UNIVERSITY OF LJUBLJANA

FACULTY OF ECONOMICS

MASTER'S THESIS

MINSKY'S FINANCIAL INSTABILITY HYPOTHESIS AS AN EXPLANATION OF THE FINANCIAL STRUCTURE IN THE EURO ZONE AND THE UNITED STATES

Ljubljana, 13 September 2018   TILEN BARBARIČ

AUTHORSHIP STATEMENT

The undersigned Tilen Barbarič, a student at the University of Ljubljana, Faculty of Economics, (hereinafter: FELU), the author of this written final work of studies with the title Minsky's Financial instability hypothesis as an Explanation of Financial structure in the Eurozone and the United States, prepared under supervision of Associate Professor Igor Lončarski, PhD,

DECLARE

1. this written final work of studies to be based on the results of my own research;

2. the printed form of this written final work of studies to be identical to its electronic form;

3. the text of this written final work of studies to be language-edited and technically in adherence with the FELU's Technical Guidelines for Written Works, which means that I cited and/or quoted works and opinions of other authors in this written final work of studies in accordance with the FELU's Technical Guidelines for Written Works;

4. to be aware of the fact that plagiarism (in written or graphical form) is a criminal offense and can be prosecuted in accordance with the Criminal Code of the Republic of Slovenia;

5. to be aware of the consequences a proven plagiarism charge based on the this written final work could have for my status at the FELU in accordance with the relevant FELU Rules;

6. to have obtained all the necessary permits to use the data and works of other authors which are (in written or graphical form) referred to in this written final work of studies and to have clearly marked them;

7. to have acted in accordance with ethical principles during the preparation of this written final work of studies and to have, where necessary, obtained the permission of the Ethics Committee;

8. my consent to use the electronic form of this written final work of studies for the detection of content similarity with other written works, using similarity detection software that is connected with the FELU Study Information System;

9. to transfer to the University of Ljubljana free of charge, non-exclusively, geographically and time-wise unlimited the right of saving this written final work of studies in the electronic form, the right of its reproduction, as well as the right of making this written final work of studies available to the public on the World Wide Web via the Repository of the University of Ljubljana;

10. my consent to the publication of my personal data that are included in this written final work of studies and in this declaration, when this written final work of studies is published.

Ljubljana, September 13, 2018   Author's signature: _____

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

INTRODUCTION

Finance has never been more global than it is today, which is one of the main reasons the global financial crisis (hereinafter: GFC or the Crisis), which started in the United States of America (hereinafter: US or the United States) translated into a worldwide financial breakdown with public and corporate defaults on their debt obligations.

My belief is that understanding the past events is an imperative to avoid making the same mistakes again or better say decisions that may harm general wellbeing in the future. Generally, scientists and researchers begin their work by looking into the past to explain what happened and what may happen in the future. Exploring the past and understanding the causes for particular events could be the best basis for the future projections, particularly in the world of finance, where most of our projections and forecasts are based on historical data. On the grounds of certain historical data, uncertain future cash flows which are the foundation of every valuation are projected. Besides finance, historical data analysis is vital for understanding businesses for many other purposes. Managers frequently rely on the historical data of operational performance in every industry in order to improve it. With an immense technology development in the last three to four decades, an extensive data analysis has become an everyday activity of corporates. As a British mathematician and the architect of Tesco card program Clive Humby said (in Krajnović, 2017, p. 24): "Data is the new oil." With an increasing influence of big data analysis, research on financial crises has been and will continue to be affected in the future. Data can be gathered and processed much faster than it used to be several decades ago.

Even though financial crises are not a new phenomenon, GFC has directly or indirectly affected every person on the planet, unlike any other financial crisis before. The word "crisis" comes from a Greek word κρισις (krisis), which literally translates into "decision", "turning point", or "dispute". According to John K. Galbraith (in Vymyatnina & Pakhnin, 2014), in 20th century it replaced the word "panic" and is seldom interpreted as something close to "depression", "recession, "growth correction", etc. Economists use it as a part of professional jargon, while the general public most often relate it to the "economic crisis". It has a negative connotation as it lowers welfare and security. The most famous one is probably the "Tulip Mania" that occurred in 1637 in the Netherlands. Speculation on tulip prices went so far that one bulb of tulip was worth as much as a house. Consequently, speculators became over-indebted and went bankrupt. Later on, since modern capitalism unfolded in 18th century, financial crises have been present as capitalism has been developing. As mentioned previously, GFC had by far the greatest impact on the global economy. Chaos in late 2008 and 2009 was triggered by the increase in mortgage defaults due to nationwide decline in US housing prices (Behlul, 2011). Following bankruptcy filings of many financial institutions and a $700 billion bank bailout by the US government, the Crisis escalated to other parts of the world.

To understand why the crises happened, many distinguished professors started developing ideas and models already in the 19th century. One of them is Minsky's financial instability hypothesis

(hereinafter: FIH or Minsky's idea or Minsky hypothesis), which is based on Keynesianism, and drew a lot of attention in the financial media (Kregel, 2008 & Behlul, 2011) after 2008. Noteworthy, it seems it is still popular among financial journals, since it was published in the Economist (2016) in 2016. The journals such as The New Yorker (2008) and BBC (2014) wrote about Minsky's instability hypothesis. According to the article in the Economist, even the former head of the Federal Reserve, Janet Yellen said that Minsky's work had become "required reading" in her speech in 2009. In 2013, the governor of Bank of England Mervyn King said that he agreed with Minsky's view that stability in credit markets leads to exuberance and eventually to instability (in Economist, 2016). In 2015, Capehart (2015) used Minsky's ideology to interpret The Art of the Deal by Donald Trump. The author summarizes that Trump's success is not fully the result of his deal making skills, but rather on appreciation of his assets because of fragility of his financing. The latter is one of the main pillars of Minsky's hypothesis.

Hyman Philip Minsky, considered as one of the leading representatives of post-Keynesian economics (Vymyatnina & Pakhnin, 2014), believed that bears and bulls in the market can be explained by looking into the capital structure of companies. In times before financial crisis happens, the economic units gradually move to more fragile financial structures. Minsky's view is that financial fragility grows as debt levels increases and the proportion of short-term debt rises while liquidity declines (in Wolfson, 2002). According to Minsky, the analysis on a micro level with some macroeconomic prerequisites can help us explain why and what has happened in the financial crisis. If that were to be confirmed then in same case scenarios in the future, we could potentially predict the next financial crisis.

Minsky's hypothesis has been studied many times. Some concluded that the recent financial crisis indeed was in line with Minsky's FIH (Lester, 2009; Qi, Juniper & Zhang, 2015; Vymyatnina and Pakhnin, 2014; Tropeano, 2010), while others argue that FIH cannot explain what led the global economy into financial crisis (Behlul, 2011; Kregel, 2008; Davidson, 2008). There are studies that suggest that the hypothesis with slight modifications can serve as a reasonable explanation to GFC (Bellofiore & Halevi, 2009; Caverzasi, 2014; Wolfson, 2002). Beshenov and Rozmainsky (2015), analysed the debt crisis in Greece based on the FIH. Their conclusion based on a sample of Greek companies was that the majority of companies switched to fragile financial structures. Vymytnina and Pakhnin (2014) applied Minsky's theory to state-denominated economies. They argue that the events of financial crisis in the period 2000 – 2009 and the USSR breakdown in the 20th century can both be interpreted on the grounds of Minsky's arguments. Critics condemn FIH due to the fact that it was not developed in the same economic setting as we have witnessed in the beginning of the 21st century (Bellofiore, Halevi & Veronese Pasarella, 2010; Caverzasi, 2014; Wolfson, 2002). Furthermore, Qi, Juniper and Zhang (2015) state that Minsky did not develop any quantitative definition for financial fragility, which serves as a central idea of his business cycles analysis. Additionally, Ryoo (2013) argues that FIH might be invalidated by the "Paradox of debt" while Detzer and Herr (2014) argue that despite the crisis there might be no increase debt to equity ratio, which would imply an increased indebtedness.

The purpose of this thesis is to identify whether FIH serves as a valid explanation of the crisis development and if the hypothesis can be used to predict the next financial crisis. Based on literature overview and data analysis, the validity of the hypothesis as a sole standing explanation tool is discussed and compared to Cavezasi's suggestion to combine it with Toporowski's Theory of Capital Market inflation (hereinafter: CMI or Toporowkis's theory). Through the literature overview and the analysis of historical financial metrics, my aim is to provide an answer and discuss whether the companies in the United States, the Eurozone core countries and the Eurozone noncore countries did switch to more financially fragile capital structures. The aim is also to test if there are statistically significant differences between the median value of debt to assets ratio of companies split based on the index and sector belonging in the periods prior to the crisis in 2009 and after it. Through my analysis, I also attempt to answer the question whether the expected factors (Interest rates, price to book ratio, value of collateral, revenue growth, operational performance, etc.) did affect the value of debt to assets ratio in the analysed period. Moreover, my analysis of the market conditions aims to confirm or deny if preconditions to the Minsky moment were present. Using analytical approaches of Beshenov and Rozmainsky (2015) and others (Behlul, 2011; Pasarella, 2012; Caverzasi 2014), different approaches of measuring the financial fragility, as mentioned by Minsky, are applied to real data to provide the analysis of those as a tool to support the validity of FIH. Previous works have focused solely on one or another approach. Furthermore, with the exception of Beshenov and Rozmainky's (2015), and Vymytnina and Pakhnin (2014), FIH has not been applied to the European institutional setting. Therefore, the aim of this thesis is also to test the hypothesis on the European grounds and compare the results of the two leading economies, from the perspective of capital structures and different kinds of institutional settings.

1 LITERATURE OVERVIEW

This section starts with literature overview of topics related to Minsky's Financial Instability Hypothesis, Toporowski's Capital Market Inflation Theory and Subprime mortgage crisis, to help reader follow through the development of research questions and the analysis.

1.1 Minsky's Financial Instability Hypothesis (FIH)

1.1.1 Foundations of FIH

Hyman Philip Minsky (September 23, 1919–October 24, 1996), born in Chicago is one of the most recognized post-Keynesian economist after global financial crisis in 2009. After the latest financial crisis, Minsky's ideas have been widely supported by researchers (Rozmainsky, 2009; Wray, 2011; Wray & Tymoigne, 2008).

Minsky started as a student of mathematics at the University of Chicago, where he graduated and began to study economics at graduate level. After serving in US military, he completed a Master of Public Administration in 1947 at Harvard University, where he most likely met Joseph Schumpeter (Knell, 2015). In 1954, Minsky earned his Ph.D. in economics from Harvard University, where he studied under Joseph Schumpeter known for his credit view of

money and finance. Most of his life Minsky worked as a professor of economics at Washington University of St. Louis and as a distinguished scholar at the Levy Economics Institute of Bard College. After earning his Ph.D., he developed FIH. He is known for his books "John Maynard Keynes" and "Stabilizing an Unstable Economy", from 1975 and 1986 (Detzer & Herr, 2014). His mentor Schumpeter influenced his theories, while one of his ultimate achievements is his interpretation of Keynes' "The General Theory of Employment, Interest, and Money", published in 1936.

1.1.1.1 Keynes theory of economics

John Maynard Keynes is probably one of the most quoted and distinguished economist in human history. His book "General Theory of Employment, Interest, and Money" is a cornerstone to many theories and hypothesises developed after its publishing. Modern studies of macroeconomics start with Keynes theory of spending and its effects on the output and inflation. The central argument of the book is that the level of unemployment is not determined by the price of labour as in classical economics, but rather by an aggregate demand and spending. While Minsky considers investment in fixed capital goods as the basic determinant of income and employment levels (Bellofiore, Halevi & Veronesse Passarella, 2010), Keynesian vision is that business cycles connect investment with the financial conditions of firms and the possibility of failures (Minsky, 2004). The latter was recognized by Minsky in his work "Induced Investment and Business Cycles", in 1954 (Knell, 2015). In 1975, Minsky wrote Keynes' biography in which he defended the thesis from his work in 1954, and extended Keynes' theory of the incentive to invest. Minsky stepped aside from Keynes is his view on interest rates rises. He argued that interest rates rise because of over-indebtedness of firms that need to borrow money to invest. As Knell (2015, p.11) wrote "later Minsky integrated a more Keynesian view that integrates asset values with liquidity preference, investment decisions to profits and the relation between asset values and current prices, and debt valuations to profits, which may lead to financial crisis". From Keynes' perspective, a decision to invest is the link between finance and the real economy, and in Minsky's vision of capitalism the same decision is a fundamental link between Schumpeter and Keynes. Another parallel of Minsky with Keynes can be drawn in their vision of causes of market instability. They both agree that instability could come from "animal spirits" on top of speculative activities. Keynes described the term as spontaneous optimism that motives investors to certain behaviour. Akerlof and Shiller (in Knell, 2015, p. 12) define it as a "behaviour that is perceived as non-economic and is often associated with ambiguity and uncertainty". According to Minsky, this may trigger serious financial difficulties. Consumers start to save less and spend more as firms start to borrow more based on asset price speculation. Another resemblance with Minsky comes from Keynes' definition of the banking system:

"There is a multitude of real assets in the world which constitutes our capital wealth – building, stocks of commodities, goods in the course of manufacture and of transport, etc.. The nominal owners of these assets, however, have not infrequently borrowed money in order to become possessed of them. To a corresponding extent, the actual owners of wealth have claims, not on

real assets, but on money. A considerable part of such financing takes place through the banking system, which interposes its guarantee between its depositors who lend money, and its borrowing customers to whom it loans money wherewith to finance the purchase of real assets. The interposition of this veil of money between the real asset and the wealth owner is an especially marked characteristic of the modern world." (Keynes,1972, p.151).

Nevertheless, Minsky identified three key issues in the mainstream interpretation of Keynes: "decision-making under uncertainty, the cyclical nature of the capitalist process, and financial relations of an advanced capitalist economy" (Minsky, 1975). As part of his interpretation of Keynes, he invented the phrase "money-manager", to characterize new era of financial markets. Markets are largely driven by investment decisions of large financial institutions such as pension funds, large insurance companies, hedge funds, and other asset managers. Minsky points out is that people taking decisions in the markets seldom show bounded rationality when faced with uncertainty. Agents in the market attempt to beat the market and for that matter they might not always act rationally. This may lead to a speculation or as Minsky called it the "by-product of the activities of a casino" (Minsky, 1991). In addition, most of businesses around the world are organized through corporations while financial institutions, whose sole aim is to maximize value of their investments, hold most of corporate liabilities. For the same reason Minsky criticized the conventional treatment of Keynesianism. As he described the idea of Keynes was more of "Wall street paradigm" rather than "Bartering paradigm", where economy is explained on the basis of "bartering such as might take place at a village fair" (Minsky, 1977). Therefore, he interprets the economy viewed from Wall Street investment bank point of view, a capitalist system with a complex structure of financial markets, where every portfolio decision potentially could influence economic activity.

According to Minsky, money and finance are driving forces of economies and as such generate booms and busts in the economy. Minsky focused on addressing the issues such as how does the "new" money-manager economy work, why downturns follow the periods of growth, what where the causes for the Great Depression and if something similar can happen again. As part of his research, he noted that there are always two types of conditions in every financial crisis. First of all there are always systematic conditions common to all crises. According to Minsky, the most important element of every crisis is a high level of indebtedness. Further, he explains that since the periods of growth are followed by downturns, the indebtedness of economic units tends to grow up to the point of the moment just before the crisis. Based on historical trends, in times of economic prosperity units tend to borrow more to invest more to keep up with the growth expectations. This kind of behaviour leads to a high level of indebtedness and thus makes units exposed to financial risks. Secondly, in every crisis there are crisis specific conditions that make predictions of financial crises extremely hard if not even impossible. The majority of idiosyncratic conditions lie in changes of institutional settings. With time financial markets evolve – new type of products, contracts, institution etc. are being created and as such, they change how market agents behave. Over the past decades, we have seen a growing influence of institutional investors in the markets. More and more corporate ownership has spread among big institutional investors. A great number of investors started to invest in mutual

funds and ETF that follow the indices in a scale never seen before. Today we even see block chain technology opening a new dimension (ICOs) in the structure of financial markets. All those elements are new and might be idiosyncratic for the next financial crisis.

1.1.1.2 Schumpeter and Fischer's ideologies

In his research, Minsky brought back Keynes idea, adopted the Wall Street paradigm and emphasized the role of finance in the economy (Vymyatnina & Pakhnin, 2014). However, Minsky's life work, the development of financial instability hypothesis, combines considerations of Keynes with those of Joseph Schumpeter and Irving Fisher.

Schumpeter developed a boom-bust cycle idea based on his credit view of money and finance. Boom cycle starts from an equilibrium situation when entrepreneurs start innovating products and services. According to his theory innovations never run out of stock. Furthermore, innovations act as triggers for economic development. This forces other players in the market to start innovating or replicating innovations to keep up with the trends or just to grasp the extra profit. Every innovation needs a credit to take place, which is in Schumpeter's' model provided by the banking system. Without it, entrepreneurs would not be able to get to physical inputs needed to implement innovations. The author divides credit into a productive credit, which increases productivity and an unproductive credit that leads to problems. As the innovation process continues, economy gets driven by high investment levels and credit expansions, which is often accompanied by a speculation on further investments and prosperity. The boom cycle ends as soon as the innovation process ends and the asset prices are again at lower levels. Companies which were not creative enough face serious financial problems in the times of contractions. Schumpeter calls this process a "creative destruction". The crisis may go out of control because of cumulative processes, such as for example Fisher's debt deflation.

Fischer (in Detzer & Herr, 2014), inspired by the events that took place during the Great Depression in the United States, identified the destructive powers of deflation processes. Similar to Schumpeter he agreed that economy tends to move in cycles. Ups and downs are normal for capitalist economy unless they get out of hand and cumulative processes lead to an economic breakdown. It happens when overoptimistic expectations accompanied with herd behaviour and speculations lead to expansions, including the asset price bubbles. As Schumpeter also concluded, those are often combined with credit expansions. The bigger the bubble is the greater the correction in the form of deflation is. In turn, that leads to the destruction of wealth, and the problems with debt servicing, especially for speculative units. As Fischer wrote (1933, p. 344): "Then, the very effort of individuals to lessen their burden of debts increase it, because of the mass effect of the stampede to liquidate in swelling each dollar owed. Then we have the great paradox which, I submit, is the chief secret of most, if not all great depressions: The more the debtors pay, the more they owe." The process is known as "Debt deflation". Detzer and Herr (2014), recognized the importance of Fisher's concept for capitalist economy. Goods market inflation in combination with high domestic debt is one of the worst things that could happen.

The theories by Schumpeter and Fisher enabled Minsky to introduce a hypothesis that would provide an explanation for business cycles in economies using indebtedness levels of economic units. The following section outlines Minsky's key theoretical concepts of FIH. The distinction between hedge, speculative and Ponzi units is of the main pillars of the hypothesis. Based on financial structures Minsky separates economic units with stable financing regimes from those with fragile financial structures.

Although the idea of financial fragility caught attention of prominent economists, represented by Neo-Keynesians such as Greenwald and Stiglitz (1993) and Bernanke and Gertler (1990), Hyman Minsky was the first to study the concept of financial fragility and its role, as Beshenov (2010) mentions in his work. Moreover, Wolfson (2002, p. 384) wrote: "Minsky's view is that fragility grows as debt levels increase, the proportion of short-term debt rises, liquidity declines, and the number of speculative and Ponzi firms increases".

1.1.1.3   Capital structures - Hedge units, speculative units and Ponzi units

Every economic unit has payment commitments that it needs to repay when they mature. The unit relies on expected cash flows from operations to service those commitments. By definition future cash flows are uncertain, since they depend on conditions in the markets, etc. (Detzer & Herr, 2014). Based on the income to debt ratios Minsky separates between units with stable financial structures and those with fragile financial structures. Therefore, Minsky describes three kinds of units in the economy.

Hedge units are able to service its debt obligations and pay down principle with the cash flows generated from operations. Hedge unit presents a save unit relative to the financial risk (Bellofiore, Halevi & Veronese Passarella, 2010). The present value of its business is positive in all scenarios of likely interest rates. Hedge units are often also characterized by high level of equity in total liabilities structure. If the economy is full of hedge units, then according to Minsky, the economy is stable and the time of prosperity is ahead.

Speculative units are able to cover interest payments but usually have to roll over their debt to cover the principle when it is due. The units rely on expected cash receipts to service interest commitments but those are not sufficient to repay the principle. Only in the long run, the expected cash flows from operations are enough to fully service its commitments. As business cycles move to the peak, some of hedge units become speculative, and some speculative units become Ponzi units.

Ponzi units are only able to cover its interest payments by rolling over and/or taking on more debt. Expected cash flows from operations are not sufficient to fulfil commitments to repay the principle and interest payments when they occur. Ponzi units need to capitalize interest payments in its balance sheet. Moreover, those units have to rollover the principle and find financing for the accrued interest. Ponzi units are actually betting on appreciation of asset prices so that they can cover their liabilities. Hence, as soon as asset prices start to plummet, Ponzi units confront substantial financial difficulties.

1.1.1.4   Theorems of FIH

FIH is composed of two theorems. First, economy has regimes of financing under which it is stable and regimes that make it unstable. Second, over some period of time the economy switches from period of stable financing regimes to periods of unstable regimes of financing, meaning that over some periods of economic prosperity economic units tend to move from stable financial structures to unstable or fragile financing structures. In times of stable financing regimes, the hedge units dominate and as the economy transits to fragile financing regimes, the number of speculative and Ponzi units grows. If the economy falls under inflationary pressure, authorities try to keep inflation bounded by controlling money supply and interest rates. As some market catalyst triggers changes in the market, some of speculative units become Ponzi units, and the net worth of previously Ponzi units evaporates.

1.1.2   FIH concepts

As mentioned, financial instability hypothesis is based on two theorems. Given that the economy moves in cycles the theorems are feasible. Boom cycles starts just after the crisis has ended and the environment has become more stable. This is reflected in greater confidence in the markets and an increased output as the demand for goods grows. The restored confidence is also present in lending decisions of banks and other financial institutions. The number of new loans starts to rebound from the levels observed in the times of economic meltdown. With time optimism starts to grow back, along with promising expectations about the future. That brings even higher rate of lending to companies and other economic units. Companies tend to invest more, since expectations about the future are favourable and expectations about future cash flows attract new projects. According to Minsky, the units are inclined to use debt to finance their investment projects. Thus, their financial position becomes more fragile through the time of prosperity. As more and more economic units follow this pattern, the entire economy approaches the peak and it becomes more exposed to risks coming from endogenous events, which may be enough to negatively affect the future expectations and trigger asset deflation.

The following section follows the flow of business cycles as seen from the perspective of Hyman Minsky. Alongside the cyclicality the concepts of FIH, such as cushions of safety, endogenous event, Minsky moment, debt deflation and Minsky paradox, are explained.

1.1.2.1   Cushion of safety

The idea of cushion of safety is often associated with the legendary security analyst and hedge fund investor Benjamin Graham. The entire idea about financial fragility is built around the erosion of cushion of safety during the conditions of stability. The famous quote by Hyman Minsky: "Stability is destabilizing" describes just that. Kregel (2008) writes that the cushion of safety described by Minsky covers the margin of error between anticipated return (P_S) and the periodic financing cost (P_D), as shown in Figure 1, while Minsky particularly analysed the investment decision based on the difference between prospective cash receipts and cash commitments, which represent the cushion of safety. From the perspective of bankers, lending

to the firm for a particular investment project is determined by the difference between the amount lent and the amount of cash flows generated by the project or the value of collateral. Bankers' decisions to lend to the borrower are based on its historical performance and expected cash flows. In conditions of solid economic growth, future cash flow estimations errors are less significant and it is not necessary to assume that bankers' credit assessments become less diligent or that their estimations are too optimistic. Rather, it is simply that a borrowing experience becomes increasingly positive (Kregel, 2008).

This is also the point, where a lender and a borrower risk come into play. The first to have suggested the terms "lender risk" and "borrower risk" was Keynes (1978). The former refers to the concerns of lenders, i.e. banks and other financial institutions, that the borrower's cash flows will not be sufficient when the debt matures. While the latter one is referred to the borrower's risk that its future earnings will not be sufficient to repay the loan either because of the interest risk or the operational risk. This may cause companies to go bankrupt and hence lose a shareholders' value.

Figure 1 shows that in the period of economic prosperity, the cushion of safety increases by the time the economic units become aware of unrealistic expectations. Therefore, the cushion is the highest during the boom phase and it starts to decrease as economy becomes unstable. The cushion diminishes as endogenous event activates the bust cycle. During the first phase of the bust cycle, the units continue to lose confidence in markets and therefore the cushion continues to decrease. In the middle of the bust cycles, when the confidence in the markets is at its lowest and the expectations of lenders are very pessimistic, the cushion of safety becomes even negative. It means that the expected returns are much lower than the financing costs. As more and more speculative and Ponzi units go bankrupt, confidence starts to restore and the cushion of safety retrieves.

1.1.2.2 Endogenous event

Just before the crisis, excessive liquidity in the market keeps Ponzi and speculative units floating by allowing them to refinance their debt. Nevertheless, Minsky suggested that the number of Ponzi and speculative units grows through the times of stability. Those units are exposed more to financial risk, as opposed to hedge units. One endogenous event, such as the interest rate hike, increase in mortgage default rates or any other that may affect the perception of marker participants, may cause an economy to fall into depression.

1.1.2.3 Minsky moment

In his work, Davidson (2008) identified a shift of the economy from hedge to Ponzi finance a precondition for a Minsky moment to happen. In the literature Minsky moment is described as a situation after endogenous event disturbed the markets and units that have been over-indebted due to optimism caused by a prolonged period of favourable economic environment are forced to sell their assets to repay their debts. Those assets are normally sold on fire sales, meaning

that they are sold on discounts. This lowers the value of assets in the market and may lead to debt deflation and economic crisis.

Figure 1: Cushion of safety development through the economic cycles
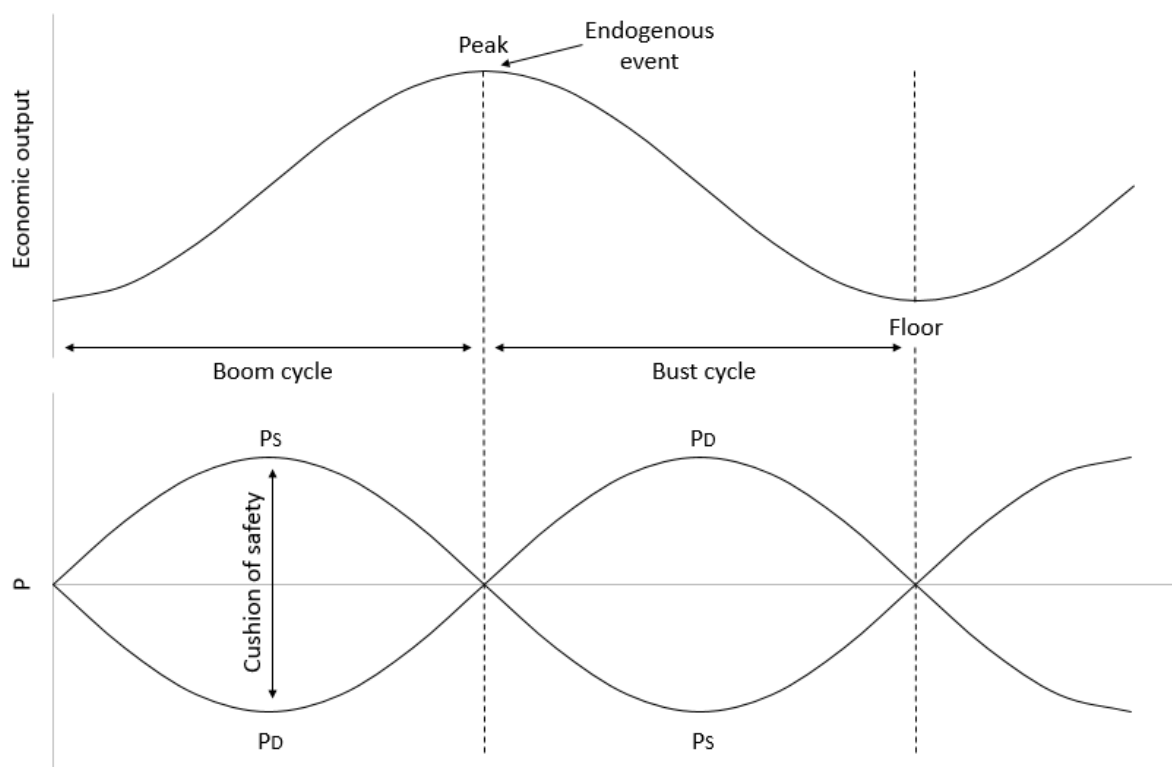
Source: own work.

1.1.2.4   Debt deflation

After Minsky moment occurs, the next one to follow is the process of debt deflation described by Irving Fisher (1933). Defaults on debt commitments lead to cutback of aggregate demand and decreases the asset prices. Furthermore, as companies start pushing their products to the market to get funds for debt repayment they increase the supply in the markets. In addition, due to the lack of investment, the income starts to fall, the rate of unemployment starts to rise and the demand for goods declines. It leads to further drops in prices and the shortage of funds. Hence, this increases the real value of outstanding debt payments (Wolfson, 2002). Deflation ends when a new equilibrium is reached, at far lower asset prices and with many speculative and Ponzi units bankrupt. The economy filters out the fragile units, leaving only hedge and some of speculative units in the economy, when the floor point of the economic activity is reached. According to Minsky, this is the time if not earlier, when the central bank and government should intervene to stimulate investments.

1.1.2.5   Minsky's paradox and the role of central bank

Minsky sees the role of government and central banks as an institution watching over the economy. Not just to act after the recession and depression have begun, but also during and before that happens. Expansionary fiscal policy to increase income of private sector through

10

increased demand, should lead to higher corporate earnings and thus to the repayment of their debt commitments. Moreover, expansionary monetary policy of central bank increases liquidity in the markets, especially the one of the financial sector and allows them to keep floating, regardless of high customer withdrawals and bad loans in their balance sheets. Beshenov (2015), writes that according to Minsky, this type of central bank's intervention prevented debt deflation in Western countries from a new "Great Depression" in the period from the 1970's through the 1990's and which led to the period of stagflation. Beshenov also found out that the financial evolution of past decades, particularly in the times before GFC, reduced the efficiency of central banks policies to help markets avoid the debt deflation. However, repeated actions of central banks may give financial institutions and corporates a false sense of security and may stimulate reckless behaviour. Minsky (1985, p. 52) writes and explains what Minsky's paradox is: "… once the doctrine of salvation through investment becomes deeply integrated into our political and economic system the constrains on foolish investments are relaxed. This is especially the case if the government stands ready to guarantee particular investments or investment projects against losses."

Nonetheless, according to Minsky central banks should act as lenders of last resorts and governments should increase budget deficit in order to stimulate aggregate demand and business profits. However, Minsky suggests that this is not sufficient to reduce the likelihood of debt deflation. Policymakers have to supervise and regulate financial innovations, financial practices and attitudes that have led to exuberant behaviour and actions in the past. Moreover, in order to keep orderly conditions in financial markets, secondary markets must be developed to offer much needed liquidity (Tropeano, 2010). In that manner, central banks as the only universal accepted guarantee provider should also provide access to refinancing for market dealers.

1.1.3 FIH drawbacks

As previously mentioned FIH got most of the attention after 2008 and alongside the spotlight came the critics. The latter is common to every hypothesis and FIH is no exception to it. Many economic professors and researchers have different point of view on what "drives" the economy. While there are no major discrepancies about what happened between 2007 and 2009, the same does not hold true for recognizing FIH as a valid explanation to causes for the events that led to the crisis. Many academics have analysed the crisis through the view of Hyman Minsky. Their conclusions fall into three categories. First, the ones that approved FIH as a valid explanation of events or at least they recognized the concepts of FIH in events leading to the crisis (Henry, 2009; Qi, Juniper and Zhang, 2015; Vymyatnina & Pakhnin, 2014; Tropeano, 2010). Second, those (Bellofiore & Halevi, 2009; Caverzasi, 2014; Wolfson, 2002) who suggest that hypothesis with minor adjustments to account for the development of financial markets serves as a reasonable explanation. Last but not least, some scholars have not recognized the concepts of FIH at all in the events prior to GFC (Behlul, 2011; Kregel, 2008; Davidson, 2008). Behlul (2011) argues that based on his approach nonfinancial corporate sector did not move toward more indebted positions, hence the conditions that must exist for FIH to be valid were

absent. Kregel (2008) suggests that the crisis was not a traditional "Minsky moment". He concludes that the financial system was structured in a way that it made credit too cheap, which in turn led to the assumption of excessive risk in order to provide higher returns. Therefore, there is almost nothing that can be done to eliminate the inevitable financial fragility, described by Minsky. Only systemic policies could damp the fragility of system. Moreover, Davidson (2008) also identifies that FIH preconditions have not occurred, but he contends that GFC happened due to the insolvency problems of large underwriters. According to him, the latter was caused by their attempt to securitize non-commercial mortgages, which by nature were illiquid.

The following sections look at particular drawbacks of FIH, addressed by academics.

1.1.3.1 Neglects consumption and savings, and trade and labour markets

Vymytnina and Pakhnin (2014) suggest that one might also address Minsky's concentration on financial markets and agents' financial decisions as excessive since it neglects savings and consumption decisions as well as trade and labour markets. The latter is one of the pillars of the well-accepted Keynesian theory. Historically many scholars have been turning to Keynes' ideology to explain macroeconomics and Minsky is one of them. He built his hypothesis from the bricks of Keynes, Schumpeter and Fisher. Therefore, we cannot say that Minsky neglects Keynes' ideology; instead he uses Keynesian theory and combines it with Fisher's Debt deflation and Schumpeter's view of credit. By doing so, he puts Keynes' concepts in the times of Minsky. Not ignoring the fact that financial markets were becoming more influential as time passed.

1.1.3.2 Paradox of debt

Bellofiore and Halevi (2009) and Ryoo (2013) claim that the paradox of debt invalidates Minsky's FIH. Ryoo (2013, p. 1) offers a great explanation of the paradox of debt: "The paradox of debt refers to the phenomenon in which individual firms attempt to reduce their indebtedness by cutting an investment spending, which leads to increasing indebtedness as the consequent reduction in aggregate demand and profits makes firms rely more on debt finance. During an expansion phase, the same mechanism works in the opposite direction: debt-capital ratios fall as investment increases because investment boosts aggregate demand and profits." Cleary, the concept as such explains business cycles in the opposite way as FIH. Furthermore, Bellofiore, Halevi and Veronese Passarella (2010) suggest that there is no compelling reason why leverage should indeed increase in the times of economic expansion. During the growth phase, debt levels increase along with the profits. Therefore, debt ratios should not change at all.

Ryoo (2013) concludes and offers an answer to the critics of FIH. He says that the deriving results that presumably make Minsky wrong from non-minskian assumptions are not surprising. In addition, he argues that the criticism is exaggerated, since it has a different logic behind it.

1.1.3.3   Developed in a domestic economy

Wolfson (2002) writes that FIH was developed in the context of a domestic economy. Thus, the key issue of the FIH is in extending the theory to an international setting. Despite the issue, he summarized that Minsky's FIH can be modified to explain the dynamics of financial structures in a global context. Financial fragility increases with the ability of funds to cross borders and invest in domestic and/or foreign markets, since that would additionally increase an exchange rate exposure and an interest rate speculation, such as carry trade. Greater capital mobility and an increasing ability to lend and invest anywhere in the world made differences between domestic and international setting much blurrier than several decades ago. Qi, Juniper and Zhang (2015) in their work, extended the analysis of financial instability to households, firms, foreign sectors, financial institutions and government, and concluded by providing the arguments in favour of Minsky's FIH. Vymytnina and Pakhnin (2014) applied it to a state dominated country and successfully explained both the breakdown of the USSR and the financial crisis in 2008-2009. Others (Arestis & Glickman, 2002; Mendoza, 2006; Mendoza & Terrones, 2008) advocated that Minsky's idea could be extended to account for open-economy and international settings. Wolfson (2002) summarizes that Minsky's theory can be modified in a way that it suits into a global context. Furthermore, Wray (2009) shares the thought that FIH could be extended to households, banks and other financial organizations. Similarly, Ryoo (2013, p. 14) extended his analysis to debt structures of firms and households portfolios.

1.1.3.4   Quantification of financial fragility

Vymytnina and Pakhnin (2014) claimed that mathematical model built to support his hypothesis (Minsky, 1957) is futile. Additionally, Qi, Juniper and Zhang (2015) argue that Minsky did not develop any quantitative definition to support his concept. However, Behlul (2011), Pasarella, (2012) and Caverzasi (2014) used leverage ratio to quantify financial fragility in their work.

1.1.3.5   Developed in the times of different financial settings

Caverzasi (2014) in his work agrees that FIH indeed embodies economic concepts that Minsky was witnessing in his time. On the other hand, he argues that some of those aspects may not be completely compatible with the recent economic environment. Bellofiore, Halevi and Veronese Passarella (2010) share the same view on FIH. In his work, he investigates the meaning of Minsky's moment in a new economic setting. They both identified that the new settings are not so much of a technological nature, as many would think. Instead, new economy is a consequence of emerging delicate balance between monetary policies, stock markets driven by irrational behaviour, an increasing debt of households and a higher autonomous consumption demand. Moreover, active monetary policies to ensure strong currencies and liquidity in the banking system led to ever-increasing asset prices and private sector growing deficit, according to Bellofiore, Halevi and Veronese Passarella (2010), suggesting that Minsky's FIH may indeed not be perfectly compatible with the current state of economy. In Minsky's view, a non-financial corporate should be the ones getting indebted in an expansion phase. Furthermore,

they argue that banks do not participate in the same business as they used to. In the times of Minsky, the banking system was oriented more towards lending the money to fund corporate investment. In many cases, banks were the only way for many companies to raise funds. As funding got accessible and cheaper outside of banking system, banks lost their long-term business partners. To ensure profitably and high performance they were forced to turn their focus to household lending and fee generating business. Hence, household and workers in this new setting are more involved into dynamics of the financial system.

In addition to Wolfson (2002) and Bellofiore, Halevi and Veronese Passarella (2010), Dymski (2010) discusses Minsky's contribution to understanding the features of the latest crisis in 2009. However, in his work he recognizes that events leading to a breakdown had some peculiarities that were different from the settings described by Minsky. According to Dymski those are as follows: new banking regulation, inclusion and consequent financial exploitation of minorities in the real estate markets, and US current account deficit (in Caverzasi, 2014). Furthermore, Caverzasi (2014) accepts Minsky's view on financial system dynamics but he recognizes that FIH embodies only the aspects of financial system that Minsky was witnessing when the theory was developed. Thus, FIH was valid in the time of Minsky, but as a financial system is constantly facing novelties, the setting has changed. For that matter, the author incorporates Toporowski's Capital Market Inflation theory (CMI). Caverzasi believes that Toporowski's CMI explains the dynamics of current settings in financial markets and their influence on the real economy very well. The combination of both theories should serve as a complete explanation of the events that led to a meltdown in 2009.

The following section looks into the Capital Market Inflation Theory by Jan Toporowski in detail, and explains why in combination with Minsky's FIH it may serve as an explanation to the dynamics of financial structures in the current economic setting.

1.2 Toporowski's Capital Market Inflation Theory (CMI)

Jan Toporowski born in 1950, in Oxford, U.K., derived his theory from his observations of financial markets during his career while he was working as an academic and a professional in the finance industry. After getting his Bachelor's Degree in Sociology and Political science in 1972, he went on to study economics at Birkbeck College, London University. Following his master studies, he got his Ph.D. in Economics in 1983.

Capital market inflation theory is based on a new role of finance in the economy. The theory is developed some time after Minsky's FIH, hence it includes a new form of capitalism. Toporowski calls this change "financialization", which stands for a dramatic increase in the role played by finance (Caverzasi, 2014). One of the major features of financialisation is the shift of financing from debt financing to equity financing, which according to Toporowski led to overcapitalization and furthermore to an increased financial fragility of banking (Toporowski, 1999). The following sections describe the framework of CMI and compare it to the perspective of Minsky.

1.2.1 Framework of Capital Market Inflation Theory

Caverzasi (2014) writes that CMI theory is based on the critique of conventional financial theories, such as Modern Portfolio Theory, the Capital Asset Pricing Model, the Arbitrage Pricing Models and the efficient market hypothesis. Caverzasi argues that according to Toporowski, those theories focus on the elements which are not important if we take net inflows in securities markets into account.

As Toporowski (1999) describes it, the CMI theory is a non-equilibrium theory. It argues that prices in securities markets are not driven by an "invisible hand" as described by Adam Smith through the demand and supply, but rather through non-rational behaviour of investors, which is exhibited through cash inflows to the markets. Indeed, when the demand for securities rises, the price of security rises as well. Yet, different asset classes have different characteristics; hence an increase in demand will most likely inflate the prices of securities without a face value (Caverzasi, 2014). Nevertheless, as the price of assets rises, investors looking for capital gain will try to exploit the opportunity and drive the price even higher. As Toporowski (2000, p. 33) wrote: "The excess is then taken up by a higher turnover of the available stocks & higher stock prices, as brokers and investors are obligated to offer higher prices to persuade holders of stocks to sell.". This will then stimulate the demand even more and generate new net inflows.

Inflows at the initial offering go to the issuers of those securities, i.e. stocks and bonds. In case of equity issuers, they use those funds either to finance an acquisition, restructure balance sheet or to finance a project undertaken by the firm. The larger part of the inflows goes to the issuers of debt, and in most cases that would be the governments that use it to finance their budget deficits. The balance between cash inflows and outflows is net excess inflow, which forms the liquidity of the market (Toporowski, 1999). Net excess inflow circulates through financial markets until an issuer takes it out through second offering. Caverzasi (2014) identifies three main types of issuers. First of all there are financial institutions such as banks, pension funds, insurance companies etc. that typically issue and trade between them. Secondly there is the government that has budget restrictions, and the third type are corporations.

According to Toporowski, corporations used such actions to raise more funds and became overcapitalized. Corporations in the era of new capitalism took advantage of inflated markets because at that time they provided cheap external financing (Caverzasi, 2014). Furthermore, the evolution of financial intermediaries that invest in markets led to less risk of losing control of a firm, since most of inflows run through financial intermediaries that are typically not inclined to actively participate in management activities. Third reason is remuneration criteria. Management bonuses switched from profit-related to price-related, meaning that managers earn bonuses and other benefits, such as stock options, which are closely tied to a stock price performance. Fourth and the final reason lies in increasing flows from private welfare and foreign capital, which further stimulated this dynamic. Moreover, Orhangazi (2008) in his work shows that easy access to funds on the side of corporations and high profits led corporations to direct their investment towards financial rather than real capital. Presenting an acceptable proof for Toporowski's process of how financialisation took place in a real sector of economy.

1.2.2 Differences between FIH and CMI

In view of Toporowski, overcapitalization, as described above, leads to a decrease in the corporates' appetite for a bank credit as a source of external financing, while from the perspective of Hyman Minsky, the relevant paradigm is a City or a Wall Street system where the asset holdings as well as current transactions are financed by debt (Minsky, 1975). Therefore, there is a noticeable difference in how these two authors see the source of financing investments and refinancing projects.

Moreover, FIH is based on a growing financial leverage, measured as debt to assets ratio, which increases as the boom phase of business cycle is progressing. While in the view of Toporowski, the leverage ratio should fall as the inflation in capital markets leads to both an increase in value of equity and a decrease of debt. Financial fragility, an important concept in FIH is pro-cyclical. Booming economy improves confidence in making financing decisions. As an optimistic sentiment affects judgments of firms and banks, loan officers are more willing to grant credits to companies. However, Toporowski shows that financial fragility is just the opposite, anti-cyclical. According to him, leverage and indebtedness levels decrease during the boom phase (Caverzasi, 2014). To support this idea Toporowski (2000, p. 7) wrote: "… when an economic boom provides them with plentiful sales revenue, firms actually reduce their debt financing, and even replace it with equity (common stock) as the stock market flourishes". Nevertheless it may seem that those aspects invalidate Minsky's FIH, according to Toporowski, FIH may be valid if equity is considered as a debt like item (in Caverzasi, 2014).

1.2.3 Updating FIH with CMI

Minsky and Whalen (1996, p. 2) wrote: "Capitalism is a dynamic, evolving system that comes in many forms. That is nowhere more evident than in the financial structure…" Therefore, if Minsky agrees that capitalism is a dynamic system that may come in different forms, then his theory of financial instability in capitalism could also be interpreted from different perspectives. To take into account the evolving side of capitalism, FIH could be adjusted to the changes attributable to the evolution of financial markets, i.e. financialisation as described in previous sections.

Caverzasi (2014) suggests that the analysis of banks by Toporowski might serve as a bridge between CMI and the FIH. Before the crisis in 2008, the equity has substituted debt as the main source of finance and financial intermediaries. Especially banks had to act fast to satisfy earning appetites of stakeholders (Caverzasi, 2014). As the answer to losing their long-term customers, who started to finance their capital needs through retained earnings and issuing equity, banks focused on the "profit-seeking" activities, among which are fee related business in derivatives and debt obligations markets. The banks increased lending for property purchases as well as to riskier customers to earn interest. Caverzasi suggests that the repeal of Glass-Steagall Act in 1999 can be seen as an institutional change that brought this change in banking business.

Minsky sees the role of banks as crucial in fuelling the investment cycles. This goes hand in hand with Keynes (in Caverzasi, 2014 p. 14) who wrote: "Banks hold the key position in the transition from lower to higher scale of activity". As such, banks supply credit during boom period and cutting it during bust cycles (credit crunch). Caverzasi (2014) continues that in the FIH banks are the ones who allow economic units to undertake riskier financial positions. However, banks should not be hold entirely responsible for creating more fragile environment. The same confidence and optimism about future that drives banks to lend more and lower their credit criteria drives the appetite of firms to expand their business and look for new loans. Caverzasi (2014) proposes the idea of banks being the "endogenous destabilizer" of the FIH. Since banks shifted their business before the crisis, as described by the CMI, destabilizing tensions started to build up in their "new" core business. Because of the new businesses, which were more household oriented through mortgages, a decision of households to purchase houses substituted the decision of firms to invest in the productive capital, as described by Minsky in the FIH.

In this updated form of FIH proposed by Caverzasi, the cushion of safety accounts for the difference between the prices of houses increased for the cost of the mortgage to protect banks from a lender's risk and the expected value of houses decreased by the amount to protect the household from a borrower's risk (Caverzasi, 2014). According to Minsky, the cushion of safety decreases as the boom phase progresses and that is what happened prior to the breakdown in 2009.

1.3   GFC from the perspective of Minsky and Toporowski

The basis for implementation of Toporowski's idea into Minsky's point of view is the asset inflation, which determined a new way of investment financing for the firms as well as investment decisions for all economic units. The asset inflation offered a new type of capital to the ones who looked for it and hence, it deprived traditional capital providers, i.e. banks, of their core business.

Repeal of Glass-Steagal Act by the US government allowed banks to invent and switch to a new type of businesses. Such a risky business is today seen as irrational. FIH sees banks as economic cycle's facilitators, as they expand their credits in the times of prosperity and stop lending money when the economic sentiment deteriorates. Caverzasi (2014) sees this shift of business as a crucial point that connects the capital market inflation theory and FIH. As banks moved towards riskier business, economy slowly and gradually started to become more and more financially fragile. Many did not recognize this until it was too late and even then, they tried to capitalize their gains on speculation.

Additionally, FIH may serve as a great explanation in combination with CMI, if we recognize that the investment decision, being a driving force for the credit demand, has moved from firms that used debt to finance their productive capital expansions to households, which were borrowing money to buy houses, i.e. consumption. This explains why firms in non-financial sector might not have been more indebted in relative numbers just before the crisis, while the

household debt might have accumulated. According to CMI, firms did not stop investing; they just switched to other source of capital, such as financial markets rather than bank loans.

In this new setting, Minsky's concept of the cushion of safety can be identified in comparing the price of the house plus the cost of the mortgage to protect banks against a lender's risk against the expected value arising from the house. It means that the actual price of the house in the market plus additional capital gains, since there were probably few who did not believe that house prices could not rise any further. The difference between the two represents the cushion that decreases during the boom phase and increases during the recession. Its size adapts according to the expectations (Caverzasi, 2014).

The last point noted from Minsky, is his classification of economic units into hedge, speculative and Ponzi units. In the years prior to the crisis, the units with increasing indebtedness as in line with the CMI are seen as households rather than non-financial corporates. Households have been refinancing mortgages as long as the value of assets was appreciating. The same way Minsky describes Ponzi units, which borrow money and stay afloat as long as the value of its assets is increasing. Therefore, they had no problems as long as the demand for houses was growing, either based on an increasing demand or speculation. Since the consumption that fuelled the asset inflation was generally financed through debt instruments, the economy was exposed to the risk of asset depression. When the bubble burst, many lost their entire life savings as well as their homes.

In the following chapter the literature overview is summarized and some issues about further implementation of Minsky's FIH to the 21st century financial systems are addressed. Based on the issues the research questions are developed, analysed, discussed and answered through the remainder of this thesis.

1.4   Research question development

One of the main pillars of FIH is that the economic units tend to increase its indebtedness prior to the downturn. To answer the question if financial fragility indeed increased, two different approaches were used. Approach of Behlul (2011), Pasarella (2012) and Caverzasi (2014) is based on measuring the financial fragility with financial leverage ratios. On the other hand, the approach of Beshenov and Rozmainsky (2015) compared the number of Ponzi, speculative and hedge units prior to and after the Greek debt crisis. My analysis also tries to identify if two different approaches could provide different results and therefore leads to different conclusions.

If the tendency of companies to increase its relative debt levels indeed increases, the trend should be observable in financial statements of public companies in the United States and Eurozone. Due to the institutional setting differences in the United States and the Eurozone economies, companies perhaps did not act simultaneously. While the companies in the United States have historically been more inclined to look for funding in equity markets, their peers in the Eurozone generally prefer debt financing. Therefore, one of the aims of the thesis is to answer the question whether the financial structures of the United States and Eurozone non-

financial companies have changed prior to and after the crisis, and if the changes were identical in both economies. Moreover, I would like to test if the difference between the median values of debt to asset ratio of the companies from the United States differs from the median values of debt to asset ratio of companies from Eurozone noncore countries and Eurozone core countries. Despite the fact that the institutional setting in the United States and Eurozone is different, the capital resources available to companies in Eurozone core countries are also different from the resources available to Eurozone noncore countries. In terms of liquidity, capital markets in Eurozone noncore economies are well behind the market in Eurozone core countries. Therefore, the cost of issuing debt or equity instruments may be very high for them.

Based on approaches of Behlul (2011), Pasarella (2012) and Caverzasi (2014), the aim of the debt to assets analysis is also to test whether there are statistically significant differences between the levels of indebtedness, the measure as debt to assets ratio, in companies belonging to big cap and small cap indices and different sectors. Moreover, through my analysis I also try to answer the question which factors have affected the value of debt to asset ratio prior to and after the crisis and if regression model can be built to predict the value of debt to asset ratio.

In order for such a change in the financial structure to take place, certain macroeconomic preconditions, as described by Minsky, have to exist. To identify if those were present from the end of the dotcom crisis, i.e. in the period from 2000 on, I conducted the analysis, which looks at monetary policies of Federal Reserve Bank (FED) and European Central Bank (ECB) to answer if FIH can be used as a starting point to discuss the financial crisis in 2009. Despite the fact, that exploring the financial structure dynamics through several crises, the analysis would be limited by the data availability and comparability of institutional settings in financial markets.

Caverzasi (2014) argues that FIH may not be fully suitable in the era of financialisation. According to him, the companies in real sector would not build up its debt exposure, but rather use more of equity financing. The latter may imply that overvaluation could be present in the markets and thus increase the value of equity and consequently had an impact on financial leverage ratios. Furthermore, as banking business changed it might not have been non-financial firms that got more indebted, but rather households. If that indeed did happen, then households were the ones who took on more debt and thus increased its borrowing, both in absolute and relative numbers. Moreover, if households did increase its borrowing, mainly through banking instruments, financial intermediaries had to increase its loan portfolio proportionately. The aim is also to identify if households increased its level of indebtedness prior to 2009.

The majority of studies focused only on non-financial sector while the others suggest that this crisis might have been different as the pattern of non-financial firms getting more indebted was absent. The analysis of credit institutions balance sheet and portfolio breakdown tries to answer the question if financial intermediaries did increase their lending to non-financial companies or households prior to the crisis.

19

Research Questions:

- Does FIH serve as a valid explanation of the crisis development in 2009?
- Can FIH be used to predict the next financial crisis?

Aims of the thesis:

- Provide an answer and discuss whether companies in the US, Eurozone Core and NonCore countries have switched to more fragile financial structures,
- Identify if there are statistically significant differences between median values of debt to assets ratios of companies form different regions, index belonging and sector belonging,
- Identify what has affected the increasing or decreasing debt to assets ratio,
- Discuss if preconditions to Minsky moment were present before the crisis.

2 METHODOLOGY & DATA

These sections explain and describe the process of analysis. Descriptions and the goal of each analysis are followed by the detailed description of data gathering, processing and presenting. I gathered the data used in the analysis for the observed period from 1. 1. 2000 to 31. 12. 2016. However, the analysis of the real sector financial structures is focused on a shorter time period, i.e. 2004–2016. I analysed the data primarily on the geographical level, the United States versus the Eurozone core and noncore countries, to support my thesis that the units in both economies do not operate in completely the same institutional settings and thus may have reacted differently to the crisis. Additionally, my analysis of non-financial companies included the sector and index level breakdown to further explore the movement of financial structures. Note that due to the lack of representative number of sample for the diversified sector, as classified by the Bloomberg (2017a), I excluded the sector from the analysis.

2.1 Methodology of analysis of monetary policies

I conducted the analysis of FED's and ECB's monetary policies to identify if central banks were actively involved in controlling economic activity, as Minsky would expect. Time series analysis of interest rates and inflation rates in the United States and the Eurozone should clarify if such preconditions were indeed present prior to the crisis.

I obtained historical data for the money market interest rates analysis from the International Financial Statistics (IFS) database (2017), while the sources for inflation rates analysis were Bureau of labour statistics (2017) and Eurostat (2017). CPI-All Urban Consumers in current series represent CPI and core CPI rates for the United States, as reported by Bureau of labour statistics. Eurostat reports Eurozone inflation rates as harmonized indices of consumer prices (HICP). Core inflation rates for the Eurozone refer to the overall index excluding energy, food, alcohol and tobacco. Core inflation rates for the Eurozone in 2000 and 2001 were at the time of the analysis not available on the Eurostat online database.

2.2 Methodology of analysis of real sector financial structures

For the purpose of this research, I constructed the sample of representable number of public companies for each geographical region, i.e. the United States, the Eurozone core countries and Eurozone noncore countries. Additionally, within the regions the samples were also split between big cap and small cap companies, according to the belonging index. The companies were picked from large cap indices, such as S&P 500 and S&P EURO Plus, and small cap indices, such as S&P Small Cap Index and STOXX Europe Small 200. More on the selection and total number of companies is described in the section 2.2.3 Selection process.

In order to find reliable and up-to-date information on capital structures annual reports and Bloomberg (2017b) terminal were used. I performed statistical analysis in SPSS 22.0 and Stata 12.0. Statistical output with the level of significance below 0.001 was classified as ***, while the results with the levels of significance below 0.05 and 0.1 were classified as ** and *, respectively.

2.2.1 Debt to assets ratio

The main purpose of this work was to look into the capital structures of non-financial companies from the United States and the Eurozone core and noncore countries, in order to see if financial structures of units have switched from less to more financially leveraged prior to GFC. Eurozone core countries list consists of Belgium, France, Italy, Luxembourg, The Netherlands and Germany. Higher financial leverage, measured as debt to assets ratio calculated as shown in equation (1), according to Minsky makes units more financially fragile.

$$Debt\ to\ assets\ ratio = \frac{Total\ financial\ debt}{Total\ assets} \tag{1}$$

2.2.1.1 Cross sectional and time series analysis

To test the hypothesis, I analysed debt to assets ratio in the period from 2004 to 2016. For the analysis (cross sectional and time series analysis), I calculated median values of debt to assets ratio for a particular company for the 3-years periods. I defined the periods as follows; the period prior to the boom phase (2004–2006), the boom phase (2007–2009), the period after the crisis (2010–2012 or 2011–2013) and the most recent period (2013–2015 or 2014–2016). The latter two depend whether the analysis of the median values of the ratio included the 1-year lag period or not. Further, I compared median ratios also based on the size criteria, i.e. market capitalization, and sector level. Variable Region_Cat refers to the categorical variable with the values from 1 to 3 (United States domiciled companies – 1, Eurozone core countries domiciled companies – 2 and Eurozone noncore companies – 3). Index Cat variable categorizes the companies based on the index belonging (1 to 4). Sector Cat categorizes the companies into a sector group (1 to 9). The rest of variables refer to median values of debt to assets ratio for a given time period. For example: DA_2004-2006_Median refers to the median value of debt to assets ratio in the period from 2004 to 2006. Statistical analysis of cross sectional analysis included Kruskal-Wallis and Median tests performed in SPSS.

I conducted time series analysis on the same sample as cross sectional analysis. Excluding 1-year lag period and including it. Likewise, I split the samples by region, index belonging and sector. Statistical analysis of time series analysis included Friedman Test to test whether the difference between the mean values are statistically different.

2.2.1.2 Multivariate regression

I performed OLS regression of debt to assets ratio in the period from 2004 to 2015, to identify which factors have affected the value of the ratio prior to and after the crisis. Equation (2) describes the regression model used in the analysis.

$$DA_i = \alpha + \beta_1 Period_{it} + \beta_2 UnitedStates_{it} + \beta_3 EurozoneCore_{it} + \beta_4 UnitedStatesEurozoneNonCore_{it} + \beta_4 BigCap_{it} + \beta_5 InterestRate_{it} + \beta_6 Revenue_{it} + \beta_7 PB_{it} + \beta_8 LTAssetsTotalAssests_{it} + \beta_9 ROIC_{it} + \varepsilon_{it}. \qquad (2)$$

I used the sample of panel data, which included dummy variable (Period) for the period before the crisis in 2009 – 0 and after the crisis – 1. Based on the same approach, I also created dummy variables for the regional belonging of the subject company (Variables: United States, Eurozone Core, Eurozone Noncore) and market capitalisation of the company (Big Cap), where, for example, I assigned 1 to the company which was classified as the big cap.

Variable Interest Rate refers to the change of the interest rate imposed by the central bank two years prior to the measurement of debt to assets ratio. The rationale behind it is the fact that increased interest rates are translated to the real economy with a lag. For example, as interest rates increase, the companies with liquidity problems will be able to stay afloat for a while but will face debt repayment difficulties as the time passes and the output in the economy declines, as the consequence of increased interest rates.

Variable Revenue refers to the increase in the top line in the period from 3 years prior to the measurement to the previous year of the debt to asset ratio measurement. The rationale is that decision makers in the company and in credit providing institutions analyse the historical financial performance metrics to assess the potential of the company to generate future cash flows.

According to Baskin (1989), the revenue growth should have a positive effect on the level of indebtedness since the growth in revenues should be supported by the increase of both current and noncurrent assets, which are usually financed by debt.

Variable ROIC, calculated as earnings before taxes (EBT) divided by total capital invested, refers to the increase of operating performance measures in the period from 3 years prior to the measurement to the previous year of the debt to asset ratio measurement. In previous papers, it has been confirmed that the operational excellence is negatively correlated to the level of indebtedness (Titman & Wesels, 1988; Pandey, 2001; Rajan & Zingales, 1995).

The price to book ratio (PB) in the previous year of the measurement of debt to assets ratio indicates how the market perceives the growth opportunity of the company. High value of PB ratio could also imply that the company is overvalued and may issue new bonds (Berk, 2005).

Variable LTAssetTotalAssets refers to the ratio of long-term assets to total asset in the previous year to the measurement of debt to assets ratio. Higher ratio increases the possibility to set up more collateral when issuing a bond or asking for loan (Myers, 1977).

2.2.2 Interest coverage ratio

In addition to analysing financial leverage, sample companies were classified into units (hedge, speculative and Ponzi), as described by Minsky. Beshenov and Rozmainsky (2015) used the same approach in their analysis of Greek debt crisis. I analysed the interest coverage ratio, calculated as shown in equation (3), to identify the unit's ability to service its debt obligations.

$$Interest\ coverage\ ratio = \frac{EBIT}{Interest\ expense} \qquad (3)$$

According to practical experts, a unit that is resilient to external shocks will have an interest coverage ratio above three (Damodaran, 2011; Teplova, 2011). For the purpose of this analysis, I classified companies with interest coverage ratio above three as hedge units. Using the same approach as Beshenov and Rozmainsky (2015), the companies with interest coverage ratio between zero and three were classified as speculative units and the others as Ponzi units. Time series of such classifications should demonstrate if the number of Ponzi and speculative units increased prior to the crisis in 2009. I conducted the analysis based on the samples split by regional belonging (United States and Eurozone) as well as the index belonging.

2.2.3 Selection process

Table 1 summarizes the number of samples used for the analysis of financial leverage, the interest coverage ratio and key financial performance metrics. I excluded the sample of diversified sector from the sector level analysis due to the number (n=1) of companies in the sample.

I constructed the sample of companies out of 1525 companies, out of which 500 were part of S&P 500 index, 225 of S&P EURO + index, 600 of S&P SMALL CAP 600 and 200 were a part of STOXX EURO SMALL 200 index. I selected the indices based on several criteria. First of all the index had to have more than 100 companies to provide a sufficient number of sample companies for the analysis. Next the indices needed to be specialized solely on either the United States or Eurozone region. Third the index had to consist of either small or big cap companies. Forth the index list of index constituents had to be accessible on Bloomberg terminal (2017c) for at least the recent 10 years.

To avoid excluding the companies that were removed from the index list because they went bankrupt after the crisis, I created a list of index constituents based on index compositions prior to the crisis. Ideally, the date of index composition list would be aligned with the start of the observed period. Unfortunately, not all of indices report their composition lists that far in the past. For other indices than S&P 500, the lists were not available on the Bloomberg terminal as of 31. 12. 1999. Nonetheless, with the exception of S&P EURO +, the remaining index composition lists were taken as of 2. 10. 2003.

Table 1: Summary table of sample sizes

	United states		Eurozone		
	S&P 500	**S&P SMALL CAP 600**	**S&P EURO +**	**STOXX EURO SMALL 200**	**Total**
Basic Materials	17	14	10	2	**43**
Communications	19	8	15	11	**53**
Consumer, Cyclical	50	51	20	8	**129**
Consumer, Non-cyclical	61	47	17	12	**137**
Energy	16	16	3	1	**36**
Industrial	47	68	14	15	**144**
Technology	33	28	4	4	**69**
Utilities	22	9	9	4	**44**
Diversified	-	-	-	1	**1**
Total	**265**	**241**	**92**	**58**	**656**

Source: own work.

The list of S&P EURO + was taken as of 21. 7. 2014. I removed the companies the data of which was not available from the sample. Dataset was then cleaned from errors (n=2). In that way I constructed a list of 1514 companies, since 9 of the companies were the members of two indices (duplicates). I screened the companies based on whether they are part of the United States or Eurozone region so that they are directly affected by FED or ECB monetary policies (153 companies were removed) Additionally, as the analysis is focused only on the real economy, I filtered out the financial sector companies (n=210). I also cleaned the sample from the companies that were acquired (n=424), went private (n=1) or were delisted (n=70). Based on the selection process I constructed the sample of 656 companies.

2.3 Methodology of the analysis of loans breakdown from credit institutions

Many scholars have focused only on the analysis of companies in the real sector. This analysis also analyses lending behaviour of financial intermediaries. Financial institutions are the ones that actually supply real sector with resources for investments, via new loans. Therefore, before the crisis when economy is doing well and the expectations dictate high rate of investment, one would expect to see an increasing trend of loans. This may apply for loans to non-financial sector or to households. Therefore, I analysed aggregated balance sheets of financial institutions separately for FED and ECB regulated credit institutions, to see if lenders have indeed increased loans to households. I gathered the data for the analysis from the FED (2018) and the ECB (2018). Loans breakdown in the United States refers to US commercial banks loans and leases breakdown, which are categorized into commercial and industrial loans, real estate loans, consumer loans and other loans. For the purpose of the analysis, I summed together the consumer and real estate loans to represent the total loans to households.

The analysed data for the Eurozone refers to the loan breakdown of Eurozone resident monetary financial institutions excluding the Euro system. Loans were separated into loans to monetary financial institutions (hereinafter: MFI's), general government and non-MFI's excluding general government, as reported by the ECB. The latter was further categorized into loans to financial corporations except MFI's, credit for consumption, lending for house purchase and other lending. For the purpose of this analysis, I calculated the total household loans as the sum of lending for a house purchase and a credit for consumption.

Moreover, I calculated the compound annual growth rate (CAGR) as shown in equation (4), to compare the movement of the amounts prior to (2000–2008) and after the crisis (2008–2016). In the equation (4), n_2 refers to the amount at the end of the analysed period and n_1 refers to the amount at the beginning of the period while t refers to the number of periods (years) between the beginning of the period and the end of the analysed period.

$$CAGR = \left(\frac{n_2}{n_1}\right)^{1/t} - 1 \tag{4}$$

2.4 Methodology of analysis of household debt

To confirm or reject the question whether prior to the crisis households indeed increased their indebtedness instead of non-financial sector, I compared debt to income ratio as shown in the equation (5) of households through the period from 2000 to 2016. I did it separately for the United States and 17 Eurozone country members. Note that Malta and Cyprus were not included in the analysis due to the absence of comparable data at the time of analysis.

$$Debt\ to\ income\ ratio = \frac{Total\ household\ debt}{Net\ disposable\ income} \tag{5}$$

In the equation (5) the debt of households is defined as all liabilities that require a payment of interest or principal amount at a specific date in the future. However, not all debt instruments are included, as shares, equity and financial derivatives are not considered as debt.

I gathered the data from the OECD (2018) database and conducted the analysis on the sample of 17 Eurozone countries and the United States (Austria, Belgium, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, the Netherlands, Portugal, Slovakia, Slovenia and Spain) separately, since ratios of the countries within the Eurozone vary significantly. Therefore, aggregating the data could produce biased results.

3 ANALYSIS

This section explains the rationale behind every analysis conducted for the purpose of answering the research questions set in section 1.4 Research question development.

3.1 Analysis of monetary policies

Different economic situations require different monetary actions in order to preserve economic stability. In times of economic prosperity, central banks normally act to prevent overheating of the economy, while in the times of financial panics (wars, depression, etc.) they act with interest to calm the markets.

Various measures have been taken throughout the history and not all of them were as successful as their originators hoped they would be. Namely, there is no rule on how and when to use particular monetary action and most importantly, you can never perfectly estimate what the outcome would be and how fast the market would react. As described by Cukierman (2012), one of the first tasks of central banks was to inject liquidity into the financial system in the times of financial panics. In the beginning of the 19th century, Thorton (1802) and Bagehot (1873) suggested that the lender of last resort policy would save temporary liquidity problems of the recipients and provide solvency. Several decades later with Keynes influence on economic thinking and the situation after the Second World War, the focus of central banks shifted to stabilization of the real economy (Cukierman, 2009). To ensure the stability central bankers referred to the Phillips curve (Phillips, 1958) which represents a stable policy trade-off between inflation and unemployment.

Disinflation, following the great inflation in 1970's in the US changed the focus of central bankers towards the price stability on the long-run. Indeed, disinflation was followed by the period of relatively stable output and inflation. However, it was soon recognized that monetary policy could not affect real variables on the long-run, but can instead be used to stabilize the real business cycle in the short and medium run (Cukierman, 2012).

In 1993, Taylor introduced an inflation targeting rule (Taylor, 1993). In his version of inflation targeting policy, the central bank sets a short-term interest rate, given the fact that the inflationary expectations and economy structure are given in order to minimize a weighted linear combination of output and inflation gaps. An output gap being the deviation between the potential output of the economy and the actual output, while the second gap is described as the deviation of actual inflation from the inflation target. Accordingly, the main policy instrument of central banks is interest rates. By controlling interest rates, inflation should move close to the desired levels and bubbles could be avoided.

In the times of financial panics, central banks most commonly follow the lender of last resort policy as described by Thorton and Bagot. The policy, however, is in conflict with the inflation targeting. Since in the times of financial crisis, in 2008, the inflation is not the main risk that economy is facing (the safety of public and banks is), a lender of the last resort policy might indeed be more appropriate. However, when the central bank acts as a lender of the last resort that may encourage market participants to excessive risk taking and it does not solve the problem but leads to the crisis.

3.1.1 United States

In the United States, the Federal Reserve System (FED) is the central bank that performs functions that promote an effective operation of the US economy. Specifically the FED performs the following functions in order to promote an effective operation of the US economy as described on FED's webpage (About FED, 2017):

- Conducts monetary policy,
- Promotes financial system stability,
- Supervises and regulates financial institutions and activities,
- Fosters payment and settlement system safety and efficiency,
- Promotes consumer protection and community development.

Cukierman (2012) explains that, Federal Reserve System (FED) was created mainly to prevent high volatility in the financial system and banking failures. Looking at the description of functions performed by the FED provided on its webpage, the list contains also a lot of monitoring activities and supervision. According to many observers it includes something that was missing in the times prior to the crisis.

Particularly, the monetary policy of FED is oriented towards achieving maximum employment (normally somewhere around 5 % unemployment rate), stable prices (2 % inflation rate), and moderate long-term interest rates (FED). It does so by managing the level of short-term interest rates and influencing the availability and cost of credit in the economy. Short-term money market interest rates (or federal funds rate) are kept at or near the target rate set by the Federal Open Market Committee (FOMC) by buying or selling securities issued or backed by the US government in the open market. This open market operations (hereinafter: OMO) function in a way that Federal Reserve buys US government issued securities by crediting the reserve accounts of banks and increasing reserve balances. A greater supply of money would likely tend to put downward pressure on short-term money market rates, as banks would be willing to lend money at lower interest rate. Another tool of traditional monetary policy, not frequently used before 2007 is Discount Window Lending, which allows banks to get an overnight funding from Federal Reserve. Since 2003, interest rates for such loans have been set above the federal funds target rate and were therefore not so attractive for depository institutions. Banks would normally borrow from the discount window only when the market conditions were tightened enough to push the short-term money market interest rate above the discount window interest rate. After the global financial crisis that was exactly the case. Thus, one way that FED responded to the crisis was by expanding its lending through the discount window to banks experiencing liquidity problems. Another response of the FED was cutting the federal funds rate to support the economy. This type of monetary easing was substantial, from 5.0 % in 2007 to 0.2 % in 2009, as shown in the Figures 2 and 3. Further, Figures 2 and 3 show the relation between money market interest rates and inflation rates in the United States.

Figure 2: CPI inflation rates vs money market interest rates in the United States
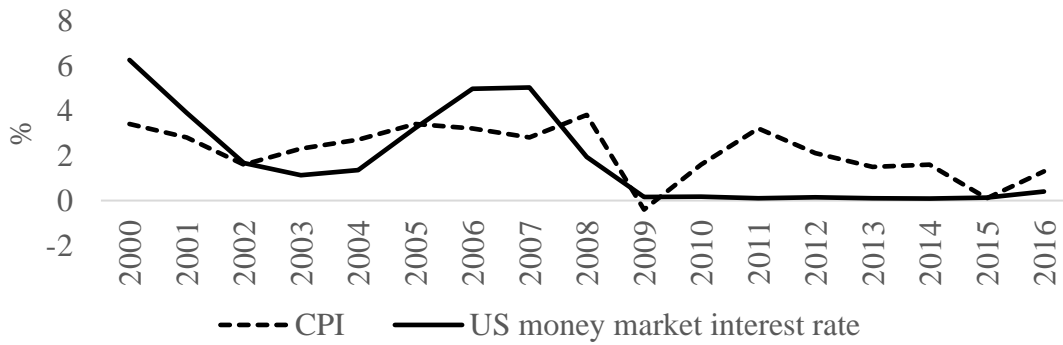
Source: own work.

Figure 3: Core CPI inflation rates vs money market interest rates in the United States
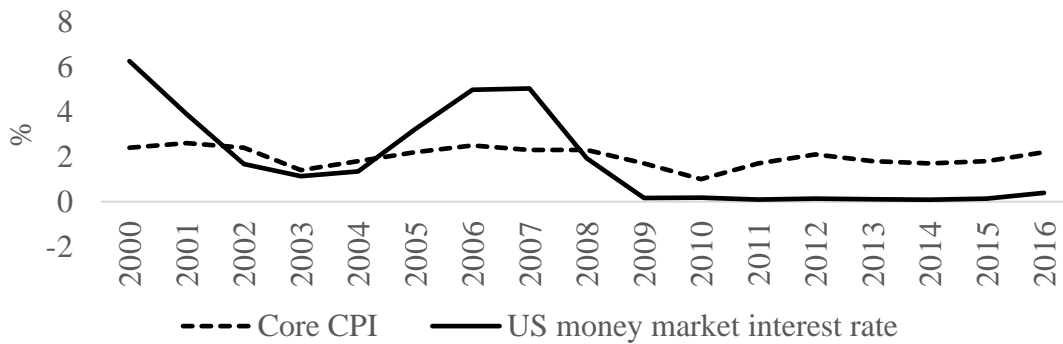
Source: own work.

Additionally, the Federal Reserve introduced a variety of programs that addressed the need for short-term liquidity in markets. Due to a massive long-term asset purchases in late 2008, long-term interest rates were put under downward pressure and the size of the Federal Reserve's balance sheet increased significantly as shown in Figure 4. Furthermore, the FED undertook Maturity extension program (hereinafter: MEP) whose purpose was to purchase Treasury securities with remaining maturities from 5 to 30 years and At the same time, FED sold Treasury securities with remaining maturities of up to 3 years. MEP therefore had no effect on the size of the FED's balance sheet. Finally in fourth quarter of 2012, with the unemployment rate of more than eight percent (FED Monetary policy, 2016), Federal Open Market Committee (hereinafter FOMC) started to purchase additional MBS in order to further stimulate the economy. The program was open-ended, meaning, that the purchases would be made until the outlook for the labour market had improved. In late 2013, the rate of asset purchases slowed down and the third asset purchase program was concluded in October 2014. Since then, the FOMC has announced plans and has taken steps to return short-term interest rates to the levels that are normal and reduce the size of FED's balance sheet.

Figure 4: Balance sheet of the FED.
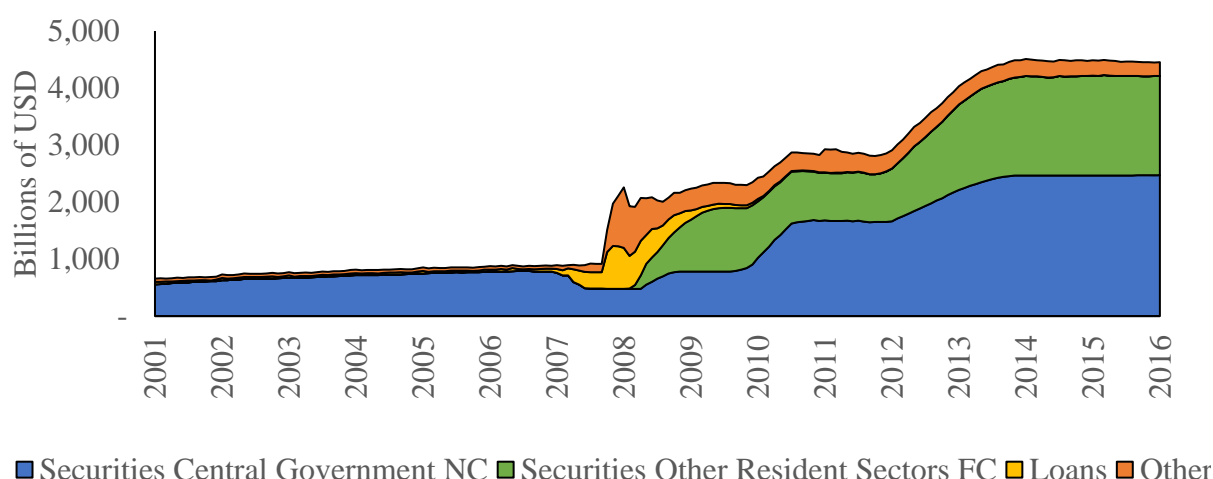
Source: own work.

3.1.2 Eurozone

European Central Bank (hereinafter: ECB) is the central bank of the Eurozone countries. Its main task is to preserve purchasing power of its single currency Euro. Moreover, the ECB also acts as a supervisor of credit institutions located in Eurozone and participating in non-euro area. Therefore, it is the governing regulatory institution providing safety and soundness of the euro-area banking system and stability of the financial system within the Eurozone.

The primary objective of its monetary policy is to maintain price stability, which supports its intention to preserve purchasing power of the Euro. To facilitate the economy and not to overheat it, ECB aims at inflation rate of below, but close to 2 % as written on ECB's webpage (About ECB, 2017). The former governor of the Bank of Japan Masaaki Shirakawa writes that central banks usually focus on core inflation rates, which exclude the prices of energy and food items, as fluctuation in their price is a consequence of exogenous supply shocks. However, according to ECB's webpage the central bank is referring to consumer prices measured by harmonized index of consumer prices (hereinafter: HICP).

Overall, ECB's monetary policy since 1999 until sovereign debt crisis in 2010 can be divided into five phases. In each phase monetary policies were faced with different kind of challenges, hence they required different kind of actions. First, from mid-1999 until 2000, Governing Council of ECB raised the main refinancing interest rates (the interest rate) in order to contain inflationary pressures against the backdrop of increasing import prices and strong economic growth (ECB, 2011). Second, after October 2000 disappearing upward inflation pressure along with geopolitical uncertainty the key interest rates were cut down to 2 % in the period from May 2001 to June 2003. Third phase, up to December 2005 the interest rates imposed by EBC were unchanged, since price levels were at desired levels. Forth, inflation rates gradually increased against the background of promising economic growth and substantial extension of the money supply and credit in the Eurozone. With upside risks to price stability prevailing

29

until mid-2008, the ECB brought key interest rate to 3.9 % in 2007. Fifth and the final period started in the autumn of 2008 after the Lehman Brothers collapse. Suddenly, the economy was no longer in a good shape and upward inflationary pressures were no longer an issue. ECB reduced the interest rate to 0.4 % in 2009, as shown in Figure 5 and 6, which show the relationship between money market interest rates and inflation rates in the Eurozone. Furthermore, the central bank additionally introduced non-traditional monetary policies, such as Enhanced Credit Support and the Securities Markets Programme.

Figure 5: HICP inflation rates vs. money market interest rates in the Eurozone
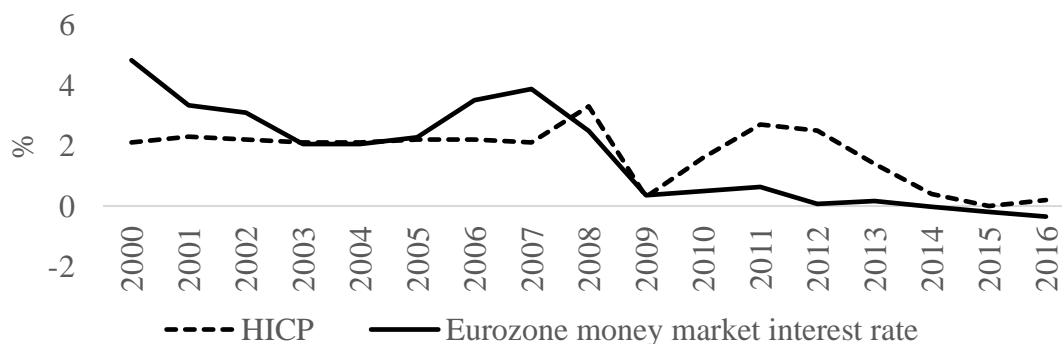
Source: own work.

Figure 6: Core CPI Inflation rates vs money market interest rates in the Eurozone
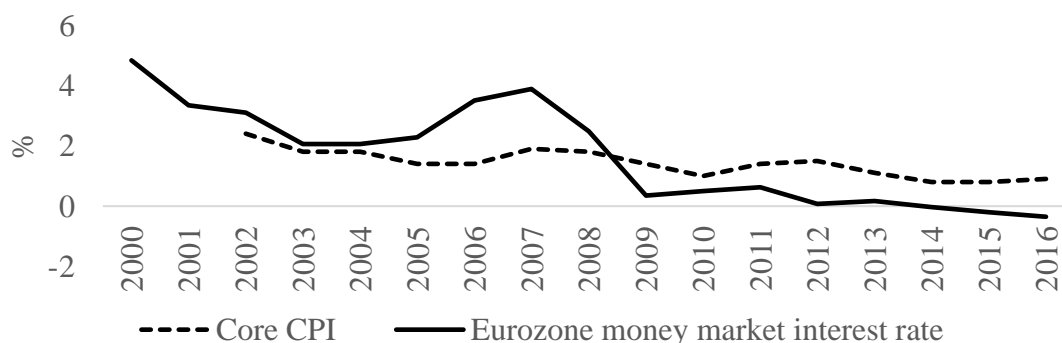
Source: own work.

Enhanced Credit Support is a set of non-traditional policies to support financing conditions and the flow of credit as this was no longer achievable with standard measures through the interest rates reductions. Already before the collapse of the Lehman Brothers, ECB decided to introduce supplementary long-term refinancing operations (hereinafter: LTROs) with maturities of three and six months to provide liquidity. After the collapse, ECB further increased its intermediation role targeted at refinancing problems in Eurozone banking system by extending the maximum maturity of LTROs to twelve months. Additionally, ECB provided liquidity in foreign currencies during the financial crisis to support banks, which were facing shortfalls in foreign currencies funding during that time. Within the scope of the programme, ECB purchased euro-denominated covered bonds issued in the Eurozone (Covered Bond Purchase Programme) at value of €60 billion in the period from May 2009 to June 2010 (ECB, 2011). According to the

exit strategy, ECB began partial phasing-out of Enhanced Credit Support programme, as improvements in financial market conditions started to show at the end of 2009. However, some elements of Enhanced Credit Support were still kept.

In the early 2010, tensions in sovereign bond markets re-emerged and called for a new type of programme called Securities Markets Programme. This new measure was focused on ensuring normal functioning of money markets and supporting banking sector. ECB started to purchase government bonds strictly on secondary markets to ensure liquidity in the markets and to restore the functioning of traditional monetary policies transmission mechanism. As Eurozone sovereign bonds were downgraded, the debt crisis intensified in 2011. Thus, the Securities Markets Programme was not sufficient to fight it anymore. In late 2011, as a response to the proposal of European Banking Authority (EBA) for additional capital buffers for banks, ECB focused on providing banks with short-term liquidity through the following actions; two LTROs, in December 2011 and February 2012, which in total provided around €1 trillion of medium term liquidity to banks in the Eurozone. Next, the ECB reduced the minimum reserve ratio requirement from 2 % to 1 % to reduce the collateral needed to satisfy requirements and increased incentives to the banks that held excess cash to offer their liquidity to other banks. Furthermore, ECB increased collateral availability by allowing national central banks to accept bank loans as collaterals. Finally, in November 2011, second Covered Bond Purchased Programme was launched. The programme ended at the end of October 2012 and totalled to amount of €16.4 billion.

With the government crisis in Greece as well as in Italy and downgrades of 9 Eurozone countries (Austria, Cyprus, France, Italy, Malta, Portugal, Slovakia, Slovenia and Spain) in 2012, yields on government bonds reached the new heights and increased the risk that those countries would exit European Monetary Union (EMU) and redenominate public and private liabilities. This provoked ECB to step in and act as a lender of last resort in government bonds market through Outright Monetary Transactions (hereinafter: OMT). OMT resembled to Securities Markets Programme, while it had stricter access to it, it was more transparent and was unlimited in time. OMT indeed reduced market volatility in Eurozone. Nevertheless, at the end of 2012 and the beginning of 2013 the new setback emerged. Inflation fell short from 2.5 % at the end of 2012 to 0.4 % in 2014.

After the actual inflation rates were down, ECB undertook the Third Covered Bond Purchase Programme and Asset-Backed Securities Purchase Programme to increase the ability of banks to expand their lending and support economic growth. Since that did not suffice, ECB announced the Expanded Asset Purchase Programme or often called Quantitative easing (QE). Since the end of 2014, Eurozone has faced almost no inflation and for some time even deflation with very low output growth rates while the interest rates were close to zero. Therefore a traditional monetary was no longer a viable source of stimulus for economic growth. Expanded Asset Purchase Programme, which is taking place in secondary markets and its amount does not exceed one third of a country's debt issuance or 25 % of any issue, started on 22nd January 2015. Central bank started to create money to purchase financial assets, like government bonds, from private investors such as pension funds, banks and insurance companies. In addition to

Asset-Backed Securities Programme and Third Covered Bonds Purchase Programme the three will last until "a substantial adjustment in the path of inflation towards the ECB's objective of lower but close to 2 % is observed" (Delivorias, 2015).

As from November 2014, when ECB introduced Single Supervisory Mechanism it oversees 120 institutions with holdings of 85 % of total assets in Eurozone banking sector. Focus of the mechanism is supervision of capital adequacy.

Figure 7 shows the expansion of ECB's balance sheet due to the asset purchase programs.

Figure 7: Balance sheet of the ECB
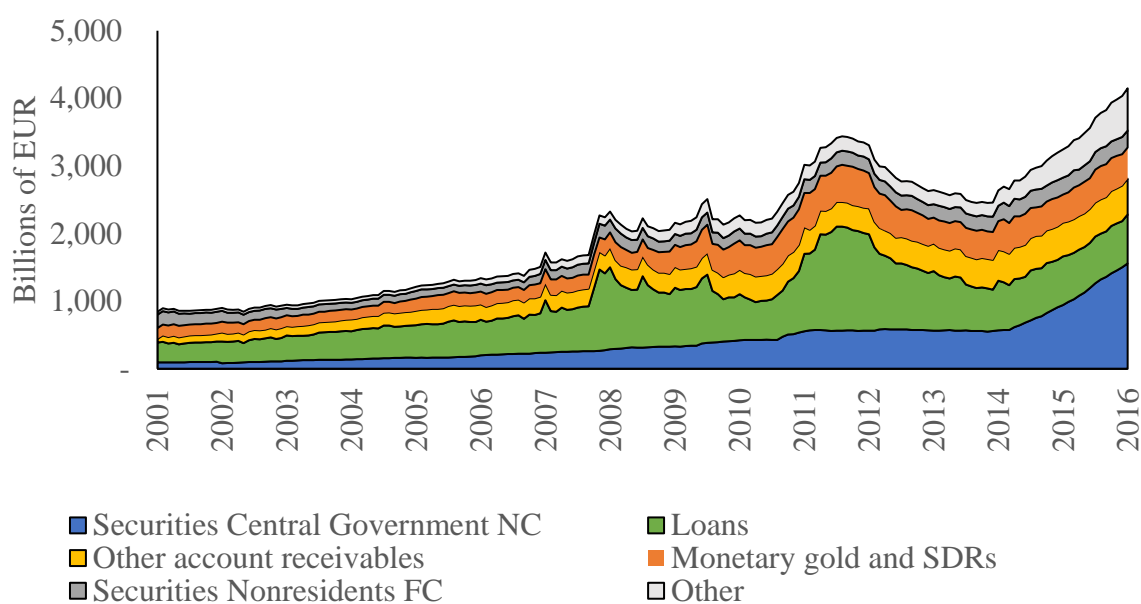
Source: own work.

3.1.3 Discussion

Central banks play an important role as an economic cycle's facilitator. When the economic output is at its lowest and inflation is low, central banks will normally try to bring down money market interest rates by increasing money supply to encourage credit-providing institutions to lend more and at a lower price. Hence, this will stimulate economic units to invest and spend more and thus increase economic output as well as price levels. Minsky agrees that central banks tend to support the economic growth from the bottom point of business cycles by reducing the interest rates until the economy becomes overheated. That is the point when it starts to gradually or instantly increasing the interest rates. The increase of interest rates may serve as the event that disrupts the fragile system and turn the economy in depression. Thus, it is of great importance that the institutions responsible for monetary policies act appropriately, which may not be an easy task. What may have worked in the past, does not necessarily work in the present. Sometimes history can serve as the best practice but often it is not the case, since no economic situation in the past was identical to another. Minsky also believes that central banks should act as a lender of last resort to further support the economic cycles.

Indeed, central banks in the United States and the Eurozone, respectively FED and ECB, have reduced interest rates in the periods prior to the crisis. After the dotcom bubble at the begging of the 21st century, both central banks reduced interest rates to keep their economy's output growing. Until 2004, both FED and ECB kept reducing interest rates until inflation rates surpassed the target of 2 %. Afterwards, the interest rates were increased and many loans i.e. mortgages, especially the ones with adjustable rates in the US, were very much affected by it. ECB continued to increase interest rates up until 2007 and FED up until 2008. Taylor (2009), the author of Taylor rule argues that according to his rule, FED and ECB failed to increase interest rates fast enough. Moreover, they were running "loose fitting" policy, which inflated the bubble to higher levels than it would otherwise. Even when comparing FED's monetary policy with its historical actions, interest rates were again increased way slower than one would expect according to the past (Taylor, 2009). Thus, as both central banks did support the economy by keeping interest rate low, the precondition to Minsky's hypothesis is met.

Both central banks reached for untraditional measures to fight liquidity problems in banking system that had roots in the United States. In addition to lowering the interest rates after the crisis happened, FED responded by increasing its balance sheet at a greater pace than ever before. ECB too, did take actions to facilitate credit availability when there was a lack of liquidity in banks. Likewise, ECB balance sheet grew too but not at the same pace as FED's. Moreover, while FED started to expand its balance sheet immediately after second half of 2007 until 2014, ECB started to significantly increase the total amount assets not earlier than 2008 and then again in 2011 (European debt crisis) and 2014. Nevertheless, this demonstrates that with programs such as asset purchase programs both central banks acted as lenders of the last resort, as Minsky would predict.

3.2 Analysis of real sector financial structures

The main component of Minsky's idea is that non-financial corporates are getting more indebted as economy approaches the peak of economic activity. Promising assumptions about the future state of the economy increases the value of assets and increases the appetites of managers to raise funds in order to expand their business and live up to the expectations of all stakeholders.

In my analysis, I used the approaches of analysing debt to assets ratio and the approach of counting the number of speculative and Ponzi units in order to assess if any of them support the FIH. Financial leverage, calculated as debt to assets ratio and interest coverage ratio were compared on the geographical criterion (the United States versus the Eurozone), on the index level (small cap versus big cap) and on the sector level.

3.2.1 Financial leverage (Debt to assets ratio)

I conducted the analysis of median values of debt to assets ratio to answer the question whether the companies domiciled in the United States and in the Eurozone have increased their financial leverage, i.e. debt to assets ratio, prior to the GFC as Minsky would predict. Furthermore, my

analysis tests if the companies from the Eurozone core and noncore countries are more indebted than their peers from the United States. To answer the research questions I performed cross sectional and times series analysis as well as multivariate regression. I prepared time series and cross sectional analysis also separately with taking into account 1-year lag period for the changes to take place and without the 1-year lag period. Tables 2, 3, 4 and 5 show descriptive statistics of the samples used for the cross sectional and time series analysis of the debt to assets ratio.

3.2.1.1 Cross sectional analysis

The results of cross sectional analysis of median values of debt to assets ratio of companies domiciled in the United States, Core countries of Eurozone and Noncore countries of Eurozone confirmed with statistical significance that the European companies were operating with higher median value of financial leverage compared to their peers from the United States. Tables 2, 3, 4 and 5 show descriptive statistics of the samples used for the cross sectional and time series analysis of the debt to assets ratio.

As shown in Table 6, the outcome does not change even if we exclude the 1-year lag after the crisis. DA_2004-2006_Median stands for median value of debt to assets ratio in period from 2004 to 2006 (i.e. prior to the boom phase). When the Eurozone companies are compared on the basis of their location, i.e. core countries versus noncore, the results indicated significantly higher debt to assets ratios for companies from the Eurozone noncore and core countries compared to the United States domiciled companies in all analysed periods. Furthermore, the ranking of the samples remained constant through the analysed periods.

While Eurozone domiciled companies reported higher median values of debt to assets ratios, the analysis based on market cap of the company reveals that the United States domiciled small caps were the least indebted sample. As shown in Table 7, the gap between the small caps and the big caps in the United States was significantly wider than the one in the Eurozone. Prior to the boom phase, Eurozone big cap companies operated with the highest median values of the ratio but small cap peers surpassed them during the boom phase. After the crisis, the ranking between the four remained unchanged; Eurozone small caps as the most indebted sample, followed by Eurozone big caps, the United States big caps and the United States small caps. Excluding the 1-year lag does not change the outcome.

As shown in appendix A, basic materials sector was the most indebted sector prior to the crisis. Based on statistically significant result of the analysis technology was the least indebted sector prior to, during and after the crisis. During the crisis, communication sector experienced the highest median value of the ratios. The ranking after the crises did not change considerably. Only energy sector moved up and surpassed the industrial sector. Excluding the 1-year lag, the energy sector did not surpass the industrial sector and the gap between the communication and basic materials sector narrowed, as compared to the period during the crisis.

Table 2: Descriptive statistics of the cross sectional and time series analysis of debt to assets ratio

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
DA_2004-2006_Median	656	0.000	0.818	0.208	0.151	0.512	0.095	0.140	0.191
DA_2007-2009_Median	654	0.000	0.953	0.234	0.164	0.544	0.096	0.226	0.191
DA_2010-2012_Median	651	0.000	0.956	0.226	0.159	0.637	0.096	0.549	0.191
DA_2011-2013_Median	651	0.000	1.317	0.234	0.163	0.854	0.096	2.641	0.191
DA_2013-2015_Median	651	0.000	0.982	0.253	0.166	0.598	0.096	0.768	0.191
DA_2014-2016_Median	650	0.000	1.160	0.271	0.169	0.631	0.096	1.227	0.191

Source: own work.

Table 3: Descriptive statistics of the cross sectional and time series analysis of debt to assets ratio of United States companies

United States	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
DA_2004-2006_Median	506	0.000	0.818	0.191	0.150	0.667	0.109	0.454	0.217
DA_2007-2009_Median	505	0.000	0.953	0.215	0.163	0.690	0.109	0.588	0.217
DA_2010-2012_Median	504	0.000	0.781	0.210	0.156	0.606	0.109	0.198	0.217
DA_2011-2013_Median	504	0.000	0.754	0.220	0.157	0.508	0.109	0.046	0.217
DA_2013-2015_Median	504	0.000	0.951	0.248	0.165	0.445	0.109	0.171	0.217
DA_2014-2016_Median	503	0.000	1.160	0.272	0.171	0.525	0.109	0.962	0.217

Source: own work.

Table 4: Descriptive statistics of the cross sectional and time series analysis of debt to assets ratio of Eurozone Core companies

Eurozone Core	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
DA_2004-2006_Median	109	0.000	0.704	0.250	0.140	0.373	0.231	0.203	0.459
DA_2007-2009_Median	108	0.000	0.714	0.277	0.146	0.502	0.233	0.063	0.461
DA_2010-2012_Median	107	0.000	0.956	0.257	0.149	1.323	0.234	3.889	0.463
DA_2011-2013_Median	107	0.000	1.317	0.262	0.174	2.399	0.234	12.130	0.463
DA_2013-2015_Median	107	0.000	0.982	0.251	0.165	1.480	0.234	4.329	0.463
DA_2014-2016_Median	107	0.000	0.982	0.248	0.154	1.305	0.234	4.042	0.463

Source: own work.

Table 5: Descriptive statistics of the cross sectional and time series analysis of debt to assets ratio of Eurozone NonCore companies

Eurozone NonCore	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
DA_2004-2006_Median	41	0.004	0.651	0.312	0.133	(0.339)	0.369	0.730	0.724
DA_2007-2009_Median	41	0.012	0.632	0.351	0.148	(0.265)	0.369	0.178	0.724
DA_2010-2012_Median	40	0.001	0.638	0.344	0.156	(0.008)	0.374	(0.489)	0.733
DA_2011-2013_Median	40	0.001	0.631	0.348	0.159	(0.064)	0.374	(0.677)	0.733
DA_2013-2015_Median	40	0.000	0.767	0.327	0.171	0.278	0.374	0.266	0.733
DA_2014-2016_Median	40	0.000	0.810	0.310	0.182	0.518	0.374	0.805	0.733

Source: own work.

Table 6: Cross sectional analysis of debt to assets ratio by region

	United States			Eurozone_Core			Eurozone_NonCore			Test statistics			
	N	Mean Rank	Mean	N	Mean Rank	Mean	N	Mean Rank	Mean	Chi-Square	df	Asymp. Sig.	Total N
DA_2004-2006_Median	506	304.88	0.19	109	385.07	0.25	41	469.61	0.31	40.35	2	***	656
DA_2007-2009_Median	505	304.57	0.22	108	380.60	0.28	41	469.61	0.35	39.35	2	***	654
DA_2010-2012_Median	504	307.35	0.21	107	362.68	0.26	40	462.85	0.34	30.23	2	***	651
DA_2011-2013_Median	504	309.90	0.22	107	353.54	0.26	40	455.18	0.35	24.87	2	***	651

Source: own work.

Table 7: Cross sectional analysis of debt to assets ratio by index

	S&P 500			S&P EURO+			Test statistics			
	N	Mean Rank	Mean	N	Mean Rank	Mean	Chi-Square	df	Asymp. Sig.	Total N
DA_2004-2006_Median	265	337.40	0.22	92	415.27	0.27	51.15	3	***	656
DA_2007-2009_Median	265	349.19	0.25	92	401.66	0.29	63.89	3	***	654
DA_2010-2012_Median	265	365.52	0.26	92	385.89	0.28	75.57	3	***	651
DA_2011-2013_Median	265	363.15	0.26	92	373.01	0.28	61.65	3	***	651
	S&P SMALL CAP 600			STOXX EURO 200			Test statistics			
DA_2004-2006_Median	241	269.12	0.16	58	396.93	0.26	51.15	3	***	656
DA_2007-2009_Median	240	255.29	0.18	57	410.97	0.30	63.89	3	***	654
DA_2010-2012_Median	239	242.86	0.16	55	396.71	0.29	75.57	3	***	651
DA_2011-2013_Median	239	250.87	0.17	55	394.88	0.30	61.65	3	***	651

Source: own work.

3.2.1.2 Time series analysis

The results of time series analysis of the samples indicate that including a 1-year lag period median values of debt to assets ratio was, with statistical significance, higher during the boom phase than it was prior to the boom phase. Afterwards, the median value of the ratio decreased and rebounded to its new peak in the most recent period. Excluding the 1-year lag period, the outcome does not differ considerably. As shown in Table 8, the gap between the period prior to the boom phase and the most recent period is somewhat narrower but the same conclusion can be drawn. Based on the statistically significant analysis, median values of debt to assets ratio increased prior to the crisis and decreased after it.

Table 8: Time series analysis of debt to assets ratio including one-year lag period and without it

Without one-year lag	Mean Rank	Mean	With one-year lag	Mean Rank	Mean
DA_2004-2006_Median	2.26	0.21	DA_2004-2006_Median	2.19	0.21
DA_2007-2009_Median	2.64	0.23	DA_2007-2009_Median	2.54	0.23
DA_2010-2012_Median	2.35	0.23	DA_2011-2013_Median	2.41	0.23
DA_2013-2015_Median	2.75	0.25	DA_2014-2016_Median	2.86	0.27
N	651			650	
Chi-Square	67.02			97.74	
Df	3			3	
Asymp. Sig.	***			***	

Source: own work.

Table 9 explains the movement of the ratio when the sample of all companies was split based on the region of domicile. The median values of debt to assets ratio increased, with statistical significance, in all regions when comparing the period prior to the boom phase and the following period. Furthermore, the median values of the ratio decreased after the crisis in all samples. However, the gap between the median value of the ratio in the boom phase and after the crisis is the narrowest in the sample of companies domiciled in the United States. In the most recent period, the median values of debt to assets ratio of the United States companies increased considerably and surpassed the values in the boom phase, while in other samples the median values of the ratio after the crisis was below or near to the values prior to the boom phase. When 1-year lag period is excluded from the analysis, the decrease of the median values of the ratio after the crisis is even more evident and statistically significant, especially in the sample of the United States domiciled companies.

As shown in Table 10, the analysis on an index level reveals some statistically significant observations. All samples demonstrated higher median values of debt to assets ratio in the boom phase as compared to the previous period. The difference between the periods was the smallest in case of the United States domiciled small cap companies, i.e. S&P SMALL CAP 600. Interestingly, both small and big caps from the Eurozone experienced lower median values of the ratio in the period after the crisis. On the other hand, while the United States domiciled big caps experienced slightly higher median values of the ratio in the period after the crisis, the

median value of their small cap peers decreased, when compared to the previous period. In the most recent period, the median values of the Eurozone big cap sample was at its lowest in the observed period, while the companies from the United States reached new peaks – even exceeding those from the boom phase. The results of the analysis that excludes the 1-year lag reveals that the increase in the boom phase and a decrease in the period after the crisis of median value of debt to assets ratio can be observed in all samples. Despite the fact that there are statistical significant changes between the United States big and small caps, when 1-year lag is included in the analysis, the results indicate that the trend of the median values of the ratio could potentially be more dependent on the regional setting and macroeconomic policy than on the size of the companies.

Time series analysis of the median values of debt to assets ratio by sector, shown in appendix A, reveals that all samples with statistical significance reported higher median values of the ratio in the boom phase than in the previous period. The only exception was the utilities sector where the differences between the median values were not statistically significant. After the crisis, the sectors responded in three different ways. Basic materials and energy sector increased its median value of the ratio in each period, reaching their peak in the most recent period. New peaks in the most recent period can be observed in consumer noncyclical, industrial and technology sector. However, the median value of the ratio was lower after the crisis than in the boom phase. The median values of the ratios of communication and consumer cyclical sector decreased in the period after the crises and increased afterwards as well but the latter two did not report new peaks of the median value of the ratio in the most recent period. If the analysis excludes the effect of 1-year lag period, the difference between the median values is not significant for utilities and technology sector samples. The remainder of the results is similar with the exception of communication sector experiencing a decrease of the median value of the ratio in the most recent period compared to the previous period.

3.2.1.3 Multivariate regression

Tables 11, 12, 13, 14 and 15 show the descriptive statistics of regression analysis. The results of regression indicate that with 95% confidence level debt to assets ratio in the observed was affected by the; institutional setting, by the period before or after the crisis, market capitalisation, interest rate movement, price to book ratio, the ratio of long-term asset to total assets and return on invested capital. As shown in Table 16, only the revenue growth in the period of three years prior to the measurement did not affect the ratio with statistical significance. The highest coefficient of long-term asset to total assets ratio indicates that the ratio is influenced by the value of the collateral in the previous year. Institutional setting is also one of the factors to influence the ratio. Both Eurozone core and noncore setting positively affects the ratio. Following, the size in terms of market capitalisation positively affects the value of the debt to assets ratio. Timely placement after the crisis positively affects the crisis. The change of ROIC in the period from three years prior to and one year prior to the measurement negatively affects the ratio. The change of interest rate two years prior to the measurement

positively affects the debt to asset ratio. The value of price to book ratio in year prior to the measurement additionally positively affects the ratio.

Regression on a regional level reveals that debt to assets ratio in the United States is with 95% confidence level positively affected by the period after the crisis, while the period after the crisis with statistical significance negatively affected the ratio of companies domiciled in the Eurozone core countries. The period after the crisis had no statistically significant effect on the ratio of the companies domiciled in the Eurozone noncore countries. The size in terms of market capitalisation in the previous year had statistically significant positive effect on debt to assets ratio of the United States domiciled companies. Likewise, the increase of interest rate two years prior to the measurement of the ratio and price to book ratio in the previous year. The ratio of long-term assets to total assets in the previous year to the measurement had a positive effect on all samples. On the other hand, an improvement in ROIC in previous years had a statistically negative effect on the ratio of the sample companies from the United States and the Eurozone core countries, while the change in ROIC had no statistical effect on the ratio of the Eurozone noncore countries domiciled companies.

Detailed output of OLS regression analysis per region can be found in appendix B.

3.2.1.4   Discussion

Based on the time series analysis of median value of debt to assets ratio, the conclusion is that the ratio was higher during the boom phase, i.e. from 2007 to 2009, as compared to the previous period. The latter also holds true when the sample was split based on regional belonging, i.e. the companies domiciled in the United States, the Eurozone core and noncore countries. I came to the same conclusion based on the sector level analysis of median values of the ratio. All sectors that reported statistically significant differences between the median values of the ratio during particular period, experienced higher debt to assets ratios in the boom phase, as compared to the previous period. After the GFC in 2009, the median ratio of the sample, including all sample companies, in the subsequent period was lower than during the boom phase. I observed the same results on the analysis of samples split by region. In the most recent period, i.e. from 2014 to 2016, the median value of the ratio decreased in the samples of companies domiciled in both Eurozone core and noncore countries. Eurozone was facing sovereign debt crisis that peaked in the period from 2010 to 2012. The latter must have influenced the behaviour of agents in those markets. On the other hand, the United States domiciled companies reported the highest median value of debt to assets ratio in the most recent period. The mean rank of the period was significantly higher than during the boom phase. Results of the regression analysis also support this. The ratio is, with 95 % confidence level, positively affected by the period after the crisis. The reason is in the high proportion of the United States domiciled companies in the sample, which reported new peaks of median values of debt to assets ratio after the crisis, particularly in the most recent period. Based on a time series analysis of median values of the ratio by sectors, the samples demonstrated four different trends, all of them having in common the higher median values of debt to assets in the boom phase than in the previous period.

Table 9: Time series analysis of debt to assets ratio by region including one-year lag period and without it

	United States		Eurozone_Core		Eurozone_NonCore	
Without one-year lag	Mean Rank	Mean	Mean Rank	Mean	Mean Rank	Mean
DA_2004-2006_Median	2.24	0.19	2.43	0.25	2.00	0.31
DA_2007-2009_Median	2.54	0.22	3.00	0.28	2.90	0.35
DA_2010-2012_Median	2.32	0.21	2.36	0.26	2.73	0.34
DA_2013-2015_Median	2.89	0.25	2.21	0.25	2.38	0.33
N	504		107		40	
Chi-Square	83.09		23.20		11.43	
df	3		3		3	
Asymp. Sig.	***		***		**	
With one-year lag	United States		Eurozone_Core		Eurozone_NonCore	
DA_2004-2006_Median	2.15	0.19	2.39	0.25	2.10	0.31
DA_2007-2009_Median	2.43	0.22	2.94	0.28	2.95	0.35
DA_2011-2013_Median	2.38	0.22	2.41	0.26	2.78	0.35
DA_2014-2016_Median	3.05	0.27	2.25	0.25	2.18	0.31
N	503		107		40	
Chi-Square	141.20		17.90		13.05	
df	3		3		3	
Asymp. Sig.	***		***		***	

Source: own work

Table 10: Time series analysis of debt to assets ratio by index with one-year lag period and without it

Without one-year lag	S&P 500		S&P EURO+		S&P SMALL CAP 600		STOXX EURO 200	
	Mean Rank	Mean	Mean Rank	Mean	Mean Rank	Mean	Mean Rank	Mean
DA_2004-2006_Median	1.98	0.22	2.39	0.27	2.53	0.16	2.18	0.26
DA_2007-2009_Median	2.53	0.25	2.98	0.29	2.56	0.18	2.96	0.30
DA_2010-2012_Median	2.43	0.26	2.42	0.28	2.19	0.16	2.53	0.29
DA_2013-2015_Median	3.05	0.29	2.21	0.26	2.72	0.20	2.33	0.30
N	265		92		239		55	
Chi-Square	92.37		18.35		24.11		11.53	
df	3		3		3		3	
Asymp. Sig.	***		***		***		***	
With one-year lag	S&P 500		S&P EURO+		S&P SMALL CAP 600		STOXX EURO 200	
DA_2004-2006_Median	1.92	0.22	2.38	0.27	2.41	0.16	2.20	0.26
DA_2007-2009_Median	2.42	0.25	2.92	0.29	2.43	0.18	2.98	0.30
DA_2011-2013_Median	2.45	0.26	2.45	0.28	2.30	0.17	2.62	0.30
DA_2014-2016_Median	3.21	0.31	2.25	0.25	2.86	0.23	2.20	0.28
N	265		92		238		55	
Chi-Square	136.40		14.32		29.97		14.16	
df	3		3		3		3	
Asymp. Sig.	***		***		***		***	

Source: own work

Table 11: Descriptive statistics of OLS regression of debt to assets ratio

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
DA	6468	0.000	1.833	0.229	0.163	0.757	0.030	1.997	0.061
InterestRate	6560	(3.092)	1.864	(0.187)	1.302	(0.506)	0.030	0.105	0.060
Revenue	6435	(1.000)	7.161	0.122	0.351	4.099	0.031	49.570	0.061
ROIC	5752	(39.011)	39.800	(0.004)	0.771	1.821	0.032	2375.989	0.065
PB	6296	0.000	759.618	3.421	14.207	41.048	0.031	1982.107	0.062

Source: own work.

Table 12: Descriptive statistics of OLS regression of debt to assets ratio of United States companies

United States	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
DA	4995	0.000	1.000	0.524	0.499	(0.095)	0.034	(1.992)	0.069
InterestRate	5060	0.000	0.989	0.213	0.160	0.635	0.035	0.349	0.069
Revenue	4959	(3.092)	1.864	(0.153)	1.391	(0.539)	0.034	(0.028)	0.069
ROIC	4387	(0.940)	5.409	0.123	0.346	3.130	0.035	28.359	0.070
PB	4869	(39.011)	39.800	(0.003)	0.880	1.614	0.037	1836.406	0.074

Source: own work.

Table 13: Descriptive statistics of OLS regression of debt to assets ratio of Eurozone Core companies

Eurozone Core	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
DA	1070	0.000	1.833	0.262	0.158	1.829	0.075	11.519	0.149
InterestRate	1090	(2.132)	1.225	(0.302)	0.933	(0.448)	0.074	(0.515)	0.148
Revenue	1072	(1.000)	7.161	0.116	0.367	8.542	0.075	140.124	0.149
ROIC	1013	(3.193)	0.462	(0.007)	0.142	(12.27)	0.077	261.195	0.154
PB	1044	0.004	39.823	2.235	1.855	9.102	0.076	164.994	0.151

Source: own work.

Table 14: Descriptive statistics of OLS regression of debt to assets ratio of the period before the crisis in 2009

Before the crisis	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
DA	3234	0.000	0.989	0.223	0.160	0.581	0.043	0.259	0.086
InterestRate	3280	(1.038)	1.864	0.553	0.940	0.250	0.043	(1.317)	0.085
Revenue	3214	(0.940)	7.161	0.135	0.378	5.154	0.043	65.398	0.086
ROIC	2985	(5.408)	39.800	0.020	0.771	46.866	0.045	2386.806	0.090
PB	3198	0.000	313.312	3.354	7.479	25.577	0.043	955.486	0.087

Source: own work.

Table 15: Descriptive statistics of OLS regression of debt to assets ratio of the period after the crisis in 2009

After the crisis	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
DA	3234	0.000	1.833	0.235	0.165	0.915	0.043	3.498	0.086
InterestRate	3280	(3.092)	0.144	(0.927)	1.188	(0.756)	0.043	(0.981)	0.085
Revenue	3221	(1.000)	3.945	0.110	0.321	2.269	0.043	15.223	0.086
ROIC	2767	(39.011)	3.030	(0.030)	0.771	(46.86)	0.047	2366.277	0.093
PB	3098	0.000	759.618	3.490	18.775	34.483	0.044	1295.786	0.088

Source: own work.

Table 16: OLS regression of debt to assets ratio

	Total		United States		Eurozone core countries		Eurozone noncore countries	
	Unstandardized Coefficients	Sig.	Unstandardized Coefficients	Sig.	Unstandardized Coefficients	Sig.	Unstandardized Coefficients	Sig.
(Constant)	0.010	Not sign.	0.023	**	0.000	Not sign.	0.013	Not sign.
Period	0.021	***	0.034	***	(0.019)	*	0.004	Not sign.
EurozoneCore	0.035	***	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
EurozoneNonCore	0.107	***	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Big_Cap	0.029	***	0.039	***	0.002	Not sign.	(0.006)	Not sign.
InterestRate	0.009	***	0.011	***	0.005	Not sign.	0.009	Not sign.
Revenue	(0.008)	Not sign.	(0.016)	**	0.004	Not sign.	0.043	*
PB	0.001	***	0.001	***	(0.003)	Not sign.	(0.003)	*
LTAssetsTotalAssets	0.307	***	0.264	***	0.452	***	0.509	***
ROIC	(0.010)	**	(0.010)	**	(0.150)	**	0.037	Not sign.
n	5,174		3,892		967		315	
Adjusted R Square	0.224		0.176		0.258		0.369	

Source: own work.

Time series analysis where samples were spilt by the index belonging indicates that the Eurozone big caps and small caps experienced the same trend. They experienced the highest median values of the ratio in the boom phase. The United Stated big caps and small caps have both reported the highest median values in the period from 2014–2016. Suggesting that the indebtedness of the companies is more dependent on the regional or macroeconomic setting than on the size of the company. Based on the result of the regression, the regional criteria in fact do play a statistically significant role. If the company is domiciled either in the Eurozone core or noncore country this positively affects the debt to asset ratio. Furthermore, the cross sectional analysis revealed that despite the growing indebtedness of the United States domiciled companies in the most recent period, the Eurozone noncore countries domiciled companies were the most indebted in all three analysed periods. Followed by the Eurozone core countries domiciled companies and the least indebted United States companies. The result confirms that the institutional setting in the Eurozone is more debt oriented as opposed to the setting in the United States where the market is more equity oriented. Especially the United States small caps, which according to the cross sectional analysis by index reported the lowest median values of the debt to assets ratio. The result may imply that small cap companies in the United States, unlike their Eurozone peers, were more prone to seek capital on equity markets.

The results of regression revealed the factors that with statistical significance positively or negatively affected the debt to asset ratio in the period from 2005 to 2014. Long-term to total assets ratio positively affected the ratio, implying that as the value of collateral increases the debt financing capacity increases as well. In addition to the previously mentioned factors (Eurozone regional belonging and period after the crisis), market capitalisation positively affected the ratio. The latter can be explained by a high portion of companies domiciled in the United States and listed as part of S&P 500 index and the sample of companies that reached the peak median values of debt to asset ratio in the most recent period of the analysis. The change in RIOC in the period from three years to one year prior to the measurement of debt to assets ratio negatively affected the ratio. The change of interest rate by the central bank two years prior to the measurement of the debt to assets ratio positively affected the ratio. Likewise, the price to book ratio positively affected the debt to asset ratio, implying that growth prospects as perceived by the market may trigger companies to look for new funds via debt instruments.

Regression on the samples split by the regional belonging indicated that with statistical significance all tested factors have affected the debt to assets ratio of the United States domiciled companies. In case of the Eurozone core countries domiciled companies, only the period, ROIC and long-term assets to total assets ratio have influenced the ratio with statistical significance. The effect that the period variable had on the United States is just the opposite to the effect on the ratio of Eurozone core countries. Outcome of time series analysis also supports the result. The ratio of noncore Eurozone domiciled companies was with statistical significance positively affected by the revenue growth in the period from three years to one year prior to the measurement of the ratio and long-term assets to total assets ratio.

Additionally, I performed the times series and cross sectional analysis of median values of debt to assets ratio without 1-year lag period. The results do not differ substantially. In cross

sectional analysis the mean ranking was only different on a sector level. The difference was clearer in case of the time series analysis. Without excluding the lag period, all samples split by index, demonstrated lower median value of debt to assets ratio after the crisis as compared to the boom phase. While with 1-year lag period, the median value of the ratio of United States big caps was higher in the period from 2011 to 2013, as compared to the boom phase.

3.2.2 Interest coverage ratio

3.2.2.1 The United States versus the Eurozone companies

Beshenov and Rozmainsky's approach (2015) of studying the FIH indicates that the number of hedge units has decreased in both regions prior to the crisis, as Minsky would expect. Historically, the percentage level of hedge units is higher in the United States (average value: 77.5 %) than in the Eurozone (average value: 68.0 %). The proportion of Ponzi units grew by 12.5 percentage points in the Eurozone, and 12.6 percentage points in the United States from 2000 to 2009. If we look at the proportion of speculative units, we notice that from 2000 to 2009 they have decreased in both regions. However, if we take into account that the central bank increased money market interest rates prior to the crisis in 2004 in the United States and in 2005 in the Eurozone, the proportion of speculative units has increased. The proportion grew by 13.1 percentage points in the Eurozone (from 2005 to 2009) and by 1.4 percentage points in the United States (from 2005–2009), while the growth of speculative units in the Eurozone was significantly higher, both regions experienced an increase of Ponzi units in 2008 and 2009, as shown in Figure 8 and 9.

Figure 8: Structure of hedge, speculative and ponzi units in the United States
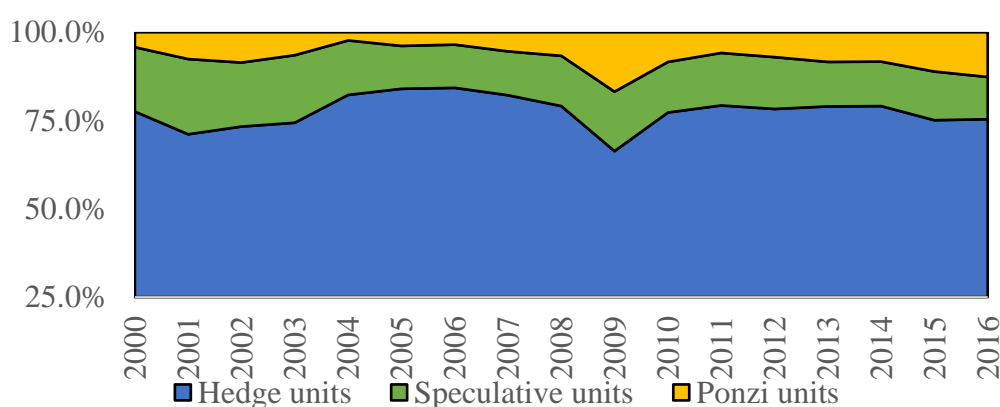
Source: own work.

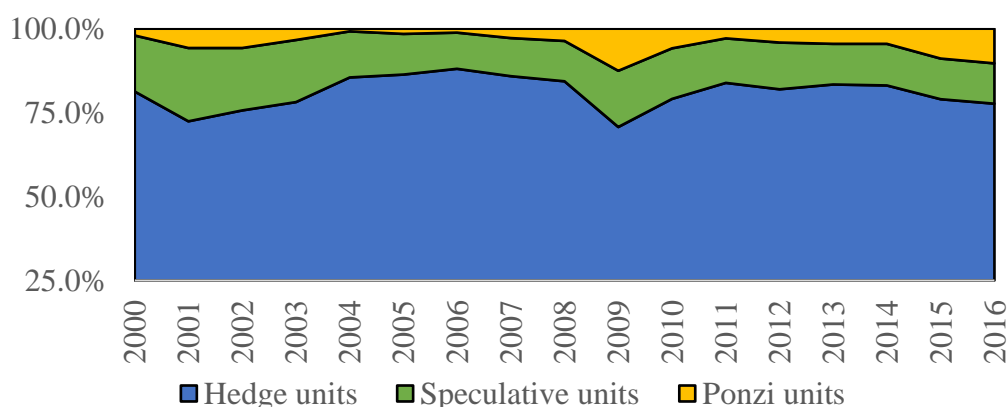Figure 9: Structure of hedge, speculative and ponzi units in the Eurozone
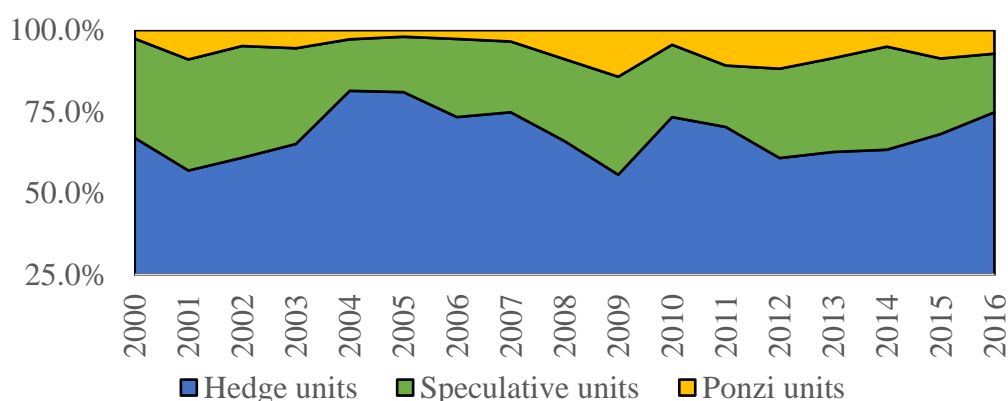
Source: own work.

### 3.2.2.2   Small cap versus big cap companies

As shown in Figure 10, 11, 12 and 13, no matter from which region the company originates, the number of hedge units has decreased in both small and big cap companies prior to the crisis. On average, the proportion of hedge units was lower in small cap companies, as opposed to their big cap peers. The highest average percentage of hedge units was observed in big cap United States corporates (80.9%). Small cap companies domiciled in the United States ranked second with 73.1% and were followed by big cap Eurozone companies (69.8%), and Eurozone small caps (64.8%). The number of speculative units has decreased in all samples except in the sample of big cap companies from the United States. The proportion of speculative units in the latter has grown by 0.1 percentage points in the period from 2000 to 2009. If we take into account that money market interest rates were increased in 2004 in the United States and in 2005 in the Eurozone, the proportion of the United States big caps, the Eurozone big and small caps grew by 3.0, 16.8 and 6.4 percentage points, respectively. However, the United States domiciled small caps still experienced a decline of speculative units' proportion by 0.7

Figure 10: Structure of hedge, speculative and ponzi units among United States big cap companies
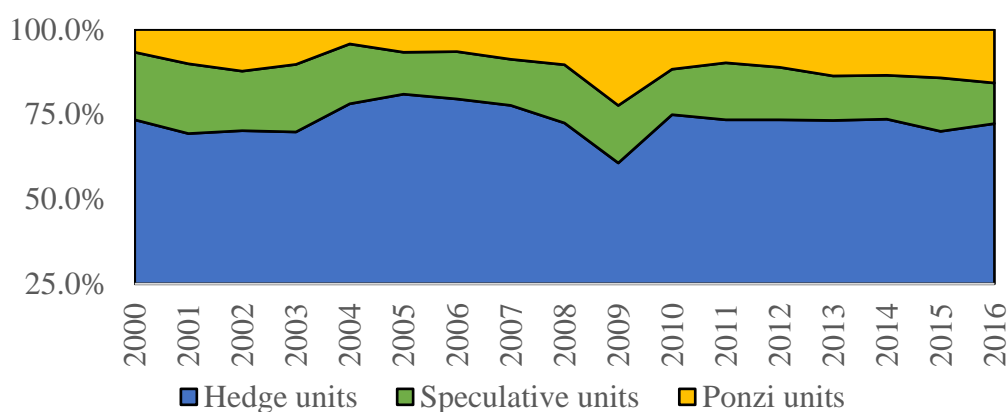

Source: own work.

Figure 11: Structure of hedge, speculative and ponzi units among Eurozone big cap
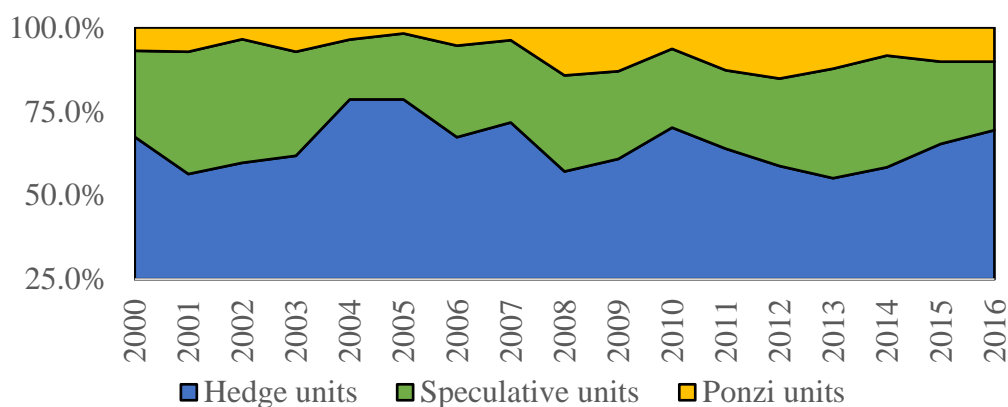companies
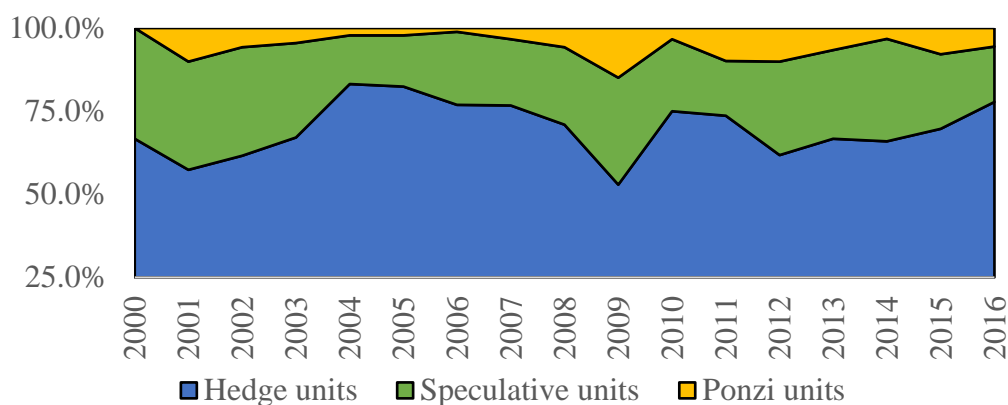
Source: own work.

Figure 12: Structure of hedge, speculative and ponzi units among United States small cap
companies

Source: own work.

Figure 13: Structure of hedge, speculative and ponzi units among Eurozone small cap
companies

Source: own work.

percentage points. No matter the region, the number of Ponzi units has increased in both big and small caps. Since 2000, the proportion of Ponzi units grew the most in the sample of United States small caps (15.7 percentage points), followed by the Eurozone big caps (14.9 percentage points), the United States big caps (10.5 percentage points) and the Eurozone small caps (8.3 percentage points).

3.3 Analysis of loan portfolios of credit providing institutions

In order to understand the preconditions to the crisis, one must also consider the activity of credit providers. Minsky suggests that in the times preceding the crisis, moneylenders push economic cycles with an increased supply of credit. Moreover, according to the FIH banks and other credit providers increase their lending to the real economy as to provide them the capital to invest or refinance their debt obligations. Thus, eventually markets become flooded with excess liquidity and even the riskiest borrowers (Ponzi units) get the funds to either invest or refinance their debt as a very low cost. By granting loans to the speculative and Ponzi units, economy becomes more fragile and thus exposed to shocks such as an increase of interest rates that may distort the whole economy.

As mentioned previously, many scholars argue that Minsky developed his thesis in the time before the financial system evolved to the level in the first decade of 21st century. Thus, Caverzasi (2014) offers a solution by introducing Capital Market Inflation theory, developed by Jan Toporowski. According to the theory, with the development of financial markets, real sector companies started to raise funds on financial markets instead of borrowing from banks. Moreover, an increased economic sentiment encouraged institutional as well as retail investors to provide the funds through investing in equities and debt instruments. Therefore, he does not suggest that non-financial companies did not raise more funds through borrowing from credit providers but instead they raised equity to invest or decrease their financial leverage.

Nevertheless, from the point of view of Caverzasi, the increase of bank's balance sheets was still present but is was not a consequence of increased lending to real sector as Minsky suggests. Instead, the increase was due to the increased amount of credits to households. The analysis focuses on the loan portfolio of US commercial banks and Eurozone monetary financial institutions except for European system of central banks (ESCB) to provide an overview of loan breakdown of credit institutions in the US and the Eurozone.

3.3.1 Loan portfolio of US commercial banks

The analysis of US commercial bank's loan portfolio, as reported by the FED and shown in Figure 14, reveals that in 2000 the largest part of the portfolio was represented by the real estate loans, followed by commercial and industrial loans (non-financial companies) and consumer loans. The ranking remained unchanged through the observed period, while the difference between the real estate loans and the commercial and industrial loans increased significantly.

Figure 14: Loan portfolio of US commercial banks
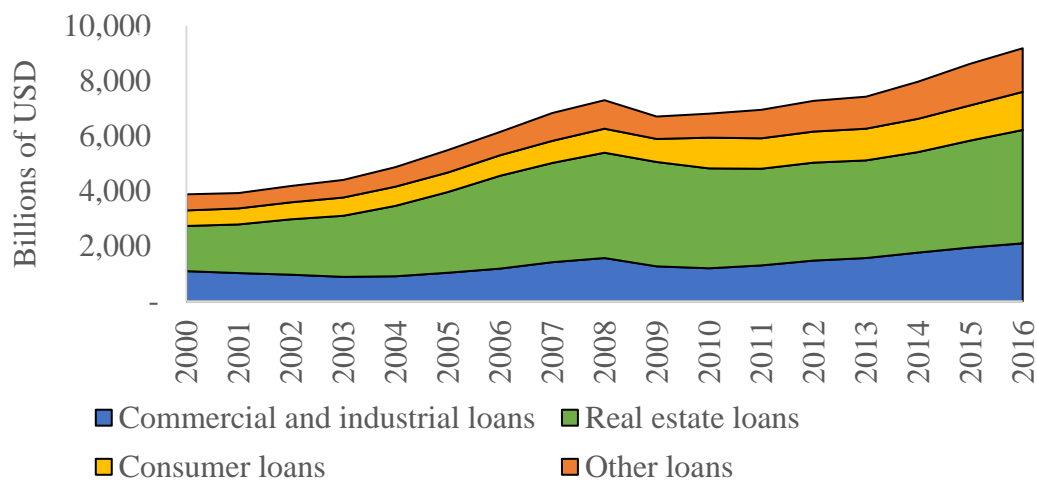
Real estate loans grew by 132.4 % or 2.3 times before reaching its peak in 2008. The average growth rate measured as compound annual growth rate in period 2000–2008 (hereinafter: CAGR 2000–2008) amounted to high of 11.1 % prior to the crisis, compared to 0.9 % after the crisis (CAGR 2008–2016). While commercial and industrial loans grew only by 44.0 % (CAGR 2000–2008 4.7 %) and consumer loans by 56.5 % (CAGR 2000–2008: 5.8 %). From that point on, the gap between the real estate loans and commercial and industrial loans remained relatively stable. As US faced the crisis in the end of 2008 and 2009, when some of the largest financial institutions faced serious problems and general public lost its confidence in financial system, the real estate loans amount started to decrease until 2011 (-8.3 %). However, commercial and industrial loans decreased by 23.5 % in the period between 2008 and 2010, meaning that US commercial banks were less inclined to lend money to real sector compared to real estate loans. Consequently, many of firms could no longer refinance their debt obligations and went bankrupt or had to undertake restructuring agreements.

Rea estate loans surpassed the amount from 2008 in 2015, while consumer loan recovered the fastest with surpassing its peak from 2008 in 2010. Commercial and industrial loans recovered to the same levels as prior to the crisis in 2013 and demonstrated the highest growth since its lowest level after the crisis (75.4 %) compared to consumer loans (64.6 %) and real estate loans (17.5 %).

As shown in Figure 15, real estate loans in 2000 represented 42.4 % of the portfolio. The amount grew to 56.5 % in 2009 and decreased to 44.9 % in 2016. On the other hand, the proportion of consumer loans decreased from 14.5 % in 2000 to 12.5 % in 2009 but soon recovered to 16.5 % in 2010 and 15.0 % in 2016. The proportion of commercial loans decreased from 28.0 % in 2000 to 18.9 % in 2009 and then increased to 22.8 % in 2016.

Figure 15: Structure of loan portfolio of US commercial banks

□ Commercial and industrial loans ■ Real estate loans □ Consumer loans □ Other loans
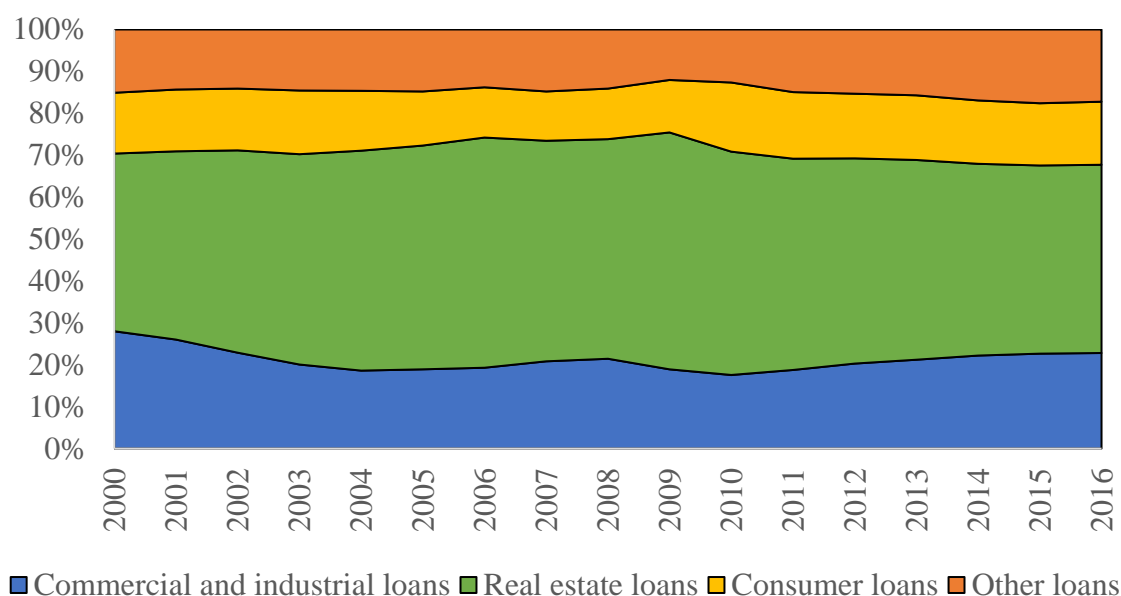
Source: own work.

### 3.3.2 Loan portfolio of Eurozone monetary financial institutions except ESCB

Analysis of Eurozone loan portfolio was conducted on the basis of the data reported by the ECB (2018). The list of MFIs as reported by the ECB consists of central banks, credit institutions, other deposit-taking corporations and money market funds. According to the ECB webpage definition (ECB MFI's, 2018), "MFIs consist of resident credit institutions as defined by the European law and other resident financial institutions the business of which is to receive deposits and/or close substitutes for deposits, to grant credits and/or make investments in securities."

At the end of 2016, monetary financial institutions (hereinafter MFIs) held 17,572 billion EUR of loans in their balance sheet. Historically (2000–2016) the largest amount of loans were given to MFI's (as at year-end 2016: 32.5 %), households (30.8 %) and non-financial corporations (24.5 %). The ranking remained equal through the period from 2000–2016 with the exception in the year 2014, when total amount of loans to households (5,206 billion EUR) surpassed the amount of loans given to the MFIs (5,137 billion EUR).

As shown in the Figure 16, household loans are separated into three categories: Credit for consumption, lending for house purchase and other lending. The greater part of other lending relates to loans to sole proprietors. The amount of loans to households reached its peak at the end of 2016. It demonstrated a growth of 81.8 % from the year 2000. Most of the growth can be explained by the growth of loans for house purchases, which grew by 115.9 % since 2000. The growth of loans to households for house purchasing demonstrated a period of high growth from 2000 to 2008 by 86.1 %. From 2008 on the amount grew by 16.0 % to reach its peak in 2016. On average the amount of loans for house purchase grew by 8.1 % (CAGR 2000–2008) prior to the crisis and 1.9 % (CAGR 2008–2016 75.4 %) in the period since 2008 to 2016. On

the other hand, total household loans measured as the sum of consumer loans and house purchase loans grew by 7.3 % (CAGR 2000–2008) prior to the crisis and by 1.6 % (CAGR 2008–2016) per year after 2008. While after the European sovereign debt crisis in the period from 2012 to 2014, the amount of credit for consumption and other household loans decreased, the amount of loans for house purchase kept growing, showing that housing market was resilient towards sovereign debt crisis.

Figure 16: Loan portfolio of Eurozone monetary financial institutions except ESCB
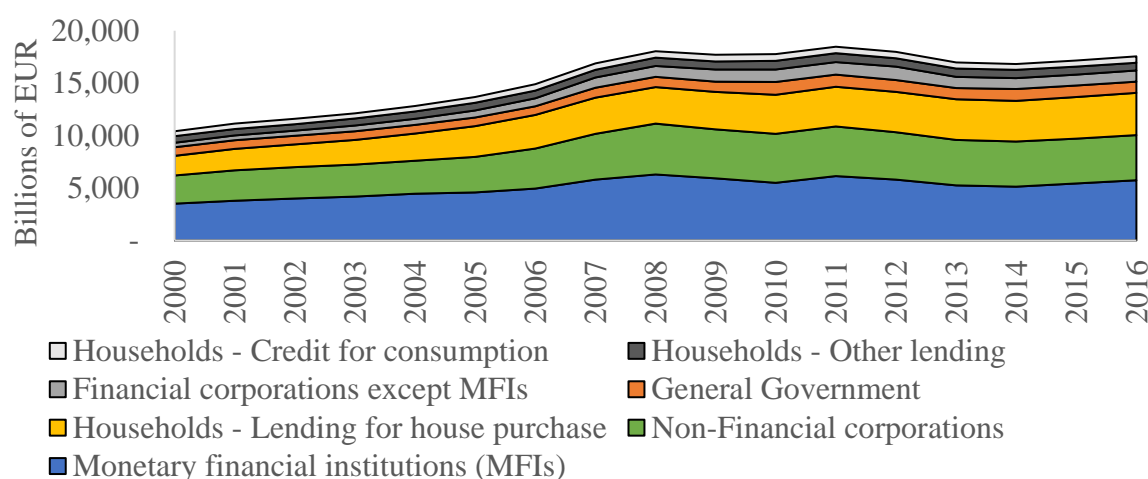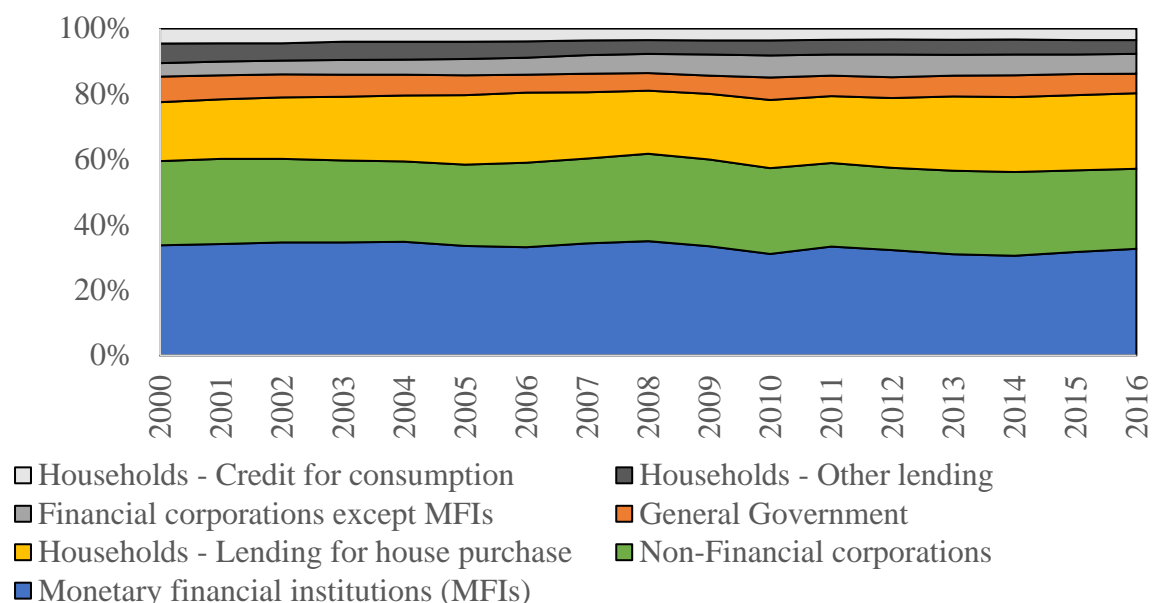

Source: own work.

Loans to non-financial corporations reached its highest value in the observed period in 2008 and demonstrated a growth of 79.6 % since 2000. After the crisis the loans to non-financial sector decreased by 3.3 % until 2010. Growth returned in 2011 but was offset by the sovereign debt crisis and a negative trend can be observed up until 2016. The CAGR prior to the crisis amounted to 7.6 % and -1.4 % after 2008.

Trend of loans to MFI's is quite similar to the one observed in category of loans to non-financial corporations – a peak in 2008 followed by a decrease afterwards with an increase in 2011 and again a decrease until 2014. Loans to MFIs started to grow in 2015 and continued to grow also in 2016. Loans to financial corporations except MFIs demonstrated the most sizable growth. The amount grew by 194.6 % or 2.9 times in the period from 2000 to 2012 when it reached its peak.

Figure 17 shows the structure of the loan portfolio of the Eurozone monetary financial institutions except ESCB. The proportion of loans to non-financial corporations increased from 25.8 % in 2000 to 26.5 % in 2009 and decreased to 24.5 % in 2016. The proportion of loans to households for consumption and real estate purchase grew from 22.6 % in 2000 to 23.6 % in 2009 and it kept increasing up until 2016 when it accounted for 26.6 % of total loans. As part of the latter, the proportion of household loans for consumption decreased from 4.6 % in 2000 to 3.6 % in 2009 and 3.5 % in 2016. Therefore, most of the growth in the proportion of household loans came from the loans for real estate purchase, which increased from 18.0 % in 2000 to 20.1 % in 2009 and 23.0 % in 2016.

Figure 17. Structure of loan portfolio of Eurozone monetary financial institutions except ESCB

Source: own work.

3.3.3   Discussion

Loans to both households and non-financial corporations have increased in both geographical regions, as shown in Table 17. Growth rates prior to the crisis and after it are higher for household loans in the United States. On the other hand, growth rates for loans to non-financial corporations prior to the crisis are higher in the Eurozone. This may indicate that Eurozone corporations are more prone to borrow from credit providers, since financial markets are less developed and liquid than in the United States. However, after the crisis growth rates for loans to non-financial corporations were higher in the Unites States. After 2009, the Eurozone faced a sovereign debt crisis with some of European countries experiencing high government debt, and rapidly rising yield spreads on government securities. The borrowing reached its peak in 2011, which is also evident from Figure 16. It led to a loss of confidence in European economies and businesses. As a result, the corporations in the Eurozone were either not confident enough to increase their debt at the same pace as their peers in the United States or the banks were no longer willing and/or able to grant loans to their customers.

Table 17: Growth rates of loans to households and non-financial corporations

CAGR in %	Unites States			Eurozone		
	Prior	After	Total	Prior	After	Total
Loans to households	9.9%	2.0%	5.9%	7.3%	1.6%	4.4%
of which loans for RE purchase	11.1%	0.9%	5.9%	8.1%	1.9%	4.9%
Loans to non-financial corporations	4.7%	3.7%	4.2%	7.6%	-1.4%	3.0%

Source: own work.

Prior to the crisis both regions experienced high growth of loan portfolios, which is in line with both Minsky's FIH and Caverzasi (2014) modification of Minsky's idea. Based solely on this analysis, it cannot be determined which theory better explains the crisis in 2009. The results of the analysis suggest that US corporations might have been less prone to borrow from credit providers than their Eurozone peers prior to the crisis. However, it is evident that after 2008, loans to non-financial corporations in the Eurozone were heavily affected by the sovereign debt crisis.

3.4 Analysis of household debt

In the following section I present and discuss the results of household indebtedness. It has to be noted that the data for Luxembourg were available only after 2013, and that comparable data for 2016 for Greece, Hungary, Ireland, Slovakia and Slovenia were not available at the time of the analysis.

The results of the analysis show that the ratios of countries vary significantly. The Netherlands' debt to disposable income ratio was the highest within the range from 196.3 % to 293.8 % in the period between 2000–2016 with an average value of 257.6 %, followed by Ireland and Austria with average ratios of 197.5 % and 187.5 %, respectively. Luxembourg, whose comparable data are only available after 2013, ranks forth with the average ratio of 167.6 % and concludes the list of countries with the average ratios of equal or above 150.0 %. The least indebted households are located in Lithuania with the average debt to income ratio of 36.6 % and in range from 3.0 % to 58.0 %.

Furthermore, Figure 18 shows that there are three different kinds of trends among the countries. First, the majority or 10 out of 18 countries have an "A-shaped" trend, meaning that their ratio reached a peak somewhere in between 2007 and 2012 and then declined towards the end of the period. Those countries are Hungary, Ireland, Italy, Latvia, Lithuania, the Netherlands, Portugal, Slovenia, Spain and the United States. The United States and Spain are among those that reached their peak the earliest, in 2007 (122.1 % and 125.6 %, respectively) and are followed by Lithuania (58.0 % in 2008) and Ireland (239.6 % in 2009). The rest of the countries reached their peak in 2010 (Hungary, Latvia and the Netherlands) and in 2012 (Italy, Portugal and Slovenia). European countries where affected by the crisis with a bit of lag compared to the United States. Thus, the majority of Eurozone countries reached their peaks somewhere around 2010. Secondly, 7 out of 18 countries demonstrate a growing trend with the debt to income ratio peak in 2015 or 2016. The only exception is Greece, which faced sovereign debt crisis in 2012 and its household debt to income ratio was the highest (122.2 %) in 2013, but has somewhat stabilized since. France and Slovakia reached their peaks in 2015 (95.3 % and 40.2 %, respectively), while the ratios of Austria, Belgium, Finland and Luxembourg were the highest in 2016 (220.7 %, 116.4 %, 133.4 % and 176.2 %, respectively). The third observable trend is a declining one. Only Germany demonstrated a pattern with the highest value in 2000 (16.5 %) and the lowest in 2015 and 2016 (93.4 %). The ratio peaked at the very beginning of the period

and decreased with minor increases in 2002 and 2009 (0.6 and 0.9 percentage points, respectively).

To sum up, the majority of analysed countries from the Eurozone and the United States demonstrated the "A-shaped" trend with the highest household debt to net disposable income ratio in years ranging from 2008 to 2012. The increasing trend prior to the crisis, which affected some countries with a lag of 2–3 years before they fell into recession may imply that households have become more indebted or in the words of Minsky more fragile. It is not possible to categorize households in Minsky's units (Hedge, speculative and Ponzi units) since gathering the data from every household would be too time consuming or even impossible. However, it cannot be neglected that the remainder of the countries demonstrated the trends which do not support the idea of Caverzasi (2014). The countries such as Germany, Belgium, France and Austria that play an important role in Euro system, demonstrated a trend, which has the peak either in the beginning or at the end of the observed period. The idea that household indebtedness grew prior to the crisis holds true for the United States and for some of Eurozone countries but fails to be confirmed in leading countries of the Eurozone. Therefore, the analysis does not support that growing indebtedness in non-financial sector was replaced by increasing indebtedness by the households. This may imply that after the crisis, debt levels continued to grow while disposable income did not follow proportionately. A detailed analysis of debt levels and disposable income may provide further explanations.

Figure 18: Household debt to net disposable income ratio

(figure continues)

Italy

United States

Spain

Portugal

Ireland

Netherlands
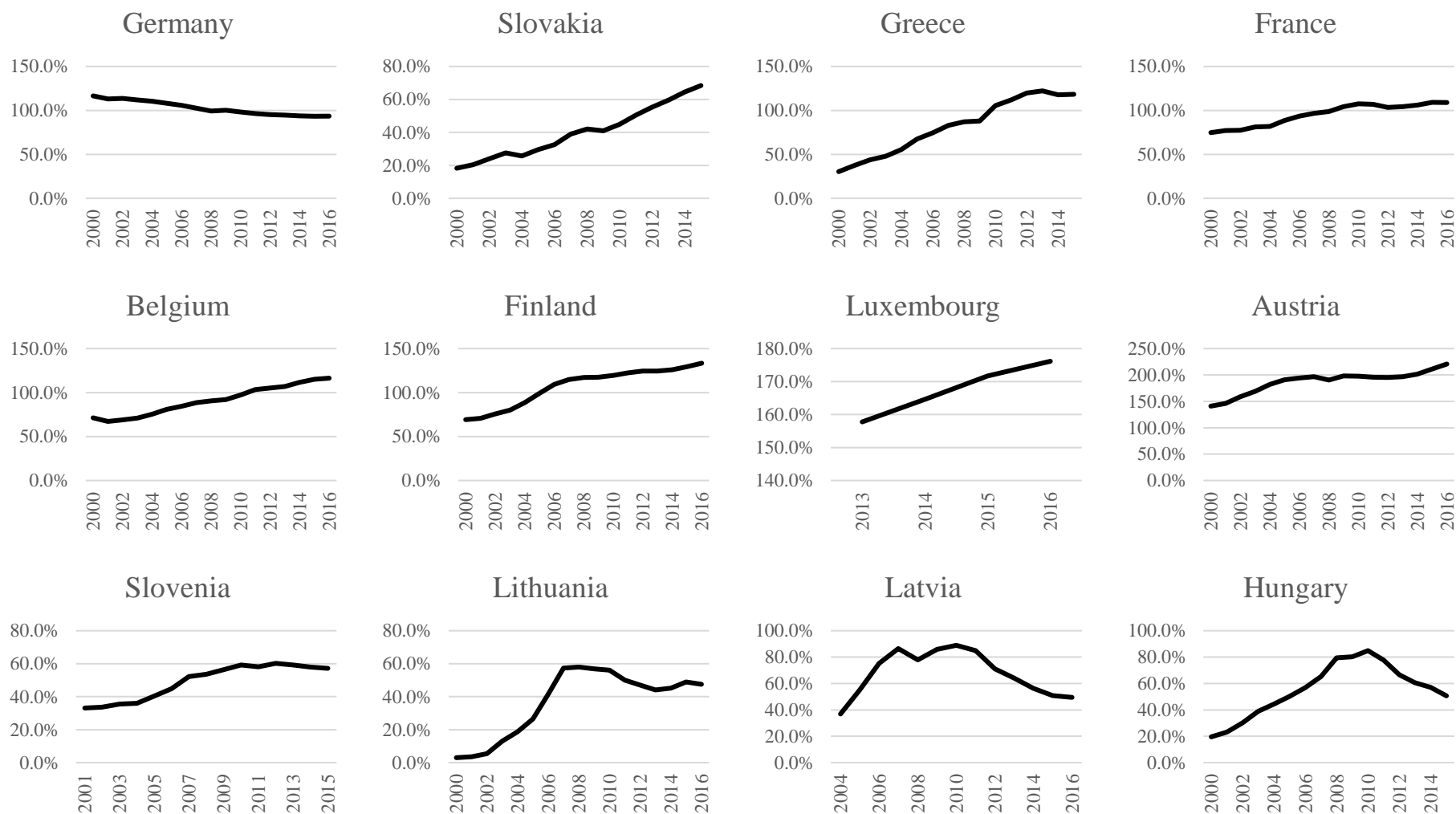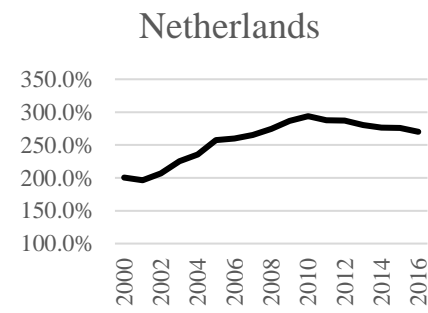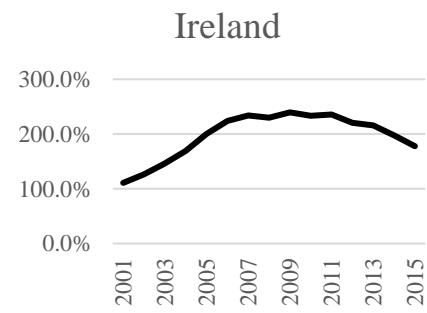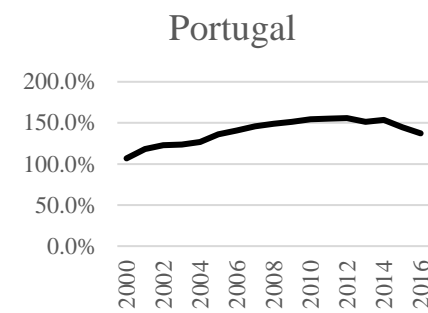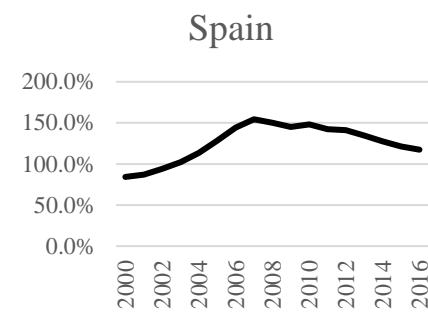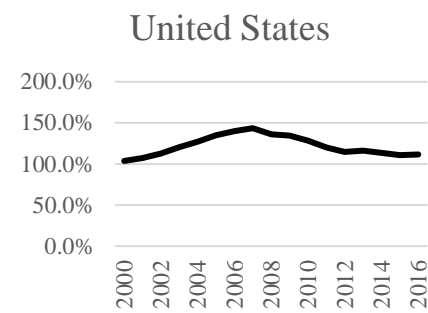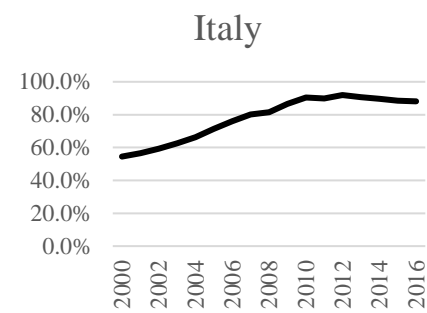
Source: own work.

3.5 Limitations

Limitations mainly refer to the availability, reliability and comparability of the data. The analysis I conducted had the purpose of identifying the trends of changes in financial structures of companies domiciled in the United States and the Eurozone prior to and after the subprime mortgage crisis in 2009. Furthermore, I extended the analysis to account for the difference among size and sector groups. Therefore, the results of analysis and discussion itself do not include the identification and discussion of any other parameters than those described by previous papers on Minsky's Financial Instability hypothesis.

Bloomberg (2017) terminal was considered as a reliable and optimal source of data for the historical list of index constituents and financial statements of the companies in the sample. Despite the fact that companies in the United States and in the Eurozone do not report their financials in accordance with the same accounting standards, the difference in accounting standards was not considered as the material for the purpose of the analysis. The analysis was limited to the availability of data. The dataset used for the analysis included the missing values, which were treated as such but did not affect the results. However, the result might differ if the values for the entire company selections and entire time period were available. Data on monetary policies and credit institutions loan portfolios were gathered from the reporting agencies from the United States and the Eurozone. Despite the efforts to gather as much as comparable data for the United States and the Eurozone market, reporting methodologies of the agencies might differ. Data were not adjusted for such differences, as the main purpose of the analysis was to follow and compare the movement of a particular parameter throughout the observed period.

Company selection for the analysis was limited to the public companies that constituted the preselected indices as of different dates due to the lack of availability of historical data on Bloomberg terminal. The analysis of small and big cap companies might provide different results if the private companies including SME's were included in the analysis. The sector analysis relied on Bloomberg (2017) classification and was not revised in the process of analysis.

Finally, earnings of non-financial companies were not adjusted for one-time items and neither was debt for debt like items. One-time items might change the outcome of the analysis, but a profound analysis of such a sizeable dataset would require a significant amount of time. Furthermore, the analysis neither included the working capital analysis nor the analysis of long-term versus short time financing, which could provide some further insides into changing financial fragility.

CONCLUSION

Hyman P. Minsky developed the Financial instability hypothesis in 1980's when financial markets presented a different setting than what we were facing in the beginning of the 21st century. Financialisation of the markets has brought the world of finance to a new era, where changes occur on a daily basis and the regulations of markets are somewhat different than they were in the time of Minsky. This thesis puts financial instability hypothesis in the time before and after the financial crisis in 2009 to see if the hypothesis provides a sound explanation of the events leading to the global economic meltdown.

The analysis of monetary policies in the United States and the Eurozone revealed that the preconditions for FIH have been met. Minsky predicts that cutting interest rates boosts the economy and creates an era of economic prosperity. Indeed, central banks have cut money market interest rate after the dotcom bubble in the beginning of 21st century and so the new business cycle began. As the economy approached and surpassed the inflation target of 2 %, central banks in the United States and the Eurozone started to increase the interest rates in order to prevent overheating of the economy. The rates were increased for the first time prior to the crisis in 2004 by the FED and in 2005 by the ECB. John Taylor (2009), the author of the Taylor rule, argued that in accordance with his rule interest rates and historical movement of interest rates, the rates were raised far too slowly and suggests that central banks failed to take timely and active position in preventing bubbles in the markets. However, after the crisis central banks did act as lenders of last resorts through the asset purchase programs that led to a massive increase of its balance sheets. The latter is also in line with Minsky standpoint that central banks should act as lenders of last resort when financial panic occurs.

According to Minsky, in the years prior to the crisis the companies in non-financial sector would become more financially fragile as they would increase their financial leverage commonly measured as debt to assets ratio. Based on time series the analysis of median values of debt to assets ratio the conclusion is that the companies in the United States and in both Eurozone core and noncore countries have increased their level of indebtedness in the period before the crisis. Furthermore, as Minsky predicted, the financial leverage decreased after the Minsky moment occurred. Debt deflation put the pressure on asset prices, which led to the global turmoil. Therefore, from the standpoint of my analysis the FIH serves as the valid explanation of the GFC. Using the same approach, I conducted the analysis on a samples split by index belonging, to compare the debt to assets ratio trends between big and small caps, and by sectors. The results of samples split by index belonging indicate that all samples reported higher median values of the ratio in the period just before the crisis, i.e. 2007–2009. Likewise, all samples split by sectors experienced higher values in the period just before the crisis. Big cap companies reached new peaks of median value of debt to asset ratio in the most recent period (2014–2016). The analysis on index levels revealed that no matter the size company's indebtedness level depends more on the institutional or regional setting that they operate in.

Both samples from the Eurozone, i.e. the companies from core and noncore countries, reported higher median values of debt to assets ratio in the period just before the crises, when compared

to the previous period, and lower values in the following one. Cross sectional analysis of the median values of the ratio indicates that Eurozone noncore domiciled countries were the most indebted sample through all analysed periods, and followed by the companies from the Eurozone core countries and the United States. Based on the index level analysis, the most indebted samples were the Eurozone small caps and Eurozone big caps. The latter is explained by the fact that the companies in the Eurozone setting indeed are more debt oriented as opposed to their peers in the United States setting, where the companies more often turn to equity as a source of financing.

The results from the multivariate regression support the findings from cross sectional analysis. Based on the results of multivariate regression of the ratio the conclusion can be drawn, with 95 % confidence level, that Eurozone setting indeed positively affected the ratio. The proportion of long-term assets in total assets also positively affects the value of financial leverage. As companies increase the value of their long-term assets the value of collateral offered to the creditor increases as well. Despite the fact that the most indebted sample were Eurozone small caps, the variable accounting for the size of the company had a positive effect on the ratio. The rationale behind it is that the majority of companies in the sample for the regression were from the United States big caps, which reported the highest values at the end of the analysed period. The same holds true for the conclusion that the period after the crisis positively affected the ratio. The ratio was also affected with statistical significance by the change in ROIC, change in the interest rate and by the price to book ratio. The ROIC as the measure of the operating performance of the company negatively affected debt to assets ratio. The explanation is that the higher the earnings of the company the smaller is the appetite for debt financing since retained earnings can be used to further support the growth. Both the interest rate change and the price to book ratio positively affected the ratio. If the market perceives the growth potential in the companies, and the price to book the ratio is high, then the company may issue new debt to finance the excepted growth, as mangers are often compensated based on stock performance.

In addition to the approach where debt to assets ratios were analysed, the research included the approach of Beshenov (2015) to assess the validity of FIH to explain the recent financial crisis. The interest coverage ratios were analysed throughout the period in order to assess if the number of Ponzi and speculative units increased prior to the crisis. When looking at the period from the point when central banks increased the interest rates until 2009, the number and the proportion of Ponzi units increased in both regions and in both big and small cap companies.

In the beginning of the thesis Capital Market Inflation theory by Jan Toporowski is discussed as a possible modification of FIH to account for the changes incurred by the financialisation as suggested by Caverzasi (2014). According to the theory, the explanation why financial leverage might not have increased is the fact that corporates nowadays rather rely on equity markets to raise capital than on debt items. Further, Caverzasi argued that as banks shifted their business and focused more on retail business, the decision how to finance the investment shifted from real economy to the households. The consequence was that investments were made in house purchases instead of investments in productive capital. Therefore, it was households that increased their financial leverage. Based on the analysis of credit institutions loan portfolios in

the observed period, the result is that both loans to non-financial corporates and to households had increased prior to the crisis. In the United States the household loans indeed increased faster than the loans to non-financial corporations. While in the Eurozone, the compound annual growth rates (CAGR) was quite similar for both of them prior to the crisis. The amount of household loans continued to increase after the crisis but at a significantly slower pace than prior to the crisis. The loans to non-financial corporations in the United States continued to increase as well, while the loans to non-financial corporations in the Eurozone decreased after the crisis. European sovereign debt crisis led to the loss of confidence in European economies and business and thus probably also affected the decision of credit providers and corporate credit takers to increase their debt exposures.

However, when considering how indebted the household were relative to their disposable income, three different trends were identified. Out of 17 Eurozone countries and the United States, 10 countries demonstrated an "A" shaped trend, where the household debt to net disposable income increased and then decreased either after the subprime mortgage crisis or after the European debt crisis. The countries reached their indebtedness peak levels between 2007 and 2012. Seven out of 18 observed countries constantly increased their ratios up until 2015 or 2016. On the other hand, only Germany demonstrated a decreasing trend of household debt to net disposable income ratio in the observed period. The analysis suggests that Caverzasi's argument was in place. In years prior to the crisis the majority of households in observed countries did increase their indebtedness. However, as the economic rebounded and the world economic output started to increase again, 6 (excluding Luxembourg) out of 18 countries continued to increase their household indebtedness. The latter raises a question whether this implies that households in some Eurozone countries have not recovered since the crisis and that we are on the brink of a new crisis. Alternatively, this may imply that the increasing trend prior to the crisis does not explain the crisis in a way that Caverzasi suggested.

To sum up, FIH not modified to account for CMI provides a sound basis for the analysis of the financial crisis. Based on the analysis of 656 publicly traded companies, my conclusion is that Minsky's financial instability hypothesis serves as a valid explanation of the changes in financial structures of companies in the United States and the Eurozone. The companies in the sample have increased financial leverage, measured as debt to assess ratio prior to the crisis. Likewise, the number of Ponzi and speculative units has increased from the point in the time when the interest rates were increased for the first time prior to 2009. Caverzasi's idea of moderating FIH with the capital market inflation theory of Jan Toporowski that non-financial companies had not increased their financial leverage prior to the crisis, but the households had, has not been confirmed. However, it seems that the original Minsky's idea of increasing financial leverage on the aggregate levels can provide an explanation of why the crisis occurred, but still neglects the increasing indebtedness of households which played an important role in the events leading to the GFC.

POVZETEK

Hipoteza finančne nestabilnosti (FIH), ki jo je razvil Hyman P. Minsky je postala popularna v ekonomskem svetu po letu 2008. Po finančni krizi, ki je zajela cel svet so finančni mediji začeli množično širiti idejo Minskega kot razlago za nastanek krize. Celo bivša predsednica ameriške centralne banke FED je označila čtivo kot pomembno branje vsakega ekonomista.

Minsky je večino svojega življenja deloval kot profesor ekonomije na Washingtonski univerzi St. Louis in kot raziskovalec v okviru Levy Economics Institiute of Bard College. Znan je predvsem po svojih knjigah John Maynard Keynes in Stabilizing an Unastable Economy. Med pomembna dela spada tudi interpretacija Keynesovega dela The General Theory of Employment, Interest, and Money. Hipotezo finančne nestabilnosti je razvil na podlagi idej velikih ekonomistov kot so Keynes, Schumpeter in Fischer. V okviru hipoteze je Minsky postavil dva temeljna stebra. Za ekonomijo sta značilni stabilni in nestabilni režim financiranja. Vsakemu obdobju stabilnosti pa sledi obdobje nestabilnosti, kot posledica neracionalnih odločitev managerjev. V obdobju stabilnosti oz. gospodarske rasti se po mnenju Minskega podjetja pospešeno zadolžujejo in tako povečujejo finančno šibkost ekonomije. Z višjo stopnjo zadolženosti se poveča število špekulativnih in ponzi enot. Poveča pa se tudi tveganje za nastanek finančne krize.

Na podlagi pregleda literature in prejšnjih raziskav tematike zadolževanja podjetij ter razlage dinamike finančnih struktur, sem si zastavil dve raziskovalni vprašanji in raziskovalne cilje na katere odgovarjam na podlagi statistične analize podatkov za obdobje pred in po globalni finančni krizi v letu 2009. Preveriti sem želel ali FIH lahko služi kot razlaga za nastanek krize in ali je na podlagi FIH mogoče napovedati naslednjo finančno krizo. Skozi raziskovalno delo sem preverjal ali so podjetja v Evro območju in ZDA pred krizo povečala stopnjo zadolženosti glede na prejšnja obdobja ter ali so obstajale statistično značilne razlike med podjetij iz različnih geografskih regij ter kateri dejavniki so v največji meri vplivali na dinamiko zadolževanja.

Analiza monetarnih politik centralnih bank v Evro območju in ZDA je pokazala, da so predpogoji za uporabo FIH bili izpolnjeni. Centralni banki sta po dotcom krizi v začetku 21. stoletja znižali obrestne mere in nato v letu 2004 oz. 2005 pričeli zviševati obrestne mere do leta 2008. Slednje, kot opisuje Minsky, vodi do povišanja števila špekulativnih in ponzi enot ter povišanja finančne šibkosti.

Osrednja tema raziskovalnega dela je analiza finančnih struktur podjetij. Na podlagi vzorca 656 javno kotirajočih podjetij iz ZDA in Evro območja sem opravil presečno analizo, analizo časovnih vrst in mulivariatno regresijo. Na ta način sem potrdil, da obstajajo statistično značilne razlike med zadolženostjo, merjeno kot razmerje med finančnim dolgom in sredstvi, med podjetij iz ZDA, iz držav jedra Evro območja in podjetij iz periferije Evro območja. Analiza je pokazala, da so historično evropska podjetja bila bolj zadolžena, kar indicira na višjo naklonjenost evropska trga do dolžinskega financiranja napram podjetjem v ZDA. Analiza časovnih vrst je pokazala, da so podjetja v vseh treh regijah povišala zadolženost pred krizo glede na prejšnja leta. Analiza na nivoju panoge in velikost podjetja pa je potrdila, da je trend

zadolževanja bolj povezan z okoljem kjer podjetja delujejo kot pa z velikostjo podjetja. Z multivariatno regresijo panelnih podatkov sem ugotovil, da imajo pozitiven vpliv na razmerje med dolgom in sredstvi: sestava sredstev, pripadnost Evro območju, velikost podjetja (merjena kot tržna kapitalizacija), obdobje po krizi, sprememba obrestne mere in razmerje med tržno in knjigovodsko vrednostjo delnice podjetja. Negativen vpliv izmed izbranih dejavnikov na zadolženost podjetja ima le donosnost poslovanja. Statistično značilnega vpliva rasti prihodkov na kazalnik zadolženosti ni bilo mogoče ugotoviti.

Uporabil sem tudi pristop Beshenova in Rozmainskega, kjer je zadolženost podjetja bila merjena kot razmerje pokritosti obresti. Glede na vrednost razmerja so bila podjetja klasificirana kot zanesljiva, špekulativna ali tvegana enota. Na ta način sem ugotovil, da se je delež zanesljivih enot pred krizo zmanjšal, na drugi strani pa se je delež špekulativnih in ponzi enot povečal.

Analizo portfelja danih posojil bank in zadolženosti gospodinjstev je pokazala, da so se posojila gospodinjstvom in nefinančnim podjetjem pred krizo povečala. Vendar pa se zadolženost gospodinjstev (merjena kot razmerje med dolgom in net razpoložljivim dohodkom) v nekaterih vodilnih ekonomskih silah Evro območje ni povečala pred krizo, kot predvideva Carvezasi.

Na podlagi ugotovitev sklepam, da je hipotezo mogoče uporabiti kot zadostno razlago dinamike finančnih struktur in nastanka globalne finančne krize v letu 2009. Modifikacija hipoteze kot jo predlaga Caverzasi ni potrebna, saj sta oba pristopa merjenja stopnje zadolženosti pokazala povišanje zadolženosti v obdobju pred krizo tako v ZDA kot na področju Evro območja.

REFERENCE LIST

1. *About ECB*. Retrieved 10 December, 2017 from https://www.ecb.europa.eu/ecb/html/index. en.html

2. *About FED*. Retrieved 10 December 10, 2017 from https://www.federalreserve.gov/aboutthefed/pf.html

3. Angell, C. & Rowley, D. (2006). Breaking New Ground in U.S. Mortgage Lending. *DIC: Outlook Summer 2006, Federal Deposit Insurance Corporation*. Retrieved May 14, 2017, from https://www.fdic.gov/bank/analytical/regional/ro20062q/na/t2q2006.pdf

4. Archarya, V., Philippon, T., Richardson, M. & Roubini, N. (2009). The Financial Crisis of 2007–2009: Causes and Remedies. *Financial Markets, Institutions & Instruments*, *18*(2), 89–137.

5. Arestis, P. & Glickman, M. (2002). Financial Crisis in Southeast Asia: Dispelling Illusion the Minskyan Way. *Cambridge Journal of Economics*, *26*(2), 237–260.

6. Baffes, J., Kose, M. A., Ohnsorge, F. & Stocker, M. (2015). The Great plunge in oil Prices: Causes, Consequences, and Policy Responses. *World Bank Group Policy Research Note*. Retrieved 10 December, 2017 from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1341170

7. Bagehot, W. (1873). *Lombard Street: A Description of the Money Market*. Genovese, F. C. (Eds.). Homewood: Richard D. Irwin.

8. Baskin J. (1989). Empirical Investigation of the Pecking Order Hypothesis. *Financial Menagement, 33*(1), 103–132.

9. BBC (2014, March 24). Did Hyman Minsky find the secret behind financial crashes? *Magazine*. Retrieved 10 May 10, 2017 from http://www.bbc.com/news/magazine-26680993

10. Behlul, T. (2011). Was it really a Minsky moment? *Journal of Post Keynesian Economics*, *34*(1), 137–157.

11. Bellofiore, R. & Halevi, J. (2009). A Minsky Moment? The Subprime Crisis and the "New" Capitalism. *International Economic Policy Institute Working Paper*, 2009–04.

12. Bellofiore, R., Halevi, J. & Veronese Passarella, M. (2010). The Elgar Companion to Hyman Minsky. In Papadimitrou, D. & Wray, L.R. (Eds.), *Minsky in the 'new' capitalism: The new clothes of the financial instability hypothesis* (pp. 84–99). Northampton: Edward Elgar.

13. Berk, A. (2005). Dejavniki zadolževanja največjih slovenskih javnih delniških družb in vpliv novega zadolževanja na donosnost delnic [Factors of indebtedness of the biggest Slovenian public companies and the effect of new debt on bond yields]. *IB revija*, *3*, 41–53.

14. Bernanke, B. S. & Gertler, M. (1990). Financial fragility and economic performance. *Quarterly Journal of Economics*, *105*(1), 87–114.

15. Beshenov, S. & Rozmainsky, I. (2015). Hyman Minsky's financial instability hypothesis and the Greek debt crisis. *Russian Journal of Economics*, *1*, 419–439.

16. Bloomberg (2017a). *Company descriptions and sector classifications*. Retrieved 27 July, 2017 from Bloomberg terminal.

17. Bloomberg (2017b). *Financial Statements and financial ratios 1/1/2000 to 31/122016*. Retrieved 27 July, 2017 from Bloomberg terminal.

18. Bloomberg (2017c). *Index constituents*. Retrieved 27 July, 2017 from Bloomberg terminal.

19. Brunnermeier, M. K. (2008). Deciphering the Liquidity and Credit Crunch 2007–2008. *Journal of Economic Perspectives, 23*(1), 77–100.

20. Bureau of labour statistics (2017). *CPI-All Urban Consumers (Current Series) - Core CPI and CPI-All Urban Consumers (Current Series) CPI*. Retrieved 6 December, 2017 from https://www.bls.gov/cpi/data.htm

21. Capehart, K. W. (2015). Hyman Minsky's interpretation of Donald Trump. *Journal of Post Keynesian Economics*, *38*, 477–492.

22. Cassidy, J. (2008, February 4). The Minsky Moment. *Magazine*. Retrieved 10 May, 2017 from https://www.newyorker.com/magazine/2008/02/04/the-minsky-moment

23. Caverzasi, E. (2014). Minsky and the Subprime Mortgage Crisis: The Financial Instability Hypothesis in the Era of Financialization. *Jerome Levy Economics Institute Working Paper*, *796*.

24. Crotty, J. (2009). Structural causes of the global financial crisis: a critical assessment of the new financial architecture. *Cambridge Journal of Economics*, *33*, 563–580.

25. Cukierman, A. (2012, July 15). Monetary Policy and Institutions Before, During, and After the Global Financial Crisis. *Paolo Baffie Research paper*, *2012-112*. Retrieved 27 November, 2017 from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2115446

26. Damodaran, A. (2011). *Applied corporate finance*. Hoboken: John Wiley & Sons.

27. Davidson, P. (2008). Is the current financial distress caused by the Subprime Mortgage Crisis a Minsky Moment? Or is it the result of attempting to securitize illiquid noncommercial mortgage loans? *Journal of Post Keynesian Economics*, *30*(4), 669–676.

28. Delivorias, A. (2015). *Monetary policy of the European Central Bank - Strategy, conduct and trends*. Retrieved 10 December, 2017 from http://www.europarl.europa.eu/RegData/etudes/IDAN/2015/549005/EPRS_IDA(2015)549005_EN.pdf

29. Demyanyk, Y. & Van Hemert, O. (2007). Understanding the subprime mortgage crisis. *FRB St. Louis and NYU Stern Working Paper*.

30. Detzer, D. & Herr, H. (2014). Theories of financial crises – an overview. *Institute for International Political Economy Berlin Working Paper*, *32*.

31. Dymski, G. A. (2010). Why the Subprime Crisis is Different: a Minskyian Approach. *Cambridge Journal of Economics*, *34*(2), 239–255.

32. ECB (2011). *The Monetary policy of the ECB*. Retrieved 10 December, 2017 from https://www.ecb.europa.eu/pub/pdf/other/monetarypolicy2011en.pdf

33. ECB (2018). *Balance Sheet Items*. Retrieved 6 January, 2018 from http://sdw.ecb.europa.eu/browseSelection.do?df=true&ec=&dc=&oc=&pb=&rc=&DATASET=0&removeItem=&removedItemList=&mergeFilter=&activeTab=&DATA_TYPE.14=1&COUNT_AREA.14=U2&BS_COUNT_SECTOR.14=&node=bbn3154&legendRef=reference&legendPub=published

34. ECB MFI's. *Monetary Financial Institutions Definition*. Retrieved 6 January, 2018 from https://www.ecb.europa.eu/stats/financial_corporations/list_of_financial_institutions/html/index.en.html

35. Eichengreen, B. & O'Rourke, K. H. (2009, April 6). A Tale of two depressions. *VoxEU.org*. Retrieved 14 May, 2017 from https://voxeu.org/article/tale-two-depressions-what-do-new-data-tell-us-february-2010-update

36. Eurostat (2017). *HICP (2015 = 100) - annual data (average index and rate of change)*. Retrieved 6 December, 2017 from http://ec.europa.eu/eurostat/web/hicp/data/database

37. FED (2016, October). *The Federal Reserve System Purposes & Functions (10th ed.)*. Retrieved 10 December, 2017 from https://www.federalreserve.gov/aboutthefed/files/pfcomplete .pdf

38. FED (2018). *Assets and Liabilities of Commercial Banks in the United States*. Retrieved 6 January, 2018 from https://www.federalreserve.gov/datadownload/Download.aspx?rel=H8&series =462d10edec69525ece2777f62296d502&filetype=spreadsheetml&label=include&layout =seriesrow&from=01/01/2000&to=12/31/2016

39. Fisher, I. (1933). The Debt-deflation Theory of Great Depressions. *Econometrica*, *1*(4), 337–357.

40. Gapper, J. (2008, October 1). The fatal banker's fall. *Financial Times: Columnists*. Retrieved 14 May, 2017 from https://www.ft.com/content/ccc6d456-8fd7-11dd-9890-0000779fd18c

41. Greenwald, B. C. & Stiglitz, J. E. (1993). Financial market imperfections and business cycles. *Quarterly Journal of Economics*, *108*(1), 77–114.

42. Henry, L. (2009). One huge Minsky moment: Lessons from the financial crisis. *Social and Economic Studies*, *58*(2), 77–89.

43. International Financial Statistics (IFS) (2017). *Interest Rates selected indicators*. Retrieved 6 December, 2017 from www.imf.org/en/Data

44. International Monetary Fund (2009, April). *Global Financial Stability Report*. Retrieved 14 May, 2017 from http://www.imf.org/external/pubs/ft/gfsr/2009/01/

45. Keynes, J. M. (1972). *Essays in Persuasion, The Collected Writings of John Maynard Keynes, Vol. IX*. London and Basingstoke: MacMillan, St. Martins Press, for the Royal Economic Society.

46. Keynes, J. M. (1978). *The general theory of employment, interest and money*. Moscow: Progress.

47. Knell, M. (2015). Schumpeter, Minsky and the financial instability hypothesis. *Journal of Evolutionary Economics*, *25*(1), 293–310.

48. Krajnović, E. (2017). Podatki so nova nafta: izvrtajte vrtino [Data is the new oil: Drill your own hole]. *MQ - Revija Združenja Manager*, *38*, 24–26.

49. Kregel. J. (2008). Using Minsky's cushions of safety to analyze the U.S. subprime mortgage market. *International Journal of Political Economy*, *37*(1), 3–23.

50. Mendoza, E. (2006). Endogenous Sudden Stops in a Business Cycle Model with Collateral Constraints: a Fisherian Deflation of Tobin's Q. *NBER Working Paper*, *12564*.

51. Mendoza, E. & Terrones, M. (2008). An Anatomy of Credit Booms: Evidence from Macro Aggregates and Micro Data. *NBER Working Paper*, *14049*.

52. Minsky, H. P. (1957) Monetary Systems and Accelerator Models. *The American Economic Review*, *47*(6), 860–883.

53. Minsky, H. P. (1975). *John Maynard Keynes*. New York: Columbia University Press.

54. Minsky, H. P. (1977). The Financial Instability Hypothesis: An interpretation of Keynes and Alternative to "Standard" Theory. *Nebraska Journal of Economics and Business*, *16*(1), 5–16.

55. Minsky, H. P. (1982). Can "It" Happen Again? *Essays on Instability and Finance*. Armonk, M.E. Sharpe.

56. Minsky, H. P. (1985). The financial instability hypothesis: A restatement (pp. 24–55). In Arestis, P. & Skouras T. (Eds.). *Post-Keynesian economic theory: A challenge to neoclassical economics*. Brighton: Wheatsheaf.

57. Minsky, H. P. (1986). *Stabilizing an unstable economy*. New Haven: Yale University Press.

58. Minsky, H. P. (1991). Financial Crises: Systematic or Idiosyncratic. *The Levy Economics Institute of Bard College Working Paper*, *51*.

59. Minsky, H. P. (2004). *Induced Investment and Business Cycles*. Papadimitrou, D.B. (Eds.). Northampton: Edward Elgar.

60. Minsky, H.P. & Whalen C. J. (1996). Economic Insecurity and the Institutional Prerequisites for Successful Capitalism. *The Levy Economics Institute of Bard College Working Paper*, *165*.

61. Myers, C. S. (1977). Determinants of Corporate Borrowing. *Journal of Financial Economics, 5*, 147–176.

62. OECD (2018). *Household debt (indicator)*. Retrieved 21 January, 2018 from https://data.oecd.org/hha/household-debt.htm

63. Orhangazi, O. (2008). Financialisation and Capital Accumulation in the Non-Financial Corporate Sector: A Theoretical and Empirical Investigation on the US Economy. *Cambridge journal of Economics*, *32*(6), 863–886.

64. Pandey, I.M. (2001). Capital Structure and the Firm Characteristics: Evidence from an Emerging Market. *Indian Institute of Management Ahmedabad, Working Paper, 2001-10-04*.

65. Partnoy, F. (2003). *Infectious Greed*. New York: Times Books.

66. Pasarella, M. (2012). A simplified stock-flow consistent dynamic model of the systemic financial fragility in the New Capitalism. *Journal of Economic Behaviour & Organization*, *83*, 570-582.

67. Phillips, A. W. (1958). The Relation Between Unemployment and the Rate of Change of Money Wage Rate in the United kingdom, 1861–1957. *Economica*, *35*, 283–299.

68. Qi, C., Juniper, J. & Zhang, J. X. (2015). Minsky moment and financial fragility: The case of China. *Journal of developing areas*, *49*(6), 279–291.

69. Rajan, R.G. & Zingales, L. (1995). What Do We Know about Capital Structures? Some Evidence from International Data. *Journal of Finance, 50*(5), 1421 – 1460.

70. Rozmainsky, I.V. (2009). Minsky's contribution to the economic theory and major causes of crises in late industrial monetary economy. *Terra Economicus*, *7*(1), 31–42.

71. Ryoo, S. (2013). The paradox of debt and Minsky's financial instability hypothesis. *Metroeconomica*, *1*(1), 1–24.

72. Taylor, J. (2009). The Financial Crisis and the Policy Responses: An Empirical Analysis of What Went Wrong. *NBER Working Papers*, *14631*.

73. Taylor, J. B. (1993). Discretion versus Policy Rules in Practice. *Rochester Conference Series on Public Policy*, *39*, 195–214.

74. Teplova, T. V. (2011). *Investment*. Moscow: Urait.

75. The Economist (2016, July 30). Minsky's moment. *The Economist - Series on seminal economic ideas*. Retrieved 10 May, 2017 from https://www.economist.com/news/economics-brief/21702740-second-article-our-series-seminal-economic-ideas-looks-hyman-minskys

76. Thorton, H. (1802). *An Enquiry into the Nature and Effects of the Paper Credit of Great Britain*. New York: Rinehart.

77. Titman, S. & Wessels, R. (1988). The Determinants of Capital Structure. *Journal of Finance, 48*(1), 1–19.

78. Toporowski, J. (1999). Monetary Policy in an Era of Capital Market Inflation. *Levy Economics Institute of Bard College Working Paper*, *279*.

79. Toporowski, J. (2000). *The End of Finance: The theory of Capital Marker Inflation, Financial Derivatives and Pension Fund Capitalism*. Routledge: London.

80. Tropeano, D. (2010). The current financial crisis, monetary policy and Minsky's structural instability hypothesis. *International Journal of Political Economy*, *39*.

81. Vymyatnina, Y. & Pakhnin, M. (2014). Application of Minsky's theory to state-denominated economies. *European University at St. Petersburg Working Paper*, *3*.

82. Whalen, C. J. (2007). The U.S credit Crunch of 2007: A Minsky Moment. *Public policy brief, Jerome Levy Economics Institute of Bard College*, *92*.

83. Wolfson, M. H. (2002). Minsky's Theory of Financial Crises in a Global Context. *Journal of economic issues*, *34*(2), 393–400.

84. Wray, L. R. (2009). The Rise and Fall of Money Manager Capitalism: a Minskian Approach. *Cambridge Journal of Economics*, *33*, 807–828.

85. Wray, L. R. (2011). Minsky's money manager capitalism and the global financial crisis. *International Journal of Political Economy*, *40*(2), 5–20.

86. Wray, L. R., & Tymoigne, E. (2008). Macroeconomics meets Hyman P. Minsky: The financial theory of investment. *Jerome Levy Economics Institute Working Paper*, *543*.

APPENDICES

Appendix A: Results of cross sectional and time series analysis by sector

Cross sectional analysis by sector

	Basic Materials			Communication			Consumer, Cyclical			Test statistics			
	N	Mean Rank	Mean	N	Mean Rank	Mean	N	Mean Rank	Mean	Chi-Square	df	Asymp. Sig.	Total N
DA_2004-2006_Median	43	368.21	0.23	53	358.36	0.25	129	351.15	0.22	101.44	8	***	656
DA_2007-2009_Median	42	356.79	0.25	52	381.46	0.30	129	358.19	0.26	88.72	8	***	654
DA_2010-2012_Median	42	381.90	0.26	51	388.24	0.30	128	338.65	0.24	91.05	8	***	651
DA_2011-2013_Median	42	380.76	0.26	51	386.86	0.32	128	341.03	0.25	84.11	8	***	651
	Consumer, Noncyclical			Diversified			Energy			Test statistics			
DA_2004-2006_Median	137	322.16	0.20	1	633.00	0.49	36	290.08	0.18	101.44	8	***	656
DA_2007-2009_Median	137	327.59	0.23	1	653.00	0.71	36	275.60	0.19	88.72	8	***	654
DA_2010-2012_Median	136	329.63	0.23	1	633.00	0.57	36	288.53	0.19	91.05	8	***	651
DA_2011-2013_Median	136	329.92	0.23	1	628.00	0.57	36	296.86	0.20	84.11	8	***	651
	Industrial			Technology			Utilities			Test statistics			
DA_2004-2006_Median	144	305.16	0.19	69	185.68	0.10	44	531.93	0.36	101.44	8	***	656
DA_2007-2009_Median	144	295.93	0.21	69	192.30	0.12	44	495.93	0.36	88.72	8	***	654
DA_2010-2012_Median	144	296.60	0.20	69	185.19	0.12	44	493.18	0.34	91.05	8	***	651
DA_2011-2013_Median	144	294.47	0.21	69	189.21	0.13	44	482.02	0.35	84.11	8	***	651

Source: own work.

1

Time series analysis by sector with one-year lag period and without it (part 1)

Without one-year lag	Basic Materials		Communication		Consumer, Cyclical		Consumer, NonCyclical	
	Mean Rank	Mean	Mean Rank	Mean	Mean Rank	Mean	Mean Rank	Mean
DA_2004-2006_Median	1.95	0.23	2.02	0.25	2.34	0.22	2.17	0.20
DA_2007-2009_Median	2.50	0.25	2.74	0.30	2.84	0.26	2.64	0.23
DA_2010-2012_Median	2.52	0.26	2.64	0.30	2.22	0.24	2.36	0.23
DA_2013-2015_Median	3.02	0.31	2.61	0.29	2.59	0.26	2.83	0.26
N	42.00		51.00		128.00		136.00	
Chi-Square	14.49		10.10		18.60		21.98	
df	3.00		3.00		3.00		3.00	
Asymp. Sig.	***		**		***		***	
With one-year lag	Basic Materials		Communication		Consumer, Cyclical		Consumer, NonCyclical	
DA_2004-2006_Median	1.98	0.23	2.02	0.25	2.27	0.22	2.11	0.20
DA_2007-2009_Median	2.38	0.25	2.72	0.30	2.77	0.26	2.54	0.23
DA_2011-2013_Median	2.64	0.26	2.56	0.32	2.30	0.25	2.45	0.23
DA_2014-2016_Median	3.00	0.32	2.71	0.29	2.67	0.27	2.90	0.28
N	42.00		51.00		128.00		135.00	
Chi-Square	14.09		10.19		15.65		26.28	
df	3.00		3.00		3.00		3.00	
Asymp. Sig.	***		**		***		***	

Source: own work.

Time series analysis by sector with one-year lag period and without it (part 2)

Without one-year lag	Energy		Industrial		Technology		Utilities	
	Mean Rank	Mean	Mean Rank	Mean	Mean Rank	Mean	Mean Rank	Mean
DA_2004-2006_Median	2.03	0.18	2.31	0.19	2.40	0.10	2.68	0.36
DA_2007-2009_Median	2.28	0.19	2.57	0.21	2.57	0.12	2.68	0.36
DA_2010-2012_Median	2.44	0.19	2.31	0.20	2.42	0.12	2.16	0.34
DA_2013-2015_Median	3.25	0.24	2.82	0.23	2.61	0.15	2.48	0.35
N	36.00		144.00		69.00		44.00	
Chi-Square	18.30		16.37		1.61		4.83	
df	3.00		3.00		3.00		3.00	
Asymp. Sig.	***		***		not sign.		not sign.	
With one-year lag	Energy		Industrial		Technology		Utilities	
DA_2004-2006_Median	1.83	0.18	2.20	0.19	2.30	0.10	2.66	0.36
DA_2007-2009_Median	2.08	0.19	2.47	0.21	2.43	0.12	2.64	0.36
DA_2011-2013_Median	2.43	0.20	2.41	0.21	2.31	0.13	2.32	0.35
DA_2014-2016_Median	3.65	0.29	2.92	0.25	2.96	0.19	2.39	0.35
N	36.00		144.00		69.00		44.00	
Chi-Square	42.75		24.97		13.64		2.37	
df	3.00		3.00		3.00		3.00	
Asymp. Sig.	***		***		***		not sign.	

Source: own work.

Appendix B: Results of OLS regression

OLS regression of debt to assets ratio

Debt to assets ratio				
	Unstandardized Coefficients	Clustered Stand. Error	t	Sig.
(Constant)	0.010	0.008	1.598	Not sign.
Period	0.021	0.005	4.419	***
EurozoneCore	0.035	0.005	6.887	***
EurozoneNonCore	0.107	0.008	13.058	***
Big_Cap	0.029	0.004	7.153	***
InterestRate	0.009	0.002	4.787	***
Revenue	(0.008)	0.009	(1.509)	Not sign.
PB	0.001	0.001	5.224	***
LTAssetsTotalAssets	0.307	0.012	29.958	***
ROIC	(0.010)	0.006	(2.828)	**
N		5,174		
Adjusted R Square		0.224		
Std. Error of the Estimate		0.138		

Source: own work.

OLS regression of debt to assets ratio in the United States

Debt to assets ratio - United States				
	Unstandardized Coefficients	Clustered Stand. Error	T	Sig.
(Constant)	0.023	0.008	3.27	**
Period	0.034	0.006	6.08	***
Big_Cap	0.039	0.005	8.39	***
InterestRate	0.011	0.002	5.29	***
Revenue	(0.016)	0.009	(2.52)	**
PB	0.001	0.001	5.23	***
LTAssetsTotalAssets	0.264	0.013	22.87	***
ROIC	(0.010)	0.006	(2.67)	**
N		3,892		
Adjusted R Square		0.176		
Std. Error of the Estimate		0.139		

Source: own work.

OLS regression of debt to assets ratio in the Eurozone core countries

Debt to assets ratio - Eurozone Core countries				
	Unstandardized Coefficients	Clustered Stand. Error	T	Sig.
(Constant)	0.000	0.021	0.03	Not sign.
Period	(0.019)	0.009	(1.96)	*
Big_Cap	0.002	0.009	0.20	Not sign.
InterestRate	0.005	0.005	0.89	Not sign.
Revenue	0.004	0.022	0.31	Not sign.
PB	(0.003)	0.004	(1.19)	Not sign.
LTAssetsTotalAssets	0.452	0.026	17.63	***
ROIC	(0.150)	0.062	(3.26)	**
N	967			
Adjusted R Square	0.258			
Std. Error of the Estimate	0.127			

Source: own work.

OLS regression of debt to assets ratio in the Eurozone noncore countries

Debt to assets ratio - Eurozone NonCore countries				
	Unstandardized Coefficients	Clustered Stand. Error	T	Sig.
(Constant)	0.013	0.026	0.40	Not sign.
Period	0.004	0.017	0.24	Not sign.
Big_Cap	(0.006)	0.015	(0.41)	Not sign.
InterestRate	0.009	0.009	1.05	Not sign.
Revenue	0.043	0.028	1.97	*
PB	(0.003)	0.001	(1.94)	*
LTAssetsTotalAssets	0.509	0.035	12.09	***
ROIC	0.037	0.070	0.45	Not sign.
N	315			
Adjusted R Square	0.369			
Std. Error of the Estimate	0.126			

Source: own work.

Appendix C: Abbreviations

CAGR	Compound annual growth rate
CMI	Capital market inflation theory
CPI	Consumer price index
EBT	Earnings before tax
ECB	European central bank
FED	Federal Reserve System
FIH	Financial instability hypothesis
GFC	Global financial crisis
HICP	Harmonized index of consumer prices
LTRO	Long-term refinancing operations
MBS	Mortgage backed security
MFI	Monetary financial institution
SME	Small and medium sized enterprises
US	United States

Appendix D: Eurozone members

Country	Eurozone member since	EU member since
Austria	1999	1995
Belgium	1999	1957
Cyprus	2008	2004
Estonia	2001	2004
Finland	1999	1995
France	1999	1957
Germany	1999	1957
Greece	2001	1981
Ireland	1999	1973
Italy	1999	1957
Latvia	2014	2004
Lithuania	2015	2004
Luxemburg	1999	1957
Malta	2008	2004
Netherlands	1999	1957
Portugal	1999	1986
Slovakia	2009	2004
Slovenia	2007	2004
Spain	1999	1986