# A Monetary Analysis of Pre-Financial Crisis Investor Behavior

Supply of Money and the Nature of Banking Institutions



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### **Executive Summary**

The focus in this thesis is on the relationship between interest rates and supply of money in relation to investor and consumption incentives, as the interest rate is believed to be one of the main drivers of investor behavior. The analysis is initiated with a discussion on the relationship between the supply of money and the price level, using the Quantity Theory of Money and the CPI, which in the period reviewed was characterized by a constant rise. The effect of inflation proved to impact the behavior of consumers, since the reduction of purchasing power gives incentives for consumption as opposed to saving. The aim of the increasing supply of money is a reduction in the interest rates, which are reduced as an effect of a reduction in demand for financial capital. The supply of money has its sources from an expansion of base money and from banks in terms of lending against reserves, and the difference proves to be a crucial distinction. The reduction in the interest rates increases incentives to borrow money for consumption and investment. Thus the statistics also revealed an increased level of investment in the period reviewed. The increased risk taking was also driven by the various government interventions such as the CRA, the FDIC, the GSE's and bailouts who contributed to moral hazard behavior, directed capital to the most risky assets, and reduced corporate and investor accountability. The investments and increased risk taking were mainly driven by companies that saw a potential to expand due to increased demand and therefore more new products and services entered the market. The decreasing interest rates had reduced opportunity cost of capital and allowed for less profitable companies to rise and increase their output. This created a problem as there is a relationship between the NPV and the value of the output of products and services. Thus it is revealed that the increase in the supply of money does not add to an equal increase in terms of exchangeable value. In the distinction between the two types of money expansion, it is revealed that the increase in the supply of money from banks neutralized the price level, as the lending criteria assured that the increase in the money supply was accompanied by an equal increase in exchangeable value in the market for products and services. It is the expansion of base money that causes excess lending. This is visualized by the Equation of Exchange where the effects can be analyzed. Here it is concluded that the increase in the supply of money did not spawn an equal supply of products and that the effect hereof was an increasing price level. The overall conclusion is that the increasing supply of money gives consumers incentives to consume what they would otherwise never consume, companies incentives to produce what they would otherwise never produce, and investors to invest in assets they would otherwise never invest in.

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# 1. Introduction and problem statement

When disasters like the current financial crisis strike the global economy, the population demands that somebody or something is held accountable. This crisis is no exception. As always the contributing factors are many and to make a proper assessment of the complete timeline of this crisis would demand more than what most people are capable of. In spite of this, very few have refrained from giving their interpretation of the factors that caused the crisis. Since the main buzz words in the media have been something in the area of: money, losses, and risky investments, corporate greed, large amounts of debt, leveraged investments, etc. most seemed to join the idea that greed has triggered the financial crisis and somehow I also find it really hard to deny that. But what exactly is greed, how does it work and how much damage can it cause to a global economy. If greed is ever going to be a problem, it is because the greed of one person should lead to the misfortune of another. There are one or two mix ups to consider here. First of all I don't believe that general human greed can increase or vary that much over such a short period of time. Greed has always been there and been more or less stable if you can say so. You see this behaviour in children as well as in grownups. Human beings have always behaved in such a way. To say that greed is a new thing or has gradually gone worse over the past 10 years is just not valid. The other thing to consider, and this really made me wonder, is that as I recall from my earliest microeconomics lectures, the most fundamental lesson in economics and the foundation of my study is that when everyone acts in their own self interest, exploit whatever opportunities they have to increase their wealth, general wealth will be greater. Since greed is an act of self interest, greed should only be pushing economic prosperity forward. This academic mismatch made me wonder.

The funny thing is though that people were greedy. They were acting strange, behaving in manners that I find difficult to assess from an economical point of view. The consumption and investment patterns before the financial crisis seem irrational in a retrospective view. However, that might not be the case when taking a thorough look at the economy as it was at the time. The main driver of consumption and investment patterns is the interest rate, and the interest rate in turn is controlled by adjustments of the money supply. To assess the rationality

of the behaviour of the economic actors in the time before the financial crisis, I will focus on the repercussions of the monetary supply.

### **1.1 Problem statement**

### How is the supply of money affecting financial decision making?

### Sub questions:

- What is the link between supply of money and inflation?
- How can we in theory expect consumers, investors, and corporate managers to react to an increasing price level and decreasing interest rates?
- How are banks involved in the supply of money process?
- What other factors affect financial decision making in relation to the supply of money?

### **1.2 Motivation**

Considering my educational path, and my elective courses so far, the subject I have chosen might seem as a very theoretical one. Before I settled on this topic, I did have a number of other topics in mind that might at first glance seem more relevant to my master program. Among various ideas such as valuation, or strategic analysis of a more or less random company, I had strong thoughts about writing my thesis on "performance measurements and incentives" and "accounting and control". It would be interesting to use the natural connection between the two courses to go into the motivational factors in an industrial company. In fact such a study could easily be one of many follow up's to the topic I finally settled on. Transfer pricing, I think would also be an interesting topic to explore in context to tax shields.

However, in my research of these topics, I could not ignore the continuous financial debate in the media. No matter what channel I switched on or what news paper I read, I would hear or read about economic experts and non economic experts proclaiming that capitalism was dead and that all we needed now was more government control of the financial sector. In between there were also people who rejected these thoughts but they were overheard. As I mentioned in the introduction it does not seem viable to blame greed. When something so dramatic and extensive strikes a global economy it is just not enough to blame general human behavior without a thorough analysis as confirmation. We might not be angels all of us, but somehow we managed to develop from tiny organisms into what we are today. The motivation behind this thesis is to provide a more thorough investigation as to what could be the leading factors of financial behavior in the time before the financial crisis.

# 2. Methodology

My aim with this thesis is to analyze if there is theoretical evidence to explain the behavior of consumers and investors in the years before the financial crisis. To assess this I will combine the necessary micro- and financial theory with the Quantity Theory of Money. I have decided to use this mix because I think that an analysis of the implications of monetary policies would be pointless without a thorough discussion on the subject of money in relation to exchange and banking operations. This I hope will give a better foundation to assess the implications of monetary policies. I also include a discussion on various governmental interventions to properly assess the composition of the market in which money is supplied.

### 2.1 Theory

There are many theories on the cause of the financial crisis and one for every opinion on whom to blame. As the subject of thesis deals with political issues in relation to the financial crisis I then have to be careful in my choice of theory. To ensure a scientific approach, I will use only the most basic microeconomic and financial theory as my foundation. The literature on these theories is literature from my classes at CBS and I therefore classify them as a highly valid source and as such, I will no further question their reliability. In my review of the operations of the Federal Reserve Banks I use two books that are not a part of my curriculum, but as I only derive a few general facts and since both of them are published by McGraw-Hill I find them very valid. In my thesis I also include Irving Fishers Theories on the Quantity Theory of Money. As his theories are a vital part on the inflation and expectations theory I include in the theoretical part I found it natural to also use his workings on the Quantity Theory of Money in the thesis, but I will elaborate further on my rationales behind it when I introduce it in the theoretical part.

### **2.2 Data**

The statistics used in the thesis is the Federal Reserve Economic Data in short FRED which I collect from the webpage: http://research.stlouisfed.org/fred2/. This data can also be found via

e-campus, but is a bit more extensive in its original form and therefore I have chosen to collect all my economic data directly from the web page of the Federal Reserve of St. Louis. I have no reason to doubt the validity of the data collected. The data I use is published on a monthly basis, but to make them more simple I use yearly average values.

### **2.3 Delimitation**

In my search for answers to the problem statement I focus only on the American economy. I chose to do so first of all, because this was where the financial crisis initially had its beginning. Second of all the data available on the American economy is more accessible and abundant than any other economy, and finally the subject becomes increasingly more extensive with the addition of an international perspective.

# 3. Foundation of financial models

Financial models are constructed on the assumptions that economists have made about the market. In turn the market is an aggregate of the actions of every individual in the market. To fully understand the workings of the market, a study of individual consumer behavior is necessary. There are many ways to do this, and since this is not a thesis with the sole purpose of explaining consumer behavior, I will only include the elements that I find relevant for the analysis of the thesis.

### **3.1 The Rational Consumer/Investor**

Many things have been written about this subject and many arguments have been put forth, but the main undisputed argument seems to be that consumers are rational. There are many ways to interpret what this means, but in economics rationality is to act in the way that will optimize your situation the most. From here on there are two different ways to approach rationality. The first approach is the *present-aim* standard and under this standard it is assumed that consumers are the best judges of their own interests. The consumer is rational if he pursues his goal, regardless of what his goal is, in a rational fashion. The second approach is called the *self-interest* standard and it assumes that people have material interests and will actually be motivated to pursue those interests. Under the self-interest standard any kind of

altruistic behavior will be regarded as an irrational action<sup>1</sup>. In this thesis I will assume that humans are rational under the present-aim standard. I chose so in the realization that I believe that the goals of humans are more complex and are sought after in more ways than most anticipate and as such I don't see how people can ever state another human beings actions as irrational.

### 3.2 The Moral Hazard Phenomenon

Having concluded that people are rational, I will now move on to explain how this affects behavior. A rational behavior is a behavior that optimizes the situation of a given individual, but sometimes an individual will try to pursue his own self-interest even if it will be to the cost of other people. In economics this is described as the *moral hazard* phenomenon and occurs in situations where people are given incentives to act in a destructive manner. The most used example to explain this is in the case where people file false claims about lost, stolen, or damaged possessions to their insurance company, although they know that their illegal act is distributing the bill for the "lost" items among all the other insurance holders. Even people who would never refrain to fraud are still less likely to reduce the risk of damage of their insured items<sup>2</sup>. On the contrary an owner of a car that is not insured would be very careful not to park it in spots where car thefts are common. Similarly that same owner is less likely to cause accidents in traffic. This type of moral hazard is an important point to remember, as we in later chapters shall see that it can very easily be used to track investor behavior.

### **3.3 Statistical Discrimination**

Although insurance companies can never eliminate the risk of moral hazard, they can differentiate the price of their car insurances according to the age and driving history of the customers. In economics this is called *statistical discrimination*. Such methods are applied in situations where it is impossible to assess individual risk and thus insurance companies are forced to discriminate certain groups of customers such as drivers under the age of 25. This might not always be fair, as there are plenty of careful drivers under the age of 25, but as they cannot be statistically differentiated they cannot be priced differently and thus they all have to pay a higher insurance premium.

<sup>&</sup>lt;sup>1</sup> Robert H. Frank (2008), Microeconomics and Behavior, Seventh Edition, McGraw Hill, 211-212.

<sup>&</sup>lt;sup>2</sup> Robert H. Frank, 191

### **3.4 The Agency Theory**

The final theory on behavior, I will present, is the *agency theory*. The agency theory describes the problems that arise in companies when different stakeholders have conflicting interests. The most common example in this relation is the example of the owner of a company (the principal) hiring a manager to run the business (the agent). As we shall see in chapter 2, the owner of the company will profit the most if the manager accepts positive *Net Present Value* projects and he will therefore instruct the manager to only do so. However, the task of discovering new projects and analyzing the return on them can be a cumbersome task and if the manager is not given proper incentives to pursue the goals of the owner, we know from the theory I have gone through up to now, he will simply just pursue his own goals and if they are conflicting with the goals of the owner, there is an agency problem. In general agency problems arise, whenever different stakeholders have different interests.

### 4. Financial Theory

### **4.1 Introduction**

As I mentioned in the beginning of chapter 1, the market is an aggregate of the actions of every individual in the market. Every one of us affects supply and demand every time we make a transaction, be it either shopping for groceries or selling houses. When putting it this way and keeping in mind the rather sizable population on earth engaging in transactions every day, "the market" sounds like a terribly confusing place to interact let alone analyze. However, this is only when assuming every single transaction is completely unforeseeable. Having concluded in chapter 1 that people or investors are rational in their actions it is actually possible to predict at least some of their actions. Predicting tastes or preferences is difficult, but as consumers are rational, we can predict that when buying they will choose under scarcity and find the product with the largest value for money. Likewise, we can expect that also the seller is rational and will try and sell his product at the highest possible price. The consumer and the seller will only engage in a trade as long as they can both agree on a price. In the market there is always one who wants to buy and one who wants to sell at the right price. Prices will adjust to meet that level and the market is said to be constantly seeking equilibrium. If there are many buyers and few sellers, the sellers have the bargaining advantage and vice versa. The effect of supply and demand will steer the market towards equilibrium. This economic fact has been described so many times that you almost feel stupid

mentioning it again, but there is no way of avoiding it, as it is simply the single most important fact to understand when observing individuals and the economy as a whole.

Naturally, the same basic rules apply in the financial markets. Due to the nature of our medium of exchange, as it exists today, explaining the workings of financial markets is in reality a bit more complicated. In Chapter 5 I will explain in historical perspective on how money developed to be such a complex substance, but for now I will confine myself to quote Robert H. Frank who says that: "Because financial capital is perfectly fungible, the market for loanable funds is an almost literal embodiment of the ideal of a perfectly homogeneous, standardized product".<sup>3</sup> What he is pointing out is that financial capital has the unique ability of being exchangeable with virtually every other good on the planet, and therefore financial capital is in effect the most perfect example of a homogeneous product. Money is the same everywhere and everybody is requesting money. In extension there is no possible meaning of the physical quality of money. Today most transactions are conducted electronically and are just a number that enables one to make a trade. In relation to supply and demand this means that every little disequilibrium in demand or supply is quickly satisfied because there is more demand and supply for financial capital than for any other commodity in the market. As Robert H. Frank continues the previous sentence: "The result is a national – indeed international – market for loanable funds in which the interest rate charged to a given type of *borrower is virtually the same everywhere*".<sup>4</sup> In other words there is very strong global competition in the market for financial capital or loanable funds, because financial capital is perfectly homogeneous and perfectly mobile.

When financial managers search funding for a new business project, they don't just go to the local bank, but search on the global financial market for the cheapest funding. Once the financial manager has decided to borrow the money he is not concerned with where in the world he has to take the loan to get the cheapest interest rate. The market for currency is just as competitive as the market for financial funds, if you can even consider them as two separate markets, and the financial manager can always hedge the company out of exchange rate risks. If he has decided to fund the business project with additional shares or to issue corporate bonds, he will also not just sell them locally, but list them on international stock

<sup>&</sup>lt;sup>3</sup> Robert H. Frank, 508

<sup>&</sup>lt;sup>4</sup> Robert H. Frank, 508

exchanges where investors from any place on the globe can place a bid on them and ones again the fact that so many investors have access to the same product increases competition. The market for financial capital, be it bonds, foreign currency or stocks, is in effect what economists are referring to as efficient. It is easy to get carried away when describing the connections in the financial market, so I will take a step back from this brief introduction to the fourth chapter and look at it in further detail.

#### 4.2 Time Value of Money and The Net Present Value Rule

As consumers in the goods market are concerned with value for money, so are investors in the financial markets, partly in absence of a focus on physical quality, mainly concerned with *time value of money*. "*The first basic rule in finance is that a dollar today is worth more than a dollar tomorrow*".<sup>5</sup> The reason is that a dollar today gives you the option to invest it and receive more than a dollar tomorrow. A rational investor lending out one dollar for one day will demand a compensation for the opportunity he has foregone in investing the dollar himself and earn a profit. The return you give up, when you invest in another alternative is termed the *opportunity cost of capital*<sup>6</sup>. These are the rationales behind the NPV rule which states that one should only invest as long as the budgeted future cash flows discounted by the opportunity cost of capital are larger than the initial investment:

$$NPV = C_0 + C_1 (1+r)^{-n}$$

The investor should be careful when choosing or estimating the opportunity cost of capital. Earlier I described how money is almost perfectly homogeneous in a physical sense, but an important financial rule is that *a safe dollar is worth more than a risky one*<sup>7</sup>. The future value is always connected with uncertainty and when considering the opportunity cost of capital, it should be an asset with an equivalent level of risk. This is because investors demand the same rate of return from the same level of risk. The Capital Asset Pricing Model can be used to assess the expected return from a given level of risk.

### 4.3 Capital Asset Pricing Model

The CAPM model is expressed as:

Expected return:  $r_e = r_f + \beta (r_m - r_f)$ 

<sup>&</sup>lt;sup>5</sup> Richard A. Brealey, Steward C. Myers, Franklin Allan (2008), Principles of Corporate Finance, Ninth Edition, McGraw-Hill, 14

<sup>&</sup>lt;sup>6</sup> Richard A. Brealey, Steward C. Myers, Franklin Allan, 15

<sup>&</sup>lt;sup>7</sup> Richard A. Brealey, Steward C. Myers, Franklin Allan, 16

Where  $r_f$  is the short term risk free rate such as a treasury bill,  $r_m$  the return on the market or the market portfolio and  $\beta$  is the beta value. The beta value measures a security's sensitivity to the market<sup>8</sup>. The expected return is thus calculated as the *market risk premium* multiplied by the risk of the security plus the risk free rate<sup>9</sup>.

### 4.4 Weighted Average Cost of Capital and the M&M proposition

Companies are usually not only funded by equity, but also debt and thus it is necessary to weight the debt part and the equity part, when calculating the *company cost of capital*. This calculation is termed *the average weighted cost of capital* or WACC in short and is expressed as:

$$WACC = \frac{D}{V} \times r_D(1-T) + \frac{E}{V} \times r_E$$

Where D is debt, E is equity, V company value and T tax. The debt part is added on an after tax basis, because cost of debt is tax deductible. This phenomenon and capital structure in general has been described by two economists named Franco Modigliani and Merton Miller or M&M as they are often referred to<sup>10</sup>. In their proposition I and II they stated that even though debt is cheaper than equity in a world without taxes, debt structure wouldn't matter. The reason is that the more you lever the company, the more risky an investment the company will be and thus as is stated from the CAPM model, the investors' expected return will increase<sup>11</sup>. This equilibrium, however, is distorted by tax. As such the equation above states that WACC is reduced most effectively when the company is levered 100 %. In reality this is not completely accurate as the risk of bankruptcy increases when the company approaches a 100 % debt structure. A bankruptcy is associated with many legal and administrative costs are referred to as *direct bankruptcy costs*, but investors will also have to deal with *indirect bankruptcy costs*. Indirect bankruptcy costs occur when a company is in *financial distress*<sup>12</sup>.

### 4.5 Market Efficiency

The microeconomic theory and the economic models presented so far have given examples of the rationale decisions of consumers and investors that constantly direct the market towards

<sup>&</sup>lt;sup>8</sup> Richard A. Brealey, Steward C. Myers, Franklin Allan, 193

<sup>&</sup>lt;sup>9</sup> Richard A. Brealey, Steward C. Myers, Franklin Allan, 214

<sup>&</sup>lt;sup>10</sup> Stephen A. Ross, Randolph W. Westerfield, Franklin Allan (2008), Corporate Finance Fundamentals, 7th edition, McGraw-Hill, 543

<sup>&</sup>lt;sup>11</sup> Stephen A. Ross, Randolph W. Westerfield, Franklin Allan, 544 and 545

<sup>&</sup>lt;sup>12</sup> Stephen A. Ross, Randolph W. Westerfield, Franklin Allan, 553 and 554

equilibrium, but I haven't yet given examples of how quickly the economy finds equilibrium and this view is important in the perception of money supply. Earlier I mentioned how the financial market is said to be efficient. Three forms of market efficiency exist in the literature (naturally only one type of market efficiency exists in the market):

### 1) Weak form efficiency

- i) Prices reflect the information recorded of past prices.
- ii) It is impossible to make consistently superior profits by studying past prices
- iii) Prices will follow a random walk

### 2) Semistrong form efficiency

- i) Prices reflect past prices and all other published information.
- ii) Prices will adjust immediately to public information.

### 3) Strong form efficiency

- i) Prices reflect all information that can be gathered through analysis of the company and the market.
- ii) No one can consistently beat the market.<sup>13</sup>

Since the *efficient market hypothesis* was first presented, it has been heavily debated. Many studies have been undertaken to prove or disprove the hypothesis. An inefficient market would mean that past prices could be used to predict future prices. That for instance a given increase in the value of a stock one day would be followed up by a further increase the next day. But if we return to the theory reviewed so far, the efficiency of the markets is obvious. There we found that investors are quick to exploit any easy profits in the market. An easy profit is a sign of disequilibrium in the market and as we know that will not last for long. If for instance stock prices increased three days in a row every year around Christmas, then investors could make a profit from buying the stocks before the rise and sell them after the rise. But this stock price movement would quickly be detected by everyone else. This would imply that already next year there would be much greater demand for the specific shares just before Christmas and their prices would rise accordingly. Investors would continue to buy the shares until they offered a normal return. It is due to the efficiency of the market impossible to make a superior profit from studying past prices and therefore the prices of stocks are said to

<sup>&</sup>lt;sup>13</sup> Richard A. Brealey, Steward C. Myers, Franklin Allan, 359

be following a *random walk*. Up until 2008 the research, so far conducted have shown evidence of the weak form efficiency, while very few researchers have found evidence of the strong form efficiency.<sup>14</sup>

### **4.6 Behavioral Finance**

Although economists do not completely agree on the level of efficiency of the market, they do seem to be certain that markets are not completely efficient. Humans are only humans, and as such there are limits to arbitrage. Humans are not 100 % right, 100 % of the time, and occasionally investors will make the wrong perceptions about prices. This doesn't mean that they are not 100 % rational. It just means that investors or consumers sometimes take wrong actions from a rational mindset. This was the case with the managers of the hedge fund called LTCM short for Long Term Capital Management. When most European countries switched their currency to the euro, LTCM betted against a convergence that never occurred and within a short period of time LTCM lost all its capital. This, naturally, was not the intent of the managers of LTCM. Up through the 90's LTCM had been one of the most profitable hedge funds and the decision to expose themselves against the interest rate convergence was based on a solid belief that the company and investors would profit from it. As it turned out they were wrong, but they were still making a rational decision when betting on the interest rate convergence, as they believed it to be a good investment.<sup>15</sup> The loss that LTCM experienced was so extensive that they were close to bankruptcy. Interestingly the Federal Reserve Bank of New York jumped in and saved the assets, so that the investors, who had invested in the fund, didn't incur any loss. There are many proposals of why the US government decided to take action towards the bankruptcy of LTCM, one being that there was a growing concern that the recent East Asian crisis in 97 and the debt issues in Russia in 98 would spread to the American economy. As LTCM also were known to be heavily exposed in those regions, it was believed that they could contain the "spreading" by bailing out LTCM. Perhaps it was believed to be important to uphold the consumer's faith in the American economy.

#### 4.6.1 Representative Bias

One of the ideas behind behavioral finance is the representativeness bias. The theory states that the main issue when humans make forecasts is the past representative period they use to predict the future. If for instance the 10 year past prices have been declining they will

<sup>&</sup>lt;sup>14</sup> Richard A. Brealey, Steward C. Myers, Franklin Allan, 361

<sup>&</sup>lt;sup>15</sup> Richard A. Brealey, Steward C. Myers, Franklin Allan, 370

underestimate the future and if the 10 year past prices have been increasing they will overestimate the future.<sup>16</sup>

### 4.7 Bonds

In September 2010 the US bond market had a trading volume of 1.004,7 Billion \$<sup>17</sup> and this gives an indication of how much influence the bond market has on the global economy. All this demand for funding is not surprising considering the average debt structure of listed companies, and adding all the houses, cars, various other consumer goods, and government projects that are financed through the bond market.

A bond is essentially a loan or a structured product of a loan. Mortgage loans, for instance, are bundled together and sold off in pieces as bonds. When you purchase a bond you in effect indirectly lend out your money. There are various types of bonds, but most common is the *coupon bonds*. There are also various types of issuers of bonds. The treasury issues treasuries, corporations issue corporate bonds and banks issue, amongst others, mortgage bonds. Bonds are sold at an initial value equivalent to the value at maturity. This value is called par or face value at issue and principal at maturity<sup>18</sup>. As I concluded earlier, investors want compensation for lending out money. This compensation comes in the form of scheduled payments called coupons. Coupons are quoted in percentages of the value at par. The buyer of a bond is entitled to receive the coupons, usually semi-annually, and at maturity he also receives the full par value<sup>19</sup>. A buyer of a bond also has the option of selling the bond before maturity. This bond will be sold at a premium and if it is selling below face value it is said to be selling at a gremium and if it is selling below face value it is said to be selling at a discount. Bonds are issued in the primary market and bonds sold and bought before maturity are traded in the secondary market<sup>20</sup>.

The prices at which bonds are traded are just like stocks depending on supply and demand and the same principle is used as when valuing stocks. The expected cash pay-offs in terms of coupons and the principal are discounted with an alternative rate of return, and subtracted

<sup>&</sup>lt;sup>16</sup> Journal of Behavioral Decesion Making, p 426

<sup>&</sup>lt;sup>17</sup> http://www.sifma.org/research/statistics/global-sector-statistics.shtml

<sup>&</sup>lt;sup>18</sup> Annette Thau (2001), The Bond Book Everything Investors Need to Know About Treasuries, Municipals, GNMAs, Corporates, Zeros, Bond Funds, Money Market Funds, and More, Second Edition, McGraw-Hill, 3.

<sup>&</sup>lt;sup>19</sup> Richard A. Brealey, Steward C. Myers, Franklin Allan, 60

<sup>&</sup>lt;sup>20</sup> Esmé Faerber (2001), Fundamentals of the bond market, McGraw-Hill, 41

with the par value. The expected rate of return is called *yield to maturity* and is not to be confused with the alternative rate of return. The alternative rate of return is the market interest on bonds with similar features, such as time to maturity and risk. The yield is the annual or monthly return on bonds adjusted for the premium or discount when the bond is sold. When the alternative rate of return decreases, the value of the bond increases and thus the yield increases as well.<sup>21</sup>

Interest rates do not affect all bonds equally. Longer term bonds are more sensitive to interest rate movements, but when looking at interest movement sensitivity, it is also crucial to look at the *duration* of the bond. For bonds with smaller coupons the principal constitute a larger part of the total discounted bond value and as such these types of bonds are said to have a longer duration as they due to the larger contribution of the principal are more sensitive to changes in the interest rate<sup>22</sup>.

The interest rate on bonds tells a lot about investors' assumption about the future. If investors expect future spot rates to rise then they will not buy a long term bond with the same coupon as a short term bond. They will require a higher coupon or a discount on the long term bond. This can be observed in the market for *stripped bonds*. These are bonds that only make a single payment. Investing 1000 \$ in a one year stripped bond at a 6 % spot rate will generate:  $1000 \text{ $ x (1 + 0,06)^1 = 1060 $ $.}$  Alternatively the investor could have bought a bond with a two year spot rate of 7 % and get a pay-off of:  $1000 \text{ $ x (1+0,07)^2 = 1144,9 $ $.}$  The extra year of savings resulted in an increase in return of  $(1 + 0,07)^2 / (1 + 0,06) - 1 = 8,01 \%$ . and is termed the *forward interest rate*.<sup>23</sup>

### 4.8 The expectations theory

Whether an investor is willing to invest his money for one extra year depends on what he thinks the future spot rate will be. If he believes that in one year the spot rate will be more than 8,01 % then he is better off if he just buys a one year bond and then in one year's time buys a second one. If everybody else shared the same belief then no one would by the two year bond. This would cause the prices of that bond to decrease until the extra expected yield from that bond equals the expected future one year spot rate. In general the expectations

<sup>&</sup>lt;sup>21</sup> Richard A. Brealey, Steward C. Myers, Franklin Allan, 63

<sup>&</sup>lt;sup>22</sup> Richard A. Brealey, Steward C. Myers, Franklin Allan, 65

<sup>&</sup>lt;sup>23</sup> Richard A. Brealey, Steward C. Myers, Franklin Allan, 69-70

theory implies that the reason for an upward sloping term structure is that investors expect that short term rates will rise and that the reason for a downward sloping term structure is that investors expect short term rates to fall.<sup>24</sup>

### **4.9 Inflation I**

Most commonly though is the upward term structure and one of the main reasons for this trend is said to be inflation. Whatever the market certainty on the 20 year pay-off on treasuries, investors are always betting against inflation. If inflation increases after they have purchased a long term bond, their investment will be worth a lot less and they would have been better off, had they just invested in a succession of short term bonds and reinvested at the end of each year at the new spot rate that will have incorporated the new information about inflation. Therefore investors require a larger return on bonds with a longer maturity. The relationship between interest rates and inflation has been described by the economist Irving Fisher who compares the interest rate to a common good, in his example apples. He says if a person is indifferent about having 100 apples today or 105 apples in one years' time then the *real interest* rate is 5 %. If one apple costs 1 \$ then this person is indifferent about having 100 \$ today or 105 \$ a year from now. If however the price of apples increase by 10 % during that year, the 5 % interest rate will not be sufficient to cover his costs of 105 apples. Now the price of one apple has increased to 1,1 \$ and the price of 105 apples has increased to 115,5 \$, in other words to think back, the person was still indifferent about 100 apples one year back and 105 apples today, but the purchasing power of those 105 \$ has declined and in dollar terms this now means an indifference between 100 \$ one year back and 115,5 \$ today. The nominal interest rate can be calculated using the formula below:

$$1 + r_{nominal} = (1 + r_{real})(1 + i)$$

Where  $r_{real}$  is the real interest rate and *i* is the expected inflation rate.<sup>25</sup> Thus the relation between inflation and interest rates can also be interpreted as an arbitrage situation. If we imagine that inflation is given and that an investor expects that inflation is not fully reflected in nominal returns, he can generate a profit in switching from cash to assets. These theories on inflation are also known as *The Fisher Effect*.<sup>26</sup>

<sup>&</sup>lt;sup>24</sup> Richard A. Brealey, Steward C. Myers, Franklin Allan, 70-71

<sup>&</sup>lt;sup>25</sup> Richard A. Brealey, Steward C. Myers, Franklin Allan, 76

<sup>&</sup>lt;sup>26</sup> Richard M. Levich (2001), International Financial Markets, Prices and Policies, Second Edition, McGraw-Hill,156.

As it seems as if inflation has a large impact on long term rates and therefore also on investors and their actions, I find it important to determine exactly what causes inflation. However, so far I have not included quite enough theory on the subject and for that reason, I will postpone the discussion to the end of the next chapter after the review of the quantity theory of money.

### 5. Money

### 5.1 Medium of Exchange

To be able to properly assess the impact of monetary policies I will in this section give a thorough discussion on the subject of money. This will include the evolution of the monetary system, the role of banks and the Federal Reserve in the monetary system and the creation of money. My search for literature with a thorough explanation on the evolution of our monetary system was not an easy, but finally I stumbled over a book called "What Has Government Done to Our Money?" and "The Case for a 100 Percent Gold Dollar". The author of the book is called Murray N. Rothbard and he explains, better so far than any other author I have encountered, the origins of our monetary system. He has a very negative view on the monetary system we have today and he totally ignores the historical timeline perspective, but, I still find his approach to the origin and value of money superior. Murray N. Rothbard brilliantly starts by describing the earliest forms of exchange, where people exchanged milk for bread and so on. Leaving out any type of coins or official medium of exchange. As he points out this type of *direct exchange* had some quite essential complications. If one person has an excess of milk and wants to exchange it for bread, he not only has to find one who has an excess of bread, but also one who is interested in getting milk and if the person with an excess of bread is not interested in milk, the milk is worthless. Since this type of exchange was so inconvenient, people started to engage in what Murray N. Rothbard describes as indirect exchange. The person with an excess of milk who wants bread, exchanges his milk, not directly for bread but for another good that he knows the person with bread needs. As indirect exchange became more and more common, certain goods were revealed as more marketable than other goods. As Murray N. Rothbard describes it: "some are more devisable into smaller units, some more durable over longer time, some more transportable over long distances."<sup>27</sup> These goods were by traders characterized as goods they could always exchange

<sup>&</sup>lt;sup>27</sup> Murray N. Rothbard (2005), What Has Government Done To Our Money and The Case for a 100 Percent Gold Dollar, 26

for other goods, no matter what they wanted. Because of this, demand for those goods increased even more, making them even more marketable. Both silver and gold possessed these advantages over other goods and therefore they gradually became the medium of exchange (much like cigarettes in prisons). Here it is important to make the notation that although silver and gold from this point on are considered as a medium of exchange and therefore by definition equal money, they are still in reality only commodities traded on the same principles as milk and bread. The price of money, or gold and silver is its purchasing power in terms of all other goods. It is how much bread or milk you can get for one ounce of gold and this is, as should be clear now, determined by supply and demand. If for some reason there is a large increase in the mining of gold, the supply of gold will increase, demand will decrease and the price of gold will fall. Likewise if the mining of gold suddenly stops, while the production of the economy keeps increasing the demand for the increasing amount of transactions would increase demand for gold and thereby the purchasing power of gold.<sup>28</sup>

### **5.2 Quantity Theory of Money**

Whereas literature in the origins of money are scarce, literature on theories on the subject of money as it exists today are abundant, but one in particular is of great relevance to the subject itself and my thesis in particular. I chose to include this theory because I believe it to incorporate better than any other the relationship between supply of money, consumption, prices and production.

The Quantity Theory of money has been interpreted by many economists up through the 20<sup>th</sup> century. "Lately" economists like John Maynard Keynes and Milton Friedman each gave their interpretation of the theory, but to avoid any confusion between such opposing interpretations of the same theory I have reached for one of the forefathers of the theory. His name was Irving Fisher and he was one of the first economists to mathematically state the relationship between the quantity of money and price level. It is in this study that he also expressed the relationship between interest and inflation described in the previous Chapter. He said that in theory the only three things that can influence the price level are the quantity of money, the volume of trade and the velocity of money transaction<sup>29</sup>. An essential point when dealing with the quantity of money is that in relation to transactions the "same" money can be used for

<sup>&</sup>lt;sup>28</sup> What Has Government Done To Our Money and The Case for a 100 Percent Gold Dollar, p. 28

<sup>&</sup>lt;sup>29</sup> Irving Fisher (1971), The Purchasing Power of Money: Its Determination and Relation To Credit, Interest and Crises, *New and Revised Edition (1922)*, Augustus M. Kelley Publishers The Purchasing Power Of Money, 14

several transactions during a given period. It is not possible to compare the amount of goods to the amount of money in an economy, without knowing how many times a particular note is exchanged for goods within a given period. Irving Fisher called this the velocity of money and dealt with it in what he called the equation of exchange. This equation is the sum of all individual transactions or exchanges where money changes hands for goods. The equation then has a "money side" and a "goods side". The equation is in balance because for every transaction the value of the money paid equals the value of the goods purchased. The "money side" however will quite likely be larger than the total supply of money because of the velocity factor. Every person has their own rate of turnover. It is the amount of money they spend per year by the average amount of money they "carry". If a person during a year spends 30.000 \$ out of an average account balance of 10.000 \$, then his individual velocity of money factor is 30.000 / 10.000 = 3. The velocity of money factor for an entire country is "simply" the average of every individual's velocity of money factor. If the average velocity factor, or the velocity of circulation as Irving Fisher describes it, is ten times per year and the supply of dollars is 10.000.000 \$, then there is a total of 100.000.000 \$ dollars used for exchange of goods, during that year. The total value of goods sold or purchased that year must be 100.000.000 \$ since the "money side" and the "goods side" must be equal. Millions of goods are traded every day, so to make matters easier I will assume that milk, bread and sugar are the only goods traded in the market. In correspondence to the total goods value of 100.000.000 \$ a likely scenario could be that during the year the sales were:

	100.000.000 \$
<u>125.000.000 pounds of sugar at 0,1 \$ / pound =</u>	12.500.000 \$
50.000.000 loaves of bread at 1  / loaf =	50.000.000 \$
75.000.000 liters of milk at 0,5 \$ / liter =	37.500.000 \$

We then have both sides of the equation complete. The "money side" consists of the total supply of money times the velocity of circulation and the "goods side" consist of the goods sold and the prices at which they are sold. The algebraically statement of the equation is:

$$MV = PQ^{30}$$

Where M is the supply of money, V is the velocity of circulation, P is price and Q is quantity. According to the equation then, all these factors are mutually related. It is evident from the example above that an increase in the supply of money will outbalance the equation. If the

<sup>&</sup>lt;sup>30</sup> Irving Fisher, 25

supply of money went up, the quantity of goods sold, the velocity factor or the prices would have to change to rebalance the equation.<sup>31</sup>

### 5.2.1 Deposit and Balance Sheet Essentials

In the beginning of this chapter I presented how gold gradually became money, and in the equation above M is exactly money in terms of gold. In this stage the total supply of money is the total value of gold in circulation. Either as gold traded directly or certificates of gold on deposit. Irving Fisher makes a very clear distinction between gold on deposit and deposit currency. Following the example we can imagine that the total supply of money is still 10.000.000 \$ and that there is only one bank at which people can deposit their gold. If everyone deposited all their gold, the balance sheet of the bank would look like the figures in step 1 in Table 5.2.1 below:

Table 5.2.1		Source: Own creation		
Step 1				
	Assets		Liabilitie	2S
Gold reserve		10.000.000	Due depositors	10.000.000
Step 2				
	Assets		Liabilitie	2S
Gold reserve		5.000.000	Due depositors	10.000.000

Sten 3			
Assets		Liabilities	
Gold reserve	1.000.000	Due depositors	10.000.000
Promissory Notes	9.000.000		_
Total	10.000.000		10.000.000

Total

5.000.000

10.000.000

In exchange for the deposit of gold the customers of the bank have been given certificates of deposit or checks in return. This is a certificate of the value of their deposit and at the same time a right to draw gold from that deposit at any given time. In the first example of a bank with gold deposits the idea was that people would store the gold in banks, because it was considered safer, and then go to the bank and draw on their deposit whenever they needed to trade the gold for goods. However, it quickly became custom to simply just trade the certificates of deposit directly in the market as they were just as valuable as the actual gold

Promissory notes

Total

10.000.000

<sup>&</sup>lt;sup>31</sup> Irving Fisher, 27

they gave the right to draw on<sup>32</sup>. However a bank operating like this would not last for long as it has no income to cover the running costs of the building and the staff wages<sup>33</sup>. To generate a profit banks have to lend out money and charge an interest on it as discussed in chapter 2. There I described the mechanisms that controlled the prices on bonds and some of the influencing factors on the level of the interest rate, but I left out one big factor. When banks today lend out money, they do not just lend out of their own equity capital as it is no way near big enough to cover the demand for financial capital nor the costs of the operation of the bank (of course if every single bank in the world reduced their lending at equal levels the demand for financial capital would rise even further relative to supply and the cost of this capital would rise and the interest income would be the same as before). What they do instead is that they lend out the money deposited by private citizens and compensate them every month with a given percentage of their entire deposit. Banks then not only risk that their debtor is unable to repay the amount he borrowed in the future, but also that an unforeseeably large number of customers will come and draw out their deposits and empty the banks' reserves. This of course is a rare case, although history does have countless examples of such a situation.

Usually it starts when a couple of the banks debtors go bankrupt. The other customers then begin to worry that the bank may need to write down as much bad debt that they will have trouble redeeming remaining deposit certificates. Worried customers then start to claim all their deposits because they fear losing them completely and this starts an evil spiral stirring up even more fear of bankruptcy and in the end every single customer in the bank will stand in line to draw out their deposits. Such a situation is called a "bank run". Today bank runs are no longer common, but later I will discuss why in more detail. From the example above we can assume that the bank decides to loan out half its deposited gold. If the borrowers draw out all the gold, the balance sheet will look like the one in step 2 in table 5.2.1. In return for the gold the bank gets a promissory note from the borrowers where they promise to pay back the loan.

How much risk the bank is willing to take depends on the bank managers long run perceptions on the economy and nature of the depositors. If we for instance assume that the bank manager sees a long term growth in the economy and that he further noticed that his depositors never

<sup>&</sup>lt;sup>32</sup> Irving Fisher, 35

<sup>&</sup>lt;sup>33</sup> Irving Fisher, 35

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draw more than 10 % of their deposit he will be willing to lend out until the balance sheet turns out like step 3 in table 5.2.1.

### 5.2.2 The Rationale and Nature of General Banking Operations

The depositors that deposited 10.000.000 \$ worth of gold can now only get 1.000.000 \$ worth of gold on demand. They don't know this of course, but as it is very unlikely that they will ever demand more than 1.000.000 \$ they never have to know. At the same time the 9.000.000 \$ worth of gold are earning interest to the bank and the depositors. They will be returned to the bank at the time stated in the contract with the borrowers. There is of course a risk that some of the borrowers will default on their debt, but since the economy is projected to grow, this is unlikely. One will question why banks put themselves in a short position at all. Why take the risk of not having enough gold or cash at hand to redeem all deposits at all times? Well exactly because of what I wrote earlier. Banks are in business to make money and cover costs and there are only two ways to do this. The first option is to simply charge people for the inconvenience of storing their gold or cash. This might sound absurd but is in fact a very normal practice. If you for some reason have a spare couch that you do not have the space for and therefore have to have it stored in a warehouse, you do not expect it to be free of charge, let alone actually gaining a bit by having your couch in a random warehouse. But just like money this unused couch can be borrowed out to someone who actually needs a couch but does not have one and this person will probably find it very fair to pay a monthly charge for the use of the couch. This brings us forward to the second option. The bank can lend out certificates of the gold on stock and deposits of customers and earn interest to themselves and the depositors. It is without question the last model that most people prefer. If the first option was the preferred one, such banks would exist in endless numbers.

### 5.2.3 The Publics' Perception of Banking Operations

The fact that it is generally acceptable that banks lend out their customers' money, imposes a question on the public's perception of a bank. It is very easy to consider a bank as a safe warehouse for your money. People look at their bank statements showing the balance of their account thinking to themselves that they have this amount of money in the bank. That the money is just there waiting for them. However what we have discovered so far, is that the money is waiting for no one and is everywhere else than in the bank account. They are in the hands of somebody else with the purpose of earning interest to the bank. As such the

expression of "money in the bank" is misleading as this is clearly not the case. What people should say instead is that the bank owes them money. What they have in fact, is a promise from the bank to pay back the money they deposited upon request. Although I make it sound like people have the wrong perception of banks, their actions actually tell us that they know exactly what a bank is and how a bank handles their money. Referring to chapter 4, I described how investors or people in general want compensation for lending out their money, because of whatever opportunity foregone by doing something else with it. The fact that people actually demand compensation in terms of interest when they deposit money in the bank, tells us that they know perfectly well how the banks handle their money and are aware of the risks.

### 5.2.4 Asset and Reserve Management

Every bank, small or large is obviously not interested in bankruptcy but they cannot afford to have high values of assets "lying idle in their vaults". In order to have sufficient cash flow to pay interest to the high demands of the depositors and the dividends of the shareholder, the management in the banks needs to make the assets work for them. Asset management is a crucial task in the operation of a bank. Assets are the profit generator of banks. The more assets the management dare to invest, the more profit they generate, but they have to step cautiously because assets also need to be flexible. The bank has to be able to meet sudden demands of depositors. There is always full value behind the assets, but if some of the assets are invested on a longer term basis they are said to be "inefficient" and cannot be used to redeem depositor demands.<sup>34</sup> To avoid liquidity shortage banks and credit institutions adjust the interest rate. Thus in situations with too rapid an increase in loan applications the banks can increase the interest rate charged on loans. That way the level of loan applications will adjust naturally and the reserve can be maintained at an appropriate level.<sup>35</sup>

The above stated examples of banking operations are partly history now. The theories of banking exist but the operation of a bank has changed a lot. The above are examples and theory of a "natural" banking system. This is no longer the case and is possible today because of the invention of *central banking*.

<sup>&</sup>lt;sup>34</sup> Irving Fisher, 43

<sup>&</sup>lt;sup>35</sup> Irving Fisher 45

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### 5.3 Central Banking and Supply of Money

Our medium of exchange today has gone through many changes since the dawn of trade. The most essential change is that there is no real connection to gold any longer. Despite of this, money today still shares many of the features that gold and silver did in the old days. As Laurence S. Copeland says it in his book Exchange Rates and International Finance: "The first thing to understand about the exchange rate is that it is simply a *price*. Or, putting it the other way round, prices as we normally understand them are themselves exchange rates".<sup>36</sup> What he essentially says is that even though we now have different currencies around the world, the picture is not much different from the one above. Each currency is still valued on the basis of supply and demand in the home country as well as currencies themselves exchange on the basis of supply and demand. However, where gold as a medium of exchange had a natural value in terms of its' unique abilities as a medium of exchange, our currency today is based on an artificial value that solely depends on the population's trust in the government of the nation. It is the task of the central banks to ensure the trust in the nation's currency. The supply of gold and silver was determined on what miners and gold diggers were able to extract from mines, rivers and such, and the supply of money today is determined by the authorities and the central banks. They control the supply of money through a coordinated activity with the banking institutions, the money market and the central banks. Naturally this varies a lot from country to country but in essence the "tools" are more or less the same.

First of all, central banks divide money into categories according to their physical and place of holding. These categories range from M0, being the narrowest definition of money and constituting the monetary base of currency outside central banks plus bank deposits at central banks to M3(M4 in the UK) being the widest measure, also termed *broad money*. However since 2006 the Federal Reserve stopped publishing statistics on M3, on part because they claimed that it did not contain any additional information that is not already embodied in the M2 measure<sup>37</sup>. Below is a detailed list of the components of M2:

 <sup>&</sup>lt;sup>36</sup> Larurance S. Copeland (2005), Exchange Rates and International Finance, Fifth Edition, Prentice Hall, 3
<sup>37</sup> http://www.federalreserve.gov/Releases/h6/discm3.htm

### A Monetary Analysis of Pre-Financial Crisis Investor Behavior

M0:	Currency held outside the Federal Reserve
	Deposits held by depository institutions at the Federal Reserve <sup>38</sup>
M1:	M0
	Traveler's checks
	Demand deposits
	NOW and similar interest earning checking accounts
M2:	M1
	Savings deposits and money market deposit accounts
	Small time deposits
	Retail money market mutual fund balances <sup>39</sup>

In the remainder of the thesis I will refer to M2 when dealing with the supply of money. Not all countries have the same reserve systems. Countries that have a lot of trade with the US, like Hong Kong and China, tend to peg their currency with the USD<sup>40</sup>(China abandoned this policy in 2005)<sup>41</sup> and in Europe countries that have not yet committed to the euro peg their currency to the euro. Some countries have floating rates with little and no intervention from the reserve banks, and other countries like the US have a highly intervening central bank. This is because the American goals for a monetary policy are very ambitious as is evident from the federal reserve act section 2a on Monetary Policy Objectives where it is stated that: "The Board of Governors of the Federal Reserve System and the Federal Open Market Committee shall maintain long run growth of the monetary and credit aggregates commensurate with the economy's long run potential to increase production, in order to effectively promote the goals of maximum employment, stable prices, and moderate long-term interest rates"<sup>42</sup>. There are, it seems, a range of good reasons why the Fed should put an effort on adjusting the interest rate properly. To do so it is given five policy tools<sup>43</sup> where the three mentioned below are the most important<sup>44</sup>:

- Open Market Operations
- Reserve Requirements

<sup>&</sup>lt;sup>38</sup> A Reconstruction of the Federal Reserve Bank of St. Louis Adjusted Monetary Base and Reserves, 41(3), Richard G. Anderson and Robert H. Rasche, with Jeffrey Loesel

<sup>&</sup>lt;sup>39</sup> The Federal Reserve System, Purposes and Functions, p. 22

<sup>&</sup>lt;sup>40</sup> http://www.info.gov.hk/hkma/eng/moneyhk/eng/monetary/linkede.htm

<sup>&</sup>lt;sup>41</sup> http://www.forbes.com/2009/03/31/china-yuan-dollar-markets-currency-pegging-g20.html

<sup>&</sup>lt;sup>42</sup> http://www.federalreserve.gov/aboutthefed/section2a.htm

<sup>&</sup>lt;sup>43</sup> http://www.federalreserve.gov/monetarypolicy/default.htm

<sup>&</sup>lt;sup>44</sup> Esmé Faerber, 43.

### • Discount Rate

Controlling the interest rate is, in the name of supply and demand, best done by changing the supply of money and in accordance two of the above mentioned policy tools can do that directly, both of which also the European Central Bank (ECB) is entitled to use<sup>45</sup>. One of them is the Open Market Operations.

### 5.3.1 Open Market Operations

This is the most widely used tool and enables the Fed to buy and sell bonds in the open market. These bonds are issued by the treasury and are known as *treasuries*. The treasury can issue three types of debt. Bills are the ones with the shortest maturity. Usually they mature in one year or less. Notes are also issued by the treasury and mature in two to ten years. Finally they issue bonds which mature in ten to 30 years<sup>46</sup>. However, all three types of debt are effectively bonds under the definitions I discussed in chapter 4. The Fed trades these treasuries, mainly bills, in the market. Selling treasuries reduces the circulation of money and increases demand and interest rates. Buying up treasuries increases the circulation of money and demand for money resulting in lower interest rates. The target of the Federal Reserve Banks open market operations is to control the federal funds rate which is the rate at which lending institutions can lend balances at the Federal Reserve to each other.

### 5.3.2 Reserve requirements

Another way the Fed controls the level of money in circulation is by demanding that banks keep a certain level of reserves with the Fed. In the wish of a reduction of the money supply the Fed can simply increase the reserve requirements and thereby reduce the banks cash holdings and their ability to supply loans. If the Fed instead reduced the reserve requirements, the reaction would be opposite. The Fed is not paying any interest on the reserve holdings of the banks. However, banks that are not able to meet a sudden increase in the reserve requirements can borrow from banks with excess reserves. This interest rate is determined by the Fed and is called the *federal funds rate*<sup>47</sup> as mentioned above. The reserve requirements are an important tool in the adjustment of the amount of money in circulation as they control how much banks or deposit institutions can expand the supply of money. Usually the reserve

<sup>&</sup>lt;sup>45</sup> http://www.ecb.europa.eu/mopo/implement/intro/html/index.en.html

<sup>&</sup>lt;sup>46</sup> Annette Thau, 95

<sup>&</sup>lt;sup>47</sup> Esmé Faerber, 43

requirement has been around 10 %. Since the early 1990's reserve requirements have only been applied to transaction and checkable deposit accounts. Reserve requirements then only limit the amount of M1 money in the economy.<sup>48</sup>

A reserve requirement of 10 % means that banks need to keep a reserve of 10 % of total deposits subject to unlimited demand, such as transaction deposits and interest bearing accounts. In other words a bank with 1.000.000 \$ of transaction and interest bearing deposits can legally lend out 900.000 \$. If the 900.000 \$ end up as a deposit in another bank, that bank can then lend out 810.000 \$ on account of the 900.000 \$ and so on. Ultimately the initial 1.000.000 \$ deposit can expand to almost 10.000.000 \$.<sup>49</sup> From the calculations above it is evident that even though the Federal Reserve open market operations receive the most attention, their impact on the money supply is very moderate in comparison to the impact of the reserve requirements. Without reserve requirements banks can expand the supply of money almost indefinitely. However it should be noted that the reserve requirements apply only to transaction accounts which are components of M1. For M2 and M3 there are no reserve requirements. Because the reserve requirements are such a sensitive measure they are very rarely changed and if so only very moderately.

### 5.3.3 Discount rate

The interest rate that banks are charged when borrowing from the Fed is called the discount rate. This interest rate is not controlled by any market mechanisms, but is a fixed rate set by the Fed, but just like with the federal funds rate, the aim of the tool is to entice banks to increase or decrease their lending and supply of money<sup>50</sup>.

### **5.4 Quantity Theory of Money Continued**

As I finished off the discussion of banking earlier, the introduction of central banking has brought about certain changes to the operation of a bank, mainly the composition of the balance sheet. Fractional reserve lending has made lending in excess of reserves officially legal through the reserve requirements. To explain the full impact, I will return to the previous discussion of banking. In the last balance sheet, the bank had gold reserves of 1.000.000 \$,

<sup>&</sup>lt;sup>48</sup> The Federal Reserve Purposes and Functions, p. 31

<sup>&</sup>lt;sup>49</sup> http://www.newyorkfed.org/aboutthefed/fedpoint/fed45.html

<sup>&</sup>lt;sup>50</sup> Esmé Faerber, 44

promissory notes of 9.000.000 \$ and deposits of 10.000.000 \$. At the time, I assumed that all the debtors would claim all the gold they had borrowed and take it somewhere else. When people receive a loan they usually use the money more or less instantly. Since it is costly to borrow money it doesn't make sense to borrow money and then deposit it again, unless the interest rate on deposits is higher than the interest on loans. Regardless of the motives it is interesting to see what happens with the balance sheet if the 9.000.000 \$ worth of gold is re deposited at the same bank. Now the gold reserve returns back to its original level, while the bank still holds 9.000.000 \$ worth of promissory notes. This is the case in Step 4 in table 5.4 below:

Table 5.4		Source: Own Creation		
Step 4				
Assets		Liabilities		
Gold reserve	10.000.000	Due Depositors	10.000.000	
Promissory Notes	9.000.000	Due New Depositors	9.000.000	
Total	19.000.000		19.000.000	
Step 5				
Loans		Liabilities		
Gold reserve	10.000.000	Due Depositors	10.000.000	

Thus in effect the value of the balance sheet has increased to 19.000.000 \$. Out of an existing deposit of 10.000.000 \$ the bank is allowed to lend out exactly 9.000.000 \$ with a reserve requirement of 10 %. As we then know from the reserve requirement discussion this 9.000.000 \$ can, if they unlike the example above, are deposited at a different bank, generate 8.100.000 \$ of loans and so on and so forth ultimately lead to a total of 100.000.000 \$ created out of 10.000.000 \$ as can be seen in step 5:

100.000.000

90.000.000 Due New Depositors

With the increasing expansion of deposit currency the equation needs to be extended with deposit currency denoted M' and the velocity of deposit currency denoted V':

$$MV + M'V' = PQ^{51}$$

Thus the equation states that the total amount of real money (gold in this example) times the velocity of circulation of real money plus the total amount of deposit currency times the velocity of circulation of deposit currency equals the total value of goods.

Promissory Notes

Total

90.000.000

100.000.000

<sup>&</sup>lt;sup>51</sup> Irving Fisher, 48

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### 5.5 Banks as Facilitator of Trade

As banks developed and deposit currency became more and more common, the perception of banks changed as well. Banks were no longer just a place where people could deposit their gold, but seen as a tool to facilitate trade. The increasing acceptance of deposit currency made credit more available and now more so than ever before banks were used to turn assets into cash. People could use their house or other valuable assets as collateral and borrow cash that could be invested. It is evident that the deposits dramatically will exceed the gold value in the vaults. The motive of any bank will always be to keep as much gold in the vaults as possible. The more gold they have on stock the better they are suited against unanticipated deposit demands.<sup>52</sup> I have to mention though that even in a highly leveraged bank there is always full value behind the obligations. On the balance sheet above it is evident that the gold reserves are 90.000.000 \$ short of the total obligations, but that is assuming that the risk that the depositors will demand all the 10.000.000 \$ worth of gold at the same time is very small.<sup>53</sup>

### **6.5 Inflation II**

In chapter 4, I postponed the final discussion on inflation, but with the review of the equation of exchange, I will now continue the discussion. Inflation is one of the most commonly named terms in mainstream economics. Almost every day somebody talks or writes about the latest development in inflation in the media. There is no doubt that the average consumer cares a great deal about inflation and has a perfect understanding of the short term impact on his or her purchasing power. However, in the public discussion on inflation it is often mentioned as something that just exists, without a real discussion on why inflation in one year is larger or smaller than the previous year or why there is even inflation in the first place. It is described as a rise in prices. To keep track of inflation economists measure the amount of dollars it takes to buy a given selection of goods, sometimes referred to as a consumer basket. This "basket" constitutes a wide selection of goods required in the average household<sup>54</sup> and is used as a benchmark on overall price levels. If the combined price of the products in the "basket" has increased by two percent, inflation is also said to be two percent. Economists term the price of the "basket" as the Consumer Price Index or CPI. This, however, is only a description of the symptoms of a problem and doesn't really describe the actual cause of

<sup>&</sup>lt;sup>52</sup> Irving Fisher, 38

<sup>&</sup>lt;sup>53</sup> Irving Fisher, 40

<sup>&</sup>lt;sup>54</sup> http://www.bls.gov/cpi/#faq

inflation. From the theories of Irving Fisher it is evident that the average price level does not just rise out of nowhere. The general price level is a function of the other factors in the equation of exchange. Prices are as discussed in chapter 4 a function of demand. Only increased demand for goods can raise prices of goods. To look at what causes prices to rise then means to look at what causes demand to increase. This point is interesting as we know that the aim of fiscal and monetary economic stimulus plans is very often implemented to increase demand.

### 6. Government Market Interventions

Besides intervention in the supply of currency it is common that governments intervene in various sectors of the economy. These interventions vary in great deal from authority to authority and it will be pointless to mention them all as they exist in infinite numbers. Most have only smaller impacts on the economy, but some are worth looking into as they can prove significant to my problem statement. I will give a brief discussion on these below

### 6.1 Community Reinvestment Act

According to the Federal Financial Institutions Examination Council FFIEC the Community Rienvestment Act or CRA is "intended to encourage depository institutions to help meet the credit needs of the communities in which they operate, including low and moderate income neighborhoods, consistent with safe and sound banking operations."<sup>55</sup> In other words, there was a belief that it was necessary to implement laws against loan discrimination or predatory lending in low income areas. It was initially enacted by the congress in 1977<sup>56</sup>, but strengthened in 1995 under the Clinton administration. The Community Reinvestment Act of 1995 was enforced to increase further than the act of 1977 the availability of loans to low income areas and families<sup>57</sup>. Since the outbreak of the financial crisis, there has been much debate about whether or not the Community Reinvestment Act has had any impact on the crisis. So much different material is available on the subject that a thorough investigation is too big a task to include in this thesis. However, I will keep focus on it in the analytical part in the next two chapters.

<sup>&</sup>lt;sup>55</sup> http://www.ffiec.gov/cra/history.htm

<sup>&</sup>lt;sup>56</sup> http://www.federalreserve.gov/dcca/cra/

<sup>&</sup>lt;sup>57</sup> http://www.associatedcontent.com/article/1069248/the\_community\_reinvestment\_act\_and.html

### **6.2 Federal Deposit Insurance Corporation FDIC**

The Federal Deposit Insurance Corporation is an independent agency created by the congress to maintain stability and public confidence in the financial system and in short the agency insures deposits up to 250.000 \$<sup>58</sup>. Again I will not discuss it in any further detail here but relate to it in the analysis.

### 6.3 Fannie Mae, Freddie Mac and Ginnie Mae

In 1938 Government sponsored the establishment of the Federal National Mortgage Association, today known as Fannie Mae. It was established to get the housing market back on its feet after the hard blow of the great depression. Fannie Mae was founded to provide liquidity to the mortgage market, stability and affordable housing for the masses<sup>59</sup>. In 1970 another government sponsored enterprise was established. This one was called Federal Home Loan Mortgage Corporation and just like Fannie Mae it also got a nick name known in the public as Freddie Mac. Just like Fannie Mae the goal here also was to keep a steady money flow to mortgage lenders<sup>60</sup>. In practice what they did and still do is keep an artificially high demand in the secondary bond market described in Chapter 4. They do not themselves lend out money, but buy up the mortgage bonds issued by banks and credit institutions. In that way they support banks and credit institutions indirectly by buying their bonds with new liquidity that can then be used to issue loans and thereby strengthen the housing sector. A third government player is Ginnie Mae. Unlike Fannie Mae and Freddie Mac, Ginnie Mae does not purchase or sell mortgages in the secondary market. Instead Ginnie Mae guaranties the payments of principal and interest to investors through a credit guaranty of the U.S. government.<sup>61</sup> Along with the Community Reinvestment Act, Fannie Mae, Freddie Mac and Ginnie Mae are part of the U.S. affordable housing program under the U.S. Department of Housing and Urban Development known as HUD.<sup>62</sup>

What Fannie Mae, Freddie Mac and Ginnie Mae essentially deal with is what is termed as mortgage-backed securities. As previously described, the three institutions, also known as Government Sponsored Enterprise or GSE's<sup>63</sup>, trade them in the secondary market as "pass-

<sup>&</sup>lt;sup>58</sup> http://www.fdic.gov/

<sup>&</sup>lt;sup>59</sup> http://www.fanniemae.com/kb/index?page=home&c=aboutus

<sup>&</sup>lt;sup>60</sup> http://www.freddiemac.com/corporate/citizenship/affordable\_housing/index.html

<sup>&</sup>lt;sup>61</sup> http://www.ginniemae.gov/about/about.asp?Section=About

<sup>&</sup>lt;sup>62</sup> http://www.huduser.org/portal/datasets/gse.html

<sup>63</sup> http://www.huduser.org/portal/datasets/gse.html

through" certificates because the principal and interest is passed on to the investor<sup>64</sup>. In 1992 Fannie Mae and Freddie Mac were pushed by congress to increase purchases of higher risk mortgages. These mortgages were mortgages of low and moderate income borrowers. In 1996 HUD set a target for Fannie Mae and Freddie Mac saying that 42 % of all their mortgage financing had to go to below median income families and 12 % had to go to "special affordable" mortgage loans. By 2000 those percentages had increased respectively to 50 % and 20 % and by 2005 HUD had increased the percentages even further, now at 52 % and 22 %.<sup>65</sup>

# 7. Analysis

From this point on no more, or at least very few theories, will be added to the thesis, as it is now time to focus on the part of this thesis that will answer the problem statement. The process should be straight forward. I will combine the brief teachings of the human nature from chapter 3 with the mathematical statements and theories aiming at explaining and calculating the actions of human nature in an economic context in Chapter 4. I will also account for the facts and realities of our medium of exchange today and the rules of our financial system which I elaborated on in chapter 5 and 6.

### 7.1 Quantity Theory of Money

As seems natural I will take my outset in the money creation process. The money creation is today a complex process between banks and central banks, but one should not exaggerate the effect of the legal fractional reserve system too much in this relation. As we have seen, it is a natural part of banking to gamble a bit and issue loans to individuals out of deposits in the bank. This is what Irving Fisher arguments was already the general practice of banks before the establishments of the central bank. However, in the past this practice was based on the economic calculations of the bank managers and the reputation of the bank. Reserve requirements were not a legal rule but a complicated balance between risk and return. The managers had to manage their assets, so an acceptable return could be distributed to the owners in terms of stock value or dividends and to the depositors in terms of interest. At the same time the managers had to make sure that the bank maintained an appropriate level of

<sup>&</sup>lt;sup>64</sup> http://www.ginniemae.gov/about/about.asp?Section=About

<sup>65</sup> http://online.wsj.com/article/SB122298982558700341.html

reserves to be able to meet all depositors' demands and prevent suffering losses and bad reputation. In such a case they would have problems finding future depositors and capital, and in a worst case scenario suffer bank runs. This risk automatically secured that the best managed banks kept a sufficient level of reserves to cover withdrawing demands, and more important that the funds invested were invested only in the most safe and profitable projects.

#### 7.1.1 Analysis of the Four Components

In the operation of a bank today these are still vital elements, only today reserve requirement is a legal restriction and not rational assessment of risk. This is not directly because of the legal restriction. First of all the legal restriction will not have any effect, unless banks are in a situation where they wish to have fewer reserves than 10 % of deposits or if they are just below the requirement and do not have the funds to clear the 10 % mark. In such a case banks can borrow overnight from each other at the federal funds rate. The Federal Reserve adjusts this rate with open market operations. If banks cannot cover the necessary reserve requirements by borrowing from other banks, they can borrow directly from the fed as a *lender of last resort* at the discount rate. These devices give banks fewer reasons to fear short term loan default risk as there are plenty of ways for them to raise the needed capital on a short notice.

### 7.1.1.1 The Velocity of Money

The reduction in the average bank reserves as we know from Chapter 5 in the discussion on central banking and the reserve requirements have a large impact on the total supply of money. It is interesting to analyze what the effect of the detected increase in the supply of money will be on the general price level. The quantity theory of money is a great tool for this:

### MV = PQ

In order to use it for analytical purposes though, I do need to consider the variables in the model. What I want to measure is the effect on the level of prices P with regards to a change in the supply of money M. This leaves the velocity of money V and quantity Q as variables that should be accounted for. In the theoretical part I discussed the velocity of money factor, but I did not explain in detail how it is calculated. There are many propositions on how to calculate the velocity of money, but the most common and obvious way to do it is by dividing the growth domestic product with the total supply of money. As GDP can be written as P x Q, V can be isolated in the quantity theory of money:

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$$V = \frac{GDP}{M}$$

Thus the relationship between the GDP and M is a close expression of how many times each dollar is used over the course of a year. Below is a timeline of the velocity of money calculated as real GDP divided by M2:



The first important notation is that the velocity of money is not varying much. It goes from a high of just above 2,1 times to a low of just below 1,7 times and has an overall average of 1,95 times. In fact as far back as the statistics goes the average have been 1,8, with a low of 1,601 times and a high of 2,13<sup>66</sup>. Since the velocity of money is reasonably steady I will for simplicity consider it as a constant. If the velocity of money is constant, a change in the supply of money will according to the quantity theory of money also change the value of GDP. The GDP can be increased by a rise in P, Q or as is most common a rise in both P and Q and the distinction between these different ways of growth is interesting in relation to inflation.

### 7.1.1.2 Prices, Production and Money Supply

In the theoretical part I dealt with two interpretations of inflation. One in which only the supply of money was considered as inflation. In relation to the quantity theory of money this means that the rate of inflation is only viewed upon as a change in M. We know that such a change will have to bring about a change in one or all of the three remaining variables but whatever happens to restore equilibrium in the equation is irrelevant. The other expression of inflation I dealt with was the CPI where inflation, or price inflation as I will refer it to in the

<sup>&</sup>lt;sup>66</sup> Appendix 1

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remainder of the analysis, is measured as the actual detected change in the level of prices. The difference here is that the CPI is not addressing what caused the change in the level of prices. For instance if the CPI increases we don't know if it is because of the supply of money or if the velocity of money has increased, or whether it is because industrial output has decreased, or if it is caused by any scenario in between. Since the velocity of money is not varying that much and since I assumed it as steady it is likely that only the supply of money and the industrial output is affecting the CPI. Still these are two variables which I cannot separate in the figures given to me from the CPI. The figure below is a good image of these issues:



The three graphs show index numbers of the development in industrial production, the CPI and the M2 money stock. At a quick glance it is obvious that both a rise in M and Q cause the CPI to rise. Another thing to notice is that the industrial production and the CPI grew at the same average rate from 1990 to 2007. This development is interesting as the quantity theory of money states that all else equal an increase in industrial output causes prices to fall accordingly. Thus with an almost steady velocity of money, parallel growth between CPI and industrial production can only come about if the supply of money rises twice as fast. This is what I illustrate in the example below. In Chapter 5 I introduced the equation of exchange and exemplified it using milk, bread and sugar as examples of products. For simplicity I will assume that the only product consumed by consumers is milk. The total supply of money is still 10.000.000 \$, the velocity of money is now 1,95 as the calculated average of the graph in

Figure 7.1.1, and milk still costs 0,5 \$ / liter. As can be concluded the equation will only balance if 39.000.000 liters of milk is consumed:

$$10.000.000$$
 × 1,95 = 0,5 \$/liter × 39.000.000 liters of milk

Equally it can be concluded that if both price and the production of milk doubles and the velocity of money factor stay constant, the supply of money will have to rise by factor four to balance the equation:

40.000.000 × 1,95 = 1 \$/liter × 78.000.000 liters of milk

This, however, is also what the graphs are indicating. In fact if we dig into the numbers we see that from 1990 to 2007 industrial output grew by 61,2 %, the CPI grew by 58,7 %, while the M2 money stock grew almost exactly twice as fast with a growth of 126,2 %. Since the velocity of money also varies a little and since the CPI is not 100 % accurate and does not contain all goods, we cannot expect that the numbers will add up completely. Nevertheless in this example it is close enough to both verify the quantity theory of money and the CPI as a solid measure of the purchasing power of money. Also and more importantly we here have a conclusive example of the relation between the supply of money and the price level. Finally from 2007 to 2009 we see how a continuous increasing supply of money and a correspondingly fall in the industrial production leads to constant price level.

#### 7.1.2 The Utilization of the Model

In the treatment of the quantity theory of money one should always be careful when making calculations as the four components in the equation of exchange themselves are based on an endless amount of variables. Because of this, calculations will never produce precise results and in relation to the subject of this thesis, one is better off by simply just leaning against the theory and arguments of the model. However, the model is very descriptive in an empirical perspective and with valid data it can reveal some very interesting connections between the supply of money and the other variables which I will show later.

#### 7.2 The Theoretical Effects of an Increase in the Supply of Money

The economy is never at any steady state. We are never in a situation with complete equilibrium or in a situation with a constant level of production and consumption. The economy is always in a boom or recession. If, however, we assume that the economy is in a steady state we can try to analyze the effects of an increase in the supply of money. We know now that there are two ways in which this can occur. The supply of money can either rise through a reduction in the reserve requirements or through government purchases of treasuries. It should be noted here that since purchases of treasuries involve for the fed to print new money, this will also affect the supply of money from banks as new notes from the Fed will increase the monetary base at which the reserve requirement rests on. Both interventions channel "new" money into the economy, but there is a difference in the way they do it. With the purchase of treasuries the "new" money will be distributed to the owners of the treasuries, while a reduction in the reserve requirements will distribute the "new" money to the new debt holders that banks were now able to service as a cause of the mentioned reduction. However as the money used to purchase treasuries will ultimately end up on the balance sheet of a bank these money as well will serve as debt at some point.

From the equation of exchange we know that either way the increase in the supply of money is going to change the other variables of the equation. Later I will go into a deeper discussion on how these variables are affected individually, but for now I will resume with the theoretical and empirical conclusion above on the relationship between the supply of money and the price level. Thus we have an increase in the supply of money which will cause an increase in the price level and that an increase in the price level can only come about through an increase in demand for products. This increase in demand naturally comes from the receivers of the "new" money. Slowly the money will work its way through the economy and for every transaction in which they are involved they will leave behind an increase in prices and the purchasing power of the currency will slowly deteriorate. If this was only a one time occurrence as this example might look like the issue would not be that big, but as it turns out this is a constant scenario. Every second these effects are affecting the economy. This is also evident from the development in the money supply in the diagram above. From 1990 to 2009 the M2 supply of money has increased from 3227,70 billion dollars to 8436,33 billion dollars. An increase of 161,37 %. I will return with more statistics later in the analysis, but for now I

will confine myself to treat the theoretical aspects on financial behavior of an increase in the money supply.

## 7.2.1 Consumer Effect

To try and analyze what this reduction in purchasing power means for the salaried man's propensity to consume is best done by taking the example to the extreme. Some might argue that if all general household items slowly got more expensive the consumer would start to save more money than usual, which means that he would reduce his spending in order to be sure to have enough money in the future to buy the products he really needs. However, although this does sound like a plausible explanation the picture is a bit different if we imagine for an instance that inflation is no longer 2 or 3% a year, but 100% a day. With this scenario it is obvious that inflation will not cause the consumer to save money, but instead spend it as fast as possible as his money will have lost half its value by the time he wakes up the next morning. Thus the increase in prices actually entices consumers to spend more. For the salaried man then, the increase in prices is obviously not a fortunate situation.

### 7.2.1.1 Interest and Inflation Effects

What is common for everyone is that they experience that the purchasing power of money is decreasing in terms of all other goods. As money basically is an asset we have a situation where one asset is decreasing in value compared to every other asset, and with that in mind it seems perfectly rational that consumers substitute money for something else. We see then that a change in the supply of money alone can create changes in the consumer consumption pattern. However, from the theoretical part, we know that the intention of modern monetary policies lies not in controlling the economy through a change in the supply of money, but in controlling the economy by adjusting the interest rate through a change in the supply of money and through adjustments in the discount rate. Why interest rate adjustments are used to control the economy makes sense as they obviously have a huge impact on any type of financial decision making in the economy. This is because the interest rate controls the demand for financial capital. The lower the interest, the cheaper the funding and the lower the discount rate in the NPV calculations. In a natural banking system we saw that this would not be the case. Here it seemed to be that the demand for financial capital determined the interest rate. In case the demand for financial capital approached a level where a given bank had to slow down its lending in order to prevent its balance reserves from becoming too low, it

would raise the interest rate to naturally reduce its lending. This would secure the solvency in the lending institutions, but from the politicians point of view the problem here is that it, at the same time, acts as a block for a continuous boom in the economy. This is why we today see that politicians artificially keep the interest rate low. The solvency issue in the balance sheets of the lending institutions is solved with a legalization of the practice of lending against very little reserves, through the reserve requirements and by offering the lending institutions to borrow from the Federal Reserve.

So how does this affect the actors of the economy mentioned earlier? In general we can say that when the purchasing power of money declines and when every other asset per definition then increases in value it seems about time to invest. If the interest rate at the same time is low then there are two main reasons not to keep too many liquid assets lying idle in your account. These are basic rationales, but were also what was stated by the fisher effect presented in the first part on inflation in chapter 4. When inflation is high, investors tend to switch from cash to assets to make an arbitrage gain from inflation. In the period from 1990 to 2009 these trends are visible in figure 7.2.1.1 (1) below:



Interest rates were slowly declining, where naturally the short-term rates have shown more volatility, and at the same time the graph showing the total investments at all commercial banks indicate a growing level of investment. The 30 year treasury constant maturity rate was discontinued on February 18, 2002 and reintroduced on February 9, 2006. To calculate the interest rate in the missing years I used the 20 year treasury constant maturity. From October

1993 to February 2002, the correlation coefficients between the two treasuries was 0,99. Thus I estimated the 30 year treasury using a 20 year / 30 year ratio in the period from February 18, 2002 to February 9, 2006.

An indication of the consumption incentives is also given when we compare the consumer price index with the return on account deposits. General demand deposit accounts in US pay very little and typically no interest. From the period of 1990 to 2009 the average annual inflation rate according to the consumer price index was 2,65 %<sup>67</sup>. Thus having money in a demand deposit account depreciates wealth with 2,65 % a year. This we saw when looking at an extreme case led consumers to consume more money. As an alternative to an increase in consumption the depreciation of the currency will also entice consumers to invest more as we just saw in the diagram above. This so in the search an asset that will generate a profit larger than the rate of inflation. One of the safest ways to do this for an American consumer is to convert the demand deposit into either a savings deposit, or certificate of demand deposit. The difference between these and a demand deposit is that they are not allowed to withdraw money on demand from savings or certificates of deposit. This is because the banks don't keep these deposits as liquid assets. Instead they take the entire deposit and invest it in something, usually government securities, but often also in investments with much greater risk. The duration of the investment will match the duration of the period the customer agreed to not withdraw any money. Because customers are not allowed to withdraw money from these account types on demand, they can demand a larger return. Remember from the theoretical part on risk management that an asset such as a 6 month untouched deposit is of great value and the bank will have to pay a premium for this. The interest on certificates of deposit naturally follow the return on government bonds so we also here see a decreasing interest rate overall. Thus the incentive to deposit money as certificates of deposit decreases every year. This can also be concluded from the diagram below. Here I have adjusted the interest on a 1-month certificate of deposit with the yearly inflation rate calculated as a percentage from the consumer price index:

<sup>&</sup>lt;sup>67</sup> Appendix 1.



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Because both inflation and particularly the return in CD's vary, the inflation adjusted or the real return on CD's vary a great deal. In spite of the high peaks from 1994 to 2000 the average real return in the 1 month certificate of deposit was 1,29 % from 1991 to 2009 with negative real returns in 2003, 2004, 2005 and 2008. The most describing period is from 1998 until 2004. Here we have a constant decrease in real return on certificates of deposit. This is then a very distinctive picture of how great the incentive to invest or consume actually was. This incentive is also visible from the statistics below. The diagram shows the development in the savings rate show an overall drop, while the development in consumer loans shows a constant growth:



There are quite a few points to take notice of in the graphs above. First of all the reduction in the savings rate once again clarifies the fact that consumers spend more of their disposable income on goods. Nevertheless the growth in consumer loans, in spite of the fact that the growth here is only modest in comparison to the significant drop in the savings rate, is of much greater analytical value. This is because the development in the savings rate only indicates that consumers spend more of their disposable income, whereas the growth in consumer loans indicates that consumers have so much faith in the economy and their future income that they are willing to raise debt to be able to increase their consumption at present. The economy is in a boom and consumers only expect that values will keep increasing. The increased lending strengthens demand for goods and increases further the economic boom.

#### 7.2.1.2 Real Estate Assets

The assets increasing the most in value are always those for which demand is greatest. As a consequence of the booming economy and the growth in wealth and the low interest rates, there was a large constant increase in mortgages from 1990 to 2009:



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The market for real estate loans increased from 544 billion dollars in 1990 to 3813 billion in 2009. The increase in the period was a dramatic 500 % with the period from 1999 to 2007 showing the most significant growth. Although this growth may seem extreme it actually made sense. In the same period the average house, according to the Standard & Poor's Case Shiller Index, grew 10,75 % in value every year.

In the theoretical part I described the representativeness bias which stated that people tend to base future budgeted trends on past prices. Thus if we picture a consumer looking for a house in the year of 2003, he or she will have a tendency to think that the prices will continue to increase. This is what most would think if they looked at the Case Shiller Home Price Index above. If one was a consumer in 2003 buying a house one would look back 16 years and see an annual price increase from 1987 to 2003 of 5,4 %. Thus according to the representative period the real estate prices should continue to increase by 5,4 % / year. On top of that the price increases from 1998 to 2003 have been much steeper with prices increasing exponentially reaching well beyond 10 %. Thus even the most cautious consumers might find it very reasonable to expect an annual price increase of 6 % on their house. With this assumption in mind what is then the NPV of an investment in real estate? The annual effective mortgage rate in 2003 was 5,82 % which is equivalent to a monthly compound interest of 0,47 %. As opportunity cost of capital I have chosen the interest on the 30 year treasury constant maturity rate, which was 4,88 % or a monthly compound interest of 0,40 %. I assume that the house purchased was worth 300.000 \$ in 2003. To calculate the NPV I need to consider the house as an investment asset bought for the purpose of making an income on

rent. I then also have to assume a given level of rent. To do this I used the price / rent ratio published by Fortune Magazine<sup>68</sup>. This ratio shows how many times you have to multiply the average yearly rent charged to get the market value of the real estate item. Here they listed a 15 year average national yearly price / rent ratio of 16,9 times. Thus the maximum rent I can assume that anyone would want to pay to live in a house worth 300.000 \$ is: 300.000 \$ / 16,9 times / 12 months = 1479,3 \$ / month. The reason why I have to calculate this figure is because of the fact that whether you rent out the house or live there yourself is irrelevant for the calculations. If a given family chose not to buy a house they would have to pay 1479,3 \$ in rent to live in a place of equivalent value. So regardless of the motive of the house purchase, whether renting it to somebody else or living there yourself, rent has to be accounted for. With the data above I can now calculate the NPV:

$$\begin{aligned} APV &= C \times \frac{(1 - (1 + r)^{-n}}{r} <=> 300000\$ = C \times \frac{(1 - (1 + 0.0047)^{-360}}{0.0047} \\ C &= 1753.62 \$ \\ Cash Flow &= 1479.3 \$ - 1735.41 \$ = -256.12 \$ \\ APV_{cash flow=} - 256.12 \$ \times \frac{(1 - (1 + 0.0040)^{-360}}{0.0040} = -48987.21 \$ \\ FV_{house} &= 300000 \$ \times (1 + 0.06)^{30} = 1723047.35 \$ \\ PV_{house} &= 1723047.35 \$ \times (1 + 0.0488)^{-30} = 413158.54 \$ \\ NPV_{house} &= -300000 \$ + (-48987.21 \$) + 413158.54 \$ = 112902.43 \$ \end{aligned}$$

As mentioned the large increase in mortgages actually made sense and above we see why. The investment in real estate actually generated a positive NPV and thus consumers should not hesitate to invest their money in real estate. However, it is obvious that the NPV is only positive because there in the calculations is an assumption that real estate prices are going to continue to increase and those are only a guess. It is only natural to base future price levels on past experience, but from the discussion of market efficiency we know that you can never estimate anything from the data of history. The best you can do is to assume that prices tomorrow are going to be like they were today. With that in mind there is one very concerning detail from the calculations above. A negative cash flow is never a good sign. Real estate is different from many other investments as the primary cash flows are considerably smaller

<sup>68</sup> http://money.cnn.com/magazines/fortune/price\_rent\_ratios/

than the final cash flow resembling the selling of the house. Because of that the monthly cash flows have a considerably smaller impact on the NPV compared to other investments and mortgage bonds are then characterized as bonds with a very long duration. As we know from the theoretical part, bonds with long durations are characterized with a larger volatility and thereby are more sensitive to changes in the interest rate. However, the cash flows, although small, still contain a large degree of information about the health of a project and negative cash flows, as we know, are always trouble. There are many theories on the prices of real estate (I will not elaborate on this), but one common belief seems to be that the cost of real estate should be a function of the highest possible income from rent on the property. Logically why would anyone pay more to own a house than they could rent it for? Some might argue, as the calculations above suggest, and which was also a very popular idea before the financial crisis, that when you own a house you also get the profit from the increasing property value, but why would the property value increase when the income from rent already cannot cover the mortgage cost. Still it is of no concern for the buyer. The representative theory and the low interest rates are the key components behind the positive NPV and this seems to be the main driving force behind consumer decision making.

Again I cannot stress enough that the results above are just rough estimates that can never be completely accurate. Even in this simple example with only few components, the results are hard to rely on. The level of accuracy of these results however is totally irrelevant. This is partly because buyers of real estate share the same variables and will more or less encounter the same problems. But most important new home owners naturally do not sit at home and calculate NPV of their future real estate investment. Consumers very rarely act like that and the theory does not suggest it either. Referring to the theoretical part, we know that the NPV rule is just as much derived as a mathematical statement of rational actions as a statement of economical profit. In the Graph below I have indexed the NPV of real estate investment from the years 1994 to 2009



Here we see that the NPV was negative up to 1997. As I mentioned the variables are very uncertain and this graph is just a very rough picture of the situation. But if I change the estimated annual house price increase the picture is still the same. An annual estimated house price increase for instance of 5 %, instead of 6% still produces positive NPV from 2003 and onwards. In the same diagram I have shown the development in the mortgage rate and the 30 year treasury rate in the same periods, which of course on average are downward sloping graphs. What's interesting though is that the correlation coefficients between both the mortgage rate and the NPV and the interest on a 30 year treasury and NPV lines both have close to perfect negative correlations. Due to the fact that the mortgage rate as well as the 30 year treasury rate in this example have a large impact on the cash flows of real estate investment, this is not really a surprise, but here again we see how it all comes down to the level of interest rates. They are the main drivers and it is only because the interest rate drops that housing looks like a good investment. Even more interestingly we see a double effect. The NPV calculations are affected positively both the decline in the mortgage rate as well as the decline in the treasury rate. What we have in effect is an example of how the expansion of money and the subsequent decline in interest rates distort business calculations.

#### 7.2.2 Corporate Management Effect

The monetary policies naturally also affect company management. Companies soon begin to notice that their sales are increasing, but even with steady sales they will actually see an increase in profit. The increase in prices caused by the expansion of money does not affect net

income directly as both their revenue and costs will rise proportionately according to the rate of price inflation. However, as previously discussed wages will probably stay fixed in the beginning and thus add to an overall reduction in costs. The decreasing interest rate at the same time also lowers the net income indirectly as interest expenses will drop.

### 7.2.2.1 Operational Conditions

Basically what happens whenever there is a change in prices and interest rates is that the operating conditions of a company changes. As we know from the theory, these changes cause the WACC to change as well and as WACC is a discount factor this ultimately changes the value of the company. It is the task of the financial manager to manage the debt structure in order to minimize the company cost of capital. This we saw was a task of seeking the most amount of funding from the cheapest source. As funding from banks is tax deductible, this is often the cheapest funding possible and thus the capital structure of a company should have more debt than equity. In fact the lowest WACC was reached from a 100 % debt funded company if there was no risk of bankruptcy. Bankruptcy costs, we discussed, would increase the WACC again if the debt levels rose to high. There is, it seems, a few interesting points to analyze here in relation to monetary policies.

To illustrate how a change in prices and interest rates affect the WACC, company value and the management of company assets I have made up a company with the following income and balance statement as of the year 1991:

Income statement	1991	<b>Balance sheet</b>	1991
Sales	500	Assets	
VC (50 %)	250	Capital equipment	150
Salaries	100	Cash	50
EBIT	150	Total	200
Interest expense	8,76917		
EBT	141,231	Liabilities	
		Debt	100
Tax	42,3693	Equity	100
Net Income/Cash Flow	98,8616	Total	200

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I have assumed 50 % in variable costs and a 30 % tax rate. In my example I will fix these assumptions and change the remaining variables according to the given conditions. One of these conditions is that I in the example use two different beta values. One value of 0,85 and one of 1,5 to get a view on how interest rates affect a relatively solid company and a company with a relatively high volatility in stock price. To correspond with the different beta values I have chosen the two different corporate bond rates available at the FRED database. I will use the corporate Aaa bond rates in the example with the 0,85 beta value and the corporate Baa bond rates in the example with the 1,5 beta value. The risk free rate used to calculate CAPM is naturally one that all the examples have in common and is taken as the return on a 6 months treasury bill as companies are often funded on short term basis. The market return is taken from the yearly average return on the Standard and Poor's index<sup>69</sup>.

In the example I wish to highlight the effect of efficient capital structure management so for both companies I give examples of constant debt equity ratio and examples of the debt equity structure that minimizes WACC, which I found using problem solver in excel. The only problem left to encounter now, is the bankruptcy costs referred to in the theoretical part under the M&M proposition II. If I disregard those my optimal WACC calculations will as we know turn out with a 100 % debt to equity outcome. In lack of real bankruptcy costs to deal with, I

<sup>&</sup>lt;sup>69</sup> www2.standardandpoors.com/spf/xls/index/MONTHLY.xls

have constructed a financial distress ratio. To simulate the growing cost of capital when a company increases its debt/equity ratio, I multiply a factor of 0,001 with the debt equity ratio and add this to the value of WACC. Thus the ratio and WACC increases, when the debt/equity ratio increases. The financial distress ratio has no relation to real bankruptcy costs in nominal terms. It only resembles the effect of an increased leverage on the WACC.



Above are the results of the analysis. As an effect of the declining interest rates WACC and thus the company cost of capital has been declining in the period from 1991 to 2008. When that is said though, it is obvious that from 1991 to 2008 the two companies above wouldn't have much to gain from an increased focus on capital structure as of 1991 and onwards. The optimal WACC, and the WACC calculated from a fixed capital structure are almost identical. The difference is most visible in company 2. This is because this company has a larger beta value, which amplifies the cost of equity capital and thus makes it more advantageous to increase its debt to equity ratio relative to company 1. The results above do not mean that capital structure does not matter, because it still does. Above I have given all the four company examples the same capital structure in 1991. For each company I used problem solver to find the optimal capital structure in 1991 and then I applied these capital values as the beginning capital structure of the examples with an active capital structure and as fixed capital structure in the entire period to the examples. The only thing that can be said at this point about the graphs above is that in the period from 1991 to 2008 there was not much

overall cheaper funding and increased company value to gain from having focus on capital structure given that the capital structure in 1991 was optimal at the time. To say it differently, the changes in the capital markets from 1991 to 2008 have not brought about any significant advantages in increased debt structure. Once again though, I am compelled to mention that this is not to say that capital structure is not important. This is evident in Figure 7.2.2.1 (2) in appendix 6a as well. The two graphs are examples of the lowest possible WACC and the highest possible WACC in company 2. The red graph shows the same development as the red graph in the diagram above. This WACC is reached with an average debt to equity ratio of about 8. The blue graph is almost the exact opposite and shows the yearly WACC when the same company is solely funded by equity capital. The difference in WACC is largest in 2004, with WACC values of 15,12% and 6,44% respectively. If the two different values are used to discount the cash flow generated in 2004 as a perpetuity, the company value varies from a low of 975,8 with the 15,12 % WACC and 2165,7 with the 6,44 % WACC<sup>70</sup>.

The two diagrams above clearly show that debt financing in the reviewed period has been cheaper than equity financing. One can then wonder why the results in the previous diagram above did not suggest any larger changes in the debt/equity structure throughout the period. The reason is that equity financing although more expensive than debt financing also gradually got cheaper. In figure 7.2.2.1 (3) in 6b I have separated the developments in cost of debt and equity financing for company 1 with a beta of 0,85. The cost of debt is cheaper than the cost of equity, but this gap is not that much bigger in 2008 than it was in 1991. The cheaper cost of debt then explains why the lowest WACC for the 0,85 beta company is reached with more debt than equity, and the fact that also the cost of equity declines in the period explains why the optimal debt to equity structure does not change considerably throughout the period.

## **7.3 Market Developments**

As consumers seem to spend more and more of their disposable income and as the cost of financing decreases, companies are highly encouraged to invest in the future. There are two reasons for that. First of all with projections of increased sales, the production capacities must be expanded and thus companies need funding for new capital equipment. Second of all, as

<sup>&</sup>lt;sup>70</sup> Appendix 4.

the company cost of capital keeps decreasing, more investments turn out with positive NPV's. Projects that seemed like bad investments in 1991 and were rejected are now accepted because the budgeted future revenue is larger due to increased demands from the population. At the same time the discount factor in terms of WACC has decreased. This then generates the exact same effect as the decreasing mortgage rate in the real estate example earlier, where NPV calculations or the 'NPV mindset' was distorted by the decreasingly cheaper credit available. These trends are also visible below.



Both retail sales, commercial and industrial loans, and the S&P 500 index are increasing and show signs of an expanding economy. The three graphs also show a development relationship, and in essence they are all expressing the same growth, at different levels. I chose them all three to highlight the effects, but one of the three graphs above would in fact have been sufficient.

The expanding economy of course did not go unnoticed in the stock markets. And as can be expected there is an upward tendency to observe. Only twice does the curve have a negative slope. From 2007 and onwards it naturally shows a rapid decline due to the outbreak of the financial crisis, but the total market capitalization is also declining from 1999 to 2002 as an effect of the burst of the IT bubble. This turn in the graph is very significant and is actually also visible in retail sales and commercial and industrial loans. A funny thing to notice here is how the retail sales and thus the consumer in general is almost completely unaffected by this event whereas the industrial production, and the volume of commercial and industrial loans in particular are widely reduced, while investors at the same time according to the market

capitalization clearly panicked. But although the burst of the IT bubble was significant it was only a three year bump in a 17 year stock market value increase. From 1990 to 2007 the S&P 500 index grew from 334,63 to 1477,19, an increase of 341,44 %

Investors in the stock market were not the only ones to profit from this development. Also bond market investors had much to gain. From the bond market theory in chapter 4 we know that the value of a bond will increase when the interest rate decreases. In the diagram below I have calculated the theoretical yearly increase in value of a bond with a par value of 1000 \$ issued at the interest rate of a 30 year government security in 1991:



In the years of 2002, 2004, 2007 and 2008 the value of the bond has increased approximately 35 % to values around 1350 \$. The columns show the average yield / year in percent that is realized if the bond purchased at par in 1991 is sold in the given year<sup>71</sup>. The bond is issued at a fictional 7,66 % and since the interest declined in the period the bond value and the possible yield received has increased.

#### 7.4 Banking and Political Interventions

The various trends pictured so far show signs of an economy in heavy expansion. Sales are increasing and so are investments. On top of this we have seen how asset prices in general also rose significantly in the same period including stocks and bonds. Financial capital is heavily demanded for production expansion, real estate investments and even consumer

<sup>&</sup>lt;sup>71</sup> The yield is calculated with problem solver in excel. The figures are visible in Appendix 5

consumption. All of this growth, natural or not, then could not exist if no investors were ready to supply the funds needed. The financial capital that supplied the growing American economy in the period described was primarily provided by lending institutions although private investors also have participated in a great extent.

### 7.4.1 Statistical Discrimination and CRA

Any foundation for investment is always initiated with a surplus of cash. As we saw in the theoretical review, banks are always institutions with a lot of spare cash and to stay in business they need to invest this cash. We have been through the anatomy of a bank in chapter 5. Basically what they do is they enable people to open accounts with them and deposit money. They then take that money and lend it out to others and charge interest for that service. Some of this interest the bank pays back to the depositors also in the form of interest as compensation for actually "borrowing" the money from the depositor. This is the core business of a bank. The difference between the income from lenders and the interest expense paid to depositors is the net interest income. As I earlier in the analysis pointed out a lot of the banks spare cash has been lent out as mortgages. And just as we saw how the individual buyers of homes had many reasons to believe that their real estate purchase was a great idea so did the banks. After all they had the same projections. One has to remember here that employees in a bank are as much human beings as the real estate buyers. They might even own a home themselves. Of course the situation of a bank is a bit different. Generally they have a lot more responsibility as it is the depositors' cash and not their own they lend out. If the real estate buyers should default on their debt, the bank will lose the interest income and will have to rely on the real estate property to redeem the money they lend out. For that reason banks are in theory very careful about whom they lend money to. Banks carry out the so called credit analysis in order to thoroughly review the customer and know about his or her ability to pay back the sum borrowed. General credit history is reviewed and in relation to real estate mortgages the future value of the property is evaluated as well. On top of that banks use statistical discrimination the same way insurance companies do. Just as insurance companies have certain groups of customers with a higher risk of damaging their cars, so do banks have certain groups of applicants for loans who have a higher risk of defaulting. As a bank cannot differentiate between good and bad payers in these groups they simply deny lending to such groups of people. According to the Federal Reserve homepage these so called "groups" is in fact communities with low- and moderate income neighborhoods as mentioned in Chapter 6.

The Community Reinvestment Act was established to prevent this type of action from the banks. The practice of statistical discrimination has even by authorities been categorized as *predatory lending*<sup>72</sup>. It was then apparently from the political side considered as an irrational action or choice when banks refused lending to specific individuals. Between the lines it is said that politicians know better than financially educated people how to run a bank.

This perception is very damaging. First of all employees in a bank are not there by accident. They are chosen out of education, experience, competitive trainee programs etc. Financial institutions, like most other companies, are very selective about who they employ as the size of their revenue is dependent on the skills of their workers. It is the responsibility of the management to ensure that the composition of the employees maximizes shareholder value. They are hired by the shareholders for that exact purpose alone. If they do not succeed they will be replaced by someone the board considers as a better alternative. As the board again constitutes a group of people selected by the shareholders to speak and act for the shareholders, and as they often themselves are some of the larger stockholders in the company, they have every possible incentive to hire only the best they can find.

As a result of this I find it very unlikely that politicians, on average, should prove superior to existing management in managing a financial institution. Second of all when politicians interfere with the operation of banks they disturb the principal agency relationship. In a company the stockholders as I described above will hold management accountable for their actions, but when their actions are affected by government intervention it is difficult to hold them accountable. The relationship between the principal and the agent is a delicate matter. As I described in Chapter 3 the principal or the shareholders are already troubled by the usual issues arising between them and the management. When governments intervene in the managements' responsibilities these issues are only further complicated.

In the statement of the CRA it is also written that the lending the government forces the banks to conduct should be consistent with safe and sound operations. This statement seems a bit contradictive, and also conflicts heavily with the accepted main stream conclusion, that banks have acted in a greedy manner. If there was ever evidence of the necessity of governmental

<sup>&</sup>lt;sup>72</sup> http://www.hud.gov/offices/hsg/sfh/buying/loanfraud.cfm

intervention like the one of the CRA, the evidence must have been that banks have been careful - if not too careful - with whom they lend money to and thus the critique of a greedy and relentless American banking sector falls a little short in relation to the motives of the CRA. Also if we stick to the theory that banks are greedy we know that they would never reject a profitable customer base. Management is hired to accept positive NPV projects and should be compensated for doing exactly so. But according to the content of an article in the Danish newspaper Børsen<sup>73</sup> the motive behind the CRA was not to prevent unfair and misplaced statistical discrimination. The article is a Danish rewrite of the words of Professor Raghuram Rajan at the Chicago's Booth School of Business. In the article he arguments on how the general disagreement between the right and the left wing in American politics has led to a lenient credit policy, as consensus was that such a policy would support the political wishes of both the left and the right wing. It was believed that it would reduce the growing inequality between the higher and lower educated individual in the American economy with cheap credit for housing, and also support the business sector with beneficial investment conditions.

#### 7.4.2 Government Sponsored Enterprises

According to the statistics revealed above it has worked in the way that both mortgage lending and commercial lending have increased substantially. I will return to then to the discussion on the anatomy of banks. As always when the economy is booming the pressure is on the banks to supply the necessary liquidity. However, in more exact terms banks are today as I also previously described more a facilitator of trade than a supplier of capital. In the case of mortgage lending for instance banks supply the capital by acting as a facilitator between the mortgage lenders and bond investors. To reduce the risk that I emphasized above, banks pass on the risk by issuing bonds. They can then use the proceeds from the sale of these bonds to issue more mortgage loans. In general these mortgage bonds are referred to as securities or asset backed securities or, as in this case when they contain mortgage debt, mortgage backed securities. These securities are sold to various entities including private investors, foreign corporations etc. but some of the main purchasers of the mortgage backed securities are the GSE's or the Government Sponsored Enterprises. As we know from chapter 6 these enterprises beginning with Fannie Mae in 1938, were established to support the housing sector. They ensure a liquid secondary market for mortgage backed securities and as is

<sup>&</sup>lt;sup>73</sup> Raghuram Rajan, "Amerikansk Ulighed Nærede Krisen", Børsen Udland, 19. Juli 2010

evident from the increasing demands placed on these enterprises by the Clinton administration it was needed, at least to fulfill the wishes of the government. It is evident also that even though the CRA and Fannie Mae were created as two individual institutions, many years apart, they perform a crucial collaboration. In fact the CRA could not exist if it was not for the government sponsored enterprises. The mortgages provided by banks to low income areas were hard to pass on in the market as they were initially seen as a risky asset. This can be assumed through common sense but is also indirectly confirmed by the actions of the HUD.

Already in 1992 Fannie Mae and Freddie Mac were pushed to increase purchases of these high risk mortgages and in 1996 as well as in 2005 these targets were increased. Again referring to the statement of the CRA, the contradictions between the goals and the means of the act and the statement that lending to low and moderate income communities should be consistent with safe and sound banking operations, becomes more and more obvious. You can tell a lot from observing the market and when the HUD keeps increasing the targets of purchases of high risk mortgages it is a sign that these high risk mortgage backed securities are not attractive in the market. Banks were under force to produce these mortgages, but they will not issue them if they cannot sell them off, and as this has not been possible, the GSE's have to step in and buy up whatever is remaining.

The situation as it seems is very unfortunate. The banks can increase their mortgages to new homeowners that have no other future values apart from everybody's assumption that housing values are going to go up, and the GSE's are literally obliged to buy the debt. Considering that people are rational individuals it is obvious that the praxis above will not go by unexploited by the financial sector. As it is stated in the article in Børsen I referred to above: "The problem was – as it is often the case with government policies – not intentional. It rarely is. But when a government with deep pockets "distribute" easy money and they get in contact with the profit motives of a sophisticated, competitive and immoral financial sector, the government are no longer in control of the situation." The bankers realized that regardless of the risk of the mortgages they issued, the GSE's would keep them liquid in the secondary market. Naturally they figured out how to profit the most from this and one very great way of exploiting these disturbances in the market was through the collateralized debt obligations.

#### 7.4.3. The Rationale Behind CDO's

To understand exactly the motives behind why so many consumers, investors and banks in general found it such a great idea to deal with CDO's we need to rewind a bit and make sure we have all the bits and pieces in place. For a detailed description of CDO's I refer to Appendix 9. What the analysis has pointed out so far is that the supply of money is continuously increasing and interest rates as an effect thereof continuously decrease through the depreciation of money. We saw that there was evidence that this depreciation of the currency led consumers to spend more money and as a result, consumption increased as well. As interest rates declined, it became harder for consumers and investors to find a place for their money where they could beat inflation. General bank accounts could not provide such returns and consumers had to invest their money somewhere to prevent their fortune from depreciating. Thus the low interest rates and high levels of inflation created a large demand for safe investments. However, the faith in the economy was strong. This was evident from the statistics showing that consumers were willing to lend money for consumption against their future income. This faith was particularly rooted in the real estate sector. Real estate values kept increasing and as no one could predict when this trend would stop real estate was in general beginning to be considered as a very safe profitable investment. But this conception was based on an assumption of continuously increasing real estate values.

The banks still issued mortgages to people where the cash flow from mortgage payments was considered unsafe and thus the interest charged was relatively high. Still the investors behind the funds that managed the CDO's saw that they could buy various types of mortgage backed securities, bundle them together and sell them off as one product. The risk would of course still vary in tranches, but the one important thing here to take notice of is that no matter the risk, the underlying asset was still real estate which was considered a very safe and profitable asset, and since the portfolio of a CDO consisted of various types of mortgage backed securities which is mortgage debt already bundled together, the CDO's had a very complex asset portfolio and were getting very high ratings. The end result was then what seemed to be a very safe investment product that due to the real "hidden" risk of the underlying assets paid higher interest than one could expect from anything else with the same quoted risk. Thus the CDO's were exactly what investors, consumers, banks, corporations etc. were looking for in times where interest rates on deposits were lower than ever. In the name of risk and return there was simply no other better alternative. Most of these CDO's even got an AAA rating

from Moody's. So from the point of view of the private investor or consumer there are plenty of economic rationalities to explain their behavior.

#### 7.5 Bailouts and Moral Hazard

However as the banks and the financial institutions issued these risky loans they should know better. One would think they should and of course they did, but they had very little encouragement to stop giving out these loans. First of all it is important to keep in mind that banks passed on much of the risky mortgages. Basically this is yet another agency issue. When banks or mortgage brokers pass on the debt they have very little attention to risk as it is just passed on to the GSE's or whomever the purchaser might be. The broker only cares about the commission fee as they are not accountable for any default risks. In this case the responsibility is on the purchaser to assess the risks not the broker. As long as Fannie Mae and Freddie Mac would help buying up these mortgages and since the housing market had been tricked into an upward spiral there did not seem to be that much to worry about.

The banks probably also had a realization of the fact that they could still very easily get into a liquidity crisis as they also kept a lot of the risks in their own balance sheets, but in such a case they could partly blame the HUD and the CRA for the situation they would be in. I will not blame the management of the banks for believing that the government or the Fed would bail them out should the situation get out of hand. They witnessed how the LTCM had been bailed out in the late 90's along with many other bailouts in history<sup>74</sup>. Lately we saw the government bail out General Motors. Any larger corporation in America ready to argument on their importance to the American people, economy, society etc. had many reasons to believe that they could "file" for a bailout. There are even legal acts to support such cases.

According to the independent newsroom Propublica.org<sup>75</sup> the following acts have been established since 1971: In 1971 the Emergency Loan Guarantee Act, which could provide funds to any major business enterprise in crisis, was established. In 1975 the New York City Seasonal Financing Act was established to help New York getting out of a period of financial trouble. In 1980 Chrysler suffered a big loss and the Chrysler Loan Guarantee Act, including 1,5 billion \$ in loan rescue was given and set up. 1989 the Financial Institutions Reform

<sup>&</sup>lt;sup>74</sup> http://www.nytimes.com/2008/12/28/business/economy/28view.html

<sup>&</sup>lt;sup>75</sup> Republica.org

Recovery and Enforcement Act was established after the widespread failure of savings and loan institutions at the time. In 2001 it was the Air Transportation Safety and Stabilization Act in support of all the airline companies that had been grounded due to the 9/11, and finally in 2008 the Housing and Economic Recovery Act<sup>76</sup>. Apart from the establishments of these various acts, there are countless other examples of government bailouts of corporations up through history. Thus as already mentioned there is no reason to believe that the government will not do it again. The financial institutions even have their own act in the Financial Institutions Reform Recovery and Enforcement Act. These policies affect behavior in financial institutions quite extensively.

Usually as we know by now banks and other credit institutions always have to stay clear of liquidity risk. At the same time industrial corporations should analyze every project very carefully before investing. Should the investments fail there will be a future liquidity shortage that they might not meet. Because of this, financial institutions and industrial corporations often have to turn down what appears to be profitable investments out of fear that the risk is just too great and could jeopardize the entire company. However, as the American government continuously has intervened in the business life with various acts and policies there is great reason to believe that the management in financial institutions and industrial corporations do not think like this anymore. Remember that their task is to maximize shareholder value, and since humans are innovative creatures they will exploit the business environment as much as possible to reach this goal. It may sound awful and greedy to many people, but that is their task. It is everybody's task, and everyone is in fact exploiting the business environment or the market or whatever we want to call it. If people did not do this there would be no equilibrium, nothing to determine prices. No corporation would ever invest in anything as their business calculations would be useless and thus progress would possibly be almost nonexistent. So let us just be happy that humans act in a rational fashion.

My point is, to get back to the discussion, that even though the business environment is constantly distorted by government intervention we cannot expect that investors, consumers or employees in financial institutions and industrial corporations will not exploit these changes, that they will keep running their businesses as they have always done it, ignoring the obvious benefits in acting in a destructive manner. This we know from the theory of moral

<sup>&</sup>lt;sup>76</sup> http://www.propublica.org/special/government-bailouts

hazard. Here I discussed how owners of a car that was ensured were more likely to take larger risks when parking the car or driving in traffic and the situation is every bit the same in the American market today. Companies are basically "insured" by the American government. Thus we may say that financial institutions in America took huge risks in the years before the financial crisis. And they did, and no one should claim that they did not know this. Of course they knew. They might have trouble assessing the risk, but they were aware of it. The problem was simply that the risks they were taking would generate large profits for the shareholders, and they were willing to take this risk because if everything went wrong the government would probably bail them out. The risk and return mechanism is weakened on a very large scale.

#### 7.5.1 FDIC

In the theoretical part I discussed how banks in a natural banking system must stay clear of the liquidity trap. One of the key elements in relation to this was to restore the customers' faith in the bank. If any doubt of the solvency of the bank should spread, customers might begin to withdraw their money and this will scare more customers who will then act accordingly. It is because bank runs like this are considered potentially dangerous to the economy that the American Congress established the Federal Deposit Insurance Corporation. With the depositors money ensured they will not fear bankruptcy and will not demand their deposit at any small rumor of insolvency. The FDIC might then seem like an innocent establishment that supports customers and banks at the same time. However, from what we know so far of rational consumer and investor behavior, it is obvious that a policy like the FDIC will have some negative side effects. First of all depositors are in a situation where the element of deposit risk is gone. Naturally, when there is no risk they will go for the largest returns, as investors are concerned about the largest return from a given level of risk. In a natural banking system customers do not have this privilege. As such depositors were very careful in choosing a safe bank that paid a satisfactory return. Not all banks would pay the same interest. The more risky the bank, the more interest it would pay. Thus there was a strong correlation between risk and return on deposits. Today, however, the risk on deposit is similar. Therefore what we can expect is that customers tend to place their deposit in the banks that pays the highest interest. The result of this effect is that capital is guided towards the most risky banks in the industry. Also when banks no longer fear the risk of a bank run they also have more incentives to invest in more risky assets as they know that their depositors will not react to a more risky profile.

#### 7.6 Banking and Supply of Money

As I have now covered the behavioral aspects of a reduction in the purchasing power of money, I will return again to the Equation of Exchange and finish the discussion of money supply. In the beginning of the analysis I finished of the discussion of money supply by concluding on the relationship between money supply and price inflation. But Irving Fisher also described how an increasing money supply is a natural part of banking. I now wish to address these contradictions and the relation to the extensive discussion of financial policy tools I included.

#### 7.6.1 No Intervention and No Central Banking

To best treat this issue I will start, as is often the case in economic literature, with the assumption of a completely free market. Thus I assume that there is no government intervention and no central banks. As there are no central banks the primary medium of exchange is gold. This is the type of market in which all the financial theories I have included are addressed and was characterized by an equilibrium controlled by supply and demand. It is in a market like this Irving Fisher described the natural causes of an increase in the money supply. This increase we know by now comes from the banks and the mines. The banks increase the money supply when they use deposited money as funds to finance their lending and the mines supply money in terms of value in gold extracted and distributed into the economic system.

As gold is the base money that lending is based upon, gold not only increases the money supply in terms of the gold value but also in terms of the additional lending it enables. I might then add to this that the money supply provided by banks is not actually an increase in money. It is simply a transfer of funds from a depositor account to a lenders checking account. The big difference is that the bank does not ask the depositor directly if they can use his or her money. However they do have permission as it is the general practice of banks as we I have already been through. Depositors are credited with interest every month exactly because they demand a return from the money the bank lend out to borrowers. But when banks do not ask customers directly and since when banks lend out deposits, they lend out of a big accumulated depositor fund they cannot debit individual accounts every time they lend out money. The reason why we talk about an increase in the supply of money provided by banks is not because the money is actually provided, but simply because the depositor still believes he has all the money he deposited and as such he will act and spend on a long term basis, as if he had

the exact sum he deposited. Accordingly the lender will also use the funds he borrowed as if they were real money. In the theoretical part on money and banking I mentioned how Irving Fisher made a big deal out of separating money and deposit currency and this is exactly why. Money as he denoted M, is actual money in gold, or today in coins and notes issued by the Federal Reserve, and deposit currency M' is only money in the sense that it can be used in transactions, but in reality there are no physical asset behind it.

#### 7.6.1.1 Money Supply and Value for Money

In an economic environment in which there are no interventions, banks can operate freely and manage their accounts in the most profitable way. They can chose their own customers and conduct their own credit analysis. They can apply statistical discrimination and they can adjust the interest rate to match demand. This has some immediate direct effects to the supply of money. As banks or lending institutions in this case have no safety net in terms of bailouts or lender of last resort, there will be a lot less loans initiated and thus a smaller supply of money. There are, however, also a few indirect effects to consider and they will prove to be a lot more significant.

As fewer loans are given, demands to borrowers rise and banks operate under perfect risk and return principles. This means that only the most profitable projects can afford the funding available and are accepted by the banks. In other words only genuine positive NPV projects will have a chance. In the discussion of purchasing power of money, it is interesting to dig a little deeper into the nature of investments with positive NPV's. As stated in the Principles of Corporate Finance book we still know very little about how to find positive NPV projects. All that the book really states is that projects with positive NPV's earn economic rents<sup>77</sup>. The important thing in relation to my problem statement is how these economic rents benefit society. It is implied in the expression that they generate value. The nature of this value no doubt varies a lot, but if we narrow it down we can say that a company has to be successful to generate a positive NPV and to be successful it will have to create better value for money than its competitors, as better value for money is what attracts customers. Better value for money can be interpreted as a product that is equal in terms of value of the competitors but slightly cheaper, better in terms of value than the competitors but costs the same, or better value and cheaper than the competitors. Thus if a new company enters a market with a better value for money two things can be concluded. It either reduces the price of the given product, leaving

<sup>&</sup>lt;sup>77</sup> Richard A. Brealey, Steward C. Myers, Franklin Allan, 970

consumers with more money to spend on the same product and every other product in the market, or it increases the value and thereby reduces the amount needed of that specific product. Again in the long run this leaves consumers with more money to spend on every other product. Either way it indirectly increases overall demand for products and overall output in terms of increased value for money. Note that this increase in demand and output is not caused by a reduction in the savings rate, but simply as a reduction in prices driven by increased production efficiency.

The entrance of this new company was only possible because a bank provided the necessary funding. As we know this funding has increased the supply of money. However, what is evident here is that this particular increase in the supply of money is not really reducing the purchasing power of money. This is because the money "created" by the bank to fund the new company, generates efficiency in terms of increased output and reduced prices. The situation is once again best described with the equation of exchange. Below I have copied the same base as I used in the beginning of the analysis.

$$10.000.000$$
 × 1,95 = 39.000.000 liters of milk × 0,5 \$/liter

Again the total supply of money is 10.000.000 \$, the velocity of money as always is 1.95, the output is 39.000.000 liters of milk and the purchasing power of money is 0,5 \$ per liter of milk. To put into numbers what I explained above I assume that the new company borrowed 1.000.000 \$ which increases the supply of money to 11.000.000 \$. Further I assume that this 1.000.000 \$ invested increases the efficiency of the company and enables them to produce 42.900.000 liters instead of 39.000.000 liters of milk.

## 11.000.000 \$ $\times 1,95 = 42.900.000$ liters of milk $\times 0,5$ \$/liter

The purchasing power is still 0,5 \$ / liter of milk but the production output has increased along with the supply of money. In fact what we see is that both supply and demand rise at the same time and rate, and thus there are no changes in prices. Since the purchasing power of money is unchanged there will be no effect on the behavior of consumers and investors. They will find that prices are unchanged and thus there are no new conditions for them to react to. These figures, apart from the velocity factor, are just made up figures to illustrate the value creation and the effect on purchasing power, but the illustration also makes sense if we return to the theoretical discussion on the origin of money. Here I described how money originated as goods that were best suited for indirect exchange. An important notation here though is that in order to acquire a good such as bread, one will still have to produce something in exchange of equal value. As the value of the medium used in exchange is determined as its purchasing power in terms of every other good, it is implied that in order to obtain a sufficient amount of money to acquire the preferred amount of goods, one will then initially have to produce something that can be sold for the amount of money needed to buy the good. What the example above illustrates is that the increase in dollar is not just used in exchange for goods, but actually also increases the supply of goods. Thus there is an increase in the value of goods in exchange to support the increase in the money supply.

## 7.7 Central Banking and Supply of Money

With central banking the currency is no longer gold but Federal Bank notes. This, however, should not impose any differences. Today Federal Bank notes are traded just like gold certificates used to be. In fact I could have made the example above with central bank notes and get the same conclusion. This is because the difference from a system with central banking and one without is not so much the medium of exchange. The difference lies in the Central Bank notes' ability to be inflated.

Today banks also face intervention from the government. This has disrupted a lot of the natural equilibriums that used to guide banking operations. The most significant disrupted economic guidance factor is the interest rate. This is no surprise as the interest rate is the exact aim of the operations of the Federal Reserve. As previous statistics have shown, the interest rate has dropped over the course of the period described in this thesis as a cause of the Federal Open Market Operations. Federal Reserve purchases treasuries in the market when it wishes to reduce the interest rate. As I mentioned earlier, the owner of the bond gets the proceeds of this sale. Thus in any case government purchases of treasuries will end up in the banks' balance sheets as some kind of deposit. This will increase bank reserves and thus diminish the need to borrow from other banks. The banks' demand for financial capital is thus reduced and in turn they will lower the rates they demand from borrowers. The standard measure for the rate that banks charge customers is the *bank prime loan rate*, which is usually the rate that loyal customers with a good credit history can borrow money at in their bank. The

development in the federal funds rate and the bank prime loan rate is depicted in Figure 7.7 (1) in Appendix 8:

In the example with no central banking and no government intervention, the inflow of base money was limited to the production capacity of goldmines and rivers and such. In a federal reserve system the growth of the base money supply is controlled by the government. This indirectly also gives the US government control on the growth of the entire M2 money supply. Below is a timeline of the Base Money:



This measure grew 522 % from the period of 1980 to 2008. The sharp rise from 2008 to 2009 is an effect of the massive stimulus package program. This yearly rise of the base money is the exact difference between a natural banking system and a system with central banking. In the system with no central banking and an assumption of gold as money, the base money or gold itself was only expanding in very small steps. In fact data on global gold reserves show that total gold reserves were reduced from 1948 to 2009<sup>78</sup>. In theory, however, it is no problem to transfer this development to a fiat system. As I mentioned earlier, fiat paper money are today accepted exactly like gold certificates used to be, and controlling the supply of fiat base money is exclusively in the hands of the Federal Reserve. The Federal Reserve could if they wanted chose to keep the level of base money steady.

<sup>&</sup>lt;sup>78</sup> http://www.reserveasset.gold.org/(This however seems a little unlikely. But in the notes on the data it is also stated that not all countries report their holdings. Still I think the number indicate that base money under a gold standard system would rise no way near as fast as it does in the US fiat system)

#### 7.7.1 The Base Money and GDP Relationship

If one looks closer at base money and M2, it is obvious that there is a sharp relation between the two. From 1980 and until 1992 the ratio between base money and the M2 money stock was around 10 and 11. From 1992 to 1994 it dropped a bit to 8,5 and from 1994 to 2007 the average M2 / Base Money ratio have been 8,37 with a maximum of 8,49 in 1994 and a minimum of 8,17 in 2000. The years 2008 and 2009 are not statistically relevant, as the growth in the base money in those years is due to extraordinary intervention from the US government. What the average ratio of 8,37 says is that every time the supply of base money rises by 1% the supply of the M2 money stock rises by 8,37 %. In Chapter 5 I introduced the equation of exchange with deposit currency:

$$MV' + MV' = PQ$$

As I only deal with one overall velocity of money I have rewritten the statement to:

$$(M + M') \times V = PQ$$

Where M is the monetary base or M0 and M' is deposit currency which I calculate as M2 - M0. In reference to the M2 multiplier this means that every time M rises by 1, M + M' or M2 rises by 8,37. Since the velocity of money is assumed constant at 1,95 it can be stated that the increase in the monetary base multiplied by 8,37 multiplied by 1,95 is equal to PQ. Since PQ can be translated into GDP in the equation of exchange we now have a relation between an increase in the monetary base and a subsequent increase in GDP:

$$GDP = 1,95 \times 8,37 \times M0 \iff GDP = 16,32 \times M0$$

Thus for instance according to the statistics the monetary base grew by 415,6 billion \$ from 1994 to 2007. According to the equation above this will mean an increase in nominal GDP of:

If we hold this measure up with the actual recorded GDP figures we see that GDP in the same period grew 6975,6 billion \$. Thus the GDP measurement is almost 200 billion \$ short on the actual figures. However, in the period from 1994 to 2007 the average velocity of money factor was not 1,95 but 2,003 and with this change the calculations indicate a GDP / M0 ratio of 16,77 and an increase in GDP of 6967,6 billion \$. So since 1994 whenever the Federal

Reserve pressed another 1 dollar as base money into the system they boosted GDP in nominal terms with roughly 16,77 \$.

### 7.7.2 Opportunity Cost and Value for Money

The expansion of money visible in Figure 7.7 (2) and the subsequent decline in the interest rate generated some beneficial credit conditions for corporations and consumers. This increased the consumers' propensity to consume, but more importantly it increased the corporations' propensity to invest. Previously in the analysis I showed how the company WACC declined along with the interest rate and as new projects are discounted with the WACC this continuously makes new projects look more and more attractive. Back in the days where every single market indicator was projecting growth this was not an issue, because private consumption was large enough to support the growing number of products entering the market. The only issue was that this consumption growth was not really natural. In the monetary policy and consumer behavior part I described how the consumption growth was mainly a result of a declining currency and cheap funding. Looking at the actual calculated WACC values for instance, we see that WACC of company 2 was 8,17 % in 1991, but dropped to 6,2 %, whereas the Company 1 WACC was 7,27 % in 1991 and dropped to 5,03 % in 2005. In other words Company 2 would in 1991 reject projects or investments with a return of roughly 8 %, but accept projects with a return above 6,2 % in 2005. Company 1 would in 1991 reject projects or investments below 7,28 %, but in 2005 they would gladly invest in anything that would generate just above 5 % in return. If this development is held up against the arguments on value for money in the part above it is obvious that there was a lot less pressure on companies or new companies to produce better value for money in 2005 than there was in 1991.

#### 7.7.3 Money Supply and Equation of Exchange

There was a foundation for companies to start up and expand which would not have existed in a natural economy. In an economy like the American economy in the "boom" period there were much more examples of *money on the table*. When consumption is increasing as rapidly as it did in the period from 1990 through 2007 and when the cost of capital at the same time was very low and easy to get, there were much more opportunities of entering the market with a profit.

The monetary base expansion effects on total money supply, prices and output from 1980 to 2007 is visible in the table below. Here I have used the equation of exchange to show the effects of monetary policy from 1980 to 2007:

**Table 7.7** 

**Source: Appendix 7** 

		( M	+	M')	х	V	=	Р	х	Q	GDP
1980	(	158,6	+	1.381,8)	х	1,81	=	1,00	х	2.788,1	2.788,1
1981	(	163,9	+	1.515,7)	х	1,86	=	1,00	х	3.118,3	3.126,8
1982	(	172,1	+	1.660,9)	х	1,78	=	1,01	х	3.206,2	3.253,2
1983	(	183,4	+	1.873,5)	х	1,72	=	1,12	х	3.143,9	3.534,6
1984	(	195,2	+	2.026,0)	х	1,77	=	1,20	х	3.286,0	3.930,9
1985	(	210,6	+	2.208,1 )	х	1,74	=	1,20	х	3.522,1	4.217,5
1986	(	230,8	+	2.384,9)	х	1,71	=	1,22	х	3.667,8	4.460,1
1987	(	253,1	+	2.532,8)	х	1,70	=	1,25	х	3.794,8	4.736,4
1988	(	271,9	+	2.664,4 )	х	1,74	=	1,30	х	3.916,3	5.100,4
1989	(	283,2	+	2.776,6)	х	1,79	=	1,34	х	4.077,3	5.482,1
1990	(	301,7	+	2.926,1 )	х	1,80	=	1,37	х	4.222,9	5.800,5
1991	(	318,1	+	3.029,4)	х	1,79	=	1,39	х	4.302,2	5.992,1
1992	(	341,5	+	3.068,0)	х	1,86	=	1,48	х	4.292,1	6.342,3
1993	(	376,4	+	3.068,8)	х	1,94	=	1,50	х	4.437,8	6.667,4
1994	(	411,1	+	3.079,8)	х	2,03	=	1,55	х	4.564,3	7.085,2
1995	(	433,7	+	3.129,0)	х	2,08	=	1,56	х	4.750,3	7.414,7
1996	(	447,8	+	3.286,7)	х	2,10	=	1,61	х	4.869,7	7.838,5
1997	(	471,5	+	3.449,6)	х	2,12	=	1,65	х	5.051,9	8.332,4
1998	(	502,1	+	3.698,7)	х	2,09	=	1,67	х	5.277,0	8.793,5
1999	(	550,5	+	3.961,5)	х	2,07	=	1,70	х	5.506,8	9.353,5
2000	(	585,3	+	4.196,8)	х	2,08	=	1,72	х	5.772,6	9.951,5
2001	(	617,8	+	4.582,1)	х	1,98	=	1,71	х	6.011,6	10.286,2
2002	(	673,0	+	4.921,3)	х	1,90	=	1,75	х	6.076,5	10.642,3
2003	(	715,9	+	5.264,1)	х	1,86	=	1,80	х	6.186,7	11.142,1
2004	(	751,9	+	5.506,8)	х	1,90	=	1,87	х	6.340,7	11.867,8
2005	(	782,1	+	5.741,8)	х	1,94	=	1,92	х	6.567,3	12.638,4
2006	(	810,8	+	6.056,7)	х	1,95	=	1,98	х	6.767,9	13.398,9
2007	(	826,7	+	6.474,9)	х	1,93	=	2,02	х	6.948,8	14.061,8

In 1980 the price level is 1, and Q as an expression of real GDP is equal to nominal GDP. From the table it is evident that the total supply of money grew from 158,6 bn + 1381,8 bn = 1540,4 bn  $\pm$  to 826,7 bn + 6474,9 bn = 7301,6 bn  $\pm$ . This is equivalent to a 374 % increase. With a velocity of money of 1,926 in 2007 the money side of the equation yielded 7301,6 billion  $\pm$  1,926 = 14062,9 billion  $\pm$ . However when looking at Q it is obvious that the real value of the goods and services produced didn't rise as fast. In the same period that the total supply of money grew 374 %, the real value in terms of goods and services produced only rose by 149 % from 2788,1 billion \$ to 6948,8 billion \$. The residual between the nominal GDP and real GDP in 2007 of 14061,8 bn \$ - 6948,8 bn \$ = 7113 bn \$ is alone a result of price inflation. As the table shows prices rose by a little more than 100 %. In reference to the discussion with no central banking it is evident that the increase in money did not bring about an equal increase in goods and services for exchange. In fact what the statistics reveal is that only half the money created provided a sound increase in GDP. The other half went into price inflation. This in turn seems like the natural outcome of the financial policies in action. A large percentage of the money created went into mortgages and rescues and subsidies of a number of the largest corporations in the economy. Mortgage financing does not produce any value but only increases the value of assets and thus brings about the perception of a value increase and the various bailouts and subsidies do not support any additional value either as they only keeps companies alive whose products the public obviously do not perceive as better value for money.

Thus what I expressed above as the theoretical outcome of the expansion of money is here visible in numbers. The supply of base money is hugely inflated and as a consequence hereof the total supply of money is hugely inflated as well. The succeeding decreasing interest rates support growth that is not sustainable and thus the increasing money supply causes prices to rise as the increasing production is not contributing with sufficient better value in exchange in terms of product value. It is then visible that the growth depicted by the GDP figure in the very right side of the table was not sustainable and that actual production only increased by half as much as GDP. Thus the supply of money has increased twice as fast as the production of goods and services and the result is that prices doubled.

# 8. Conclusion

The effect of the supply of money on financial decision making is a many sided subject to assess. First of all there are two primary types of money supply of which money is supplied on two very different grounds. Second of all the effect of the supply of money in general depends on the type of banking system that is in operation. What my research concluded was that in a natural banking system the supply of money would not have any significant effect on consumer and investor behavior. This was because there in a natural banking system was no or only very little supply of base money. The only expansion of money in society was based on the lending that banks provided to corporations and consumers. This lending had in turn

some natural limits. As there are no safety net supporting banks and consumers they both operate with more financial caution. Consumers keep an eye on the operation of their bank to make sure that the risk profile of the bank matches theirs. If at any time they believe that the risk of default in the assets of the bank increases they will demand their deposit and place it in a safer bank. Likewise, banks will more closely monitor their investments and their reserves to make sure that their depositors at all times feel confident with the way the bank is handling their money. These conditions create a natural equilibrium in the market for financial capital.

The interest rate is determined on the reserves of the bank and demand for capital. Thus in times of economic expansion, banks will gradually increase the interest rate as their lending starts to eat too much of their reserves. Thus lending and the economic expansion are gradually reduced. There is then a strong correlation between interest rates and demand for financial capital. These conditions have a profound impact on the value of production. As financial resources are scarce, only the most profitable projects and startups get funded. This in turn acts as a window from which only the products or services with the best value for money slip through to the market to the benefit of the consumer. Thus the interest rate indirectly selects only the products with the best value for money. The result is that the expansion of money in terms of the loans supplied to the industry will not change the prices up or down, as the products that are developed actually add additional value to the market in terms of quality or price and increased competition. The quantity theory of money showed in such a case that money supply and quantity of services and goods produced rose equally and left behind a stable level of prices assuming a constant velocity of money.

As it turns out the economy today is very different from the scenario above and this in turn has an extensive impact on the way money expansion occurs. In a fractional reserve system the supply of money comes not only from the banks but from the central banks as well. They control the overall supply of money. This also has an impact on the way new money enters the system. Since governments expand money with a predefined purpose in the economy, the money expansion is directed towards specific areas or goals. Thus we have seen how some of the expansion of money has been directed at the market for mortgages, industrial production and consumption. The money creation is now not only driven by the prospect of a profitable investment in new innovative ideas. Money is also injected into the system to create a demand with the purpose of new or existing companies to expand and satisfy this demand. These
conditions, however, do not increase competition. All they do is create a larger market for the producers to sell their products and services in. Companies are then motivated by the artificial increase in demand and the cheap funding to increase their own investments. The result is that products are produced and sold in the market that would never have been demanded, had the interest rates not been artificially low. The unfortunate effect hereof is that the new dollars supplied to provide capital for such products do not bring about an equal value of exchange in terms of quality. Thus there is not a sufficient increase in the value of goods in exchange to support the increase in the money supply. Money is nothing but a tool for indirect exchange; to increase the supply of money without increasing the value of goods in exchange only reduces the value of money.

The increased consumption of capital is driven by an expanding economy and the supply of capital is driven by an increasing demand for higher returns. The bi-product of excess supply of money is low interest rates. Savers, we saw, were forced to invest in more risky assets as their money would otherwise depreciate. In fact they were also further enticed by the fact that almost every asset including stocks increased dramatically in the period and thus added to the growing demand for risky assets. Even savers unwilling to invest were still given incentives to deposit their capital in the most risky banks with the largest return as they were insured by the FDIC. Likewise the low interest rates coupled with government incentives for financial institutions to issue mortgages enabled consumers, usually not suited for a mortgage, to purchase a house. There is evidence to support that some of these incentives were generated by the CRA but Fannie Mae and Freddie Mac no doubt seemed to be the more damaging participants. All in all there are, it seems, a couple of contributing factors to explain the unusual behavior of the various market participants. General economic equilibrium is constantly distorted and the actors of the economy are constantly given incentives to take actions against natural rationalism. Many of these incentives are driven by the government interventions, but they in turn are all provided with money supplied by the Federal Reserve Bank. It can be concluded then that the type of money expansion conducted by the Federal Reserve Bank and the composition of the market in which all this credit is pumped into, has some very profound repercussions to any type of financial decision making.

#### 9. Discussion

With this thesis I have not tried to explain the causes of the financial crisis. What I wished to highlight instead was how greed exactly was suddenly an issue. The conclusions I made are more dramatic than I had expected. I was surprised at how much the American economy is distorted by the excess supply of money and the government interventions. I revealed how this expansion of money caused an unusual investor and consumer behavior, but it was in a recent article in the New York Times that I was reminded of the even deeper devastating effects. In the article published the 8<sup>th</sup> of September this year it is written that the deterioration of the value of the dollar and the low interest rates are starting to really hamper the future of people who planned to live of their savings such as retirees<sup>79</sup>. People who thought that they could retire soon are now in a situation where they have to push their retirement to an unknown future date. Such developments are by any standards the most destructive of all. Savings as I have mentioned play a vital role in a nation's economy as they are the foundation of investment and development.

Even worse they do it on a continual basis and recently the expansion of the money supply has been so excessive that the usual effects of such actions have been exhausted in the sense that short term interest rates have now reached the 0 to 0,25 % band and cannot get any lower. As such it is written in another recent article from The Wall Street Journal that Ben Bernanke is now preparing for the Federal Reserve to take new steps in order to boost the economy that still really has not recovered from the financial crisis<sup>80</sup>. In the realization of the exhaustion of short term rates, Bernanke is now targeting the long term rates. To push them down he will simply promise the market to keep the short term interest rate low for a longer time than the market would normally anticipate. Apparently, investors are now supposed to base their financial choices on promises from the Chairman of the Federal Reserve. Considering the theory of the term structure, it is obvious how destructive this kind of policy is. To begin to mess this relationship up is a dramatic violation of the efficiency of the market and will only create more opportunities for investors to take advantage of.

<sup>&</sup>lt;sup>79</sup>http://www.nytimes.com/2010/09/09/business/economy/09rates.html?\_r=2&scp=1&sq=low%20interest%20rat es&st=cse

<sup>&</sup>lt;sup>80</sup>http://online.wsj.com/article/SB10001424052748704779704575553813746866210.html?mod=WSJ\_Markets\_ LEFTTopNewsInt

There is actually also evidence to suggest that people are gradually losing faith in the policies of the federal bank. According to an article from Bloomberg the market is clearly indicating its level of trust in the American government by requiring a larger return on treasury bills than corporate bonds from Berkshire Hathaway, Proctor and Gamble, Johnson and Johnson and Lowe<sup>81</sup>. A situation the article describes as highly unusual. It might sound like the companies mentioned are just very safe investments, but in essence what this data suggests is that Americans and global investors as well of course, find it less safe to invest in their own country or USA than they find it to invest in a company. Put it differently in March 2010, investors had more faith in the managers and the future of the mentioned companies than they had in the American Government and nation as a whole.

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<sup>&</sup>lt;sup>81</sup> http://www.bloomberg.com/apps/news?pid=newsarchive&sid=ayK1N3ffXarY

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# 11. Appendix

### Appendix 1

Title: Series ID: Source: Notes:		Velocity of M2 Money Stock M2V Federal Reserve Bank of St. Louis Calculated as the ratio of quarterly	nominal GDP	
		(http://research.stlouisfed.org/fred/ average of M2 money stock (http://research.stlouisfed.org/fred/	2/series/M2SL).	he quarterly
		Velocity is a ratio of nominal GDP supply. It can be thought of as the rate of t is, the number of times one dollar i and services included in GDP.	to a measure of th urnover in the mo is used to purchas	ne money oney supplythat se final goods
DATE		VALUE		
	1959-01-01	1,721	1	
	1959-04-01	1,741	1	
	1959-07-01	1,720	1	
	1959-10-01	1,727	1	_
				_
	2007-01-01	1,934	. 1	
	2007-04-01	1,934	. 1	
	2007-07-01	1,924	· 1	
	2007-10-01	1,914	· 1	
	2008-01-01	1,882	. 1	
	2008-04-01	1,872	. 1	
	2008-07-01	1,851	1	
	2008-10-01	1,750	1	
	2009-01-01	1,680	1	
	2009-04-01	1,667	· 1	
	2009-07-01	1,672	. 1	
	2009-10-01	1,676	1	
	2010-01-01	1,696	1	
	2010-04-01	1,704	· 1	_
		370,967	206	1,800811

	Industrial production	Consumer Price Index for All Urban	M2 Money
	indeks	Consumers: All Items	Stock
_	(2007=100)	(2007=100)	(2007=100)
1990	62,03	63,02	44,21
1991	61,07	65,67	45,85
1992	62,80	67,67	46,70
1993	64,85	69,68	47,18
1994	68,28	71,49	47,81
1995	71,53	73,50	48,79
1996	74,71	75,65	51,15
1997	80,10	77,42	53,70
1998	84,78	78,62	57,53
1999	88,41	80,34	61,80
2000	91,96	83,05	65,50
2001	88,89	85,39	71,22
2002	89,08	86,75	76,62
2003	90,21	88,75	81,90
2004	92,31	91,11	85,72
2005	95,26	94,18	89,35
2006	97,39	97,21	94,05
2007	100,00	100,00	100,00
2008	96,69	103,82	107,12
2009	87,72	103,48	115,54
	Industrial production indeks	Consumer Price Index for All Urban Consumers: All Items	M2 Money Stock
-		Growth from 1990 to 2007	
_	61,22%	58,69%	126,21%

#### Appendix 2

#### Appendix 4

	1-Month Certificate	Consumer Price	
	Secondary Market	Consumers: All	Inflation Adjusted
	Rate	Items Growth rate	1-Month CD
1990	0,0815		
1991	0,0582	0,0422	0,0154
1992	0,0364	0,0304	0,0058
1993	0,0311	0,0297	0,0014
1994	0,0438	0,0260	0,0173
1995	0,0587	0,0281	0,0298
1996	0,0535	0,0294	0,0234
1997	0,0554	0,0234	0,0313
1998	0,0549	0,0155	0,0388
1999	0,0519	0,0219	0,0293
2000	0,0635	0,0337	0,0288
2001	0,0382	0,0282	0,0098
2002	0,0172	0,0160	0,0012
2003	0,0115	0,0230	-0,0112
2004	0,0145	0,0267	-0,0119
2005	0,0334	0,0337	-0,0003
2006	0,0506	0,0322	0,0178
2007	0,0523	0,0287	0,0230
2008	0,0273	0,0382	-0,0105
2009	0,0030	-0,0032	0,0063
	Average inflation /	Average real	
	Year	return on CD's	

Year	return on CD's
0,026490911	0,012921884

#### Appendix 6a





Source: Appendix 6

#### A Monetary Analysis of Pre-Financial Crisis Investor Behavior









#### Appendix 9

#### A Note on CDO's

CDOs were the main force behind the global ownership distribution of American mortgage debt. CDOs exist in many variations but are essentially structured as a trust set up by an investment bank. The trust raises funds from selling bonds in the trust and uses those proceeds to buy interest bearing assets. Usually the assets consist of varying types of debt, but during the years before the financial crisis, demand for mortgage debt was larger than anything else, so investors filled up the trusts with mortgage debt. As mortgage debt varies a great deal in risk the trusts were able to divide the different risks into categories also called tranches. As with any other financial product the least risky tranches also pay the smallest interest. In addition though the tranches are connected in a way that the least risky tranches get paid first and only the mortgage interest that is left from paying the first tranches can "flow" down and fill the second tranche and so on and so forth.<sup>82</sup>

Many have later questioned how these CDOs managed to get such a high rating from the rating agencies but in reality it was very difficult to calculate the risk of these products. This mainly because the CDOs were further complicated by the fact that the mortgages that they bought were Mortgage Backed Securities and were as such already slices of different mortgage debt bundled together.

As there seemed to be a solid housing market in the U.S. with increasing housing values there was, apparently little concern about the risk of the CDOs. As long as the housing market kept increasing in value there was little concern about the possible losses. Only few people seemed to think about the devastation if the housing market turned around.

<sup>&</sup>lt;sup>82</sup> http://money.cnn.com/2007/11/24/magazines/fortune/eavis\_cdo.fortune/index.htm

#### Appendix 5, NPV Real Estate

	19	89 1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
30-Year Conventional Mortgage Rate	10,	32 10,13	9,25	8,40	7,33	8,36	7,96	7,81	7,60	6,94	7,43	8,06	6,97	6,54	5,82	5,84	5,87	6,41	6,34	6,04	5,04
30-Year Conventional Mortgage Rate in %	10,32	2% 10,13%	9,25%	8,40%	7,33%	8,36%	7,96%	7,81%	7,60%	6,94%	7,43%	8,06%	6,97%	6,54%	5,82%	5,84%	5,87%	6,41%	6,34%	6,04%	5,04%
Monthly compounded in %	0,82	2% 0,81%	0,74%	0,67%	0,59%	0,67%	0,64%	0,63%	0,61%	0,56%	0,60%	0,65%	0,56%	0,53%	0,47%	0,47%	0,48%	0,52%	0,51%	0,49%	0,41%
30-Year Treasury Constant Maturity Rate		8,61	8,14	7,67	6,60	7,37	6,88	6,70	6,61	5,58	5,87	5,94	5,49	5,32	4,88	4,96	4,57	4,87	4,83	4,28	4,07
30-Year Treasury Constant Maturity Rate in %		8,61%	8,14%	7,67%	6,60%	7,37%	6,88%	6,70%	6,61%	5,58%	5,87%	5,94%	5,49%	5,32%	4,88%	4,96%	4,57%	4,87%	4,83%	4,28%	4,07%
Monthly Compounded in %		0,69%	0,65%	0,62%	0,53%	0,59%	0,56%	0,54%	0,53%	0,45%	0,48%	0,48%	0,45%	0,43%	0,40%	0,40%	0,37%	0,40%	0,39%	0,35%	0,33%
Price / Rent ratio	16,90																				
http://www.standardandpoors.com/indices/sp-case-shiller-home-price-indices/en/us/?indexId=spusa-cashpidffp-us																					
Annual House Price Increase in %	0,06																				
Real Estate Value	300.000,00																				
Payments	360,00																				
Likely Calculated Rent	1.479,29																				
APV mortgage payment		2.563,82	2.387,75	2.220,93	2.015,02	2.212,16	2.134,51	2.105,81	2.065,60	1.942,30	2.033,85	2.155,43	1.947,61	1.866,59	1.735,41	1.739,46	1.743,83	1.843,22	1.830,65	1.775,68	1.597,58
Cash Flow		-1.084,53	-908,46	-741,64	-535,73	-732,87	-655,22	-626,52	-586,31	-463,01	-554,56	-676,14	-468,32	-387,30	-256,12	-260,17	-264,54	-363,93	-351,36	-296,39	-118,29
APV cash flow		143.871,68	125.625,19	107.011,32	-85.586,81	108.702,34	101.791,88	-99.087,51	-93.597,57	-82.084,70	-95.403,29	115.402,07	-83.776,38	-70.591,88	-48.987,21	-49.284,78	-52.358,03	-69.639,90	-67.509,95	-60.627,30	-24.791,31
FV house	1.723.047,35																				
PV house		144.678,08	164.895,30	187.870,76	253.387,26	204.083,84	233.827,69	246.185,73	252.853,01	338.106,22	311.618,05	304.923,36	346.375,17	364.102,57	413.158,54	402.928,43	451.074,63	413.644,15	418.034,18	490.197,01	520.756,74
NPV house		- 156.406,45	- 136.013,16	- 112.870,88	-47.148,47	-96.649,03	-66.827,53	-54.440,80	-47.733,30	37.643,20	11.063,49	4.247,23	45.906,85	63.715,27	112.902,43	102.668,26	150.810,09	113.280,22	117.682,82	189.900,62	220.638,46
NPV House Index (2007=100)		-132,91	-115,58	-95,91	-40,06	-82,13	-56,79	-46,26	-40,56	31,99	9,40	3,61	39,01	54,14	95,94	87,24	128,15	96,26	100,00	161,37	187,49
30-Year Conventional Mortgage Rate Index (2007=100)		159,72	145,83	132,45	115,57	131,74	125,42	123,07	119,76	109,49	117,13	127,13	109,93	103,07	91,75	92,10	92,48	101,08	100,00	95,26	79,50
30-Year Treasury Constant Maturity Rate Index (2007=100)		178,07	168,30	158,59	136,49	152,46	142,41	138,61	136,65	115,39	121,34	122,93	113,64	110,01	100,85	102,66	94,51	100,76	100,00	88,52	84,18

# Appendix 6, Company 1, Beta 0,85

	Year	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
FRED	Moody's Seasoned Aaa Corporate Bond Yield	0,088	0,081	0,072	0,080	0,076	0,074	0,073	0,065	0,070	0,076	0,071	0,065	0,057	0,056	0,052	0,056	0,056	0,056	0,053
	Moody's Seasoned Baa Corporate Bond Yield	0,098	0,090	0,079	0,086	0,082	0,081	0,079	0,072	0,079	0,084	0,079	0,078	0,068	0,064	0,061	0,065	0,065	0,074	0,073
	Inflation	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027
FRED	6 monts treasury	0,075	0,054	0,035	0,031	0,046	0,056	0,051	0,052	0,048	0,047	0,059	0,033	0,017	0,011	0,016	0,034	0,048	0,044	0,016
	Tay	0.3																		
	a	0.85																		
Sheet S&P	4	0,00																		
500	Average market return	0,104	0,103	0,103	0,102	0,106	0,107	0,110	0,112	0,114	0,111	0,107	0,102	0,104	0,104	0,104	0,104	0,104	0,096	
	Sales	500,000	513,250	526,851	540,813	555,144	569,856	584,957	600,458	616,370	632,704	649,471	666,682	684,349	702,484	721,100	740,209	759,824	779,960	800,629
	VC (50 %)	250,000	256,625	263,426	270,406	277,572	284,928	292,478	300,229	308,185	316,352	324,735	333,341	342,174	351,242	360,550	370,104	379,912	389,980	400,314
	Salaries	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
	EBIT	150,000	153,975	158,055	162,244	166,543	170,957	175,487	180,137	184,911	189,811	194,841	200,004	205,305	210,745	216,330	222,063	227,947	233,988	240,189
	Interest expense	14,732	13,675	12,128	13,377	12,751	12,382	12,200	10,973	11,830	12,806	11,899	10,906	9,520	9,456	8,795	9,387	9,334	9,461	8,926
	FBT	135.268	140.300	145 927	148 867	153 792	158 575	163,287	169 164	173.081	177.005	182 943	189.098	195,785	201.290	207 535	212 676	218 614	224.527	231,262
											,	,		,	,		,		,,	,
	<b>v</b> .	40 500	42,000	40.770		16 430	47 570	10.000	50 740		52.402	54.000	5.6 700	50 705	co 207	<b>CD DC4</b>	c2 002		67.050	co 270
	Tax	40,580	42,090	43,778	44,660	46,138	47,573	48,986	50,749	51,924	53,102	54,883	56,730	58,735	60,387	62,261	63,803	65,584	67,358	69,379
	Net Income	94,687	98,210	102,149	104,207	107,654	111,003	114,301	118,415	121,157	123,904	128,060	132,369	137,049	140,903	145,275	148,873	153,029	157,169	161,884
	Balance sheet																			
	Assets																			
	Capital equipment	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000
	Cash	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000
	Book value	200.000	200.000	200.000	200.000	200.000	200.000	200.000	200.000	200.000	200.000	200.000	200.000	200.000	200.000	200.000	200.000	200.000	200.000	200.000
	Liabilities	1991.000	1992.000	1993.000	1994 000	1995.000	1996.000	1997.000	1998 000	1999 000	2000.000	2001.000	2002.000	2003.000	2004.000	2005.000	2006.000	2007.000	2008.000	2009.000
	Eddinees	1551,000	1552,000	1555,000	1554,000	1999,000	1990,000	1997,000	1990,000	1999,000	2000,000	2001,000	2002,000	2003,000	2004,000	2005,000	2000,000	2007,000	2000,000	2005,000
	Debt	168,000	168,000	168,000	168,000	168,000	168,000	168,000	168,000	168,000	168,000	168,000	168,000	168,000	168,000	168,000	168,000	168,000	168,000	168,000
	Equity	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000
		200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000
	WACC	0,073	0,068	0,063	0,067	0,065	0,064	0,064	0,060	0,063	0,066	0,063	0,058	0,053	0,053	0,050	0,053	0,053	0,052	
	Re	0,099	0,096	0,093	0,091	0,097	0,099	0,101	0,103	0,104	0,101	0,100	0,092	0,091	0,090	0,090	0,094	0,095	0,088	
	Debt/equity	5 350	5 350	5 250	5.250	5,250	5,250	5,250	5,250	5,250	5,250	5,250	5,250	5,250	5,250	5,250	5,250	5,250	5,250	
		5,250	5,250	5,250																
	Cost of debt	5,250	5,250	3,230	-,															
	Cost of debt Financial distress ratio	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	
	Cost of debt Financial distress ratio	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	
	Cost of debt Financial distress ratio	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	
	Cost of debt Financial distress ratio	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	
	Cost of debt Financial distress ratio Stocks	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	
	Cost of debt Financial distress ratio Stocks	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	
	Cost of debt Financial distress ratio Stocks Number of stocks	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	
	Cost of debt Financial distress ratio Stocks Number of stocks Book value of stocks	0,005 100 2,000	0,005 2,000	0,005	0,005	0,005	2,000	2,000	2,000	2,000	0,005	0,005	0,005	0,005	0,005	2,000	2,000	2,000	0,005	
	Cost of debt Financial distress ratio Stocks Number of stocks Book value of stocks Market value Re	5,250 0,005 100 2,000 9,525	2,000 10,225	0,005 2,000 10,969	0,005 2,000 11,403	0,005 2,000 11,142	0,005 2,000 11,169	0,005 2,000 11,303	0,005 2,000 11,482	0,005 2,000 11,681	0,005 2,000 12,263	0,005 2,000 12,821	0,005 2,000 14,421	0,005 2,000 15,032	0,005 2,000 15,615	0,005 2,000 16,066	0,005 2,000 15,881	0,005 2,000 16,064	0,005 2,000 17,862	

# Appendix 6, Company 1, beta 0,85, Active capital structure (Problemsolver)

	Year		1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
FRED	Moody's Seasoned Aaa Corporate Bond Yield		0,088	0,081	0,072	0,080	0,076	0,074	0,073	0,065	0,070	0,076	0,071	0,065	0,057	0,056	0,052	0,056	0,056	0,056	0,053
	Moody's Seasoned Baa Corporate Bond Yield		0,098	0,090	0,079	0,086	0,082	0,081	0,079	0,072	0,079	0,084	0,079	0,078	0,068	0,064	0,061	0,065	0,065	0,074	0,073
	Inflation		0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027
FRED	6 monts treasury		0,075	0,054	0,035	0,031	0,046	0,056	0,051	0,052	0,048	0,047	0,059	0,033	0,017	0,011	0,016	0,034	0,048	0,044	0,016
	Тах	0,3																			
	β	0,85																			
Sheet S&P 500	Average market return		0,104	0,103	0,103	0,102	0,106	0,107	0,110	0,112	0,114	0,111	0,107	0,102	0,104	0,104	0,104	0,104	0,104	0,096	
	Sales		500,000	513,250	526,851	540,813	555,144	569,856	584,957	600,458	616,370	632,704	649,471	666,682	684,349	702,484	721,100	740,209	759,824	779,960	800,629
	VC (50 %)		250,000	256,625	263,426	270,406	277,572	284,928	292,478	300,229	308,185	316,352	324,735	333,341	342,174	351,242	360,550	370,104	379,912	389,980	400,314
	Salaries		100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
	EBIT		150,000	153,975	158,055	162,244	166,543	170,957	175,487	180,137	184,911	189,811	194,841	200,004	205,305	210,745	216,330	222,063	227,947	233,988	240,189
	Interest expense		14,694	13,675	12,226	13,258	12,878	12,608	12,475	11,339	12,174	13,037	12,168	11,076	9,754	9,678	9,042	9,663	9,632	9,647	0,000
	EBT		135,306	140,300	145,829	148,986	153,665	158,349	163,012	168,798	172,737	176,774	182,673	188,928	195,551	201,067	207,288	212,400	218,316	224,341	240,189
	Tax		40,592	42,090	43,749	44,696	46,100	47,505	48,904	50,639	51,821	53,032	54,802	56,678	58,665	60,320	62,186	63,720	65,495	67,302	72,057
	Net Income		94,714	98,210	102,081	104,290	107,566	110,844	114,108	118,159	120,916	123,742	127,871	132,250	136,885	140,747	145,101	148,680	152,821	157,039	168,132
	Palanco shoot																				
	balance sheet																				
	Assets																				
	Capital equipment		150.000	150.000	150.000	150.000	150.000	150.000	150.000	150.000	150.000	150.000	150.000	150.000	150.000	150.000	150.000	150.000	150.000	150.000	150.000
	Cash		50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000
	Book value		200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000
	Liabilities		1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
	Debt		167,566	168,004	169,353	166,501	169,674	171,070	171,797	173,605	172,890	171,037	171,802	170,621	172,131	171,950	172,727	172,941	173,362	171,302	
	Equity		32,434	31,996	30,647	33,499	30,326	28,930	28,203	26,395	27,110	28,963	28,198	29,379	27,869	28,050	27,273	27,059	26,638	28,698	
			200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	0,000
	1																				
	WACC		0,073	0,068	0,063	0,067	0,065	0,064	0,064	0,060	0,063	0,066	0,063	0,058	0,053	0,053	0,050	0,053	0,053	0,052	
	Re		0,099	0,096	0,093	0,091	0,097	0,099	0,101	0,103	0,104	0,101	0,100	0,092	0,091	0,090	0,090	0,094	0,095	0,088	
	Debt/equity		5,166	5,251	5,526	4,970	5,595	5,913	6,092	6,577	6,377	5,905	6,093	5,808	6,176	6,130	6,333	6,391	6,508	5,969	
	Cost of debt		0,051	0,048	0,043	0,046	0,045	0,044	0,044	0,040	0,043	0,046	0,043	0,039	0,034	0,034	0,032	0,034	0,034	0,034	
	Financial distress ratio		0,005	0,005	0,006	0,005	0,006	0,006	0,006	0,007	0,006	0,006	0,006	0,006	0,006	0,006	0,006	0,006	0,007	0,006	
	1																				
	1																				
	Stocks																				
		100																			
	Number of stocks																				
	Book value of stocks	1	1,999999999	2	1,99999999	1,999999999	1,99999999	1,999999999	2	1,99999999	1,99999999	2	2	2	2,00000001	1,99999999	1,99999999	2	2	2	
	Market value Re		9,53	10,22	10,96	11,41	11,13	11,15	11,28	11,46	11,66	12,25	12,80	14,41	15,01	15,60	16,05	15,86	16,04	17,85	

# Appendix 6, Company 2, beta 1,5

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	Year		1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
FRED	Moody's Seasoned Aaa Corporate Bond Yield		0,088	0,081	0,072	0,080	0,076	0,074	0,073	0,065	0,070	0,076	0,071	0,065	0,057	0,056	0,052	0,056	0,056	0,056	0,053
	Moody's Seasoned Baa Corporate Bond Yield		0,098	0,090	0,079	0,086	0,082	0,081	0,079	0,072	0,079	0,084	0,079	0,078	0,068	0,064	0,061	0,065	0,065	0,074	0,073
	Inflation		0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027
FRED	6 monts treasury		0,075	0,054	0,035	0,031	0,046	0,056	0,051	0,052	0,048	0,047	0,059	0,033	0,017	0,011	0,016	0,034	0,048	0,044	0,016
	Tax	0,3																			
	β	1,5																			
et S&P	Average market return		0,104	0,103	0,103	0,102	0,106	0,107	0,110	0,112	0,114	0,111	0,107	0,102	0,104	0,104	0,104	0,104	0,104	0,096	
	Sales		500.000	513 250	526 851	540 813	555 144	569.856	584 957	600.458	616 370	632 704	649 471	666 682	684 349	702 484	721 100	740 209	759 824	779.960	800 629
	VC (50 %)		250,000	256.625	263 426	270.406	277.572	284 928	292 478	300,229	308.185	316 352	324,735	333 341	342.174	351.242	360,550	370.104	379.912	389,980	400.314
	Salaries		100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000
	EBIT		150.000	153,975	158.055	162.244	166.543	170.957	175.487	180.137	184.911	189.811	194,841	200.004	205.305	210.745	216.330	222.063	227.947	233.988	240.189
				,	,				., .				- ,-	,		., .	.,	,		,	.,
	Interest expense		16,859	15,440	13,640	14,831	14,105	13,853	13,524	12,420	13,538	14,386	13,670	13,419	11,637	10,997	10,430	11,144	11,150	12,808	12,549
	EBT		133,141	138,535	144,416	147,413	152,438	157,103	161,964	167,718	171,373	175,425	181,172	186,586	193,667	199,749	205,900	210,919	216,797	221,180	227,640
	Tax		39,942	41,561	43,325	44,224	45,731	47,131	48,589	50,315	51,412	52,627	54,351	55,976	58,100	59,925	61,770	63,276	65,039	66,354	68,292
	Net Income		93,199	96,975	101,091	103,189	106,706	109,972	113,374	117,402	119,961	122,797	126,820	130,610	135,567	139,824	144,130	147,643	151,758	154,826	159,348
	Balance sheet																				
	Assets																				
	Assets		150.000	150.000	150.000	150.000	150.000	150.000	150.000	150.000	150.000	150.000	150.000	150.000	150.000	150.000	150.000	150.000	150.000	150.000	150.000
	Assets Capital equipment Cash		150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000
	Assets Capital equipment Cash Ronk value		150,000 50,000 200,000	150,000 50,000 200,000	150,000 50,000 200,000	150,000 50,000	150,000 50,000 200,000	150,000 50,000 200,000	150,000 50,000 200,000	150,000 50,000 200,000	150,000 50,000	150,000 50,000 200,000	150,000 50,000 200,000	150,000 50,000	150,000 50,000 200,000	150,000 50,000 200,000	150,000 50,000 200,000	150,000 50,000 200,000	150,000 50,000 200,000	150,000 50,000 200,000	150,000 50,000 200,000
	Assets Capital equipment Cash Book value		150,000 50,000 200,000	150,000 50,000 200,000	150,000 50,000 200,000	150,000 50,000 200,000	150,000 50,000 200,000	150,000 50,000 200,000	150,000 50,000 200,000	150,000 50,000 200,000	150,000 50,000 200,000	150,000 50,000 200,000	150,000 50,000 200,000	150,000 50,000 200,000	150,000 50,000 200,000	150,000 50,000 200,000	150,000 50,000 200,000	150,000 50,000 200,000	150,000 50,000 200,000	150,000 50,000 200,000	150,000 50,000 200,000
	Assets Capital equipment Cash Book value Liabilities		150,000 50,000 200,000 1991	150,000 50,000 200,000 1992	150,000 50,000 200,000 1993	150,000 50,000 200,000 1994	150,000 50,000 200,000 1995	150,000 50,000 200,000 1996	150,000 50,000 200,000 1997	150,000 50,000 200,000 1998	150,000 50,000 200,000 1999	150,000 50,000 200,000 2000	150,000 50,000 200,000 2001	150,000 50,000 200,000 2002	150,000 50,000 200,000 2003	150,000 50,000 200,000 2004	150,000 50,000 200,000 2005	150,000 50,000 200,000 2006	150,000 50,000 200,000 2007	150,000 50,000 200,000 2008	150,000 50,000 200,000 2009
	Assets Capital equipment <u>Cash</u> Book value Liabilities Debt		150,000 50,000 200,000 1991 172,000	150,000 50,000 200,000 1992 172,000	150,000 50,000 200,000 1993 172,000	150,000 50,000 200,000 1994 172,000	150,000 50,000 200,000 1995 172,000	150,000 50,000 200,000 1996 172,000	150,000 50,000 200,000 1997 172,000	150,000 50,000 200,000 1998 172,000	150,000 50,000 200,000 1999 172,000	150,000 50,000 200,000 2000 172,000	150,000 50,000 200,000 2001 172,000	150,000 50,000 200,000 2002 172,000	150,000 50,000 200,000 2003 172,000	150,000 50,000 200,000 2004 172,000	150,000 50,000 200,000 2005 172,000	150,000 50,000 200,000 2006 172,000	150,000 50,000 200,000 2007 172,000	150,000 50,000 200,000 2008 172,000	150,000 50,000 200,000 2009 172,000
	Assets Capital equipment Cash Book value Liabilities Debt Equity		150,000 50,000 200,000 1991 172,000 28,000	150,000 50,000 200,000 1992 172,000 28,000	150,000 50,000 200,000 1993 172,000 28,000	150,000 50,000 200,000 1994 172,000 28,000	150,000 50,000 200,000 1995 172,000 28,000	150,000 50,000 200,000 1996 172,000 28,000	150,000 50,000 200,000 1997 172,000 28,000	150,000 50,000 200,000 1998 172,000 28,000	150,000 50,000 200,000 1999 172,000 28,000	150,000 50,000 200,000 2000 172,000 28,000	150,000 50,000 200,000 2001 172,000 28,000	150,000 50,000 200,000 2002 172,000 28,000	150,000 50,000 200,000 2003 172,000 28,000	150,000 50,000 200,000 2004 172,000 28,000	150,000 50,000 200,000 2005 172,000 28,000	150,000 50,000 200,000 2006 172,000 28,000	150,000 50,000 200,000 2007 172,000 28,000	150,000 50,000 200,000 2008 172,000 28,000	150,000 50,000 200,000 2009 172,000 28,000
	Assets Capital equipment Cash Book value Liabilities Debt Equity		150,000 50,000 200,000 1991 172,000 28,000 200,000	150,000 50,000 200,000 1992 172,000 28,000 200,000	150,000 50,000 200,000 1993 172,000 28,000 200,000	150,000 50,000 200,000 1994 172,000 28,000 200,000	150,000 50,000 200,000 1995 172,000 28,000 200,000	150,000 50,000 200,000 1996 172,000 28,000 200,000	150,000 50,000 200,000 1997 172,000 28,000 200,000	150,000 50,000 200,000 1998 172,000 28,000 200,000	150,000 50,000 200,000 1999 172,000 28,000 200,000	150,000 50,000 200,000 2000 172,000 28,000 200,000	150,000 50,000 200,000 2001 172,000 28,000 200,000	150,000 50,000 200,000 2002 172,000 28,000 200,000	150,000 50,000 200,000 2003 172,000 28,000 200,000	150,000 50,000 200,000 2004 172,000 28,000 200,000	150,000 50,000 200,000 2005 172,000 28,000 200,000	150,000 50,000 200,000 2006 172,000 28,000 200,000	150,000 50,000 200,000 2007 172,000 28,000 200,000	150,000 50,000 200,000 2008 172,000 28,000 200,000	150,000 50,000 200,000 2009 172,000 28,000 200,000
	Assets Capital equipment Cash Book value Liabilities Debt Equity WACC		150,000 50,000 200,000 1991 172,000 28,000 200,000	150,000 50,000 200,000 1992 172,000 28,000 200,000 0,078	150,000 50,000 200,000 1993 172,000 28,000 280,000 0,073	150,000 50,000 200,000 1994 172,000 28,000 200,000 0,077	150,000 50,000 200,000 1995 172,000 28,000 280,000 0,074	150,000 50,000 200,000 1996 172,000 28,000 200,000 0,073	150,000 50,000 200,000 1997 172,000 28,000 200,000 0,073	150,000 50,000 200,000 1998 172,000 28,000 200,000 0,070	150,000 50,000 200,000 1999 172,000 28,000 200,000 0,074	150,000 50,000 200,000 2000 172,000 28,000 200,000 0,076	150,000 50,000 200,000 2001 172,000 28,000 200,000 0,072	150,000 50,000 200,000 2002 172,000 28,000 200,000 0,072	150,000 50,000 200,000 2003 172,000 28,000 200,000 0,068	150,000 50,000 200,000 2004 172,000 28,000 200,000 0,066	150,000 50,000 200,000 2005 172,000 28,000 200,000 0,063	150,000 50,000 200,000 2006 172,000 28,000 200,000 0,065	150,000 50,000 200,000 2007 172,000 28,000 200,000 0,064	150,000 50,000 200,000 2008 172,000 28,000 200,000 0,068	150,000 50,000 200,000 2009 172,000 28,000 200,000
	Assets Capital equipment Cash Book value Liabilities Debt Equity WACC Re		150,000 50,000 200,000 1991 172,000 28,000 200,000 0,082 0,118	150,000 50,000 200,000 1992 172,000 28,000 280,000 0,078 0,128	150,000 50,000 200,000 1993 172,000 28,000 28,000 200,000 0,073 0,137	150,000 50,000 200,000 1994 172,000 28,000 200,000 0,077 0,137	150,000 50,000 200,000 1995 172,000 28,000 280,000 0,074 0,135	150,000 50,000 200,000 1996 172,000 28,000 200,000 0,073 0,133	150,000 50,000 200,000 1997 172,000 28,000 200,000 0,073 0,140	150,000 50,000 200,000 1998 172,000 28,000 200,000 0,070 0,142	150,000 50,000 200,000 1999 172,000 28,000 200,000 0,074 0,146	150,000 50,000 200,000 2000 172,000 28,000 200,000 0,076 0,142	150,000 50,000 200,000 2001 172,000 28,000 200,000 0,072 0,131	150,000 50,000 200,000 2002 172,000 28,000 200,000 0,072 0,136	150,000 50,000 200,000 2003 172,000 28,000 200,000 0,068 0,148	150,000 50,000 200,000 2004 172,000 28,000 200,000 0,066 0,151	150,000 50,000 200,000 2005 172,000 28,000 200,000 0,063 0,148	150,000 50,000 200,000 2006 172,000 28,000 200,000 0,065 0,139	150,000 50,000 200,000 2007 172,000 28,000 200,000 0,064 0,131	150,000 50,000 200,000 2008 172,000 28,000 200,000 200,000	150,000 50,000 200,000 2009 172,000 28,000 200,000
	Assets Capital equipment Cash Book value Liabilities Debt Equity WACC Re Debt/equity		150,000 50,000 200,000 1991 172,000 28,000 200,000 0,082 0,118 6,143	150,000 50,000 200,000 1992 172,000 28,000 200,000 0,078 0,128 6,143	150,000 50,000 200,000 1993 172,000 28,000 28,000 200,000 0,073 0,137 6,143	150,000 50,000 200,000 1994 172,000 28,000 200,000 0,077 0,137 6,143	150,000 50,000 200,000 1995 172,000 28,000 28,000 200,000 0,074 0,135 6,143	150,000 50,000 200,000 1996 172,000 28,000 200,000 0,073 0,133 6,143	150,000 50,000 200,000 1997 172,000 28,000 200,000 0,073 0,140 6,143	150,000 50,000 200,000 1998 172,000 28,000 200,000 0,070 0,142 6,143	150,000 50,000 200,000 1999 172,000 28,000 28,000 200,000 0,074 0,146 6,143	150,000 50,000 200,000 172,000 28,000 200,000 0,076 0,142 6,143	150,000 50,000 200,000 2001 172,000 28,000 200,000 0,072 0,131 6,143	150,000 50,000 200,000 2002 172,000 28,000 28,000 200,000 0,072 0,136 6,143	150,000 50,000 200,000 2003 172,000 28,000 200,000 0,068 0,148 6,143	150,000 50,000 200,000 2004 172,000 28,000 200,000 0,066 0,151 6,143	150,000 50,000 200,000 2005 172,000 28,000 200,000 0,063 0,148 6,143	150,000 50,000 200,000 20066 172,000 28,000 200,000 0,065 0,139 6,143	150,000 50,000 200,000 2007 172,000 28,000 200,000 200,000 0,064 0,131 6,143	150,000 50,000 200,000 2008 172,000 28,000 200,000 0,068 0,121 6,143	150,000 50,000 200,000 2009 172,000 28,000 200,000
	Assets Capital equipment Cash Book value Liabilities Debt Equity WACC Re Debt/equity Cost of debt		150,000 50,000 200,000 1991 172,000 28,000 200,000 0,082 0,118 6,143	150,000 50,000 200,000 1992 172,000 28,000 280,000 200,000 0,078 0,128 6,143	150,000 50,000 200,000 1993 172,000 28,000 28,000 200,000 0,073 0,137 6,143	150,000 50,000 200,000 1994 172,000 28,000 200,000 0,077 0,137 6,143	150,000 50,000 200,000 1995 172,000 28,000 28,000 200,000 0,074 0,135 6,143	150,000 50,000 200,000 1996 172,000 28,000 200,000 0,073 0,133 6,143	150,000 50,000 200,000 1997 172,000 28,000 200,000 0,073 0,140 6,143	150,000 50,000 200,000 1998 172,000 28,000 200,000 0,070 0,142 6,143	150,000 50,000 200,000 1999 172,000 28,000 200,000 0,074 0,146 6,143	150,000 50,000 200,000 172,000 28,000 200,000 0,076 0,142 6,143	150,000 50,000 200,000 22001 172,000 28,000 200,000 200,000 0,072 0,131 6,143	150,000 50,000 200,000 2002 172,000 28,000 200,000 0,072 0,136 6,143	150,000 50,000 200,000 2003 172,000 28,000 280,000 0,068 0,148 6,143	150,000 50,000 200,000 2004 172,000 28,000 200,000 0,066 0,151 6,143	150,000 50,000 200,000 2005 172,000 28,000 200,000 0,063 0,148 6,143	150,000 50,000 200,000 2006 172,000 28,000 200,000 0,065 0,139 6,143	150,000 50,000 200,000 2007 172,000 28,000 200,000 0,064 0,131 6,143	150,000 50,000 200,000 2008 172,000 28,000 200,000 0,068 0,121 6,143	150,000 50,000 200,000 2009 172,000 28,000 200,000
	Assets Capital equipment Cash Book value Liabilities Debt Equity WACC Re Debt/equity Cost of debt Financial distress ratio		150,000 50,000 200,000 1991 172,000 28,000 200,000 0,082 0,118 6,143 0,006	150,000 50,000 200,000 1992 172,000 28,000 200,000 0,078 0,128 6,143 0,006	150,000 50,000 200,000 1993 172,000 28,000 200,000 200,000 0,073 0,137 6,143 0,006	150,000 50,000 200,000 1994 172,000 28,000 200,000 0,077 0,137 6,143 0,006	150,000 50,000 200,000 1995 172,000 28,000 200,000 200,000 0,074 0,135 6,143 0,006	150,000 50,000 200,000 1996 172,000 28,000 200,000 200,000 0,073 0,133 6,143 0,006	150,000 50,000 200,000 1997 172,000 28,000 200,000 0,073 0,140 6,143 0,006	150,000 50,000 200,000 1998 172,000 28,000 200,000 0,070 0,142 6,143 0,006	150,000 50,000 200,000 1999 172,000 28,000 200,000 0,074 0,146 6,143 0,006	150,000 50,000 200,000 2000 172,000 28,000 200,000 0,076 0,142 6,143 0,006	150,000 50,000 200,000 2001 172,000 28,000 200,000 0,072 0,131 6,143 0,006	150,000 50,000 200,000 2002 172,000 28,000 200,000 0,072 0,136 6,143 0,006	150,000 50,000 200,000 2003 172,000 28,000 200,000 0,068 0,148 6,143 0,006	150,000 50,000 200,000 2004 172,000 28,000 200,000 0,066 0,151 6,143 0,006	150,000 50,000 200,000 2005 172,000 28,000 200,000 200,000 0,063 0,148 6,143 0,006	150,000 50,000 200,000 2006 172,000 28,000 200,000 0,065 0,139 6,143 0,006	150,000 50,000 200,000 200,000 28,000 28,000 200,000 0,064 0,131 6,143 0,006	150,000 50,000 200,000 2008 172,000 28,000 200,000 0,068 0,121 6,143 0,006	150,000 50,000 200,000 2009 172,000 28,000 200,000
	Assets Capital equipment Cash Book value Luabilities Debt Equity WACC Re Debt/equity Cost of debt Financial distress ratio Stocks		150,000 50,000 200,000 1991 172,000 28,000 200,000 0,082 0,118 6,143 0,006	150,000 50,000 200,000 1992 172,000 28,000 200,000 0,078 0,128 6,143 0,006	150,000 50,000 200,000 1993 172,000 28,000 200,000 0,073 0,137 6,143 0,006	150,000 50,000 200,000 1994 172,000 28,000 200,000 0,077 0,137 6,143 0,006	150,000 50,000 200,000 1995 172,000 28,000 200,000 0,074 0,135 6,143 0,006	150,000 50,000 200,000 1996 172,000 28,000 200,000 0,073 0,133 6,143 0,006	150,000 50,000 200,000 1997 172,000 28,000 200,000 0,073 0,140 6,143 0,006	150,000 50,000 200,000 1998 172,000 28,000 200,000 0,142 6,143 0,006	150,000 50,000 200,000 1999 172,000 28,000 200,000 200,000 0,074 0,146 6,143 0,006	150,000 50,000 200,000 20000 172,000 28,000 200,000 0,076 0,142 6,143 0,006	150,000 50,000 200,000 2001 172,000 28,000 200,000 0,072 0,131 6,143 0,006	150,000 50,000 200,000 2002 172,000 28,000 200,000 0,072 0,136 6,143 0,006	150,000 50,000 200,000 2003 172,000 28,000 200,000 200,000 0,068 0,148 6,143 0,006	150,000 50,000 200,000 2004 172,000 28,000 200,000 0,066 0,151 6,143 0,006	150,000 50,000 200,000 2005 172,000 28,000 200,000 0,063 0,143 6,143 0,006	150,000 50,000 200,000 2006 172,000 28,000 200,000 0,065 0,139 6,143 0,006	150,000 50,000 200,000 2007 172,000 28,000 200,000 0,064 0,131 6,143 0,006	150,000 50,000 200,000 2008 172,000 28,000 200,000 0,068 0,121 6,143 0,006	150,000 50,000 200,000 2009 172,000 28,000 200,000
	Assets Capital equipment Cash Book value Liabilities Debt Equity WACC Re Debt/equity Cost of debt Financial distress ratio Stocks Number of stocks		150,000 50,000 200,000 1991 172,000 28,000 200,000 0,082 0,118 6,143 0,006	150,000 50,000 200,000 1992 172,000 28,000 200,000 0,078 6,143 0,006	150,000 50,000 200,000 1993 172,000 28,000 200,000 0,073 0,137 6,143 0,006	150,000 50,000 200,000 1994 172,000 28,000 200,000 0,077 0,137 6,143 0,006	150,000 50,000 200,000 1995 172,000 28,000 200,000 0,074 0,135 6,143 0,006	150,000 50,000 200,000 1996 172,000 28,000 200,000 0,073 6,143 0,006	150,000 50,000 200,000 1997 172,000 28,000 200,000 0,073 0,140 6,143 0,006	150,000 50,000 200,000 1998 172,000 28,000 200,000 0,070 0,142 6,143 0,006	150,000 50,000 200,000 1999 172,000 28,000 200,000 0,074 0,146 6,143 0,006	150,000 50,000 200,000 20000 28,000 28,000 200,000 0,076 0,142 6,143 0,006	150,000 50,000 200,000 2001 172,000 28,000 200,000 0,072 0,131 6,143 0,006	150,000 50,000 200,000 2002 172,000 28,000 200,000 0,072 0,136 6,143 0,006	150,000 50,000 200,000 2003 172,000 28,000 200,000 0,068 0,148 6,143 0,006	150,000 50,000 200,000 2004 172,000 28,000 200,000 0,066 0,151 6,143 0,006	150,000 50,000 200,000 2005 172,000 28,000 200,000 200,000 0,063 0,148 6,143 0,006	150,000 50,000 200,000 22006 172,000 28,000 200,000 0,065 0,139 6,143 0,006	150,000 50,000 200,000 22007 172,000 28,000 200,000 0,064 0,131 6,143 0,006	150,000 50,000 200,000 2008 172,000 28,000 200,000 0,068 0,121 6,143 0,006	150,000 50,000 200,000 2009 172,000 28,000 200,000
	Assets Capital equipment Cash Book value Liabilities Debt Equity WACC Re Debt/equity Cost of debt Financial distress ratio Stocks Number of stocks Book value of stocks		150,000 50,000 200,000 1991 172,000 28,000 200,000 0,082 0,118 6,143 0,006	150,000 50,000 200,000 1992 172,000 28,000 200,000 0,078 0,128 6,143 0,006	150,000 50,000 200,000 1993 172,000 28,000 200,000 0,073 0,137 6,143 0,006	150,000 50,000 200,000 1994 172,000 28,000 200,000 0,077 0,137 6,143 0,006	150,000 50,000 200,000 1995 172,000 28,000 200,000 0,074 0,135 6,143 0,006	150,000 50,000 200,000 1996 172,000 28,000 200,000 0,073 0,133 6,143 0,006	150,000 50,000 200,000 1997 172,000 28,000 200,000 0,073 0,140 6,143 0,006	150,000 50,000 200,000 1998 172,000 28,000 200,000 0,142 6,143 0,006	150,000 50,000 200,000 1999 172,000 28,000 200,000 0,074 0,146 6,143 0,006	150,000 50,000 200,000 2000 28,000 28,000 200,000 0,076 0,142 6,143 0,006	150,000 50,000 200,000 2001 172,000 28,000 200,000 0,072 0,131 6,143 0,006	150,000 50,000 200,000 2002 172,000 28,000 200,000 0,072 0,136 6,143 0,006	150,000 50,000 200,000 2003 172,000 28,000 200,000 0,068 0,148 6,143 0,006	150,000 50,000 200,000 2004 172,000 28,000 200,000 0,056 0,151 6,143 0,006	150,000 50,000 200,000 2005 172,000 28,000 200,000 0,063 0,148 6,143 0,006	150,000 50,000 200,000 2006 172,000 28,000 200,000 0,065 0,139 6,143 0,006	150,000 50,000 200,000 2007 172,000 28,000 200,000 0,064 0,131 6,143 0,006	150,000 50,000 200,000 2008 172,000 28,000 200,000 0,068 0,121 6,143 0,006	150,000 50,000 200,000 2009 172,000 28,000 200,000
	Assets Capital equipment Cash Book value Uabilities Debt Equity WACC Re Debt/equity Cost of debt Financial distress ratio Stocks Number of stocks Book value of stocks Book value of stocks Book value Re		150,000 50,000 200,000 1991 172,000 28,000 200,000 0,082 0,118 6,143 0,006 2,000 2,000	150,000 50,000 200,000 1992 172,000 28,000 280,000 0,078 0,128 6,143 0,006	150,000 50,000 200,000 1993 172,000 28,000 200,000 0,073 0,137 6,143 0,006 2,000 7,367	150,000 50,000 200,000 1994 172,000 28,000 200,000 0,077 0,137 6,143 0,006 2,000 7,511	150,000 50,000 200,000 1995 172,000 28,000 280,000 0,074 0,135 6,143 0,006	150,000 50,000 200,000 1996 172,000 28,000 2,0000 0,073 0,133 6,143 0,006	150,000 50,000 200,000 1997 172,000 28,000 2,0000 0,073 0,140 6,143 0,006 2,000 8,122	150,000 50,000 200,000 1998 172,000 28,000 200,000 0,142 6,143 0,006 2,000 8,244	150,000 50,000 200,000 1999 172,000 28,000 200,000 0,074 0,146 6,143 0,006 2,000 8,210	150,000 50,000 200,000 22,000 28,000 200,000 0,076 0,142 6,143 0,006 2,000 8,646	150,000 50,000 200,000 2001 172,000 28,000 280,000 0,072 0,131 6,143 0,006 2,000 9,669	150,000 50,000 200,000 2002 172,000 28,000 200,000 0,072 0,136 6,143 0,006	150,000 50,000 200,000 2003 172,000 28,000 200,000 0,068 0,148 6,143 0,006 2,000 9,156	150,000 50,000 200,000 2004 172,000 28,000 200,000 0,066 0,151 6,143 0,006 2,000 9,249	150,000 50,000 200,000 2005 172,000 28,000 28,000 0,063 0,148 6,143 0,006 2,000 9,770	150,000 50,000 200,000 2006 172,000 28,000 200,000 0,065 0,139 6,143 0,006 2,000	150,000 50,000 200,000 2007 172,000 28,000 280,000 0,064 0,131 6,143 0,006 2,000 11,550	150,000 50,000 200,000 2008 172,000 28,000 28,000 200,006 0,068 0,121 6,143 0,006	150,000 50,000 200,000 2009 172,000 28,000 200,000
	Assets Capital equipment Cash Book value Liabilities Debt Equity WACC Re Debt/equity Cost of debt Financial distress ratio Stocks Number of stocks Book value of stocks Market value Re Market value Re Market value Re		150,000 50,000 200,000 1991 177,000 28,000 200,000 0,082 0,118 6,143 0,006 2,000 7,869 11,403	150,000 50,000 200,000 1992 172,000 28,000 200,000 0,078 0,128 6,143 0,006 2,000 7,582 12,419	150,000 50,000 200,000 1993 172,000 28,000 200,000 0,073 0,137 6,143 0,006 2,000 7,367 13,881	150,000 50,000 200,000 1994 172,000 28,000 200,000 0,077 6,143 0,006 2,000 7,511 13,352	150,000 50,000 200,000 1995 172,000 28,000 200,000 0,074 0,135 6,143 0,006 2,000 7,899 14,338	150,000 50,000 200,000 1996 172,000 28,000 200,000 0,073 0,133 6,143 0,006 2,000 8,280 15,019	150,000 50,000 200,000 1997 172,000 28,000 200,000 0,073 0,140 6,143 0,006 2,000 8,122 15,527	150,000 50,000 200,000 1998 172,000 28,000 200,000 0,142 6,143 0,006 2,000 8,244 16,880	150,000 50,000 200,000 1999 172,000 28,000 200,000 0,074 0,146 6,143 0,006 2,000 8,210 16,215	150,000 50,000 200,000 2000 172,000 28,000 200,000 0,076 0,142 6,143 0,006 2,000 8,646 16,077	150,000 50,000 200,000 2001 172,000 28,000 200,000 0,072 0,131 6,143 0,006 2,000 9,669 17,529	150,000 50,000 200,000 2002 172,000 28,000 200,000 0,072 0,136 6,143 0,006 2,000 9,570 18,086	150,000 50,000 200,000 2003 172,000 28,000 200,000 0,068 0,148 6,143 0,006 2,000 9,156 2,000 9,156	150,000 50,000 200,000 2004 172,000 28,000 200,000 0,066 0,151 6,143 0,006 2,000 9,249 21,251	150,000 50,000 200,000 2005 172,000 28,000 200,000 0,063 0,148 6,143 0,006 2,000 9,770 22,768	150,000 50,000 200,000 2006 172,000 28,000 200,000 0,065 0,139 6,143 0,006 2,000 10,585 22,828	150,000 50,000 200,000 200,000 200,000 200,000 0,064 0,131 6,143 0,006 2,000 11,550 23,876	150,000 50,000 200,000 2008 172,000 28,000 200,000 0,068 0,121 6,143 0,006 2,000 12,753 22,779	150,000 50,000 200,000 2009 172,000 28,000 200,000

# Appendix 6, Company 2, beta 1,5, active capital structure (Problem solver)

	Year		1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
	Moody's Seasoned Asa Corporate Bond Vield		0.088	0.081	0.072	0.080	0.076	0.074	0.073	0.065	0.070	0.076	0.071	0.065	0.057	0.056	0.052	0.056	0.056	0.056	0.053
FRED	Moody's Seasoned Pag Corporate Bond Viold		0,000	0,001	0,072	0,086	0,070	0.091	0,079	0.072	0.070	0.094	0.079	0.079	0.059	0.064	0.061	0,050	0.065	0,030	0,055
	Inflation		0,038	0,030	0,073	0,080	0,082	0,001	0,075	0,072	0,073	0,084	0,073	0,078	0,008	0,004	0,001	0,005	0,005	0,074	0,073
	iniation		0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027
FRED	6 monts treasury		0,075	0,054	0,035	0,031	0,046	0,056	0,051	0,052	0,048	0,047	0,059	0,033	0,017	0,011	0,016	0,034	0,048	0,044	0,016
	Тах	0.300																			
	в	1.500																			
Sheet S&P	F	-,																			
500	Average market return		0,104	0,103	0,103	0,102	0,106	0,107	0,110	0,112	0,114	0,111	0,107	0,102	0,104	0,104	0,104	0,104	0,104	0,096	
	Sales		500,000	513,250	526,851	540,813	555,144	569,856	584,957	600,458	616,370	632,704	649,471	666,682	684,349	702,484	721,100	740,209	759,824	779,960	800,629
	VC (50 %)		250,000	256,625	263,426	270,406	277,572	284,928	292,478	300,229	308,185	316,352	324,735	333,341	342,174	351,242	360,550	370,104	379,912	389,980	400,314
	Salaries		100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
	EBIT		150,000	153,975	158,055	162,244	166,543	170,957	175,487	180,137	184,911	189,811	194,841	200,004	205,305	210,745	216,330	222,063	227,947	233,988	240,189
	Interest expense		16,826	15,728	14,105	15,280	14,541	14,266	14,015	12,935	14,092	14,897	14,066	13,879	12,183	11,547	10,945	11,623	11,567	13,104	5,107
	EBT		133,174	138,247	143,950	146,964	152,003	156,691	161,472	167,202	170,819	174,914	180,775	186,126	193,121	199,198	205,385	210,440	216,380	220,884	235,082
	Tax		39,952	41,474	43,185	44,089	45,601	47,007	48,442	50,161	51,246	52,474	54,233	55,838	57,936	59,759	61,615	63,132	64,914	66,265	70,524
	Net Income		93,222	96,773	100,765	102,875	106,402	109,684	113,030	117,042	119,574	122,440	126,543	130,288	135,185	139,439	143,769	147,308	151,466	154,619	164,557
	Balance sheet																				
	Assets																				
	Capital equipment		150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000
	Cash		50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000
	Book value		200.000	200.000	200.000	200.000	200.000	200.000	200.000	200.000	200.000	200.000	200.000	200.000	200.000	200.000	200.000	200.000	200.000	200.000	200.000
	Liabilities		1991.000	1992.000	1993.000	1994.000	1995.000	1996.000	1997.000	1998.000	1999.000	2000.000	2001.000	2002.000	2003.000	2004.000	2005.000	2006.000	2007.000	2008.000	2009.000
	Debt		171.665	175.204	177.873	177.212	177.308	177.125	178.250	179.134	179.036	178.110	176.986	177.894	180.070	180.613	180.489	179.386	178.435	175.970	70.000
	Equity		28.335	24 796	22.127	22 788	22 692	22.875	21,750	20.866	20.964	21,890	23.014	22,106	19,930	19 387	19.511	20.614	21.565	24.030	130,000
			200.000	200.000	200.000	200.000	200.000	200.000	200.000	200.000	200.000	200,000	200.000	200.000	200.000	200.000	200.000	200.000	200.000	200.000	200,000
			200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000
	WACC		0.082	0.078	0.073	0.077	0.074	0.073	0.072	0.069	0.073	0.076	0.072	0.072	0.066	0.064	0.062	0.064	0.063	0.068	
	WACC		0.082	0.078	0.073	0.077	0.074	0.073	0.072	0.069	0.073	0.076	0.072	0.072	0.066	0.064	0.062	0.064	0.063	0.068	
	Po		0.119	0,070	0,075	0,077	0.125	0 122	0.140	0.142	0.146	0.142	0.121	0.126	0.149	0.151	0.149	0,004	0,005	0,000	
	Rebt/oquity		6.059	7.066	0,137	0,137	7 914	7 742	9 106	0,142	9 540	0,142	7 601	0,130	0,148	0,151	0,140	0,133	0,131	7 2 2 2	
	Cost of dobt		0,058	7,000	8,033	1,111	7,014	7,745	8,150	6,565	8,540	8,137	7,051	8,047	3,035	5,510	5,251	8,702	0,274	7,323	
	Cost of debt		0.000	0.007	0.009	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007	
	rinancial distress ratio		0,008	0,007	0,008	0,008	0,008	0,008	0,008	0,009	0,009	0,008	0,008	0,008	0,009	0,009	0,009	0,009	0,008	0,007	
	STOCKS																				
	Notes data																				
	Number of stocks	100		4 0000005-	4 0000005 -	a	-	-			-			-				4 00000077			
	· ····································				- /////////////////////////////////////		2		2				2	2		2		- /////////////////////////////////////	2	2	
	BOOK VALUE OF SLOCKS		2	1,999999999	1,999999999	2,0000001		2			2				2		2	1,999999999	-		
	Market value Re		7,87	7,57	7,34	7,49	7,88	8,26	8,10	8,22	8,18	8,62	9,65	9,55	9,13	9,22	9,75	1,999999999	11,53	12,74	

#### Appendix 7.1 Bond Premium and Yield

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13
Face value	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
30-Year Treasury Constant Maturity Rate	0,076666667	0,065983333	0,0737	0,068841667	0,067008333	0,066058333	0,055783333	0,058658333	0,059425	0,054933333	0,053179626	0,048751711	0,04962857	0,045686803	0,048710648	0,048341667	0,042791667	0,040691667
caupons	76,66666667	76,66666667	76,66666667	76,66666667	76,66666667	76,66666667	76,66666667	76,66666667	76,66666667	76,66666667	76,66666667	76,66666667	76,66666667	76,66666667	76,66666667	76,66666667	76,66666667	76,66666667
PV coupons	890,9659933	979,7674862	898,2114008	929,1251185	932,2442469	926,0839683	1000,851113	954,7197768	927,8213785	941,6420896	930,1941071	936,0396396	898,808027	892,877963	838,573906	804,7694028	795,1161148	762,2910946
PV Face value	109,0340067	156,760983	136,5454751	165,7062387	185,198262	202,0578677	271,7720273	269,5355969	280,8375815	325,2929723	354,7733786	404,7799869	418,1753402	467,9207882	467,2068025	492,5579016	556,204212	595,4057158
PV bond in \$	1000	1136,528469	1034,756876	1094,831357	1117,442509	1128,141836	1272,62314	1224,255374	1208,65896	1266,935062	1284,967486	1340,819626	1316,983367	1360,798751	1305,780709	1297,327304	1351,320327	1357,69681
Index	100	113,6528469	103,4756876	109,4831357	111,7442509	112,8141836	127,262314	122,4255374	120,865896	126,6935062	128,4967486	134,0819626	131,6983367	136,0798751	130,5780709	129,7327304	135,1320327	135,769681
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Yield Premium		6,61%	1,15%	2,29%	2,25%	2,03%	3,50%	2,56%	2,13%	2,39%	2,31%	2,47%	2,14%	2,22%	1,79%	1,64%	1,79%	1,71%
Pvcoupons	1000	999,9999998	999,9999999	1000	1000	999,9999996	1000	999,9999997	1000	999,9999996	999,9999999	1000	1000	1000	999,9999994	1000	1000	999,9999998
Yield in %	7,67%	14,27%	8,81%	9,96%	9,91%	9,70%	11,17%	10,23%	9,79%	10,06%	9,97%	10,14%	9,81%	9,89%	9,46%	9,31%	9,45%	9,38%

#### Appendix 7.2, Equation of Exchange statistics

				-																										
	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Base money	158,59	163,92	1/2,0/	183,30	195,24	210,64	230,80	253,09	2/1,88	283,23	301,66	318,12	341,54	3/0,30	411,14	433,70	447,79	471,40	502,11	550,52 4512.01	385,35	5100.00	672,99	715,94	751,95	182,07	6967 42	820,09 7201 EE	960,75	1//4,00
Ratio	0.71	10/9,59	10.02,90	2030,87	11 20	2410,74	11 22	2/05,95	10.90	10.90	10.70	10.50	0.09	0.15	9 40	3302,72	3/ 34,40	3921,07	4200,78	4012,01	4/02,10	9 42	0.24	0.25	0230,70	0020,00	0007,43	/301,30	7021,03	4 75
Railo	9,71	10,25	10,65	11,22	11,38	11,48	11,33	11,01	10,80	10,80	10,70	10,52	9,98	9,15	8,49	8,21	8,34	8,32	8,37	8,20	8,17	8,42	8,31	8,30	8,32	8,34	8,47	8,83	7,93	4,75
GDP	2788 10	3126.80	3253 20	3534.60	3930.90	4217 50	4460 10	4736.40	5100.40	5482 10	5800 50	5992 10	6342 30	6667 40	7085 20	7414 70	7838 50	8332.40	8793 50	9353 50	9951 50	10286 20	10642 30	11142 10	11867.80	12638.40	13398.90	0,37	0,34 14369 10	14119.00
	2100,10	0120,00	0200,20	0004,00	0000,00	4217,00	4400,10	4700,40	0100,40	0102,10	0000,00	0002,10	0012,00	0007,10	1000,20	1414,70	1000,00	0002,40	0/00,00	0000,00	0001,00	10200,20	10042,00	11142,10	11001,00	12000,10	10000,00	14001,00	11000,10	14110,00
м		163.92	172.07	183.36	195.24	210.64	230.80	253.09	271.88	283.23	301.66	318.12	341.54	376.35	411.14	433.70	447.79	471.46	502.11	550.52	585.35	617.76	672.99	715.94	751.95	782.07	810.76	826.69	986.75	1774.65
M		1515.68	1660.89	1873.51	2025.96	2208.11	2384.95	2532.84	2664.38	2776.59	2926.05	3029.38	3067.99	3068.83	3079.83	3129.02	3286.68	3449.61	3698.67	3961.49	4196.83	4582.14	4921.31	5264.14	5506.83	5741.80	6056.67	6474.86	6834.87	6661.69
v		1,81	1,86	1,78	1,72	1,77	1,74	1,71	1,70	1,74	1,79	1,80	1,79	1,86	1,94	2,03	2,08	2,10	2,12	2,09	2,07	2,08	1,98	1,90	1,86	1,90	1,94	1,95	1,93	1,84
		=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=
GDP		3126,80	3253,20	3534,60	3930,90	4217,50	4460,10	4736,40	5100,40	5482,10	5800,50	5992,10	6342,30	6667,40	7085,20	7414,70	7838,50	8332,40	8793,50	9353,50	9951,50	10286,20	10642,30	11142,10	11867,80	12638,40	13398,90	14061,80	14369,10	14119,00
Diff		-86,32	160,23	117,88	-114,32	63,07	100,45	15,69	-108,76	-167,18	-17,25	23,36	-239,24	-259,36	-329,31	-183,28	-66,12	-105,02	132,11	92,39	-39,23	534,79	431,60	237,98	-206,14	-269,13	-98,41	181,71		
		-0,03	0,05	0,03	-0,03	0,01	0,02	0,00	-0,02	-0,03	0,00	0,00	-0,04	-0,04	-0,05	-0,02	-0,01	-0,01	0,02	0,01	0,00	0,05	0,04	0,02	-0,02	-0,02	-0,01	0,01		
	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
M	158,59	163,92	172,07	183,36	195,24	210,64	230,80	253,09	271,88	283,23	301,66	318,12	341,54	376,35	411,14	433,70	447,79	471,46	502,11	550,52	585,35	617,76	672,99	715,94	751,95	782,07	810,76	826,69	986,75	1774,65
M'	1381,76	1515,68	1660,89	1873,51	2025,96	2208,11	2384,95	2532,84	2664,38	2776,59	2926,05	3029,38	3067,99	3068,83	3079,83	3129,02	3286,68	3449,61	3698,67	3961,49	4196,83	4582,14	4921,31	5264,14	5506,83	5741,80	6056,67	6474,86	6834,87	6661,69
V	1,81	1,86	1,78	1,72	1,77	1,74	1,71	1,70	1,74	1,79	1,80	1,79	1,86	1,94	2,03	2,08	2,10	2,12	2,09	2,07	2,08	1,98	1,90	1,86	1,90	1,94	1,95	1,93	1,84	1,67
		=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=
GDP		3126,80	3253,20	3534,60	3930,90	4217,50	4460,10	4736,40	5100,40	5482,10	5800,50	5992,10	6342,30	6667,40	7085,20	7414,70	7838,50	8332,40	8793,50	9353,50	9951,50	10286,20	10642,30	11142,10	11867,80	12638,40	13398,90	14061,80	14369,10	14119,00
		96.22	160.22	117.00	114 22	62.07	100.45	15.60	109 76	167 19	17.05	22.26	220.24	250.26	220.24	102.20	66 10	105.02	122.11	02.20	20.22	524 70	424 60	227.09	206 14	260.12	09.41	101 71		
DIII		-80,32	160,23	117,88	-114,32	0.01	100,45	15,69	-108,76	-107,18	-17,25	23,30	-239,24	-259,30	-329,31	-183,28	-00,12	-105,02	132,11	92,39	-39,23	0.05	431,60	237,98	-206,14	-209,13	-98,41	181,71		
		-0,03	0,00	0,00	-0,03	0,01	0,02	0,00	-0,02	-0,03	0,00	0,00	-0,04	-0,04	-0,05	-0,02	-0,01	-0,01	0,02	0,01	0,00	0,05	0,04	0,02	-0,02	-0,02	-0,01	0,01		
GDP nominal		3040.48	3413.43	3652.48	3816.58	4280.57	4560.55	4752.09	4991.64	5314.92	5783.25	6015.46	6103.06	6408.04	6755.89	7231.42	7772.38	8227.38	8925.61	9445.89	9912.27	10820.99	11073.90	11380.08	11661.66	12369.27	13300.49	14243.51	15062.49	15505.98
GDP nominal		0.00	0.02	0.02	0.05	0.07	0.04	0.02	0.02	0.04	0.04	0.02	0.00	0.02	0.02	0.04	0.02	0.04	0.04	0.04	0.05	0.04	0.01	0.02	0.02	0.04	0.02	0.02	0.02	0.00
GDR nominal		3118.26	3206.16	-0,02	3285.05	3522.05	3667.92	3704 84	2016 20	4077.26	4222 02	4202 17	4202.11	4437.76	4564 30	4750.28	4869.70	5051.88	5277.00	5506.84	5772.61	6011.55	6076.46	6196.66	6340 73	6567.30	6767.00	60/8 70	7094 11	7084.06
GDP Brice inflation		8.54	47.04	200 72	644.95	605.45	702.28	0/156	1194 11	1404 84	1577 59	1690.03	2050 10	2220 64	2520.00	2664 42	2069.90	3280.52	3516 50	3846.66	4179.90	4274.65	4565.94	4955 44	5527.07	6071 10	6631.00	7113.01	7284.00	7034.04
GDP Price Change		0,54	47,04	7 31	0,65	0.08	0 14	0.19	0.26	0.19	0.12	0.07	0.21	0.09	0.13	0.06	0.11	0.10	0.07	0.09	0.09	4274,00	4303,04	4333,44	0.12	0.10	0.09	0.07	0.02	-0.03
			4,01	1,01	0,00	0,00	0,14	0,10	0,20	0,10	0,12	0,07	0,21	0,00	0,10	0,00	0,11	0,10	0,01	0,00	0,00	0,02	0,01	0,00	0,12	0,10	0,00	0,01	0,02	0,00
м	158,59	163,92	172,07	183,36	195,24	210,64	230,80	253,09	271,88	283,23	301,66	318,12	341,54	376,35	411,14	433,70	447,79	471,46	502,11	550,52	585,35	617,76	672,99	715,94	751,95	782,07	810,76	826,69		
M	1381,76	1515,68	1660,89	1873,51	2025,96	2208,11	2384,95	2532,84	2664,38	2776,59	2926,05	3029,38	3067,99	3068,83	3079,83	3129,02	3286,68	3449,61	3698,67	3961,49	4196,83	4582,14	4921,31	5264,14	5506,83	5741,80	6056,67	6474,86		
v	1,81	1,86	1,78	1,72	1,77	1,74	1,71	1,70	1,74	1,79	1,80	1,79	1,86	1,94	2,03	2,08	2,10	2,12	2,09	2,07	2,08	1,98	1,90	1,86	1,90	1,94	1,95	1,93		
P	1,00	1,00	1,01	1,12	1,20	1,20	1,22	1,25	1,30	1,34	1,37	1,39	1,48	1,50	1,55	1,56	1,61	1,65	1,67	1,70	1,72	1,71	1,75	1,80	1,87	1,92	1,98	2,02		
Q	2788,10	3118,26	3206,16	3143,88	3285,95	3522,05	3667,82	3794,84	3916,29	4077,26	4222,92	4302,17	4292,11	4437,76	4564,30	4750,28	4869,70	5051,88	5277,00	5506,84	5772,61	6011,55	6076,46	6186,66	6340,73	6567,30	6767,90	6948,79		
GDP	2788,10	3126,80	3253,20	3534,60	3930,90	4217,50	4460,10	4736,40	5100,40	5482,10	5800,50	5992,10	6342,30	6667,40	7085,20	7414,70	7838,50	8332,40	8793,50	9353,50	9951,50	10286,20	10642,30	11142,10	11867,80	12638,40	13398,90	14061,80		
Money Side	2788,42	3127,82	3254,88	3534,21	3930,97	4217,08	4461,80	4736,07	5100,28	5482,44	5800,19	5992,03	6341,73	6667,29	7085,79	7414,90	7835,86	8331,29	8794,34	9352,27	9951,72	10293,20	10645,94	11142,37	11866,64	12635,11	13396,63	14060,98		
Price inflation		0,27%	1,19%	10,80%	6,40%	0,10%	1,55%	2,64%	4,35%	3,24%	2,16%	1,40%	6,09%	1,68%	3,32%	0,55%	3,12%	2,47%	1,03%	1,93%	1,49%	-0,75%	2,36%	2,83%	3,93%	2,82%	2,88%	2,22%		