	0,05376
-15	0,00458	0,00274	-0,00947	-0,02251	-0,02535	-0,07390	-0,03849	0,10138
-14	0,01351	-0,00763	-0,00089	-0,03444	-0,00207	-0,08604	-0,00468	0,01605
-13	-0,01045	-0,00529	-0,00364	0,04413	-0,02237	-0,01734	0,01739	-0,00430
-12	0,02119	-0,01049	-0,00254	0,00254	-0,00560	0,02323	-0,03281	0,03281
-11	0,01190	-0,00520	-0,01448	0,02253	0,05671	0,03580	-0,01748	-0,03010
-10	0,00726	-0,00838	-0,01171	0,01244	0,03012	0,00993	-0,00245	0,15744
-9	0,00522	-0,02236	-0,03323	-0,01603	-0,00646	-0,01677	0,01416	-0,02930
-8	0,00784	0,01431	-0,01425	0,04216	-0,00596	-0,11608	-0,01360	-0,10312
-7	-0,00868	0,00144	-0,01506	-0,03843	0,00436	0,25262	-0,05409	-0,00475
-6	0,00240	0,00261	-0,00761	-0,02430	-0,02626	-0,08122	-0,03551	-0,39139
-5	-0,00444	-0,01011	0,00122	0,13635	-0,02334	-0,00761	-0,06980	0,18103
-4	0,00236	0,00578	0,00445	0,03229	-0,01038	0,00776	0,08948	0,13753
-3	-0,00785	-0,00793	0,00736	-0,03287	-0,01510	-0,02693	0,11920	-0,02248
-2	-0,01348	-0,01330	-0,05246	0,00013	-0,03328	-0,02308	0,04485	0,12605
-1	-0,02325	-0,00848	-0,02793	0,01310	0,00316	0,02635	0,01244	-0,08967
0	0,00137	-0,00529	-0,02044	-0,05155	0,04597	-0,02370	0,03299	0,02721
1	-0,00595	-0,07429	-0,03021	0,11407	0,00547	0,06193	0,06884	-0,29327
2	-0,01658	-0,03141	-0,08268	0,08268	0,02225	-0,00272	-0,04523	-0,09787
3	-0,01180	0,01728	0,03995	0,04626	-0,00414	-0,03532	-0,05025	0,00196
4	0,01029	-0,01990	0,02642	0,05980	-0,01145	0,00618	-0,05975	0,08799
5	-0,01097	0,01269	0,06337	-0,01192	-0,01555	-0,01390	0,01752	0,09716
6	0,00053	-0,06163	-0,00113	-0,04908	0,00542	0,09121	0,03671	0,03093
7	0,01701	0,02881	0,00273	0,05101	0,02382	0,01885	-0,00759	0,12491
8	0,00982	-0,02960	0,02510	0,03147	0,01767	-0,02479	-0,02022	0,01834
9	0,00185	0,00136	-0,01116	0,04664	-0,01254	0,01175	-0,03528	-0,05310
10	0,01339	-0,02160	0,00506	0,05830	-0,00419	-0,01993	0,07351	-0,00411
11	-0,03369	-0,04578	0,02098	0,07264	0,00254	0,01600	0,00233	0,01288
12	-0,01985	-0,05848	-0,01523	-0,11477	0,02431	-0,05184	-0,05123	-0,01306
13	-0,01743	-0,00939	-0,06678	0,00876	-0,00782	-0,07428	-0,01170	-0,07002
14	0,00787	0,03643	-0,01497	-0,03959	-0,00600	0,03065	0,03883	-0,00449
15	-0,01994	-0,16992	-0,01714	0,09898	-0,02309	-0,03509	-0,05565	-0,04177
16	-0,01419	-0,01878	-0,01884	-0,00844	-0,01793	-0,02251	-0,09155	0,04879
17	-0,01604	0,07219	-0,02428	-0,04915	-0,01998	0,01228	0,01140	0,04522
18	0,00259	0,01001	0,03656	-0,04734	0,00839	-0,01713	-0,00697	0,04963
19	0,02431	0,03095	-0,00546	-0,00300	-0,01419	-0,02257	-0,02237	-0,05529
20	0,00813	-0,03490	-0,00755	0,03034	-0,00371	-0,00646	-0,07929	0,05281
21	-0,02344	-0,02154	-0,02320	0,03206	0,00810	0,04564	0,01190	-0,01190
22	-0,01511	-0,00917	0,00611	-0,00611	-0,00399	-0,02152	-0,01956	-0,03045
23	-0,02214	-0,05336	0,00754	-0,03254	-0,01312	0,01113	0,03353	-0,05164
24	0,00676	-0,03417	-0,02026	0,04995	-0,02339	0,00225	-0,02368	-0,03825
25	-0,02534	-0,01146	0,00859	-0,03048	-0,03091	-0,01381	-0,01625	0,01347
26	0,00177	-0,00177	-0,00169	0,01240	0,00177	0,00353	0,01010	-0,02696
27	0,01918	0,02978	0,02855	-0,01854	-0,01996	-0,01121	0,06006	0,03189
28	-0,01022	-0,06978	0,02570	-0,01986	-0,01224	0,01224	0,01325	0,03222
29	0,01468	0,00825	0,01571	-0,03809	0,00015	0,03629	-0,00345	0,00345
30	0,02613	0,03641	-0,03398	-0,03124	-0,01105	0,00047	-0,00345	0,00345

Test window:	t-probabilities	CAR	t-probabilities	CAR	t-probabilities	CAR	t-probabilities	CAR
t= -29 to 1	0,14783	-0,15283	0,96527	0,01141	0,81469	-0,10286	0,68848	-0,25948
t= -1 to 1	0,32175	-0,08806	0,65309	0,07563	0,47751	0,06457	0,33291	-0,35573
t= -1 to 29	0,03441	-0,54297	0,32707	0,28801	0,95503	-0,01050	0,62953	-0,20299
t= -29 to 29	0,02315	-0,60773	0,54407	0,22380	0,70224	-0,17793	0,87836	-0,10674
t= -5 to 5	0,13270	-0,13497	0,07789	0,38836	0,74546	-0,03104	0,73887	0,15564