



VILNIAUS GEDIMINO TECHNIKOS UNIVERSITETAS

VERSLO VADYBOS FAKULTETAS
FINANSŲ INŽINERIJOS KATEDRA

Nadežda Chitrenko

**JUNGTINIŲ VALSTIJŲ NEKILNOJAMOJO TURTO KRIZĖ IR JOS ĮTAKA
LIETUVOS RINKAI**

**U.S. MORTGAGE CRISIS AND ITS INFLUENCE ON LITHUANIAN
MARKET**

Baigiamasis magistro darbas

Verslo vadybos studijų programa, valstybinis kodas 62403S121

Investicijų valdymo specializacija

Vadybos ir administravimo mokslo kryptis

Vilnius, 2009

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Anotacija

Pagrindinis magistro baigiamojo darbo tikslas yra išanalizuoti Amerikos krizę ir praktiškai patikrinti jos įtaką Lietuvos rinkos konkrečiam dalyviui, fiksuojant smukimą ir prognozuojant atsigavimą. Tam, kad išanalizuoti JAV krizę, darbe apibūdinamos jos priežastys, raida ir pasekmės. Praktinėje dalyje koreliacijos ir regresinės analizės dėka yra nustatomas ryšys tarp pagrindinių makroekonomikos rodyklių ir būsto paskolų išdavimu Lietuvoje. Padaryta išvada, kad dalinant būsto paskolas, bankai nepakankamai griežtai vertino tokį pagrindinį faktorių kaip darbo užmokestis - šis ryšys pasirodė esant silpniausias. Tam, kad patikrinti kokioje padėtyje atsirado rinkos dalyviai, pasirenkama vienintelė Vilniaus biržos statybos ir nekilnojamojo turto sektoriaus įmonė – „Panevėžio Statybos Trestas“. Per vienerius metus šios įmonės akcijos kaina smuko 90%, todėl analizės tikslas yra nustatyti, kiek dar truks šios akcijos kainos kritimas ir kada galima tikėtis atsigavimo, t.y. prognozuoti akcijos kainą iki 2015 metų. Šiam tikslui pasiekti yra naudojamas Dividendų Diskontavimo Modelis. Diskonto norma, naudojama modelyje yra apskaičiuojama pagal Kapitalo Turto Vertinimo Modelį (CAPM, angl.). Padaryta išvada, kad po staigaus smukimo yra prognozuojamas lėtas atsigavimas, kuris vyks tik po 2010 metų; o tokie augimo tempai, kuriuos turėjome iki šiol per artimuosius septynerius metus negalės būti pasiekti.

Darbą sudaro 6 dalys: įvadas, teorinė dalis, praktinė dalis, išvados, prognozės ir siūlymai, literatūros sąrašas.

Darbo apimtis – 78 p. teksto be priedų, 21 iliustr., 10 lent., 61 bibliografiniai šaltiniai.

Atskirai pridedami darbo priedai.

Prasminiai žodžiai: Krizė, nekilnojamasis turtas, akcijos kainos prognozė, būsto paskolų suteikimas, ekonominis burbulas, spekuliacija, ekonomikos suletėjimas, augimo tempai, skolintojų vertinimas, pavojingos paskolos, panika.

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Annotation

The main goal of Master thesis is to analyze U.S. mortgage crisis and test its influence on the particular Lithuanian market player, pointing the drop and stabilization of its financial indicators. To reach this goal mortgage crisis reasons, mechanism and consequences are being analyzed and described. In practical part the relationship between credit deals and main macroeconomic indicators is established. Its task is performed by using correlation and regression analysis. The calculation revealed the weakness in the credit system as relationship between credit deals and average salary turned out to be the weakest one. In order to test the situation on a market player the only Lithuanian listed company from real estate and constructions sector is analyzed. Company's name is „Panevėžio Statybos Trestas“ and during one-year period the price of its stock has dropped by 90%. Therefore, the task is to forecast the behavior of stock price in the coming years and find out when it will be more stable. To forecast the stock price for coming years Dividend Discount model is used. Discount rate is calculated using Capital Asset Pricing Model. The analysis shows that after sharp slow down moderate growth may be expected after 2010. However, the pace of growth will be slow enough, especially in comparison with recent years aggressive increase.

Structure: introduction, theoretical part, responses to the crisis, practical part, conclusions, expectations and suggestions, references.

Thesis consists of: 78 p. text without appendixes, 21 figures, 10 tables, 61 bibliographical entries.
Appendixes included.

Keywords: Crisis, real estate, stock price forecast, mortgage market, mortgage-backed securities, economic bubble, speculation, lending standards, subprime borrower, economic slow down, growth pace, credit ratings, panics.

Table of Contents

List of figures	8
List of tables	9
List of abbreviations.....	10
Introduction	11
1. Theoretical part	13
1.1 Crisis concept	13
1.1.1 Crisis definition	13
1.1.2 The variety of crises	14
1.1.2.1 Economic and financial crises.....	15
1.1.2.2 Speculative bubble	15
1.2 Subprime mortgage crisis.....	16
1.2.1 Background	16
1.2.2 Reasons and causes	17
1.2.2.1 Housing bubble	17
1.2.2.2 Subprime mortgages.....	19
1.2.2.3 Mortgage Backed Securities.....	20
1.2.2.3.1 Mortgage securities' issuers	21
1.2.2.3.2 How Safe are Mortgage Securities	21
1.2.2.3.3 Market risks involved	22
1.2.2.4 Securitization practices and Originate-To-Distribute Model.....	22
1.2.2.5 Credit risk scoring	26
1.2.2.6 Speculation	27
1.2.2.7 Panics	27
1.2.3 Consequences	28
1.2.3.1 Consequences to the economy	28
1.2.3.2 Consequences to private business	30
1.3 Responses and expectations to the crisis.....	32
1.3.1 Economic stimulus	33
1.3.1.1 Housing and Economic Recovery Act of 2008	33
1.3.1.2 American Recovery and Reinvestment Act of 2009	34
1.3.2 Expectations of the crisis.....	35
1.4 Section summary	38
2. Practical part.....	40
2.1 Market analysis	41
2.1.1 Methodology	41
2.1.1.1 Descriptive statistics.....	41
2.1.1.2 Correlation and regression analysis.....	41

2.1.1.3 Simple regression analysis	41
2.1.1.4 Multiple regression analysis	43
2.1.2 Calculation	43
2.1.2.1 Correlation analysis.....	45
2.1.2.2 Simple regression analysis	46
2.1.2.3 Multiple regression analysis.....	49
2.2 “Panevėžio Statybos Trestas” analysis.....	51
2.2.1 Methodology	52
2.2.1.1 Forecasting	52
2.2.1.1.1 Moving Average Method	52
2.2.1.1.2 Exponential smoothing.....	52
2.2.1.1.3 Trend model	53
2.2.1.2 Capital Asset Pricing Model.....	54
2.2.1.3 Dividend Discount Model	55
2.2.2 “Panevėžio Statybos Trestas” Sales forecast by Traditional methods	55
2.2.2.1 Moving average method.....	55
2.2.2.2 Exponential smoothing method.....	56
2.2.2.3 Trend method	58
2.2.2.4 Comparing forecast methods.....	59
2.2.3 “Panevėžio Statybos Trestas” Sales forecast by GDP.....	60
2.2.3.1 GDP forecast	60
2.2.3.2 “Panevėžio Statybos Trestas” Sales forecast by GDP	63
2.2.4 Dividend forecast by Sales	65
2.2.5 Required Rate of Return calculation by Capital Asset Pricing Model	66
2.2.6 “Panevėžio Statybos Trestas” stock price calculation by Dividend Discount Model	67
2.3 Section summary	69
Conclusions.....	72
Suggestions and expectations.....	74
References.....	75
APPENDICES.....	78

List of figures

Figure 1: Borrowing under securization structure.....	23
Figure 2: Relationship between credit deals and unemployment rate.....	46
Figure 3: Relationship between credit deals and GDP.....	47
Figure 4: Relationship between credit deals and Netto salary	47
Figure 5: Relationship between credit deals and average flat price	48
Figure 6: Number of credit deals VS unemployment rate.....	48
Figure 7: Number of credit deals VS GDP.....	48
Figure 8: Number of credit deals VS Netto salary	49
Figure 9: Number of credit deals VS average flat price.....	49
Figure 10: Moving average method forecast (2-period).....	56
Figure 11: Exponential smoothing method forecast ($\alpha=0.2$).....	57
Figure 12: Trend analysis forecast	58
Figure 13: "PST" data forecast.....	59
Figure 14: GDP historical data.....	61
Figure 15: GDP drop and recovery forecast.....	62
Figure 16: GDP forecast.....	63
Figure 17: GDP and Sales growth comparison	64
Figure 18: "PST" Sales forecast by GDP	64
Figure 19: Dividend forecast by Sales	66
Figure 20: "PST" stock price VS OMXV index.....	67
Figure 21: "PST" stock price forecast	68

List of tables

Table 1: Data for correlation and regression analysis	44
Table 2: Forecast by Moving Average method.....	56
Table 3: Forecast by Exponential smoothing method ($\alpha=0.2$)	57
Table 4: Forecast by Trend method.....	58
Table 5: Mean squared error comparison	59
Table 6: GDP historical data quarterly.....	61
Table 7: GDP forecast	63
Table 8: Sales forecast by GDP.....	64
Table 9: Dividend forecast by Sales.....	65
Table 10: Stock price forecast.....	68

List of abbreviations

CAPM – Capital Asset Pricing Model

“PST” – “Panevėžios Statybos Trestas“

DDM – Dividend Discount model

RRR – Required rate of return

MBS – Mortgage-backed securities

RFR – Risk free rate

OTD – Originate-to-Distribute model

CDO – Collateral Debt obligations

MSE – Mean Squared Error

Introduction

In my thesis work I am going to analyze current financial crisis and its influence on Lithuanian market. The topic is very actual nowadays, as the crisis with its roots in U.S. mortgage market has widespread globally and now is the major reason of economic slow down in vast amount of countries. Lithuanian market is not the exception and we are currently experiencing large amounts of problems on both governmental and entrepreneur levels.

Therefore, it would be very interesting to look at the initial point of such a big global recession and to analyze what were the reasons for that as well as describe consequences. As a result of the worldwide financial crisis, including: the sub-prime lending and credit crisis, the turmoil in world markets, the government rescues of banking systems and the markets worldwide, the reshaping of the banking and investment banking industries, volatility, and the prospect of a prolonged recession, the business world has changed dramatically.

The suitability and actuality of this analysis is proved by mortgage crisis huge impact on global economy: breakdown in consumer and investor confidence, real estate market collapse, fixed income and sub-prime mortgage crisis, unrelenting liquidity crunch, ever-growing corporate and personal bankruptcies, freefall in commodity prices, millions of job losses, historic stock market crashes, trillion dollar stimulus and bailout packages, and a global economic slowdown.

Therefore, the ***goal of this paper*** is to describe the reasons and mechanism of mortgage crisis in U.S. and test its influence on Lithuanian market player in order to establish financial crisis impact on it.

To accomplish the goal next tasks will be performed:

1. Present crisis concept definition
2. Describe economic bubbles
3. Discuss the reasons of U.S. mortgage crisis
4. Describe the mechanism of crisis development and widespread through different parties
5. Describe crisis consequences and statistics of losses
6. Check interrelationships between credit deals and macroeconomic variables for Lithuanian market
7. Make the analysis of change in the stock price of selected company on Lithuanian market and make a forecast for the price in coming seven years

As a result, in my theoretical part I am mainly focusing on U.S. market, as it was the initial start point. I strive to describe the main reasons and development of the crisis as well as discuss its mechanism and widespread over the globe. For this purpose I am using vast amount of internet sources, articles and publications both from foreign and local markets.

After describing the major events happening in U.S, I am analyzing what impact they had on local market. Therefore, practical part of this paper is devoted to Lithuanian data analysis. To accomplish the goal I start my practical part with testing Lithuanian information by correlation and regression analysis in order to establish the basic relations and weaknesses between variables.

Another task is to analyze one market player (“Panevėžio Statybos Trestas”) data. At my final point of analysis I strive to predict company’s future stock price for the coming seven years. This is done in order to test how much the company has suffered and when it would be able to stabilize as well as what level of growth it may reach. I introduce traditional econometric forecast models as well as making forecast on my expectations about future trends. Later on, I use Capital Asset Pricing Model (CAPM) and Dividend Discount Model (DDM) models to calculate “Panevėžio Statybos Trestas” stock future price.

1. Theoretical part

1.1 Crisis concept

1.1.1 Crisis definition

Before going deeper into the problem and analysis of mortgage crisis influence to the economy worldwide, it is necessary to describe what the crisis itself is about.

Cycles in the economy (going up and down) are normal process, occurring periodically all the time. However what are the limits between low point in the cycle and crisis concept? For instance, in medicine it is precisely defined when epidemic starts. The exact number of accidents or diseases occurred means the crisis has started over. In economy it is hardly calculated that easily. Widespread of situation, influence on other sectors may emphasize the potential risk.

I also would like to note that psychological issues may be crucial and may have a really strong influence on economic situation and on the potential of the crisis. To illustrate, ones somebody expects the drop of price of particular goods and shares these expectations with friends, millions of people may stop buying and waiting for the more favorable situation (fall of prices), even the legend of price drop was unfounded in the beginning. As the result of decreased demand, some seller could not be waiting anymore and would reduce the price as expected by buyers. This action would create the domino effect once again, because other sellers would follow the example in order to maintain competitive environment. Therefore, consumer expectations and psychological reasons (fear, greediness) may have a big influence on the whole situation in the market.

The bright example of what was mentioned above could be bank run concept. A bank run is a type of financial crisis. It is a panic which occurs when a large number of customers of a bank withdraw their deposits because they fear it is, or might become, insolvent. This action can destabilize the bank to the point where it really becomes insolvent. No bank has enough reserves on hand to cope with more than the fraction of deposits being taken out at once. As a result, the bank faces bankruptcy, and will 'call in' the loans it has offered. This can cause the bank's debtors to face bankruptcy themselves, if the loan is invested in a plant or other items that cannot easily be sold.

A banking panic or bank panic occurs if many banks suffer runs at the same time. The resulting chain of bankruptcies can cause a long economic recession. [13].

The term *crisis* comes from the Greek noun *krisis* (choice, decision, judgment), deriving from the Greek verb *krinein* (to decide). The word makes an ancient debut in Greek historical writing via the legal, medical, and rhetorical terminology as the turning point in a decision, illness, or argument. Its definitive reappearance with reference to historical events, periods, or processes dates from the late eighteenth century, its classic formulation from the second half of the nineteenth century, and its proliferation as a catchall term for a crucial or decisive stage or state of affairs from

the last half of the twentieth century. The history of the notion of crisis veers between failed attempts at precise definition and its inflation and devaluation as a tool of analysis.

By its definition, every crisis is outstanding, but all crises can be defined by some common features. In order manage and deal with crisis and create a comprehensive plan or solution, it is necessary to develop the clear vision or idea what the crisis is about. To make it, we should first look at the “root” of crisis and analyze it deeper. It is important to get understanding of reasons and work out on the ways of prevention. However, it is not less important to realize what in general crisis is about, what systematic view may be used over it. Therefore, in this chapter I will present the definition of the crisis itself, as well as definition of financial and economic crisis. Furthermore, I am going to describe the economic term “bubble”, as it is strongly related to crisis concept and often stands out as its main reason.

The most famous crisis concept definitions are:

- Any event or situation that jeopardizes economic situation and ability to conduct normal business.
- An unstable and dangerous social situation, in political, social, economic, military affairs.
- A large-scale environmental event, especially one involving an impending abrupt change.
- It is a term meaning ‘testing time’ or ‘emergency event’.
- A stage in a sequence of events at which the trend of all future events is determined.
- A condition of instability or danger, as in social, economic, political, or international affairs, leading to a decisive change.
- A crucial or decisive point or situation; a turning point.
- An unstable condition, as in political, social, or economic affairs, involving an impending abrupt or decisive change. [2, 36]

Therefore, I may conclude that generally crisis is defined as a change of common and stable situation with particular influence on future trends.

1.1.2 The variety of crises

There exists big variety of crises that may occur on the level of society. The brightest examples are presented below:

- ✓ Poverty-related crisis
- ✓ Unemployment and Underemployment
- ✓ Environmental crisis
- ✓ International crisis
- ✓ Economic crisis

However, I would like to concentrate on economical and financial crisis concepts, as they are the most relative problems to the topic of this paper.

1.1.2.1 Economic and financial crises

An *economic crisis* is a sharp transition to a recession. Recession is usually called a downturn in economic growth lasting several quarters or more. An especially prolonged recession may be called a *depression*, while a long period of slow but not necessarily negative growth is sometimes called economic stagnation. Since these phenomena affect much more than the financial system, they are not usually considered financial crises *per se*. But some economists have argued that many recessions have been caused in large part by financial crises. One important example is the Great Depression, which was preceded in many countries by bank runs and stock market crashes. The subprime mortgage crisis and the bursting of other real estate bubbles around the world is widely expected to lead to recession in the U.S. and a number of other countries in 2008.

A financial crisis may be a banking crisis or currency crisis. The term financial crisis is applied broadly to a variety of situations in which some financial institutions or assets suddenly lose a large part of their value. Until a few decades ago, many financial crises were banking panics and many or perhaps most recessions were closely related with these panics. Other situations that are often called financial crises include stock market crashes and the bursting of other types of financial bubbles, as well as international phenomena like currency crises and sovereign defaults.

1.1.2.2 Speculative bubble

Economists say that a financial asset (stock, for example) exhibits a *bubble* when its price exceeds the value of the future income (such as interest or dividends) that would be received by owning it to maturity. If most market participants buy the asset primarily in hopes of selling it later at a higher price, instead of buying it for the income it will generate, this could be evidence that a bubble is present. If there is a bubble, there is also a risk of a *crash* in asset prices: market participants will go on buying only as long as they expect others to buy, and when many decide to sell the price will fall. [35]

1.2 Subprime mortgage crisis

1.2.1 Background

There are different definitions of subprime mortgage crisis, however most all of them are stating that it is ongoing situation with dramatic consequences as mortgage foreclosures and companies' bankruptcies. Here I present several quite descriptive definition of Credit Crunch and Subprime mortgage crisis.

The **Credit Crunch**, also known as "Liquidity crisis", can be defined as an economic condition where money for investments, liquidity, loans and other types of credit are difficult to obtain. It also leads to the sudden increase in the cost of debt. [21]

Subprime mortgage crisis is a current economic problem characterized by contracted liquidity in the global credit markets and banking system. An undervaluation of real risk in the subprime market cascaded, rippled and ultimately adversely affected the world economy. [21]

The **subprime mortgage crisis** is an ongoing financial crisis triggered by a dramatic rise in mortgage delinquencies and foreclosures in the United States, with major adverse consequences for banks and financial markets around the globe. [35]

The crisis took its roots of last years of 20th century and became apparent in 2007, revealing exposed pervasive weaknesses in financial industry regulation and the global financial system.

A lot of reasons and factors came together creating such a complicated and dangerous situation in U.S. To describe shortly the situation, several reasons may be mentioned. First of all, huge amount of U.S. mortgage credits in recent years have been issued to subprime borrowers. Subprime borrowers are defined as those with lesser ability to repay the loan based on various criteria. Another factor is that house prices started to decline in 2006-2007 in U.S. and this lead to soaring of mortgage delinquencies, and securities backed with subprime mortgages, that were widely held by financial firms, lost most of their value. As the result, a large decline in the capital of many banks and USA government sponsored enterprises occurred. This decline has lead to tightening credit around the world. The psychological panic has widespread around the globe, tightened credits reduced consumption that lead to bankruptcy of various businesses around the world.

As revealed the literature review, some authors are arguing that there were actually several bubbles overlapping at the same time - housing and financial bubbles. This bubbles' merge made the situation even more severe, of course. [60]

All the factors related to crisis will be described in the detailed way in other chapters.

1.2.2 Reasons and causes

The reasons of crisis proposed in literature are various; some issues may also be overlapping. The crisis can be attributed to a number of factors coming from both housing and credit markets, and those may emerged over a number of years. Numerical reasons proposed in the literature include:

- Downturn in the U.S. housing market (“U.S. housing bubble”) and excessive speculation in housing market
- Deterioration of lending standards in subprime markets
- Aggressive practices by mortgage brokers
- Excessive individual and corporate debt levels
- Over leveraging by banks and excessive use of the medium term public debt market
- Complexity and lack of transparency of securitization products together with inadequate oversight
- Liquidity risks
- Predatory lending
- Speculation and overbuilding during the boom period
- Risky mortgage products
- The inability of homeowners to make their mortgage payments
- Asset pricing risk
- Government regulation (or lack of it) [38, 2]

1.2.2.1 Housing bubble

Economic term “bubble” was already described above, while I would like to discuss the housing bubble in this section.

Low interest rates and large inflows of foreign funds created easy and favorable credit conditions for a number of years prior to the crisis, fueling a housing market boom and encouraging debt-financed consumption. According to G. Bush speech to the Nation in September 2008, the USA home ownership rate increased from 64% in 1994 to an all-time high of 69.2% in 2004. Subprime lending was a major contributor to this increase in home ownership rates and in the overall demand for housing, which drove prices higher. [28]

Between 1997 and 2006, the price of the typical American house increased by 124%. During the two decades ending in 2001, the national median home price ranged from 2.9 to 3.1 times median household income. This ratio rose to 4.0 in 2004 and 4.6 in 2006. This housing bubble resulted in quite a few homeowners refinancing their homes at lower interest rates, or financing consumer spending by taking out second mortgages secured by the price appreciation. USA

household debt as a percentage of annual disposable personal income was 127% at the end of 2007, versus 77% in 1990. [8]

While housing prices were increasing, consumers were saving less and both borrowing and spending more. According to Christopher Lasch, in 2005, American households have spent more than 99.5% of their disposable personal income on consumption or interest payments. If imputations mostly pertaining to owner-occupied housing are removed from these calculations, American households have spent more than their disposable personal income in every year starting in 1999. Household debt grew from \$705 billion at year-end 1974, 60% of disposable personal income, to \$7.4 trillion at yearend 2000, and finally to \$14.5 trillion in midyear 2008, 134% of disposable personal income. During 2008, the typical USA household owned 13 credit cards, with 40% of households carrying a balance, up from 6% in 1970. [27]

This credit and house price explosion led to a building boom and eventually to a surplus of unsold homes, which caused U.S. housing prices to peak and begin declining in mid-2006. Easy credit, and a belief that house prices would continue to appreciate, had encouraged many subprime borrowers to obtain adjustable-rate mortgages (ARM). These mortgages enticed borrowers with a below market interest rate for some predetermined period, followed by market interest rates for the remainder of the mortgage's term. ARMs have become increasingly popular in recent years due to their initial low monthly payments and low interest rates. Introductory rates for ARMS typically last two or three years. The rate is then adjusted every six to 12 months and can increase by as much as 50 percent or more. Borrowers who could not make the higher payments once the initial grace period ended would try to refinance their mortgages. Refinancing became more difficult, once house prices began to decline in many parts of the USA. Borrowers who found themselves unable to escape higher monthly payments by refinancing began to default. [31]

As more borrowers stop paying their mortgage payments, foreclosures and the supply of homes for sale increase. This places downward pressure on housing prices, which further lowers homeowners' equity. The decline in mortgage payments also reduces the value of mortgage-backed securities, which erodes the net worth and financial health of banks.

By September 2008, average U.S. housing prices had declined by over 20% from their mid-2006 peak. This major and unexpected decline in house prices means that many borrowers have zero or negative equity in their homes, meaning their homes were worth less than their mortgages. As of March 2008, an estimated 8.8 million borrowers had negative equity in their homes, a number that is believed to have risen to 12 million by November 2008. Borrowers in this situation have an incentive to "walk away" from their mortgages and abandon their homes, even though doing so will damage their credit rating for a number of years. [32]

Economist Nouriel Roubini wrote in January 2009 that subprime mortgage defaults triggered the broader global credit crisis, but were just one symptom of multiple debt bubble collapses: "This crisis is not merely the result of the U.S. housing bubble's bursting or the collapse of the United States' subprime mortgage sector. The credit excesses that created this disaster were global. There were many bubbles, and they extended beyond housing in many countries to commercial real estate mortgages and loans, to credit cards, auto loans, and student loans. There were bubbles for the securitized products that converted these loans and mortgages into complex, toxic, and destructive financial instruments. And there were still more bubbles for local government borrowing, leveraged buyouts, hedge funds, commercial and industrial loans, corporate bonds, commodities, and credit-default swaps..." It is the bursting of the many bubbles that he believes are causing this crisis to spread globally and magnify its impact. [33]

Nouriel Roubini has noticed the bubble bursting in early 2006. In the press release in New York magazine 2006 he commented: "When supply increases, prices fall: That's been the trend for 110 years, since 1890. But since 1997, real home prices have increased by about 90 percent. There is no economic fundamental like real income, migration, interest rates, demographics that can explain this. It means there was a speculative bubble. And now that bubble is bursting." [33]

1.2.2.2 Subprime mortgages

Subprime lending is the practice of lending, mainly in the form of mortgages for the purchase of residences, to borrowers who do not meet the usual criteria for borrowing at the lowest prevailing market interest rate. If a borrower is delinquent in making timely mortgage payments to the loan servicer (a bank or other financial firm), the lender can take possession of the residence acquired using the proceeds from the mortgage, in a process called foreclosure. [35]

Lenders began to offer more and more loans to higher-risk borrowers. The value of USA subprime mortgages was estimated at \$1.3 trillion as of March 2007, [20] with over 7.5 million first-lien subprime mortgages outstanding. [35]

By the study conducted by Federal Reserve, risk premium required by lenders to offer a subprime loan declined in 2007. This is the evidence of easy access to the loans for different types of borrowers.

One high-risk option was the "No Income, No Job and no Assets" loans, sometimes referred to as Ninja loans. Another example is the interest-only adjustable-rate mortgage, which were already discussed above. Still another is a "payment option" loan, in which the homeowner can pay a variable amount, but any interest not paid is added to the principal. An estimated one-third of ARMs originated between 2004 and 2006 had "teaser" rates below 4%, which then increased significantly after some initial period, as much as doubling the monthly payment. [58]

On the plus side, subprime mortgages allow people with poor credit a chance to get into a market previously unavailable to them with standard home loans. The downside of this scenario is that these loans are more likely to go into default, meaning that the borrower fails to make payments on the loan. The large number of foreclosures from subprime mortgages has had a drastic impact on the U.S. housing bust and overall economy. Lenders have also been hit hard, with many working in the red and some going under completely.

1.2.2.3 Mortgage Backed Securities

Mortgage securities represent an ownership interest in mortgage loans made by financial institutions (savings and loans, commercial banks or mortgage companies) to finance the borrower's purchase of a home or other real estate. Mortgage securities are created when these loans are packaged, or "pooled," by issuers or servicers for sale to investors. As the underlying mortgage loans are paid off by the homeowners, the investors receive payments of interest and principal.

Investors may purchase mortgage securities when they are issued or afterward in the secondary market. Investments in mortgage securities are typically made by large institutions when the securities are issued. These securities may ultimately be redistributed by dealers in the secondary market.

The most basic mortgage securities, known as "pass-throughs," or participation certificates (PCs), represent a direct ownership interest in a pool of mortgage loans. These mortgage securities may be pooled again to create collateral for a more complex type of mortgage security known as a Collateralized Mortgage Obligation (CMO) or, since 1986, as a Real Estate Mortgage Investment Conduit (REMIC). CMOs and REMICs are similar types of securities which allow cash flows to be directed so that different classes of securities with different maturities and coupons can be created. They may be collateralized by mortgage loans as well as securitized pools of loans.

To summarize, mortgage securities play a crucial role in the availability and cost of housing in the United States. The ability to securitize mortgage loans enables mortgage lenders and mortgage bankers to access a larger reservoir of capital, to make financing available to home buyers at lower costs and to spread the flow of funds to areas of the country where capital may be scarce. Mortgage securities also offer a number of benefits to investors.

1.2.2.3.1 Mortgage securities' issuers

The majority of mortgage securities are issued and/or guaranteed *by an agency of the U.S. government, the Government National Mortgage Association (Ginnie Mae), or by government-sponsored enterprises such as the Federal National Mortgage Association (Fannie Mae) and the Federal Home Loan Mortgage Corporation (Freddie Mac)*. Ginnie Mae is a government-owned corporation within the Department of Housing and Urban Development. Fannie Mae and Freddie Mac are chartered by Congress, but owned by stockholders. These agencies buy qualified mortgage loans or guarantee pools of such loans originated by financial institutions, securitize the loans (i.e., place them in a pool and issue securities representing fractional undivided interests in the pool) and distribute the securities through the dealer community. They also provide different levels of guarantees to investors.

Some private institutions, such as subsidiaries of investment banks, financial institutions, and home builders, also package various types of mortgage loans and mortgage pools. The securities they issue are known as “private-label” mortgage securities, in contrast to “agency” mortgage securities issued and/or guaranteed by Ginnie Mae, Fannie Mae or Freddie Mac.

1.2.2.3.2 How Safe are Mortgage Securities

Issuers of mortgage securities are typically very selective in choosing the mortgages which make up their pools. Beyond the basic security of the mortgage loans themselves, mortgage securities issued and/or guaranteed by Ginnie Mae, Fannie Mae and Freddie Mac carry additional guarantees which enhance their creditworthiness.

Ginnie Mae guarantees the timely payment of principal and interest on all of its pass-through and REMIC securities, and its guarantee is backed in turn by the full faith and credit of the U.S. government. This means that holders of bonds and certificates issued by Ginnie Mae will receive their payments promptly each month, whether or not mortgage payments are collected, and they will receive full repayment of principal even if the mortgages in the pool default.

Fannie Mae guarantees timely payment of both principal and interest on its mortgage securities, whether or not the payments have been collected from the borrower.

Freddie Mac also guarantees timely payment of both principal and interest on its Gold PCs. Some older series of Freddie Mac PCs guarantee timely payment of interest and ultimate payment of principal.

Neither Fannie Mae's nor Freddie Mac's guarantees are backed by the full faith and credit of the U.S. government. However, each entity has a line of credit to the U.S. Treasury, and the credit markets consider the securities of both entities to be nearly equivalent to those issued by agencies which have the full-faith-and-credit guarantee.

Private-label mortgage securities are the sole obligation of their issuer and are not guaranteed by any governmental entity. However, many private-label securities are backed by pass-through securities issued or guaranteed by Ginnie Mae, Fannie Mae or Freddie Mac, meaning that the collateral backing these securities carries the respective agency's guarantees.

1.2.2.3.3 Market risks involved

Mortgage securities are often priced at a higher yield than Treasury and corporate bonds of comparable maturity, but their opportunities for profit (and loss) are also greater. They may be sold at par, or at a premium or a discount to their face value. As with other fixed-income securities, mortgage securities' prices fluctuate in response to changing interest rates: when interest rates fall, prices rise, and vice versa.

Mortgage securities also have implied call and extension risks. The implied call risk means that investors may have their principal returned to them sooner than expected, because of accelerated prepayment speeds. In this case, investors may be forced to reinvest the returned principal at lower interest rates. On the other hand, the life of the security may turn out to be longer than anticipated, because prepayment rates are slower, creating an implied extension risk. In this scenario, investors might miss an opportunity to earn higher prevailing rates of interest on their principal.

In general, before investing in a mortgage security, investors should consider the expected performance of that security if interest rates should rise, fall or remain the same.

To sum up, I would like to say that Mortgage-backed securities, backed by pools of individual mortgage loans, are primarily issued by the Agencies: Fannie Mae, Freddie Mac and Ginnie Mae. Mortgage-backed securities' high credit quality and attractive yield relative to other high-quality bonds have helped MBS grow into the largest sector of the U.S. bond market. [59]

1.2.2.4 Securitization practices and Originate-To-Distribute Model

A lot of various sources note that behind the mortgage crisis stands originate-to-distribute model (OTD) and, more precisely, the shift from originate to hold mentality to originate to distribute scheme. [7]

To show the variety of parties involved I present the diagram below.

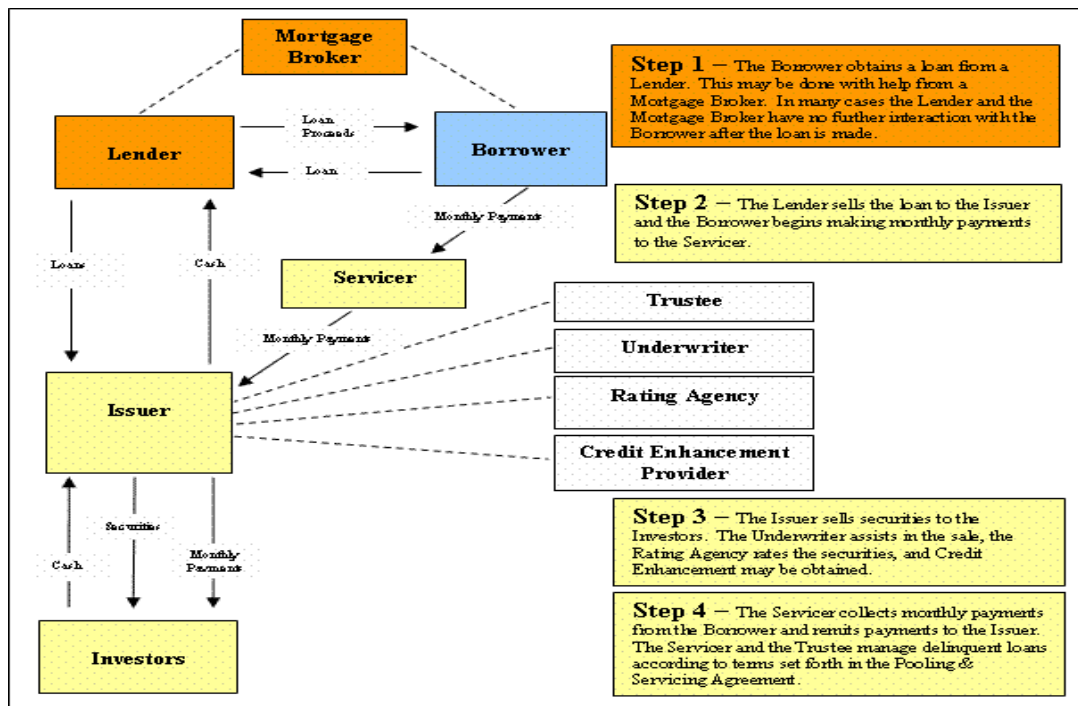


Figure 1: Borrowing under securitization structure

[Data source: US Federal Deposit Insurance Corporation, 60]

The mortgage market perhaps best illustrates how risk instruments can transform the scope and nature of a business and also what the limitations are of relying too heavily on markets for risk management. Traditionally, banks held their mortgages in a single portfolio. In the early 1980s, especially in the United States, they started to securitize these portfolios: They pooled their mortgages, divided the pools into tranches, and sold them to third-party investors, like other banks, pension funds, or insurance companies.

An originate to distribute model of lending, where the originator of a loan sells it to various third parties, has become a popular vehicle for credit and liquidity risk-management in recent years and emerged as a solution and response to originate and hold model. [3] This method of lending was very popular in the mortgage-loans market until a disruption in this market began in the middle of 2007.

The model is working in the way that most originating banks and mortgage lenders only held mortgage loans as long as it is needed to sell them to investors. This promotes a higher-risk environment for loan production.

Generally talking, originate to distribute (as opposed to originate to hold) is an innovative process that allows banks to expand their lending business (i.e. *originate* more loans) without

violating the lending limits placed by regulators. The latter are there to prevent excessive risk-taking.

Securitization involves the pooling of financial assets, especially those for which there is no ready secondary market, such as mortgages, credit card receivables, and student loans. The pooled assets are transferred to a special purpose entity and serve as collateral for new financial assets issued by the entity.

Securitization, combined with investor appetite for mortgage-backed securities (MBS), and the high ratings formerly granted to MBSs by rating agencies, meant that mortgages with a high risk of default could be sold easily to "warehouses," with the risk shifted from the mortgage originator to investors. Securitization allows issuers to easily generate capital for new loans.

In this way the risks of mortgage default were taken off the books of the original banks, which went on to make further mortgage loans (and to collect the associated fees), which were also pooled. This growth in business led to unprecedented profitability in the banking sector.

The transfer of credit risk through the OTD channel resulted in the origination of inferior quality mortgages. [3]

There are several useful functions that banks perform to alleviate value relevant frictions in the economy. On the asset side of their balance sheet, they develop considerable expertise in screening and monitoring their borrowers to minimize the costs of adverse selection and moral hazard. This model allows the originating financial institution to achieve better risk sharing with the rest of the economy, economize on the regulatory capital, and achieve better liquidity risk management. Thus, banks can use this model to leverage their comparative advantages in loan origination.

There is a cost for everything; therefore these benefits of the OTD model come with the risk. As the lending practice shifts from originate to hold to originate to distribute model, it begins to interfere with the originating banks' ex-ante screening and ex-post monitoring incentives. By separating the originator of a loan from the bearer of its ultimate default risk, the OTD model can dilute the screening incentives of the originating banks. For example, if the originating bank is unable to credibly communicate the unobservable risk or soft information about a loan to its ultimate buyer, then the bank's incentive to expend resources in screening gets diluted. Further, if the ultimate buyers are unable to understand the true risks of these loans due to some external frictions, then it is in the interest of the originating banks to lend without efficient (costly) screening. An example of such a friction is the potential rating mistakes made by credit rating agencies, which many investors rely upon.

The lack of transparency caused scores of low quality loans to widespread through the whole system and find their way into structured investments that eventually spoiled as home prices began to stagnate and fall, and mortgage defaults began to surge.

According to the study of Amiyatosh Purnanandam, the extent of a commercial bank's participation in the OTD mortgage market prior to the mid-2007 disruption positively predicts its mortgage charge-offs in the post-disruption period. These losses are more pronounced among banks that are unable to sell their OTD mortgage loans to third parties in the post-disruption period. In Amiyatosh Purnanandam paper there are some evidence provided in support of higher foreclosure rates for OTD mortgages. These findings lend support to the view that the transfer of credit-risk through the OTD market resulted in the origination of inferior quality loans by the banks. Overall, lack of screening incentives coupled with leverage induced risk-taking behavior significantly contributed to the current sub-prime mortgage crisis. The fragility of bank's capital structure acted as a moderating device. [3]

But by early 2007 it was clear that both the underwriting and the rating of mortgages had become far too lax, so when subprime default rates rose, a major financial crisis ensued. Its ramifications are still spreading. The higher default rates rapidly depressed the prices of mortgage securitizations, first of the lower-rated tranches and then of the higher-rated ones. Some global banks, though they were not direct U.S. mortgage lenders, held portfolios of highly rated mortgage-backed securities.

Transferring risk in these ways can free up capital for growth, enabling banks to offer more and more credit. The main buyers of transferred risk have been pension and hedge funds, insurers, and others seeking the diversification provided by assets whose returns aren't directly correlated to stock and bond markets. But the liquidity of wholesale credit markets, like that of mortgages, cannot be taken for granted. The mortgage crisis has made investors less willing to participate in the securitization and credit-transfer markets. What is more, the ability to estimate credit-risk exposure has not kept pace with the growth in credit-risk instruments; during 2007 it became evident that banks were struggling to cope with the complexity of their portfolios. [36]

To sum up, as banks transfer the ultimate risk to loans buyers, they try to overcome expensive and time-consuming proper evaluation of borrower's potential risk and its monitoring after the provision of the loan. As the result, more weakly-scored loans are provided and the risk of default increases drastically. Once the bank originates and holds the loan it is in its own interest to produce efficient monitoring and screening in order to reduce default risk. Lack of banks' incentives in proper scoring is the weak point in originate to distribute model.

I would like to emphasize that to transfer the risk from one party will always create this risk at another party, thus, transferring is not eliminating.

1.2.2.5 Credit risk scoring

As in all investment instruments there exists a special risk of mortgage lending that is compensated by potential revenues and is called credit risk.

Credit risk arises because there is always a possibility that a borrower will fail to pay on the loans he or she owes.

After review of U.S. websites, promotions and forums, it is quite obvious that people are very dependent of receiving loans, for so many important things in life, whether it is for buying a car, house or computer or getting a student loan. Therefore, there exists three-digit number, the credit score that can determine whether the loan might be provided and what would be the cost for it. Borrowers' income, credit history and other factors reflect this three digit number. Credit score also determines how much a borrower should pay for credit, insurance, depending on the level of risk.

Credit Scoring is Statistical method used to analyze an application, account or customer and its characteristics to predict future credit performance (Probability of Default). It predicts future performance by comparing groups with the past performance of groups with similar characteristic.

Main characteristic of Credit Scoring are:

- ✓ Probability of bad ("good/bad odds, default, prepay, attrition)
- ✓ Predict future credit performance
- ✓ Proven to be a relatively accurate indicator of risk at the aggregate levels
- ✓ Ability to rank order loans within a portfolio (good to bad)
- ✓ Focus on the ability to pay instead on collateral
- ✓ Sophisticated model development (i.e. logistic regression) and comprehensive validation required
- ✓ Based on empirical evidence (2 to 4 years of historical data) [19]

Till recent times the credit scores were only accessible for companies, however in 2001 due to pressure from the U.S. Congress and industry and consumer groups, the free access was granted for citizens. Scores may be viewed from credit reporting agencies and credit monitoring services.

Credit scores played a very important role in the development of the crisis. High ratings encouraged investors to buy securities backed by subprime mortgages, helping finance the housing boom. The reliance on agency ratings and the way ratings were used to justify investments led many investors to treat securitized products (some based on subprime mortgages) as equivalent to higher quality securities.

Credit rating agencies are currently under scrutiny for having given investment-grade ratings to MBSs on subprime mortgage loans. These high ratings were believed justified because of risk reducing practices, including over-collateralization (pledging collateral in excess of debt issued), credit default insurance, and equity investors willing to bear the first losses.

1.2.2.6 Speculation

Speculation in residential real estate has been a contributing factor. During 2006, 22% of homes purchased (1.65 million units) were for investment purposes, with an additional 14% (1.07 million units) purchased as vacation homes. During 2005, these figures were 28% and 12%, respectively. In other words, a record level of nearly 40% of homes purchases were not intended as primary residences.

Housing prices nearly doubled between 2000 and 2006, a vastly different trend from the historical appreciation at roughly the rate of inflation. While homes had not traditionally been treated as investments subject to speculation, this behavior changed during the housing boom.

Economist Robert Shiller argues that speculative bubbles are fueled by "contagious optimism, seemingly impervious to facts, that often takes hold when prices are rising. Bubbles are primarily social phenomena; until we understand and address the psychology that fuels them, they're going to keep forming." [31]

Keynesian economist Hyman Minsky described three types of speculative borrowing that contribute to rising debt and an eventual collapse of asset values:

- ✓ The "hedge borrower," who expects to make debt payments from cash flows from other investments;
- ✓ The "speculative borrower," who borrows believing that he can service the interest on his loan, but who must continually roll over the principal into new investments;
- ✓ The "Ponzi borrower," who relies on the appreciation of the value of his assets to refinance or pay off his debt, while being unable to repay the original loan. [30]

To sum up, speculative borrowing has been cited as a contributing factor to the subprime mortgage crisis.

1.2.2.7 Panics

Foreclosures in risky subprime mortgages have soared, but they are only a small part of the market. In fact, despite economic pain and uncertainty, the vast majority of Americans continue to make their mortgage payments.

There are about 51 million first mortgages in the United States right now — but only about 1.4 million of them are either referred for foreclosure or in foreclosure. In other words, fewer than 3 percent of American homes with mortgages are in foreclosure.

The problem is that those bad loans are having an outsize impact on the financial world. They are mixed with good loans in securities that are crippling investment banks. No one wants the securities, even though not all of the loans are bad.

Inside these bundles of mortgages are lots of great mortgages, at least ones where borrowers are going to pay back all the money, they are going to make their payment every month, even if it hurts. Some investment banks were overexposed to subprime mortgages, but they also have good loans that people continue to pay. Some securities are worth much more than they've sold for recently, because of the dramatically decreased demand and people fear for this commercial papers. [14]

The difficulty is that the mortgages have been sliced up and sold so many times, they are extremely hard to value. And investors are so worried about a continuing fall in housing prices, there is no market. The real problem is nobody knows which mortgages are good and which mortgages are bad at the moment. So a problem that began with a small percentage of mortgages now threatens the financial world. And the government will have to buy those mortgages to bring stability back to the system. [4]

To sum up, the most crucial problem at financial market is the lost of trust of investors. The demand for mortgage-backed products has sharply reduced, however not all mortgages were bad. To say more, the vast majority was good, but the widespread panics among investors only promoted the collapse of whole market. Now, when it is extremely hard to price such products, the majority of them are under their real value, but even then there are no volunteers to invest to such papers.

1.2.3 Consequences

1.2.3.1 Consequences to the economy

In this section I would like to list the most dramatic consequences of mortgage crisis on the economy worldwide. In my opinion, the major facts are these:

1. Funding difficulties for the financial institutions (for example Bonds, MBS become very difficult to sell) and slowing deal volume;
2. High lending costs;
3. Reduction in the volume of granting loans and mortgages (stricter borrowing requirements);
4. Increasing interest rates on mortgages and current account overdrafts;
5. Further fall in house prices;
6. Financial institutions failures (e.g. Northern Rock, Lehman, See Appendix A);
7. Volatility in the stock markets;
8. Stricter regulation;
9. Economic growth slowdown;
10. Reduced consumption
11. Lost of consumer trust

In the fourth quarter of 2007, bank industry earnings fell to their lowest level since the fourth quarter of 1991. The average return on assets was 0.18 percent, the lowest quarterly since the fourth quarter of 1990. [2]

Significant write-downs of mortgage-backed securities by large banks led to the earnings decline. Net interest margins are now getting squeezed as a result of declining interest rates and intense competition for deposits. Many banks have been forced to increase rates on collateral debts, which has significantly raised their cost of funds. Some banks' cost of funds have increased from 2 percent to 5 percent over the last several years.

The combination of poor asset quality and shrinking net interest margins will cause many bank owners to strongly consider selling to, or merging with, a better capitalized bank, as opposed to struggling through these tough economic conditions and risking regulatory scrutiny and possible insolvency. Subprime Mortgage Crisis The U.S. bank and thrift industry is suffering through the worst housing recession in U.S. history. The subprime mortgage crisis has resulted in huge asset write-downs by the country's largest banks and more are expected.

Most of the negative impact from the real estate sector has been due to the decline in home values and the related effect the housing slowdown is having on homebuilders. Many construction and development loans are moving to nonaccrual status. Delinquency rates on construction loans for single-family homes increased to 7.5 percent of the value of all such loans in the fourth quarter of 2007, up from 2.1 percent in the fourth quarter of 2006. [51]

Meanwhile, healthy investors have lost their appetite for risk, so distressed firms will have few options. For evidence of the increasing cost of debt once thought to be relatively safe, one need only look at the spread on bonds backed by home loans guaranteed by Fannie Mae and Freddie Mac. As of March 2008, the bonds were yielding a record 3.51 percent above the safe five-year treasury security, up from 2.48 percent one month ago and 1.23 percent one year ago. [45]

The unemployment rate is also a factor in the crisis. Midwestern states hit hard by auto industry layoffs rank among the highest in foreclosures [source: Federal Reserve]. Many people were counting on being able to refinance to make their loan affordable, but slowing appreciation rates in the housing market have made it difficult or impossible. Once the introductory period on the subprime loans ran out, the new payments were more than many could handle. [14]

To conclude, I would like to say that weak real income growth, greater uncertainty about employment prospects, falling house and equity prices and tighter credit conditions have raised concerns about household debt vulnerabilities in a number of countries.

1.2.3.2 Consequences to private business

The measurable effects of the crisis thus far are dramatic; substantial damage has already been done. Major financial institutions are gone or transformed. Equities have declined in value globally by \$25 trillion. Banks have been seized and sold overnight. Emerging market equities have on average lost half their value. Growth is slowing in the developed economies, which still account for 70% of global gross domestic product, and therefore also in the rest of the world. The estimates of the costs of recapitalizing the financial sector are between \$1 trillion to \$2 trillion and continue to rise. Private flows of capital into the financial sector have dried up, capital is pulling out of emerging markets, many currencies are falling and there is credit tightening. Just as pressing, concerns about the viability of major financial institutions caused interbank lending to dry up, and the channels via which short-term credit is delivered to businesses and municipalities failed completely. This credit lockup threatened damage outside the financial sector. [18]

The landscape of American finance has been radically changed. The independent investment bank, a quintessential Wall Street animal that relied on high leverage and wholesale funding, is now all but extinct. Lehman Brothers has gone bust; Bear Stearns and Merrill Lynch have been swallowed by commercial banks; and Goldman Sachs and Morgan Stanley have become commercial banks themselves. [19]

Several financial services companies and funds have failed to meet margin calls on loans backed by securities in their portfolios, including securities issued by the government-sponsored agencies, Fannie Mae and Freddie Mac. As more and more troubled institutions attempt to meet capital calls, the amount of assets for sale continues to rise while prices plummet. The result is a vicious downward spiral in asset prices forcing many companies to sell, seek emergency capital, or shut down. For example, Bear Stearns, the fifth largest investment bank in the United States, received emergency funding from J.P. Morgan Chase and the Federal Reserve Bank of New York because its liquidity had deteriorated significantly in a short period of time. The funding was expected to allow Bear Stearns to continue normal operations; however, J.P. Morgan Chase has agreed to acquire the firm at a depressed valuation of approximately US\$2.5 billion. Only a week before the deal announcement, Bear Stearns was valued at more than US\$7 billion. [30]

The tightening of credit has caused a major decline in the sale of motor vehicles. Between October 2007 and October 2008, Ford sales were down 33.8%, General Motors sales were down 15.6%, and Toyota sales had declined 32.3%. There is an ongoing global automobile industry crisis, and calls for some form of government intervention. [14]

When Lehman Brothers and other important financial institutions failed in September 2008, the crisis hit a key point. During a two day period in September 2008, \$150 billion were withdrawn from USA money funds. The average two day outflow had been \$5 billion. In effect, the money

market was subject to a bank run. The money market had been a key source of credit for banks and nonfinancial firms. [39]

It could be any number of the following issues that are impacting companies today. Demand is weakening, sales are slowing down, inventories are building up, competition is getting more intense, costs are not falling at the same pace as prices, margins are being squeezed, creditors' default risk is rising, debt availability is getting scarcer, cash flow management is becoming critical, employee morale is declining, suppliers are demanding shorter payment cycles, buyers are clamoring for easier credit terms, certain businesses and product categories are under-performing, and industry recovery horizon remains as unclear as ever. Essentially, the future seems rather uncertain.

1.3 Responses and expectations to the crisis

In this section I would like to describe what were government and Central Bank actions taken to anticipate the crisis.

First of all, it is important to mention that both government action and inaction has contributed to the crisis. Currently there are lots of theories that are blaming government policies in the collapse of financial market. It is not the purpose of this paper to support these theories, as the most important factors in my opinion were already listed above. They include overlapping many different issues, coming all together and psychological issues as the most crucial factor. Of course, I agree that governmental policies work as support factor, but I do not put all the focus on it, as it is additional, but not the unique one. Therefore, short review of government's activity and taken actions will be presented in this section.

Increasing home ownership was a goal of the Clinton and Bush administrations. There is evidence that the Federal government leaned on the mortgage industry, including Fannie Mae and Freddie Mac, to lower lending standards. Also, the U.S. Department of Housing and Urban Development's mortgage policies fueled the trend towards issuing risky loans. [50]

From 2002 to 2006 Fannie Mae and Freddie Mac combined purchases of subprime securities rose from \$38 billion to around \$175 billion per year before dropping to \$90 billion, thus fulfilling their government mandate to help make home buying more affordable. During this time, the total market for subprime securities rose from \$172 billion to nearly \$500 billion only to fall back down to \$450 billion. [51]

Central banks manage monetary policy and may target the rate of inflation. They have some authority over commercial banks and possibly other financial institutions. They are less concerned with avoiding asset price bubbles, such as the housing bubble and dot-com bubble. Central banks have generally chosen to react after such bubbles burst so as to minimize collateral damage to the economy, rather than trying to prevent or stop the bubble itself. This is because identifying an asset bubble and determining the proper monetary policy to deflate it are matters of debate among economists.

A contributing factor to the rise in house prices was the Federal Reserve's lowering of interest rates early in the decade. From 2000 to 2003, the Federal Reserve lowered the federal funds rate target from 6.5% to 1.0%. This was done to soften the effects of the collapse of the dot-com bubble and of the September 2001 terrorist attacks, and to combat the perceived risk of deflation.^[133] The Fed believed that interest rates could be lowered safely primarily because the rate of inflation was low; it disregarded other important factors. [52]

1.3.1 Economic stimulus

As a result of the subprime mortgage crisis, credit has tightened severely throughout the financial system. Consumer, commercial, mortgage, and other types of loans are all being closely scrutinized by banks. Banks are reluctant to lend to correspondent banks and hedge funds due to concerns about the asset quality of their portfolios. Lending to private equity firms has also declined as banks are no longer willing to finance leveraged buyouts. In response to the credit and liquidity crisis, the Federal Reserve has taken significant action to inject liquidity into the financial markets by directly increasing the amount of capital available to banks and securities dealers. These financial firms can draw on the available funds to make loans to or buy asset-backed securities from their customers. Since December 2007, the Federal Reserve has offered a total of US\$160 billion in short-term loans. In March 2008, the Federal Reserve announced it would supply US\$200 billion in liquidity to Wall Street bond dealers, which could be collateralized by mortgage-backed securities. This move was another attempt to increase liquidity by creating demand for mortgage-backed securities, which will hopefully raise the valuations of mortgage-backed securities and reduce the level of uncertainty in the markets. The Federal Reserve is trying to alleviate the growing concern that even top-quality agency paper is being affected by the credit market meltdown. [30]

The response of the USA Federal Reserve, the European Central Bank, and other central banks was immediate and dramatic. During the last quarter of 2008, these central banks purchased US\$2.5 trillion of government debt and troubled private assets from banks. This was the largest liquidity injection into the credit market, and the largest monetary policy action, in world history. The governments of European nations and the USA also raised the capital of their national banking systems by \$1.5 trillion, by purchasing newly issued preferred stock in their major banks. [35]

On 13 February 2008, President Bush signed into law a \$168 billion economic stimulus package, mainly taking the form of income tax rebate checks mailed directly to taxpayers. However, this rebate coincided with an unexpected jump in gasoline and food prices. This coincidence led some to wonder whether the stimulus package would have the intended effect, or whether consumers would simply spend their rebates to cover higher food and fuel prices. [53]

1.3.1.1 Housing and Economic Recovery Act of 2008

The Housing and Economic Recovery Act of 2008 was signed into law on July 30, 2008 and included six separate major acts intended to restore confidence in the American mortgage industry. The Act includes:

- ✓ Insures \$300 billion in mortgages, that will assist an estimated 400,000 borrowers;
- ✓ Creates a new Federal regulator to ensure the safe and sound operation of the Government sponsored enterprises (Fannie Mae and Freddie Mac) and Federal Home Loan Banks;

- ✓ Raises the ceiling on the dollar value of the mortgages the government sponsored enterprises may purchase;
- ✓ Lends money to mortgage bankers to help them refinance the mortgages of owner-occupants at risk of foreclosure. The lender reduces the amount of the mortgage (typically taking a significant loss), in exchange for sharing in any future appreciation in the selling price of the house via the Federal Housing Administration. The refinancing must have fixed payments for a term of 30 years;
- ✓ Requires that lenders disclose more information about the products they offer and the deals they close;
- ✓ Helps local governments buy and renovate foreclosed properties.

Critics have indicated this law was wholly ineffective, with fewer than 1,000 homeowners helped, due to a requirement that lenders voluntarily write down the mortgage principal amount.

1.3.1.2 American Recovery and Reinvestment Act of 2009

On 17 February 2009, U.S. President Barack Obama signed the American Recovery and Reinvestment Act of 2009, an around \$800 billion stimulus package with a broad spectrum of spending and tax cuts.

The Act of Congress was based largely on proposals made by President Obama and is intended to provide a stimulus to the U.S. economy in the wake of the economic downturn. The Act includes federal tax relief, expansion of unemployment benefits and other social welfare provisions, and domestic spending in education, health care, and infrastructure, including the energy sector and includes these main points:

- ✓ Save and create more than 3.5 million jobs over the next two years;
- ✓ Take a big step toward computerizing Americans' health records, reducing medical errors, and saving billions in health care costs;
- ✓ Revive the renewable energy industry and provide the capital over the next three years to eventually double domestic renewable energy capacity;
- ✓ Undertake the largest weatherization program in history by modernizing 75 percent of federal building space and more than one million homes;
- ✓ Increase college affordability for seven million students by funding the shortfall in Pell Grants, increasing the maximum award level by \$500, and providing a new higher education tax cut to nearly four million students;

- ✓ As part of the \$150 billion investment in new infrastructure, enact the largest increase in funding of our nation's roads, bridges, and mass transit systems since the creation of the national highway system in the 1950s;
- ✓ Provide an \$800 Making Work Pay tax credit for 129 million working households, and cut taxes for the families of millions of children through an expansion of the Child Tax Credit;
- ✓ Require unprecedented levels of transparency, oversight, and accountability. [54]

In conclusion, I would like to note that some government activities (like the attempt to motivate banks lending and make homes more affordable to people) created a favorable background for developing problematic issues. The most important steps taken by governmental institutions were presented in this section, they basically monetary injections to the economy not to let it slow down even more.

To summarize all the government actions as a response to mortgage crisis, I present the most important ones:

- ☐ Bailout (Buying some unwanted debts)
- ☐ Privatization of large investment corporation, e.g. Fannie Mae, Freddie Mac
- ☐ Encouraging consumption
- ☐ Reducing interest rates
- ☐ American Recovery and Reinvestment Act of 2009

1.3.2 Expectations of the crisis

It would be interesting to know what economists are saying about the expectations of current crisis. Therefore, I would like to present some points of view in this section.

I personally believe that only the strongest players will survive at the market, eliminating companies with illegal and directed to short-term profit activities.

For instance, not all banks have suffered from the subprime crisis. Those financial institutions with diversified earnings streams have fared much better than those focused on the real estate sector. For example, banks with a high percentage of commercial and industrial loans are still generating solid financial results. Commercial and industrial loans provide attractive diversification if the bank is lending into many different industries.

Many smaller banks see an opportunity to take market share from the large institutions that have curtailed lending dramatically to build up their weakened capital reserves. Some small- and mid-sized banks have plenty of cash available to lend for working capital and equipment, especially in certain sectors such as biotech, medical goods, agriculture, and export businesses. Banks with asset management, insurance, or other fee-generating operations are still producing good financial

results with limited downside risk. These institutions are well situated to exploit the weaknesses in the current financial system and will be looking to take full advantage of their strong financial positions relative to some of their peers.

In 2009 and 2010, healthy banks will have good opportunities to increase market share through reasonably priced acquisitions of distressed banks or thrifts. [47]

Francis Fukuyama has argued that the crisis represents the end of Reaganism in the financial sector, which was characterized by lighter regulation, pared-back government, and lower taxes. Significant financial sector regulatory changes are expected as a result of the crisis. [55]

Fareed Zakaria believes that the crisis may force Americans and their government to live within their means. Further, some of the best minds may be redeployed from financial engineering to more valuable business activities, or to science and technology. [56]

Roger Altman wrote that "the crash of 2008 has inflicted profound damage on financial system, its economy, and its standing in the world; the crisis is an important geopolitical setback...the crisis has coincided with historical forces that were already shifting the world's focus away from the United States. Over the medium term, the United States will have to operate from a smaller global platform, while others, especially China, will have a chance to rise faster." [57]

Basically, the current credit crisis will come to an end when the overhang of inventories of newly built homes is largely liquidated, and home price deflation comes to an end. That will stabilize the now-uncertain value of the home equity that acts as a buffer for all home mortgages, but most importantly for those held as collateral for residential mortgage-backed securities. Very large losses will, no doubt, be taken as a consequence of the crisis. But after a period of protracted adjustment, the U.S. economy, and the world economy more generally, will be able to get back to business.

In a growing economy, most companies seem to deliver healthy top line and bottom line results. In a buoyant market, most companies seem to create consistent increase in shareholder value. It does not seem to matter as much whether your company is a high performer, an average performer or a mediocre performer. But in a recessionary environment such as the current one, only the strongest and most efficient companies generate positive returns. In fact, in a recessionary environment, the stakes are even higher: *it is a matter of survival*. The good news is that those companies that do survive a recession as severe as the current one, will thrive when they come out of it. After all, at the other side of the current economic slowdown, there is likely to be fewer but stronger players in most markets. And fewer players would suggest each player is likely to enjoy greater market share and better margins than in the past.

It is crucially important to increase consumption and regain consumers' confidence. Losses in the stock markets and housing value declines place further downward pressure on consumer

spending, a key economic engine. The need to encourage people shopping became obvious. Lots of hopes were put on the new administration of U.S., as the current had lost all the credibility:

“Now is when we need a president who has the skill, the vision and the courage to cut through this cacophony, pull us together as one nation and inspire and enable us to do the one thing we can and must do right now:

Go shopping.”

[13]

1.4 Section summary

First of all, Mortgage crisis in U.S. and its huge impact on global economy was analyzed. The important task of this analysis was to describe reasons of such a dramatic event in global economy. As it goes without saying, the list is very long and different factors may be blamed in current situation.

During a period of strong global growth, growing capital flows, and prolonged stability earlier this decade, market participants sought higher yields without an adequate appreciation of the risks and failed to exercise proper due diligence. At the same time, weak underwriting standards, unsound risk management practices, increasingly complex and opaque financial products, and consequent excessive leverage combined to create vulnerabilities in the system. Policy-makers, regulators and supervisors, in some advanced countries, did not adequately appreciate and address the risks building up in financial markets, keep pace with financial innovation, or take into account the systemic ramifications of domestic regulatory actions.

Favorable government policies directed to reduced interest rates on mortgages, competitive pressures for several years prior to the crisis encouraged higher risk lending practices. Further, an increase in loan incentives such as easy initial terms and a long-term trend of rising housing prices had encouraged borrowers to assume difficult mortgages in the belief they would be able to quickly refinance at more favorable terms. Inappropriate and irresponsible lending (sub-prime lending) to customers with bad credit quality has led to increase in mortgage delinquency rates and cases of foreclosures. Another result of this issue was correction in house prices, as more credits were available in the market.

Strong demand caused by credit available has overpriced real estate products, while underestimating the underlying risk. Asset valuation is derived from both the collectability of mortgage payments (credit risk) and the existence of a viable market into which these assets can be sold (market risk), which are interrelated. Complex financial and structure models increased asset pricing risk.

Financial products called mortgage-backed securities, which derive their value from mortgage payments and housing prices, had enabled financial institutions and investors around the world to invest in the U.S. housing market. Major banks and financial institutions had borrowed and invested heavily in MBS and reported losses of more than US\$435 billion as of 17 July 2008. This is how the risk and slow down have widespread over other countries also. [6] High engagement into complex financial products as MBS was often caused by expectation of high revenues, but the risk was not evaluated in the proper way.

As the ratings of those securities dropped, the banks had to write off billions of dollars in asset values, seek out huge infusions of capital, and sharply reduce lending. The resulting credit crunch

has changed the policy landscape, creating pressure for interest rate cuts and giving rise to special lending facilities for liquidity-starved financial institutions. But risk can still be sliced and diced into discrete elements.

The liquidity and solvency concerns regarding key financial institutions drove central banks to take action to provide funds to banks to encourage lending to worthy borrowers and to restore faith in the commercial paper markets, which are integral to funding business operations. Governments also bailed out key financial institutions, assuming significant additional financial commitments.

The risks to the broader economy created by the housing market downturn and subsequent financial market crisis were primary factors in several decisions by central banks around the world to cut interest rates and governments to implement economic stimulus packages. These actions were designed to stimulate economic growth and inspire confidence in the financial markets.

Financial services companies continue to suffer from the deterioration of asset quality and pricing, which is forcing many banks to raise capital. The Federal Reserve has lowered the federal funds rate and expanded the amount of capital offered through auction in an effort to inject badly needed liquidity into the economy. However, the banks' lack of confidence and increased caution have severely tempered their appetite for risk. Until the bulk of the bad loans have worked their way through the banking system and prices begin to reflate, the U.S. bank and thrift industry will remain highly volatile. Banks with large exposure to real estate are expected to continue to struggle with asset quality and capital adequacy issues as real estate prices are expected to remain depressed. In order to preserve enterprise value, banks experiencing financial challenges may seek assistance in evaluating liquidity and transaction options.

Therefore, the basic conclusion that I can make is that transferring risk does not mean eliminating risk. The lesson here is not that the banks were wrong to take advantage of the markets but that even the largest and most liquid derivatives markets depend on the quality of the underlying assets. Other lessons from this crisis and weak points recognized are:

- ✓ *External credit rating for MBS is not perfect*
- ✓ *Simple loans eligibility criteria in existing MBS structure*
- ✓ *Credit scoring reflects the credit quality of the underlying loans based on past performance behavior only, it showed probability of the account going into default but make no assumption of the actual loss (as a result of collateral, recoveries, etc.)*
- ✓ *Lack of transparency in the current ABS valuation framework*
- ✓ *Key inputs and assumptions are often ignore or not verified*
- ✓ *Credit scoring can be incorporated into MBS valuation model and monitoring framework to better understand the risk of the underlying loans*

2. Practical part

In the theoretical part I was mainly analyzing U.S. data and market information. This is grounded by the fact that current financial crisis was initiated in U.S. by the mechanism described above. Therefore, it was strongly important to describe the roots and reasons of the current situation. However, it would be interesting to know what influence it had on Lithuanian market and local players and to present this influence in precise numbers, focusing on concrete examples. As the result, in the practical part of this paper I will essentially focus on Lithuanian market data, performing several kind of analysis.

First of all, it is rather important to know what were the number of credit loans provided to citizens in Lithuania, at what rate was it increasing and how it related with other macroeconomic data. Therefore, I am performing correlation and regression analysis between number of credit deals during the period and other factors, such as inflation rate, unemployment, GDP, number of new flats and buildings, average salary after taxes (netto) and flat price. I am going to make the conclusions on the results of the calculation and compare them to theoretical evidences from U.S. In this section macroeconomic influence and relations will be established.

In the next part of this section I am going to look deeper at the Lithuanian market and review some market players' information. This microeconomic analysis will allow me to realize how the global situation has affected local companies and what damage (if any) did it bring. As I am primarily interested in real estate and constructions sector, I have chosen "Panevėžio Statybos Trestas" ("PST") company for performing the calculations. This company was chosen for the reason it is the only listed company on Vilnius OMX market that is coming from the sectors of my interest. Listed companies are obligated to publish the audited reports and financial statements; therefore the information is rather available and reliable, which is very important for performing analysis.

I am going to review historical data of company's dividends, sales, costs and net profit, while also making forecast of them using the assumptions described below in this section. I will also concentrate on the stock price fluctuations of "PST", compare it to the whole market fluctuations and, to the end, forecast the "PST" stock price for the coming seven years. The area of my interest and the goal of this section is to find out in what time the market and, accordingly, the financial result of "PST" as the market representative, are going to stabilize and experience growth. Furthermore, to point out what the growth may be expected and will economic indicators be able to occupy their former positions in coming years.

The methodology for analysis will be presented before each sector prior of starting the calculation.

2.1 Market analysis

2.1.1 Methodology

2.1.1.1 Descriptive statistics

Descriptive statistics consists of a set of procedures that is used to tabulate or graph the general characteristics of a set of data and describe some specific characteristics of this set, such as measures of central tendency or measures of dispersion.

To analyze data I am using charts, tables and graphs. I suppose that visible pictures provide the reader with the best understanding of trends.

2.1.1.2 Correlation and regression analysis

Correlation analysis is group of statistical techniques used to measure the strength of the relationship (correlation) between two variables.

Correlation is the process when one event brings about another. Actually, the correlation analysis provide with the information of the *relationship* of the activities. I use it to prove, how one activity affects another and in what ways [strong/weak; positive/negative relationship].

The *positive correlation* is when the movement of one activity causes the movement of another in *the same direction*. And the *negative* brings the opposite effect-the activities are moving to the opposite directions.

To analyze how weak/strong and what kind of relationships' exist I calculate the specific ratio: the correlation coefficient [r]. The correlation coefficient can vary from -1 to 1 and when the coefficient is close to -1 or 1 the relationship of analyzed activities is strong. But in case the coefficient is close to 0 the relationship is weak. It means that the change in one activity does not expose a high change in another activity. The change could occur due to a lot of other external factors. However, it does not mean that variables are little dependable they just can be dependable not linearly. Moreover, when the coefficient is negative, there is a negative relationship and when it is greater than 0, the relationship is positive.

The formula for calculating correlation coefficient is resented below:

$$r = \frac{n(\Sigma Y) - (\Sigma X)(\Sigma Y)}{\sqrt{[n(\Sigma X^2) - (\Sigma X)^2][n(\Sigma Y^2) - (\Sigma Y)^2]}} \quad (1)$$

2.1.1.3 Simple regression analysis

I need to develop an equation to express the relationship between two variables and estimate the value of the dependent variable Y based on a selected value of the independent variable X. The technique used to make these predictions is called **regression analysis**. A mathematical equation that defines the relationship between two variables is called **regression equation**. Regression line is determined by using a mathematical method called the **least squares principle**. This method gives

what is commonly referred to as the “best-fitting” straight line. It minimizes the sum of squares of the vertical deviations about the line.

The general form of simple regression equation is:

$$Y' = a + bX \quad (2)$$

where

a is the Y-intercept. It is the estimated value of Y when X = 0. Another way to put it is: **a** is the estimated value of Y where the regression line crosses the y-axis is zero.

b is the slope of the line, or the average change in Y' for each change of one unit [either increase or decrease] in the independent variable X.

The values a and b are called regression coefficients:

$$b = \frac{n(\sum XY) - (\sum X)(\sum Y)}{n(\sum X^2) - (\sum X)^2} \quad (3)$$

$$a = \frac{\sum Y}{n} - b \frac{\sum X}{n} \quad \text{or} \quad \bar{Y} - b\bar{X} \quad (4)$$

where:

X is a variable of independent variable;

Y is a value of dependent variable;

n is the number of items in the sample

$\bar{X}$ is the mean of independent variable

$\bar{Y}$ is the mean of the dependent variable.

According to scatter diagram all of the points do not lie on the regression line. What is needed, then, is to calculate standard error of estimate. **Standard error of estimate** measures the scatter, or dispersion, of the observed values around the line of regression.

$$S_e = \sqrt{\frac{\sum Y_i^2 - a\sum Y_i - b\sum X_i Y_i}{n - 2}} \quad (5)$$

The standard error of estimate S_e is one measure of how close the observed data lie to the estimated sample regression line. If S_e is small then we assume that our data is close to estimated line and we should have confidence in predictions made from the model. On the other hand, if S_e is large, then Y has much variation that has not been explained by X, and therefore we should pay little confidence in the model.

2.1.1.4 Multiple regression analysis

Multiple regression assumes that the expected value of the dependent variable is linear function of more than one independent variable. As in the case of simple regression [where there is only one independent variable], the method of least square can be used to obtain most efficient linear unbiased estimates of the parameters, or constants, of this linear relationship. In addition, it is possible to construct confidence intervals for these parameters. The multiple coefficient of determination or the multiple correlation coefficient is used to measure how well the estimated multiple regression fits the data.

The line $\hat{Y} = a_0 + a_1x_1 + a_2x_2 + \dots + a_kx_k$ is called **multiple regression line**. (6)

$a_0, a_1, a_2, \dots, a_k$ are unknown coefficients, that should be calculated.

I also calculate the significant of this coefficient. I use Ordinary Least Square method to receive similar table as in simple regression model.

2.1.2 Calculation

In my analysis I will find out the relationship between Credit deals during the period in litas (Y) and these factors:

X1 – Inflation rate, %

X2 – Unemployment rate, %

X3 – GDP, mln LTL

X4 – Number of new flats

X5 – Number of new buildings

X6 – Netto salary, LTL

X7 – Average flat price, LTL/m²

Table 1: Data for correlation and regression analysis

[Department of statistics, The Bank of Lithuania and State Enterprise Center of Register]

Lithuania	Y	X1	X2	X3	X4	X5	X6	X7
2004 Q1	-	-1.2	13	13524.311	1094	581	833	2600
2004 Q2	371.5	0.5	11.3	15478.355	1492	780	882	2700
2004 Q3	405.9	2.4	10.6	16365.04	1484	660	907	3000
2004 Q4	455.5	3	10.6	17330.143	2734	915	939	3100
2005 Q1	452.9	3.2	10.2	15057.675	1380	577	913	3400
2005 Q2	673.9	2.4	8.5	17736.007	1077	704	952	4100
2005 Q3	885.3	2.2	7.2	19145.614	1279	599	983	4400
2005 Q4	975	2.9	7.1	20121.067	2197	844	1030	5000
2006 Q1	870.1	3.3	6.4	17335.285	893	509	1019	5500
2006 Q2	945.2	3.6	5.6	20250.705	1823	683	1072	5400
2006 Q3	1062.2	3.9	5.7	22205.947	2040	676	1239	5300
2006 Q4	1167.5	4.2	4.8	23000.864	2536	953	1294	5300
2007 Q1	1298.5	4.3	5	20222.904	2279	756	1307	5350
2007 Q2	1712	4.8	4.1	24384.836	1815	774	1369	5350
2007 Q3	1879.7	5.9	3.9	26195.071	2436	799	1455	6400
2007 Q4	1505.8	7.8	4.2	27335.913	2756	975	1527	6500
2008 Q1	1031.9	10.6	4.9	24461.046	3200	878	1651	6600
2008 Q2	1325.4	12.1	4.5	28604.244	2653	966	1713	6800
2008 Q3	1142.6	11.7	5.9	29854.577	2457	928	1773	6600
2008 Q4	634	9.3	7.9	28578.811	3519	1255	1773	6000

2.1.2.1 Correlation analysis

In my correlation analysis I strive to determine the relationship between Y and X-es.

First of all I calculate the correlation coefficient. The result of calculation is:

r1	r2	r3	r4	r5	r6	r7
0.43	-0.92	0.67	0.3	0.17	0.58	0.76

By the empirical evidence the next step would be calculating the *SIGNIFICANCE* of ratios, the t-statistics is needed and for every X may be calculated by the formula:

$$t = r \sqrt{\frac{n-2}{1-r^2}} \quad (7)$$

This value I am comparing with tabulated t-statistics with a meaning 2.23 to determine what coefficients are significant.

t1	t2	t3	t4	t5	t6	t7
1.95	-9.74	3.70	1.29	0.71	2.92	4.77

If $t^{\text{calculated}} > t^{\text{tabular}}$, so the coefficient are significant. As a result of calculation, coefficients t1, t4 and t5 may be excluded from the analysis. Other factors are important for analysis and I will proceed with the calculation.

In the table below you may find what coefficients did and did not [red color] pass the significance test:

y	credit deals during the period
x1	<i>inflation rate</i>
x2	<i>unemployment rate</i>
x3	<i>gdp</i>
x4	<i>number of new flats</i>
x5	<i>number of new buildings</i>
x6	<i>netto salary</i>
x7	<i>average flat price</i>

2.1.2.2 Simple regression analysis

By the formulas presented above I am calculating slope and intercept coefficients:

	X2	X3	X6	X7
Slope:	-163.98	0.06	0.79	0.25
	X2	X3	X6	X7
Intercept:	2097.37	-336.78	-1.83	-290.12

And so, the regression equations are:

$$Y2 = 2097.37 - 163.98X2$$

$$Y3 = -336.78 + 0.06X3$$

$$Y6 = -1.83 + 0.79X6$$

$$Y7 = -290.12 + 0.25X7$$

Relationships between Y and discussed factors are depicted in the graphs below.

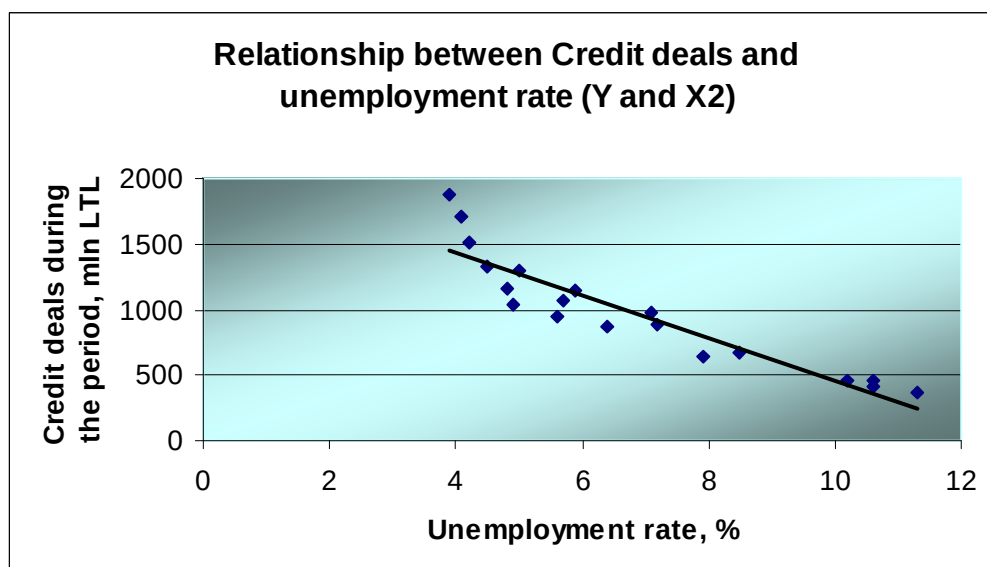


Figure 2: Relationship between credit deals and unemployment rate
[Prepared by author]

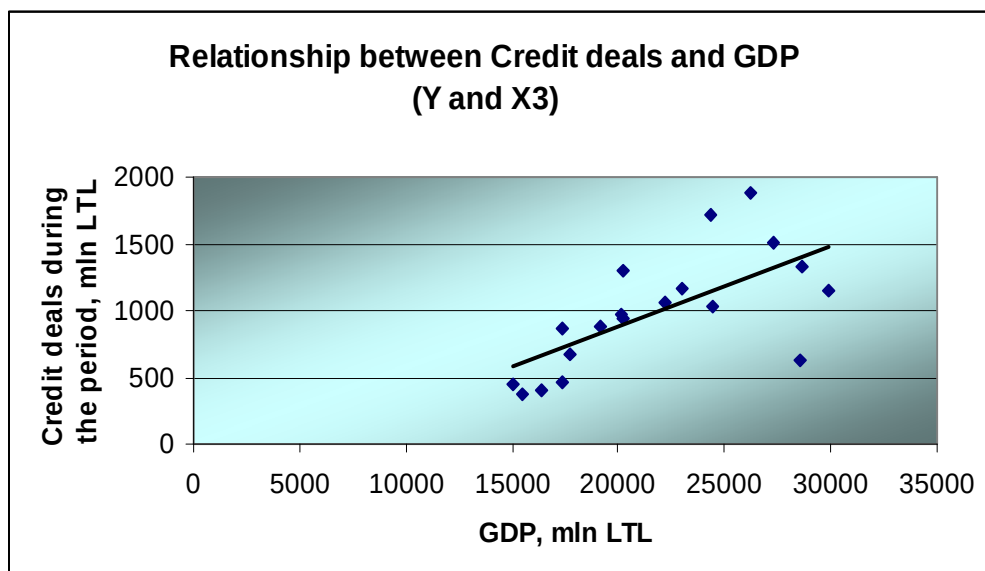


Figure 3: Relationship between credit deals and GDP

[Prepared by author]

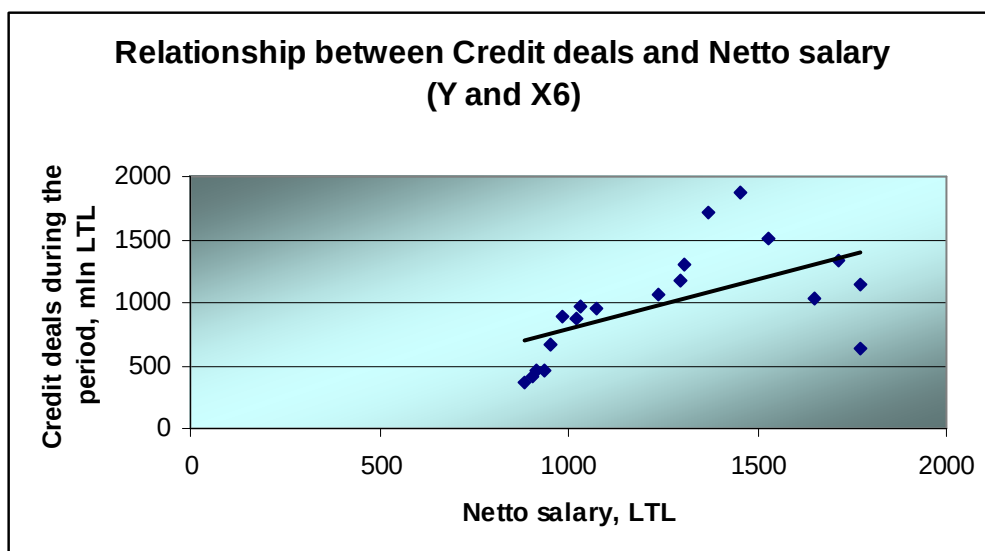


Figure 4: Relationship between credit deals and Netto salary

[Prepared by author]

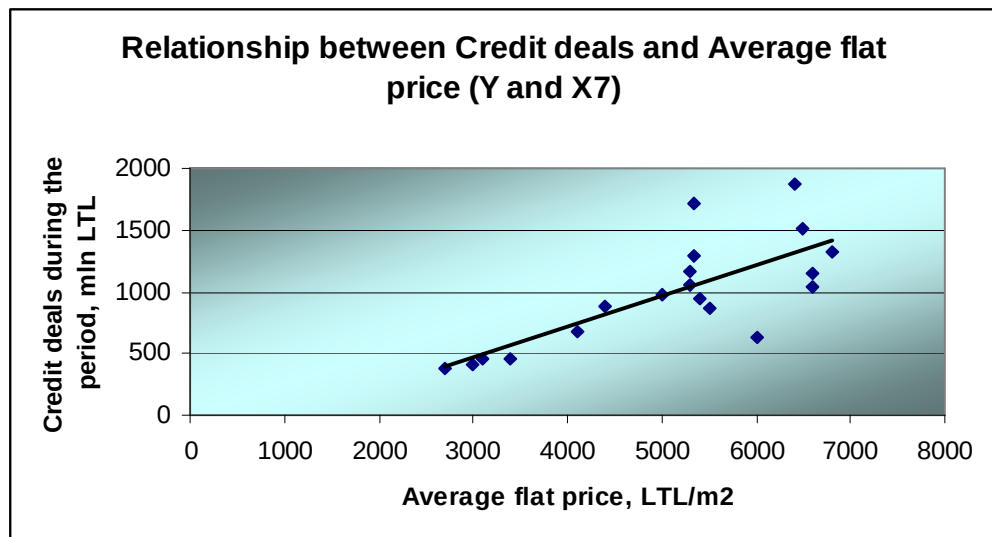


Figure 5: Relationship between credit deals and average flat price

[Prepared by author]

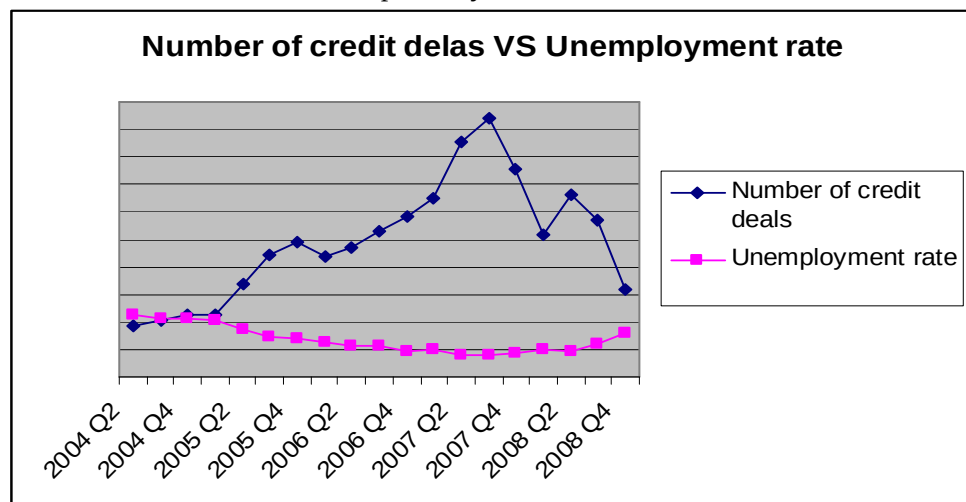


Figure 6: Number of credit deals VS unemployment rate

[Prepared by author]

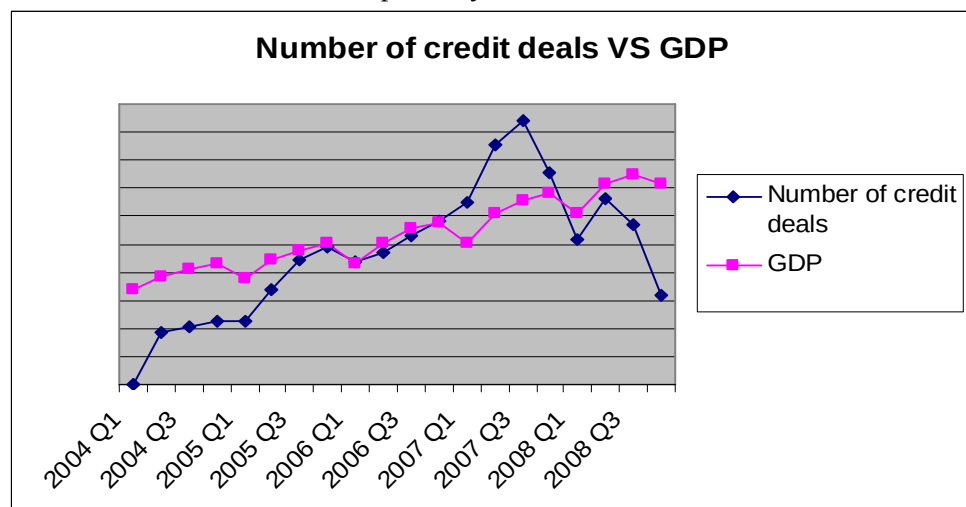


Figure 7: Number of credit deals VS GDP

[Prepared by author]

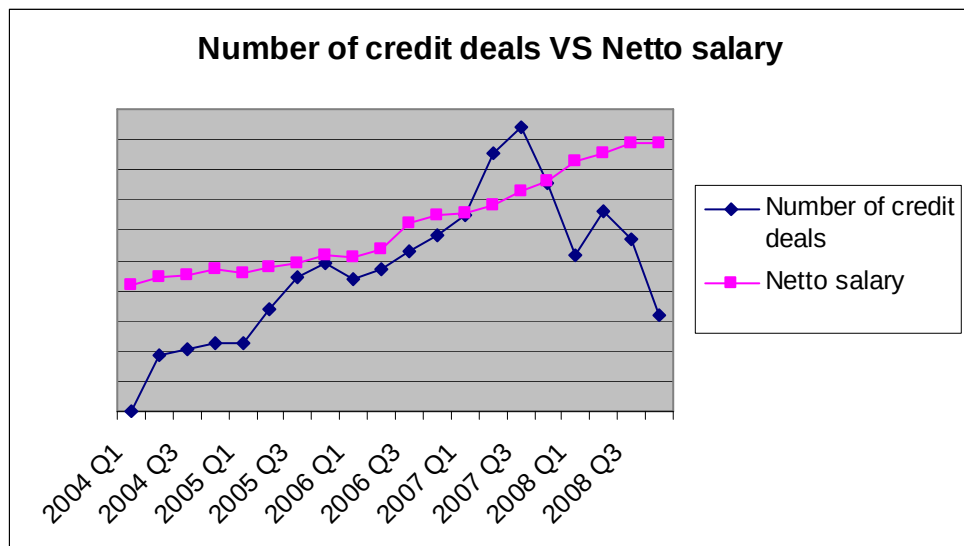


Figure 8: Number of credit deals VS Netto salary

[Prepared by author]

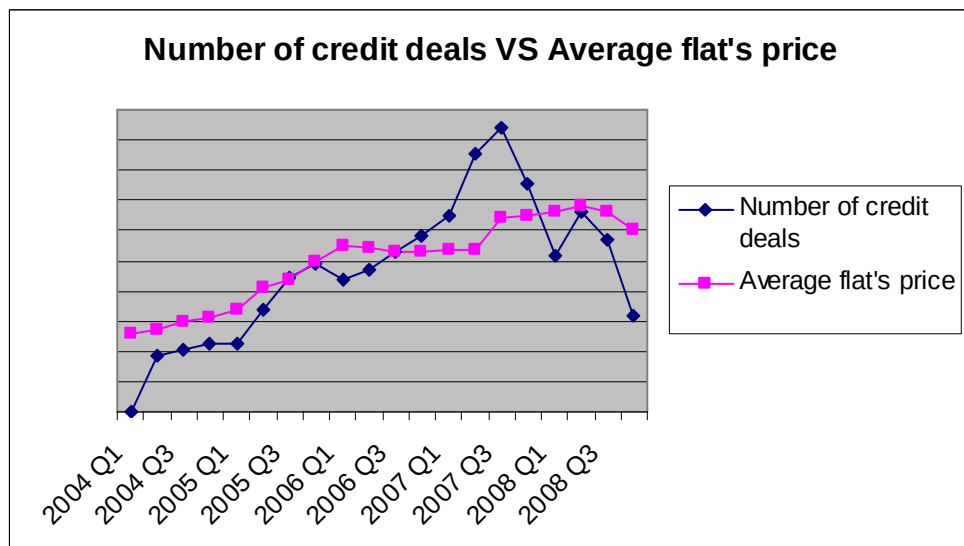


Figure 9: Number of credit deals VS average flat price

[Prepared by author]

2.1.2.3 Multiple regression analysis

Multiple regression and correlation analysis examines how affect two or more independent variables the dependent variable.

a0	a2	a3	a6	a7
2811.54	-219.78	0.05	-0.30	-0.22

Then we substitute these coefficients into multiple regression equation:

$$Y=2811.54-219.78X_2+0.05X_3-0.3X_6-0.22X_7 \quad (8)$$

Later the comparison of F_{tabular} is performed. If $F > F_{\text{tabular}}$, then the regression equation is adequate to the real situation.

F is calculated according to the formula:

$$F = \frac{S_y^2}{S_{residual}^2} = \frac{\sum \left(\hat{y} - \bar{y} \right)^2}{\frac{1}{n-2} \sum (y - \hat{y})^2} \quad (9)$$

$$F = 154,16$$

$F_{tabular}$ is equal to 4,07

$F > F_{tabular}$, this means, that this regression equation is adequate to the real situation and could be applied in practice.

Coefficient of multiple determination R^2 measures the proportion of the variation in the dependent variable, that is explained by the independent variables. $0 \leq R^2 \leq 1$. Values of R^2 near 1 indicate that the sample data tend to lie near the estimated regression equation [independent variables have accounted for most of the variation in Y], whereas values of R^2 close to 0 indicate that a large proportion of the variation in Y has been unexplained.

$$\text{According to formula } R = \sqrt{\frac{S_{\hat{Y}}^2 - S_{residual}^2}{S_{\hat{Y}}^2}} \quad (10)$$

I calculated coefficient of multiple determination and get $\hat{R}^2 = 0,9935$. This shows the combined effect of four independent variables and indicates that 99,35% of credit deals during the period is explained by the inflation rate (X_2), GDP (X_3), Average Netto salary (X_6) and Average flat price (X_7).

2.2 “Panevėžio Statybos Trestas” analysis

After analyzing market data, I would like to go deeper and describe the situation of one market player – „Panevėžio Statybos Trestas“. The company operates in real estate and construction market and is the only Lithuanian company from this sector listed on OMX stock exchange. The company was chosen according the reason that all necessary information for my calculations is available and published.

The basic goal of this sector is to analyze how the global situation influenced this precise company and to forecast its financial indicators for next coming years. The final objective is to present the forecast of “PST” stock price and demonstrate how the market conditions reflect the price value.

To calculate the future price of “PST” stock I will use Dividends Discount Model [DDM]. Starting from 2006 “PST” is paying Dividends to the shareholders, therefore I assume that dividends will be constantly paid in future years also. In 2008 company started to prepare the general dividends policy, which relates the payout of dividends directly to the sales of company. As a result, I am using this assumption in order to predict Dividends payment in future years. To do this, I need to make a forecast of company’s Sales for the coming years, so that I would be able to relate dividends payout with the sales.

First of all I apply econometrics models for Sales forecast, which are based on historical data. However, I believe that in current situation it is not enough to rely just on historical analysis; that is why I am going to use another way for predicting company’s sales. As a market player, “PST” should reflect market situation in its financial indicators. Therefore, I may assume that sales of the company would increase meanwhile the whole market experiences growth and vice versa. Taking the Lithuanian GDP forecast from Euro commission and relating it to sales by regression analysis I am preparing sales forecast for the coming seven years.

To the end, I am using Capital Asset Pricing Model (CAPM) to calculate the Required Rate of Return (RRR) on “PST” stock. This rate of return I am using in Dividends discount model for calculating stock future prices and making conclusions.

2.2.1 Methodology

2.2.1.1 Forecasting

One of the main reasons for studying a time series is to make forecasts of future values of the series. Forecasting techniques are many and varied and the choice of method often depends on if the series has a trend or seasonal effect or both. The usual way to display a time series is with time on the horizontal axis of a graph and the data on the vertical axis. This is called a time series plot. If the general level of the series increases or decreases, we say that there is a trend in the series. Trends may be upwards or downwards. If the time series has a seasonal pattern – high in winters, low in summers [or vice verse], which is roughly repeated every year, we say that this series has a seasonal effect. There are two types of time series: Stationary and Non-stationary time series. To calculate forecast for Stationary time series I use Exponential-forecasting model and Moving average forecast model. For Non-stationary data, I use Trend model.

2.2.1.1.1 Moving Average Method

Moving average method is used for calculating stationary time series forecast. Using this method, I calculate past time series meanings average. In practice, moving average is calculated using this formula:

$$F_{t+1} = \frac{1}{n} \sum_{i=(t-n+1)}^t A_i \quad (11)$$

where

t = period number for the current period;

F_{t+1} = forecast of inflation rate for the next period;

A_i = actual inflation rate in period

n = number of periods to be included in the moving average.

3.2.1.1.2 Exponential smoothing

This is one of the simplest methods of forecasting but it is only appropriate for series with no trend or seasonal effect. The advantage of exponential forecasting is that the calculations are simple and can be used to forecast for many hundreds of different values without the need for complicated software.

Single exponential smoothing models require three items of data:

- The most recent forecast
- The most recent actual
- A smoothing constant

The smoothing constant $[\alpha]$ determines the weights given to the most recent past observations and, therefore, controls the rate of smoothing or averaging. The constant's value must be between zero and one.

The equation for the exponential smoothing model is:

$$F_{t+1} = \alpha A_t + [1 - \alpha] F_t \quad (12)$$

where

α – smoothing constant that must be between 0 and 1;

F_t – exponential forecast for period t ;

A_t – actual inflation rate in period t .

2.2.1.1.3 Trend model

The trend component of time series reflects the effects of any long-term factors on the series. Analysis of trend involves searching for an equation that will suitably describe trend. The equation we will use to forecast the trend into the future is regression equation given below:

$$T_t = a + bt \quad (13)$$

where

T_t = trend forecast value of inflation rate y for period number t

a = estimate of y -axis intercept

b = estimate of slope of the demand line

t = number of period

To determine a and b I use formulas

$$b = \frac{\sum XY - n\bar{X}\bar{Y}}{\sum X^2 - n\bar{X}^2} \quad (14)$$

$$a = \bar{Y} - b\bar{X} \quad (15)$$

Usually when we calculate a forecast, it should be as more exact and more closely to actual data. Therefore, I calculate these coefficients to measure the error of forecast:

$$\mathbf{1. Forecast error} \quad e_t = x_t - f_t = x_t - m_{t-1} \quad (15)$$

$$\mathbf{2. MSE (Mean Square Error)} \quad MSE = \frac{1}{n} \sum_{t=1}^n e_t^2 \quad (16)$$

I would expect a good forecasting procedure to result in small errors and a bad forecasting procedure to give large errors. In therefore seems sensible to use criterion based on the errors, to compare different forecasting methods.

2.2.1.2 Capital Asset Pricing Model

Expected returns are described by Capital Asset Pricing Model (CAPM), developed by William Sharpe in 1964, who shared in the Nobel Prize for Economics for his work. Therefore, I introduce CAPM in order to clarify the basic assumptions of this model.

Jagannathan and McGrattan use CAPM to explain the differences in risk premium across assets [23]. It is a single factor model – with beta as that single factor which measures sensitivity to systematic risk of a security.

CAPM is applied for pricing of risky assets. It illustrates the connection between risk and expected return. CAPM also provides an appropriate discount rate for the future cash flows of an asset. The less risky the asset, the higher the present value of its future cash flows. The model's single determining factor is beta, as the risk-free rate and market risk premium are naturally the same for all securities.

In case a security cannot generate the required rate of return for a given level of risk, it is thought of as a bad investment according to CAPM. On the other hand, if a security surpasses the required rate of return, it is thought of as a fine investment according to CAPM. On average in the long run all securities are expected to theoretically earn returns predicted by the model.

CAPM operates under the certain set of assumptions [22]:

- It is a one period model;
- Investors have homogenous expectations about asset returns, i.e. everyone have the same information at the same time and evaluate it accordingly;
- Asset returns are distributed by the normal distribution;
- There exists a risk free asset and investors may borrow or lend unlimited amounts of this asset at a constant rate – the risk free rate;
- There are a definite number of assets and their quantities are fixed within the one period world;
- Asset markets are frictionless and information is costless and simultaneously available to all investors. Implication: the borrowing rate equals the lending rate;
- There are no market imperfections such as taxes, regulations, or restrictions on short selling.

The mathematical interpretation of the model is:

$$\mathbf{RRR = RFR + \beta (K_m - RFR)} \quad (17)$$

Where:

RRR – Required Rate of Return on the risky asset

β – Volatility of the stock compared to market volatility

RFR – Risk Free Rate

K_m – Expected return on the market

2.2.1.3 Dividend Discount Model

Dividend Discount Model (DDM) is a traditional stock valuation model. Stock present value calculation is made basing on future values that it will provide – dividends and final stock price. The discount rate is used to perform the calculation.

The value of stock is the present value of its expected dividends plus the present value of the expected share price at some point in future. The formula is presented below:

$$\mathbf{Stock\ Intrinsic\ Value = D_1/[1+k]^1 + D_2/[1+k]^2 + D_3/[1+k]^3 + \dots D_n/[1+k]^n + P/[1+k]^n} \quad (18)$$

Where:

P = Selling Price of Stock

D = Annual Dividend Payment

k = RRR

n = Number of Years until Stock is Sold

2.2.2 “*Panevėžio Statybos Trestas*” Sales forecast by Traditional methods

In this section I will apply econometrical models to make a forecast of “PST” Sales. I will use 3 different methods and compare the results, choosing one with the smallest error term. I will also use Cost and Net profit historical data of the company to compare of forecast methods suitability to the company.

2.2.2.1 Moving average method

A moving average forecast uses a number of the most recent actual data values in generating forecast. I make forecast using **two-period** moving average.

Actual and forecasted data is provided in the table, as well as Error and Mean Squared Error terms calculated by formulas provided above.

Table 2: Forecast by Moving Average method

[Prepared by author]

	Sales	Cost	Net profit	Sales Forecast	Cost Forecast	Net profit forecast
2002	93435484	-85468744	70413			
2003	136358888	-124167647	779658			
2004	157628440	-136723654	2616758	114897186	-104818195.5	425035.5
2005	191589890	-159557572	8465738	146993664	-130445650.5	1698208
2006	339512297	-296836915	13474753	174609165	-148140613	5541248
2007	516975858	-445027091	30530632	265551093.5	-228197243.5	10970245.5
2008	586086434	-485421845	24183631	428244077.5	-370932003	22002692.5
	(Sales)	Error (Cost)	Error (Net profit)	Sq. error (Sales)	Sq. error (Cost)	Sq. error (Net profit)
	-	-	-	-	-	-
	-	-	-	-	-	-
	42731254	-31905458.5	2191722.5	1825960068412520.00	1017958282095220.00	4803647517006.25
	44596226	-29111921.5	6767530	1988823373443080.00	847503973422162.00	45799462300900.00
	164903132	-148696302	7933505	27193042943409400.00	22110590228475200.00	62940501585025.00
	251424765	-216829848	19560386.5	63214412203880500.00	47015182766873300.00	382608720029382.00
	157842357	-114489842	2180938.5	24914209505473100.00	13107923921185000.00	4756492740782.25
			SUM=	119136448094619000.00	84099159172050800.00	500908824173096.00
			MSE=	2.38273E+16	1.68198E+16	1.00182E+14

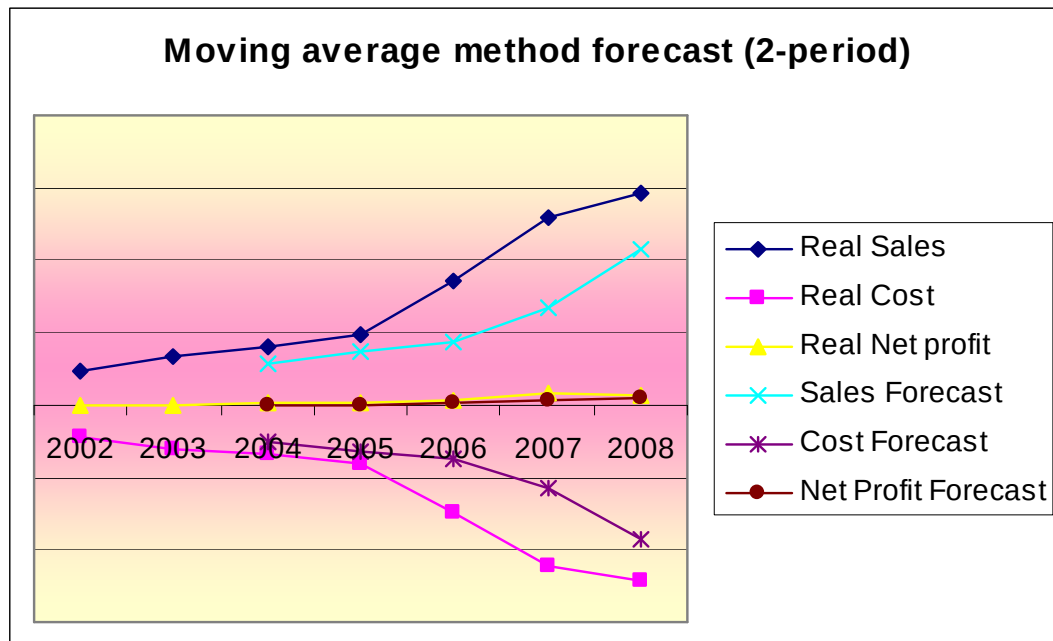


Figure 10: Moving average method forecast (2-period)

[Prepared by author]

2.2.2.2 Exponential smoothing method

As described above I am going to apply the second method for company's data forecast. I will use α coefficient equal to 0.2 in this case. The results of forecasting by using exponential smoothing method are provided in the table below.

Table 3: Forecast by Exponential smoothing method ($\alpha=0.2$)

[Prepared by author]

	Sales	Cost	Net profit	Sales Forecast $\alpha=0.2$	Cost Forecast $\alpha=0.2$	Net profit Forecast $\alpha=0.2$
2002	93435484	85468744	70413	93435484	85468744	70413
2003	136358888	-124167647	779658	93435484	85468744	70413
2004	157628440	-136723654	2616758	102020164.8	43541465.8	212262
2005	191589890	-159557572	8465738	113141819.8	7488441.84	693161.2
2006	339512297	-296836915	13474753	128831433.9	-25920760.93	2247676.56
2007	516975858	-445027091	30530632	170967606.5	-80103991.74	4493091.848
2008	586086434	-485421845	24183631	240169256.8	-153088611.6	9700599.878
	Error (Sales)	Error (Cost)	Error (Net profit)	Sq. error (Sales)	Sq. error (Cost)	Sq. error (Net profit)
	0	0	0	0.00	0.00	0.00
	42923404	-209636391	709245	1842418610947220.00	43947416431504900.00	503028470025.00
	55608275.2	-180265120	2404496	3092280270718930.00	32495513416508400.00	5781601014016.00
	78448070.2	-167046014	7772576.8	6154099711828280.00	27904370739833500.00	60412950111898.20
	210680863	-270916154	11227076.44	44386426088359100.00	73395562537163700.00	126047245389603.00
	346008252	-364923099	26037540.15	119721710107748000.00	133168868371772000.00	677953497167012.00
	345917177	-332333233	14483031.12	119658693483344000.00	110445378026140000.00	209758190469234.00
			SUM=	294855628272946000.00	421357109522923000.00	1080456512621790.00
			MSE=	4.91426E+16	7.02262E+16	1.80076E+14

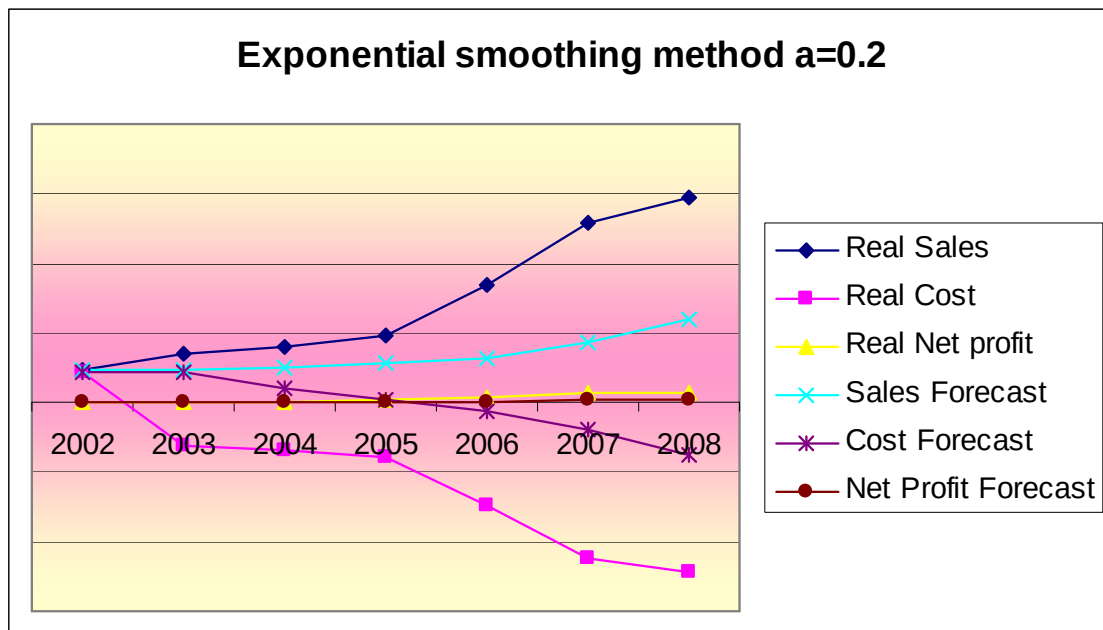


Figure 11: Exponential smoothing method forecast ($\alpha=0.2$)

[Prepared by author]

2.2.2.3 Trend method

Table 4: Forecast by Trend method

[Prepared by author]

	Sales	Cost	Net profit		
slope	86466808.82	-89803711.29	5096414.179		
intercept	-173077153502.54	179833260273.57	-10206864487.61		
	Trend	Trend	Trend		
2002	29397757.96	46230279.57	-3843302.107		
2003	115864566.8	-43573431.71	1253112.071		
2004	202331375.6	-133377143	6349526.25		
2005	288798184.4	-223180854.3	11445940.43		
2006	375264993.3	-312984565.6	16542354.61		
2007	461731802.1	-402788276.9	21638768.79		
2008	548198610.9	-492591988.1	26735182.96		
2009	634665419.7	-582395699.4	31831597.14		
2010	721132228.5	-672199410.7	36928011.32		
2011	807599037.4	-762003122	42024425.5		
2012	894065846.2	-851806833.3	47120839.68		
2013	980532655	-941610544.6	52217253.86		
2014	1066999464	-1031414256	57313668.04		
2015	1153466273	-1121217967	62410082.21		
Error (Sales)	Error (Cost)	Error (Net profit)	Sq. error (Sales)	Sq. error (Cost)	Sq. error (Net profit)
64037726.04	39238464.43	3913715.107	4100830355824080.00	1539657090711240.00	15317165939867.60
20494321.21	-80594215.29	-473454.0714	420017202034679.00	6495427537523580.00	224158757752.03
-44702935.61	-3346511	-3732768.25	1998352451896750.00	11199135873325.30	13933558808208.10
-97208294.43	63623282.29	-2980202.429	9449452505709290.00	4047922048806580.00	8881606515264.66
-35752696.25	16147650.57	-3067601.607	1278255289144760.00	260746618976394.00	9410179620148.78
55244055.93	-42238814.14	8891863.214	3051905715437680.00	1784117420197040.00	79065231421552.90
37887823.11	7170143.143	-2551551.964	1435487139798480.00	51410952688998.80	6510417426455.85
		SUM=	21734300659845700.00	14190480804777100.00	133342318489250.00
		MSE=	3.1049E+15	2.02721E+15	1.90489E+13

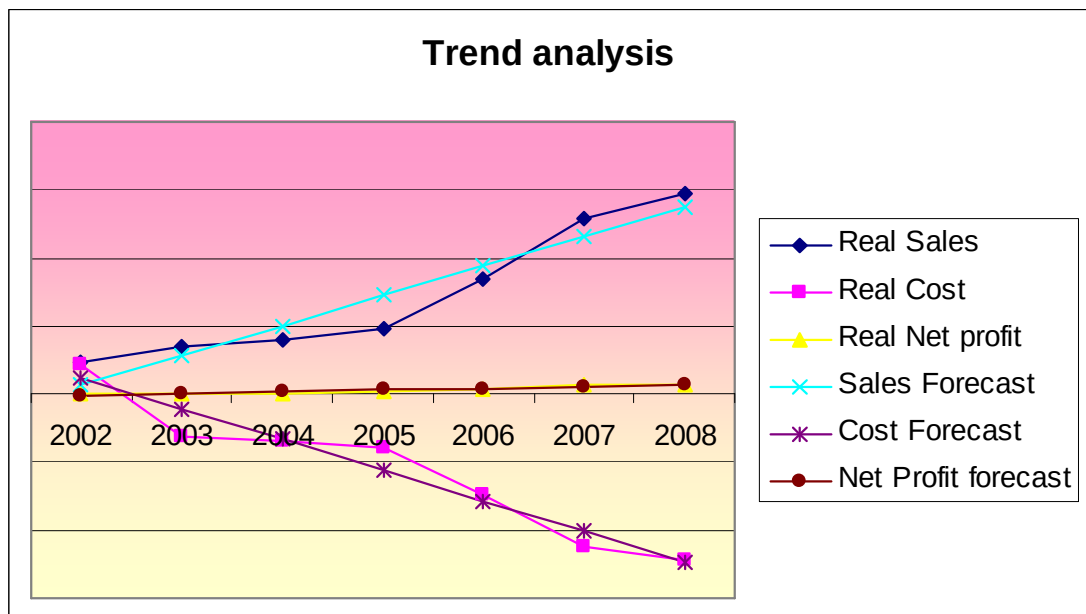


Figure 12: Trend analysis forecast

[Prepared by author]

2.2.2.4 Comparing forecast methods

To analyze data I used three different methods. Now I am going to compare all three methods using the MSE error term. The ration is presented in the table below.

Table 5: Mean squared error comparison

[Prepared by author]

	<i>Sales</i>	<i>Cost</i>	<i>Net profit</i>
Moving average (2-period)	2382.73E+13	1681.98E+13	10.02E+13
Exponential smoothing (a=0.2)	4914.26E+13	7022.62E+13	18.01E+13
Trend analysis	310.49E+13	202.72E+13	1.91E+13

As described in the methodology, I am interested in the smallest error of forecast.

From the calculations performed the obvious “winner” is trend forecast method, as its MSE is smallest for all the variables. Therefore, if basing on mathematical assumptions, I should proceed my forecast with Trend method.

In the graph below Trend analysis is used for making Sales, Cost and Net profit projection for the next seven years.

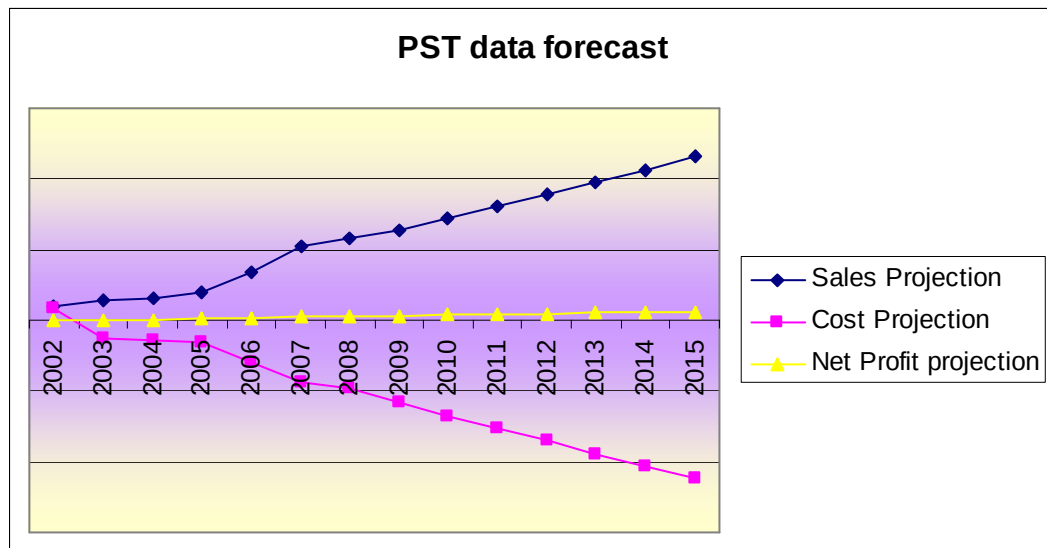


Figure 13: "PST" data forecast

[Prepared by author]

2.2.3 “Panevėžio Statybos Trestas” Sales forecast by GDP

In the section above I tested the traditional econometrics forecast models, choosing Trend method as the most suitable for given data having the smallest error term. However, I believe that it is not enough to look at historical information at the current market conditions. The economy was growing last years, therefore, sales of the company have also been increasing.

As it is depicted in the graph above, using the Trend forecast sales of “PST” would continue growing during the coming years, as they did in the past. However, current economic conditions have changed a lot, GDP experiences slow down, enterprises cut their cost, and the overall demand is reduced. That is why it is hardly possible that the assumption of Trend forecast may be valid in this case.

Therefore, after demonstrating what could be the forecast in case economy would still be growing, I am focusing on the real market situation, pointing out another development of financial indicators.

I am using the general assumption that market players go along with the market data. The most objective market growth indicator is GDP. I suppose that when GDP experiences growth, separate players may also improve their financial data and vice versa. As a result, I am going to make Sales forecast using the GDP forecast for the coming years. I believe this forecast would be more adequate to the real situation in comparison with the one proposed by Trend line.

2.2.3.1 GDP forecast

As it is already visible and known, Lithuanian GDP is currently experiencing slow down. According to Euro commission Lithuanian GDP forecast, it would fall by 11% in 2009 and by 5% more in 2010. [11]

Further, I use the cyclical assumption of economics. As there is a fall, there will also be a raise and the raise will account for the same index as before the decrease. This is an empirical evidences and it may be easily noticed for instance, in the U.S. data timeline provided above. After the drop of indicator it stabilizes during the same time and reaches the same point as before the drop.

It means that if GDP value is forecasted to decrease during the coming two years [11], it is also supposed to increase during two years after drop and reaching the same level as in 2008. Using this assumption, I am taking Euro commission GDP forecast for 2009 and 2010, saying also that GDP in 2011 will equal GDP in 2009, while GDP in 2012 will equal GDP in 2008.

After demonstrating GDP fall and recovery from 2008 till 2012, I use the Trend analysis to forecast further GDP growth, e.g. considering that trend line before 2008 should be continued from

2012. To do this, I apply the same slope coefficient as in the regression line from 2004 till 2008.

The calculations are presented below. It would be optimistic GDP forecast after recovery. Furthermore, I use another way to depict GDP after 2012, which is described below. The method is based on assumption that GDP will not be able to grow with the same speed as it used before the crisis.

Table 6: GDP historical data quarterly

[Prepared by author]

	GDP, mln LTL
2004 Q1	13524.311
2004 Q2	15478.355
2004 Q3	16365.04
2004 Q4	17330.143
2005 Q1	15057.675
2005 Q2	17736.007
2005 Q3	19145.614
2005 Q4	20121.067
2006 Q1	17335.285
2006 Q2	20250.705
2006 Q3	22205.947
2006 Q4	23000.864
2007 Q1	20222.904
2007 Q2	24384.836
2007 Q3	26195.071
2007 Q4	27335.913
2008 Q1	24461.046
2008 Q2	28604.244
2008 Q3	29854.577
2008 Q4	28578.811
2009 Q1	20980.98

The data is depicted in the graph below.

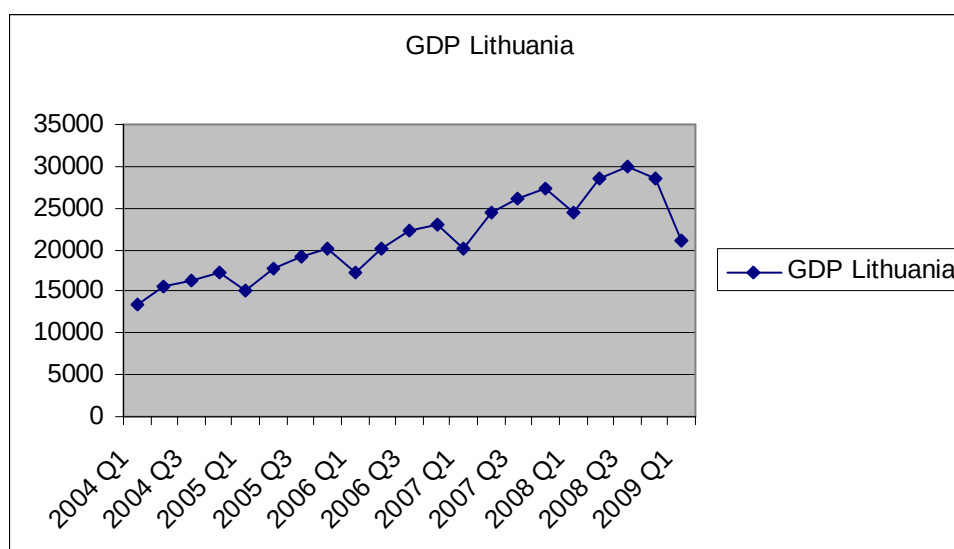


Figure 14: GDP historical data

[Data source: Department of Statistics]

Using the assumptions described above and Euro commission GDP forecast its number from 2009 till 2012 will be:

GDP forecast till 2012, mln LTL	
2009	99234.11
2010	94272.41
2011	99234.11
2012	111498.7

Graphically, this slow down and recovery are depicted below.

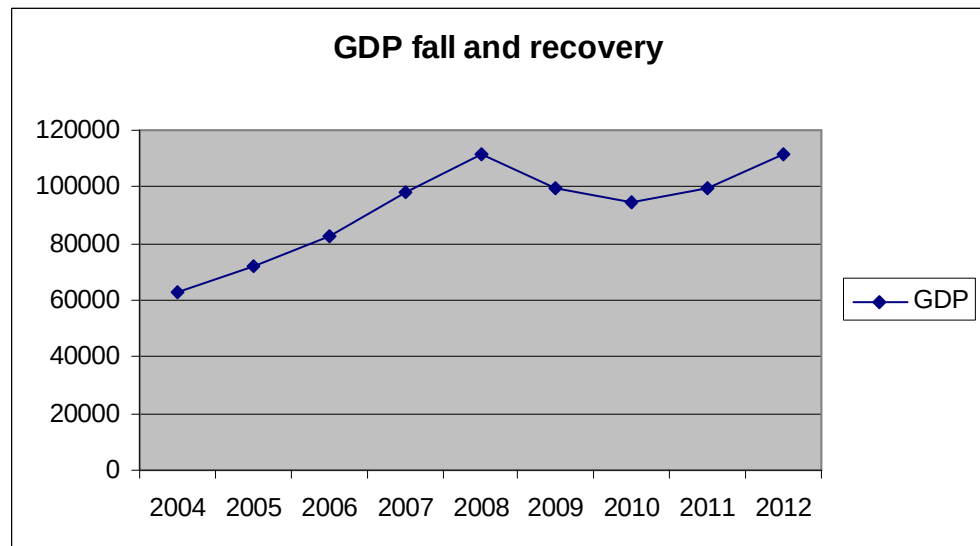


Figure 15: GDP drop and recovery forecast

[Prepared by author]

Now I need to predict the further growth of GDP, starting from 2012 and till 2015 year. As I already mentioned, I am using trend line to make the forecast, with the same slope coefficient as in regression line for the data 2004-2008. This allows me continue GDP growth at the same level as it used to be before the drop. However, it is hardly believable that GDP would recover after 16% fall in two years and continue growth that fast as it was in a growing economy. That is why, I apply constant 5% GDP growth after the recovery. Therefore, I get optimistic and more realistic forecasts and in my further calculations I will use both of them in order to demonstrate the “PST” stock price in the best and worst possible ways.

In the table below GDP forecast by both Trend and 5% constant growth is presented.

Table 7: GDP forecast

[Prepared by author]

	GDP Trend forecast	GDP forecast with 5% growth
2004	62698	62698
2005	72060	72060
2006	82793	82793
2007	98139	98139
2008	111499	111499
2009	99234	99234
2010	94272	94272
2011	99234	99234
2012	111503	111503
2013	123871	112060
2014	136239	112620
2015	148607	113183

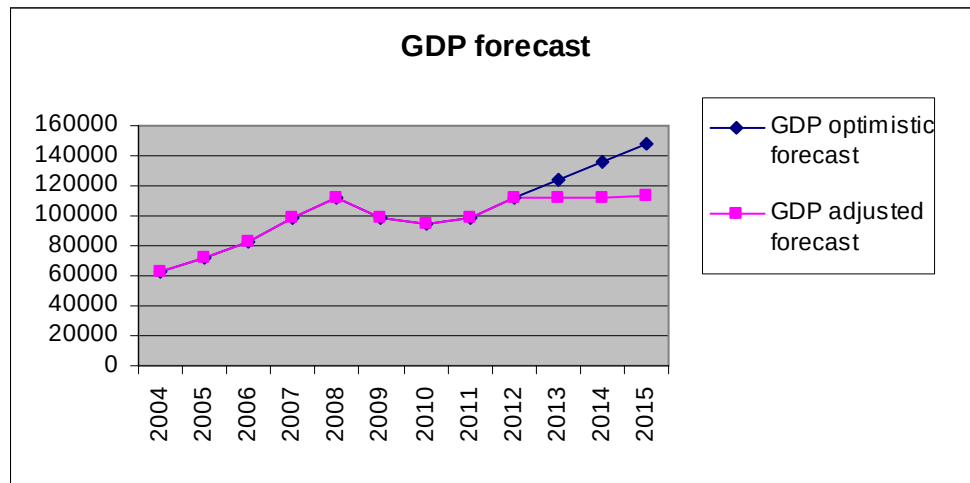


Figure 16: GDP forecast

[Prepared by author]

2.2.3.2 “Panevėžio Statybos Trestas” Sales forecast by GDP

As described above, in this section I am going to use GDP optimistic and adjusted forecast to perform “PST” sales forecast. To reach this goal, I use regression analysis with Sales and dependent variable and GDP as independent variable. The results of calculation are presented below.

Sales	y	intercept	-460557294.7
GDP	x	slope	9584.949518
		Y =	- 460557295+9584.95*X

Table 8: Sales forecast by GDP

[Prepared by author]

Sales forecast by GDP (optimistic)	Sales forecast by GDP (adjusted)
140398422.9	140398422.9
230137646.9	230137646.9
333007523.3	333007523.3
480097420.6	480097420.6
608151905.3	608151905.3
490596640.1	490596640.1
443038996.1	443038996.1
490596640.1	490596640.1
608152116.1	608188757.4
679042370.8	613532487.7
761598930.8	618902936.6
844155490.9	624300237.7

Historical comparison of GDP and “PST” Sales is depicted in the graph below and demonstrates that company was developing along the market.

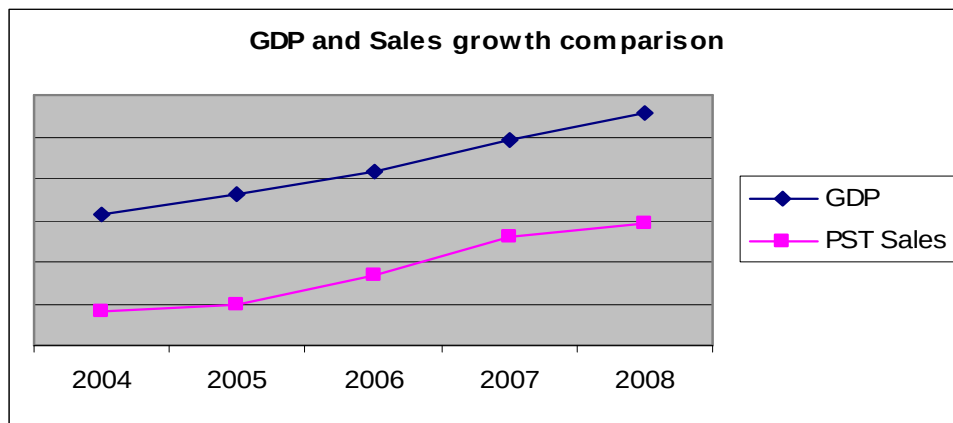


Figure 17: GDP and Sales growth comparison

[Prepared by author]

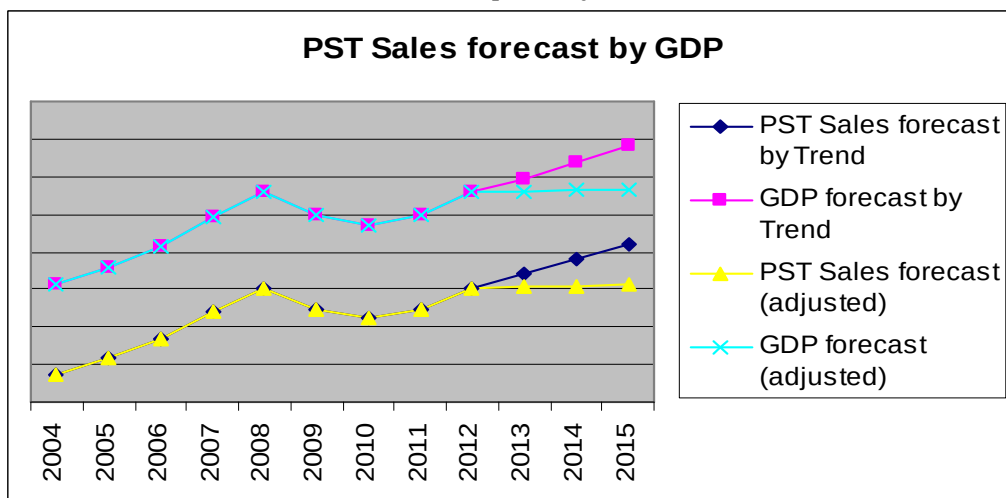


Figure 18: "PST" Sales forecast by GDP

[Prepared by author]

2.2.4 Dividend forecast by Sales

Now, as I have two forecasts for company's sales, I am using the dividend policy described in "PST" website. Starting with 2007, the policy relates sales with the dividend payout each year. Therefore, I am calculating the coefficient of this relationship for 2008 and use it as constant for the next years. [11]

The coefficient value and Dividends forecast s presented in the table and graph below:

Dividends payout coefficient: 0.000000000099
--

Table 9: Dividend forecast by Sales

[Prepared by author]

	Sales forecast by GDP	Dividend forecast optimistic
2004	140398423	
2005	230137647	
2006	333007523	0.17
2007	480097421	0.23
2008	608151905	0.06
2009	490596640	0.05
2010	443038996	0.04
2011	490596640	0.05
2012	608152116	0.06
2013	679042371	0.07
2014	761598931	0.08
2015	844155491	0.08

	Sales forecast adjusted	Dividend forecast adjusted
2004	140398423	
2005	230137647	
2006	333007523	0.17
2007	480097421	0.23
2008	608151905	0.06
2009	490596640	0.05
2010	443038996	0.04
2011	490596640	0.05
2012	608188757	0.06
2013	613532488	0.06
2014	618902937	0.06
2015	624300238	0.06

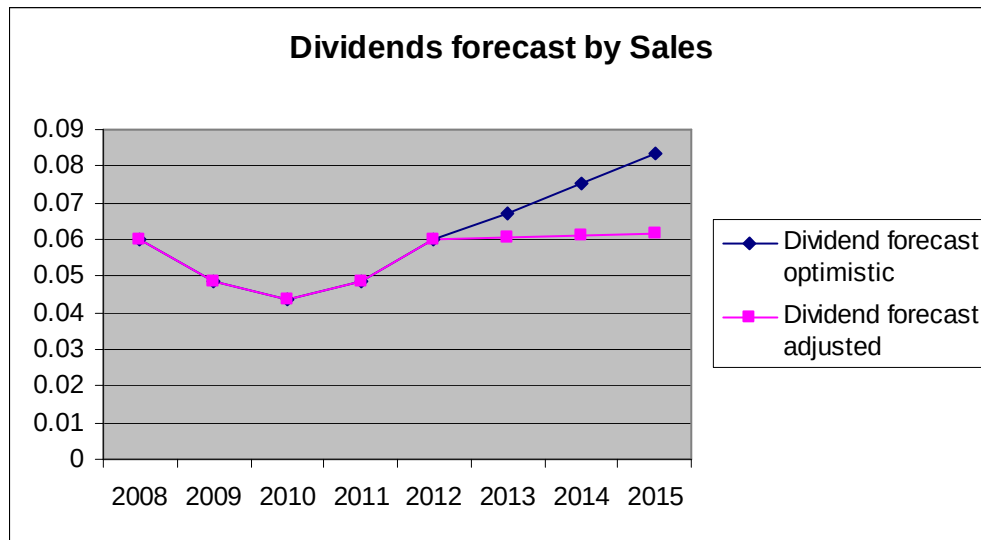


Figure 19: Dividend forecast by Sales

[Prepared by author]

2.2.5 Required Rate of Return calculation by Capital Asset Pricing Model

In order to apply Dividend Discount Model for calculating stock future price, I need firstly to find the discount rate, or Required Rate of Return for the “PST” stock. I also assume that RRR will stay constant during coming several years.

As it was described in methodology, the model equation and its coefficients described and calculated are presented below::

$$RRR = RFR + \beta(K_m - RFR) \quad (17)$$

As **RFR** (risk free rate) I use the interest rate on government bond, taking it in euros currency. I suppose that in current expectations of devaluation of Litas the risk of making deposit in local currency is quite high; therefore I can not use it as risk free rate. That is why I use euro deposits to bonds, the information on them is taken from DnB Nord bank and it is 7%. [26]

β coefficient means volatility of the stock in comparison to whole market volatility. Market volatility is always equal to 1. Therefore, I need to calculate how many percentages more the stock is volatile or dispersed from the market regression line. For this purpose, I calculate **Standard error of estimate** which measures the scatter, or dispersion, of the observed values around the line of regression. Standard error of estimate is calculated by formula:

$$S_e = \sqrt{\frac{\sum Y_i^2 - a\sum Y_i - b\sum X_i Y_i}{n - 2}} \quad (5)$$

The standard error of estimate S_e is one measure of how close the observed data lie to the estimated sample regression line. To calculate this measure I use OMXV index and “PST” average stock price for the period from 2008 November 10th till 2009 May 10th, considering OMXV index as dependent variable (Y) and “PST” average stock price as independent variable (X). The

calculations are presented in Appendix. The analysis shows that “PST” stock price is 13.72% more volatile than the market. And β coefficient is equal to 1.1372.

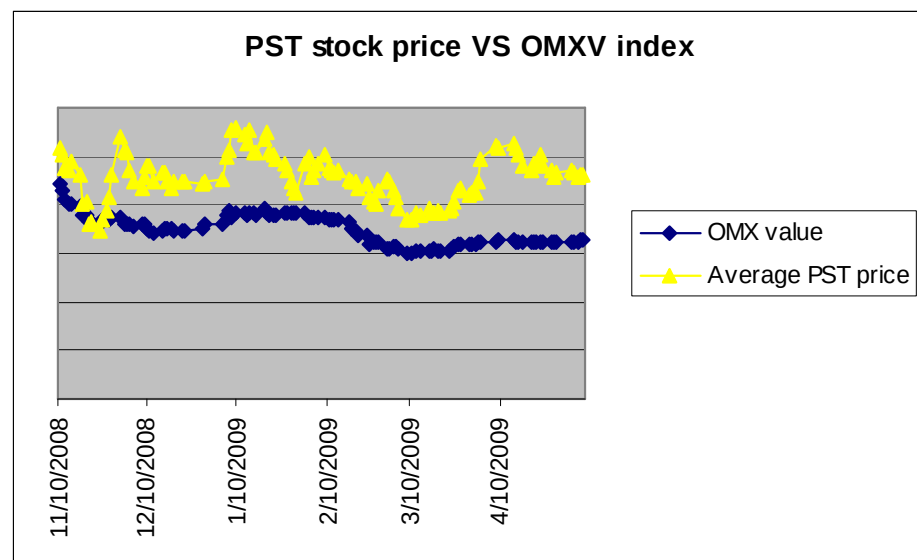


Figure 20: "PST" stock price VS OMXV index

[Data source: Nasdaq OMX data]

The expected return on the market (K_m) is the measure of the return on the whole market, meaning that each company's stock is presented in the portfolio. To calculate this variable I take OMXV index information from the beginning of its presence (2000) till 2008. To calculate annual return during this period I take the initial and final values of OMXV index, find the difference and divide by number of year. Expected return on market should be measured over time to demonstrate the long-term investment opportunities, that is why I take 8 years data.

$$K_m = (179,25 - 100) / 8 = 9.91\% \quad (19)$$

$$RRR = 7\% + 1.1372(9.91\% - 7\%) = 10.31\% \quad (20)$$

2.2.6 “Panevėžio Statybos Trestas” stock price calculation by Dividend Discount Model

Now, as all the necessary variables are calculated I may apply dividend Discount Model for calculation future stock price. The model was described in methodology and final calculation is presented below.

Table 10: Stock price forecast

[Prepared by author]

	Future price forecast	Future Price forecast adjusted
2008	1,5	1,50
2009	1,61	1,61
2010	1,73	1,73
2011	1,86	1,86
2012	1,99	1,99
2013	2,13	2,13
2014	2,27	2,29
2015	2,42	2,47

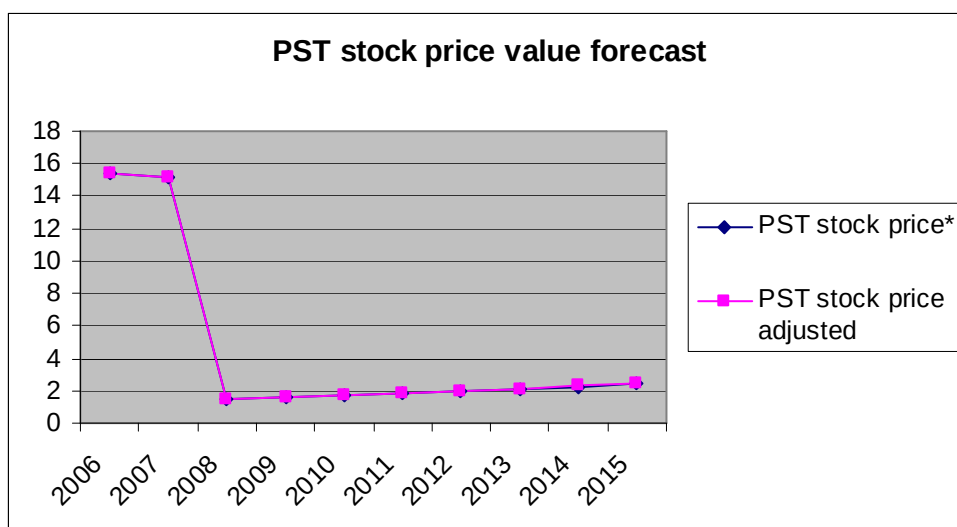


Figure 21: "PST" stock price forecast

[Prepared by author]

2.3 Section summary

And now I would like to make conclusions on my practical part. In the first section of practical part I strive to determine the relationship between number of credit deals during the period and other variables, such as inflation rate, unemployment rate, GDP, number of new flats and buildings, average netto salary and average flat price. By the empirical evidence, after calculating the correlation coefficient, the next step would be calculating the **significance** of ratios, the t-statistics is needed. In addition, I made the comparison and demonstrated what coefficients are significant. If $t^{\text{calculated}} > t^{\text{tabular}}$, so the coefficient is significant.

After the analysis performed there are some numerical evidences to mention. First of all, I review the influence on macroeconomic factors on the credit turnover over the period. Correlation analysis proved that such factors as inflation rate and construction growth (number of new flats and building over the period) do not have significant influence on the mortgage credit deals.

I believe that it is quite logical that construction growth is not strongly influencing credits provided. I would make the conclusion that it is credit deals that make influence on construction sector. The more money is available to citizens, the higher demand for real estate products may be expected, thus increasing supply (constructions). To my mind, constructions factor is like an indicator of the demand at the market. In its turn, demand is generated from other things, like salaries, credit offered, interest rates etc.

The analysis demonstrated that dependence of credit deals on unemployment rate, GDP, Netto average salary and flat average price is significant, describing 99% of credit deals. I suppose that all this relationships were rather predictable, as their importance is quite logical and visible.

However, I would like to emphasize that significance of Netto average salary data on credit deals turned out to be the weakest in comparison with other factors. Its correlation coefficient and T-statistics value is the lowest and, thus, the weakest having influence on credit deals. This is a very interesting factor, because supposedly mortgage credits offered should strongly relate on salaries of borrowers. Therefore, I can make the conclusion that banks were not putting obvious attention to salaries, making them as critical point of getting the loan. So, the analysis performed reveals the weak point in credit system in Lithuania, demonstrating not objective criterion on getting the loan during the analyzed period.

In the second section of practical part, I strive to show what alterations occurred in the financial data of one market representative – „Panevėžio Statybos Trestas“ company. This company was chosen due to the reason that it is the only listed Lithuanian company on OMX stock exchange which operates in the sector of real estate and constructions. In my analysis of PST the final goal is to predict stock future price for the coming seven years. For this purpose I am using Dividend Discount Model. All the missing variables for DDM are calculated primarily.

I start my analysis from testing mathematical forecast methods for PST data. I use Moving Average, Exponential Smoothing and Trend methods to calculate company's Sales, Costs and Net profit forecasts from 2004 till 2008. Later on, I compare the data calculated to the real historical information and find the Mean squared error terms. The method of Trend analysis performs the best result and normally may be applied for the further data projection.

However, I emphasize that in current market conditions it is not enough to rely on historical data. As the whole market has been growing during the last years, it does not mean that it could still keep the same pace. As it is already obvious, the market experiences slow down, caused by global financial crisis. This drop in indicators could not be projected by Trend analysis for the last years. This is the bright evidence that forecasts during market slow down should be done very carefully and should be based more on assumptions and expectations than on historical evidences.

As a result, I am using GDP forecast in order to relate in with PST sales for coming years. As GDP forecast also may not be projected by historical data, I apply GDP forecasted numbers by Euro commission for 2009 and 2010. Relying on expectations that GDP will recover by the same time that it has dropped, I suppose that 2011 GDP will equal 2009 and in 2012 it will be just like before the fall after 2008. Further forecast of GDP is performed in two ways: optimistic and adjusted. Optimistic forecast reflects the trend line of historical numbers till 2008, supposing that after fall and recovery GDP will be able to continue increasing at the same pace. However, I make an assumption that this could hardly be possible and the more expected GDP growth after such a drop would be constant 5% per year. Therefore, forecast by both ways is provided and used for further calculations. PST Sales are also forecasted using optimistic and adjusted way.

Starting from 2008 PST declared preparing Dividend policy relating dividend payout directly with company's sales. Using this assumption I calculate payout coefficient for 2008 and assume it will be constant during further years. Having company's sales forecasted, I may easily calculate dividend forecast by both optimistic and adjusted ways.

The only factor still missing is required rate of return on PST stock. This rate I calculate using Capital Asset Pricing Model, applying data from OMX market that includes PST stock average price during half a year, OMXV index during half a year and OMXV index during eight years and DnB Nord bank deposit rate as Risk Free Rate. Using this information from OMX I calculate beta coefficient and market premium.

After having all the necessary information I apply DDM for calculating PST future stock price. I would like to mention that differences in optimistic and adjusted analysis did not have sufficient influence on future stock price. My findings show that PST stock will be able to recover and grow by 64% in 2015 in comparison with 2008. However, this is 64% growth in seven years means only 9.14% annual growth. Therefore, the growth will be very slow. It is important to

mention that in the end of 2007 PST stock price was 15.14 LTL, that means it experienced 90% drop during one year. After such a sufficient fall only slow recovery may be expected.

The general conclusion I can make on the calculations performed is that current drop in financial indicators is very dramatic. Of course, market will recover after several years, but as the analysis demonstrates, the recovery will be slower than the rapid drop. Furthermore, we may not expect indicators to continue growing at the same pace as they used to before the slow down. Market grew very aggressively during last years, multiplying values as it is seen from some graphs, however after this shock, fall and recovery, everything should stabilize with a more constant and lower growth.

Conclusions

After the describing topics related and presenting the analysis I would like to summarize everything discussed above in both theoretical part and Lithuanian market review section. Therefore, in this section I would like to present main conclusions on the paper.

1. First of all, the general crisis concept was discussed. Various definitions of crises as well as different types of crises were presented. To summarize all of them, I would like to mention that crisis is mainly about change of the situation. It is also obvious that this change has particular consequences that may be both good and bad. Therefore, there exist some expectations and fear for uncertainty.

2. Economic bubble is unproved increase of price of asset, exceeding the value of its future income. In its turn, U.S. housing bubble is called one of the major causes and reason of drop of the economy.

3. There were a lot of factors making the situation favorable for crisis development. Different reasons are reviewed in the paper, however in my opinion the most important of them are:

- 1. Deterioration of loans quality (Subprime lending)*
- 2. Risk transfer to third parties (investors)*
- 3. Strong demands for real estate asset class*
- 4. Lack of understanding and the risk involved by engaging in complex financial products*
- 5. Asset valuation is complex and is often "mark to model"*
- 6. Unreliable ratings from the credit agencies, lack of disclosure and transparency*

4. New practices in the banking business were organized in the way that banks “originate” loans, “keep” them on their balance sheet for a short time and then “distribute” them to investors in the form of structured financial products. The mortgage lending model was created in such a way that organizations providing loans were reselling them and thus transferring the risk to buyers. The risk transferred to the third parties increased risk appetite. Banks were not so worried about supervising the quality of the loans provided as risk was overcoming them and transferred to investors. Therefore, it was very comfortable for banking institutions to organize lending process and reduce their own risk by putting it to other players using so called “Originate-to-Distribute model”.

5. I consider that the most critical consequences of the crisis originated in U.S. are:

- 1. Lost of consumers and investors confidence*
- 2. Funding difficulties for the financial institutions*
- 3. High lending costs*
- 4. Reduction in the volume of granting loans and mortgages, stricter borrowing requirements*

5. *Further fall in house prices*
6. *Financial institutions failures (e.g. Northern Rock, Lehman, See Appendix A)*
7. *Volatility in the stock markets*
8. *Stricter regulation*
9. *Economic growth slowdown*
10. *Reduced consumption*

6. After performing correlation and regression analysis between credit deals and main Lithuanian macroeconomic indicators, it was proved that such factors as inflation rate and construction growth (number of new flats and building over the period) do not have significant influence on the mortgage credit deals. The analysis demonstrated that dependence of credit deals on unemployment rate, GDP, Netto average salary and flat average price is significant, describing 99% of credit deals. However, I would like to emphasize that significance of Netto average salary data on credit deals turned out to be the weakest in comparison with other factors. Therefore, the weak point in credit system was revealed after this analysis.

7. Finally, analysis of “Panevėžio Statybos Trestas” stock price showed that in the end of 2007 PST stock price was 15.14 LTL, that means it experienced 90% drop during one year. My findings show that PST stock will be able to recover and grow by 64% in 2015 in comparison with 2008. However, this is 64% growth in seven years means only 9.14% annual growth. Therefore, slow stabilization of stock price is expected after 2010, however the pace of growth will be rather slow.

Suggestions and expectations

In this section I would like to present more optimistic view on crisis issue. As in all the processes, there are both advantages and disadvantages and there exist both winners and losers. In my opinion, this slow down will stabilize the market after recovery and such aggressive growth as we experienced several years in prior will not occur in future years. This is a good sign from one hand, as sharp growth is followed by more aggressive drop afterwards. Furthermore, in stable market there will be lower probability of economic bubbles, leading to dramatic consequences.

I suppose also that the levels of recession will differ across regions and sectors and my basic assumptions are:

- ✓ The impact of this particular financial upheaval on the world economy will be higher than previous crises because it is more geographically widespread and has a broader mix of asset classes and loan types
- ✓ World regions with continued positive GDP growth during 2009 could be South America, Middle-East, India, and China
- ✓ Consumer spending in Europe and the U.S. will deteriorate further
- ✓ Organizations will be faced with declining revenues, low cash positions and difficulties to refinance their business
- ✓ Consumer and Retail sectors will be among those hit hardest, especially those sectors producing goods that are not necessary for the day-to-day living
- ✓ In the short-term the key issue for Financial Services it is all about “Managing the crisis” and in the mid-term the changing regulatory landscape globally and supervision generally will require further change and adoption

I would also like to propose several things for further analysis. The topic of events timeline for U.S. and Europe was out of scope of this paper. However, it would be interesting to know what was the first indicator to drop in U.S. and supervise how it affected other and in what terms. Furthermore, there is a gap in time between U.S. events and, let’s say, European countries, meaning that in Europe we feel the consequences of American decline after some time only. Therefore, this time gap may be analyzed and illustrated. Also, the level of drop in U.S. and Europe may be compared.

As for Lithuanian market, one particular company was described with the reason it is the only listed company on Lithuanian real estate and construction market. It may be included some other companies from different sectors to perform the same analysis and compare the results and forecasts. This would allow making more precise conclusions on the whole market.

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APPENDICES