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## **Stock market panics, safe havens and implications for the portfolio management**

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### **Čestné prohlášení**

Prohlašuji, že diplomovou práci na téma „*Paniky akciových trhů, bezpečné investiční přístavy a jejich důsledky pro řízení portfolia*“ jsem vypracoval samostatně a veškerou použitou literaturu a další zdroje jsem řádně označil a uvedl v přiloženém seznamu.

V Praze dne

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David Hýža

### **Statutory Declaration**

I hereby declare that I prepared the diploma thesis on the topic „*Stock market panics, safe havens and implications for the portfolio management*“ on my own and I properly stated all used literature and other sources in the attached list.

In Prague

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David Hýža

## **Acknowledgments**

I would like to thank prof. Ing. Petr Musílek, Ph.D. for our collaboration, for his valuable advice and comments and provided expertise, and any other support that enabled the creation of this work.

## **Anotace**

Práce se zabývá nestabilitami na akciových trzích v USA. Existuje mnoho faktorů, které mohou zvýšit volatilitu ceny, nebo dokonce způsobit paniku. Během těchto bouřlivých časů mohou investoři hledat úkryt v investičních bezpečných přístavech, které jim umožňují chránit své portfolio proti značným finančním ztrátám. Důraz je kladen na identifikaci situací, kdy je vhodné používat bezpečná útočiště a jak správně časovat tyto transakce. Historický nadhled, studium šoků a analýza ekonomických cyklů jsou nedílnou součástí práce.

### **Klíčová slova:**

Finanční krize, reálné šoky, cenové bubliny, bezpečné investiční přístavy, ekonomické cykly, vedoucí ekonomické indikátory, cyklická rotace aktiv

## **Annotation**

The thesis addresses the instabilities in stock markets in the USA. There are many factors that may increase the price volatility, or even cause a panic. During these turbulent times investors can seek shelter in investment safe havens that allow protecting their portfolio against significant financial losses. The focus is put on identifying the situations where it is appropriate to use the safe havens and how to properly time all transactions. Historical insight, events study and investigating economic cycles are the integral part of the work.

### **Key words:**

Financial crises, real shocks, asset price bubbles, safe havens, business cycles, leading economic indicators, cyclical asset rotation

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## Introduction

A legendary investor Warren Buffett distinguishes between three main investment classes: currency-based investments (including deposits, bond and money market investments), gold and productive investments. In his famous article *'Why stock beat gold and bonds'*<sup>1</sup> he argues that so called safe currency-based investments are in fact the most dangerous one as their taxed yields can't even cover inflation. The only viable long-term investment, according to Buffett, is the investment into stocks of quality companies creating real product and added value. His investment track proves him right – having invested mainly in stocks he has been able to outperform both share index and the performance of the other investment classes in past decades as well as did other legendary investors such as Benjamin Graham, John Templeton or Philip Fisher investing primarily in stocks. The successful stories attract people to the stock market promising extraordinary profits.

But in reality, stocks market is a very risky place, especially for unexperienced small investor. The market is prone to panics and crashes – needles to mention the major stock market collapses in 1929, 1987 or 2008, there was a number of other episodes in the history, where markets fell sharply. Any negative economic, political or catastrophic event occurring in the media, or mere mood swing can trigger large sell-offs and a significant number of investors had lost a fortune during such turbulent times. Although stock markets belong to the most profitable over long-term, many investors end up worse off than having invested in the currency-based assets.

How is this possible? Small investor who makes his own decisions on the market often underestimates required knowledge; he is often not focused on the issues of economic theory and practice, the laws of the markets and he does not sufficiently explore economic cycles. Insufficient knowledge of investment theory and practice often results in a situation where the investor bases his investment decision upon tips, impulses and investment recommendations in times when markets are at their local maxima and sells at the end of market declines.

## Motivation

The author himself invests his funds on the stock markets and therefore is motivated to know more on the matter. In order to be successful over long-term on the markets, it is necessary to analyze and understand a series of aspects. First, the investor must be able to understand the shocks that affect the markets. As such, it encompasses understanding the

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<sup>1</sup> <http://finance.fortune.cnn.com/2012/02/09/warren-buffett-berkshire-shareholder-letter/>

shock origin, how long it lasts, how does it channel throughout the markets and what are its impacts on the markets and the national economy. Second, the investor should understand the laws that govern the overall economic cycles and all movements of macroeconomic variables that are associated with them. If the investor acquires such skills, it is necessary to know how to respond to the occurred situation. For example, if an equity investor detects an approaching recession, he should know how to respond properly and how to adjust their portfolio. There are specific assets on the market often called “safe havens”, which gain in value during critical times thus protecting the portfolio from losses. The investor should know which assets have such properties and when is the right time to use them. The author hopes this thesis will help him to deepen the knowledge with regard to capital markets and to make competent and correct decisions while investing.

### Thesis aim

The aim of this work is to address all the outlined topics in an understandable form; namely, to draw up a comprehensive view on the origins, development and impacts of shocks affecting the markets and their bonds to economic cycles, to introduce several types of safe havens and their attributes; and to analyze and quantify economic drivers, which will lead to creation of an understandable long-term investment strategy for a small investor

### Used methodology

The work is primarily focused on the investor making his investments on the U.S. markets, as they are the most developed and have sufficiently long time series to analyze. Any quantitative analysis in this work covers the period from the beginning of 1970 till the end of 2012 and is based on secondary, publically available data. Used methodologies of calculations and formulae are always described at the beginning of the analytical section.

### Thesis structure

The thesis is composed in following manner: *The first chapter* describes the nature of financial markets and their interference with financial, man-made and natural shocks. Individual shocks are defined, analyzed from a historical angle and discussed from the perspective of their occurrence and impact on the markets and economy. *The second chapter* introduces safe havens and their attributes as the potential investment instruments for asset rotation. In this chapter, several prospective asset classes are preselected for the further analysis. *The third chapter* measures the impact of various shocks on financial markets and

the behavior of individual assets – the stock market and selected safe havens. One of the conclusions from this chapter is narrowed list of suitable safe havens. Part of this chapter is also dedicated to the question whether the small investor can benefit while trading on the basis of these shocks, or whether he should rather focus on the overall behavior of economic cycles. The most important and largest part, *chapter four*, focuses directly on business cycles. This chapter defines the various types of cycles that together co-affect the economic cycle. The most important business cycles theories are briefly touched on here as well. This part is further followed by the actual analysis of economic drivers, leading indicators with aim to create a leading composite macroeconomic indicator understandable for the small investor and suitable for investing. Index creation, its description and quality testing completes the entire chapter. *The fifth chapter* builds on the previous chapters, where appropriate safe havens were chosen first, based on the definition and second, on subsequent empirical analysis. Selection of appropriate safe havens is further narrowed reflecting their historical risks. *The sixth chapter* summarizes all the elements on whose basis a simple and clear long-term investment strategy is made. Quality of the resulting strategy is subsequently tested on historical data.

#### Used software

Following software was used during the thesis elaboration: MS office 2007 for all calculations, charting and writing, Gretl version 1.9.13 for statistical modelling and Bloomberg Professional Services (or Bloomberg) as one of the primary sources for time series.

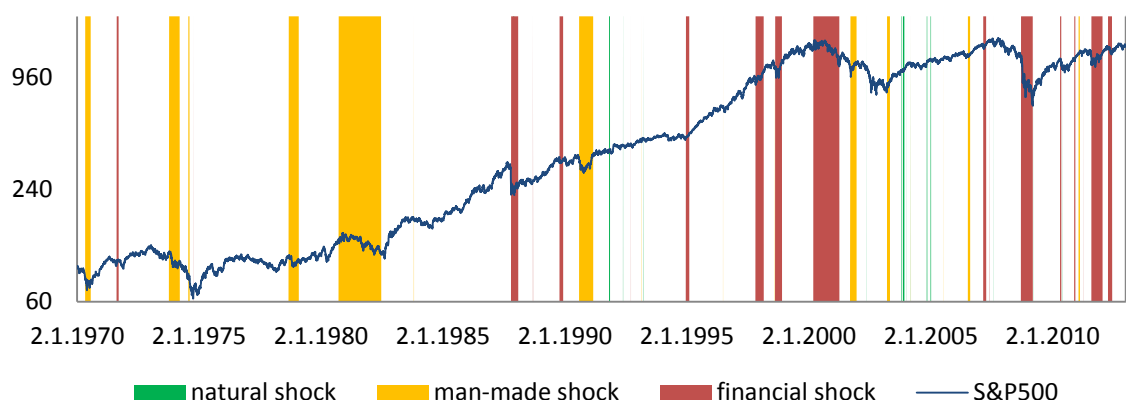
## Descriptive section

### 1. Stock markets and their interference with prospective shocks

The US stock market price development can be briefly summarized with Buffett's words: *"In the 20th century, the United States endured two world wars and other traumatic and expensive military conflicts; the Depression; a dozen or so recessions and financial panics; oil shocks; a flu epidemic; and the resignation of a disgraced president. Yet the Dow rose from 66 to 11,497."*<sup>2</sup> Indeed, the broad index S&P 500 was around 10 points in 1924, while in the end of 2011 it closed over 1250 points and an investing into stocks seems to be the most profitable investment in the long run. According to Damodaran<sup>3</sup>, stock markets yielded average annual nominal returns around 9,2% between 1928 – 2011, whereas T-bonds offered only 5,2%, and gold yielded around 5,3% measured by the geometric mean. Although the numbers will always vary a little with selected period, the offered comparison suggests that stock markets offer greater returns in the long run.

Yet, it can be deceiving to rely simply on these regularities when investing in the stock markets. Charles Ellis said: *"The average long-term experience in investing is never surprising but the short term experience is always surprising."*<sup>4</sup> This is particularly true for the share markets. There were periods in the past not favorable for stocks. For instance, if investor decided to put his funds into shares during 1930s, 1970s, or in the new millennium it is more than probable that instead of getting the average yield of 9% he reached only a below-average yield or incurred losses.

Figure 1: Effects of numerous shocks on broad equity index S&P 500, 1970-2012



Source: <http://finance.yahoo.com/q?s=^gspc>, author

<sup>2</sup> <http://www.nytimes.com/2008/10/17/opinion/17buffett.html?pagewanted=print>

<sup>3</sup> <http://people.stern.nyu.edu/adamodar/>

<sup>4</sup> <http://www.blackstone.uk.net/Resources/WhatTheExpertsSay.aspx?topic=LongTermStrategy>

Figure 1 captures numerous shocks affecting the overall economy and stock markets. One can divide them into financial shocks – currency, banking or debt crises, often associated with bursting financial bubbles; and real shocks – man-made or natural. Let us focus on the shocks themselves first. Following chapters set themselves the task to define the shocks, to describe their source of birth and try to answer whether their appearance is random or systematical and what are their effects within the economy.

### 1.1. Financial crises

The financial crisis can be defined as a: “*Disturbance to financial markets, associated typically with falling asset prices...which spreads through the financial system, disrupting the market's capacity to allocate capital...which is associated with bank runs..*”<sup>5</sup> or “*Significant banking sector problems...associated with widespread bank failures and the suspension of deposits...*”<sup>6</sup> During financial crises information asymmetry grows so large that economy loses its ability to channel funds efficiently via pricing system, resulting in output losses. Financial crises also cohere with significant movements in exchange rates, reflecting changing risk aversions regarding particular currencies.

One can distinguish between three major types of financial crises; *banking crises* (often precipitated with excessive investments and credit expansion), *currency crises* (caused mainly by large capital inflows and misbalances in the balance of payment), and *sovereign debt crises* (associated with unsustainable public debt). Financial crises are also preceded with investment and speculative *manias and bubbles in asset prices*. Thanks to an interconnected modern global financial system, a contagion of financial distress in one country or region can spread quickly further and become an international financial crisis. Many financial crises also exhibit features of multi-type crises (twin crises – a simultaneous occurrence of two crisis types at once, or triple crises) as it is shown in the following example.

Let's have a look at The Asian crisis starting in 1997, which can serve as the best instance. During eighties and nineties, the countries of ASEAN (Thailand, Indonesia, Singapore, Malaysia and so forth) enjoyed a long period of exceptional growth fueled by international investments. Most ASEAN countries had their currency pegged against dollar to provide a stable environment for international investors. However, due to weak economic conditions of Japan, dollar was consistently appreciating against yen after 1990. As Japan

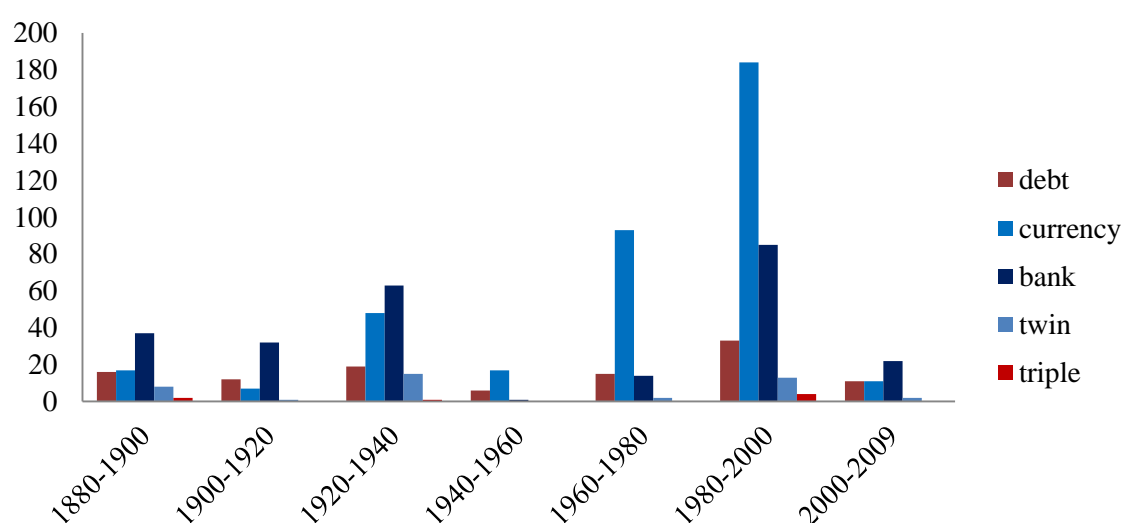
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<sup>5</sup> B. Eigengreen, R. Portes (1987), p. 2

<sup>6</sup> Bordo & Lane (2010), p. 2

was a major trade partner to the ASEAN countries with their currencies fixed to the strengthening dollar, their current account balances kept deteriorating and their foreign debt became unsustainable. In July 1997, the speculative attack against Thai baht heated up the whole situation and affected countries were eventually forced to break the peg against dollar with all consequences; in 1998, the ASEAN output contracted rapidly, e.g. Thai output level shrunk by 10,4% and Indonesian GDP fell even by 13,2%. Asian crisis had a large impact on all developing countries; international investors became worried about the foreign investments into developing countries and started withdrawing their funds on a large scale. This forced many post-Soviet countries to abandon their fixed currency regimes, too. Even the Asian crisis had only a little real effect on the US economy, S&P index had lost almost 11% during a week when the financial contagion had spread around the world. But there were more consequences ahead. General slowdown in the economic activity and declining oil prices strongly contributed to the Russian sovereign debt crisis in 1998, which in return caused the collapse of the famous hedge fund called Long-Term Capital Management (or LTCM). It turned out LTCM fund had open derivative positions in extend threatening to derail the whole US financial system. In the end, the Federal Reserve System had to organize more than USD 3.5 billion rescue package for the fund to allow liquidating its all fund's open positions.<sup>7</sup> This example clearly shows how easily a financial contagion can spread in the modern world and how an investment crisis can grow simultaneously into currency, bank and debt crises around the whole world.

Figure 2: Occurrence of financial crises during the 1880-2009 period around the world



Source: Bordo & Lane (2010), p. 41-44

<sup>7</sup> <http://news.bbc.co.uk/2/hi/business/184861.stm>

As figure 2 depicts, financial crises aren't rare at all. Since the dawn of banking and capitalist economy, economies moved in cycles often disrupted with financial crises. During the 19<sup>th</sup> century, bank runs were common as former central banks did not act as a lender of last resort. After the World War I (or WWI), crises were mainly linked to the gold standard and fixed exchange regimes. After the Great Depression, banking crises disappeared with stiff regulation and the Bretton Woods fixed currency system (1945-1971). *"Financial bank crises were rare although there were frequent currency crises. Since the early 1970s along with the switch to a floating exchange rate regime .. and the liberalization of domestic financial markets, international financial crises have reappeared."*<sup>8</sup> Bordo & Lane add to the topic, that twin crises (currency and bank crises) were quite common but only the crisis in 1931-33 had the global extend. Moreover, they find several examples of triple crises (in periods 1890-93, 1931-33, 1982-84), but none of them grew into the global triple crisis and remained on single country level.

#### 1.1.1. Bank crises

According to International Monetary Fund, bank crisis represents a situation when NPL ratio<sup>9</sup> exceeds 10%, or when bank bailout costs outweigh 2% of GDP, or when the government has to react to problems in bank sector by introducing redemption measures (such as bank holiday, frozen deposit accounts or granted guarantees on deposit accounts).<sup>10</sup> Such situations usually lead to a serious credit reduction and major losses in output. Measured by an output loss, bank crises are the most severe ones. Cecchetti, Kohler & Upper analyzed bank crises in 1980-2007 and conclude that average output loss from peak to trough was 8,6% and it took economies 11,4 quarters to get back on pre-crisis level.<sup>11</sup>

Bank crises are nothing new; in the USA, first bank crises emerged at the end of 18<sup>th</sup> century with a major bank panic of 1797 caused by land speculations in the US and crisis in the United Kingdom. Until then, crises were often bound to real factors such as wars, embargos or natural disasters. Major bank panics repeated roughly in 10-year periods (as shown in figure 3) and had severe impacts. This was undoubtedly caused by exploding financial sector and an absence of lender of last resort until 1913. There was a central bank called Second bank of America before that once but the President, Andrew Jackson, had it

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<sup>8</sup> Bordo & Lane (2010), p. 4

<sup>9</sup> Non-performing loans relative to total loans provided

<sup>10</sup> Musílek, P. *Trhy cenných papírů*, EKOPRESS, 2011, p. 132

<sup>11</sup> Cecchetti, Kohler & Upper, (2009), p. 10

shut down in 1836. Before the era of lender of last resort in the form of central banks, the common cause of banking crises were bank runs.

Figure 3: List of major bank crises in the USA

Bank crisis	Cause
1797	Crisis in the UK, land speculation in the US
1819	US first boom-bust cycle, failure of monetary policy
1826	Collapse of stock market in the UK, fraudulent practices in the US
1837	Excessive money supply, real estate speculation, central bank closed
1857	Speculation in railroad stocks
1873	Speculation in railroad stocks, abandoned silver standard by Germany
1892	Speculation in railroad stocks, gold mine speculation in the UK
1907	Overinvestment, lack of gold, soaring interest rates
1914	Great war, drain of gold to Europe
1929	Overinvestment, stock market crash, failure of monetary policy
1987	The largest one-day drop in stock market history
1989	S&Ls crisis due to deregulation
1998	LTCM derivative positions bailout to prevent market crash
2007	Real estate bubble, propagation effects of derivatives

*Source: Vogel (2010), Tvede (2006), Jalil (2012)*

Before 1860s, paper money would be issued by different banks of uneven quality and whole payment system was broadly unstable, because notes of banks out of state would be often accepted only with discounts<sup>12</sup>. A period from 1863 to 1913 is called the Nation bank era. There was set up a list of national banks who was entitled to issue paper money, nevertheless bank crises and bank runs were still present. Situation changed with the foundation of 12-bank Federal Reserve System in 1913, which started operating as a lender of last resort and major financial panics disappeared until the Great Depression.

Since the Great Depression financial markets became heavily regulated. In the USA, Glass–Steagall Act of 1933 strictly separated commercial and investment banking activities. Commercial banks were forbidden to underwrite securities with the exception of Treasury and municipal securities and investment banks could not receive deposits. Also restrictions on interest rates were imposed on all types of accounts. Investment banks were partnerships back then and their partners carefully oversaw all investments they made. In 1972, Morgan Stanley had one office and approximately 110 employees.<sup>13</sup> Thanks to tight regulation of the banking system and the post-war Breton Woods currency system the banking crises were

<sup>12</sup> Shiller, R.J., online lecture ECON 252 at the Yale University, USA, 2011: (<http://www.youtube.com/watch?v=1mDL1fKEVZM&list=PLhpGcOu8ddyoxMqCaTjXftnnoplXX5YA>)

<sup>13</sup> Inside Job, USA, 2010, a documentary directed by Charles Ferguson



nonexistent during 1933-1971.<sup>14</sup> No single major asset price bubble occurred in advanced countries during that period.

Since seventies, the wave of fundamental changes swept throughout the financial markets. With the fall of Breton Woods system, all past regularities vanished, and markets became more volatile, encouraging the swift development of derivatives contracts. The fall of the Communist regime and the dynamic development in the Information Technologies made financial markets more interconnected and globalized. Finally, deregulation processes took place. In the USA, Depository Institutions Deregulation and Monetary Control Act of 1980 started the removal of interest rate ceilings on deposit accounts. In 1982, the U.S. Saving & Loan companies (S&Ls), small finance saving institutions specializing to mortgages) were allowed commercial lending and newly could be involved in other markets than just mortgage lending. This caused the first bank crisis since the Great Depression. Due to excessive speculation in other fields than housing (e.g. oil industry), hundreds of S&Ls went under and stabilization of the situation cost taxpayers 124 billion dollars<sup>15</sup>. During eighties, once private partnerships, the investment banks went public and investment industry experienced a massive boom. Going back to the Morgan Stanley example, in 2010 it employed more than fifty thousand workers and had operations all over the world. Glass-Steagall act was reinterpreted in 1996 permitting finance holding companies to generate up to 25% of total revenues by investment banking activities and in 1999, Glass-Steagall act was finally repealed by Gramm-Leach-Bliley Act allowing the financial industry to consolidate into several giant, too-big-to-fail institutions.<sup>16</sup> Booming derivatives markets resisted regulatory attempts in 1998 and in the end Commodity Futures Modernization Act<sup>17</sup> passed in 2000 prevented derivative markets from the supervision of the regulatory body at all. Last but not least the SEC relaxed limits on banks' leverage in 2004.

Due to all mentioned changes, the financial sector became larger than ever. Let's have a look at figure 4 . While for the first eight decades of the 20<sup>th</sup> century the value of financial assets in the USA exhibited generally a modest pace of growth, after 1980 it speeded up significantly. Whereas it took 80 years for the financial system to double in size between 1900 and 1980, it took it only 20 years after 1980. Needles to mention that figure 4 omits

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<sup>14</sup> Knoop, T. A. *Modern financial macroeconomics: panics, crashes, and crises*. Blackwell Publishing, 2008, p. 194

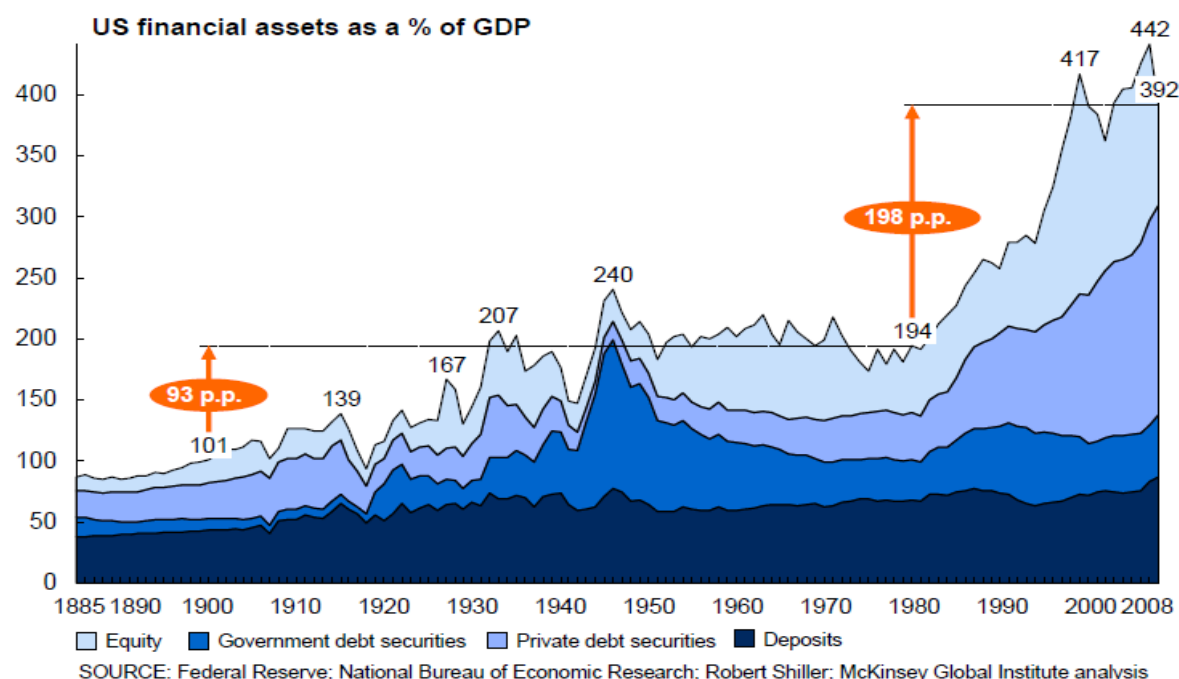
<sup>15</sup> Inside Job, USA, 2010, a documentary directed by Charles Ferguson

<sup>16</sup> Scherman (2010), p.3

<sup>17</sup> <https://www.sec.gov/about/laws/cfma.pdf>

other classes of financial assets such as derivatives experiencing boom during last three decades. Overall, the total value of financial assets grew much more rapidly than global GDP, from 227 percent in 1990 to 392 percent in the end of 2008<sup>18</sup>.

Figure 4: Financial system in the US



Source: McKinsey (2009), p.8, according to Federal Reserve, NBER, R.J.Shiller

It is evident today that regulatory bodies did not keep up with the vast changes and growth in the financial sector. Since the end of 1980s a large number of asset bubbles occurred and costly banking crises became present again crowned with the Global Financial Crisis. As the financial sector grew bigger, it became a predominant feature affecting the business cycles. While developed financial system is of course essential for the growth of economy, it can also be also a source of excessive turbulences when the regulation falls behind.

There are two main types of models explaining bank crises; the first, a *belief-based model* was introduced by Charles P. Kindleberger in 1976 claiming that the cause of bank crises are inherent fear waves, where financial fundamentals do not have to change at all but people can simply spark a crisis by following the others spreading bad mood. This leads to periodic, self-fulfilling banking crises often started with bank runs, unless deposit insurance is employed and central bank carries out its duties as a lender of last resort. The second model is *based on*

<sup>18</sup> According to Mc Kinsey report (2009), p.8

*fundamentals* - Allen & Gale (1998) distinguish between two types of shock: a major decline in asset prices (e.g. bubble burst) impacting negatively banks' net worth or an unexpected change in an important macroeconomic variable such as rise in interest rates or inflation or depreciation of foreign exchange rates having impact on bank profitability. To prevent bank crises, tight regulation is suggested; especially concerning capital requirements, limits on foreign currency funding and excluding deposit insurance (as it can paradoxically lead to moral hazard). There's no consensus, whether bank crises are the source, or are caused by an economic contraction. For example, a bank crisis in 1873 preceded the one of the deepest recessions in the US history (unemployment in New York hits 50% <sup>19</sup>), whereas during the Great Depression, bank crisis was preceded by an economic contraction. <sup>20</sup> An interesting fact is that 86% of major bank panics in the USA happened in spring or fall and there wasn't single one during winter. <sup>21</sup>

### 1.1.2. Currency crises

The currency crisis can be defined as: *"The most dramatic form of exchange rate volatility.. when an exchange rate depreciates substantially in a short period"*<sup>22</sup> or as a: *"Speculative attack on a pegged exchange rate."*<sup>23</sup> or expressed as: *"A nominal depreciation of the currency of at least 30 percent.."*<sup>24</sup> It has often a serious implication on the affected country's banking system and fiscal position and is, therefore, linked with dramatic recessions.

During history, currency crises were often a result of an excessive indebtedness of monarchs waging expensive wars but they never grew into international extend. The first international currency crisis unfolded during the Great Depression, which was raging in its high during early thirties; many countries were vainly struggling to spark recovery as their currency was tied in the gold standard. Economies were stuck in the liquidity traps, people were hoarding gold (demand for money was dropping) and the only way how to protect the gold standard was to keep interest rates high, which was, of course, having disastrous effects on damaged economies. The United Kingdom was the first to abandon the gold standard in

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<sup>19</sup> Tvede, L. *Business cycles: history, theory and investment reality, third edition*. Chichester. John Wiley & Sons, 2006, p. 65

<sup>20</sup> Knoop, T. A. *Modern financial macroeconomics: panics, crashes, and crises*. Blackwell Publishing, 2008, p. 167

<sup>21</sup> Jalil (2012), p. 45

<sup>22</sup> Miles, D., Scott, A. *Macroeconomics, understanding the wealth of nations*, 2nd edition, John Wiley & Sons, 2005, p. 554

<sup>23</sup> Bordo & Lane (2010), p. 3

<sup>24</sup> Leaven & Valencia (20080, p. 8

1931, followed by many countries afterwards, among them USA abandoning the gold standard in 1933 – dollar was devalued by 40%. After the World War II (WWII), countries came back to a fixed currency regime with their currencies pegged against the US dollar. This system, known as Bretton Woods, helped post-war reconstruction and lasted until 1971. During that period, currency crises were linked only to countries with obvious bad macroeconomic policy.<sup>25</sup> After the collapse of Bretton Woods system countries adopted fixed currency rates to keep low inflation and support exports but during this period foreign exchange markets became extremely volatile and a great number of currency crises reappeared. They were also harder to predict than before and often grew to an international extent. Countries on-by-one abandoned the fixed exchange rate system eventually.

Currency crises are mostly associated with a fixed currency regime (monetary union, currency board, pegged system) and liberalized capital account. There are two types of models explaining how the crisis can unfold. First, *fundamentals-based* models blame governments for carrying out unsustainable policies – maintaining fixed currency regimes and running fiscal deficits. The current account position gradually deteriorates and when certain covenants are breached (e.g. deficit of current account higher than 5% of GDP, foreign debt more than 40% of GDP, central bank's level of currency reserves covering imports does not exceed 3 months, and others), initiated speculator attacks bear the message from the markets that situation is unsustainable. Most speculative attacks are successful as the central bank runs out of foreign reserves and has to give up a fixed currency regime.

These models can explain a great deal of currency crises but fail to clarify specific situations. Fundamentals of countries may be so strong that a probability of the speculative attack approaches zero, on the other hand, there are countries with obviously weak fundamentals and crises are expected. What about countries with dubious fundamentals? Some of them never experienced the currency crises but the others did. One may present as an example successful speculative attacks on the United Kingdom and Italy in 1992, which were eventually forced to abandon the ERM system but shared similar statistics with the other European countries.

Based on that, the second type, *belief-based* models suggest that investors observe three factors – fundamentals, benefits of the fixed regime for the government (stable inflation, support to export, attracting foreign investments) and benefits of the floating regime (mainly

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<sup>25</sup> Knoop, T. A. *Modern financial macroeconomics: panics, crashes, and crises*. Blackwell Publishing, 2008, p. 194

active monetary policy). The latter two determine the government dedication to maintain the fixed regime and when a large proportion of investors get the impression the government would find the fixed regime disadvantageous, they strike an attack.<sup>26</sup> Therefore, the stability of currency often relies on the sentiment of the crowd and they basically decide, whether the currency remains stable or not – the whole model is self-fulfilling.

The implications of currency crisis are terrible; the affected country experiences capital flight as investors withdraw their *hot money*. In order to stop this situation central banks buy their own currency with currency reserves, which depresses money supply, causes interest rates to rise and leads the economy into recession. In most cases, their effort ends in vain and they have to give up the fixed exchange system. New exchange rate often depreciates by tens of percent, which immediately raises burden of foreign currency-denominated debt of governments, banks, businesses and households. Therefore, currency crises often occur as twin or even triple crises, with concurrent banking or debt crises. Bordo & Lane (2010) estimate that the currency crisis alone causes output to decline by 3% but a twin (currency-bank) crisis leads to an average 16,5% fall in GDP.<sup>27</sup>

### 1.1.3. Sovereign debt crises

A sovereign default is defined as: *“The failure to meet a principal or interest payment on the due date, often resulting in debt restructuring under conditions not favorable for the investors.”*<sup>28</sup> The main factor responsible for such crises is irresponsible management of public finance. As governments are elected only for a certain period they think only in short term frame and they regularly fulfill their election promises, e.g. social benefits. Paradoxically, dictatorial regimes are not so prone to debt crises because their reign is not bound to any political cycle and they don't have to “spoil” citizens with costly pre-election promises.<sup>29</sup> Nevertheless, there are many other reasons putting strain on public finance, too, such as major wars, natural disasters, deep recessions or negative demographic development putting burden on state pay-as-to-go pension system.

Problematic part is that if country suffers from large public debt so large it attracts attention of investors governments find themselves in an unenviable situation – budgets are curbed with rising cost of debt service as well as with soaring interest rates on newly issued

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<sup>26</sup> Knoop, T. A. Modern financial macroeconomics: panics, crashes, and crises. Blackwell Publishing, 2008, p. 194

<sup>27</sup> Based on data from 1880 to 2009

<sup>28</sup> Reinhart & Rogoff (2010), p. 80

<sup>29</sup> Jílek, J. Finanční trhy a investování, Grada, 2008, p. 576

government bonds. In such a situation, the government has several options how to solve the problem – they can introduce austerity measures trying to reduce a large pile of debt (which had been generated over many years, or even decades) or they can declare bankruptcy immediately and restructure debt according to negotiation outcome with the investors, nationalize possessions or in some cases monetize debt. According to Axel Ljeonhufvud, a proponent of John Maynard Keynes, austerity measures are frequently badly timed<sup>30</sup> – they come into effect, when economy operates under its potential; it finds itself in the recession or shows a very fragile growth. Fiscal multiplier is not fixed but changing with the scale of negative output gap (e.g. in boom, fiscal expansion has lesser effects than in recession). This may lead to a counterproductive situation where the multiplier exceeds one and austerity measures cause bigger decline in GDP and overall debt-to-GDP ratio getting even worse.<sup>31</sup> The situation gets aggravated even more if country operates under a fixed exchange rate regime.

Nowadays, the most discussed ratio describing countries' situation is debt-to-GDP ratio. But the variable alone can't provide an objective measure for any decision-making. In the case of the United Kingdom, as it was a supreme world power during the 18th century no default occurred until the Napoleonic wars even its sovereign debt exceeded 200% threshold several times. On the other hand, Great Britain was forced to restructure its sovereign debt in 1889 even its debt ratio kept close 50% (see figure 5).

Moreover, during a period from 1970 to 2007, there were 63 country defaults with the average debt ratio 51,3% (e.g. in 1998 Russia defaults with ratio reaching 50%) and one third of countries defaulted with the ratio even below 40%.<sup>32</sup>

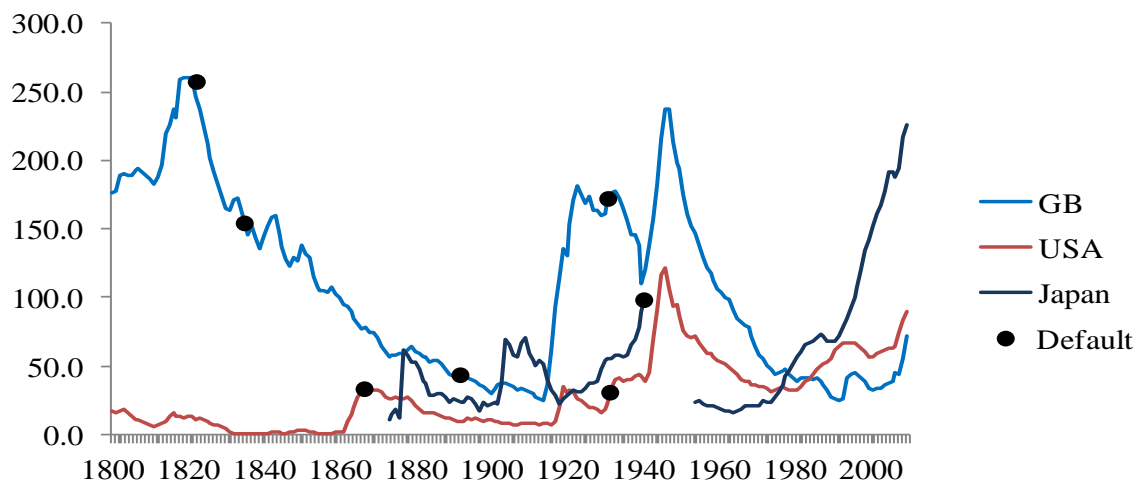
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<sup>30</sup> Institute for New Economic Thinking, video available at: <http://www.youtube.com/watch?v=90zLGjQr6jo>,

<sup>31</sup> Littleboy, B. lecture ECON2040 at the University of Queensland, Australia, 2012

<sup>32</sup> Laeven & Valencia (2008), p. 59-74

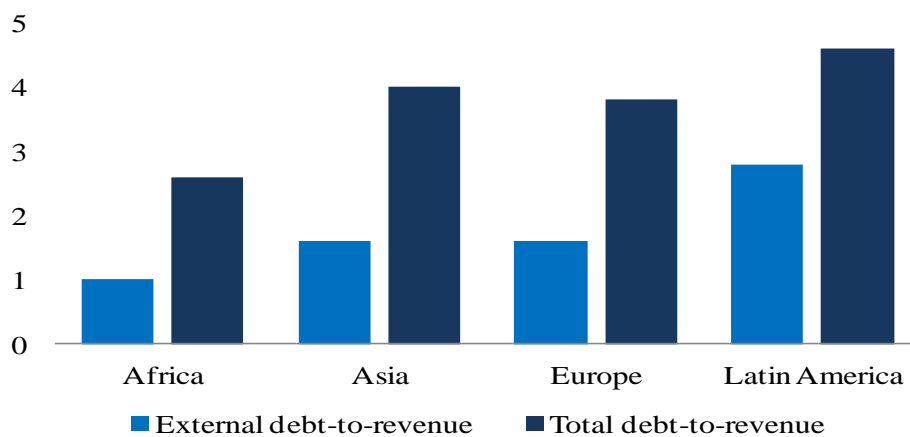
Figure 5: Public debt-to-GDP ratio and defaults in USA, United Kingdom and Japan



Source: Reinhart & Rogoff (2008)

Reinhart & Rogoff (2008), who went back to 1900 and analyzed sequacious debt crises, emphasize it is not a size of debt but its *dynamics* – on average, total debt runs up to 140% of original level five years prior to a default. They also state that one has to observe a *proportion of revenues relative to total debt* and the size of the government.

Figure 6: Debt-to-revenue ratios during defaults



Source: Reinhart & Rogoff (2008), p. 14

This can be also documented with situation in France during the 18<sup>th</sup> century: “*When Sun King, Louis XIV, died in 1715 in France.. his ancestor had to deal with national debt of 2000 million livres held by private French financiers, whereas tax revenues accounted only for 145*

*livres, i.e. debt accounted for 14 times amount of government annual revenue.*“<sup>33</sup> This situation led to the introduction of paper credit according to suggestion from John Law (debt-equity swap where national debt was swapped into equity shares in Company of the West with trade privileges in the Mississippi region) and creation of the famous Mississippi bubble, whose crash plunged whole country into chaos. Last but not least, *currency regime* is important, too. Most of debt crises are associated with concurrent currency crises as a result of overvalued pegged currency. In modern history, there were waves of sovereign defaults in 1977-79, 1981-84, 1998-99 and 2001-2002 – 63 defaults took place and all countries were operating under fixed exchange system.

Implications of sovereign default are substantial – Reinhart & Rogoff (2010) conclude: “*The average cumulative decline in output during the three-year run-up to a domestic default crisis is 8 percent.. and it takes 3 years to GDP to reach pre-crisis level*”<sup>34</sup>. For example, during already mentioned Russian debt crisis of 1998, short-term interest rate reached 150%; GDP declined by 5,3% in 1998; central bank abandoned fixed exchange rate and ruble fell from 5,9 to 21 rubles per US dollar; half of Russian 3000 banks went under and international investors lost around 30- 35% during debt restructuring. Nevertheless, whole economy recovered pretty quickly as industry rebounded with devalued exchange rate. In 2001, Argentina defaulted. After a prolonged period of high inflation during eighties, the government pegged peso against the US dollar. Everything went on smooth until 1999, when country was struck with recession. The government was already generating large fiscal deficits and together with fixed exchange rate it had no tool to fight the recession. After two years of severe austerity measures, cumulative GDP fall of 20% and massive social disturbances. Argentinean government refused to pay its obligations, devalued peso by 29% and implemented dual exchange rate (fixed rate for exports and imports). In 2002, the government adopted the floating exchange rate and one could exchange one US dollar for 3,4 pesos (before the crisis it was fixed 1:1). Living standard of Argentinean people sharply dropped and investors incurred substantial losses as the sovereign debt was restructured by issuing new bonds with face value as 40% of original bonds.<sup>35</sup>

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<sup>33</sup> Tvede, L. *Business cycles: history, theory and investment reality, third edition*. Chichester. John Wiley & Sons, 2006, p. 7

<sup>34</sup> Reinhart, C.M., Rogoff, K.S. *This time is different, Eight Centuries of Financial Folly*, Princeton University Press, 2010, p. 129

<sup>35</sup> Jílek, J. *Finanční trhy a investování*, Grada, 2008, p. 612, 616



#### 1.1.4. Bubbles and manias

Bubbles on financial markets are the source human madness, incredible capital gains and devastating losses. They can be defined from several angles; in relation to prices they are long-lasting divergences of market prices relative to their true value connected with excessive price surges and subsequent market crash. With respect to the cycles, bubbles often occur during rapid expansions followed by strong contractions. Professor R. J. Shiller emphasizes a human nature of the bubbles, as they are “*Essentially social-psychological phenomena and...they are, by their very nature, difficult to control*”<sup>36</sup> When the bubble grows, it becomes quickly one of the hottest topics of conversation and created public attention then keeps on feeding the bubble itself. Finally, Keynes shows that bubbles can be bounded to irrationality of both professional and individual investors: “*It might have been supposed that competition between expert professionals, possessing judgment and knowledge beyond that of the average price investor, would correct the vagaries of the individual...*”<sup>37</sup>

The existence of bubbles is in the direct contrast with the Efficient Market Hypothesis (or EMH) introduced by Eugene Fama in 1965. It should be impossible for prices to depart significantly from their fair value on efficient markets, as any price divergence should be revealed by the arbitrageurs and neutralized by their interventions. This situation not infrequently fails to facilitate due to several reasons. The EMH, above all, envisages a rational, marginal, risk-averse investor with a perfect access to information investing on efficient markets with no transaction costs and other obstacles. Nevertheless, all of these assumptions can fail to work while the bubble occurs (as shown on figure 7).

Figure 7: EMH assumptions versus bubble reality

#	EMH assumptions	Bubble reality
1	In long term, only marginal investor investing only when new price-setting information arrives stay on the market	Wide crowd is attracted acting rather on gossip and hot tips than thorough valuations
2	Rational investor correctly pricing the information and deciding upon investments according the analysis outcomes	Concept of bounded rationality introduced by Herbert A. Simon highlights the fact, that rationality can be bounded with a lack of time, scarcity of information and investor's intellect
3	Risk averse concave utility function of the investor (more wealth generates decreasing utility increments)	Bubble greed - convex course of the utility function (more wealth generates increasing utility increments)
4	Investor can short-sell the market to balance the prices any time	Frequent barriers to short-sell or it is effectively banned especially when markets sunk into free-falls

<sup>36</sup> <http://www.project-syndicate.org/commentary/the-never-ending-struggle-with-speculative-bubbles-by-robert-j--shiller>

<sup>37</sup> Keynes, J.M. The General Theory of Employment, Interest and Money, London, Macmillan, 1936, p. 154

Source: [https://www.princeton.edu/~achaney/tmve/wiki100k/docs/Bounded\\_rationality.html](https://www.princeton.edu/~achaney/tmve/wiki100k/docs/Bounded_rationality.html), Vogel (2010) p. 12

Bubbles, as history had shown, can occur at any market with variable prices. They can be divided by several criteria: *Extent* – bubbles' extent can vary from local/regional (e.g. property bubble on Florida, peaking in 1926), national (e.g. property bubble in Japan, peaking in 1989) to international (e.g. property bubble in the USA, Ireland, Spain etc., peaking in 2007). *Market type* – bubbles on non-financial markets occur especially in gold, silver, oil and collectibles (often with the lesser impact on economy), and bubbles on financial markets are formed at markets in shares, property, bonds and international investments (with greater impact on economy). Nevertheless, they can occur on any market with variable prices whatsoever. *Source of origin* – positive expectations (where bubbles occur in risk-related assets), or negative expectations (bubbles get formed in assets acting as safe havens during dodgy times). It is important to point out, however, that bubbles bursting out in one asset class do not have to stay confined to the particular asset class but can inflate prices in other markets as well, as happened in Japan during late 1980s, when stock market, housing market, and market in collectibles were inflated at the same time.

Bubbles, crazes and manias they are nothing new. Rumors about excessive speculations lead even to Ancient Rome, where speculations in foreign exchange grew into large extent,<sup>38</sup> but the first documented bubbles was the Tulip mania in Netherlands. Following figure illustrates famous bubbles in risky assets:

Figure 8: Famous bubbles in risky assets

<i>Bubble</i>	<i>Period</i>	<i>Country</i>	<i>Price surge</i>	<i>Commentary</i>
Tulip mania	1634-37	Netherlands	5900%	Rare tulip bulbs were priced as a house in the city center
Mississippi Company	1719-21	France	6200%	Mississippi company was granted trading rights and paper credit was introduced in France for the first time
South Sea Company	1719-20	United Kingdom	1000%	Expression bubble originates from here, as little, fraudulent stock dealers (called bubbles), gathered money from the poor to enable them to invest
Real estate bubble of 1837	1834-37	Chicago, USA	6400%	Bubble caused by excessive money supply as the Bank of the United States lost its monopoly and every bank could issue banknotes
Railroad stocks craze	1868-73	USA, UK, Germany	320%	Railroad boom of 1870s originated with the end of the Civil war in the USA - the first transcontinental route was built in 1869
Florida housing	1921-26	Florida (USA)	900%*	Bubble caused by the accessibility of the new means of transport - car, end of WWI and pleasant tax regime. At

<sup>38</sup> Rostovtzeff, M.I. *The social & economic history of the Hellenistic world*, Oxford University Press, 1941, p. 419

bubble				the peak of the bubble, city lots changed owner even 10 times per day. Bubble was pricked by a hurricane hitting Florida
Stock market bubble	1925-29	USA	497%	Greatest stock market crash in history, starting great depression, contributing to the growth of nationalism, World War II. It took another 26 years for stock market to beat the peak in 1929
Silver bubble	1979-82	Worldwide	710%	Hunt brothers tried to corner the market in silver (they held one third of the entire silver supply) as they were concerned with stability of the government as gold standard was concluded
Crash of 1987	1985-87	USA	115%	Professor R.J. Shiller sent out questionnaires to investors regarding the crash, few could remember any external news justifying sale - market collapsed with no news
Japanese bubble	1984-91	Japan	385%	Bubble inflated stock market, real estate and even collectible prices. The enormous size of the bubble can be demonstrated with the fact, that value of the land of Tokyo metropolitan was equivalent to the value of whole California
Dot.com bubble	1996-00	USA	733%	During a peak of the bubble, companies were able to double their share prices overnight just by renaming company to sound it was engaged in the IT industry
Housing bubble	2004-07	USA, Worldwide	228%**	Housing bubble occurring worldwide thanks to the boom of structured products caused the global financial crisis and recession

\* prices not available - number refers to housing starts activity

\*\* house prices

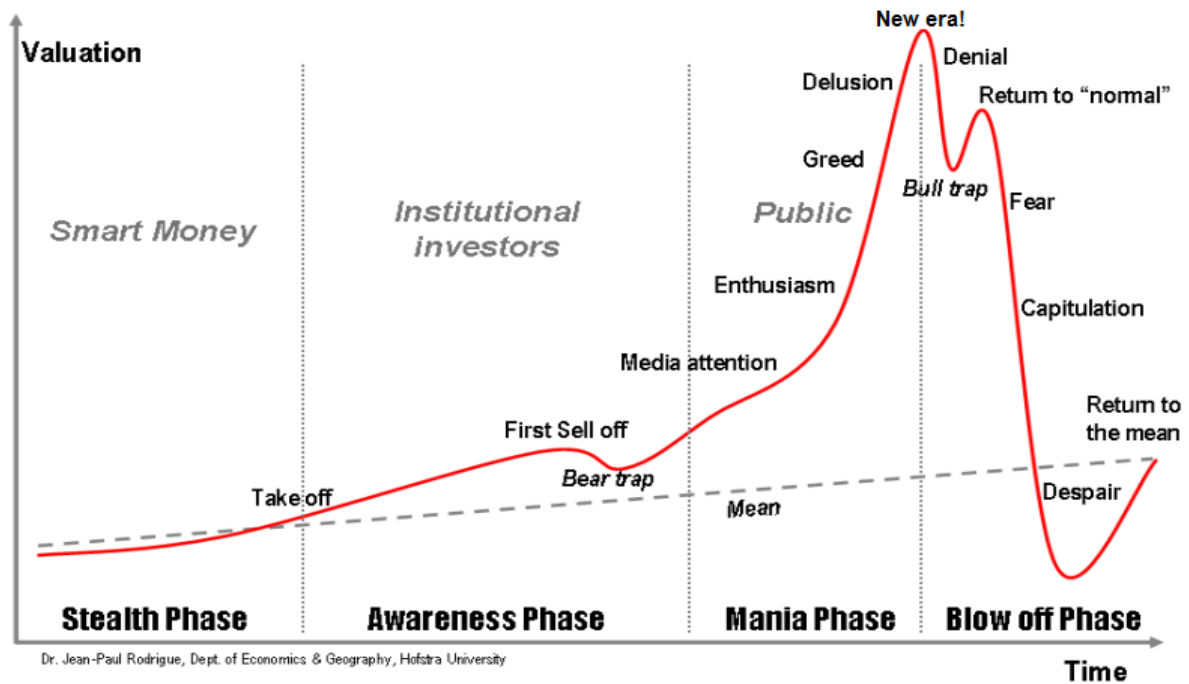
Source: <http://www.library.hbs.edu/hc/crises/forgotten.html>, Veselá (2007) p 501, Tvede (2006) p51, Shiller (2005) p.98, Knoop (2008) p.173

According to their nature, bubbles should never occur twice in the same asset class as the investors clearly remember the past craze and following drops and it should take at least one generation before a speculative mania in the same asset class can start forming. It is therefore rather probable that a phenomenon called “bubble rotation” may facilitate. But it is a bit disturbing that while during a 1940s – 1970s period, no speculative manias emerged in the USA, there were at least 3 manias straight away during past since 1980s (housing speculation of 1980s, 1987 crash, dot-com bubble and housing bubble).

### Bubble course

Bubble development can be roughly divided into four main phases – stealth, awareness, mania and blow-off phase (see figure 9).

Figure 9: Bubble phases, according to R.J. Shiller



Source: [http://people.hofstra.edu/jean-paul\\_rodrigue/jpr\\_blogs.html](http://people.hofstra.edu/jean-paul_rodrigue/jpr_blogs.html), according to R.J. Shiller

### Stealth phase

What does it take for a bubble to be born? Firstly, there must be present favorable precipitating conditions generating overall optimistic outlook on the economy future, such as demographic presumptions, low tax burden, liberalized markets and eligible macroeconomic properties. But these precipitating factors let alone cannot be the cause of the bubble. There is always an exogenous factor setting the boom into motion such as the end of wars or non-democratic regimes and a technical innovation promising a large change in life standard and surge in productivity. During 1800s it was a *transportation boom*, *electrification* during the advent of 1900s, end of the World War I tagging along with the *invention of cars, radios*, progress in *cinematography* during the *roaring twenties*; the World War II end associated with *baby boom* and *post-war reconstruction*, the occurrence of *television* during 1950s and invention of the *Internet* linked with a *rapid progress in IT technologies* at the end of 1990s. All these factors can set the bubble in the stealth phase.

### Awareness phase

How is it possible that while some of booms were just followed by contractions and were dissolved in the bear trap, while others turned into sheer speculative manias? Answer can be

found in the cycle developments as discussed later in Chapter 4.2; it takes big cycles to form speculative manias – if the ground-breaking innovation is backed up by upward-headed cycles, it creates echo in the markets strong enough to survive the bear trap when cyclical inventory contraction occurs and following upward phase turns out to be so strong that bubble evolves from awareness to mania phase.

### Mania phase

Smart money who had already invested at the very beginning of the boom reap first yields; the rational and successful speculation does not go unnoticed and catches the attention of the crowds. As Kindleberger & Aliber (2005) immortalized J.B Steward's words: *"There is nothing as disturbing to one's well-being and judgment as to see a friend get rich."*<sup>39</sup> this phenomenon known as a regret theory urges people to try to be as successful as their neighbors, thus investing in the markets feeding up the valuations. Sustained trend acts as a signal for the technical analysts to enter the position, feeding the market prices further. Soon enough, whole uptrend is caught up by media and the bubble enters its third stage – mania. One can detect several effects, both of behavioral and financial nature, tagging along the mania-phase, creating positive feedback and pushing the market prices to new, exorbitant and unsubstantiated peaks:

Figure 10: Effects occurring during the bubble

#	Effect	Factor	Description
1	Regret theory	Behavioral	People regret their inactivity while others take action and succeed
2	Extrapolation	Behavioral	Tendency to extrapolate the future developments from the past
3	Greater fool theory	Behavioral	Even identifying the bubble correctly, investors still deliberately enter the market assuming they can sell at higher prices before the crash
4	In-house money	Behavioral	People handle money won by gambling and speculation differently from handling money earned - they tend to be more prone to risky transactions with the in-house money R.J. Shiller notes that <i>"The history of speculative bubbles begins roughly with the advent of newspapers."</i> <sup>40</sup> Movements on markets are grateful
5	Role of media	Behavioral	topics for the mass-media as there are new stories emerging on a daily basis. During the bubble, constant coverage of price surges create positive feedback as it draws attention of the people and promotes the word-of-mouth potential
6	Word-of-mouth potential	Behavioral	Bubbles become a true social phenomenon, a subject of peoples' conversations. E.g., at the peak of the bubble in 1929 one could get recommendations on stock from shoeshine boys or waiters picking up the pieces of their customers conversations.
7	New era thinking	Behavioral	Ongoing economic boom accompanied with market price increases is being justified by the crowds but also by politicians and prominent economists who claim that market prices are adequate to economic prospects. There is

<sup>39</sup> Kindleberger, Ch.P., Aliber, R.Z., Manias, Panics, and Crashes, A history of Financial Crises, 5th edition, New Jersey, John Wiley & Sons, 2005, p. 29

<sup>40</sup> Shiller, R.J. *Irrational Exuberance*, 2nd edition, New York, Broadway Books, 2005, p. 85

			widespread belief that boom is permanent because people were able to learn from the past mistakes
8	Animal spirits	Behavioral	Phenomenon proposed by J.M. Keynes. When things are set into motion, people feel sudden urge to act, i.e. to invest when prices are skyrocketing and to sell when prices are collapsing
9	Erosion in lending standards	Financial	Hyman Minsky or Clement Juglar pointed out that prosperity is destabilizing. Banks repeatedly lower their lending standards forced by shareholders and the competition
10	Collateral effect	Financial	Loans are regularly backed by collateral, such as property. Inflated prices of collateral allow debtors to borrow more funds and more debt is created but it never looks excessive. But while prices of collateral can move, nominal value of the loan still remains the same. When bubble bursts, whole debt setbacks are revealed
11	Occurrence of Ponzi schemes	Financial	Large profits on the markets, erosion in lending standards and collateral effects can breed proliferation of Ponzi units - highly leveraged investors sensitive to price movements
12	Monetary easing	Financial	According to Posen, <sup>41</sup> only 17 of 48 of cases led to unsustainable asset price booms, but Roubini opposes this opinion with an argument that most monetary easing cases follow sharp recession and don't have to necessarily end up with the bubble, but they are nevertheless strong contributors themselves

Source: Posen (2004), Roubini (2006) p. 7, Tvede (2006) p.403, Keynes (1936) p. 103, Schiller (2005) p. 85,

### Blow-off phase

But bubbles can't go on growing forever. According, to the Mean Reversion Theory<sup>42</sup>, any price divergence from the long-term average will eventually disappear. The initial positive incentive sooner or later exhausts its potential and whole boom heads to the end. One would expect there must be negative news significant enough to alter the investors' sentiment but it is not always the case, e.g. Shiller analyzed stock market crashes of 1929 and 1987 and found out to his surprise there were no significant news at all. *"The most significant news stories in the newspapers seem consistently to have been about previous moves of the market itself ... interpretations of the reasons for these previous moves, often in terms of investor psychology."*<sup>43</sup> It can be market psychology and sentiment alone able to change the course of the trend.

There are several effects in work causing that market prices are prone to collapse. All effects described in figure 10 work in reverse, too. There are also other factors of technical kind accelerating the whole process. First, at the top of the peak, smart money already knowing pricings are excessive go into short positions in order to gain from anticipated price collapse. They may fail on several occasions but in the end trend reverses and short sells

<sup>41</sup> <http://www.iie.com/publications/opeds/oped.cfm?ResearchID=221>

<sup>42</sup> [http://www.investorwords.com/6860/mean\\_reversion.html](http://www.investorwords.com/6860/mean_reversion.html)

<sup>43</sup> Shiller, R.J. *Irrational Exuberance*, 2nd edition, New York, Broadway Books, 2005, p. 97

contribute to the overall decline. Second, many high-levered investors are sensitive to any price movements and even little price decrease can initiate margin calls and forced sales. Third, wide usage of stop-loss orders causes more sale orders when breaching exact price levels. All these factors combined together cause prices not to deflate but crash instead.

### Aftermath – consequences

It is always very difficult, if not impossible, to estimate the impact of the bubble when it reaches its breakeven point. While some bubbles affected the real economy only a little, other manias were the cause of serious recessions. The overall effect depends on many different factors; let us point out to the most important ones:

Figure 11: Bubble effects on economy

#	Effect	Description
1	Bubble extent from regional and asset class perspective	Does bubble occur only in one region, the whole country, or even internationally? Do prices surge in one asset class spring over to other asset classes? What was the overall market exposition relative to GDP and its corresponding wealth effect on GDP?
2	Credit level in economy	How does bubble coincide with growth of debt level in economy? Is there a strong connection? What proportion of funds was channeled via banking system and what are the possible impacts?
3	Sentiment	What is the impact on the consumers and their sentiment? How they change their spending patterns?
4	Reaction of central bank	Does central bank try to deflate bubbles amid its buildup? Does central bank provide liquidity to support the banking system?

Source: Author

### Role of central bank

Decisions concerning bubbles belong to the toughest tasks of central bankers. There can be raised many questions with regards to the matter with no clear answers:

1) Is it possible to identify a bubble ex ante? It is extremely difficult, if not impossible. Not seldom there is even disagreement over the ex post price movements. There are still disputes among the economists whether the past price increases were justifiable by fundamentals or not. Some economists, especially proponents of the Efficient Market Hypothesis question the very existence of the bubbles – e.g., Jean. C. Trichet, the former president of the ECB, claimed that: “Assuming apparently reasonable parameter values...one can reproduce the NASDAQ valuation and of the late 1990s and its volatility. There would thus be no reason to refer to a dotcom bubble.”<sup>44</sup> Kroszner (2003)<sup>45</sup> points out

<sup>44</sup> Cooper, G. The origin of Financial Crises. Petersfield. Harriman House, 2010, p. 115

<sup>45</sup> Kroszner, R. Asset Price Bubbles, Information, and Public Policy, Council of Economic Advisers, 2003, p. 10



that it is almost impossible to calibrate the filters to distinguish bubbles from the fundamentally justifiable trends. Problems with identifying bubbles make central bankers dubious with regard to bubbles and any pre-emptive actions.

2) Which instrument should policy makers use? Pivotal instrument regarding monetary policy and price valuations is the interest rate. But one must note that central bankers observe developments in many segments and while one can be booming, the others can show signs of deceleration and raising interest rates can harm already inhibiting sectors. Also, small movements in interest rates can fall flat in attempt to deflate bubbles, whereas a significant interest rate raise strong enough to stop expanding prices can destabilize financial markets and the whole economy. Post Keynesian economists therefore suggest stronger regulation of financial institutions, such as tight capital and liquidity requirements.<sup>46</sup>

3) Is it possible to deflate bubbles step-by-step? History shows this is particularly hard task since it is hard to identify the very existence bubble ex ante (an attempt to prick the bubble in Japan during 1980s came too late and asset prices collapsed) but it is not impossible (monetary authorities in Australia and New Zealand identified inflating bubbles in housing prices and were among the first central banks to raise interest rates, thus reducing risk of financial crisis).

#### How to react to the bubbles?

The economists undertake an everlasting debate over the possible solutions of the phenomenon and their opinions correspond with economists' ideological streams. Here are some examples of potential solutions to the issue:

1) Alan Greenspan, the former chairman of the Federal Reserve Board in the USA, claims one should not take any pre-emptive actions on bubbles but be ready to respond strongly via interest rate changes and acting as a lender of last resort after it bursts ('to mop it after'). The reasoning behind that is that one can never be sure whether a putative bubble truly exists and pre-emptive strikes could put out fundamentally healthy growth.

2) Post Keynesian economists, such as Hyman Minsky, suggest using tighter regulation of financial institutions, such as strict lending limits on liquidity and capital. Central banks should closely cooperate with the government to target the unemployment rate.

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<sup>46</sup> Koderová, J., Sojka, M., Havel, J. Teorie peněz, 2nd extended edition, Prague, Wolters Kluwer, 2011, p. 210



3) Simon Maxwell suggests that financial system is inherently unstable creating endogenous cycles but it is also impossible for central banks to reach the perfect equilibrium. Central banks should therefore use the monetary policy to support the creation of smaller cycles.

4) Nouriel Roubini proposes targeting of asset prices along with inflation targeting.<sup>47</sup> In his view, asset price bubbles pose a serious threat for the economies. Therefore, central banks should not only steer interest rates according to production and inflation gaps (rule proposed by J.B. Taylor) but include market prices gaps as well and react to significant rise in asset prices even when they are uncertain about their excessiveness.

## **1.2. Real shocks**

In addition to financial shocks, various real shocks also affect the economy. Before the capitalism and modern monetary economy emerged real shocks were a predominant cause of business cycles. In 1982, New Classic Economy Economists Finn E. Kydland and Edward Prescott introduced the Real Business Cycle Theory claiming fluctuations in output are connected to random shocks coming from the real sector (such as bad harvests, wars, natural disasters, etc.) affecting the supply side of the economy. According to the theory, the economy stays in the state of equilibrium until hit by the exogenous shock. The initial effect impacts only a certain part of the economy at first but propagates itself spreading like a wave into the economy affecting other, originally unaffected areas and industries. The economy responds to the shocks in the most efficient fashion but it takes time for productive capacities to adjust. Although the theory fails to elucidate financial crises, it is able to provide the best explanation of what happens in the economy when struck by disaster, energy shock or the war. Let's take a look at some shocks in greater detail:

### **1.2.1. Hostility acts**

Military operations, terrorist attacks and other hostile actions can have serious effects on business cycles and capital markets as they can alter the fate of the whole nation. Any long term investment reflects a belief in the good prospects of a company or the country in the future, so when sudden and unexpected negative information (such as lost battle or terroristic attack) arrives on the market it can cause panic behaviors. Indeed, this can be documented with the famous story from the Napoleonic wars. During war periods it was common that nations had run large fiscal deficits then and their debt was largely financed, among others,

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<sup>47</sup> Roubini (2006), p. 89

by wealthy individuals. Nathan Rothschild, apart from his numerous other business interests, speculated heavily during the war and had gathered immense gold stocks in order to finance the British government as he originally expected the war to rage for a long time. In 1815, Napoleon lost the decisive battle of Waterloo. Rothschild was informed about the victory sooner than others in London and knew he would not be able to sell all his gold for the price he had bought it before. Therefore by selling government bonds, he created a panic on the bond and stock markets as he made investors believe England had lost. In reaction to the panic, bond prices plummeted and Rothschild managed to sell a great deal of gold and buy bonds at their knockdown prices. Hence the old French proverb says *buy on the cannons, sell on the trumpets*.

#### 1.2.1.1. Terrorist attacks

Terrorist attacks can have implications for the markets as they are merely unpredictable. Sadly, terrorism showed new patterns in recent decades, aiming in particular for civilian targets instead of military or government ones, with serious implications. Short-term effects include direct costs such as property damage, injuries and casualties and the emergency response. Such costs are generally low in comparison to the whole economy. For instance, direct costs of the largest attack, the 9/11, accounted only for USD 27,2 billion. meaning about 0,24% of the US GDP.<sup>48</sup> *“What affects markets is more likely to be the indirect effects, bringing in the fear, uncertainty and undermining consumer and investor confidence.”*<sup>49</sup>

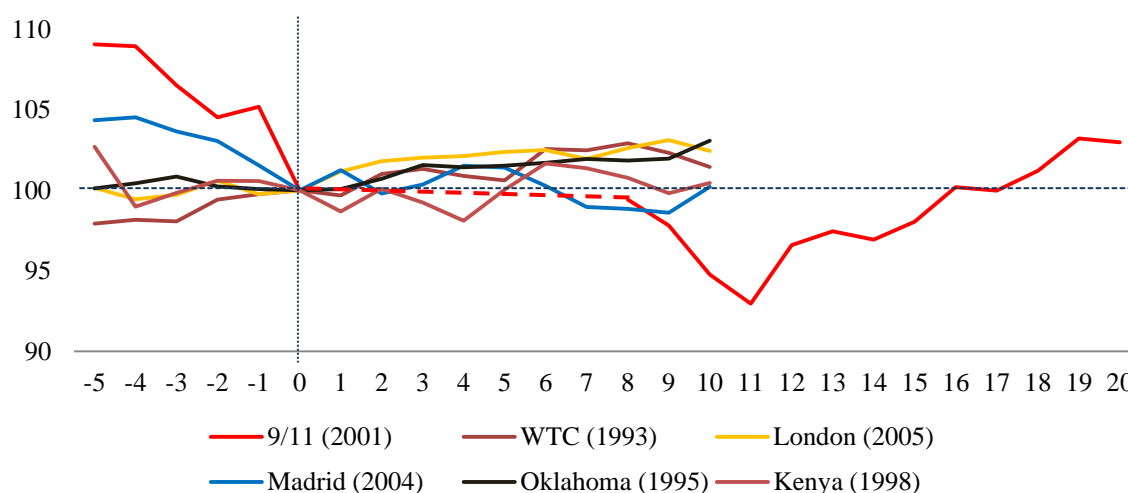
After the 9/11 attacks, several studies dedicated to the topic of terrorism and its impact on global markets were introduced. The main findings are that global markets respond strongly only to attacks directly targeting the financial systems and attacks significant enough to have the global effect. Unlike the 9/11 attacks, the bombings in Madrid or London were perceived only as regional events. The second finding asserts the role of lender of the last resort and states that well developed and liquid markets are relatively efficient in absorbing such shocks. Chen & Siems (2004) find evidence that U.S. capital markets are more resilient than in the past and that they recover from terrorist or military attacks sooner than other global capital markets. It took only 19 days to S&P 500 to rebound from the 9/11 attacks, while it took 23 days for European index to rebound in. Finally, terrorist attacks seem to have only short term direct effects on the markets (see figure 12).

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<sup>48</sup> Bruck & Wickstrom (2004), p. 294

<sup>49</sup> Johnston & Nedelescu (2005), p. 4

Figure 12: Effects of terrorist attacks on S&P 500 in %



Source: <http://finance.yahoo.com/q?s=^gspc>, [www.ushistory.org/us/index.asp](http://www.ushistory.org/us/index.asp), author

Although the terrorist attacks do not seem to have long-lasting effects on the markets and their costs are generally low compared to the overall size of the economies, the initial shock may have lasting effects on the economy (e.g. impacts on aviation, national security, armaments, or can directly lead to war).

#### 1.2.1.2. Wars

Unlike the terrorist attacks, wars are more predictable but can have long-lasting effects both on economy and the markets. At the offset of war, one never knows how long the conflict will last, and what the outcomes will be. Wars seriously raise the level of uncertainty about the future because anything unimaginable can happen. Decisive battles are unique, unrepeatable and only one-go events and it is hard to forecast the effects on the people, economy and markets.

Economists have their own opinions on wars. Keynesian economists see the potential in wars to stop recessions caused by under consumption. Paul Krugman remarks: *“Military spending does create jobs when the economy is depressed. Indeed, much of the evidence that Keynesian economics works comes from tracking the effects of past military buildups. Some liberals dislike this conclusion but economics isn’t a morality play: spending on things you don’t like is still spending, and more spending would create more jobs.”*<sup>50</sup> But Krugman takes wars from the prospective of the USA, which did not have a major devastating conflict in their country since the Civil War (besides for Pearl Harbor attacks).

<sup>50</sup> [http://www.nytimes.com/2011/10/31/opinion/bombs-bridges-and-jobs.html?\\_r=0](http://www.nytimes.com/2011/10/31/opinion/bombs-bridges-and-jobs.html?_r=0)

F.A. Hayek also followed up the topic of the warfare and argued wars can indeed contribute to the overall GDP growth but for what cost; a great majority of growth is not infrequently pushed by the government spending on warfare associated with large public deficits, whereas people in fact suffer. Following figure shows GDP growth and its structure in the UK, the USA and Germany during the World War 2. One can observe the war truly stimulated GDP growth but the structure of output changed rapidly; private consumption and investments remained subdued throughout the war (see figure 13). From the figure there is also apparent how war impacted each country involved in the WWII at different extent.

Figure 13: WWII and its macroeconomic impact on selected belligerents

USA	1939	1940	1941	1942	1943	1944	1945
GDP growth	9%	9%	16%	13%	13%	7%	-2%
C in % of GDP	73%	70%	64%	55%	50%	49%	54%
I in % of GDP	10%	13%	14%	6%	3%	4%	5%
G in % of GDP	16%	15%	21%	39%	48%	48%	42%
NX in % of GDP	1%	1%	1%	0%	-1%	-1%	0%
UK	1939	1940	1941	1942	1943	1944	1945
GDP growth	1%	10%	9%	3%	2%	-4%	-4%
C in % of GDP	75%	63%	57%	55%	53%	56%	64%
I in % of GDP	11%	9%	7%	4%	4%	1%	2%
G in % of GDP	20%	41%	48%	49%	50%	50%	43%
NX in % of GDP	-7%	-14%	-11%	-8%	-8%	-7%	-9%
Germany	1939	1940	1941	1942	1943	1944	1945
GDP growth	9%	1%	6%	1%	2%	3%	-29%

Source: Harrison (1988), p. 158, [www.usgovernmentdebt.us/custom\\_chart](http://www.usgovernmentdebt.us/custom_chart), [bankofengland.co.uk](http://bankofengland.co.uk)<sup>51</sup>, author

Data regarding GDP structure are not available for Germany but according to available sources “...The German approach to a war economy was to covert the economies of occupied countries... This was a policy Hitler ordered because of the impact of shortages on German morale during World War I... Hitler was very concerned with maintaining German civilian consumption levels...”<sup>52</sup> and Germany did not convert into an entirely transformed war economy until 1941. With air raids starting in 1943 and war turning in favor of Germany’s adversaries, German economy eventually collapsed. Moreover, in the end of the war German public debt “... amounting to over 600 percent of German GDP was written off... The Allies, remembering the disastrous consequences of German reparations after the First World War,

<sup>51</sup><http://www.bankofengland.co.uk/boeapps/iadb/FromShowColumns.asp?Travel=NIxAZxI1x&FromCategoryList=Yes&NewMeaningId=TNB|PERCENTAGE|G&CategId=6&HighlightCatValueDisplay=Net%20debt%20as%20PERCENTAGE%20of%20GDP>

<sup>52</sup> <http://histclo.com/essay/war/WWII/cou/ger/home/eco/ghf-eco.html>

*did not insist on their pound of flesh.*”<sup>53</sup> From this example it is evident how hard the war hit the German economy.

The war theme is extensively covered by researchers. E.g. Caplan (2002) argues that output growth is associated with war fought on foreign soil, whereas consequences on domestic war are always negative for the economy (as in the case of the USA and Germany during the WWII). Schneider & Troeger (2006) track redistributive effects between industries where war-related sectors boost profits during wars. Organskin & Kugler (1977) show evidence that it takes approximately two decades to pay for the costs of war. They also point to the fact that conflicts negatively impact bilateral trade between belligerents and Alesina & Perotti (1996) find a strong negative relationship between political instability and investments during wars. This altogether with a soaring uncertainty about the outcome and output losses has a crushing impact on the economy of countries having a conflict on their soil and their stock markets, if not closed, plunge as well as the stock markets of the neighboring countries.

An extensive research on wars and their impact on markets were undertaken by Guidolin & La Ferrara (2005, 2010). They analyzed a sample of 101 conflicts taking place during 1971-2004. According to them, an average conflict lasted for 6 years, thereof the international conflicts took only 3,6 years and 55% of them were resolved within 1 year (wars of international scope draw more attention and there is stronger will to solve them). The more severe conflict is, the bigger impact it has on markets; this is the case of 'polarized' wars (with ethnic context) and international conflicts. The stock markets generally decline during weeks preceding the war as the tension and uncertainty grow and indices partially recover on the onset of war, because the uncertainty disappears and it is finally clear how severe the conflict becomes.

The US stock market exhibits the strongest reaction. The reasons for that are threefold: USA as a leader in consumption is dependent on the imports of foreign supplies. Moreover, there is the largest number of multinational corporations (whose operations can be affected by the conflict anywhere in the world) listed on NYSE and finally, the USA get often directly involved into conflicts.

During the major conflict, the MSCI World index generally declines being negatively affected by sharp market decreases of affected countries and their neighbors. In contrast to that, the US markets generally are more likely to grow than to decline but the outcome

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<sup>53</sup> <http://prospect.org/article/german-history-lesson>

strongly depends on the conflict location. According to Guidolin & La Ferrara (2005, 2010), there was no single instance of positive reaction during conflicts taking place in the Middle East and losses are also probable when the battlefield is situated in Africa (see figure 14).

Figure 14: US stock market reaction to conflicts occurring during 1971-2004

	Losses in %	Gains in %
<i>All conflicts</i>	7.8	11.8
Internal	8.2	11.0
International	6.9	13.8
<i>Location</i>		
Africa	15.0	5.0
Asia	0	16.7
Americas	0	35.0
Europe	0	21.1
Middle East	9.1	0

Source: Guidolin & La Ferrara (2005, 2010)

The reason is evident. Throughout history, the USA was always a net oil importer. OPEC countries account for approximately a half of their oil net imports; about 15% come from an unstable Persian Gulf region and 19% is supplied by African countries<sup>54</sup>. Tension or unexpected events occurring in these regions have an adverse effect on oil prices. Nerurkar states: *“Import dependence for an item can have negative economic impacts; particularly if it contributes to long-term trade deficits or when prices for that good increase... Greater national oil import dependence can also amplify the negative economic impacts of oil price increases... Economic analysts estimate that the impact of a sustained \$10 per barrel increase in the price of oil could result in about 0.2% lower economic growth.”*<sup>55</sup> An increase in oil prices and their effects on the economy can be also explained by the real business cycle theory; energy squeeze negatively affects companies’ abilities to produce and transport goods. This has a series of negative effects on the economy and higher prices affect people’s purchasing power. Companies aren’t able to produce as much goods and had to lay-off a part of workforce, further lowering their purchasing parity. A phenomenon called stagflation occurs. Figure 15 depicts the negative impact of oil shocks on S&P 500 during the 1970s. Due to spiking oil prices the index gained only 4% in whole decade, although the real GDP grew by 38%<sup>56</sup>. Later on, the impacts of high oil prices were offset by changes in peoples’ behavior and production of more economical goods but the USA is still oil net importer (in 2010 oil net imports accounted for 49% of the consumption and in 2035 it is 35%, according

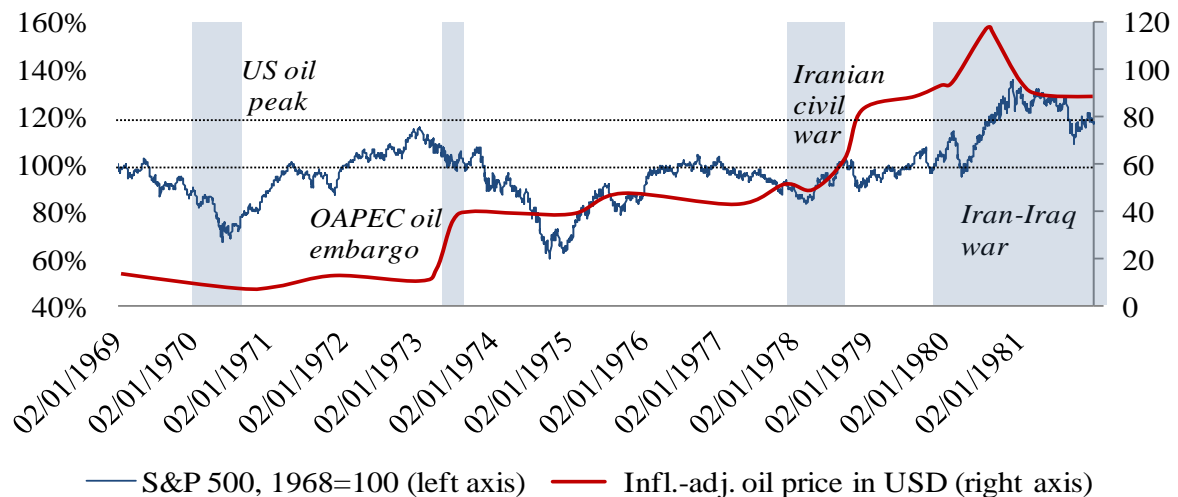
<sup>54</sup> Data for 2010

<sup>55</sup> Nerurkar (2012), p. 13

<sup>56</sup> According to NIPA accounts available at BEA.org

to forecast.<sup>57</sup>) and soaring oil prices take a toll on the US economy and market performance. Stock prices start soaring only when conflict is over or is evident that oil supply remains intact and oil prices start declining.

Figure 15: Oil shocks and S&P 500 performance



Source: <http://finance.yahoo.com/q?s=^gspc>, [ushistory.org/us/index.asp](http://ushistory.org/us/index.asp), [inflationdata.com](http://inflationdata.com)<sup>58</sup>, author

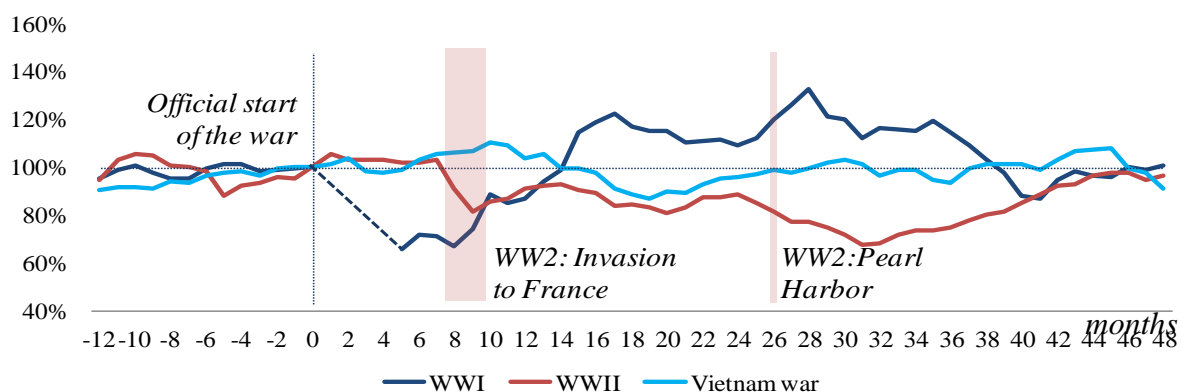
In conclusion, wars have generally a positive influence on the US stock markets, mainly because they are not taking part on the US soil. Initial uncertainty gets resolved and declining markets experience war rallies on the onset of conflict. However, any severe conflict situated in oil producing countries can have a negative impact. This effect may be partly mitigated in the future with the ongoing shale gas boom in the USA promising to gain up to the energy self-sufficiency in following decades.

Anyway, if the black scenario came true in the future and a large-scale conflict occurred again, one cannot expect markets to perform well. Figure 16 shows weak market performance during the three largest conflicts the US has been involved in. Last but not least, on the brink of nuclear war during the Cuban Missile crisis in October 1962, markets lost nearly 7% in few days and hit a year low after J.F. Kennedy addressed the nation announcing the discovery of the missiles on Cuba.

<sup>57</sup> Annual Energy Outlook 2012, BEA.gov

<sup>58</sup> [http://inflationdata.com/Inflation/Inflation\\_Rate/Historical\\_Oil\\_Prices\\_Table.asp](http://inflationdata.com/Inflation/Inflation_Rate/Historical_Oil_Prices_Table.asp)

Figure 16: Major wars and S&P 500 performance during the conflict



Source: <http://finance.yahoo.com/q?s=^gspc>, [americanhistory.about.com](http://americanhistory.about.com), author

### 1.2.2. Natural disasters

The impacts of natural disasters such as earthquakes, tsunamis, hurricanes or floods can be observed from different angles. Disasters incur humanitarian costs: the loss of lives, injuries, post-catastrophe trauma; ecological costs encompass the loss of arable land or pollution; finally, there are economical costs involved as well.

For the purposes of analyzing the impact of catastrophic events on the economy, let us have a look on macroeconomic effects associated with natural disasters. As a disaster (let's say an earthquake) occurs, it hits in most cases only a certain part of the country while the rest remains intact. However, the initial shock propagates itself; infrastructure and wealth is devastated, there are many casualties and whole supply chain in the affected area gets disrupted. This has effects on prices in the whole economy and therefore influences investments decisions both in public and private sectors. The wave spreads throughout the economy and affects areas and industries not hit by the disaster at the first place.

Several studies focus on question, whether a disaster can be beneficial for the economy as a whole. However, the evidence is mixed. Skydmore & Toya (2002) analyzed 89 countries during a period of 1960-1990 and find positive correlation between per land disaster occurrence and long-term GDP growth. Wang (2011) postulates that natural disasters are linked with an increased government spending (e.g. after 2011 earthquake, Japanese government announced an emergency measures for reconstruction works worth USD 50 billion, the largest budget for rebuilding after the WWII) and increased deficits. There are evident negative impacts on the balance of payments on GDP; trade balance becomes negative as demand for imports sharply increase, whereas exports are temporarily diminished



by suspended production possibilities due to lost lives or damaged production factors and temporary broken supply chains. On the other hand, there is a positive effect on finance account as the international companies reallocate funds back for an increased reconstruction spending. Hallengate & Dumas (2009) analyze impacts on productivity; as the large amount of destroyed capital stock is replaced with a new, modern technology, countries can benefit from short-term productivity-pushed growth but this effect is partially offset by the loss in labor force due to injury and dead toll.

Turning the focus on the stock markets, several studies point out that while there's no significant reaction to the disasters on the stock markets as a whole, there can be a negative impact on firms related to a real estate industry. Speaking of the insurance industry, outcomes vary with magnitude of the disasters and depend on two main factors – first, short-term one is associated with direct losses resulting from excessive insurance benefit payments, if the scope of disaster is larger than expected by the insurers; second, long-term effect allow insurance companies to benefit from higher-than-average demand for their services after the major cataclysmic events.

The US stock markets hardly react to natural-based events but there can be found a considerably increased volatility on stock markets in Japan when a calamity occurs. The Japanese economy lying on the boundary of two tectonic plates is frequently exposed to earthquakes and related symptoms. Compared to the USA with vast territories, the country is relatively small in size and the effects on the economy are therefore more intense and concentrated (another case, the 2010 Haiti earthquake shows how serious a natural disaster can become to a small country; the country infrastructure was entirely destroyed and estimated costs build up to unbelievable 140% of GDP)<sup>59</sup>. Nevertheless, according to research on Japanese catastrophe data Yang, Wang & Chen (2008) postulate that: *“Catastrophe is nothing more than a noise and can hardly impact the entire market trend.”*<sup>60</sup> After conducting research on the earthquakes, tsunamis, and volcanoes in Japan and their impact on Japanese and the US markets, Wang (2011) concludes there can be seen an excessive volatility on the market in first 5 days after the fact as the new information regarding losses keep on arriving every day. Although markets may fall in the beginning, impact is eventually absorbed and there is no need to worry about markets to crash.

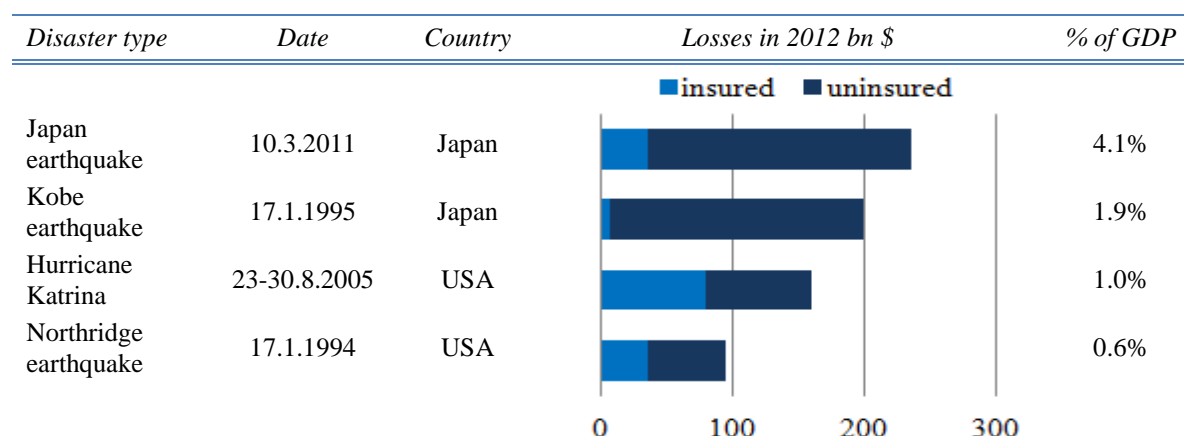
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<sup>59</sup> <http://news.bbc.co.uk/2/hi/americas/8595615.stm>

<sup>60</sup> Yang, Wang & Chen (2008), p. 236

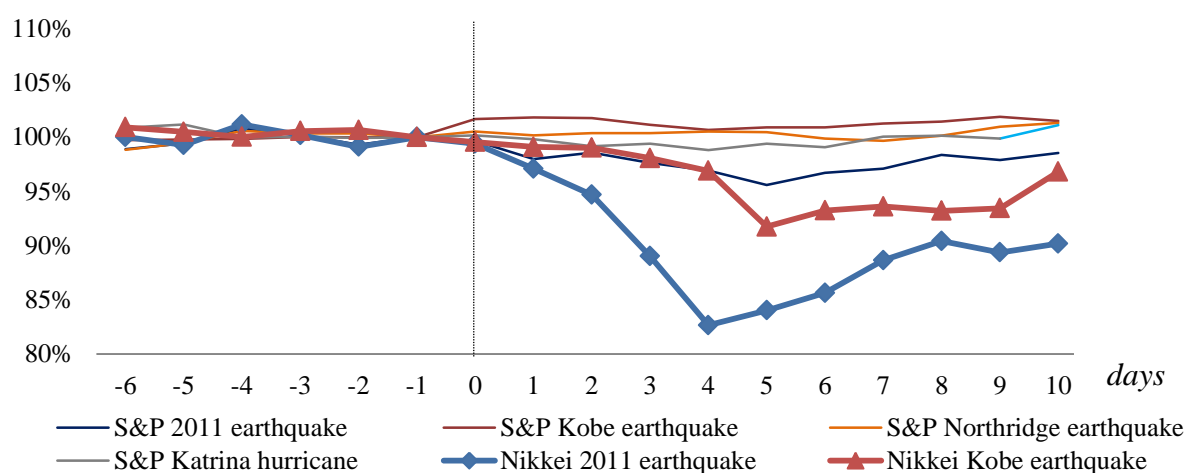
Figure 17 shows the reaction of the markets to the world's most devastating and costliest events in modern human history. One can observe that estimated costs of the most destructive natural calamity in the USA, the hurricane Katrina flooding New Orleans in 2005 accounted only for 1% of GDP, whereas overall costs of the worst natural disaster striking Japan in 2011 reached 4,1% of GDP.

Figure 17: Largest natural disasters in the modern history



Source: [http://www.economist.com/blogs/dailychart/2011/03/natural\\_disasters](http://www.economist.com/blogs/dailychart/2011/03/natural_disasters)

Figure 18: Reaction to largest natural disasters in the USA and Japan



Source: <http://finance.yahoo.com/q?s=^gspc>, [ushistory.org/us/index.asp](http://ushistory.org/us/index.asp), author

From figure 18 it is evident that natural disasters on the US soil don't have any significant effect on stock markets at all. Even the US costliest catastrophe moved the S&P index only by merely 1%. Unlike that, Japanese stock markets truly exhibit high volatility and the major earthquakes have effect on the markets. In fact, the effect of 2011 earthquake was *more than a noise*<sup>61</sup> and actually reversed the trend on the Japanese stock markets. The earthquake was

<sup>61</sup> Opposed to what Yang, Wang & Chen (2008) claimed

strong enough even to impact the US stock markets. The reasons can be as follows: As Japan belongs to one of most important economies in the world the earthquake caused temporary outages in the world's supply chains. Moreover, the Japanese investors started withdrawing capital from their foreign investments to use it for reconstruction in Japan in such large extent that the Japanese central bank had to intervene against strengthening yen. Therefore, one can see that the most destructive disasters have some power to affect international markets.

## 2. Safe Havens

Last chapter showed that economies and markets have been constantly exposed to various unexpected financial and non-financial shocks that financial markets are inherently unstable and go through the periods of downfall and upheaval. During the financial turmoil, investor can use the investment safe havens, the instruments gaining in price in the times of instability, to protect his portfolios and offset the losses. But to be able to use these instruments properly, he needs to know, which instrument can act as safe haven, what are its properties and in which situations it is worthwhile using them.

### 2.1. Defining safe havens

Safe haven can be defined as: *“An asset with low risk and high liquidity a safe haven asset is what investors buy in uncertain times.”*<sup>62</sup> In other words, safe haven is a liquid asset widely bought in times of financial distress caused by both financial and non-financial factors.

In their analysis, Baur & McDermott (2009) distinguish between *safe haven* (safe haven is defined as an asset that is negatively correlated (uncorrelated) with another asset or portfolio in certain periods only, e.g. in times of falling stock markets.) and *hedge* (hedge is defined as an asset that is negatively correlated (uncorrelated) with another asset or portfolio on average.). Moreover, they divide safe havens into weak and strong forms: *“A weak safe haven we define as an asset which is not correlated with the reference asset or portfolio. Therefore as the reference asset loses value, the value of the weak safe haven asset on average will remain unchanged. A strong safe haven asset is negatively correlated with the reference asset or portfolio and therefore gains value as the reference asset loses value.”*<sup>63</sup>

Yet the definition is not complete. To define a safe haven, one has to determine, against which asset class it serves as a safe haven in the first place. For example, gold can be

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<sup>62</sup> McCauley & McGuire (2009), p. 2

<sup>63</sup> Baur & McDermott (2009), p. 3

considered a safe haven for US stocks, but this does not hold against the US T-bonds. In the following analysis a safe haven asset will be hereinafter referred to an asset negatively correlated or uncorrelated to the US stock market yields in the times of economic distress.

## 2.2. Safe Haven features

What are the characteristics making an asset considered safe haven in general? First property is the inverse risk premium; in the time of economic distress many investors rebalance their portfolio in favor of non-risky assets selling the risky ones. That comes together with the second crucial feature – safe haven must be traded at a liquid and deep market. If the market were not liquid, high transaction costs would have strong adverse effect on investor's portfolio. Moreover, in shallow market the sudden influx of funds might cause unsustainable price swings.

## 2.3. List of suitable Safe Havens

According to the definition and suggested features, figure 19 summarizes the list of possible safe havens for the US stock market:

Figure 19: List of suggested safe havens for the US stock market

Name	Asset class
Gold	Commodity
Silver	Commodity
US T-bonds and T-bills	Bond
Swiss franc - CHF	Currency
Japanese yen - JPY	Currency
Australian dollar - AUD	Currency
Canadian dollar - CAD	Currency
Norwegian crown - NOK	Currency
Swedish crown - SEK	Currency
British pound - GBP	Currency
Farmlands	Real estate

*Source: Author*

Let's have a closer look at each asset class, what is it exactly making it safe haven:

### Currencies

In order to be considered a safe haven, particular currency has to comply with several qualities. First of all it is a currency of a stable and developed country, with a trustworthy bank system, developed law framework and stable macroeconomic fundamentals and political situation. Moreover, the market in local currency must meet several qualities, such as sufficiently deep and liquid foreign exchange market and ability to make large volumes of investments denominated in such currencies. Ideal safe haven currency is credible and

isolated from the financial turbulences coming from outside. Habib & Stracca (2011) advocate that safe haven currencies are typically of low-interest, less financially open to the world but there are many instruments denominated in the currency, which can be invested at, especially the safe instruments such as low risk government bonds. To their surprise, they discovered that currencies of the developed countries with higher public debt to GDP tend to appreciate during the financial distress.

In the ČNB<sup>64</sup> global economic outlook from September 2012<sup>65</sup>, authors focused on key macroeconomic variables and stated that the safe haven currencies shared following common signs: high quality country rating, small deficit or surplus of the current account, sufficient liquidity and low yields. Ranaldo & Söderlind (2009) conclude that safe haven effects last from several hours to several days and currencies tend to appreciate disproportionately (meaning more) the stronger the market stress is. This can be explained by the fact that more investors decide to rebalance their portfolio but they have a curbed number of safe investment choices. Kohler (2010) focused on recent financial crises and found out that many currencies not directly hit by the financial crises depreciated in favor of major currencies even if they were hit most by the financial distress. The rationale behind this is investors considered assets such as government bonds and such less risky compared to other countries even despite the ongoing financial crisis.

Viewed through the lenses of mentioned authors and based on their research, safe haven currencies related to the US stock market can be in particular the Swiss franc, Japanese yen possibly followed by British pound, Norwegian and Swedish crown and Australian and Canadian dollar.

### Gold and silver

Gold and silver were used as currencies for millennia thanks to their ideal monetary properties. First of all, they are scarce and therefore valuable; moreover, their quality does not decay over time; and as they are malleable, they are also easy to divide, measure and exchange. Monetary orders based on gold and silver standards therefore played pivotal role in the development of the civilization. Even that in the USA silver was de-monetized in the last quarter of the 19<sup>th</sup> century and gold standard ceased to exist in 1971, investors still view them as monetary metals, assets, which cannot default and invest into them in times of financial uncertainty, war, inflation and falling dollar.

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<sup>64</sup> Czech National Bank

<sup>65</sup> [http://www.cnb.cz/cs/menova\\_politika/gev/gev\\_2011/index.html](http://www.cnb.cz/cs/menova_politika/gev/gev_2011/index.html)

To understand gold and silver market price movements, it is suitable to break down their supply and demand, as figure 20 does:

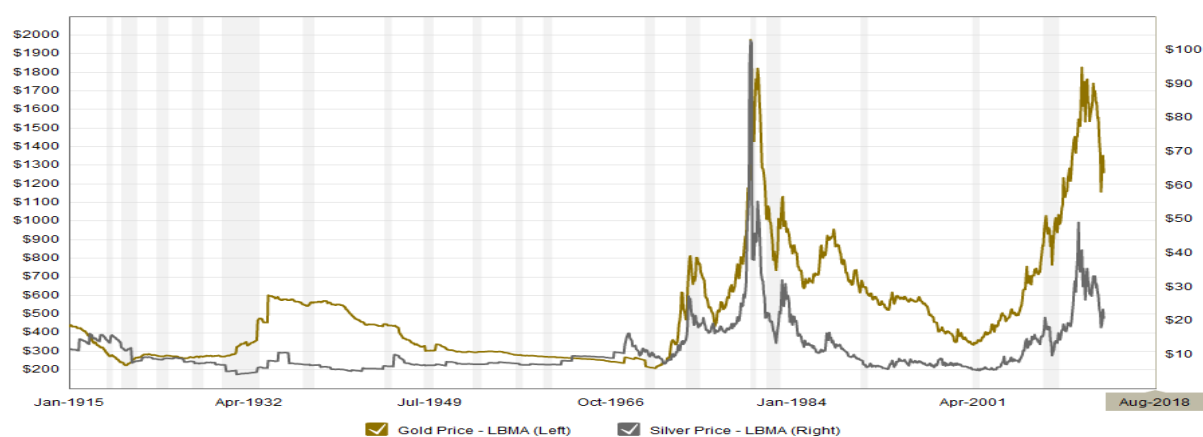
Figure 20: Gold and silver supply and demand composition

Gold (2008-2012 data)			Silver (2010-2011 data)		
Supply	Mining	61%	Supply	Mining	73%
	Recycling	39%		Recycling	25%
Demand	Jewelry	49%	Demand	Industrial use	69%
	Investment	40%		Jewelry	15%
	Industrial use	11%		Investment	16%

Source: [http://www.gold.org/investment/why\\_and\\_how/why\\_invest/demand\\_and\\_supply/](http://www.gold.org/investment/why_and_how/why_invest/demand_and_supply/), The Silver Institute, Thomson Reuters GFMS, author

Posted numbers must be interpreted carefully because while supply of both metals remains relatively stable, their demand changes rapidly with the business cycle. Demand based on industrial and jewelry use is cyclical, whereas demand based on investment reasons tends to be counter-cyclical as investors seek refuge in uncertain times. This is valid especially for gold, hence the phrase: “*The beauty of gold is, it loves bad news.*”<sup>66</sup> It can be documented by figure 21 with prices of gold and silver soaring during the Great Depression, Stagflation period and Global financial crisis.

Figure 21: Gold and silver prices in 2012 dollars



Source: <http://www.macrotrends.net/1333/gold-and-silver-prices-100-year-historical-chart>

<sup>66</sup> From John Updike's novel

An investor can invest into gold in several ways; he can buy it physically, purchase stocks of mining companies, buy bonds denominated in gold or invest in ETFs<sup>67</sup>. But it must be taken into consideration that investments into mining company stocks can't be granted for safe haven investments because there are many side-risks associated with discovering, prospecting and mining precious metals. It is also worth noting that a long-term investment into gold and silver does not seem to be the best option. McCown & Zimmerman (2006) state that during 1970-2003 both metals exhibited lower yields than stock market index and higher volatility, return on silver was even lower than return on T-bills.

But as it was stated above, gold and silver can act as safe haven investments, gaining rapidly in value during the hard times. McCown & Zimmerman (2006) suggest gold is a zero beta asset. In their analysis, Baur & McDermott (2009) state gold is both a hedge and a safe haven for the US market; particularly in extreme market conditions but gradual bear trends do not seem to attract investors to gold as extreme shocks. Coudert & Raymond (2010) find systematic negative co-integration between gold and the US stock market and conclude that gold seems to be a strong safe haven for the US stock market during a bear stock market. This indicates, gold can be a suitable asset to invest into now only during the crises but also during whole recessions.

### Bonds

There's is a strong negative relation between stock and bond yields in long run, caused primarily by the competition between the markets and assets' relation to the long-term interest rates. This long-term regularity was validated by Shiller & Beltratti (1992) documenting a strong positive (negative) correlation between changes in stock prices and long-term bond prices (yields). According to their research, the correlation is caused by the common discount rate effect. Cohen, Zintarg & Zeikel (1982) explain the negative correlation by the developments in the real economy and interest rates expectations. At the end of the boom, economy is likely to heat up and interest rates are expected to rise. While expected returns on shares drop, bond yields grow. Investors therefore shift their activities between the markets according to part of business cycle; in times of economic uncertainty, they often rebalance their portfolios towards less risky and more liquid instruments, such as bonds. This was confirmed by Connolly, Stivers & Sun (2004) who also stress out impacts of relative attractiveness of stocks and bonds during different parts of business cycle – when economy is

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<sup>67</sup> Exchange Traded Funds

booming, investors demand higher yields and invest in stocks, while during recession they settle for lower but more certain returns yielded by bonds.

Focusing on safe haven properties of bonds, one has to understand there are several classes of bonds, but only some of them can be regarded safe havens. Bond prices are driven by interest rate developments, bond type and risk premium linked to issuer's credibility. Moreover, not all markets are adequately liquid. Thereby, only *government bonds* issued in *stable countries* can be deemed safe havens (the shorter maturity, the better), whereas corporate, municipal and lower-quality government bonds do not share these properties.

This can be documented by the 2<sup>nd</sup> half of 2008, where USD 78,5 billion were withdrawn from the US corporate bonds but USD 273 billion have flown into the US T-bills and USD 49,9 billion into 10-year US T-bonds paradoxically contribution to the appreciation of dollar against other currencies during the climax of the financial crisis.<sup>68</sup>

Seeking refuge during financial distress, American small investor can put his funds into the US bonds or into high-quality bonds of other foreign safe haven currencies, which should also appreciate during hard times. But it must be borne in mind that during financial distress, investor gets exposed to intensified exchange rate volatility, which might turn the positive returns into losses.

### **2.3.1. Other suggested safe havens**

Apart from traditional safe havens, there are other asset classes whose demand is supposed to rise during risky times. For instance, gemstones, farmlands, or counter-cyclical shares are often mentioned. Gems and particularly diamonds are regarded safe store of value but markets in gems are still illiquid. Outside gemstones, farmlands or counter-cyclical stocks can share some safe haven attributes. Let's have a brief look at them:

#### **Farmlands**

Farmlands as an investments are another asset class suggested to belong among safe havens but their behavior during the times of financial distress is not yet extensively covered. Nevertheless, farmlands share ideal properties for safe havens – they are generally scarce and inexhaustible and thanks to technology development, farmlands have been benefiting from increase in productivity. But the most important feature is utterly simple; they produce food. During crises, people largely invest into safe havens such as safe currencies and gold, but: *“At the end of the day, whether it's dollars or gold, people value it because it can be*

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<sup>68</sup> McCauley & McGuire (2009), p. 86



*exchanged for a sandwich. If we're starving, the cure is a sandwich, not a bar of gold.*"<sup>69</sup> Rising demand for food is driven by two major factors – first, world population is gradually increasing and second, expanding middle class in developing countries are generally eating more and demand more meat products, whose production is grain-extensive. Moreover, low interest rates during recessions encourage both farmers and investors to purchase more land.

For all above stated reasons, it is suggested that farmlands as an asset class are not correlated to the stock market and exhibit lesser volatility. According to a famous investor, Jim Rogers, investments into farmlands consistently generate positive results (farm income and land value appreciation) with only short periods with negative yields.<sup>70</sup> For instance, over past ten years, investments in farmland yielded more than stock market itself.<sup>71</sup>

In the past, market with farmlands was rather illiquid as a direct purchase of land was the prevalent way and farmers were often reluctant to sell it (only 3Ds compelled them to sell – debt, divorce or death), so farmlands could hardly be considered safe havens back then. Direct purchase of particular land or farm also carries several risks such as droughts, hailstorms, diseases and other adverse conditions, which can destroy crops and even insured investor can incur larger losses than on stock market.

Nowadays, investors have the possibility to invest into farmland ETFs or companies owning farmlands and investors purchase lands all over the world, especially in developing countries. But one must be careful while investing in such countries as they can have insufficient infrastructure for food transportation and there are several risks, which might materialize such as underdeveloped ownership legal framework associated with the risk of nationalization or export quotas etc.

For the analysis in following chapters safe haven attributes will be tested on, Archer Daniels Midland (incorporated in the US, traded on NYSE<sup>72</sup>) and Cresud S.A. (incorporated in Argentina, traded alter alia in NASDAQ). Both companies own thousand hectares of fertile soil in several countries and raise livestock and produce a diversified mix of food, which is exported around the world.

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<sup>69</sup> <http://www.minyanville.com/mvpremium/2011/10/28/forget-gold-farmland-is-the/?refresh=1>

<sup>70</sup> <http://moneymorning.com/2012/07/12/why-jim-rogers-is-investing-in-farmland/>

<sup>71</sup> <http://invezz.com/news/real-estate/335-farmland-a-profitable-safe-haven-asset>

<sup>72</sup> New York Stock Exchange

### Counter-cyclical shares

Other assets suggested performing well during crises and therefore keeping some safe haven properties are counter-cyclical shares. They can be defined as stocks of companies operating in industry doing well during recessions. Their price therefore is expected to move in the opposite direction to the general market trend. During financial panics and recessions, people mostly dispose of small companies, leveraged and cyclical stocks but often keep the counter-cyclical ones.

Typical counter-cyclical shares come from industries producing cheap substitutes to more luxurious products, such as discount retailers, fast food restaurants, and cheap apparel. Also companies producing inexpensive alcoholic beverages and tobacco products register higher sales during recessions. Although the overall consumption of alcohol decreases during recessions, it is expensive brands and consumption in the pubs decreasing while binge drinking soars.<sup>73</sup> Other industries supposed to benefit from downturns are enforcement agencies, bankruptcy companies and outplacement agencies.

Nevertheless, while investing into counter-cyclical stocks the investor must not merely assume particular share will do well during financial panic just because it operates in counter-cyclical industry. If it is badly managed company, it can still suffer from problems with liquidity and go bankrupt. It is important to analyze the stock and its past performance, and pick companies with strong operating cash flow, larger firm size and low leverage.

Complying with such requirements, Dollar Tree (discount retail chain), Family Dollar (discount retail chain), Altria Group (tobacco), Mc'Donalds (fast food chain) and Walmart (discount retail chain), all traded on NYSE and S&P 500 components, are selected for the following analysis.

### Analytical section

Analytical section leads up to understanding regularities among stock markets and other asset classes in order to pick suitable safe havens for investing, unfolding cyclical behavior on the markets, creating comprehensive leading macroeconomic index and making simple investments rule for the small investor.

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<sup>73</sup> <http://www.livescience.com/16656-alcohol-economy-relationship.html>

### 3. Regularities among Stock markets and safe havens during shocks

#### 3.1. Assumptions

##### Data

Time series include daily closing nominal prices covering period from January 1970 to December 2012. This period covers a wide variety of financial, natural and man-made shocks as well as sufficient number of business cycles. Moreover, according to Shiller<sup>74</sup>, stock market was reasonably priced at the beginning of 1970 with the Cyclically adjusted P/E ratio (CAPE) of 15,06<sup>75</sup>. Longer period was not suitable as relevant daily data aren't available. Some data series cover shorter period, as it is captured in figure number 23.

##### Shocks and their definition by type

Natural shocks (dealt with in chapter 1.2) include hurricanes, storms, earthquakes, tsunamis and floods. For the analysis, the most devastating 15 events in modern history measured by their impact relative to GDP are chosen. Shock duration is measured from the beginning of the metrological phenomena to its end (most of natural disasters do not last more than one day, however, hurricanes last longer and are included when the storm reaches class 4 or 5 on the Saffir-Simpson hurricane scale<sup>76</sup>).

Man-made shocks (covered in chapter 1.2) comprise major wars, terrorist acts, revolutions, embargos and political scandals establishing the involvement of the USA, or having direct or indirect impact on the US economy – shock duration is defined since the occurrence of the event, e.g. declaration war or start of the invasion until its proclaimed end. In the case of long-term war lasting several years, only the period of heavy fighting is accounted for (end of shock is defined with ceasefire or end of war campaign).

Financial shocks (elaborated in chapter 1.1) encompass escalation of currency, banking or debt crises, blow-off phases of bubbles, collapses of different financial markets, bankruptcies of the largest corporate companies of financial institutions (if not related to the financial crisis itself), or other significant financial contagion. In the case of many financial shocks it is extremely difficult to establish the exact duration of the shock, especially its exact end. When the end of the shock can't be assigned to particular measure or date, annualized standard deviation (the "ASD", elaborated in figure 22) is used, with financial shock ending when ASD reaches pre-crisis levels.

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<sup>74</sup> <http://www.econ.yale.edu/~shiller/data.htm>

<sup>75</sup> In period from 1881 to 2012, average CAPE amounted to 16,46, according to R.J. Shiller

<sup>76</sup> <http://www.aoml.noaa.gov/general/lib/laescac.html>

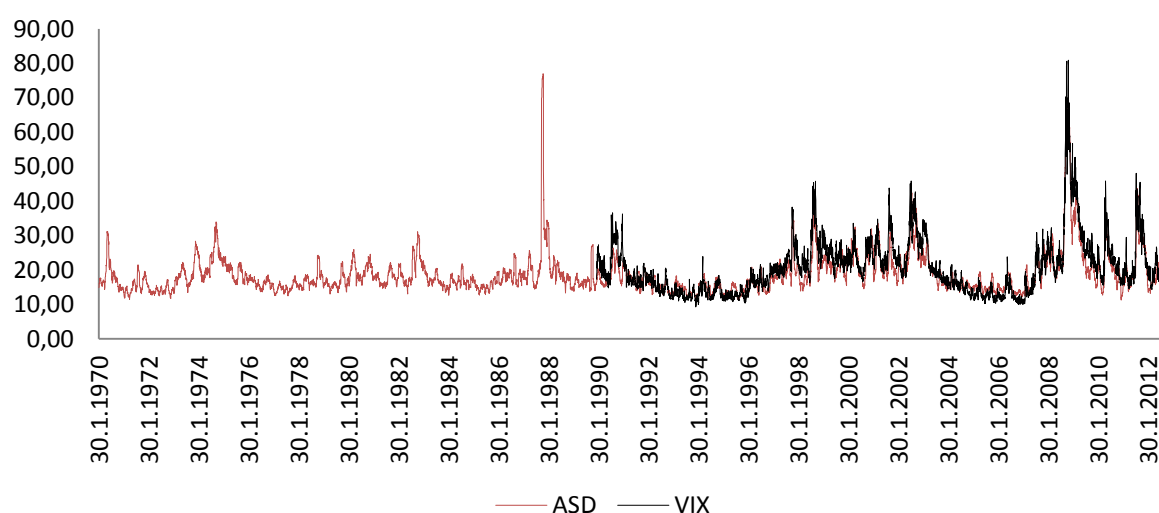
For the selected period, total 57 events of financial (25 in total), natural (15 in total), and man-made (17 in total) nature are selected. Detailed list of events is available in appendix number 9.1.

### Shock strength and duration

Separate shocks also affect market with various amplitude and duration. Some shocks are not significant as others and reaction on the markets is weak, short-lived or event absent; on the other hand some shocks strike markets heavily for days or even months. There are several ways how to define the power of particular event on financial markets. One can utilize the CAPM model to calculate varying risk premium according to the difference between pricing based on the CAPM and current market pricing. Another possibility is to use Ted spread (a spread between low-risk bearing T-bill and interbank rates). In 1993, VIX index was introduced, representing the fear on the stock market with a 30-day implied volatility of stock market options – the value of index represents expected stock prices for the following month. During normal times, VIX amounts to approximately 15-18 points and rises sharply during market turmoil. Since the VIX index does not cover the whole selected period, the reciprocal fear curve was reconstructed utilizing annualized 30-day standard deviation (or ASD) of the stock market prices since 1970 (see figure...):

$$ASD = st. dev._m \sqrt[2]{m} \quad ^{77}$$

Figure 22: Author's approximate VIX reconstruction with ASD for the 1970-2012 period



Source: <http://finance.yahoo.com/q?s=^gspc>, author

<sup>77</sup> Where st. dev. <sub>m</sub> represents monthly standard deviation of the market, containing 21 trading days

For the purpose of the analysis, strength of individual shock is divided into 3 categories (weak, moderate, strong), defined by the ASD response after shock is materialized. If ASD increases up to 10% in within 5 days after the shock occurs, it is classified as ‘weak’. If ASD increases between 10% and 100% in within 5 days after the shock occurs, it is classified as ‘moderate’. Finally, any increase of ASD more than 100% during 5 days after shock constitutes it as ‘strong’. According to Rinaldo & Söderlind (2009), safe haven properties materialize in period from few hours to several days after shock but in extreme cases, effects can last up to several months. In this analysis, behavior of the market 2, 5 and 42 days after the shock is measured to cover an initial market response, response after one week and response after 2 months. The classification of the shocks is supported with Cochrane-Orcutt model, where dummy variables were activated 2, 5 and 42 days after individual shocks materialized, having impact on S&P 500 ASD time series. Analysis is available in appendix 9.1.

#### Data limitations

In the 1970-2012 period, total 57 shocks according to ASD (VIX) and historical news are found. This number is sufficient for any kind of statistical analysis. However, it is probable, that individual asset classes will react differently to shock of financial, man-made, or natural kind and the course of reaction will vary according to shock strength, too. For the relevant analysis the total list must be thereof broken-down into 9 sections, which, however, brings problem with lack of data. Results from the following subchapters must be therefore regarded as indicative only.

#### Measured yields

While measuring long-term returns of asset classes depending on the shocks, nominal rates of return and the geometric mean are used to be able to compare the analysis outcome with outcomes represented by Damodaran <sup>78</sup>:

$$r_{geom} = \sqrt[t-1]{\frac{P_t}{P_0}}$$

In the case of stock index returns, dividend-adjusted returns are utilized:

$$r_{S\&P} = \frac{S\&P_t + \frac{\text{annual dividends}_t}{t} - S\&P_0}{S\&P_0} \quad 79$$

<sup>78</sup> <http://people.stern.nyu.edu/adamodar/> - Historical Returns on Stocks, Bonds and Bills - United States

In respect of bond revenues, a return measure should capture both capital gains and accrued income for given hold period. As only coupon rates are available on daily basis, methodology of Damoradan on constant-maturity bond is used.<sup>80</sup>:

$$r_{bond} = c_0 + \frac{c_0}{c_t}(1 - (1 + c_t)^{-t}) + \left(\frac{1}{1 + c_t}\right)^t - 1 \quad 81$$

Return of each currency against USD is defined by exchange rate change during measured period:

$$r_{FX} = \frac{FX_t - FX_0}{FX_0}$$

Returns of other asset classes are also calculated as follows:

$$r_{other\ asset\ classes} = \frac{P_t - P_0}{P_0}$$

### 3.2. Nominal yields during shocks and panics

Let's start the analysis with the nominal returns of selected asset classes over long-term period. The average performance of the stock market and selected safe havens during a selected period is expressed by the following figure:

**Figure 23: Asset classes nominal returns measured by geometric average in 1970-2012 period**

Name	Asset type	Yearly nominal return	Measured period
S&P 500	broad stock market index	9,5%	1970-2012
Dollar Tree	counter-cyclical stocks	20,3%	1995-2012
Family Dollar Stores	counter-cyclical stocks	17,7%	1987-2012
McDonald's	counter-cyclical stocks	14,5%	1970-2012
Altria Group	counter-cyclical stocks	19,2%	1970-2012
Walmart	counter-cyclical stocks	18,6%	1972-2013
10Y US govt bonds	debt instruments	6,8%	1970-2012
13W t-bills	debt instruments	5,2%	1970-2012
Gold_dollar ounce	commodities	5,9%	1978-2012
Silver_dollar ounce	commodities	5,8%	1975-2012
USD/NOK	currency	0,6%	1971-2012
USD/SEK	currency	-0,6%	1971-2012
USD/AUD	currency	-0,2%	1971-2012
USD/CAD	currency	0,0%	1971-2012
USD/CHF	currency	3,7%	1971-2012
USD/JPY	currency	3,4%	1971-2012
USD/GBP	currency	-0,9%	1971-2012
Archer Daniels Midland	farmlands	9,6%	1983-2012
Cresud Sociedad	farmlands	-5,0%	1997-2012

<sup>79</sup> Where S&P<sub>0</sub> represents index value at the beginning of calculation and S&P<sub>t</sub> represents index value at given time

<sup>80</sup> <http://pages.stern.nyu.edu/~%20adamodar/> - Historical Returns on Stocks, Bonds and Bills - United States

<sup>81</sup> Where c<sub>0</sub> captures coupon rate at the beginning of measured period, c<sub>1</sub> represents coupon rate at the end of measured period, t expresses period until bond maturity

Source: <http://finance.yahoo.com/q?s=^gspc>, <http://finance.yahoo.com/q?s=^tnx>, <http://finance.yahoo.com/q?s=^IRX>, Bloomberg, author

During the reported period, the winners among the major asset classes with variable prices are equity markets. This result is not surprising as equity markets experienced sustained, long-term upward trend from the 1980s to the end of the 1990s. However stocks start underperforming, when inflation exceeds 4 or 5% p.a. In the period of 1970s and 1980s during the stagflation period, bonds outperformed stock markets and bonds offer higher yields. Therefore, one has to always adjust nominal returns with inflation<sup>82</sup>. Surprising is the performance counter-cyclical stocks, outperforming all other asset classes, including the stock market index itself.

Turning our focus on short-term regularities and the shocks themselves, their analysis raises several questions: What impact on yields of individual assets do they have? Are there any specific features and surprising reactions regarded to natural, real, or financial shocks? Which safe havens yield the best results? Can small investor profit from trading based on shocks? How are they connected with business cycle? Which shocks are in fact the strongest? Figure 24 summarizes the impact of the strongest shocks on the US stock market:

**Figure 24: Strongest shocks and their impact on the S&P 500**

Shock	Shock occurrence	Shock lasting (in working days)	Maximum S&P 500 % loss
Global Financial Crisis	15.9.2008	121	-46,0%
Collapse of 1987	19.10.1987	71	-22,6%
OAPEC Oil Embargo	6.10.1973	106	-16,1%
Eurozone Debt Crisis Escalation	4.8.2011	114	-12,8%
9/11 Terrorist Attack	11.9.2001	25	-11,6%
Russian debt crisis	17.8.1998	70	-9,9%
Asian Flu	20.10.1997	82	-6,9%

Source: <http://finance.yahoo.com/q?s=^gspc>, author

### Natural shocks

As it was already described in chapter 1.2, natural shocks do not have any notable impact on the US economy. Therefore, as expected, all selected 15 natural shocks are classified weak according to ASD, and statistical model also showed that natural shocks have no statistically significant impact on the markets. Figure number 25, however, points to an interesting phenomenon. In relation to the natural shock, the best-performing assets are retail stores. This can be explained by the fact that people fearing catastrophic weather (e.g. hurricanes) significantly increase purchases of basic products such as food and sanitary goods, and after

<sup>82</sup> Average annual inflation in the USA for the 1970-2012 period amounted to 4,4%, according to Eurostat. However, during its peak in 1980, inflation reached 13,5%

the storm passes away, they spend heavily on damaged amenities and tools to be able to repair their property and restore supplies. Even though the chains are forced to close some stores for a few days, positive effect offset these losses, especially in the case of retailers.<sup>83</sup>

**Figure 25: Average return after analyzed weak natural shock**

Shock (15 cases)	for 2 days from shock	for 5 days from shock	for 42 days from shock
S&P 500	0,2%	0,9%	2,1%
Dollar Tree	2,2%	3,3%	11,2%
Family Dollar Stores	1,7%	2,7%	7,0%
McDonald's	0,8%	1,2%	6,5%
Altria Group	0,9%	0,8%	2,8%
Walmart	0,2%	0,9%	3,4%
10Y US govt bonds	0,1%	0,1%	1,0%
13W t-bills	0,0%	0,1%	0,7%
Gold_dollar ounce	-0,6%	-0,8%	2,9%
Silver_dollar ounce	-0,3%	-1,8%	1,8%
USD/NOK	0,3%	0,4%	1,3%
USD/SEK	0,2%	0,1%	1,7%
USD/AUD	-0,1%	0,0%	2,1%
USD/CAD	0,2%	0,5%	0,6%
USD/CHF	0,2%	0,4%	1,5%
USD/JPY	-0,1%	0,5%	1,3%
USD/GBP	0,2%	0,5%	-0,2%
Archer Daniels Midland	0,8%	2,3%	3,0%
Cresud Sociedad	-2,0%	1,2%	3,8%

Source: <http://finance.yahoo.com/q?s=^gspc>, Bloomberg, author

### Man-made shocks

Man-made shocks pose significant impact to markets, especially if they are related to war. As mentioned above, wars, revolutions or other geographical tension occurring particularly in Middle East have effect on oil production, distribution and prices. Oil shocks caused by tension in oil-producing countries during 1970s and 1980s and at the beginning of 1990s belonged to one of major factors causing inflationary pressures and economic slowdown.

Following figure captures market behavior after moderate & strong man-made shock took place. There were only 6 cases of such shocks, so presented numbers have little explanatory power. Nevertheless, they can provide us with valuable insight anyway. Out of 6 measured shocks, 4 had strong impact on oil prices; all of them included involvement of US troops. Such shocks generally promote inflationary pressures due to spiking oil prices, and deficient government budgets during war.

As it can be seen, shares perform poorly during such periods and fear together with inflationary pressures prompt rising prices of gold and silver. Due to increased inflation, investment into government bonds after man-made shock does produced sound returns as well.

<sup>83</sup> <http://articles.latimes.com/2011/sep/01/business/la-fi-retail-sales-20110902>



**Figure 26: Average returns after analyzed moderate & strong man-made shocks**

Shock (6 cases)	for 2 days from shock	for 5 days from shock	for 42 days from shock
S&P 500	-1,80%	-2,40%	-5,00%
Dollar Tree	-14,60%	-20,30%	10,30%
Family Dollar Stores	-7,40%	-5,00%	25,20%
McDonald's	1,40%	1,10%	-11,50%
Altria Group	-1,40%	-0,30%	-2,00%
Walmart	1,80%	1,00%	-5,20%
10Y US govt bonds	7,40%	7,40%	7,50%
13W t-bills	6,60%	6,50%	6,70%
Gold_dollar ounce	5,00%	4,30%	1,10%
Silver_dollar ounce	4,20%	5,80%	-0,30%
USD/NOK	0,50%	0,60%	0,10%
USD/SEK	0,20%	-0,20%	-1,40%
USD/AUD	-0,90%	-1,10%	1,10%
USD/CAD	0,10%	-0,10%	-0,90%
USD/CHF	0,60%	1,00%	-0,80%
USD/JPY	-0,60%	0,00%	0,30%
USD/GBP	0,20%	0,30%	-0,50%
Archer Daniels Midland	-2,30%	-3,10%	11,10%
Cresud Sociedad	-2,70%	-4,30%	-8,20%

Source: <http://finance.yahoo.com/q?s=^gspc>, Bloomberg, author

### Financial shocks

Shocks of a financial nature are the most common. Frequency of their occurrence rose sharply since 1980s – during the covered period, 24 out of 26 shocks occurred after 1987, which is probably related to deregulation and globalization of financial markets. Financial shocks have the strongest impact on markets. Statistical tests showed (see appendix number 9.1) that strong financial shocks/crisis can have statistically significant effects even 42 days after their start.

**Figure 27: Average returns after analyzed moderate & strong financial shocks**

Shock (11 cases)	for 2 days from shock	for 5 days from shock	for 42 days from shock
S&P 500	-3,10%	-2,70%	-4,00%
Dollar Tree	-0,50%	0,40%	6,40%
Family Dollar Stores	0,80%	4,60%	6,10%
McDonald's	-2,30%	-1,00%	0,70%
Altria Group	-6,00%	-3,40%	-1,90%
Walmart	-1,30%	0,60%	2,00%
10Y US govt bonds	5,00%	4,90%	4,80%
13W t-bills	3,20%	3,10%	3,00%
Gold_dollar ounce	0,80%	1,00%	-0,20%
Silver_dollar ounce	1,20%	-0,20%	0,40%
USD/NOK	-0,30%	-0,40%	-3,10%
USD/SEK	0,00%	0,20%	-1,70%
USD/AUD	-0,70%	-0,90%	-3,60%
USD/CAD	-0,80%	-0,90%	-2,50%
USD/CHF	0,70%	0,90%	-0,20%
USD/JPY	1,10%	1,10%	3,20%
USD/GBP	0,00%	0,10%	-1,10%
Archer Daniels Midland	-3,40%	-2,60%	0,50%
Cresud Sociedad	-4,30%	-3,80%	-3,50%

Source: <http://finance.yahoo.com/q?s=^gspc>, Bloomberg, author

Figure 27 clearly shows that one can't rely on any suggested safe haven such as counter-cyclical stocks or farmlands. The best results were achieved in US government obligations, gold, silver, and some currencies.

On 15th September 2008, the collapse of the US investment bank Lehman Brothers triggered the worst financial crisis since the Great Depression and brought about an unprecedented turmoil on the markets unmatched by other shocks (except, perhaps, the collapse of the markets in 1987), deserving its own measurement. From the figure number 28, one can deduce investors were not aware of the depth of the crisis during first couple of days but they learned eventually. Only few assets behaved as true safe havens during the heaviest phase of the crisis.

**Figure 28: Nominal returns during global financial crisis in 2008**

	for 2 days from shock	for 5 days from shock	for 42 days from shock
S&P 500	-3,00%	0,30%	-28,20%
Dollar Tree	-0,40%	-5,60%	-3,50%
Family Dollar Stores	-1,50%	2,40%	1,60%
McDonald's	0,40%	-0,10%	-12,10%
Altria Group	-2,40%	0,50%	-18,10%
Walmart	-0,40%	-4,30%	-12,30%
10Y US govt bonds	4,00%	3,30%	19,90%
13W t-bills	3,00%	3,20%	3,40%
Gold_dollar ounce	3,90%	15,80%	-2,20%
Silver_dollar ounce	2,70%	10,50%	13,70%
USD/NOK	-2,50%	0,50%	-22,40%
USD/SEK	-1,70%	1,40%	-20,60%
USD/AUD	-2,90%	1,20%	-25,40%
USD/CAD	-0,80%	1,20%	-13,90%
USD/CHF	0,70%	2,20%	-5,10%
USD/JPY	2,10%	0,50%	9,50%
USD/GBP	-0,60%	2,00%	-16,60%
Archer Daniels Midland	-4,10%	-1,30%	0,70%
Cresud Sociedad	1,50%	1,20%	-50,00%

Source: <http://finance.yahoo.com/q?s=^gspc>, Bloomberg, author

### 3.3. Yields correlations among asset classes

Another angle on the shock analysis can be provided with correlation analysis. The following figures are showing correlations between examined asset classes analyzed 2, 5 and 42 working days after all available strong shocks. The correlation coefficient shows linear dependency between two assets; it can oscillate between -1 to 1 for each asset couple, where -1 represents a negative correlation meaning that returns of selected two assets move in the opposite direction; 0 poses no dependence of assets at all and 1 represents a positive dependency of asset yields. Other correlation measurements are available in the appendix number 9.3. From the figures number 29 and 30 there can be observed a strong negative correlation of S&P 500 returns with returns of gold, silver, T-bonds, T-bills and USD/CHF

and USD/JPY currency pairs. Such assets can be regarded as strong safe havens for the US stock markets 2 days after adverse shock as well as 5 and 42 days after shock; such argument can be also supported with the yield analysis.

Figure 29: Correlations among asset classes 2 days after analyzed strong selected shocks

Correlation among assets after strong shock - 2 trade days after	S&P 500	Dollar Tree	Family Dollar	McDonald's	Altria Group	Walmart	US 10Y govt bonds	13W t-bills	Gold	Silver	USD/NOK	USD/SEK	USD/AUD	USD/CAD	USD/CHF	USD/JPY	USD/GBP	Archer Daniels	Cresud Sociedad
S&P 500	1,00	0,62	0,89	0,52	0,41	0,79	-0,49	-0,51	-0,55	-0,34	-0,24	-0,17	0,43	0,21	-0,55	-0,17	-0,27	0,89	0,07
Dollar Tree		1,00	0,64	0,34	-0,15	0,65	-0,45	-0,40	-0,03	0,01	-0,22	-0,21	0,42	0,23	-0,21	0,51	-0,08	0,56	-0,20
Family Dollar Stores			1,00	0,56	-0,04	0,85	-0,69	-0,46	-0,46	-0,07	-0,13	-0,08	0,69	0,62	-0,58	0,17	-0,02	0,88	0,08
McDonald's				1,00	0,31	0,56	-0,08	-0,14	-0,13	0,08	-0,13	-0,05	0,03	0,04	-0,30	0,36	-0,01	0,47	0,31
Altria Group					1,00	0,00	-0,11	-0,29	0,10	-0,22	0,09	0,12	0,02	0,31	-0,23	0,02	-0,06	0,32	0,50
Walmart						1,00	-0,13	-0,06	-0,49	-0,08	-0,22	-0,17	0,44	0,15	-0,36	0,15	-0,17	0,68	-0,13
10Y US govt bonds							1,00	0,82	0,07	0,24	0,03	-0,01	-0,70	-0,56	0,28	-0,07	-0,17	-0,58	-0,01
13W t-bills								1,00	-0,16	0,08	0,03	-0,05	-0,63	-0,39	0,02	-0,13	-0,18	-0,56	-0,15
Gold_dollar ounce									1,00	0,72	0,05	0,06	0,01	0,06	0,37	0,46	0,17	-0,41	0,47
Silver_dollar ounce										1,00	-0,04	-0,01	0,10	0,02	0,11	0,29	0,07	-0,29	0,59
USD/NOK											1,00	0,98	0,26	0,09	0,43	0,45	0,78	-0,12	-0,02
USD/SEK												1,00	0,32	0,11	0,41	0,45	0,76	-0,08	-0,01
USD/AUD													1,00	0,70	-0,04	0,34	0,43	0,60	-0,01
USD/CAD														1,00	-0,38	0,12	0,06	0,53	0,32
USD/CHF															1,00	0,54	0,57	-0,49	-0,31
USD/JPY																1,00	0,61	0,01	-0,02
USD/GBP																	1,00	0,00	-0,13
Archer Daniels Midl.																		1,00	0,11
Cresud Sociedad																			1,00

Source: <http://finance.yahoo.com/q?s=^gspc>, Bloomberg, author

Figure 30: Correlations among asset classes 42 days after analyzed strong shocks

Correlation among assets after strong shock - 42 trade days after	S&P 500	Dollar Tree	Family Dollar	McDonald's	Altria Group	Walmart	US 10Y govt bonds	13W t-bills	Gold	Silver	USD/NOK	USD/SEK	USD/AUD	USD/CAD	USD/CHF	USD/JPY	USD/GBP	Archer Daniels	Cresud Sociedad
S&P 500	1,00	0,55	0,54	0,67	0,51	0,70	-0,03	0,05	-0,23	-0,23	-0,06	0,05	0,36	0,38	-0,28	-0,18	-0,06	0,61	0,46
Dollar Tree		1,00	0,37	0,38	0,22	0,41	-0,01	0,09	-0,02	-0,13	-0,07	-0,13	0,22	0,24	-0,22	0,04	-0,11	0,37	0,27
Family Dollar Stores			1,00	0,30	0,37	0,48	-0,01	0,06	-0,11	-0,12	0,03	0,10	0,31	0,36	-0,13	-0,08	0,00	0,37	0,24
McDonald's				1,00	0,51	0,51	0,00	0,10	-0,13	-0,14	0,00	0,10	0,27	0,36	-0,14	-0,17	0,01	0,41	0,38
Altria Group					1,00	0,39	-0,03	-0,03	-0,12	-0,15	0,08	0,10	0,25	0,30	-0,10	-0,12	0,06	0,38	0,19
Walmart						1,00	-0,02	0,00	-0,23	-0,15	-0,06	0,08	0,25	0,32	-0,18	-0,10	0,04	0,46	0,33
10Y US govt bonds							1,00	0,26	0,09	-0,03	-0,09	-0,07	-0,03	-0,13	-0,03	0,09	-0,09	-0,05	0,00
13W t-bills								1,00	-0,10	-0,15	0,00	0,02	0,02	0,00	-0,02	0,02	0,02	-0,07	0,07
Gold_dollar ounce									1,00	0,32	0,16	0,05	0,08	0,07	0,22	0,28	0,11	-0,11	0,07
Silver_dollar ounce										1,00	0,04	0,02	-0,15	-0,13	0,11	0,13	-0,05	-0,07	-0,20
USD/NOK											1,00	0,74	0,33	0,28	0,54	0,25	0,57	0,07	0,07
USD/SEK												1,00	0,37	0,28	0,58	0,19	0,62	0,10	0,09
USD/AUD													1,00	0,52	0,09	0,10	0,35	0,29	0,22
USD/CAD														1,00	0,05	0,02	0,21	0,32	0,35
USD/CHF															1,00	0,36	0,53	-0,14	-0,14
USD/JPY																1,00	0,18	-0,19	-0,05
USD/GBP																	1,00	0,09	0,07
Archer Daniels Midl.																		1,00	0,37
Cresud Sociedad																			1,00

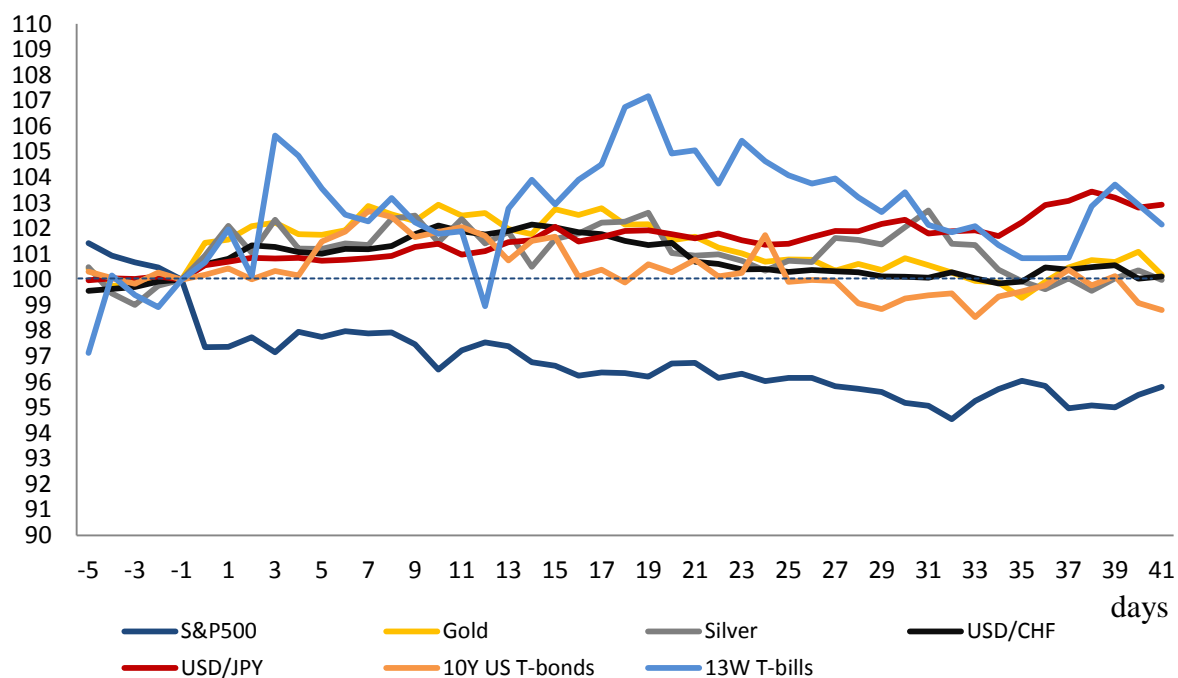
Source: <http://finance.yahoo.com/q?s=^gspc>, Bloomberg, author

Negative correlation of some assets persists even 42 days after a strong negative shock, but in a much weaker form. This is due to the fact that investors, who first quickly shifted their funds to proven safe havens, slowly withdrew their funds and allocated them elsewhere. This can be seen on the example of 13-week t-bills, which share the strongest safe haven form. Investors therefore heavily buy up T-bills immediately after the shock while selling stocks and correlation coefficient reached -0,55 for a 2-day period, but falls to zero for a 42-day period.

### 3.4. Shocks and related profit opportunities for small investor

One of the questions at the beginning of the yields analysis was whether the retail investor was able to take advantage of such shocks and benefit from them with active trading. This seems to be problematic for several reasons. First, it is very hard to be able to determine the strength of the shock when it is transpiring and to know whether it pays off to respond or not. Second, it is likely that professional traders will have faster access to accurate information and immediate trade opportunities so it is highly probable that the small investor reacts late and misses the whole profit opportunity. Thirdly, each operation is associated with transaction costs, which are likely to be relatively high in the case of the small investor.

Figure 31: Percentage change in price of selected assets in response to analyzed moderate and strong shocks



Source: <http://finance.yahoo.com/q?s=^gspc>, Bloomberg, author

Figure number 31 refers to the average percentage change of analyzed safe havens in relation to all measured moderate and strong shocks (17 cases in total). It is apparent that the profit possibilities are small on average and the potential profit after deduction of transaction costs might be minimal or negative. Small investor could of course use leverage (i.e. trade on margin with borrowed funds) for gaining the higher results but it is naturally associated with the corresponding increase of risk. It seems that the small investor should avoid trading solely based on individual shocks and focus on understanding the patterns of cycles and associated bigger market moves instead.

### 3.5. Shocks and cycle

How exactly are individual shocks connected to the economic cycle of the country? Do the shocks cause the cycle or are they caused by the cycle itself? How to measure their effects on the economy and how to react to them? These are difficult questions to answer.

Many business cycle theories trying to answer these questions were born during the course of history. Authors of the theories were often influenced by certain economic school of thought so many theories are built up on different assumptions, deny each other and suggest different measures. Nevertheless, no single theory alone is able to explain all business fluctuations. Therefore, it is appropriate to study all different theories and take the best from each of them.

Each economist regarded different drivers important for governing the economy; some focused on the monetary conditions and financial system, for others, the essential cycle drivers came from the real sector; and last but not least, some observed humans and their nature. It is also important to distinguish whether the drivers are of exogenous or endogenous nature. While the former suggest the economy stays in equilibrium until set into motion by external shocks (such as 9/11 attack) later gradually fading out, the latter indicate there are processes governed from within the system and they are persistent, self-perpetuating.

Detailed description of each important business cycle theory would make a separate book. However, the most important contributions to economic theory should not be neglected. Accurate classification of some theories is not easy as they are comprehensive and could be included in more classes. Figure 35 tries to summarize the most important contributions to the business cycle theory:

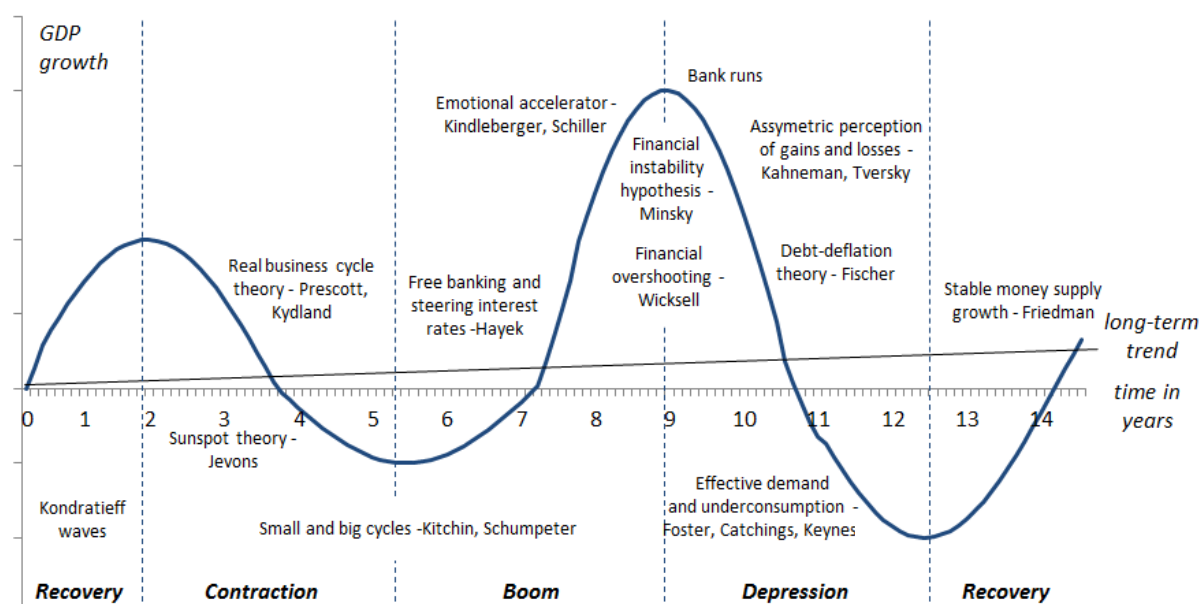
Figure 32: Most important contributions to the business cycle theory

Theory, model	Exogenous	Endogenous
Monetary	Stable money supply growth (Friedman) Central bank-free banking system (Hayek) Transaction quantity theory (Fisher) Inflation targeting, product and inflation gaps (Taylor)	Fin. overshooting - banks & credit (Wicksell) Financial instability hypothesis (Minsky) General theory (Keynes) Debt-deflation theory (Fisher)
	Manias, bubbles (Kahneman, Tversky, Kindleberger, Shiller)	
Psychological	Bank runs and panics Economics of uncertainty (Shackle)	Fundaments & mood swings (Pigou) Optimism and pessimism waves (Minsky, Keynes)
	Manias, bubbles (Kahneman, Tversky, Kindleberger, Shiller)	
Real	Sunspot theory (Jevons) Real Business Cycles (Prescott, Kydland) Techno-economic waves (Kondratieff)	Underconsumption theory (Foster, Catchings) Asynchronous interest and savings (Keynes) Innovation clusters (Schumpeter)

Source: Inspired by Littleboy<sup>84</sup>

Investor can learn a lot from what economists had discovered so far and we can at least anticipate the change is on its way. It is important to note that one can take the best from manifold theories, which saw the light of the world, and discover when it is valid to apply given approach to be able to understand what happens in the economy anticipate its further development. Following figure represents simplified course of business cycles tries to depict when particular theory can be applied:

Figure 33: Business cycles and theories



Source: Author

<sup>84</sup> According to lectures of Littleboy, B.: lecture ECON2040 at the University of Queensland, Australia, 2012

The theories suggest and history concurs that cycles can develop with uneven and different duration, course and magnitude and are caused by different reasons. Figure number 37 summarizes the main reasons for the recessions occurring in the U.S. since the early 20th century and ties, in fact, all visible shocks with business cycle theories.

The most recessions are associated with propagation of real or financial shock. First, one can observe that recessions in the US were truly historically related to wars and other real shocks – tensions in the Middle East had impact on oil prices increasing inflationary expectations and thus forcing the Federal Reserve rise the interest rates; besides that, the end of major wars with US involvement caused recessions, when governments had cut spending large sums on armaments. In such cases, real shocks can be regarded as exogenous, impacting the system from outside.

It is obvious that financial shocks play important role in business cycles, too. Monetary theories primarily explain bonds between money supply, interest and inflation; investor should be acquainted with them in order to understand steps made by Federal reserve with all prospective consequences. Besides that, monetary theories, however, also clarify the process of money creation via financial sector and its influence on real activity, financial markets and occurrence of financial bubbles and crises. It shows that financial shocks aren't random in kind at all as it is in the case of real shocks (both natural and man-made). Financial shocks are the outcome of the overall financial cycle (more on that is elaborated in chapter 4.2) and come to light in its late phase.

**Figure 34: Characteristics of recessions in the USA since 1900 and their bonds to examined shocks**

Year	Recession duration	Characteristics	Examined shocks occurring shortly before recession
Period before analysed dataset	1907 14 months	Recession was caused by bank run leading to large credit crunch	Period not covered
	1918 36 months	End of WWI was marked with ending of warfare production and returning troops from war resulting in high unemployment	Period not covered
	1929 43 months	Stock market crash the deepest recession in the 20th century tagging along with severe bank, currency and debt crisis	Period not covered
	1937 13 months	Restrictive fiscal and monetary policy along with low investments in early 1930s led to drop in GDP	Period not covered
	1945 8 months	After WWII, steep decline in government spending and demobilization led to recession	Period not covered
	1949 11 months	Shallow recession following tightened monetary policy	Period not covered
	1953 10 months	Korean war and national security spending created inflationary pressures to which Federal reserve responded with tightened monetary policy	Period not covered
	1958 8 months	Shallow recession following tightened monetary policy	Period not covered
	1960 10 months	Mild recession following tightened monetary policy	Period not covered
Period covering analysed	1969 11 months	Combination of financial tightening to balance federal budgets after increased spending in Vietnam war and tightened monetary policy due to inflationary expectations	Period not covered
	1973 16 months	Period of stagflation - oil prices quadrupled after OAPPEC set embargo, recession was characteristic with rising inflation and unemployment	OAPPEC oil embargo



dataset				
	1980	6 months	Recession followed second energy shock caused by the Iranian revolution and tightening monetary policy struggling to lower inflation	Iranian revolution
	1981	16 months	Iraq-Iran war kept oil price high for several year. Federal reserve carried on with restrictive policy fighting inflation	Iraq-Iranian war
	1990	8 months	Liberalized banking system enabled S&Ls to undertake risky operations and contributed to a small bubble in property and build-up in inflation. Tension on Middle East resulted in soaring oil prices and inflationary pressures. In response, federal reserve tightened monetary policy	Housing bubble, junk bond market collapse, gulf war
	2001	8 months	At the beginning of a new millenium, american economy sustained several adverse shocks, such as dot.com bubble burst and 9/11 attacks followed by brief recession	dot.com bubble, 9/11 attack
	2007	18 months	Bursting housing bubble together with extensive use of derivatives led to a collapse of financial system and global recession	Global Financial Crisis

Source: <http://www.nber.org/cycles/cyclesmain.html>, [ushistory.org/us/index.asp](http://ushistory.org/us/index.asp), author

### 3.6. Chapter summary

An analysis in this chapter suggests that safe haven properties and abilities to withstand all kinds of adverse shocks impacting the US equity markets are shared among US T-bonds, US T-bills, gold, silver, Swiss franc and Japanese yen. Such assets preserved value during all measured shocks (on the top of results presented in chapters 3.2 and 3.3, the rest is available in appendix number 9.2) and with 57 cases, such results might be deemed as statistically significant. The other proposed safe havens yielded ambiguous results: Counter-cyclical stocks, other currency pairs and farmlands did not show consistent safe haven properties throughout all selected shocks. As for the type of shock, there is an interesting effect natural disaster had on the discount retail stores.

As described in previous chapter, cycles are closely tied to shocks. Financial crises are often tied to major business cycles in their late-cycle phase. This phase is often associated with overvalued markets, excessive funding and resulting inflationary pressures, to which central banks react with rising interest rates and the resultant financial shock can turn into a prolonged bear market. The investor should therefore not try to benefit from individual shocks without focusing his attention to business cycles. The question he should ask is therefore not how to respond to a shock in the first place, but rather when to expect a response in advance. The answer lies in studies of business cycles, which is discussed in the next chapter.

## 4. Business cycles

The aim of this chapter is to create a simple comprehensive index able to warn the investor before the recession in advance and provide him with timely signal to sell shares



near their local peaks and to give buy signal in a recession. To create the index, it is, however, necessary to understand the characteristics and drivers behind the business cycles first and to be familiar with the various economic indicators.

#### 4.1. Business cycles definition

NBER <sup>85</sup> describes business cycles by defining recessions and expansions: “A *recession* is a significant decline in economic activity spread across the economy, lasting more than a few months, normally visible in real GDP, real income, employment, industrial production, and wholesale-retail sales. A recession begins just after the economy reaches a peak of activity and ends as the economy reaches its trough. Between trough and peak, the economy is in an expansion. Expansion is the normal state of the economy; most recessions are brief and they have been rare in recent decades.”<sup>86</sup>

Fidelity Investments, one of the largest mutual funds in the world, distinguish between four distinctive phases of economic development throughout business cycle: early, mid and late-cycle phase followed by recession. For each phase there are typical several features, as described in the figure bellow:

**Figure 35: Four phases of business cycle**

<i>cycle phase according to Fidelity</i>	<i>inflationary pressure</i>	<i>production</i>	<i>stock market performance</i>	<i>inventories</i>	<i>credit</i>	<i>macroeconomic policy</i>
early-cycle	low	sharp rise	high	low	grows	eased
mid-cycle	picking up	growth peaks	moderate	building up	grows strongly	neutral
late-cycle	high	slows	low	excessive	decelerate	restrictive
recession	easing	falling	negative	falling	tightens	accommodative

Source: <https://www.fidelity.com/viewpoints/investing-ideas/business-cycle-investing>

The word cycle may be promoting the impression of business cycles being something smooth regular and symmetrical, like a sinusoid, but one has to be careful about this – business cycles vary both in length and amplitude and the duration of expansions and recessions. According to the NBER study<sup>87</sup>, there were 33 economic cycles during 1854-2009 in the USA with the average duration of about 56 months where contractions lasted on average for 17 months and expansions took approximately 39 months. But while the shortest contraction lasted for only 7 months (for example 1918-1919), the longest recession

<sup>85</sup> National Bureau of Economic Research

<sup>86</sup> <http://www.nber.org/cycles/>

<sup>87</sup> <http://www.nber.org/cycles.html>

continued for 43 months (1929-1933). On the other hand, the shortest expansions lasted only for 12 months (1913-1914 and 1981-1982), but the longest booms took incredible 120 months (1991-2001) or 106 months (1961-1970). Moreover, the length of business cycles together with contractions and expansions varies over time (see figure 34). Another important fact is that business cycles can develop with different amplitude according to the effect of the whole list of cycle drivers. Uniformity is not the representative feature of business cycles.

Figure 36: Average duration of contractions, expansions and whole cycles in the USA in months

	<i>Contraction</i>	<i>Expansion</i>	<i>Whole cycle</i>
1854-2009 (33 cycles)	17,5	38,7	56,2
1854-1919 (16 cycles)	21,6	26,6	48,2
1919-1945 (6 cycles)	18,2	35,0	53,2
1945-2009 (11 cycles)	11,1	58,4	69,5

Source: <http://www.nber.org/cycles/cyclesmain.html>

## 4.2. Business cycle types

Fluctuations in economic activity and their amplitude are affected by the large number of factors. Firstly, it is important to realize that the business cycle is not only one macroeconomic cycle in the economy but is composed of several other cycles. One can highlight following underlying business cycles affecting individual components of the output (given by the sum  $GDP=C+I+G+NX$ <sup>88</sup>) with resulting fluctuation in overall business activity:

### Asset prices cycles (affecting GDP mainly via C and I)

There are many ways how to categorize different asset classes. The best way how to classify them in relation with business cycles is their division to assets with fixed prices, such as bank deposits, and assets with floating prices such as equity, bonds, and real estate (there are of course other markets in assets, such as markets in precious metals, gems, collectibles, but they account for only a neglectable fraction of value in comparison to assets stated above). Figure 37 summarize size of each asset class in relation to the US gross domestic product.

<sup>88</sup> C – consumption, I – investments, G – government spending, NX – net exports

Figure 37: Depth of US asset markets (end of 2010)

<i>Asset class</i>	<i>Size of asset relative to US GDP in %</i>
<b>Fixed price assets</b>	<b>121%</b>
Securitized outstanding loans	77%
Non-securitized outstanding loans	44%
<b>Variable price assets</b>	<b>458%</b>
Stock market capitalization	119%
Bond market overall	222%
<i>Thereof public debt</i>	75%
<i>Thereof financial institutions debt</i>	116%
<i>Thereof corporate bonds</i>	31%
Housing stock	117%
<i>US home equity</i>	47%
<i>US mortgage debt outstanding</i>	69%
<b>Total</b>	<b>579%</b>

*Source: McKinsey (2011)<sup>89</sup>, Freddie Mac (2013)<sup>90</sup>*

According to the figure, assets with variable prices form more than 450% of the US GDP, thus it is evident their price development will have significant impact on the US business cycle throughout so-called wealth effect – when economy is booming and asset prices rise, consumers seeing their growing wealth allow themselves to spend more and vice versa. There were several studies<sup>91</sup> trying to estimate the magnitude of the wealth effect concluding it accounts for approximately 4% of change in asset values (meaning that if for example in recession asset prices fall from 500% to 300% of GDP, the overall drag on economy due to the wealth effect will be 8% GDP).

#### Presidential cycles (affecting GDP mainly via G)

The president of the USA is often perceived to belong among the most powerful people in the world affecting the both macroeconomic and market performance. Although there is no consensus whether markets perform better under Democratic or Republican presidents, many papers propose there is a positive linkage between Democratic presidents and stock markets. For instance, Si & Al Zaman<sup>92</sup> postulate market performs better under the administration of the Democratic president and support their conclusion with prevalent expansive policies focusing on small businesses. Wong & McAleer (2007)<sup>93</sup> argue that a Republican administration seems to be more active; however, the efficiency of their policy is doubtful and bull markets are more common under the Democratic president. However, other studies

<sup>89</sup> [http://www.mckinsey.com/insights/global\\_capital\\_markets/mapping\\_global\\_capital\\_markets\\_2011](http://www.mckinsey.com/insights/global_capital_markets/mapping_global_capital_markets_2011)

<sup>90</sup> <http://www.freddie.mac.com/investors/pdf/files/investor-presentation.pdf>

<sup>91</sup> Mayer & Simons (1994), p. 22: 4,2%; Brayton & Tinsley (1996), p. 42: around 4%; Mehra (2001), p. 87: around 3%

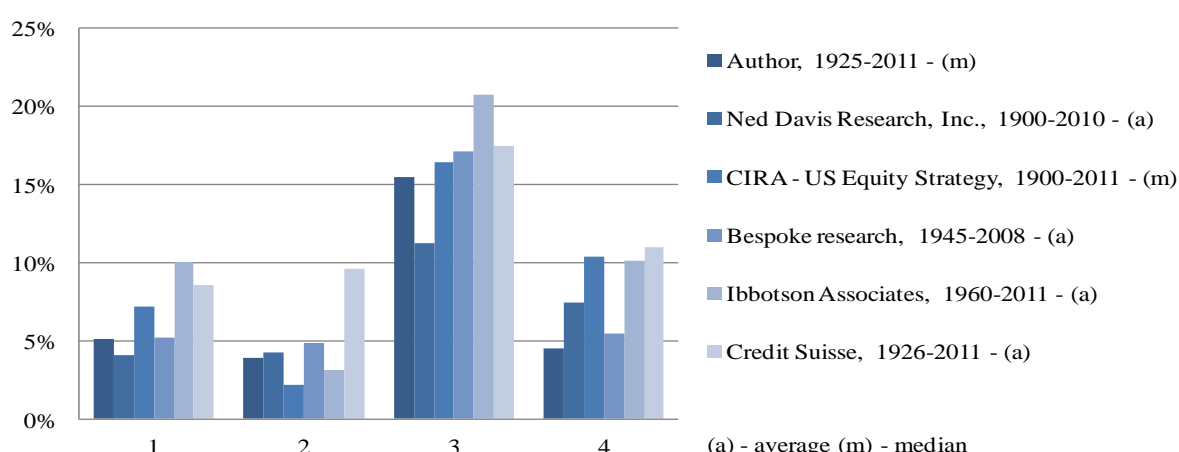
<sup>92</sup> Si & Al Zaman (2013), p. 288

<sup>93</sup> Wong & McAleer (2007), p. 15-16

propose that the regularity is not significant. Two Federal Reserve economists, Campbell & Li, corrected other studies' outcomes for the market volatility during the Great Depression and conclude that *“neither risk nor return is significantly different across the presidential cycle”*<sup>94</sup>.

Nevertheless, there is a consensus that a presidential cycle has large influence on the overall economy and stock markets. The stock markets on average perform worse during the first two years after the elections and the third year exhibits the highest returns. This fact can be explained with cyclical pattern in government and investment behaviors; the expansionary policy in the second half of tenure often takes place to boost the economy and make the chance of re-election higher. Figure 38 captures returns related to the 4-year US presidential cycle.

Figure 38: Annual nominal returns on US stock market in % during presidential cycles



Source: Ned Davis<sup>95</sup>, CIRA<sup>96</sup>, Bespoke<sup>97</sup>, Ibbotson Associates<sup>98</sup>, Credit Suisse<sup>99</sup>, <http://finance.yahoo.com/q?s=^gspc>, author

But one cannot merely rely on this pattern when investing into stock markets for there are several counterexamples disapproving the regularity. Markets fell almost by 50% in 1931, the third year under Hebert Hoover and during last two years of George Bush's administration (2007-08), markets lost almost 35%, too.

<sup>94</sup> Campbell & Li (2004), p. 33

<sup>95</sup> <http://cdn.ameriprisecontent.com/cds/alwp/advisor/marc.a.dynder/cusersmarcdesktopmarkets-in-presidential-election-yrs634566132805808323.pdf>

<sup>96</sup> <http://email.gradientfg.com/GI/PresidentialElections.pdf>

<sup>97</sup> <http://www.johnrothe.com/2012/08/the-presidential-cycle-how-to-take-advantage-in-your-portfolio/>

<sup>98</sup> [http://www.investmenteurope.net/digital\\_assets/6018/Presidential+Politics\\_EAPM\\_exp0113.pdf](http://www.investmenteurope.net/digital_assets/6018/Presidential+Politics_EAPM_exp0113.pdf)

<sup>99</sup> <http://ftalphaville.ft.com/2011/12/14/797331/electoral-maths-presidential-elections-and-the-sp-500/?Authorised=false>

### Capital spending cycles (affecting GDP mainly via I)

Capital spending cycle represents fluctuations in investment in machinery and equipment. His explorer, Clement Juglar, was the first one to discover that capitalist economy can be inherently unstable, forming a very progressive claim during those days. All his predecessors focusing on the same topic have considered business fluctuations were caused by external factors. His cycle lasted between 8-11 years and was primarily caused by the oscillations in fixed capital investments caused by several factors, predominantly by money supply and interest rate levels. Juglar demonstrated that movements in business activity aren't random but follow certain pattern instead. *“Juglar developed an endogenous analysis of business cycles which at his time was opposed to the analysis of economic fluctuations as chronic cycles. Instead of the long-run equilibrium tradition which dominated at that time, Juglar constructed a business cycle theory as a natural movement. He opened the door for modern business cycles explanations based on an action reaction sequence.”*<sup>100</sup>

### Inventory cycles (affecting GDP mainly via C)

Joseph Kitchin analyzed data from the USA and the United Kingdom for the period 1890-1922 and discovered yet another fluctuation in the economy – the inventory cycle. Its length is estimated approximately to 3,5 years. The crucial driver for the cycles are firms themselves. When the prospects in the economy turn bright, a company expects rising demand for its goods and expands its production. However, this is how every company on the market operates, so companies increase their production simultaneously. This phenomenon causes markets to get gradually oversupplied with excessive goods, companies start to accumulate excessive supplies and therefore cut down their production until stocks decline to normal level again. Stock levels are also significantly correlated to commodity prices, bank clearings and interest rates, he claimed. He also divided inventory cycles into minor and major, where major cycles were mainly consisting of two, or three minor cycles. The final phases of major cycles are often associated with financial panics and crises as Kitchin observed. In his work he forecasted that *“major maxima to be probably erected in 1926,67 or more probably in 1930,00.”*<sup>101</sup> As such, he in fact predicted the Great Recession of 1930s while analyzing one component of the business cycle.

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<sup>100</sup> Legrand & Hagemann (2005), p. 22

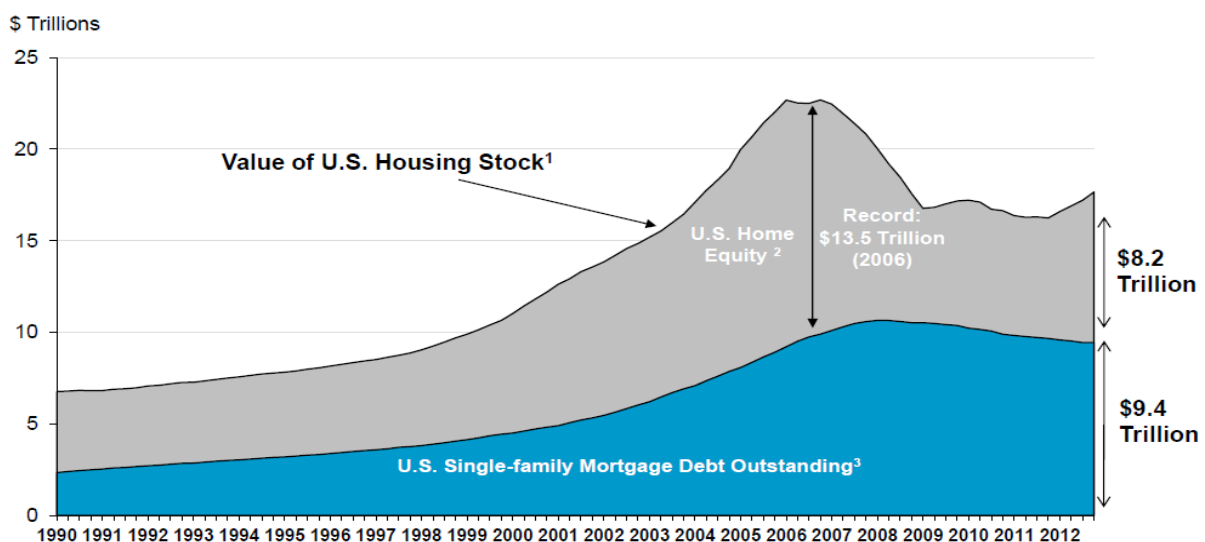
<sup>101</sup> Kitchin (1923), p. 15

### Construction cycles (affecting GDP mainly via I and C)

Construction cycles were discovered by Simon Kuznets. He was deeply focused in the national income account analyses where he tried to define major contributors for the long-term economic growth. In 1930, he discovered a secondary trend (so-called Kuznets swing) lasting 15-25 years where the predominant factors were demographic changes and associated construction activity. In 1933, Homer Hoyt issued a complex study of property prices fluctuations called *One Hundred Years of Land Values in Chicago* covering the period from 1830 to 1933 where he discovered property cycles with the average duration of 18 years.

The cycle has large duration and price amplitudes according to the features of the housing market. When demand in housing increases (due to variety of reasons such as the end of war, demographic boom, economic boom, convenient financing conditions, state support etc.) prices are pushed up because it takes several years until fixed supply can respond: The whole process of construction starts with an empty land. Land gets zoned first according to municipal plan, than divided into parcels and sold after. Before construction can take place here, whole process is a subject to building approvals until finally a building permit is issued. This process can take several months or even years. By the time supply finally responds to once-high demand, situation in economy can be completely different and supply can overshoot.

Figure 39: Peak of property cycle in 2007



Source: FreddieMac (2013) based on Federal Reserve Board's Flow of Funds Accounts

The downward phase of property cycle takes a long time and leaves huge damage on economy because of real-estate collateral effect and associated leverage (at its peak, a mortgage debt amounted to more than USD 10 trillion - see Figure 39). Properties act often as collateral for the bank loan and when real estate prices start to raise, price of collateral increases as well allowing customers to borrow more credit. The problem is that whereas the amount of borrowed credit (understand debt) stays fixed, value of collateral can move down and if this phenomenon reaches greater extent during downward phase of cycle it can cause serious problems to bank sector. Fred Harrison analyzed data of the US housing market from 1818 to 1929 and concluded that peaks in land values in most cases preceded building cycle peaks, which outran the overall economic activity by 1-2 years and peak in property cycle was one of the main cause of Great Depression.<sup>102</sup> However, there are more recent examples of pricked property bubbles and their effects: One can recall massive bubble in Japan in late 1980s and the US housing bubble in new millennium with all consecutive effects on their economies.

### All cycles tied together

Joseph Alois Schumpeter analyzed individual cycles (Juglar, Kitchin, Kuznets) and came to conclusion, that all cycles are governed together through innovations<sup>103</sup> in the economy: *“Innovations are not only the decisive impulse of cyclical fluctuations but the period of their implementation also determines the different length of the cycles”*<sup>104</sup> a notion on which his cycle mono-causality argument emerged. *“Innovations, their immediate and ulterior effects and the response to them by the system, are the common "cause" of them all”*<sup>105</sup> Based on this, he created a multi-cycle model, where one grand super-cycle, 54 years in length, a Kondratieff wave, to honor his author’s name (super-cycle was introduced by Nikolai Kondratieff, presenting this very phenomenon in 1924, where innovations cause technological revolution and form cycle approximately 50-60 years long), is composed of 6 Juglar capital spending cycles each of them consisting of 2 Kitchin inventory cycles (as shown in figure 40).

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<sup>102</sup> Tvede, L. *Business cycles: history, theory and investment reality, third edition*. Chichester. John Wiley & Sons, 2006, p. 326

<sup>103</sup> Innovations are also, according to R.J. Shiller (see chapter 1.1.4. – stealth phase) , one of the main factors predeceasing expansions and prospective bubbles on financial markets

<sup>104</sup> Legrand & Hagemann (2005), p. 12

<sup>105</sup> Schumpeter, J.A. *Business Cycles* (1936), Brunswick, New Jersey, Sixteenth printing, 2012, p. 179-180

Figure 40: Long-term cycle development according to Schumpeter

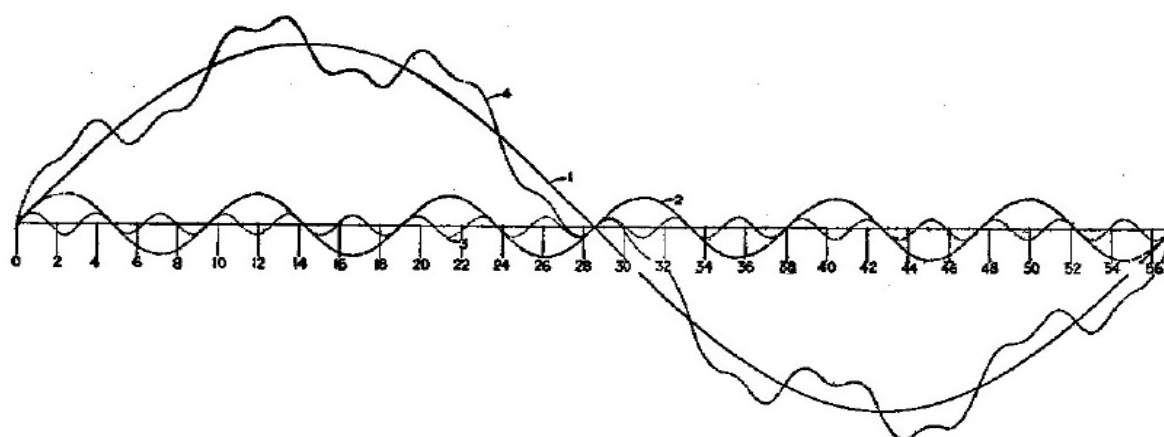


CHART I.—Curve 1, long cycle; curve 2, intermediate cycle; curve 3, short cycle; sum of 1–3.

Source: Schumpeter (1939), p. 175

Schumpeter originally intended to include Kuznets property cycle as well but refused to do so in the end. The official reason for this is Schumpeter did not acknowledge Kuznets property cycle as a proper phenomenon, but it is said he did so due to his personal rivalry against Kuznets.

### 4.3. Business cycle drivers analysis

#### 4.3.1. Initial analysis as a guide for examining individual cycle drivers

Starting point for following business cycle analysis is a comprehensive research of James H. Stock and Mark W. Watson of the NBER from 1998. Stock and Watson analyzed 71 time series for a 1947-1995 period and their relation to nominal GDP in 8 distinctive categories (sectoral employment, NIPA components – consumption, investment, government spending and net exports, productivity and utilization, prices and wages, interest rates and stock prices, money, miscellaneous leading indicators and international output). The following figure summarizes the cross-correlations between GDP and selected variables with strongest dependence. Correlation coefficients in column ‘t’ represent a linear dependence between GDP and certain variable at the same time. Correlation coefficients in columns ‘t+n’ capture statistical dependence between GDP and the individual variable development n quarters in advance (and in the same fashion, correlation coefficients in column ‘t-n’ depict statistical dependence between GDP and lagged variables by n quarters).



**Figure 41: Cross correlations between the US GDP and selected macroeconomic variables**

Variable	Cross-correlations between GDP growth and other variables									
	t-4	t-3	t-2	t-1	t	t+1	t+2	t+3	t+4	
GDP	0,03	0,33	0,66	0,91	1,00	0,91	0,66	0,33	0,03	
Total employees	0,49	0,72	0,89	0,92	0,81	0,57	0,24	-0,07	-0,31	
Unemployment rate	-0,27	-0,55	-0,80	-0,93	-0,89	-0,69	-0,39	-0,07	0,19	
Capacity_utilization	0,01	0,31	0,63	0,86	0,93	0,83	0,59	0,29	0,02	
New orders, nondefense capital goods	0,30	0,53	0,72	0,83	0,83	0,71	0,51	0,26	0,02	
PPI level	0,27	0,18	0,05	-0,09	-0,24	-0,37	-0,47	-0,54	-0,56	
CPI level	0,12	-0,04	-0,21	-0,38	-0,51	-0,62	-0,68	-0,67	-0,59	
Federal funds rate	0,50	0,60	0,63	0,56	0,38	0,13	-0,16	-0,41	-0,60	
10 year government bond rate	0,07	0,13	0,17	0,16	0,08	-0,07	-0,24	-0,39	-0,49	
Tibill 3-month rate	0,40	0,50	0,57	0,54	0,41	0,18	-0,10	-0,38	-0,58	
Long-Short yield spread	-0,52	-0,61	-0,66	-0,64	-0,52	-0,32	-0,07	0,17	0,38	
Commercial paper-Tbills spread	0,66	0,65	0,54	0,33	0,06	-0,20	-0,41	-0,53	-0,54	
M2 stock	-0,27	-0,15	0,03	0,22	0,39	0,53	0,59	0,58	0,51	
Stock prices	-0,35	-0,28	-0,12	0,10	0,34	0,51	0,57	0,49	0,32	
Exports	0,47	0,50	0,48	0,40	0,27	0,09	-0,11	-0,29	-0,43	
Imports	-0,03	0,27	0,54	0,72	0,78	0,70	0,53	0,34	0,17	
Consumer expectations	-0,59	-0,46	-0,25	0,00	0,25	0,44	0,54	0,53	0,44	
Building permits	-0,51	-0,41	-0,21	0,07	0,36	0,60	0,74	0,75	0,67	
Domestic fixed investment	0,04	0,32	0,61	0,82	0,89	0,83	0,65	0,41	0,18	
Government purchases	0,22	0,21	0,21	0,19	0,15	0,03	-0,10	-0,20	-0,23	

*Source: Stock & Watson (1998), p. 51-53*

While following the figure, two observations come in place. First, some variables such as total employees co-move with the GDP in the same direction (having positive correlation) and can be called procyclical, while the others move in the opposite direction and are considered as countercyclical (e.g. see development of unemployment or price level). Second, there are three types of indicators with regard to their development: Leading indicators share the strongest dependence with GDP in advance – they rise and fall before the whole economy does and can be used for its forecasting. Coincident indicators change at the same time as the overall output and they can be used to confirm the anticipated trend. Finally, lagging indicators follow the development of the economy with a certain delay and express the historical economic performance.

#### 4.3.2. Leading indicators and their link with the economy

It is desired to estimate the peak of the economic cycle approximately 3 months to one year in advance, in order to hit a local maximum in the stock markets. Therefore, the subsequent analysis will examine leading indicators alone and their link with the economy.

Figure 42: List of the most common macroeconomic indicators

Macroeconomic indicators		
Leading	Coincident	Lagging
shares prices	number of non-farm employees	unemployment
money supply - M2	industrial production	CPI
consumer expectations	capacity utilization	trade inventories relative to sales
new building permits	company sales	outstanding consumer credit
change in input prices	personal income minus transfers	outstanding commercial loans
weekly hours in manufacturing	average manufacturing hours	average prime rate of commercial banks
durables new orders		
jobless claims		
interest rate spreads		

Source: Veselá, J. *Investování na kapitálových trzích*. Prague, ASPI, 2007, pages 288-289, <http://www.nber.org/chapters/c4170.pdf>

### Shares prices

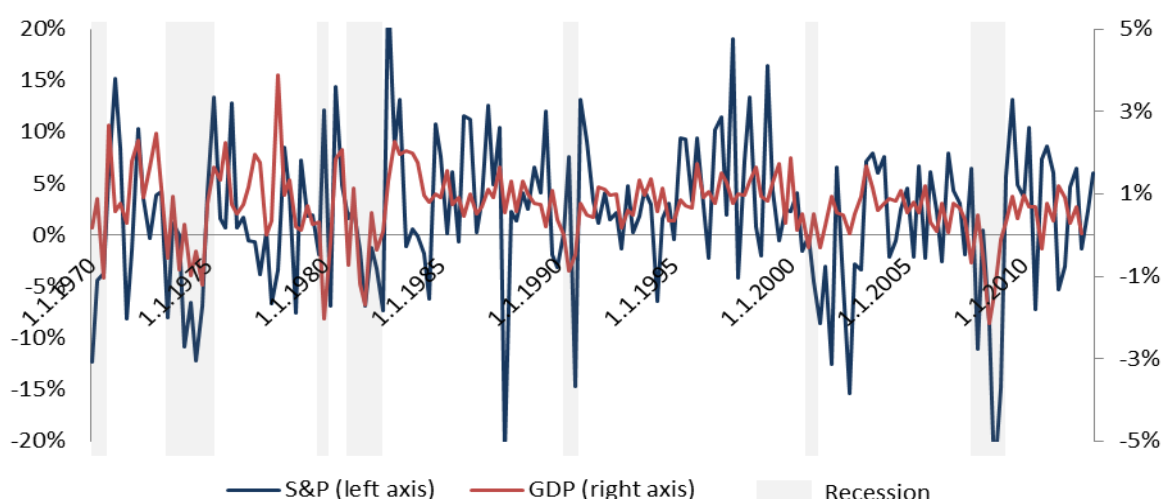
Stock market prices play the role of strong procyclical leading indicator outrunning the economic development by 3 to 9 months<sup>106</sup>. This happens because stock market prices are based on investors' expectations. When prospects in economy look bright, investors expect future corporate profits to boost and therefore invest in stocks. Rising stock markets send signal to the whole economy and businesses expecting growing sales are encouraged to increase production to be able to satisfy upcoming higher customer demand. Companies' production capacity is, however, limited by capital and labor force so in light of that firms hire more people and invest into new projects. More created jobs contribute to the wealth of consumers allowing them to spend even more. Business is booming and companies indeed generate more free cash-flow, which was expected by the investors at the beginning of the process. Secondly, an increase in asset prices also represents the wealth effect – profits generated on the stock markets allow consumers to spend more thus supporting the overall business activity. Strong procyclical nature of equity markets can be also supported with its close link to US GDP with correlation coefficient reaching 0,95.<sup>107</sup>

The process goes the same in the opposite direction, too. As stocks are risky assets, investors get rid of them when the prospects turn sour. Negative expectations together with adverse wealth effect rank among the major cause of economic downturns. It is clear that stock market indexes and economic activity will tend to move in the same direction. Since 1924, there were 15 bear markets over past 90 years, 12 of them were associated with recessions. Moreover, viewed in the opposite angle, each recession was linked to declining markets.

<sup>106</sup> Veselá, J. *Investování na kapitálových trzích*. ASPI, 2007, p. 283

<sup>107</sup> Measured for 1970-2012 period, based on quarterly nominal data.

Figure 43: Quarterly percentage change of S&P 500 index and GDP



Source: <http://www.nber.org/cycles.html>, <http://finance.yahoo.com/q?s=^gspc>, author

As already stated, stock market prices act as the leading indicator for the overall business activity, so its development can't be used for forecasting stock prices. It is also evident there are lots of false signals, too, and market can also develop in waves, in which it is undervalued or overvalued for a long time.<sup>108</sup> However, wealth of knowledge in business cycle analysis is one of prerequisites for the successful investor.

### Money supply – Aggregate M2

Money supply expressed by monetary aggregate M2 (including traveler's checks, currency, money market account, savings, demand and small-denomination time deposits) has a strong influence on overall economic activity. In 1963, the leading monetarist, Milton Friedman, introduced *A monetary history of the United States* where he claimed that during the Great depression (1929-33), the Federal Reserve allowed money supply to fall by about 33%<sup>109</sup>, thus choking up the nominal flow of funds leading to a collapse in nominal demand. In other words, this proved that the amount of money in the economy matters and is a major cause of business cycles – if money supply grows slowly or is allowed to decrease it leads to contraction but if money supply grows excessively it will always produce high inflation, as inflation is solely a monetary phenomenon. Based on that, Friedman expanded the old transaction Quantity theory to the modern portfolio theory where he distinguished between 3 periods – when money supply is changed, in a very short period there are only changes in the velocity of money (affecting only left side of equation  $MV=PQ$ ), later on, as money reach

<sup>108</sup> Valuation of the market can be analysed via Schiller's CAPE ratio or Tobin's q

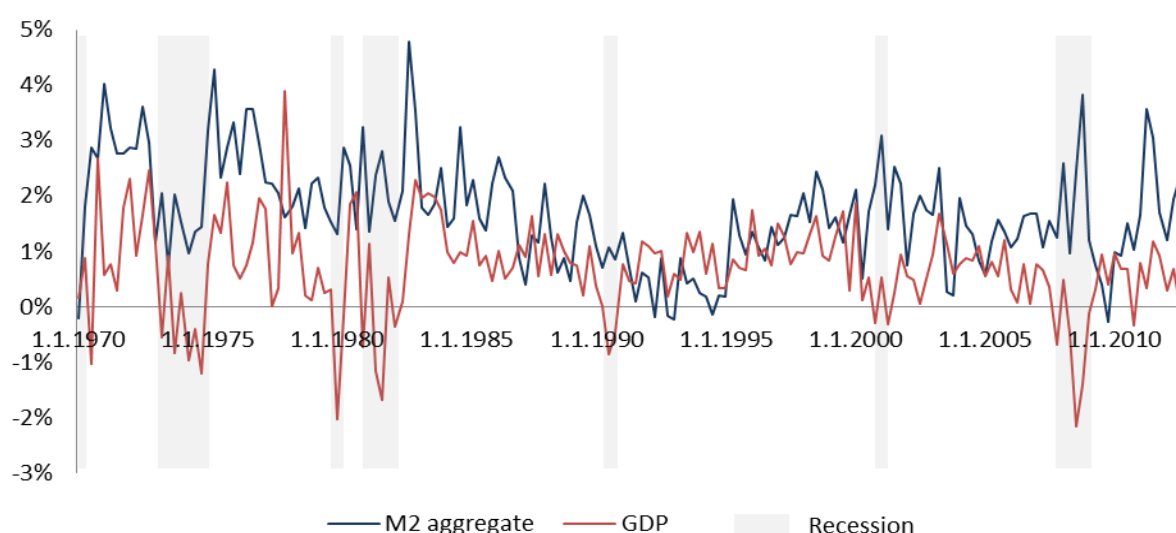
<sup>109</sup> Friedman, M., Schwartz, A.J. *A Monetary History of the United States, 1867-1960*, Princeton. Princeton University press, 1963, p. 300

real economy both inflation and real product rise but in the end rise in money supply ends solely in inflation.

From this logic comes the role of money supply as a leading indicator, too. By the end of the cycle when inflation is rising, the real growth of money supply actually starts decreasing. Moreover, money supply is created with debt. In other words commercial banks create money supply by lending credit. By the end of the cycle demand for credit dampens and banks are curbed by their lowering reserves anyway. As a result, money supply starts decreasing several quarters before the overall economic activity. Development of monetary aggregates M1 and M2 is published weekly by the Federal Reserve.

Nevertheless, role of money supply as a leading indicator gradually weakens due to changes in the financial system. Due to change of monetary policy from monetary to inflation targeting, money changed towards its endogenous nature. Developments of new financial products go in hand with decline in bank intermediation – newly established money market funds operate in the same sphere as commercial banks and create additional demand for money not captured by the M2 indicator. The indicator also does not include expanding investments in stocks or bonds. Decreasing explanatory power of the indicator is captured in figure 44 and it completely missed the last recession.

Figure 44: Quarterly percentage change of money supply (M2) and GDP

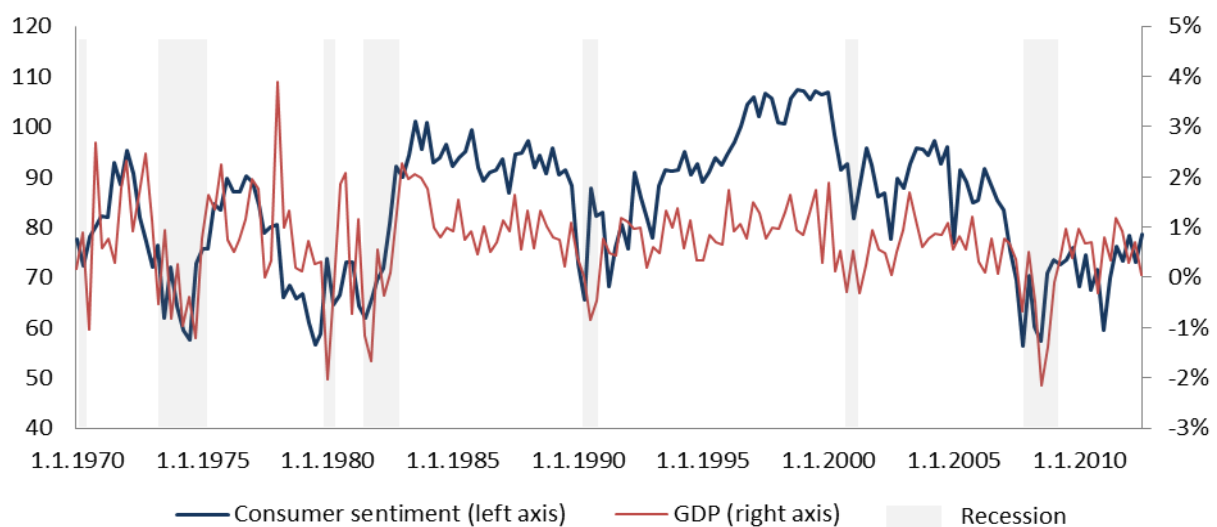


Source: [www.nber.org/cycles.html](http://www.nber.org/cycles.html), [www.federalreserve.gov/releases/h6/current/default.htm](http://www.federalreserve.gov/releases/h6/current/default.htm),  
author

## Consumer expectations

Consumption represents the largest element of the US GDP. During a period from 1970 to 2012, consumption on average constituted 64,37% of the overall US GDP (67,98% in 2012). Therefore, analysis of the consumption can't be omitted. Consumption is closely tied to overall consumer sentiment and expectations, which can be regarded as leading indicator. The logic behind that is straightforward. When consumers feel positive about the future and expect economy to boom they allow themselves to spend more, either from their own resources, or on credit. Increasing consumer demand causes inventories to fall and makes companies produce more. Sentiment alone creates positive, self-fulfilling feedback. On the contrary, when consumers feel uncertain about the economy and expect bad times, they feel reluctant to run into debt and save up instead. Lower demand then creates the opposite, negative feedback in the economy.

Figure 45: Quartely percentage change of consumer sentiment and GDP



Source: [www.nber.org/cycles.html](http://www.nber.org/cycles.html), <http://research.stlouisfed.org/fred2/series/UMCSENT/>,  
author

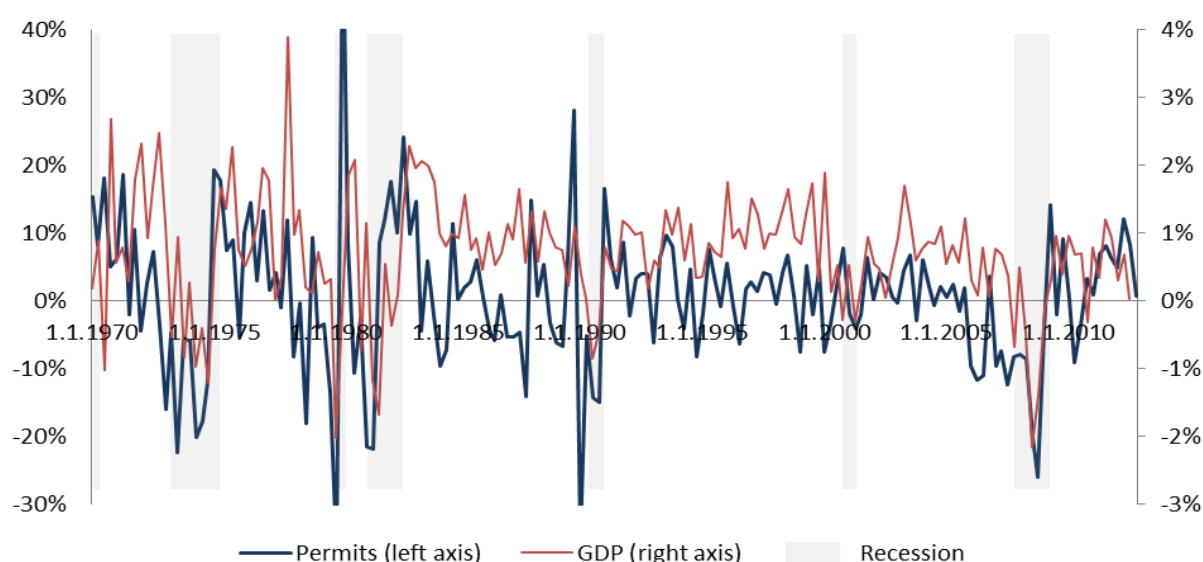
Consumer sentiment indexes are based on surveys, personal questionnaires or telephone interviews. Respondents answer questions related to several categories regarding overall business conditions, employment and personal finance. For instance Consumer Sentiment Index of the University of Michigan monitors following topics: Respondents assess their personal finance one year ago, today and their expectation for one year from now, they give their opinion on the overall business climate for next five years and share their attitude towards

major spending on households. Resulting index has the character of the oscillator and is published once a month. From the figure number 45 it is clear that consumer sentiment has always started to fall earlier than the entire output and therefore it can truly be considered a leading indicator.

### Building permits

Other important indicators for monitoring the overall economic activity include construction-related indicators having strong procyclical nature. One can distinguish between three types of indicators - building permits, housing starts and housing completions. For the investor, the most important one is the building permits indicator, which is at the very beginning of the construction process and gives the earliest signal – it takes approximately one month for a single-unit house and 2 months for a multiple-unit house from obtaining the permit to the start of actual construction<sup>110</sup>. Subsequent investment in real estate represents a significant item in personal outlays and is mostly associated with the mortgage. People therefore tend to make such a commitment during the economic boom. One can also expect that when the house will be finally built, people will continue to spend further for the property amenities. Building Permits thus represent an important leading indicator.

Figure 46: Percentage quarterly change of building permits and GDP



Source: [www.nber.org/cycles.html](http://www.nber.org/cycles.html), <http://www.census.gov/construction/bps/>, author

<sup>110</sup> <http://www.census.gov/construction/nrc/lengthoftime.html>

The indicator itself is published monthly by the U.S. Census Bureau for the whole USA and the 4 main regions - West, South, Northeast and Midwest (these markets do not develop homogeneously, e.g. Northeast and West regions with so called glamour cities show more erratic development<sup>111</sup>) as the number of new building permits for single and multiple unit houses. Figure 46 documents strong forward-looking nature of the indicator.

## Change in input prices

One of the most important indicators of the overall economy health is inflation. In the capitalist economy all decisions are governed with the price signals. When there is high or rising inflation price signals get distorted and investment planning together with capital formation gets hindered. As an example, high inflation during 1980s and 1970s caused a lot of damage to the US economy. Inflation has harmful effect on stock markets, too:

**Figure 47: Stock markets and negative effects of inflation**

<i>Negative effects of inflation on stock market performance</i>	
Discount factor and money illusion	Future earning are in practice transfered to present value by nominal interest rate as a discount factor. If inflation rises, so rises discount factor
Overheating economy	Rising inflation is typical for late phases of economic cycle. Investors expect restrictive monetary policy and rising interest rates
Competition between stock and bond markets	Rising inflation incentives central banks to set interest rates higher, thus making bond market yields higher. Investors therefore transfer part of funds to bond markets
Interest costs	Interest costs constitute significant part of companies' overall costs. If interest paid by the company is calculated from floating rates, rising inflation and interest rates present higher costs for the companies

*Source: Veselá, J. Investování na kapitálových trzích. Prague, ASPI, 2007, pages 280-283*

Although the Federal Reserve does not have any explicit target set, goals set in 1977 amendment to the Federal Reserve Act state to support maximal sustainable output growth and employment and to maintain stable price level<sup>112</sup> (i.e. keeping low levels of inflation in within 1-4% range<sup>113</sup>).

Inflation can be measured from several angles – most commonly people associate it with CPI<sup>114</sup>, reflecting change in price level for average citizen, or wage rates or oil prices. One can also track PPI<sup>115</sup>. The PPI index itself is based on prices of raw commodities such as metals, wood, plastic etc. (excluding some volatile commodities) weighted according to their

<sup>111</sup> Shiller, R.J. *Irrational Exuberance*, 2nd edition, New York, Broadway Books, 2005, p. 18

<sup>112</sup> <http://www.federalreserve.gov/aboutthefed/section2a.htm>

<sup>113</sup> Altig (2003), research department in Federal Reserve Bank of Cleveland

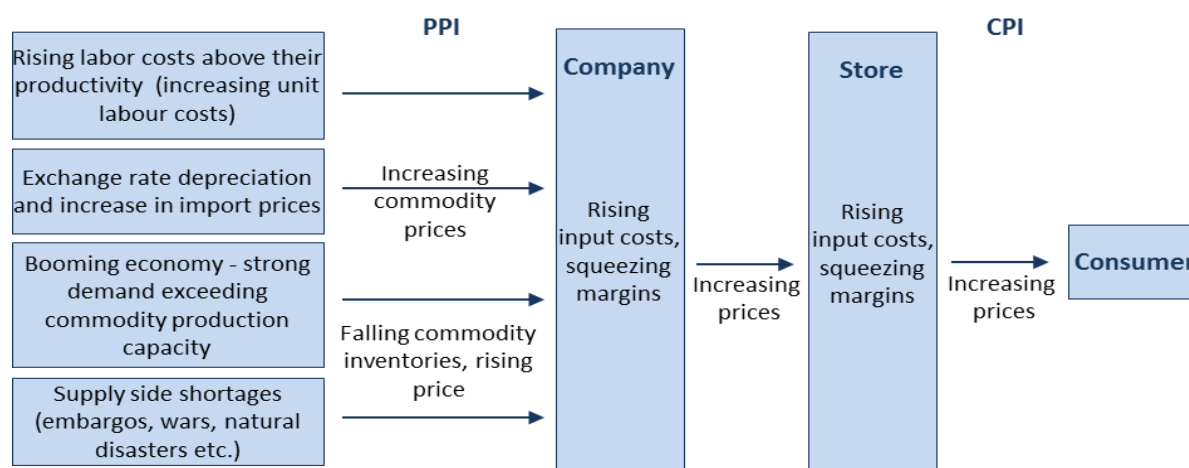
<sup>114</sup> Consumer Price Index

<sup>115</sup> Producer Price Index



share in overall product. PPI is composed as a chained index with a base in 1982 (1982 = 100%). There is also a broader version, PPIACO<sup>116</sup> taking into account all commodities. Both indices are published monthly by Bureau of Labor Statistics of the U.S. Department of Labor.

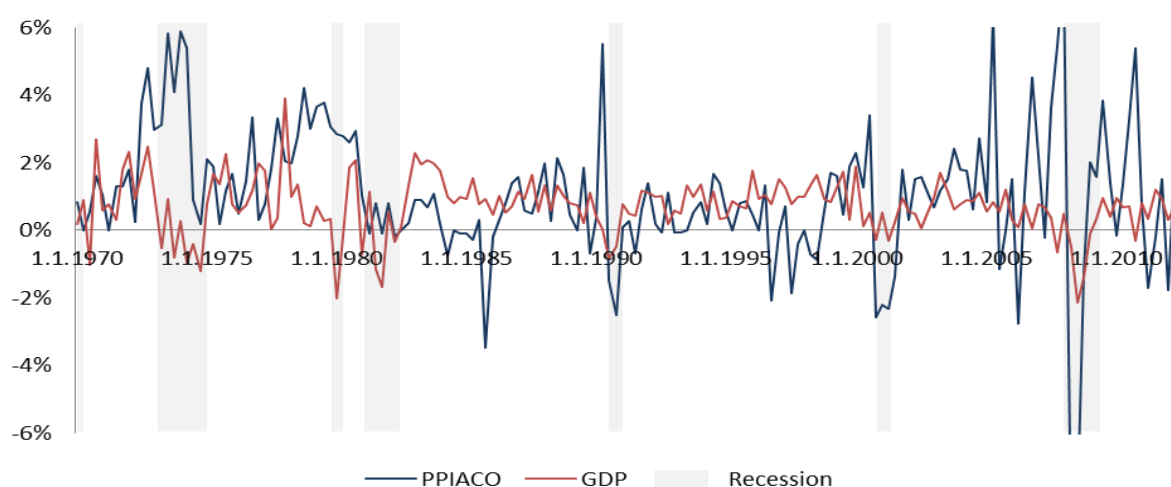
Figure 48: Source of inflation



Source: Author

PPI acts as a leading index to inflation and overall economy. Producers can be faced with input inflation, for several reasons (see figure 48). Rising input prices squeeze their margins, so sooner or later they pass along the costs to stores and in the end the increase gets to the consumer.

Figure 49: Percentage quarterly change of PPIACO and GDP



Source: [www.nber.org/cycles.html](http://www.nber.org/cycles.html), [research.stlouisfed.org/fred2/series/PPIACO](http://research.stlouisfed.org/fred2/series/PPIACO), author

<sup>116</sup> Producer Price Index All Commodities



PPI monitoring allows one to recognize inflationary pressures sooner, than the Federal Reserve reacts with rising interest rates. Preceding figure documents there was always upsurge in producer prices before recession.

### Manufacturer's new orders indices

Manufacturing plays more or less important role in any economy. In 1970, 26% of all workers (excluding farm employees) were employed in manufacturing in the USA. As the economy transformed towards the tertiary economy over the decades, manufacturing was gradually pushed out in favor of service-related employment and production was outsourced abroad. In 2012, there was only 9% of workforce employed in manufacturing<sup>117</sup>. Nevertheless, it should be noted that a new trend is now starting to take place and production capacities are beginning to return back to the USA. As manufacturing is strongly procyclical and volatile, it still considerably contributes to the overall GDP development.

Manufacturing production can be measured with several different leading indicators related to orders (the indicators are leading in nature because manufacturing order precedes actual production and following consumption). For example Manufacturer's new orders for consumer goods/materials index shows effect on inventories – increase in order backlog causes inventories to fall and companies need to produce more to satisfy all orders. Manufacturer's new orders for non-defense capital goods index is closely tied to the first index. The production of the goods requires, along with labor, capital equipment, so increasing orders of consumer goods go hand in hand with the growing demand for capital goods. The Factory Orders Report describes the overall health of the selected manufacturing sector, capturing new and unfilled orders, total level of inventories and their transport.

The most elaborate index with regards to production is PMI<sup>118</sup> issued monthly by the Institute for Supply Management. Once a month, a survey among more than 400 top managers of large manufacturing US companies is undertaken tracking answers in five categories – current production level (having 25% weight in the index), new orders (30%), employment level (20%), speed of supplier deliveries (15%) and inventories level (10%). Managers can answer the questions with worse, the same, better. Their responses are then weighted into the final index oscillating from 0 to 100 points, where 50 means unchanging

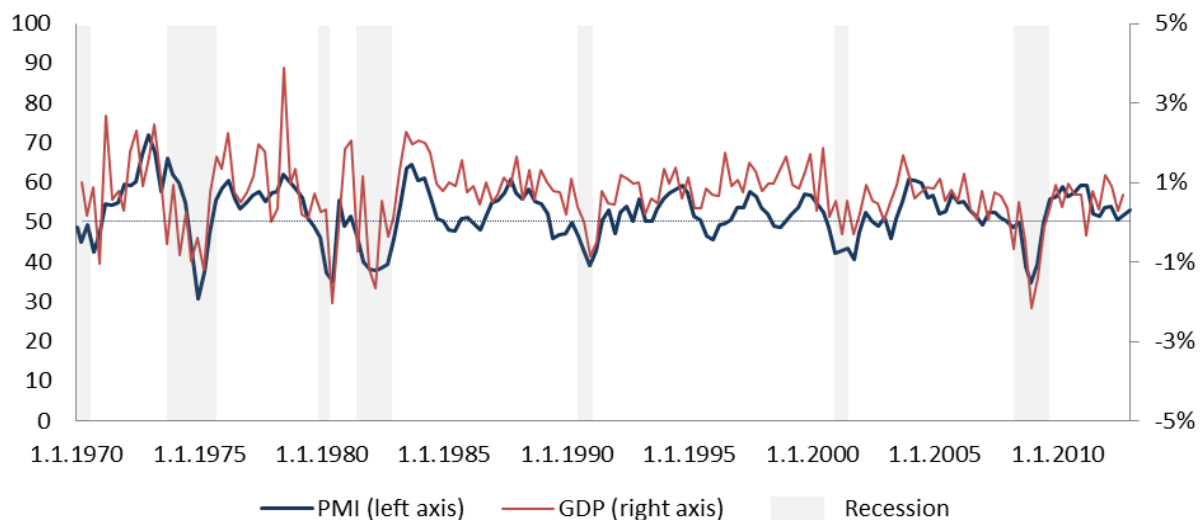
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<sup>117</sup> Data available at <http://research.stlouisfed.org/fred2/series/MANEMP>

<sup>118</sup> Purchasing Managers Index

conditions for the manufacturing industry are expected, whereas more than 50 points to expansion in the manufacturing industry and vice versa.

**Figure 50: PMI development and percentage quarterly change of GDP**



*Source: [www.nber.org/cycles.html](http://www.nber.org/cycles.html), <http://research.stlouisfed.org/fred2/series/NAPM>, author*

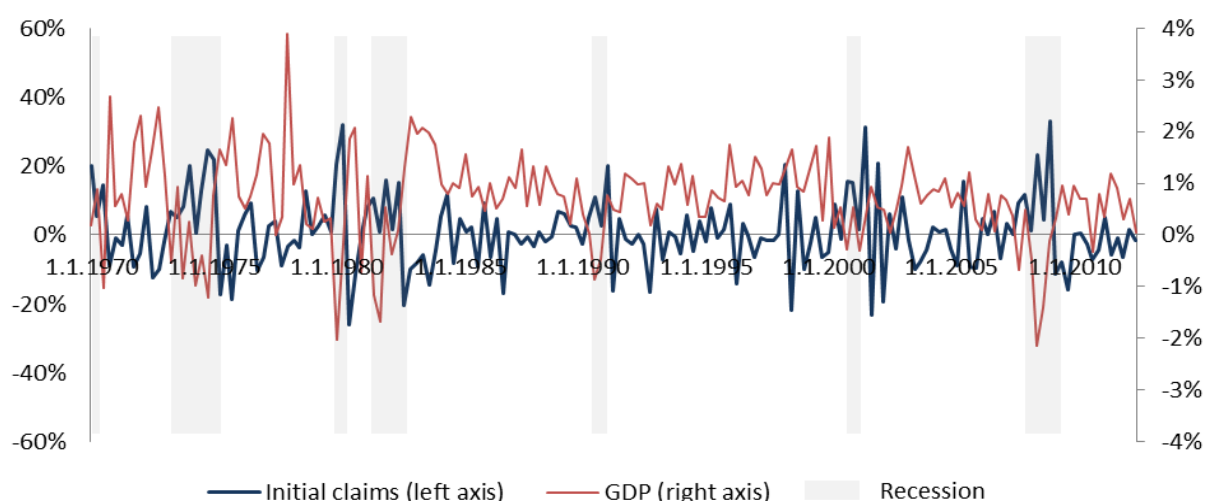
The figure number 50 shows that the index itself can often indicate the onset of recession and recovery, but his explanatory power is lowered by a series of false signals.

### Jobless claims

The jobless claims report is issued every week by the U.S. Department of Labor and it belongs among the most expected indicators. There are two categories of claims – initial claims, which register people filling for insurance benefits for the first time; and continuing claims including people taking benefits for a longer period. Initial claims have quite a volatile development so a 4-week moving average is commonly used for their analysis. Average weekly hours in manufacturing (presented monthly by the Bureau of Labor Statistics) aptly co-illustrate the situation on the labor market and are also observed on regular basis.

Initial claims at particular are considered an important leading indicator because investors can observe week-to-week changes in overall situation on the job market. Persistent rise of jobless claims (assuming at least a 30 thousand rise per week) signals increasing unemployment tied with dampened future consumption.

Figure 51: Percentage quarterly change of Initial jobless claims and GDP



Source: [www.nber.org/cycles.html](http://www.nber.org/cycles.html), [research.stlouisfed.org/fred2/series/ICSA](http://research.stlouisfed.org/fred2/series/ICSA), author

It is not recommended to observe this indicator in isolation as investors interpret it in connection with other indicators so their reactions thereby can seem to have somewhat random nature. However, if used in combination with other leading indicators, it gives valuable information about future state of the economy.

### Interest rates and interest rate spreads

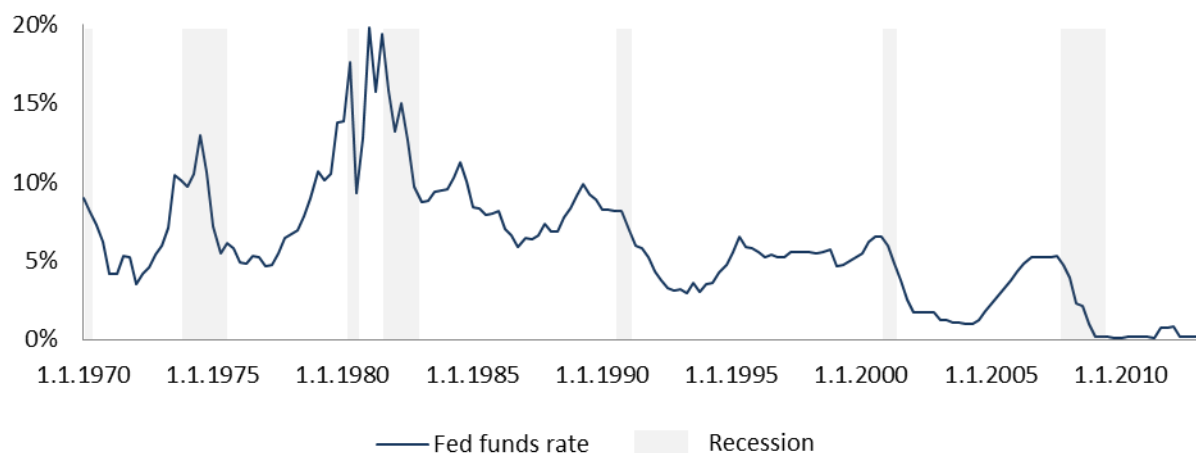
The impact of interest rates on the economy is obvious. Interest rates as variables affect more or less every decision maker in the overall economy, whether it applies to individuals and their decisions regarding consumer loans, or mortgages; or to the decision of companies to expand their businesses and chosen form of financing their investment; and interest rates influence the decisions of investors in financial markets, too. Their role is underlined by the fact that interest rates have been used as a basic tool for inflation targeting since the beginning of the 1990s.

In economics, one can meet plenty of interest rates binding to different sectors. Their level is influenced to a large extent by the short-term federal funds target rate set by the Federal Open Market Committee of the Federal Reserve. The federal funds target rate is set with respect to maximizing employment and maintaining stable prices, based on the monetary policy objectives specified by the Federal Reserve Act.<sup>119</sup>

<sup>119</sup> <http://www.federalreserve.gov/aboutthefed/section2a.htm>

Under normal circumstances, the Committee meets eight times a year and announces a new level of rates. The effective targeted rate is then achieved with open market operations via trading government securities. The rate is changed in trends reflecting signal function of monetary policy – during a late phase of the cycle, typical with imminent inflation pressures, the rate increases, and starts decreasing again during downturns (see figure 52).

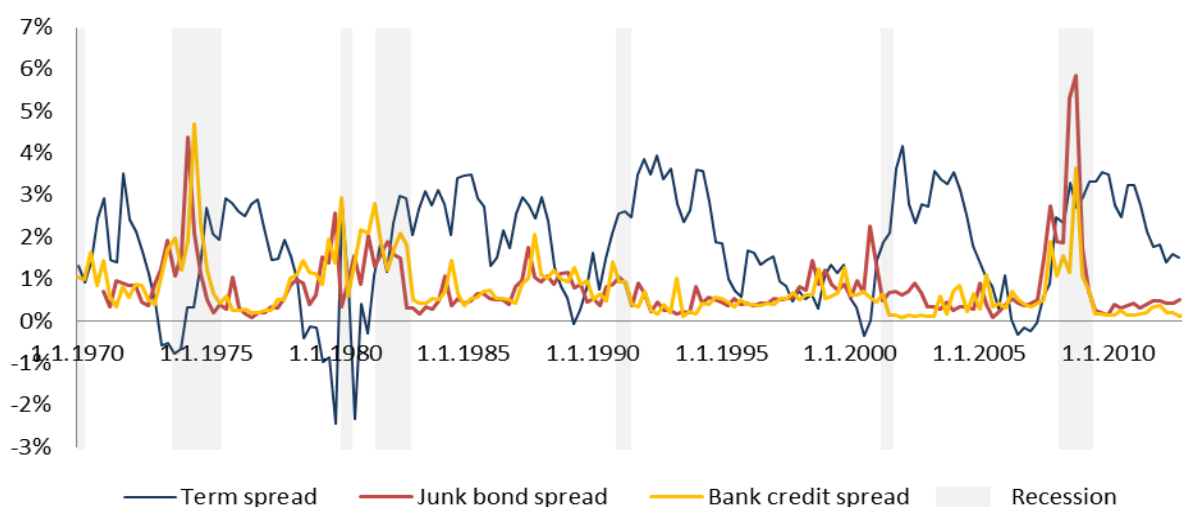
**Figure 52: Federal funds rate and recessions**



*Source: [nber.org/cycles.html](http://nber.org/cycles.html), [newyorkfed.org/markets/statistics/dlyrates/fedrate.html](http://newyorkfed.org/markets/statistics/dlyrates/fedrate.html), author*

In practice, various interest rate spreads are utilized extensively for forecasting cycles. The most common and reliable indicator is the term spread, which compares the rate of return of long-term debt (e.g. 10-year government bond) with the rate of return of short-term bonds. Under normal conditions, spread should be positive (increasing yield curve); as investment in long-term instrument is connected, first, with a higher risk, and investors should collect a risk premium; and secondly, the long-term separation from one's funds is compensated with time premium. On the onset of recession, the yield curve often inverts and spread reaches negative values, since the long-term rate of return already reflects the expected recession and a decline in interest rates, but monetary authority still does not respond by reducing short-term rates. Later on, spread turns positive again, as the Fed keep the interest rates low and economy starts showing signs of healing on the long-term end of the yield curve. Following figure demonstrates excellent forecasting power of the term spread – it went negative several quarters in advance to every observed recession.

Figure 53: Interest rate spreads and their forecasting power in relation to recessions <sup>120</sup>



Source: [nber.org/cycles.html](http://nber.org/cycles.html), [finance.yahoo.com](http://finance.yahoo.com), [research.stlouisfed.org/fred](http://research.stlouisfed.org/fred), author

Investors should also observe spreads reflecting the tensions in financial markets. Junk bond spread measures the difference between yields of low-quality bonds and safe Government securities. At any sign of future trouble in the economy, investors get rid of low-quality, risky securities and therefore junk bond spread is widening. Last but not least, spreads monitoring the health of the banking sector, measuring the difference between 3-month LIBOR (or 3-month bank Certificates of Deposit) and 3-month T-bill yields give out valuable information about perceived credit risk in banking sector and became a relevant tool for forecasting recessions as well.

## 4.4. Empirical business cycle analysis

### 4.4.1. Used data

The table in appendix 9.4.1 captures all time series that were part of the business cycle analysis. The analysis used monthly and quarterly data from 30 June 1971 to 31 December 2012. As a main source of data primarily served web pages of Federal Reserve, ST. Louis FED, U.S. Bureau of Economic Analysis, U.S. Bureau of Labor Statistics and U.S. Census Bureau. All selected series data were in nominal values and in the case of series with strong seasonal course (e.g. employment, industrial production etc.), seasonally adjusted data were utilized.

<sup>120</sup> Term spread is set as 10y US Govt bond vs. 3m US T-bills, Corporate (junk) bond spread is set as 3m BAA commercial papers vs. 3m US T-bills, Bank credit spread is set as 3m Certificate of Deposit rate vs. 3m US T-bills rate

To be able to compare the time series, their character must have been taken in account. A large number of the series contained the trend component, or had an exponential course. The exponential course was separated from the series by using natural logarithm and auto correlated time series were prospectively adjusted using the 1st difference.

The final form of time series essentially represents the percentage change in quantity and level of spreads. Such data format allows us to examine their linear dependence with correlation coefficients, the series can be also used in statistical modeling and the resulting coefficients can serve as a guide for the indicator weighting in the final formed leading indicator.

#### **4.4.2. Regularity among S&P and other variables**

At the beginning of the analysis, short time was dedicated to analyze the stock market and its dependence on other leading indicators in order to catch any prospective regularity. For the analysis, monthly data were used. Given the market's perceived random walk nature, propensity to herd movement and its position as a leading indicator, it could be expected that stock market would not be strongly dependent on transpiring leading variables' development. On the other hand, it was expected, that many variables would be affected by the stock market.

Following cross correlation analysis truly points out a random walk process on the market (i.e. development of the stock market is not auto-correlated). Correlations with other variables changing several months before the stock market itself are generally close to zero, supporting the notion that unlike in the GDP case, it is very hard to predict future movement of the stock market with other variables.

Cross correlations between S&P and other variables at the same month show a bit stronger but still low dependence between S&P and leading indicators. An exception in this regard is CAPE<sup>121</sup> quite logically moving in the same direction as the market.

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<sup>121</sup> Cyclically Adjusted Price-Earnings ratio, measured as a 10-years moving average of stock market prices compared to current earnings.

Figure 54: Cross correlations - S&P and selected variables, monthly, 1971-2012

Variable	Cross-correlations between S&P 500 percent change and other variables								
	t-4	t-3	t-2	t-1	t	t+1	t+2	t+3	t+4
S&P_q-o-q_pctchange	0,02	0,05	-0,04	0,04	1,00	0,04	-0,04	0,05	0,02
employees_q-o-q_pctchange	-0,04	0,15	0,09	0,05	0,01	-0,01	0,03	-0,03	-0,04
weekly hours manufact_pct change	-0,02	0,10	0,03	0,05	-0,04	0,07	-0,06	-0,05	-0,02
unemployed_q-o-q_pctchange	0,07	-0,09	-0,12	-0,11	-0,03	0,05	-0,07	-0,04	0,07
jobless claims initial_pct change	0,04	-0,13	-0,16	-0,07	-0,04	0,03	-0,04	-0,05	0,04
employees durable_q-o-q_pctchange	-0,07	0,19	0,10	0,02	-0,03	-0,01	-0,08	-0,05	-0,07
industrial production_dif	-0,01	0,17	0,06	0,02	0,03	0,00	-0,02	-0,03	-0,01
InduProdDur_q-o-q_pctchange	-0,01	0,20	0,14	0,03	-0,01	0,05	0,02	-0,02	-0,01
capacity_utilization_dif	-0,05	0,25	0,12	0,03	-0,04	0,06	0,00	-0,05	-0,05
PMI_pctchange	-0,10	0,11	0,05	0,02	-0,05	-0,10	-0,09	-0,11	-0,10
CAPE_pctchange	0,04	0,00	-0,02	0,56	0,66	0,05	-0,02	0,08	0,04
PPIACO_q-o-q_pctchange	-0,07	0,05	0,07	0,12	0,04	0,03	0,02	0,01	-0,07
CPI_q-o-q_pctchange	-0,09	0,06	0,07	0,10	-0,03	0,00	0,07	0,01	-0,09
fed_rate_pctchange	-0,04	0,02	0,01	-0,01	-0,07	0,05	-0,03	-0,04	-0,04
BAA_rate_pctchange	-0,10	0,05	0,06	-0,23	-0,20	-0,09	-0,08	-0,06	-0,10
y10_rate_pctchange	-0,05	-0,01	0,06	0,19	-0,01	-0,05	-0,02	0,05	-0,05
tbill_rate_pctchange	-0,02	-0,06	0,03	0,03	-0,03	-0,04	0,10	0,04	-0,02
CDs_q-o-q_pctchange	-0,02	0,09	0,13	-0,02	-0,19	-0,08	-0,02	-0,04	-0,02
m3comm_rate_pctchange	-0,02	0,03	0,03	-0,04	-0,15	-0,11	-0,03	-0,06	-0,02
L-S spread	0,02	0,03	0,07	0,04	0,03	0,02	0,04	0,02	0,02
CDs-tbills spread	-0,01	-0,15	-0,16	-0,19	-0,18	-0,07	-0,06	-0,03	-0,01
Comm-Tbills spread	0,00	-0,22	-0,24	-0,23	-0,21	-0,14	-0,11	-0,04	0,00
BAA-govt spread	0,06	-0,13	-0,15	-0,12	0,03	0,03	0,03	0,02	0,06
M2_q-o-q_pctchange	0,02	-0,02	-0,02	0,00	-0,03	-0,08	-0,03	0,03	0,02
sentiment_q-o-q_pctchange	0,00	0,13	0,13	0,14	0,16	0,12	0,05	0,00	0,00
permits_q-o-q_pctchange	0,04	-0,02	0,16	0,20	0,06	0,09	0,04	0,05	0,04
consumer debt q-o-q_pctchange	-0,07	0,03	0,01	-0,02	-0,06	-0,04	-0,05	-0,03	-0,07

Source: author, inspired by Stock & Watson (1998)

Regression analysis (see appendix no 9.4.2) comparing S&P development with concurrent or advancing leading indicators also did not yield any satisfactory result. Several statistically significant variables were discovered but the overall explanatory power of the models was very weak. This is an important observation; leading indicators can't be relied heavily upon while trying to forecast future stock market movements, especially not as separate variables, as there are forces governing the market not captured by the statistics (market sentiment).

#### 4.4.3. Regularity among GDP and other variables

In the previous section no strong relationship for S&P and leading indicators was found. In the context of these findings, it must be relied upon finding relationships for the development of the economic cycle itself in order to identify the upcoming recession and come across the local maxima on the stock market.



In the original cross-correlations analysis by James H. Stock and Mark W. Watson from 1998, they focused primarily on relation between GDP and NIPA accounts and other macroeconomic variables. However, not all leading indicators were included. Therefore, their analysis was reproduced with new data (covering period 1970-2012), including, among others, all leading indicators. The analysis was performed on quarterly data. Since different period and partly different form of time series were used, is it no wonder that results were somewhat different compared to the original analysis.

Figure 55: Cross correlations - GDP and selected variables, quarterly, 1971-2012

Variable	Cross-correlations between GDP growth and other variables								
	t-4	t-3	t-2	t-1	t	t+1	t+2	t+3	t+4
GDP_q-o-q_pctchange	0,09	0,13	0,24	0,37	1,00	0,37	0,24	0,13	0,09
employees_q-o-q_pctchange	0,26	0,36	0,49	0,54	0,65	0,62	-0,29	0,11	0,01
weekly hours manufact_pct change	0,23	0,43	0,03	0,07	0,04	0,17	0,04	0,00	-0,04
unemployed_q-o-q_pctchange	-0,05	-0,18	-0,29	-0,51	-0,49	-0,62	-0,29	-0,12	-0,06
jobless claims_initial_MA_pct change	0,11	0,07	0,03	-0,14	-0,45	-0,56	-0,27	-0,09	-0,10
jobless claims_continued_pct change	0,07	-0,03	0,05	-0,10	-0,27	-0,24	-0,04	0,00	-0,03
employees durable_q-o-q_pctchange	0,13	0,28	0,45	0,53	0,64	0,55	0,23	-0,01	-0,03
industrial production_dif	-0,04	-0,01	0,17	0,31	0,52	0,68	0,30	0,15	0,09
InduProdDur_q-o-q_pctchange	-0,08	-0,07	-0,01	0,05	0,34	0,59	0,23	0,15	0,11
capacity_utilization_dif	-0,09	-0,01	0,16	0,26	0,49	0,68	0,24	0,05	0,02
PMI_pctchange	0,09	0,23	0,36	0,48	0,60	0,53	0,25	0,00	-0,06
CAPE_pctchange	0,05	0,34	0,37	0,22	0,20	0,11	0,02	-0,07	-0,01
PPIACO_q-o-q_pctchange	-0,03	0,02	0,05	0,01	0,12	0,08	-0,03	-0,18	-0,21
CPI_q-o-q_pctchange	-0,02	0,11	-0,06	-0,04	0,02	0,01	-0,17	-0,18	-0,23
fed_rate_pctchange	0,08	0,03	0,06	-0,02	0,15	0,07	0,06	0,00	-0,04
BAA_rate_pctchange	-0,01	0,10	0,07	0,00	0,06	-0,16	-0,29	-0,26	-0,15
y10_rate_pctchange	-0,05	0,09	-0,02	-0,01	0,12	0,11	0,07	-0,12	-0,08
tbill_rate_pctchange	-0,04	0,09	0,10	0,14	0,29	0,20	0,04	-0,01	0,00
CDs_q-o-q_pctchange	0,13	0,15	0,15	0,24	0,31	0,17	-0,05	-0,10	0,00
m3comm_rate_pctchange	0,12	0,13	0,22	0,23	0,32	0,04	-0,10	-0,17	0,00
L-S spread	-0,23	-0,15	-0,12	-0,04	0,04	0,20	0,31	0,25	0,26
CDs-tbills spread	0,05	-0,03	-0,07	-0,11	-0,19	-0,38	-0,44	-0,31	-0,16
Comm-Tbills spread	0,01	-0,13	-0,11	-0,23	-0,37	-0,51	-0,45	-0,31	-0,13
BAA-govt spread	-0,29	-0,33	-0,34	-0,39	-0,38	-0,34	-0,15	0,10	0,12
M2_q-o-q_pctchange	0,05	0,03	0,04	-0,01	-0,05	0,09	0,21	0,13	0,09
S&P_q-o-q_pctchange	-0,06	-0,05	-0,04	-0,01	0,04	0,32	0,31	0,23	0,17
exports_q-o-q_pctchange	0,19	0,11	0,18	0,18	0,34	0,03	-0,16	-0,22	-0,16
imports_q-o-q_pctchange	-0,21	-0,07	-0,18	-0,38	-0,38	-0,16	0,10	0,14	0,09
sentiment_q-o-q_pctchange	-0,20	-0,10	-0,11	-0,11	-0,11	0,13	0,17	0,21	0,05
permits_q-o-q_pctchange	-0,05	-0,04	-0,17	-0,03	-0,06	0,35	0,49	0,31	0,20
GDIInv_q-o-q_pctchange	0,05	0,07	0,23	0,43	0,79	0,21	0,12	0,06	0,01
debt_q-o-q_pctchange	0,36	0,39	0,38	0,35	0,35	0,25	0,11	0,03	0,01
deficit/GDP	0,33	0,32	0,29	0,24	0,17	0,08	0,05	0,01	0,00
G_q-o-q_pctchange	0,03	-0,14	-0,18	-0,26	-0,10	-0,12	-0,08	-0,10	0,05

Source: author, inspired by Stock & Watson (1998)

Figure clearly shows that, unlike in the stock market case, there are strong dependencies between GDP and other NIPA accounts as well as leading indicators, and such indicators can be used for forecasting GDP itself. Several indicators in the highlighted red area (such as S&P, interest rate spreads, jobless claims, building permits, consumer sentiment, PPIACO



and others) show their leading nature and will be used as cornerstones in further statistical modelling.

#### **4.5. Creating leading macroeconomic index**

Index creation process is divided into several steps. First, it is necessary to select relevant variables and determine their weight in the index. Then it must be determined how to evaluate their course and movements and transfer such development into the scoring table. In the final phase, the index is compared with the other leading composite indices and back-tested on the covered time series (1970-2012). In order to provide the timeliest signals, monthly data were used within the index composition.

##### **4.5.1. Variables choice and their weight in the index**

Prospective variables were already identified in the previous chapter. In order to select the most relevant components, statistical modelling was used, based on comparable quarterly data. In the regression model (see appendix. 9.4.3), building permits, consumer sentiment, term spread, corporate bond spread, PPIACO and 4-week moving average jobless claims outrunning GDP several quarters in advance shared statistical significance. The results seem relevant as their leading nature was already described in previous chapter and such selection covers the behavior in the financial sector (term and corporate bond spreads), on Labor Market (jobless claims), in the construction sector (building permits), overall consumption (consumer sentiment) and heralds the future change in the overall price level (PPIACO). The model itself has quite strong explanatory power, explaining 73% of GDP development purely based on leading indicator movements. Model also considered statistically relevant BAA corporate yields and weekly hours in manufacturing. However, these variables were not included in the final model, as corporate yields are already covered in the corporate bond spread and manufacturing hours in fact provided delayed signals (they started decreasing during the recession, not in advance).

Model on the contrary, did not consider relevant M2 monetary aggregates and variables related to manufacturing. This finding is not surprising, as the origin of the disintegrating links of M2 and PMI have been already explained in the (chapter number 4.3.2). S&P index was not included in the model on purpose.

Weight of each component in the index was also derived from the model as a weighted average of the regression coefficients. The actual calculation is captured in next figure:

**Figure 56: Index components weight calculation, based on regression analysis**

<i>Index components</i>	<i>coefficient</i>	<i>weight</i>
PPIACO	0,05157	9,9%
Term spread	0,22763	43,5%
Corporate bond spread	0,18329	35,1%
Consumer sentiment	0,02457	4,7%
Building permits	0,01774	3,4%
Jobless claims 4WMA	0,01803	3,4%
Total	0,52	100%

*Source: author*

Index is heavily dependent on financial sector - almost 80% of its weight is composed with term and corporate spreads. That may look striking at the first glance, however, given the fact, that financial sector accounts for approximately 400-500% of the overall US economy, the weighing seems relevant.

#### **4.5.2. The method of calculating the index**

The index is composed with diffusion method, meaning that each selected component is marked either 0 or 1 at given point of time, based on predefined conditions. In such fashion the overall index will oscillate between 0 and 1, where 0 represents the minimal risk of recession and 1 signals the maximum risk of recession. Linkage between individual components and GDP was already covered in chapter 4.3.2. Following paragraphs therefore only briefly touch the most important points and focus the actual marking system.

##### **Components marking**

In the case of PPIACO, year-on-year change of producer costs is tracked. Sustained rise in producer costs sooner or later reaches the final customer and affects consumer prices. As it was already stated above, the Federal Reserve has no explicit inflationary target set but in current economic environment inflation exceeding 4% is regarded damaging for the economy. If PPIACO thereby exceeds 4%, one can expect the Federal Open Market Committee to raise interest rates in order to cool economy down in advance and avoid elevated inflation levels. Based on this, PPIACO is marked 1 each time it crosses the 4% threshold.

As it was already covered above, term spread turns negative before recessions and turns positive during recoveries later on. The term spread itself oscillates between -1% and 4% with mean value of 1,9%. In the index, term spread is marked 1 each time it hits negative values until it reaches long-term mean value.

Corporate bond spread ranges between 0,2-0,5% during sound economic conditions. However, it grows rapidly during times of economic distress. According to Manconi, Massa & Yasuda (2012), corporate bond spreads rise over 1% during a first quarter of the crises (and almost 2% during the first 2 quarters). At the peak of Global Financial Crisis in 2008, the spread reached 6,4%. For the purpose of the analysis, spread exceeding 1% is accounted as recession value.

Consumer sentiment indicator issued by the University of Michigan has neither defined exact barriers nor has it defined exact line signaling recession, when breached. This makes the marking a bit harder. The index itself hovers approximately between 60 and 110 points, with mean value around 87 and falls regularly under 80 during recessions. Recession value is therefore reached when the indicator value is both decreasing and falling under the reference value of 87 at the same time.

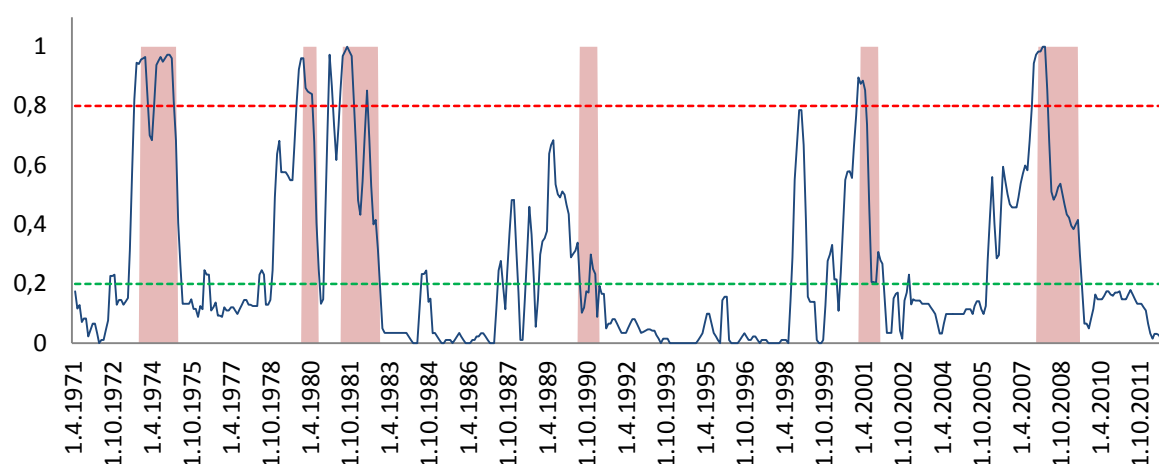
During the selected period, average 1460 building permits were issued on monthly basis. As the construction market is strongly procyclical, sharp decrease in permits can be seen on the onset of each recession (besides recession in 2001, where investors transferred funds from stock to housing market). Based on that, a decrease in building permits for at least 3 consecutive months is regarded as a recession signal. To smoothen out occasional deviations from the trend, 2-month moving average was used.

Jobless claims reflect the present situation on the labor market and indicate future conditions in overall economy. Worsening or weak labor market dampens purchasing power of the citizens and puts burden on the social system. In financial sphere it is regarded that labor market is weak when the amount of initial claims keep over 400 thousands. Therefore, sustained rise in initial claims (at least 3 consecutive months) or value exceeding 400 thousand is regarded as a recession value.

#### **4.5.3. Index attributes**

Resulting index is captured in figure 57. Since the index is heavily dependent on financial sector (78% of total weighting) represented by term and corporate spreads, it requires, among others, both components to reach recession levels to be able to signal one. It warns investors against recession each time the value breaches 0,8; so apart from signals in financial sector, the real sector must point to recession as well. On the contrary, recession wears off when index descends back to 0,2.

Figure 57: Composite recession-warning index (pink area indicates recession)



Source: <http://www.nber.org/cycles.html>, author

Index is calculated as a 2-month moving average. Prediction power may be weakened a little bit as it gives the signal one month later but in such manners several false signals are filtered off. During the selected period the index was able to capture 5 out of 6 recessions and gave no false signal. The only missed recession was the brief-one of 1990. The index, however, suggested some weakness in growth one-year in advance as it reached 0,7. On the other hand, the combination of currency crises in Eastern Asian and former Soviet countries, the Russian debt crisis and the collapse of Long-Term Capital Management in the USA shook global financial markets and almost grew into recession. The index almost reached the recession levels showing strong tension on the financial markets, which, however did not translate into real sector.

Figure 58: Forecasting power of the index

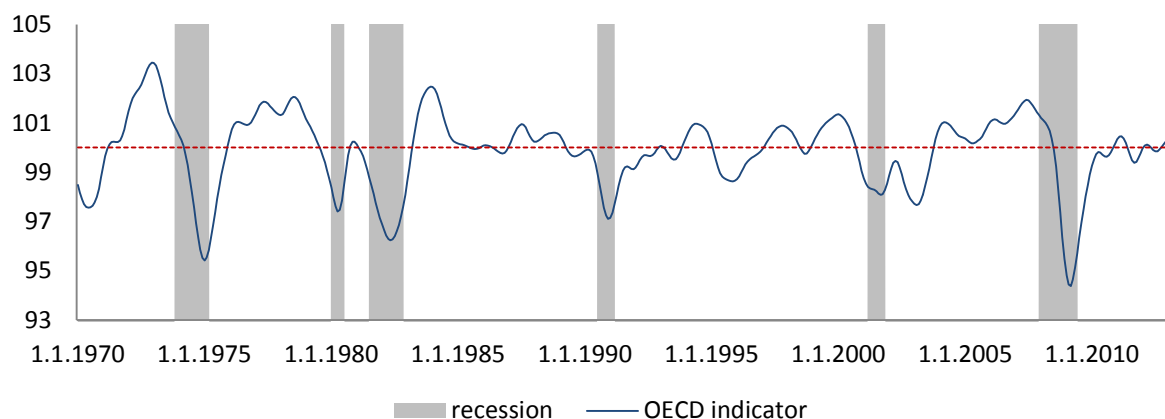
<i>Recession</i>	<i>duration</i>	<i>recession captured by the index</i>	<i>index timing</i>
1973 recession	16 months	yes	3
1980 recession	6 months	yes	3
1981 recession	16 months	yes	6
1990 recession	8 months	(partly)	(12)
2001 recession	8 months	yes	2
2007 recession	18 months	yes	3

Source: <http://www.nber.org/cycles.html> , author

To be able to ascertain the attributes of the index, it is appropriate to compare it with other composite leading indicators. OECD composes leading indicators for all OECD member countries. On the top of that, they cover important non-member countries (such as

BRICS<sup>122</sup> countries) as well as indices for whole regions including Euro area, NAFTA etc. Index uses different components for each country or region; in the case of the USA, components include dwellings started, new orders for durable goods, share prices (NYSE composite), consumer sentiment indicator, weekly hours of work in manufacturing, PMI and interest rate spread.<sup>123</sup> The weighting is unfortunately not disclosed. Index is composed as an oscillator with reference level set at 100. If index sinks under 100, it signals recession and vice versa. Index historical performance can be observed in figure number 59. Forecasting power of the index is doubtful. On the one hand, the index produced several false signals, for instance, OECD expected recessions in 1985 and 1994. On the other hand, index failed to warn its users on time in case of severe recessions starting 1973 and 2007.

**Figure 59: OECD Composite Leading Indicator for the US economy and its forecasting power**



Source: [http://stats.oecd.org/Index.aspx?datasetcode=MEI\\_CLI&lang=e#](http://stats.oecd.org/Index.aspx?datasetcode=MEI_CLI&lang=e#)

Another well-known composite leading indicator is composed by the Economic Cycle Research Institute. Components of the index are currently not disclosed as the institute regards them proprietary.<sup>124</sup> In 2012, index encompassed M2 aggregate, Dow Jones Bond Average, S&P 500, Initial unemployment claims, Journal of Commerce change in commodity prices, new business formation and large business failures and real estate loans<sup>125</sup>. The index is updated weekly and is free to download.

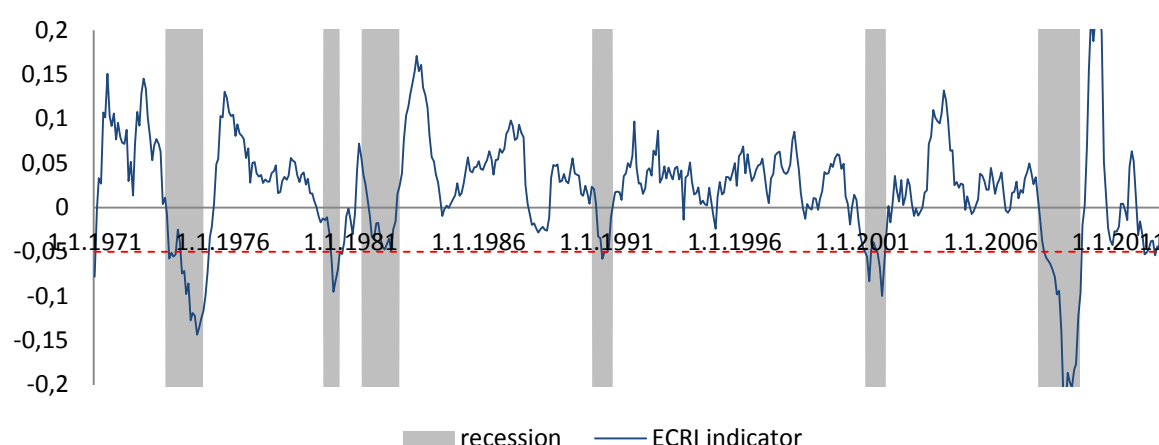
<sup>122</sup> Brazil, Russian Federation, India, China and South Africa

<sup>123</sup> <http://www.oecd.org/std/leading-indicators/oecdclihistoricaldataandmethodologicalinformation-updateddecember2013.htm>

<sup>124</sup> <http://www.businesscycle.com/ecri-faq/details/ecri-index-components>

<sup>125</sup> According to: <http://www.businessinsider.com/the-ecri-weekly-leading-index-unmasked-2012-1>

Figure 60: ECRI Weekly Leading Indicator for the US economy



Source: <http://www.businesscycle.com/ecri-reports-indexes/all-indexes>

In order to interpret the index with relevance, one has to know how to read it. When the index sinks under zero, it produces so called recession warning. Actual recession is confirmed when index sinks further and crosses line at  $-0,05$ . This can, however, produce confusion among the investors as index historically provided several false signals while crossing the zero line and on the other hand, the confirmed recession signals are in fact not that timely.

Figure 61: Comparison of the described indices (positive values indicate index captures recession in advance)

Recession	Duration	Author		OECD		ECRI		
		recession captured	timing	recession captured	timing	recession captured	timing (recession warning)	timing (recession confirmed)
1973 recession	16 months	yes	3	yes	-5	yes	1	-2
1980 recession	6 months	yes	3	yes	5	yes	3	-4
1981 recession	16 months	yes	6	yes	5	yes	-3	-9
1990 recession	8 months	partly	12	yes	14	yes	-2	-5
2001 recession	8 months	yes	2	yes	5	yes	4	1
2007 recession	18 months	yes	3	yes	-7	yes	1	-3

Source: author

Figure number 61 compares all three described indices. In conclusion, even indices introduced by renowned institutions aren't able to produce timely and accurate signals at all times. Index introduced by author seems to give satisfactory results both from prospective of time and signal strength. Therefore, it will be used as guiding rule for the investor elaborated in chapter 6.

## 5. Safe Havens and their associated risks

In chapters number 2 and 3 a few assets that can serve as safe havens were chosen. But it is worth repeating several characteristics associated with them. First, the safe havens should gain in price during the crises and high uncertainty on the market. Besides that, there is no guarantee that the price of the asset cannot fall. Second, it was said safe havens effects materialize in within several days, while bear markets can last for several years. If an equity investor invested according to the author's index, i.e. selling, when the index exceeds 0.8, then buying while index approaches 0,2 it raises the question where to store his funds in the meantime. Are safe havens able to preserve value not only during market panics but through the whole recession?

Figure 62: Comparison of the asset value at the beginning and at the end of recession

Recession		1973 recession	1980 recession	1981 recession	1990 recession	2001 recession	2007 recession
Duration		16 months	6 months	16 months	8 months	8 months	18 months
S&P 500	start of recession	108	106	130	360	1241	1472
	end of recession	82	114	135	368	1060	919
Gold	start of recession	103	560	422	357	266	784
	end of recession	180	654	427	363	279	976
Silver	start of recession	2,9	28,3	7,6	5,7	8,5	15,7
	end of recession	3,1	13,9	10,2	4,3	8,4	19,2
USDCHF	start of recession	3,10	1,58	2,08	1,40	1,65	1,13
	end of recession	2,40	1,63	2,19	1,33	1,63	1,07
USDJPY	start of recession	270,3	238,5	228,3	151,3	117,4	110,5
	end of recession	286,5	238,5	276,9	133,0	122,4	95,3
10y US tbonds	start of recession	93,3	89,5	85,6	91,6	95,1	95,3
	end of recession	92,5	89,1	89,4	91,8	95,7	97,9
13w US tbills	start of recession	92,5	87,8	85,4	92,3	96,1	97,0
	end of recession	94,6	92,1	92,2	93,6	96,5	99,9

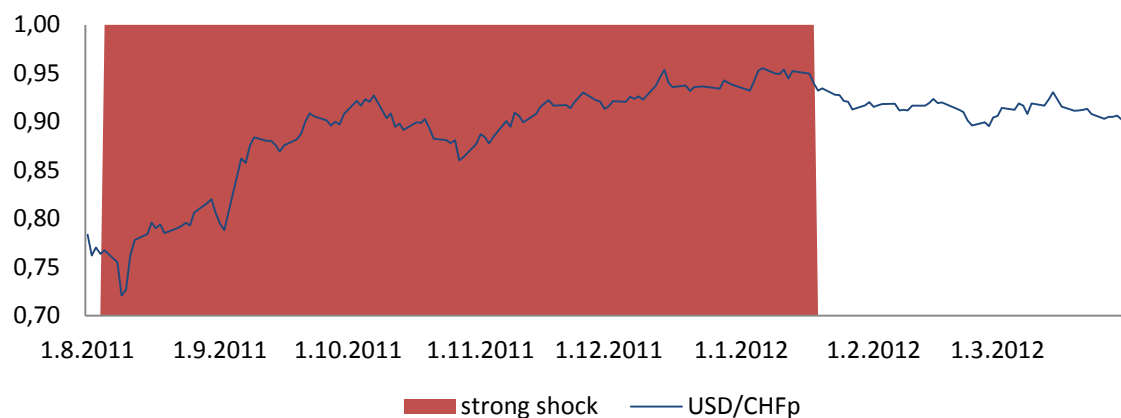
Source: <http://www.macrotrends.net/1333/gold-and-silver-prices-100-year-historical-chart>,  
<http://finance.yahoo.com/q?s=^gspc>, Bloomberg

Figure number 62 compares the number value of each asset at the beginning and end of recessions. Out of stock market and all selected safe havens only U.S. Government Obligations and gold generated positive returns during all six recessions since the 1970s. However, can the investor rely on that any time? Following sub-chapters highlight several risks associated with investing into individual types of safe havens and try to find ideal asset to invest in during the recessions.

## 5.1. Currencies and government interventions

Selected currencies (Swiss franc and Japanese yen) are popular safe havens for equity investors. Nevertheless, investment into foreign currencies poses several risks for the investor. Both countries have managed float exchange rate regimes, which make the currencies subject to both market and non-market forces. If an American investor would like to protect his portfolio while investing to CHF or JPY, he can more or less successfully predict the market exchange rate development based on fundamental analyses and also rely on its safe haven properties. However, it is almost impossible to predict, for example, government interventions and their impact on the exchange rate, which can counteract against their requested features.

Figure 63: Impact of the Swiss central bank intervention on USD/CHF



Source: Bloomberg

First example is the intervention of the Swiss National Bank in September 2011. Central Bank was concerned with strong franc exchange rate, and these fears were compounded with further currency appreciation in response to financial shocks coming from the USA (loss rating) and the Eurozone (the debt crisis). After a sharp appreciation of the franc National Bank intervened verbally at first and in early September, they acceded to intervene directly in the market. As a result of the intervention, franc weakened by about 16% against USD in merely couple of weeks. If the U.S. investor expecting a recession tried to store funds for several months to frank, he would suffer a significant loss due to the intervention.

As another example, one could mention Abenomics, a series of expansionary economic measures in Japan with the aim of supporting economic growth and inflation. Applying such doctrine, yen weakened unexpectedly by approximately 20% against US dollar at the end of 2012.

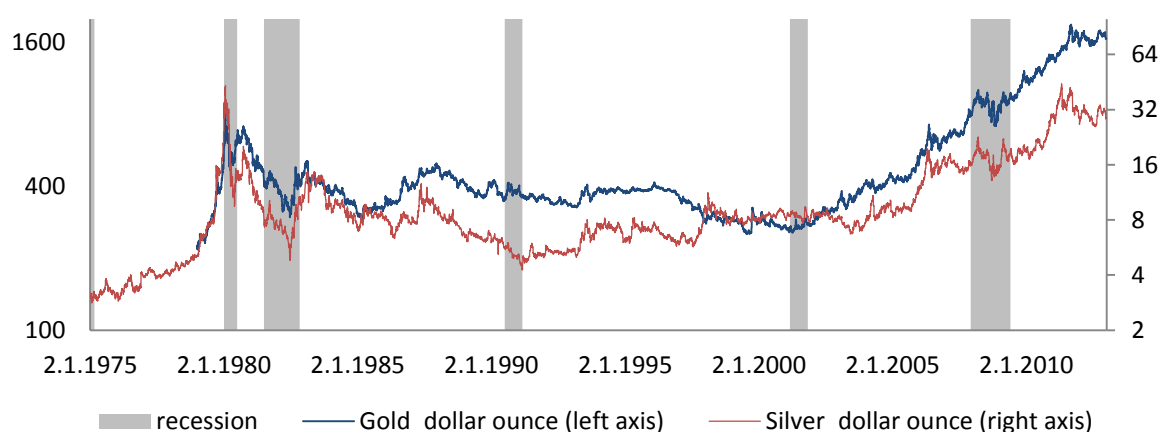


Whereas the central bank is curbed with available foreign reserves while trying to protect the currency against the depreciation, its possibilities to weaken the currency are relatively unlimited. In other words, exchange rate after the depreciation can stay weak as long as the central bank wishes and this can have negative effect on investor's portfolio. Such cases are rare, but can happen.

## 5.2. Safe Haven price bubbles

Safe haven assets, which should serve as safe investment during uncertain times, can experience a paradoxical situation where they become victims of speculative mania and bubble in their markets during a particularly strong pronounced crisis and any investment in such case cannot be considered safe. Although gold did not lose its value during any recession since 1970, it became subject to a speculative mania. During the period from 1975 to 1980 marked with rampant inflation, the price of gold has risen more than fourfold to more than 800 dollars per ounce only to collapse to 300 dollars per ounce two years after. The same phenomena occurred on the silver market, which collapsed even more dramatically during the early 1980s. Gold and silver markets experienced strong surge in price again since 2000, starting at 250 dollars per ounce and reaching 1900 in 2011. The price such price could have been partly justified by the growing demand for gold and silver as an industrial metal, but subsequent price collapse in 2013 pointed out to the riskiness of investments into gold or silver.

Figure 64: Gold and silver bubbles



Source: [www.nber.org/cycles.html](http://www.nber.org/cycles.html), Bloomberg, author

### 5.3. Suitable safe havens

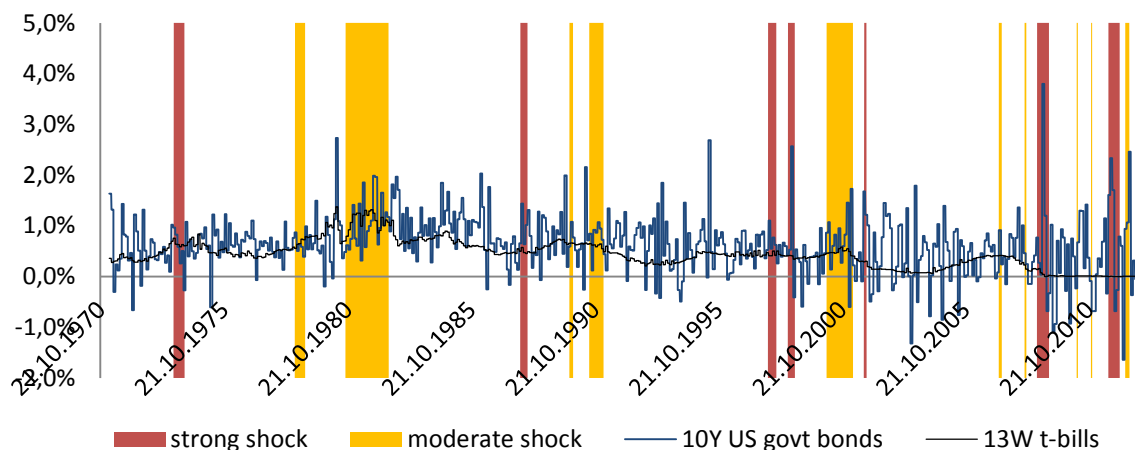
Apart from the bubble dangers, gold and silver markets are more volatile than stock market, while bonds express much lower volatility. When comparing the volatility of the markets for a 1978-2012 period with the coefficient of variation defines as:

$$\text{Coefficient of variation} = \frac{\sigma_r}{E(r)}^{126}$$

Stock market obtains with 4,91; gold gets 6,16 and silver obtains 9,81, whereas 10y government bonds get 0,91 points and 13w T-bills score 0,62. Therefore, apart from investing to riskier gold, it is suggested for the investor to purchase government bonds during the recession.

From the perspective of risk, the most appropriate asset to invest during the recessions or market turbulences appears to be investments in U.S. government Treasury obligations. Figure number 65 shows the annual yields of long-term and short-term bonds based on the hold period of year, which take into account coupon income and capital gains/losses (used monthly data). During the reported period, the investment in U.S. government bonds for the one-year period seldom generated substantial loss.

**Figure 65: Combined annual returns of US government bonds, monthly data, one year hold period**



Source: Bloomberg, <http://finance.yahoo.com/q?s=^tnx>, <http://finance.yahoo.com/q?s=^IRX>, author

<sup>126</sup> Where  $\sigma_r$  defines standard deviation of returns and  $E(r)$  their mean value

## 6. Interpretation of analytical part and creating portfolio

In this final chapter, all partial results from individual chapters are linked together into a recommended long-term investment strategy. Based on chapters 3.4 and 3.5 investor should not focus on individual shocks but rather track the overall development of the economy and invest according to its development. In the chapter number 4.5.3 a macroeconomic leading index was constructed able to tell the investor when to expect the recession and the recovery. The subsequent chapter proposed safe havens that should be used by investors for investment in times of recession.

### 6.1. Assumptions to an investment approach

For the purpose of measuring the portfolio performance, several assumptions and simplifications have been set. Firstly, it is assumed that the investor in the stock market sufficiently diversifies his portfolio to avoid individual risk. A well-diversified portfolio can be represented with the stock index; therefore, an investment into stock market is identified with S&P index in this analysis (practically executed with investment into index ETFs<sup>127</sup>).

Furthermore, if the investor actively responds to economy swings and rearranges its portfolio, all transactions are linked with transaction costs. For the purposes of this study, it is assumed that the investor will lose 3% on each transaction, for example, if he sells stocks and buys gold according to the index signal, this operation will take 6% of the portfolio value.

If the investor will benefit from macroeconomic index described in chapter 4.5.3, he will invest into stocks in times of economic growth, and when index indicates the recession he may put his resources into the recommended safe havens. The following table shows the tested combinations of investments during the cycle.

Figure 66: Tested combinations of investments during the economic cycle

Scenario	Growth	Recession			
	S&P	S&P	Gold	T-bills	T-bonds
S&P only	100%	100%	0%	0%	0%
S&P + gold	100%	0%	100%	0%	0%
S&P + gold + T-bills	100%	0%	50%	50%	0%
S&P + gold + T-bonds	100%	0%	0%	0%	100%
S&P + gold + T-bills + T-bonds	100%	0%	33%	33%	33%
S&P + T-bills	100%	0%	0%	100%	0%
S&P + T-bills + T-bonds	100%	0%	0%	50%	50%
S&P + T-bonds	100%	0%	0%	0%	100%
S&P + none	100%	0%	0%	0%	0%

Source: author

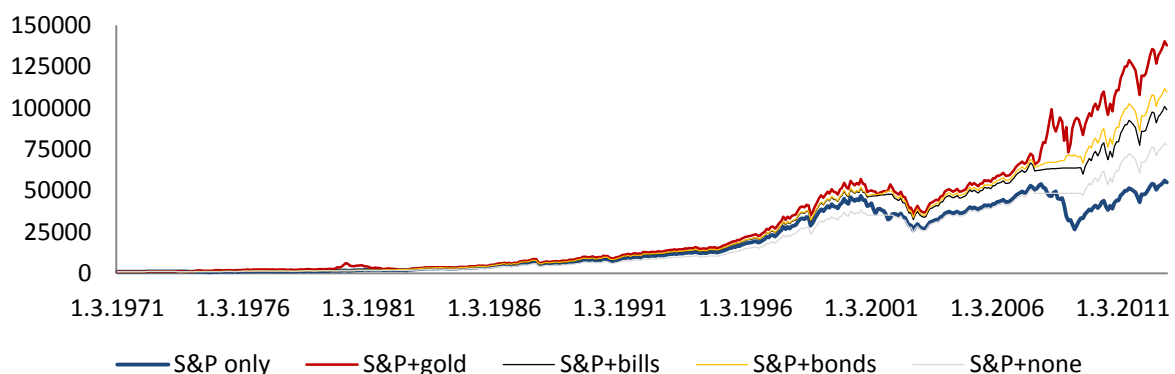
<sup>127</sup> Exchange-traded funds

## 6.2. Back-testing portfolio performance

To measure the appreciation of individual portfolios, formulas defined in chapter 3.1 were used. Changes in the portfolio are calculated on monthly data. Figure number 67 captures the appreciation of the portfolio during the years 1971-2012 using 5 different investment strategies with an initial investment of USD 1,000. It is apparent that investment based on the macroeconomic indicator can't entirely shield investor from all losses, as it missed market downturns in 1987, 1991 and 2002.

Nevertheless, asset rotation yields better results – if the investor stored his money only in the stock market, he would be able to sell his portfolio for approximately USD 55,000 at the end of 2012. However, if he rotated investments in stocks and safe havens according to the recession index, he would be able to sell his portfolio for USD 100,000 – 140,000, depending on chosen combination of safe havens. The same enlarged graph showing all 9 possible combinations is available in appendix number 9.5

**Figure 67: Portfolio appreciation based on different assets during recessions, with initial invested value USD 1,000**



*Source: author*

It is, however, not appropriate to pursue solely a rate of return of the portfolio, but also include risk while assessing the overall portfolio quality. For the overall portfolio assessment both one-dimensional as well as two-dimensional methods were utilized. As for the one-dimensional methods, annual return of the portfolio will be measured with the geometric mean (defined in chapter 3.1) and portfolio risk will be compared via the coefficient of variation (defined in chapter 5.3)

Two-dimensional methods evaluate profitability and risk together. Treynor index compares how the portfolio outperforms the risk-free asset relative to systematic risk. The resulting values should be compared among themselves and also against the market portfolio – the higher the index value, the better result portfolio achieved.

$$I_{Treyner} = \frac{r_p - r_{free}}{\beta_p} \quad 128$$

As the second benchmark Jensen alpha is used, providing information about excessive revenues compared to the market portfolio in absolute terms. If alpha turns positive, portfolio generates positive results compared to market portfolio:

$$\alpha = r_p - r_{free} - \beta(r_m - r_{free}) \quad 129$$

Both two-dimensional approaches count with the systematic risk, which can be defined as:

$$\beta = \frac{\text{covariance}(r_m; r_p)}{\text{variance}(r_p)} \quad 130$$

Resulting values for each portfolio are captured with following figure:

**Figure 68: Comparison of individual portfolios**

Measure	S&P only	S&P + gold	S&P + gold + bills	S&P + gold + bonds	S&P + gold + bills + bonds	S&P + bills	S&P + bills + bonds	S&P + bonds	S&P + none
Annual return (geomean)	10,0%	12,4%	12,2%	12,4%	12,2%	11,6%	11,7%	11,8%	10,9%
Coefficient of variance	4,91	4,04	3,45	3,41	3,31	3,32	3,28	3,25	3,58
Treynor index	0,05	0,03	0,06	0,06	0,07	0,06	0,07	0,07	0,06
Jensen	0,0%	4,7%	3,1%	3,2%	2,6%	1,5%	1,7%	1,9%	0,9%

*Source: author*

### 6.3. Chapter conclusion

Figure number 68 implies that the rotation of S&P and selected safe havens based on recession index tracking ensures investor higher returns with lower risk in comparison with a mere investment into stock markets. Absolutely highest return was achieved while combining investment into S&P during economic growth with investments in gold during indicated recessions but such portfolio is also riskier than others. The best combination in terms of performance measurement portfolio seems to be the investment into S&P during growth replaced by a combination of gold and T-bonds during recession. Such a portfolio not only generated one of the highest returns but also belonged among the less risky ones.

<sup>128</sup> Where  $r_p$  represents returns of tested portfolio over measured period measured with geometric average,  $r_{free}$  is defined as average rate of return of U.S. T-bills over test period (with 5,2% yield) and  $\beta$  includes systematic risk

<sup>129</sup> Where  $r_m$  stands for market return rate

## 7. Final conclusion

The aim of this study was to pass the necessary knowledge to retail investor about the macroeconomic aspects of investing in a comprehensive manner. In order to be successful on the markets over the long term investor must realize and understand several facts.

The first fact is that cycles are an integral part of a free market economy with all their consequences and implications. Since the 18th Century, when the USA were founded, the economy went through the years of growth and prosperity associated with increasing wealth and well-being, but also through many deep economic crises and downturns. Although the economic science and policy stepped forward over the course of time and has developed tools for fine-tuning and smoothening the economic cycles, it is clear that new imbalances and recessions will arise in the future and investor should be able to recognize such imbalances. An important conclusion is that all the imbalances do not arise overnight and investor should always think within the cycles and not in a shorter period.

Other knowledge that the investor should acquire is the ability to understand shocks that have constant effects on the economy and financial markets and understand their differing origins, course, and impacts. Such shocks can be divided into financial and real, which is then appropriate to examine separately as natural and man-made. Natural shocks do not always happen on random occasion but it is hard to predict the exact time of their occurrence. Nevertheless, due to the huge geographical area of the USA they have relatively minimal material impact on the economy or markets. It is different, however, in the case of financial and man-made shocks. America's financial system has grown bigger in size and its malfunction can have a strong adversary impacts on the economy, as one could see in recent years. Majority of the recent crises were caused by large financial cycles leading to the growing and bursting bubbles in financial markets with disastrous consequences. Investor should also not overlook the real negative shocks; history shows how significant impacts on the economy energy crises have, and how the entire economic policy of the country can be affected by acts of violence.

The actual development of the economy can be with greater or lesser success predicted. Based on the analysis of cycles, their components and drivers and their overall economical and statistical relation to leading indicators, a simple comprehensive composite macroeconomic leading index for the US economy was created. Such tool allows small investor to discern the oncoming recession in advance and react accordingly. Of course, the investor should not entirely rely on index created on the basis of historical and statistical

regularities and should, inter alia, his wealth of knowledge and experience, while deciding upon investing his savings. Created index, however, has a solid predictive power and can serve, among others, as an important guideline in the context of investment.

Part of the work also focused on identifying suitable safe havens in which investor can store his funds during crises or recessions. In this analysis derivatives as hedging instruments were omitted on purpose as a small investor may face difficulties with understanding how to use them properly. Although, broad list of potential safe havens was introduced as the original intention was to identify new, underutilized safe haven, gold, T-bonds and T-bills still seem to be the most relevant investment choice during crises or recessions.

The use of any investment strategy eliminates any subjective decision of the investor, which may lead to suboptimal behavior on the markets. Summarizing all findings in this paper a simple investment strategy was designed for the small investor. The strategy is based on the recognition of the impending recession with help of created leading indicator and asset rotation between stock market in a period of economic growth and the investment in gold and bonds during the economic downturn. On the contrary, any effort to use the shocks in the financial markets without understanding the big picture is not recommended. Back testing of introduced strategy showed that if the investor invested thoroughly in accordance with this strategy, he would achieve much better combination of risk-adjusted revenues than investing merely in the stock market, which alone is the most profitable asset in the long run. In conclusion, the author is ready to allocate a certain amount of funds for the long term testing of the introduced strategy on the U.S. markets.

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## 22. Appendices

### 22.1. Statistical significance of shocks

Event	Start	End	Type	Strength	Significance over 2 days after shock	Significance over 5 days after shock	Significance over 42 days after shock
Eurozone - Spain seeks bailout	10.4.2012	10.6.2012	financial shock	moderate	no	no	no
Eurozone crisis escalation	5.8.2011	18.12.2011	financial shock	strong	yes	yes	yes
Eurozone - Portugal seeks bailout	6.4.2011		financial shock	weak	no	no	no
2011 Japan Earthquake	11.3.2011		natural	weak	no	no	no
Arabian Spring - Egyptian revolution	25.1.2011	11.2.2011	man-made	weak	no	no	no
Eurozone - Ireland seeks bailout	21.11.2010	7.12.2012	financial shock	moderate	no	no	no
Eurozone - Greece seeks bailout	23.4.2010	2.5.2010	financial shock	moderate	no	no	yes
Haiti Earthquake	12.1.2010		natural	weak	no	no	no
CIT Group	1.11.2009		financial shock	weak	no	no	no
Thornburg Mortgage	1.5.2009		financial shock	weak	no	no	no
General Growth Properties	16.4.2009		financial shock	weak	no	no	no
Global Financial Crisis	15.9.2008	9.3.2009	financial shock	strong	yes	yes	yes
IndyMac	31.7.2008		financial shock	weak	no	no	no
Sichuan earthquake	12.5.2008		natural	weak	no	no	no
Bear Stearns	14.3.2008		financial shock	moderate	no	yes	no
Northern Rock bank Run in the UK	1.6.2007		financial shock	weak	no	no	no
Fear about world growth	27.2.2007		financial shock	moderate	yes	yes	no
Lebanon War	12.7.2006	14.8.2006	man-made	weak	no	no	no
Refco	17.10.2005		financial shock	weak	no	no	no
Hurricane Wilma	15.10.2005	26.10.2005	natural	weak	no	no	no
Hurricane Katrina, New Orleans flood	23.8.2005	30.8.2005	natural	weak	no	no	no
London bomb attacks	7.7.2005		man-made	weak	no	no	no
Indian ocean earthquake	26.12.2004		natural	weak	no	no	no
Chuetsu Earthquake, Japan	23.10.2004		natural	weak	no	no	no
Hurricane Ivan	2.9.2004	24.9.2004	natural	weak	no	no	no
Hurricane Charley	9.8.2004	15.8.2004	natural	weak	no	no	no
Madrid attacks	11.3.2004		man-made	weak	no	no	no
USA invading Iraq	19.3.2003	1.5.2003	man-made	weak	no	no	no
SARS outbreak	12.3.2003	5.7.2003	natural	weak	yes	no	no
Conseco	17.12.2002		financial shock	weak	no	no	no
WorldCom	19.7.2002		financial shock	weak	no	no	no
Enron	2.12.2001		financial shock	weak	no	no	no
Invasion in Afghanistan	7.10.2001	17.12.2001	man-made	weak	yes	no	no
9/11 attack	11.9.2001		man-made	strong	yes	yes	yes
dot.com bubble burst	10.3.2000	3.4.2001	financial shock	moderate	no	yes	yes
Russian debt crisis	17.8.1998	15.11.1998	financial shock	strong	no	no	no
US embassy bombing in Kenya	7.8.1998		man-made	weak	no	no	no
Asian financial crisis	1.7.1997	25.2.1998	financial shock	weak	yes	yes	yes
US barracks bombing in Saudi Arabia	26.6.1996		man-made	weak	no	no	no
Tequila Peso crisis	19.12.1994	4.2.1995	financial shock	weak	no	no	no
Northridge earthquake	17.1.1994		natural	weak	no	no	no
Storm of the century	12.3.1993	15.3.1993	natural	weak	no	no	no
WTC bombing	26.2.1993		man-made	weak	no	no	no
Successful speculation against GBP	16.9.1992		financial shock	weak	no	no	no
Hurricane Andrew	16.8.1992	28.8.1992	natural	weak	no	no	no
Gulf War	2.8.1990	28.2.1991	man-made	moderate	no	no	no
Collapse of junk bond market	13.10.1989		financial shock	moderate	yes	yes	no
Hurricane Hugo	10.9.1989	25.9.1989	natural	weak	no	no	no
Financial Corporation of America	9.9.1988		financial shock	weak	no	no	no
1987 market collapse	19.10.1987		financial shock	strong	yes	yes	yes
US barracks bombing in Beirut	23.10.1983		man-made	weak	no	no	no
Iraq-Iran war (heaviest phase)	22.9.1980	20.6.1982	man-made	moderate	no	no	no
Civil war escalation in Iran	4.9.1978	1.2.1979	man-made	moderate	no	no	no
Franklin National Bank collapse	8.10.1974		financial shock	weak	yes	no	no
Watergate scandal, Nixon resigning	24.7.1974	9.8.1974	man-made	weak	no	no	no
OPAEC oil embargo	6.10.1973	17.3.1974	man-made	strong	no	no	yes
End of Bretton Woods	15.8.1971		financial shock	weak	yes	yes	no
US Invasion to Cambodia	1.5.1970	22.7.1970	man-made	moderate	no	no	yes

**Model 1: Cochrane-Orcutt, used time series 1970-01-06:2012-12-31 (T = 10750)****2 days after shock**

Dependent variable: ASD

rho = -0,0175511

	coefficient	stand. dev.	t-quotient	p-value
-----				
const	0,218954	0,0250085	8,755	2,35e-018 ***
Eurozone__Spain~	0,0464911	0,559874	0,08304	0,9338
Euroz__crisis_ex~	3,21118	0,559851	5,736	9,97e-09 ***
Eurozone__Portu~	-0,676830	0,559810	-1,209	0,2267
Japan_Earthquake~	0,0913494	0,559834	0,1632	0,8704
Arabian_Spring__~	-0,0316684	0,559846	-0,05657	0,9549
Eurozone__Irela~	0,371076	0,559811	0,6629	0,5074
Eurozone__Greec~	0,0942637	0,559828	0,1684	0,8663
Haiti_Earthquake	0,273488	0,559823	0,4885	0,6252
CIT_Group	-0,346577	0,559903	-0,6190	0,5359
Thornburg_Mortga~	0,359302	0,560008	0,6416	0,5211
General_Growth_P~	-0,0326863	0,560277	-0,05834	0,9535
Global_Financial~	2,11759	0,559917	3,782	0,0002 ***
IndyMac	-0,0401264	0,559856	-0,07167	0,9429
Sichuan_earthqua~	0,0558313	0,559831	0,09973	0,9206
Bear_Stearns	0,364564	0,559848	0,6512	0,5149
Northern_Rock_ba~	-0,0540914	0,559831	-0,09662	0,9230
Fear_about_world~	2,71489	0,559986	4,848	1,26e-06 ***
Lebanon_War	0,253579	0,559816	0,4530	0,6506
Hurricane_Wilma	0,723362	0,559845	1,292	0,1964
Ray_E__Friedman_~	-0,0884151	0,559842	-0,1579	0,8745
Hurricane_Katrin~	-0,0245322	0,559834	-0,04382	0,9650
London_bomb_atta~	0,232294	0,559836	0,4149	0,6782
Indian_ocean_ear~	0,0626562	0,559829	0,1119	0,9109
Chuetsu_Earthqua~	0,336011	0,559816	0,6002	0,5484
Hurricane_Ivan	-0,898228	0,559809	-1,605	0,1086
Hurricane_Charley	0,421860	0,559817	0,7536	0,4511
Madrid_bomb_atta~	0,477801	0,559829	0,8535	0,3934
USA_invading_Iraq	-0,0446377	0,559883	-0,07973	0,9365
SARS_outbreak	1,15625	0,559861	2,065	0,0389 **
Conseco	0,423158	0,559832	0,7559	0,4497
WorldCom	0,909000	0,559844	0,7258	0,3323
Enron	0,989899	0,559831	0,7133	0,4133
Invasion_in_Afhg~	-1,14421	0,559952	-2,043	0,0410 **
Sep_11th_attack	2,23737	0,559917	3,996	6,49e-05 ***
dot_com_bubble_b~	-0,272919	0,559874	-0,4875	0,6259
Russian_debt_cri~	0,974665	0,559833	1,741	0,0817 *
US_embassy_bombi~	-0,118383	0,559823	-0,2115	0,8325
Asian_flu	6,83581	0,559980	12,21	4,79e-034 ***
US_barracks_bomb~	-0,0518044	0,559854	-0,09253	0,9263
Tequila_Peso_cri~	-0,148088	0,559817	-0,2645	0,7914
Northridge_earth~	-0,163760	0,559856	-0,2925	0,7699
Storm_of_the_cen~	0,0334501	0,559808	0,05975	0,9524
WTC_bombing	0,0135007	0,559810	0,02412	0,9808
Succesful_specul~	-0,158847	0,559842	-0,2837	0,7766
Hurricane_Andrew	-0,118442	0,559835	-0,2116	0,8324
Gulf_War	0,363506	0,559811	0,6493	0,5161
Collapse_of_junk~	6,09240	0,560166	10,88	2,09e-027 ***
Hurricane_Hugo	-0,566837	0,650160	-0,8718	0,3833
Financial_Corpor~	0,280357	0,650196	0,4312	0,6663
Market_collapse~	18,5678	0,568326	32,67	3,01e-223 ***
US_barracks_bomb~	-0,134939	0,559815	-0,2410	0,8095
Iraq_Iran_war__h~	0,0300358	0,559807	0,05365	0,9572
Civil_war_escala~	0,156011	0,559820	0,2787	0,7805

Franklin_Nationa~	1,68005	0,560038	3,000	0,0027	***
Watergate__Nixon~	-0,252285	0,559847	-0,4506	0,6523	
OPAEC_oil_embargo	-0,158201	0,559810	-0,2826	0,7775	
End_of_Bretton_W~	1,90162	0,559852	3,397	0,0007	***
US_Invasion_to_C~	0,749090	0,559824	1,338	0,1809	
ASD_1	0,987848	0,00124634	792,6	0,0000	***

Statistics based on rho-differentiated dates:

Mean value od dependent variable	18,75631
Std. deviation of dependent variable	6,148304
Sum of squared residuals	6819,077
Std. regression error	0,798607
Coefficient of determination	0,983218
Adjusted coefficient of determination	0,983128
F(57, 10692)	11381,76
P-value(F)	0,000000
rho (autocorrelation coefficient)	0,001295
Durbin h	0,135394

### Model 3: Cochrane-Orcutt, used time series 1970-01-06:2012-12-31 (T = 10750)

#### 5 days after shock

Dependent variable: ASD

rho = 0,0274571

	coefficient	stand. dev.	t-quotient	p-value
const	0,290033	0,0259520	11,18	7,74e-029 ***
Eurozone__Spain~	0,222121	0,373831	0,5942	0,5524
Euroz__crisis_ex~	3,15016	0,374136	8,420	4,25e-017 ***
Eurozone__Portu~	-0,349782	0,373820	-0,9357	0,3495
Japan_Earthquake~	0,353059	0,373822	0,9445	0,3450
Arabian_Spring__~	0,347749	0,373877	0,9301	0,3523
Eurozone__Irela~	0,321702	0,373820	0,8606	0,3895
Eurozone__Greec~	0,601279	0,373836	1,608	0,1078
Haiti_Earthquake	0,114007	0,373843	0,3050	0,7604
CIT_Group	0,0162066	0,373865	0,04335	0,9654
Thornburg_Mortga~	0,135776	0,374099	0,3629	0,7167
General_Growth_P~	-0,560578	0,374557	-1,497	0,1345
Global_Financial~	2,54791	0,374085	6,811	1,02e-011 ***
IndyMac	0,0309736	0,373915	0,08284	0,9340
Sichuan_earthqua~	-0,371556	0,373819	-0,9939	0,3203
Bear_Stearns	1,23377	0,373940	3,299	0,0010 ***
Northern_Rock_ba~	0,322137	0,373860	0,8617	0,3889
Fear_about_world~	1,11498	0,373831	2,983	0,0029 ***
Lebanon_War	-0,230021	0,373819	-0,6153	0,5384
Hurricane_Wilma	0,561180	0,464220	1,209	0,2267
Ray_E__Friedman_~	-0,118885	0,464235	-0,2561	0,7979
Hurricane_Katrin~	-0,0549979	0,373867	-0,1471	0,8831
London_bomb_atta~	0,0708698	0,373863	0,1896	0,8497
Indian_ocean_ear~	-0,240457	0,373860	-0,6432	0,5201
Chuetsu_Earthqua~	0,0420545	0,373840	0,1125	0,9104
Hurricane_Ivan	-0,452548	0,373830	-1,211	0,2261
Hurricane_Charley	0,213151	0,373834	0,5702	0,5686
Madrid_bomb_atta~	0,349031	0,373838	0,9336	0,3505
USA_invading_Iraq	0,565846	0,373972	1,513	0,1303
SARS_outbreak	0,701463	0,373905	1,876	0,0607 *
Conseco	0,451605	0,373873	1,208	0,2271
WorldCOM	0,799989	0,373881	1,208	0,0988
Enron	0,897879	0,373872	1,089	0,1389

Invasion_in_Afhg~	-0,612623	0,373840	-1,639	0,1013
Sep_11th_attack	1,16873	0,373880	3,126	0,0018 ***
dot_com_bubble_b~	0,988991	0,373931	2,645	0,0082 ***
Russian_debt_cri~	0,333008	0,373883	0,8907	0,3731
US_embassy_bombi~	0,0873911	0,373857	0,2338	0,8152
Asian_flu	2,96461	0,374078	7,925	2,51e-015 ***
US_barracks_bomb~	-0,0534598	0,373891	-0,1430	0,8863
Tequila_Peso_cri~	-0,337385	0,373841	-0,9025	0,3668
Northridge_earth~	-0,0837115	0,373904	-0,2239	0,8229
Storm_of_the_cen~	-0,402587	0,373822	-1,077	0,2815
WTC_bombing	0,00841931	0,373826	0,02252	0,9820
Succesful_specul~	-0,0833405	0,373849	-0,2229	0,8236
Hurricane_Andrew	-0,0271697	0,373868	-0,07267	0,9421
Gulf_War	0,531531	0,373820	1,422	0,1551
Collapse_of_junk~	2,65441	0,373878	7,100	1,33e-012 ***
Hurricane_Hugo	0,0119218	0,610657	0,01952	0,9844
Financial_Corpor~	-0,150694	0,610668	-0,2468	0,8051
Market_collapse~	9,03555	0,378115	23,90	5,42e-123 ***
US_barracks_bomb~	-0,133059	0,373840	-0,3559	0,7219
Iraq_Iran_war_h~	0,272026	0,373825	0,7277	0,4668
Civil_war_escal~	0,0813796	0,373840	0,2177	0,8277
Franklin_Nationa~	0,658350	0,374310	1,759	0,0786 *
Watergate_Nixon~	0,0977922	0,373887	0,2616	0,7937
OPAEC_oil_embargo	0,307285	0,373822	0,8220	0,4111
End_of_Bretton_W~	0,909102	0,373824	2,432	0,0150 **
US_Invasion_to_C~	0,501522	0,373821	1,342	0,1798
ASD_1	0,983797	0,00135678	725,1	0,0000 ***

Statistics based on rho-differentiated dates:

Mean value of dependent variable	18,75631
Std. deviation of dependent variable	6,148304
Sum of squared residuals	7143,854
Std. regression error	0,817404
Coefficient of determination	0,982419
Adjusted coefficient of determination	0,982325
F(57, 10692)	9909,351
P-value(F)	0,000000
rho (autocorrelation coefficient)	-0,001419
Durbin h	-0,148609

## Model 2: Cochrane-Orcutt, used time series 1970-01-06:2012-12-31 (T = 10750)

### 42 days after shock

Dependent variable: ASD

rho = 0,0735223

	coefficient	stand. dev.	t-quotient	p-value
const	0,434920	0,0322014	13,51	3,13e-041 ***
Eurozone__Spain~	0,0875207	0,140151	0,6245	0,5323
Euroz_crisis_ex~	0,550141	0,143189	3,842	0,0001 ***
Eurozone__Portu~	0,0179698	0,172814	0,1040	0,9172
Japan_Earthquake~	-0,159488	0,177621	-0,8979	0,3693
Arabian_Spring__~	0,190996	0,146315	1,305	0,1918
Eurozone__Irela~	-0,135706	0,140209	-0,9679	0,3331
Eurozone__Greec~	0,500982	0,140904	3,555	0,0004 ***
Haiti_Earthquake	0,0469337	0,140160	0,3349	0,7377
CIT_Group	-0,128680	0,140182	-0,9179	0,3587
Thornburg_Mortga~	0,0497748	0,206304	0,2413	0,8094
General_Growth_P~	-0,0335018	0,207247	-0,1617	0,8716
Global_Financial~	1,64950	0,158769	10,39	3,65e-025 ***
IndyMac	0,255898	0,145041	1,764	0,0777 *

Sichuan_earthqua~	0,110926	0,140292	0,7907	0,4291	
Bear_Stearns	0,0537762	0,140786	0,3820	0,7025	
Northern_Rock_ba~	0,120108	0,140161	0,8569	0,3915	
Fear_about_world~	0,0191931	0,140151	0,1369	0,8911	
Lebanon_War	-0,141459	0,140187	-1,009	0,3130	
Hurricane_Wilma	-0,0244458	0,445565	-0,05486	0,9562	
Ray_E_Friedman_~	-0,0608158	0,447595	-0,1359	0,8919	
Hurricane_Katrin~	0,0126445	0,145759	0,08675	0,9309	
London_bomb_atta~	-0,0927216	0,143577	-0,6458	0,5184	
Indian_ocean_ear~	-0,0619325	0,140296	-0,4414	0,6589	
Chuetsu_Earthqua~	-0,0736618	0,142301	-0,5176	0,6047	
Hurricane_Ivan	-0,0644448	0,172721	-0,3731	0,7091	
Hurricane_Charley	-0,0305028	0,171050	-0,1783	0,8585	
Madrid_bomb_atta~	0,0384777	0,140154	0,2745	0,7837	
USA_invading_Iraq	-0,462852	0,291453	-1,588	0,1123	
SARS_outbreak	0,521269	0,291598	1,788	0,0739	*
Conseco	-0,0219466	0,140200	-0,1565	0,8756	
WorldCom	-0,8923829	0,123220	-0,1322	0,6232	
Enron	-0,0219466	0,140200	-0,1565	0,8756	
Invasion_in_Afhg~	-0,130512	0,152933	-0,8534	0,3935	
Sep_11th_attack	0,303353	0,153540	1,976	0,0482	**
dot_com_bubble_b~	0,420795	0,141291	2,978	0,0029	***
Russian_debt_cri~	0,486093	0,292084	1,664	0,0961	*
US_embassy_bombi~	0,0712940	0,291531	0,2446	0,8068	
Asian_flu	0,215586	0,140958	1,529	0,1262	
US_barracks_bomb~	0,0572966	0,140153	0,4088	0,6827	
Tequila_Peso_cri~	-0,208134	0,140447	-1,482	0,1384	
Northridge_earth~	-0,0465943	0,140304	-0,3321	0,7398	
Storm_of_the_cen~	-0,286692	0,214778	-1,335	0,1820	
WTC_bombing	0,163932	0,214735	0,7634	0,4452	
Succesful_specul~	-0,102724	0,161362	-0,6366	0,5244	
Hurricane_Andrew	0,0340894	0,161450	0,2111	0,8328	
Gulf_War	0,209549	0,140333	1,493	0,1354	
Collapse_of_junk~	0,105576	0,140244	0,7528	0,4516	
Hurricane_Hugo	-0,339796	0,597416	-0,5688	0,5695	
Financial_Corpor~	0,300696	0,597413	0,5033	0,6147	
Market_collapse_~	0,972996	0,153535	6,337	2,43e-010	***
US_barracks_bomb~	-0,111617	0,140264	-0,7958	0,4262	
Iraq_Iran_war_h~	0,211888	0,140239	1,511	0,1308	
Civil_war_escal~	0,174806	0,140179	1,247	0,2124	
Franklin_Nationa~	0,103428	0,141223	0,7324	0,4640	
Watergate_Nixon~	0,344288	0,140608	2,449	0,0144	**
OPAEC_oil_embargo	0,283665	0,140177	2,024	0,0430	**
End_of_Bretton_W~	-0,0746890	0,140151	-0,5329	0,5941	
US_Invasion_to_C~	0,276925	0,140692	1,968	0,0491	**
ASD_1	0,975527	0,00183547	531,5	0,0000	***

Statistics based on rho-differentiated dates:

Mean value od dependent variable	18,75631
Std. deviation of dependent variable	6,148304
Sum of squared residuals	7564,918
Std. regression error	0,841148
Coefficient of determination	0,981382
Adjusted coefficient of determination	0,981283
F(57, 10692)	8474,876
P-value(F)	0,000000
rho (autocorrelation coefficient)	-0,007124
Durbin h	-0,752320

## 22.2. Asset returns after shocks

<i>Average return after weak financial shock</i>	<i>for 2 days from shock</i>	<i>for 5 days from shock</i>	<i>for 42 days from shock</i>
S&P 500	1,0%	1,2%	1,8%
Dollar Tree	0,1%	2,1%	3,1%
Family Dollar Stores	0,2%	0,9%	2,1%
McDonald's	1,4%	3,1%	8,5%
Altria Group	6,9%	7,3%	4,9%
Walmart	8,3%	8,6%	1,0%
10Y US govt bonds	5,3%	5,3%	5,3%
13W t-bills	3,0%	3,1%	3,1%
Gold_dollar ounce	0,2%	0,4%	2,6%
Silver_dollar ounce	0,1%	0,7%	-1,4%
USD/NOK	-0,2%	-0,4%	0,1%
USD/SEK	-0,2%	-0,2%	0,4%
USD/AUD	0,1%	7,6%	0,5%
USD/CAD	0,4%	-0,3%	0,4%
USD/CHF	0,2%	0,1%	2,4%
USD/JPY	-0,1%	0,2%	2,2%
USD/GBP	-0,4%	-1,1%	-0,3%
Archer Daniels Midland	0,9%	-1,1%	-1,6%
Cresud Sociedad	0,7%	-0,1%	1,6%

<i>Average return after moderate financial shock</i>	<i>for 2 days from shock</i>	<i>for 5 days from shock</i>	<i>for 42 days from shock</i>
S&P 500	-1,9%	-0,6%	0,3%
Dollar Tree	-1,7%	3,3%	15,5%
Family Dollar Stores	3,7%	9,1%	5,4%
McDonald's	-2,3%	-2,1%	2,4%
Altria Group	-7,7%	-4,3%	-3,7%
Walmart	-1,6%	1,3%	3,9%
10Y US govt bonds	4,5%	4,4%	4,4%
13W t-bills	2,8%	2,8%	2,8%
Gold_dollar ounce	0,9%	-1,2%	0,3%
Silver_dollar ounce	1,6%	-1,6%	-0,5%
USD/NOK	-0,2%	-0,9%	-1,5%
USD/SEK	0,1%	-0,3%	-0,5%
USD/AUD	-0,8%	-1,4%	-1,4%
USD/CAD	-0,6%	-1,1%	-0,5%
USD/CHF	0,7%	0,4%	-0,5%
USD/JPY	1,2%	1,1%	0,2%
USD/GBP	-0,2%	-0,7%	-1,3%
Archer Daniels Midland	-1,7%	-1,9%	4,5%
Cresud Sociedad	-3,1%	-1,3%	-3,9%

<i>Average return after strong financial shock</i>	<i>for 2 days from shock</i>	<i>for 5 days from shock</i>	<i>for 42 days from shock</i>
S&P 500	-4,9%	-3,1%	-10,1%
Dollar Tree	1,2%	-3,9%	-7,3%
Family Dollar Stores	-4,3%	-3,4%	7,3%
McDonald's	-2,2%	0,6%	-1,7%
Altria Group	-3,7%	-2,0%	0,8%
Walmart	-0,9%	-0,3%	-0,7%
10Y US govt bonds	5,5%	5,3%	5,2%
13W t-bills	3,5%	3,4%	3,2%
Gold_dollar ounce	0,6%	4,0%	-1,0%
Silver_dollar ounce	0,7%	1,7%	1,6%
USD/NOK	-0,4%	0,4%	-5,4%
USD/SEK	-0,1%	0,9%	-3,4%
USD/AUD	-0,6%	-0,2%	-6,6%
USD/CAD	-1,0%	-0,6%	-5,2%
USD/CHF	0,8%	1,7%	0,2%
USD/JPY	0,9%	1,1%	7,6%
USD/GBP	0,2%	1,2%	-0,9%
Archer Daniels Midland	-5,7%	-3,6%	-5,1%
Cresud Sociedad	-6,0%	-7,5%	-11,8%

<i>Average return after weak man-made shock</i>	<i>for 2 days from shock</i>	<i>for 5 days from shock</i>	<i>for 42 days from shock</i>
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S&P 500	-0,3%	-0,5%	0,1%
Dollar Tree	-1,2%	-0,3%	0,7%
Family Dollar Stores	-3,6%	-2,8%	2,2%
McDonald's	0,2%	0,9%	0,0%
Altria Group	-2,6%	-1,7%	0,6%
Walmart	0,6%	-0,7%	-0,5%
10Y US govt bonds	5,7%	5,7%	3,9%
13W t-bills	3,8%	3,8%	0,9%
Gold_dollar ounce	0,0%	-0,7%	0,8%
Silver_dollar ounce	0,2%	-1,8%	3,1%
USD/NOK	-0,3%	-0,2%	-0,4%
USD/SEK	0,1%	0,1%	-0,4%
USD/AUD	0,2%	-0,1%	-0,2%
USD/CAD	0,0%	-0,1%	-0,2%
USD/CHF	0,1%	0,3%	-0,4%
USD/JPY	0,3%	0,3%	-0,2%
USD/GBP	0,3%	-0,1%	-0,1%
Archer Daniels Midland	-0,6%	-1,0%	0,9%
Cresud Sociedad	-2,1%	-2,3%	-1,1%

<i>Average return after moderate man-made shock</i>	<i>for 2 days from shock</i>	<i>for 5 days from shock</i>	<i>for 42 days from shock</i>
S&P 500	-1,0%	-1,5%	-5,5%
Dollar Tree	n.a.	n.a.	n.a.
Family Dollar Stores	-13,4%	-11,2%	26,9%
McDonald's	0,1%	-1,5%	-9,2%
Altria Group	-3,4%	-1,1%	-3,4%
Walmart	4,6%	2,3%	-4,3%
10Y US govt bonds	9,0%	9,1%	9,3%
13W t-bills	8,1%	8,1%	8,6%
Gold_dollar ounce	3,9%	3,7%	0,5%
Silver_dollar ounce	3,9%	2,0%	-0,2%
USD/NOK	0,1%	0,2%	-1,2%
USD/SEK	0,0%	0,2%	-0,3%
USD/AUD	0,3%	0,0%	-1,7%
USD/CAD	-0,1%	0,2%	1,0%
USD/CHF	0,5%	0,1%	0,0%
USD/JPY	1,6%	1,0%	-2,4%
USD/GBP	0,1%	0,2%	0,8%
Archer Daniels Midland	0,7%	-2,0%	9,5%
Cresud Sociedad	n.a.	n.a.	n.a.

<i>Average return after strong man-made shock</i>	<i>for 2 days from shock</i>	<i>for 5 days from shock</i>	<i>for 42 days from shock</i>
S&P 500	-2,5%	-4,4%	-3,9%
Dollar Tree	-14,6%	-20,3%	10,3%
Family Dollar Stores	-1,3%	1,3%	23,6%
McDonald's	3,9%	6,3%	-15,9%
Altria Group	2,8%	1,3%	0,6%
Walmart	-2,4%	-0,9%	-6,4%
10Y US govt bonds	5,8%	5,8%	5,6%
13W t-bills	5,1%	4,9%	4,9%
Gold_dollar ounce	7,2%	5,4%	2,3%
Silver_dollar ounce	5,4%	17,3%	-0,6%
USD/NOK	1,3%	1,9%	-1,7%
USD/SEK	0,4%	-0,2%	-3,9%
USD/AUD	-1,7%	-2,8%	0,2%
USD/CAD	0,0%	0,1%	-0,9%
USD/CHF	2,3%	2,6%	-1,8%
USD/JPY	0,9%	1,5%	-2,8%
USD/GBP	0,3%	0,6%	-2,4%
Archer Daniels Midland	-5,2%	-4,2%	12,7%
Cresud Sociedad	-2,7%	-4,3%	-8,2%

## 22.3. Correlation among asset classes

Whole measured period	S&P 500	Dollar Tree	Family Dollar	McDonald's	Altria Group	Walmart	US 10Y govt bonds	13W t-bills	Gold	Silver	USD/NOK	USD/SEK	USD/AUD	USD/CAD	USD/CHF	USD/JPY	USD/GBP	Archer Daniels	Cresud Sociedad
S&P 500	1,00	0,30	0,16	0,29	0,17	0,21	0,00	0,01	-0,02	-0,04	0,09	0,13	0,22	0,30	-0,06	-0,12	0,05	0,18	0,27
Dollar Tree		1,00	0,25	0,16	0,08	0,21	-0,02	-0,01	-0,01	-0,02	-0,02	0,00	0,04	0,06	-0,07	-0,06	-0,03	0,08	0,06
Family Dollar Stores			1,00	0,05	0,03	0,10	-0,03	-0,03	-0,02	-0,03	0,01	0,01	0,01	0,03	-0,02	0,00	-0,02	0,05	0,09
McDonald's				1,00	0,06	0,08	-0,01	-0,01	-0,02	-0,02	0,01	0,01	0,04	0,05	-0,02	-0,02	0,01	0,06	0,10
Altria Group					1,00	0,06	-0,01	-0,01	-0,01	-0,01	-0,01	0,02	0,02	0,03	0,00	-0,01	0,00	0,04	0,08
Walmart						1,00	-0,02	-0,02	-0,04	-0,01	-0,01	0,01	0,02	0,03	-0,03	-0,02	0,00	0,03	0,09
10Y US govt bonds							1,00	0,92	0,02	0,01	0,02	0,02	0,02	0,01	0,01	0,01	0,02	-0,03	0,00
13W t-bills								1,00	0,02	0,01	0,02	0,02	0,02	0,01	0,02	0,02	0,02	-0,03	0,00
Gold_dollar ounce									1,00	0,22	0,21	0,18	0,10	0,13	0,25	0,15	0,21	0,02	0,05
Silver_dollar ounce										1,00	0,01	0,01	-0,05	-0,01	0,03	0,02	0,01	0,01	-0,01
USD/NOK											1,00	0,75	0,31	0,34	0,67	0,33	0,57	0,06	0,11
USD/SEK												1,00	0,30	0,35	0,64	0,31	0,54	0,06	0,11
USD/AUD													1,00	0,43	0,16	0,02	0,24	0,07	0,18
USD/CAD														1,00	0,19	0,00	0,27	0,08	0,20
USD/CHF															1,00	0,49	0,58	0,02	0,00
USD/JPY																1,00	0,32	-0,03	-0,07
USD/GBP																	1,00	0,04	0,09
Archer Daniels Midl.																		1,00	0,15
Cresud Sociedad																			1,00

Period 1970-1990	S&P 500	Dollar Tree	Family Dollar	McDonald's	Altria Group	Walmart	US 10Y govt bonds	13W t-bills	Gold	Silver	USD/NOK	USD/SEK	USD/AUD	USD/CAD	USD/CHF	USD/JPY	USD/GBP	Archer Daniels	Cresud Sociedad
S&P 500	1,00	n.a.	0,03	0,29	0,18	0,15	0,01	0,03	0,01	-0,03	-0,02	-0,01	0,00	0,06	-0,01	0,00	-0,01	0,10	n.a.
Dollar Tree		n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Family Dollar Stores			1,00	-0,01	0,00	0,01	0,03	-0,02	0,01	-0,07	0,06	0,04	-0,04	0,02	0,04	0,08	-0,01	0,03	n.a.
McDonald's				1,00	0,05	0,06	-0,01	0,00	-0,01	-0,02	-0,01	-0,01	-0,01	0,00	-0,01	0,02	0,01	0,04	n.a.
Altria Group					1,00	0,05	0,02	0,01	0,00	-0,02	-0,01	0,02	-0,02	0,00	0,00	0,01	0,00	0,03	n.a.
Walmart						1,00	0,00	0,01	-0,02	-0,01	-0,01	0,00	0,00	0,01	-0,02	0,00	-0,01	0,00	n.a.
10Y US govt bonds							1,00	0,85	0,04	0,02	0,06	0,06	0,03	0,03	0,05	0,04	0,04	-0,02	n.a.
13W t-bills								1,00	0,03	0,02	0,05	0,06	0,02	0,03	0,05	0,06	0,04	-0,01	n.a.
Gold_dollar ounce									1,00	0,14	0,28	0,25	0,00	0,14	0,33	0,22	0,28	0,02	n.a.
Silver_dollar ounce										1,00	0,03	0,03	-0,02	-0,01	0,05	0,02	0,04	0,02	n.a.
USD/NOK											1,00	0,71	0,05	0,19	0,66	0,48	0,55	0,04	n.a.
USD/SEK												1,00	0,02	0,17	0,65	0,46	0,52	0,05	n.a.
USD/AUD													1,00	0,06	0,02	0,04	0,05	0,00	n.a.
USD/CAD														1,00	0,20	0,12	0,21	0,03	n.a.
USD/CHF															1,00	0,56	0,59	0,03	n.a.
USD/JPY																1,00	0,44	0,00	n.a.
USD/GBP																	1,00	0,04	n.a.
Archer Daniels Midl.																		1,00	n.a.
Cresud Sociedad																			n.a.

Period 1991-2012	S&P 500	Dollar Tree	Family Dollar	McDonald's	Altria Group	Walmart	US 10Y govt bonds	13W t-bills	Gold	Silver	USD/NOK	USD/SEK	USD/AUD	USD/CAD	USD/CHF	USD/JPY	USD/GBP	Archer Daniels	Cresud Sociedad
S&P 500	1,00	0,30	0,29	0,35	0,20	0,45	-0,01	-0,01	-0,04	-0,05	0,15	0,20	0,36	0,40	-0,10	-0,20	0,09	0,34	0,27
Dollar Tree		1,00	0,25	0,16	0,08	0,21	-0,02	-0,01	-0,01	-0,02	-0,02	0,00	0,04	0,06	-0,07	-0,06	-0,03	0,08	0,06
Family Dollar Stores			1,00	0,12	0,07	0,22	-0,02	-0,02	-0,05	-0,02	-0,01	0,01	0,04	0,06	-0,06	-0,05	-0,03	0,09	0,09
McDonald's				1,00	0,10	0,20	-0,01	-0,01	-0,02	-0,02	0,03	0,03	0,12	0,12	-0,05	-0,07	0,00	0,12	0,10
Altria Group					1,00	0,11	-0,01	-0,02	-0,03	-0,01	0,00	0,03	0,06	0,06	0,00	-0,04	0,00	0,07	0,08
Walmart						1,00	-0,01	-0,02	-0,07	-0,03	-0,01	0,02	0,08	0,09	-0,07	-0,09	0,00	0,13	0,09
10Y US govt bonds							1,00	0,81	0,04	0,01	0,01	0,01	0,01	0,01	0,01	0,00	0,00	-0,01	0,00
13W t-bills								1,00	0,03	0,01	0,01	0,01	0,02	0,01	0,02	0,02	0,00	-0,01	0,00
Gold_dollar ounce									1,00	0,35	0,20	0,16	0,19	0,15	0,20	0,11	0,16	0,02	0,05
Silver_dollar ounce										1,00	-0,01	-0,01	-0,07	-0,01	0,01	0,02	-0,02	0,00	-0,01
USD/NOK											1,00	0,77	0,45	0,39	0,68	0,25	0,60	0,10	0,11
USD/SEK												1,00	0,45	0,41	0,65	0,23	0,57	0,11	0,11
USD/AUD													1,00	0,57	0,27	0,01	0,38	0,17	0,18
USD/CAD														1,00	0,21	-0,05	0,31	0,17	0,20
USD/CHF															1,00	0,43	0,58	0,00	0,00
USD/JPY																1,00	0,23	-0,08	-0,07
USD/GBP																	1,00	0,06	0,09
Archer Daniels Midl.																		1,00	0,15
Cresud Sociedad																			1,00

Correlation among assets after strong shock - 5 trade days after	S&P 500	Dollar Tree	Family Dollar	McDonald's	Altria Group	Walmart	US 10Y govt bonds	13W t-bills	Gold	Silver	USD/NOK	USD/SEK	USD/AUD	USD/CAD	USD/CHF	USD/JPY	USD/GBP	Archer Daniels	Cresud Sociedad
S&P 500	1,00	0,66	0,67	0,65	0,53	0,75	-0,25	-0,40	-0,23	-0,17	-0,14	-0,03	0,44	0,37	-0,23	-0,07	-0,30	0,68	0,22
Dollar Tree		1,00	0,54	0,67	0,32	0,56	-0,13	-0,35	0,13	0,05	-0,38	-0,41	0,49	0,47	-0,23	0,18	-0,52	0,37	0,34
Family Dollar Stores			1,00	0,36	0,13	0,62	-0,13	-0,38	0,24	-0,05	-0,08	-0,01	0,43	0,44	-0,19	0,06	-0,23	0,44	0,38
McDonald's				1,00	0,50	0,60	0,10	-0,21	0,04	-0,06	-0,20	-0,11	0,27	0,53	-0,15	0,13	-0,23	0,44	0,60
Altria Group					1,00	0,33	-0,02	-0,32	-0,06	0,04	0,05	0,02	0,23	0,36	-0,14	-0,06	-0,05	0,42	0,30
Walmart						1,00	0,05	-0,22	-0,18	0,10	-0,12	-0,09	0,39	0,38	-0,12	0,05	-0,12	0,65	0,19
10Y US govt bonds							1,00	0,60	0,18	0,30	0,13	0,03	-0,23	-0,18	0,24	0,17	0,05	-0,27	0,00
13W t-bills								1,00	-0,13	0,09	0,18	0,03	-0,32	-0,24	0,03	-0,05	0,03	-0,43	-0,27
Gold_dollar ounce									1,00	0,17	0,15	0,22	0,09	0,08	0,42	0,53	0,03	-0,26	0,35
Silver_dollar ounce										1,00	0,26	0,01	0,26	-0,08	0,08	0,04	0,18	0,09	0,06
USD/NOK											1,00	0,87	0,20	0,01	0,58	0,30	0,71	-0,09	-0,13
USD/SEK												1,00	0,17	0,06	0,63	0,43	0,69	-0,08	-0,02
USD/AUD													1,00	0,59	0,03	0,21	0,16	0,59	0,15
USD/CAD														1,00	-0,23	0,04	0,00	0,53	0,34
USD/CHF															1,00	0,60	0,56	-0,27	-0,21
USD/JPY																1,00	0,36	-0,03	0,08
USD/GBP																	1,00	-0,02	-0,18
Archer Daniels Midl.																		1,00	0,19
Cresud Sociedad																			1,00

## 22.4. Business cycle analysis

### 22.4.1. Used data

Analyzed variable	Series nature	Data available		Series adjustment
		monthly	quarterly	
NIPA accounts	GDP	no	yes	ln(x), 1st difference
	Gross Domestic Investments	no	yes	ln(x), 1st difference
	Exports	no	yes	ln(x), 1st difference
	Imports	no	yes	ln(x), 1st difference
	Government spending	no	yes	ln(x), 1st difference
	Public deficit/GDP	no	yes	ln(x), 1st difference
Labor market	Total employed (non-farm)	yes	yes	% change
	Total employed manufacturing	yes	yes	% change
	Total unemployed (non-farm)	yes	yes	% change
	Weekly hours (manufacturing)	yes	yes	% change
	Jobless claims initial	yes	yes	% change
	Jobless claims initial_4WMA	yes	yes	% change
	Jobless claims continued	yes	yes	% change
Production	Industrial production	yes	yes	1st difference
	Industrial production durables	yes	yes	1st difference
	Capacity utilization	yes	yes	1st difference
	PMI	yes	yes	1st difference
Consumer	Consumer sentiment	yes	yes	1st difference
	Building permits	yes	yes	% change
	Consumer debt	yes	yes	ln(x), 1st difference
Prices	PPIACO	yes	yes	ln(x), 1st difference
	CPI	yes	yes	ln(x), 1st difference
Interest rates	Fed funds rate	yes	yes	% change
	10y BAA corporate bondsrate	yes	yes	% change
	10y T-note	yes	yes	% change
	3m T-bill	yes	yes	% change
	3m Certificates of deposit	yes	yes	% change
	3m commercial paper rate	yes	yes	% change
Interest rate spreads	Term spread	yes	yes	none
	Bank credit spread	yes	yes	none
	Junk bond short spread	yes	yes	none
	10y BAA corp-govt spread	yes	yes	none
Money	M2 monetary aggregate	yes	yes	ln(x), 1st difference
Stock market	CAPE	yes	yes	% change
	S&P 500	yes	yes	ln(x), 1st difference

## 22.4.2. S&P and leading indicators statistic dependence

VAR system, order delay 2

OLS estimates, observation 1971:07-2012:12 (T = 498)

Maximum likelihood logarithm = 896,79427

Covariance matrix determinant = 0,0015972682

AIC = -3,5052

BIC = -3,3023

HQC = -3,4256

Portmanteau test: LB(48) = 35,8163, df = 46 [0,8602]

Equation : S\_P\_q\_o\_q\_pctchange\_1

	coefficient	standard error	t-quotient	p-value	
const	0,0221393	0,00513927	4,308	2,00e-05	***
S_P_q_o_q_pctc~_1	-0,0756159	0,0456314	-1,657	0,0982	*
S_P_q_o_q_pctc~_2	-0,0468715	0,0457075	-1,025	0,3057	
M2_q_o_q_pctchan~	0,0514973	0,612879	0,08403	0,9331	
M2_q_o_q_pctch~_1	-1,11931	0,674198	-1,660	0,0975	*
M2_q_o_q_pctch~_2	0,286481	0,613307	0,4671	0,6406	
sentiment_q_o_q_~	0,136654	0,0495776	2,756	0,0061	***
sentiment_q_o_~_1	0,0726172	0,0693975	1,046	0,2959	
sentiment_q_o_~_2	-0,183026	0,0504596	-3,627	0,0003	***
PMI_pctchange	0,126766	0,0880382	1,440	0,1506	
PMI_pctchange_1	-0,251301	0,123916	-2,028	0,0431	**
PMI_pctchange_2	0,0637963	0,0876273	0,7280	0,4669	
BAA_rate_pctchan~	-0,185975	0,0879717	-2,114	0,0350	**
BAA_rate_pctch~_1	0,0694471	0,0934201	0,7434	0,4576	
BAA_rate_pctch~_2	-0,0931210	0,0870316	-1,070	0,2852	
tbill_rate_pctch~	0,0123082	0,00887452	1,387	0,1661	
tbill_rate_pct~_1	-0,0225294	0,00927219	-2,430	0,0155	**
tbill_rate_pct~_2	0,0307237	0,00915836	3,355	0,0009	***
CDs_q_o_q_pctcha~	-0,0612368	0,0214959	-2,849	0,0046	***
CDs_q_o_q_pctc~_1	-0,0204818	0,0220412	-0,9293	0,3532	
CDs_q_o_q_pctc~_2	0,00625207	0,0209637	0,2982	0,7657	
Comm_Tbills_spre~	-1,32256	0,504181	-2,623	0,0090	***
Comm_Tbills_sp~_1	0,202289	0,591254	0,3421	0,7324	
Comm_Tbills_sp~_2	-0,287973	0,508023	-0,5668	0,5711	

Mean value of the dependent variable	0,006386
Standard deviation of the dependent variable	0,044734
Sum of squares of residues	0,795440
Standard error of regression	0,040965
Coefficient of determination	0,200197
Adjusted coefficient of determination	0,161388
F(23, 474)	5,158532
P-value (F)	5,28e-13
rho (autocorrelation coefficient)	-0,018895
Durbin-Watson statistics	2,035923

F-test for zero restrictions:

All lagged variables S\_P\_q\_o\_q\_pctc~\_1 F(2, 474) = 1,8172 [0,1636]

All variables, delay 2 F(1, 474) = 1,0516 [0,3057]

Comparison of information criteria::

Order delays 2: AIC = -3,50520, BIC = -3,30228, HQC = -3,42556

Order delays 1: AIC = -3,50700, BIC = -3,31253, HQC = -3,43068

Autocorrelation test:

Ljung-Box Q' = 0,878385 with p-value = P(Che-square(2) > 0,878385) = 0,645

ARCH test:

	coefficient	standard error	t-quotient	p-value
alpha(0)	0,00121699	0,000256859	4,738	2,86e-06 ***
alpha(1)	0,0963752	0,0459840	2,096	0,0366 **
alpha(2)	0,0266450	0,0461855	0,5769	0,5643
alpha(3)	0,0742479	0,0460010	1,614	0,1072
alpha(4)	-0,0196153	0,0460652	-0,4258	0,6704
alpha(5)	-0,0102431	0,0460413	-0,2225	0,8240
alpha(6)	0,00128671	0,0460273	0,02796	0,9777
alpha(7)	-0,0207841	0,0459437	-0,4524	0,6512
alpha(8)	-0,0389497	0,0459451	-0,8477	0,3970
alpha(9)	0,0548112	0,0460832	1,189	0,2349
alpha(10)	0,0939400	0,0460292	2,041	0,0418 **
alpha(11)	-0,0191010	0,0462151	-0,4133	0,6796
alpha(12)	0,00556039	0,0460368	0,1208	0,9039

Null hypothesis: there is no ARCH effect

Test statistics: LM = 15,1541

With p-value = P(Chi-square(12) > 15,1541) = 0,233116

### 22.4.3. GDP and leading indicators statistic dependence

VAR system, order delay 3

OLS estimates, observations 1971:4-2012:4 (T = 165)

Maximum likelihood logarithm = 634,14826

Covariance matrix determinant = 2,6869395e-005

AIC = -7,3715

BIC = -6,8821

HQC = -7,1728

Portmanteau test: LB(41) = 41,5493, df = 39 [0,3603]

Equation 1: GDP\_q\_o\_q\_pctchange

	coefficient	standard error	t-quotient	p-value
GDP_q_o_q_pctc~_1	-0,00917304	0,0840469	-0,1091	0,9132
GDP_q_o_q_pctc~_2	0,107925	0,0784405	1,376	0,1711
PPIACO_q_o_q_pct~	0,0977368	0,0274865	3,556	0,0005 ***
PPIACO_q_o_q_p~_1	0,0140834	0,0286104	0,4922	0,6233
PPIACO_q_o_q_p~_2	0,0515650	0,0284626	1,812	0,0722 *
PPIACO_q_o_q_p~_3	0,0278393	0,0278994	0,9978	0,3201
L_S_spread	-0,000397651	0,0675975	-0,005883	0,9953
L_S_spread_1	-0,0272717	0,0849257	-0,3211	0,7486
L_S_spread_2	0,227630	0,0812271	2,802	0,0058 ***
L_S_spread_3	-0,0961077	0,0665158	-1,445	0,1507
sentiment_q_o_q~	0,0135990	0,00820661	1,657	0,0998 *
sentiment_q_o~_1	0,0245742	0,00956871	2,568	0,0113 **
sentiment_q_o~_2	-0,0141367	0,0102872	-1,374	0,1716
sentiment_q_o~_3	0,00269299	0,00910060	0,2959	0,7677
permits_q_o_q_pc~	-0,0136909	0,00561160	-2,440	0,0160 **
permits_q_o_q~_1	0,0112233	0,00608369	1,845	0,0672 *
permits_q_o_q~_2	0,0177434	0,00577109	3,075	0,0025 ***
permits_q_o_q~_3	0,0100107	0,00594508	1,684	0,0945 *
jobless_claims_i~	-0,0144185	0,00775257	-1,860	0,0650 *
jobless_claims~_1	-0,0180268	0,00836162	-2,156	0,0328 **
jobless_claims~_2	-0,00481462	0,00767855	-0,6270	0,5317
jobless_claims~_3	0,00232485	0,00650033	0,3577	0,7211
Comm_Tbills_spre~	0,00865503	0,0920914	0,09398	0,9253
Comm_Tbills_sp~_1	-0,0995777	0,105582	-0,9431	0,3472

Comm_Tbills_sp~_2	0,183292	0,105950	1,730	0,0859 *
Comm_Tbills_sp~_3	0,0549910	0,0921928	0,5965	0,5518
jobless_claims~_2	0,00168514	0,00662466	0,2544	0,7996
jobless_claims~_3	0,0107834	0,00616406	1,749	0,0824 *

Mean value of the dependent variable	0,007060
Standard deviation of the dependent variable	0,008348
Sum of squares of residues	0,004433
Standard error of regression	0,005648
Coefficient of determination	0,774393
Adjusted coefficient of determination	0,733816
F(23, 142)	18,35060
P-value(F)	4,28e-33
rho (autocorrelation coefficient)	-0,046270
Durbin-Watson statistics	2,085252

F-test for zero restrictions:

All lagged variables	GDP_q_o_q_pctcha~	F(2, 139) = 0,94966 [0,3894]
All variables, delay 3		F(1, 139) = 1,8931 [0,1711]

Autocorrelation test:

Equation 1:

Ljung-Box Q' = 2,23969 with p-value =  $P(\text{Chi-square}(4) > 2,23969) = 0,692$

Test for ARCH order 4:

Equation 1:

	coefficient	standard error	t-quotient	p-value	
-----					
alpha(0)	2,49957e-05	7,04189e-06	3,550	0,0005	***
alpha(1)	-0,0173182	0,0800456	-0,2164	0,8290	
alpha(2)	0,0764336	0,0799560	0,9559	0,3406	
alpha(3)	0,0196534	0,0799761	0,2457	0,8062	
alpha(4)	-0,0110996	0,0799863	-0,1388	0,8898	

Null hypothesis: there is no ARCH effect

Test statistics: LM = 1,0453

with p-value =  $P(\text{Chi-square}(4) > 1,0453) = 0,90285$

Residual normality:

Correlation residual matrix, C (1 x 1)

1

Own numbers C

1

Doornik-Hansen test

Chi-square(2) = 49,6169 [0,0000]

## 22.5. Different combinations of portfolio and assessment of their profitability (initial investment 1000 USD)

