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Credit Creation and its Contribution to Financial Crises

Master Thesis for the degree of Master of Science
in Management, Technology and Economics (MTEC)

by

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Declaration

I hereby declare that this thesis was performed and written on my own and that references and resources used within this work have been explicitly indicated.

I am aware that making a false declaration may have serious consequences.

Zurich, August 2010 ----------

(Signature)

Abstract

This master thesis investigates the role of credit creation and its contribution to financial crises. The idea that banks are the creators of credit is at the core of this work. Other aspects relating to credit creation, like the theory of endogenous money, imperfect information and rationed markets are further points that are discussed to help explain the mechanism of credit creation and its role in past and current events. It is argued that it is credit creation that fuels bubbles, makes the system unstable and leads economies into crises. This work identifies different measures that have been taken during the recent Global Financial Crisis that started to unfold in 2007 and during past historical crises. The role of credit creation in the development of bubbles is elaborated. If credit creation is in fact the fundamental cause that leads to bubbles, there might be ways to effectively deal with crises or perhaps even prevent future crises.

Key words
Credit creation, financial crisis, Global Financial Crisis (GFC)

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With this report, I hope to stimulate a new view on the fundamental cause of financial crises and the role of banks in the economy. My endeavor is to help finding measures that improve the chances of financial stability in the future.

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List of Abbreviations

Abbreviations used in this master thesis

BOJ	Bank of Japan
CB	central bank
CC	credit creation
FRB	Fractional Reserve Banking
GFC	Global Financial Crisis
LTD	loan-to-deposit ratio
mm	money multiplier
RR	reserve requirement
SBS	Shadow Banking System

Commonly used abbreviations

ABCP	asset-backed commercial paper
ABS	asset-backed security
CDO	collateralized debt obligation
CDS	credit default swap
CP	commercial paper
CRT	credit risk transfer
ECB	European Central Bank
Fed	Federal Reserve bank (of the U.S.)
GDP	gross domestic product
IB	investment bank
IMF	International Monetary Fund
MBS	mortgage-backed security
nGDP	nominal GDP
SIV	Special Investment Vehicle
SPE	special purpose entity
SPV	special purpose vehicle

Glossary

mainstream economics	Mainstream economics is a term used in this thesis to refer to the prevailing view on economics. It is closely associated with neoclassical economics, with the Keynesian approach to macroeconomics.
malinvestment	Describes investments of economic participants being badly or inappropriately allocated due to artificially low cost of credit and associated unsustainable increases in bank-created money, often blamed on a central bank. It is a concept developed by the Austrian School.

1. Introduction

1.1. The importance of the issue

The ongoing Global Financial Crisis is the worst since the Great Depression in the 1930s. The current paradigm in macroeconomics advocates the idea that monetary policy via interest rates can steer the economy towards growth or contraction. The prevailing belief is that bubbles do occur and cannot be detected in advance. The existence of a bubble is only revealed after its burst has confirmed its previous existence. A few researchers have started to take an opposite point of view (e.g. Prof. Dr. Sornette[1]) and claim that bubbles are predictable.

Bubbles and the consequent busts often lead to a destructive asset price crash. William C. Dudley (President and CEO of the Federal Reserve Bank of New York) remarked in April 2010 that asset price bubbles are hard to recognize in real time, but that their collapse can be very damaging to the financial system and the macroeconomy. The ongoing financial crisis shows clearly that an identification of bubbles in real time is more than desirable. In order to detect them, it is necessary to understand more about the causes and mechanisms that lead to bubbles.[2]

Mr. Jean Claude Trichet (President of the European Central Bank) makes a similar statement. He argues that financial crises share some commonalities. Such financial crises are associated with the emergence of euphoria and complacency in financial markets, typically supported by rapid credit growth and a growing belief that new concepts like financial innovation or technological advances have rendered old limits on economic performance obsolete. The existence of such commonalities in the anatomy of crises gives rise to a number of hopes. They suggest that it is possible to develop warnings of nascent crises at an early stage. It implies that policy-makers could design and implement policies that contain or avoid such crises. Such commonalities offer hope that policy-makers can detect, at an early stage, a nascent crisis. On the basis of inductive logic, historical regularities could be exploited to help predict the future. Being able to identify financial tensions would allow appropriate policy actions to be taken in a timely manner, Trichet concluded.3 The suggestion that it might be possible to detect bubbles in real time in order to take appropriate action is a remarkable change in

the mindset of two leading central bankers. So far, prevailing belief has been that bubbles only reveal their existence after the fact and the damage has been caused.

The Global Financial Crisis is currently seen as the largest crisis since the Great Depression in the 1930s. Trillions of losses, company defaults and high unemployment rates are only a few of the symptoms of the nuisance. Due to the many negative consequences of financial crises, a more stable economy would be desirable. But in order to stabilize the economy or even avoid further financial crises, the causes and factors that facilitate a crisis have to be known. The creation of new financial instruments, deregulation and over-leveraging are the standard causes considered to explain the current financial crisis. These conditions were definitely factors that facilitated the unfolding of the current financial crisis. But what is the ultimate driver of the current financial crisis?

The aim of this master thesis is to address the question of what the fundamental cause of financial crises is. Richard A. Werner‘s ideas provide the basis for this research. He suggests that credit creation is the fundamental cause for the Japanese crisis in the 1990s, which is known as “the lost decade”. Werner’s hypothesis and its application to the Japanese crisis will be explained in this thesis.

Can the argument of credit creation as the fundamental cause be used to explain other financial crises, such as the ongoing Global Financial Crisis that started to unfold in 2007? This master thesis takes a closer look at credit creation and its relation to the Global Financial Crisis. Several mechanisms of credit creation have been identified. Their role in relation to the Global Financial Crisis is investigated according to Werner’s hypothesis.

1.2. Structure of the document

First, a definition of credit creation will serve as a starting point to explore the multifaceted forms of credit creation. The fractional reserve banking system and the mainstream approach to banking and credit creation is outlined. An explanation of Werner’s hypothesis of credit creation and how it is supposed to explain financial crises follows. This is shown on the example of Japan’s lost decade, as Werner used his hypothesis to explain the Japanese crisis.

The role and development of credit creation in history is illustrated. During the 18th century the English goldsmiths constituted the basis for the modern banking system when they changed their lending practices. The story of China in the 13th century under Kublai Khan illustrates an economy where the power of credit creation is in public hands. Japan's lost decade is a more recent example that shows how excess credit creation led to a crisis.

The next part of the thesis pays attention to the ongoing Global Financial Crisis. The aim is to find out whether Werner's theory can be applied to explain the Global Financial Crisis and whether the evidence supports Werner's hypothesis. Different mechanisms of credit creation are isolated and the developments in the years leading up to the crisis are illustrated. The main focus is on the U.S. economy, as it is the leading global economy. Greece and Iceland are investigated in more detail, as they are countries contributing to the European sovereign debt crisis. An emphasis lies on the vast variety of forms that credit creation took proceeding and during the ongoing crisis.

The present state of the economy is investigated and a discussion of measurements to resolve the crisis follows.

Based on past and present developments, I dare an outlook with a possible scenario of future developments.

1.3. Aim of the work

First, Werner's hypothesis of credit creation is explained. The paper addresses the question, what credit creation is and what forms it can take. In a broader context, it is shown how credit creation can lead to a crisis and what the role of credit creation in a crisis is. It also addresses the question how credit creation contributed to the current financial crisis, whether it can be seen as the fundamental cause and consequently whether Werner's hypothesis applies to the current crisis.

Although Werner's ideas are investigated in a broader context, the focus is on the credit creation problem. Other problems will be discussed only in relation to this and only when they support and characterize the credit creation mechanism.

It is a hard fact that banks create credit. The question to be answered is what actual role credit creation as a main driver and cause of the crisis plays. The answer is provided by identification and analysis of different ways of the credit creation mechanism and its impact on the business cycle.

It is shown that banks are the creators of credit and as such are much more than mere intermediaries. Banks with their power to create and allocate credit play a powerful role in the economy. The problematic of the power of private entities that strive for profit to create credit is discussed.

2. Theory

2.1. First definition of credit creation

A clear definition of the term credit creation will allow us to work with the term. The Compact Oxford English Dictionary provides the following definition of the term credit:

Credit[4]

1) the facility of being able to obtain goods or services before payment, based on the trust that payment will be made in the future.
2) an entry in an account recording a sum received.
3) a public acknowledgement or praise given for an achievement or quality.
4) a source of pride: the fans are a credit to the club.
5) a written acknowledgement of a contributor's role displayed at the beginning or end of a film or program.
6) a unit of study counting towards a degree or diploma.
7) Brit. a grade above a pass in an examination.

This general definition includes several different meanings of the term. The first meaning of credit refers to credit in the sense of a loan. In the second part of the definition credit is seen as an entry in an account recording a sum received. A saving deposited in a bank account would be a possible example for such an entry. Only the first two meanings (number 1 and 2) are appropriate to explain the term credit in the financial context.

In order to complete the definition of the term credit creation, the term creation needs to be clarified. The Compact Oxford English Dictionary explains creation as follows:

Creation[4]

1) the action or process of creating.
2) a thing, which has been made or invented, especially something showing artistic talent.

3) (the Creation) the creating of the universe regarded as an act of God.
4) (Creation) literary the universe

Referring to the financial environment, only creation seen as the action or process of creating is considered appropriate (number 1).

Thus, credit creation is defined as the act or process of creating a) the facility of being able to obtain goods or services before payment, based on the trust that payment will be made in the future or b) an entry in an account recording a sum received.

This raises the question, how money creation is related to credit creation. According to the Oxford English Dictionary, money is a medium of exchange in the form of coins and banknotes, but money can also mean wealth or financial gain. The meaning of the term capital is similar to the definition of money. Capital is defined as wealth owned by a person or organization or invested, lent, or borrowed. The term capital is somewhat broader than money but can mostly be used as a substitute. How is money created in an economy? The following definition of money creation is proposed:

Money creation[5] is the process by which new money is produced or issued. There are three ways to create money:
1) by manufacturing paper currency or metal coins,
2) through fractional reserve banking and lending by the banking system,
3) and by government policies such as quantitative easing.

The definition of money creation is closely related to credit creation. The definition of money creation includes the previously suggested definition of credit. The previous suggestion for credit creation refers to point 2) where money is created via the banking system and 3) where the Federal Reserve increases the money supply ex nihilo. The creation of new money by simply creating money out of nothing – either by adding money in form of paper currency or metal coins to the system or by electronic creation of money is included in the definition of credit creation. The definition of money creation adds only one new aspect: the creation of money by manufacturing paper currency or metal coins, which is excluded in the definition of credit creation.

The previous definition of credit creation shall serve as a starting point to have a closer look on what forms credit creation can take and its role in the economy. Traditionally, the term credit creation has been used as the channeling of savings towards alternative uses. This is clearly different from the definition used here. We will see that savings are not a necessary condition in order to create credit as credit is often created out of nothing. Our understanding of credit creation will be extended as credit creation can take many forms.

2.2. Fractional reserve banking (FRB) and mainstream economics

2.2.1. Introduction to FRB

The following part will explain how the fractional reserve banking (FRB) system works in theory and the mainstream perspective is outlined. At a later point, the flaws in the theory and the loopholes that can be exploited are pointed out.

Our economy is based on the FRB system. The basic idea of this system is to keep a fraction of the deposited money in the bank account. The remainder can be lent out at an interest. Theoretically, it has to be possible at any time to provide the creditors access to their deposits. Most countries, including the US and European economies, use the FRB system. However, differences e.g. in the required reserve ratio exist.

2.2.2. History of FRB

The FRB system evolved over time. Prior to 1800, gold and silver coins had been deposited in the vaults of goldsmiths. In return, the depositors received a note for their deposit. In the turn of time, these notes became a trusted medium of exchange. Notes were used as an early form of paper money in the form of goldsmith's notes. It happened that the original depositors of gold lost faith in the ability of goldsmiths to repay their notes. This led to an early form of bank runs where many of these creditors would try to get their deposits at the same time. If banks were not able to raise enough funds, they went into insolvency or defaulted on their notes. In order to prevent such bank failures, central banks were created (see below).[6]

2.2.3. Entities of the FRB

The FRB system of an economy consisted originally of commercial banks and a central bank. In the last decades however, the shadow banking system (SBS) evolved out of the commercial banking system. The focus is first on the traditional form of FRB. The SBS is explained in the context of credit creation during the Global Financial Crisis.

Commercial Banks
Commercial banks are the main actors in the FRB system. According to mainstream theory, they act as financial intermediaries to channel savers money to firms and individuals who seek funding for their activities. A commercial bank provides checking accounts, savings accounts and money market accounts and they accept time deposits.[7]

Investment banks are part of the commercial banking system. They are limited to capital market activities. Their role is to assist corporations and governments in raising capital by underwriting and acting as the agent in the issuance of securities.[6] They act as intermediaries between investors and borrowers and take an important role in providing credit across the financial system.[8]

Central banks
Central banks were created as a remedy to repeated bank failures that occurred when banks were not able to raise enough funds to pay out their creditors in a bank run. Central banks were created with the purpose to regulate commercial banks, impose reserve requirements and act as a lender-of-last-resort in case a bank is likely to default on its debt. Central banks are crucial in a FRB system as they take on a monitoring and regulatory function.[8]

Their responsibilities may encompass:[6] [9]

- Formulating and executing monetary policy
- controlling the nation's entire money supply
- the Government's banker and the banker's bank ("lender of last resort")
- managing the country's foreign exchange and gold reserves and the Government's stock register
- supervising and regulating depository institutions (banks)

- setting the official interest rate – used to manage both inflation and the country's exchange rate – and ensuring that this rate takes effect via a variety of policy mechanisms

These are all possible functions that a central bank might carry out. However, not all central banks provide all of these functions.

2.2.4. Underlying legislation and current situation in the economy

Mainstream economic theory advocates the view that FRB implies that the money supply in an economy can be modified. Regulators have the power to manipulate the money supply and interest rates. In mainstream economic theory, these two instruments are seen as the key elements of monetary policy to create a healthy economy.[10]

The reserve requirements differ from country to country. Some nations do not impose reserve requirements at all, such as the United Kingdom, Sweden, Australia and Canada.[11] Most other countries require a reserve ratio between 2.0 and 15%. IMF Financial Statistic Yearbook data shows that in general, the reserve ratios have decreased over time. That is, the theoretical amount of money that can be created has increased (higher leverage) and the system became more unstable over time (increased liquidity risk in case of a bank run).

The higher the reserve requirements, the lower the amount of additional money that can be created. The Federal Reserve does not often change reserve requirements because of the exponential impacts on the money supply and the large time lag between their implementation and the corresponding effect of inflation.[6]

The capital adequacy ratio (CAR) measures a bank's capital as a percentage of its risk weighted credit exposures. The CAR serves as an indicator for the amount of loss that a bank can absorb and it allows to ensure that banks are complying with their statutory requirements.[6]

Bretton Woods system
The Bretton Woods system has been introduced after World War II and embodies the idea of pegged exchange rates. The US dollar serves as the leading currency, which in turn is backed by gold.[6] The idea of fixed exchange rates traces back to

John Maynard Keynes. The International Monetary Fund IMF has been established as an organization to oversee the global financial system. In addition, the International Bank for Reconstruction and Development IBRD has been created which is today part of the World Bank Group.[6]

The need for a fixed exchange rate system came out of the Great Depression period in the 1930ies. The floating exchange rate during that period discouraged trade and investment. Governments used currency devaluation to increase their own competitiveness. Indeed, increased exports were the result. But this came at tremendous cost; plummeting national incomes, shrinking demand, mass unemployment, and an overall decline in world trade were the consequences of devaluation. At the same time, it encouraged destabilizing speculation and competitive depreciations. The policy of devaluating the currency is also known as "beggar thy neighbor" policy. The international economic problems lead to the desire for a regulated system. A regulated market with a controlled value of currencies was favored. As the gold standard of the nineteenth century seemed too rigorous, a compromise was established to adjust currency values if needed.[6]

The new solution was a pegged rate currency regime. Member countries were expected to establish a parity of their national currencies in terms of gold (a "peg") and to maintain exchange rates within plus or minus 1% of parity by intervening in their foreign exchange markets. Buying and selling foreign money allowed adjusting the exchange rate.[6] Because the US dollar emerged as the reserve currency, it took over the role that previously gold had played under the gold standard. The US dollar itself was pegged to gold at the rate of $35 per ounce of gold. The US dollar gained purchasing power as European countries transferred large amounts of gold into the United States. The US dollar experienced a strong appreciation and became the key currency of the Bretton Woods system.

The Bretton Woods system has been abandoned at the beginning of the 1970ies. The period after is referred to as Bretton Woods II.

Glass-Steagall Act

The implementation of the Glass-Steagall Act separated commercial banking from investment banking. The Act has been released in 1933. It was the answer to the 1929 stock market crash and a time of nationwide commercial bank failure. Commercial banks were blamed for having taken too much risk by investing

depositors' money in the stock markets. The Glass-Steagall Act finally separated the activities of commercial banks from those of investment banks and commercial banks were prohibited from collaborating with full-service brokerage firms.[12] It made the system more stable.

Garn-St.Germain Depository Institutions Act and Gramm-Leach-Bliley Act

In November 1999, the Glass-Steagall Act has been repealed when Bill Clinton signed into Law the Garn-St. Germain Depository Institutions Act. The Gramm-Leach-Bliley Act (GLBA) was another law released in 1999 that opened up the market among banking companies, securities companies and insurance companies. The Gramm-Leach-Bliley Act facilitates affiliation between banks and securities firms by repealing Sections 20 and 32 of the Glass-Steagall Act. The act authorizes bank holding companies and foreign banks that meet eligibility criteria to become financial holding companies, thus allowing them to engage in a broad array of related activities. The act also provides for the functional regulation of financial holding companies, protects nonpublic customer information held by financial institutions, alters supervision related to the Community Reinvestment Act (CRA), and makes various other regulatory changes. After the introduction of the new Acts has been introduced, the separation between commercial banks and investment banks has been reduced. The distinction between commercial banks and brokerage firms has blurred since and many banks own brokerage firms and provide investment services.[6] An example is one of the world's largest mergers. In 1998, Citigroup merged to a conglomerate composed of the former Citicorp, a commercial bank holding company and Travelers Group, an insurance company.[13]

Basel Accords

The Basel accords are a set of agreements introduced by the Basel Committee on Bank Supervision (BCBS). The accords contain recommendations on banking regulation in regards to capital risk, market risk and operational risk. They encompass Basel I and Basel II. Basel I suggests minimal capital requirements for a bank and focuses mainly on credit risk. It was enforced by law in the Group of Ten (G-10) countries in 1992. Basel II is a more comprehensive set of guidelines.[6]

2.3. Credit creation in mainstream economic theory

2.3.1. Introduction

John Maynard Keynes is one of the most influential economists of modern macroeconomics. The idea to use monetary policy to actively intervene in the economy and many of the concepts explained in this section trace back to Keynes. The section explains how credit creation in our economic system works in theory. The concept of the money multiplier, velocity of money and leverage are explained in detail.

2.3.2. The standard representation of credit creation by banks

On the asset side of the balance sheet, banks hold reserves and loans. The liabilities consist of debt and equity. When a customer makes a deposit at a bank, it is listed as debt (Table 1).[6]

Table 1: Banks balance sheet

Bank's balance sheet	
Assets	**Liabilities**
Reserves	Debt
Loans	Equity

The equality of assets and liabilities requires lead to Equation 1:

Equation 1: $R + L = D + E$

R Reserves
L Loans
D Debt
E Equity

To illustrate the credit creation process of banks in the fractional reserve banking system, let's assume that equity is 0 and the reserve requirement RR is 0.1 (10% of the deposits must be held as reserves).

Bank A receives a deposit of 1000 (Table 2).

Table 2: Step 1

Bank A	
100	1000
900	

Bank A keeps 100 as reserves and extends loans to Bank B of 900 (Table 3).

Table 3: Step 2

Bank B	
90	900
810	

Bank B has now 900 on the liabilities side of the balance sheet. Based on this debt, Bank B leaves 90 as reserve and extends 810 as a loan to Bank C (Table 4).

Table 4: Step 3

Bank C	
81	810
729	

This process can go on until the extendable loan goes to zero. Table 5 shows that the total amount of money has grown from an original of 1000 to 10000 after n steps.

Table 5: Credit creation process in n steps

Bank	Liabilities Deposits	Assets Credits	Reserves	Total Assets
Bank A	1000	900	100	1000
Bank B	900	810	90	900
Bank C	810	729	81	810
-				
-				
Bank n	0	0	0	0
Total	**10000**	**9000**	**1000**	**10000**

2.3.3. Money multiplier and velocity of money

Mechanism of credit creation in the FRB system

In the FRB system, money is created by extending loans. The central bank has the power to create money out of thin air. This money is further lent to commercial banks. These, in turn, keep a fraction of the money in their accounts and lend out the other part of the money. Thus, mainstream economic theory argues that money in the system is created through lending and re-lending among banks. Money is exogenously created by central banks that set the limit on the money supply by originating a certain amount of money. According to this theory, the imposition of reserve requirements by central banks sets the limit of the amount of money in the economy.

Money multiplier

Mainstream economic theory supports the idea of exogenous money. It advocates the idea that the amount of money in the economy is determined by the amount of money that is created by the central bank via the money multiplier.

The deposit creation process is at the heart of the fractional reserve banking system (see previous sections). According to the textbook knowledge, money that has been deposited in the bank is brought back to circulation by lending it out again. Thus the amount of money in the economy increases. The percentage of the original deposit is usually limited – the loans that can be made are smaller than the original deposit (loan-to-deposit (LTD) ratio is smaller than 1, reserve requirement is larger than 0). This is thought to be an effective self-regulating mechanism of money supply. The total potential money supply is limited and determined by the imposed fraction of reserve. The reserve requirement (RR) sets the limit on the money supply. The possible amount of money that theoretically can be created out of a deposit is the inverse of the reserve requirement multiplied by the money created by the central bank (Equation 2). The money multiplier (mm) is the factor by which the existing amount of money maximally can be multiplied.

Equation 2: $mm = 1/RR$

mm money multiplier
RR reserve requirement

A reserve requirement of 10% would lead to a money multiplier of 10. That means that an original deposit of CHF 100 would lead to a maximum amount of money of CHF 1000. The money multiplier has been introduced to link narrow money measures (M1 for US, M0 for UK)[14] [15] to broader deposit aggregates.

There is a certain liquidity risk (below 100%) in fractional reserve banking as it is always possible that the demand for withdrawals exceeds cash reserves (this is called a bank run).

Money supply and its different measures

The total amount of money in an economy is called money supply. A change in the money supply can have an impact on inflation, the price level and the business cycle. The relation between money and prices is associated with the quantity theory of money. Empirical evidence suggests a direct relation between growth in the money supply and long-term price inflation. Usually, the money supply is divided into several categories encompassing M0, MB, M1, M2, M3 and MZM.[11] Table 6 lists different types of monetary aggregates. The definitions of the different types of measurements for the monetary aggregates depend on the country. In the following table, the definitions by the US Fed are used, if not stated otherwise.[16]

Table 6: Monetary aggregates

Monetary aggregate	General definition	Specific components
M0	Narrow money, money base (not used by US Fed)[17]	Bank reserve
M1	Money commonly used for payment	Money commonly used for payment. Currency (and traveler's checks), demand deposits, negotiable order of withdrawal and similar interest-earning checking accounts
M2	M1 + balances that are similar	M1 + Savings deposits and

	to transaction accounts and can be converted fairly readily to M1 with little or no loss of principal. M2 is a measure of money held primarily by households.	money market deposit accounts, small time deposits, retail money market mutual fund balances
M2+CD	Measure of the money supply used by the BoJ. Indicator tracks closely with the total money supply.	All currency in circulation + all bank deposits
M3	M2 + certain accounts held by entities other than individuals and are issued by banks and thrift institutions.	M2 + large time deposits, institutional money market mutual fund balances, repurchase agreements, Eurodollars
MZM	Money of Zero Maturity. It measures the supply of financial assets redeemable at par on demand.	It is basically cash that can be in a bank, a money market fund or at hand.[18]

The US Federal Reserve used to publish data of M1, M2 and M3. However, it stopped publishing data of M3 in 2006.[19] According to the US Federal Reserve, "M3 does not appear to convey any additional information about economic activity that is not already embodied in M2 and has not played a role in the monetary policy process for many years." Furthermore, the costs to collect the data on M3 do not outweigh its benefits.[20]

The velocity of money

The average frequency with which a unit of money is spent in a specific period of time is called the velocity of money. It serves as a measure for the economic activity with a given money supply. GDP is not only a function of the money supply but also on the turnover of that money supply. GDP remains the same if there is no change in both the money supply and the velocity of money. The velocity of money is one of the variables used to determine inflation.

Friedman assumed that the velocity of money remains constant. Data (from different sources like the Federal Reserve Board, Bureau of Economic Analysis and HIMCO)[18] shows, that this is not the case. Indeed, the velocity of money – measured in the traditional way as GDP/M - increased in the '90s.

Equation of exchange

The money supply is an easily observed evidence for the state of an economy. The velocity of money is not as tangible, but it supports the analysis of the inflationary/deflationary tendency of the economy. The velocity of money can be derived from the equation of exchange (Equation 3 and 4):

Equation 3: $M*V = P*Q$

Equation 4: $nGDP = M*V$

M total amount of money in circulation on average in an economy
V velocity of money
P price level (GNP deflator, inflation measure)
Q index of expenditures (quantity/volume)

In practice, M, P and Q are measured and V is calculated from the values of the other terms (V = nGDP/M).[21]

2.4. Alternatives to fractional reserve banking

Fractional reserve banking developed out of the goldsmith's practice of lending the gold deposited in their vaults. The system changed gradually to the modern form of fractional reserve banking. This is still the banking system used by most countries.

Full reserve banking system

The loan-to-deposit ratio in fractional-reserve banking lies between 0 and 1. It has been shown that the money multiplier (mm = 1/RR = 1/(1-LTD)) sets a theoretical limit for the money supply. Fractional reserve banking with a LTD ratio between 0 and 1 is only one possible case. But what happens if the LTD ratio is exactly 1 (no reserves kept) or 0 (full reserve)? Or even above 1?

Let's have a closer look. An LTD ratio of exactly 0 can be considered "full reserve banking". The full reserve banking system poses an alternative to the FRB system. This system would require that all the money deposited has to be kept in the account. Thus, the reserve ratio would be 100%. The money supply would not grow and the amount of money in the economy remains stable. There is no liquidity risk as the deposits remain at the bank and could be withdrawn at anytime. Deflation is the consequence in a growing economy that is based on a full reserve banking system. However, the strongest argument against full reserve banking is that it does not allow for financial intermediation. Banks would not have the opportunity to create credit and extend loans. It would not be possible to lend out the money at interest and a vast amount of the money would sit idle. The system is inefficient as savers pile up their money and entrepreneurs remain without the funds they need. [22]

No reserve banking system

We deal with a "No reserve banking" system if the LTD ratio equals 1. The money supply in such a system (loans and deposits on a bank's balance sheet) would grow to infinity. The money multiplier 1/(1-LTD) is infinity. Both loans and deposits grow to infinity and liquidity risk tends to 100% (in a finite time).

Depletion banking system

A fourth possibility is the case where the LTD ratio exceeds 1. This can be considered a depletion banking system. If the loans are bigger than the original deposit, the money supply grows exponentially. How is it possible that more money could be lent out than has been deposited before? This would be the case if a bank A creates a loan by adding borrowed money to already existing reserves. The bank A would first borrow from another bank B and consider these bank B's debt papers as good as cash. Bank B's debt papers would serve as collateral to extend a loan to another bank C in a second step. Let's assume a LTD ratio of 1.2. For an original cash deposit of \$100, after n steps we would have a money supply of $\$100*1.2^n$ in the system. The money supply grows exponentially by a factor of LTD^n. The money multiplier tends to infinity (has to be calculated in a different way in this case) and the liquidity risk is 100% in a finite time.

In the depletion banking system, the amount of money in the economy is constantly growing. Let I1 be the interest that a customer pays on a loan and I2 the interest that a bank pays on a customer deposit. Let I2 > I1. Let D be the total amount of

deposits accepted by a bank from which it creates credits, C = D * LTD. Let LTD > I2/I1.

The customer receives:
L * I2 – L * I1 = L * (I2 – I1) > 0 That is a customer makes profit since I2 > I1.

The bank receives:
C x I1 - D x I2 = D x LTD x I1 - D x I2 = D x (LTD x I1 – I2) > 0: The bank makes profit too since the loan-to-deposit ratio is higher than the interest ratio (LTD > I2/I1).

Both the bank and the customers make a profit in such a game because the bank is lending out more than it is taking in deposits with LTD > I2/I1. But this financial perpetuum mobile cannot last forever. It works only as long as the cash reserves are sufficient to top up loans. This describes well how the bubble economy worked that lead to the current financial crisis. In the years preceding the crisis, the money ("wealth") created in the system was not tied to the real growth rate of the economy. It therefore created the illusion of a perpetual money machine[23] where wealth would grow at an accelerated pace.[22]

2.5. Monetary policy in the FRB

Introduction to monetary policy
Monetary policy encompasses all measures taken by the central bank to control the money supply. It is one of the two principal means by which government authorities in a market economy regularly try to influence the pace and direction of overall economic activity. The government does not only intend to influence the level of aggregate output and employment but also the general rate at which prices rise or fall.[24] The other means to influence money supply by the government is fiscal policy. This includes government borrowing, spending and taxation.

Expansionary policy is applied in order to fight a recession by lowering interest rates. To combat inflation, interest rates are raised. This is referred to as contractionary policy. Open market operations are the primary tool used by monetary policy. Other means include discount window lending, fractional deposit lending (changes in the reserve requirement), moral suasion (persuading certain

market players to achieve specified outcomes) and "open mouth operations" (communicating monetary policy to the market).[25] [26]

Types of monetary regimes include inflation targeting, price level targeting, monetary aggregates, fixed exchange rate, gold standard and mixed policy. Many countries nowadays use inflation targeting. The U.S. apply a mixed policy. The Taylor rule helps to find the nominal interest rate in response to inflation and GDP. These are regimes used in regular economic times. In times of exceptional events like the current crisis, more extreme measures may be taken like credit easing or quantitative easing (see below).[27]

The idea that large fiscal and monetary interventions are necessary in order to keep the economy on the right track goes back to John Maynard Keynes. However, this idea is more and more questioned.

Prediction of economic movement (inflation)
A broad range of indicators like actual output and prices, as well as different measurements of the money supply, are used to assess trends in the economy.[28]
The different measures for the money supply are used as forecasters of real economic activity. The prediction of inflationary or deflationary tendencies is of special interest as it leads to unwanted consequences. Data of different monetary aggregates are used as indicators to predict the economical tendencies. Measurements for monetary aggregates have historically been better forecasters than credit variables such as bank loans.[29] In order to forecast inflation, an adjusted M2 velocity measure can be used.[30] Usually, a whole set of indicators is used rather than a single measurement. The information obtained by the different indicators is further used to conduct monetary policy.

But not only the money supply gives an idea about inflation. An increasing velocity of money can also be an indicator for inflationary tendencies. As the price level gets higher, either the money supply, the velocity of money or both has to increase. Therefore, supply and velocity should both be taken into account and not interpreted isolated.

The velocity of money is mean reverting. That is, it tends to fall over time back to the mean or average (Hunt).[31] The question of which mean has to be taken remains. The velocity of money is going to drop generally. An average of 1.67 (V =

GDP/M, for the years from 1900-2008 for the US) has been calculated.[18] Usually, the velocity of money is lower during times of recession. According to the mainstream view, the money supply must rise in order to obtain nominal GDP to grow.

Quantitative easing

Quantitative easing (QE) is a monetary policy tool used by central banks to increase the monetary supply (M3) in an economy. It is applied if lowering the interest rate any further is not possible anymore but a further expansion of the monetary base is still considered necessary.[32] The idea is that the extra cash encourages banks to lend again and is therefore seen as the cure for a credit crunch.[33]

The creation of new money ex nihilo is referred to as quantitative easing. The central bank does not print new money but it creates money electronically. It purchases financial assets from financial institutions with the created money. This process is referred to as open market operations. It is supposed to encourage financial institutions to borrow money due to the low cost and then lend the money. The flow of money (credit creation) is believed to be encouraged and therefore QE serves as a stimulus for the economy.[34]

The first time QE has been used was in March 2001 by the Japanese central bank. The measures taken by the US Federal Reserve during the current financial crisis are also called QE. However, these measures were different from the practice of QE described by Werner. US Federal Reserve Chairman Ben Bernanke explained that it was credit easing rather than quantitative easing. Switzerland is another nation who engaged in QE. In March 2009, it decided to buy foreign currencies out of the fear of currency devaluation.

Credit easing

Lending to financial institutions, providing liquidity to key credit markets, and purchasing long-term securities are the three strategies referred to as credit easing.[35] The aim is to add liquidity to a troubled market to ease the flow of credit and lending.

US Federal Reserve chairman Ben Bernanke called the approach of the US Federal Reserve to the financial crisis as credit-easing rather than quantitative

easing. In the approach of 2009, the US Federal Reserve bought commercial paper and residential mortgage backed securities. The quantity of money remains unchanged if the sales of government bills offset the purchases (credit easing). If purchased assets are funded through the creation of money, the practice is referred to as quantitative easing as defined by Werner.[36] [37]

2.6. An alternative theory of banking and credit creation

2.6.1. Introduction

Nowadays, mainstream economics advocates the neoclassical view of economics. The view prevails in organizations such as the IMF and the World Bank. We live in a capitalist system, which is characterized by a strong belief that free markets must lead to the best outcome for society.[38] Deregulation, liberalization and privatization have been the propagated policy tools of mainstream economics. One of the most influential advocates of this theory was ex Federal Reserve chairman Alan Greenspan. He believed that banks should not be further regulated and he thought that their self-interest would ensure an optimal result. In the meanwhile, however, he admitted that his ideal of free market was flawed.[39] He could have taken influence on irresponsible lending practices that led to the subprime mortgage crisis. He could have pushed for regulation of derivatives but he chose not to. He felt that his ideology pushed him to make wrong decisions that he wished he had not made (in hindsight). He recognized that the modern risk-management paradigm that held sway for the past decades was deficient (October 23, 2008).[39]

Werner argues that the current crisis has mainstream economics and its implementation by central banks proven wrong.[40] The experiences in many countries have contradicted key aspects of mainstream theories. Hence, a presentation of an alternative theory opposed to the mainstream view follows.

2.6.2. The origin of credit creation

The idea of credit creation is not new. It traces over 5000 years back in history. Temples often acted as banks in ancient Babylon (3rd Millennium BC). For many centuries, banks have served as the main creators of the money supply. Ancient Egypt, Greece and Rome had banking systems that supplied the economy with

credit money.[40] At the beginning of the 20th century, the idea of credit creation has been a widely discussed topic. Economists like Schumpeter (1954), Hahn (1920) and Wicksell (1898) were concerned with the phenomenon of credit creation.[40] For decades, these ideas had fallen into oblivion. Werner is one of the economists, who acted on their suggestions and developed a theory of credit creation for the modern banking system. Following, his ideas are explained.

Schumpeters creative destruction

Werner has been heavily influenced by Schumpeter's ideas in his understanding of credit creation. Schumpeter states that development primarily consists in employing existing resources in a different way than before. It is these different methods of employment, not savings that change the face of the economic world. Wealth can't be reached by saving but by the implementation of innovative ideas. Entrepreneurs are the ones who know how to implement and market those ideas. This requires the support from capitalists that support them by lending their money.[41] [42] [43]

2.6.3. Credit creation process of banks

We have previously seen how credit creation is usually represented in textbooks. It is a process of intermediation where money is created via lending and re-lending. Only after n steps, an original deposit of 1000 can grow to 10000. The first Bank A could only extend loans of 900. Werner proposes what he considers a more accurate representation of credit creation.[40]

In a first step, Bank A receives a deposit of 1000 by a customer (Table 7). The deposit is found on the debt side of the banks balance sheet.

Table 7: Step 1 (Credit creation process by Werner).

Bank A	
	1000

The 1000 of Bank A can now be used to increase the reserve of Bank A (Table 8).

Table 8: Step 2 (Credit creation process by Werner)

Bank A	
1000	1000

With a reserve requirement of 10%, Bank A can now *directly* extend 9000 in loans (Table 9). The created credit of 9000 is not based on previous savings - the money comes from nowhere. Thus, Bank A created an additional money supply of 9000, which is 90% of the total money supply of 10'000 in this isolated economy.

Table 9: Step 3 (Credit creation process by Werner).

Bank A	
1000	1000
9000	9000

The long process of lending and re-lending is not necessary. Other than commonly represented in textbooks, Bank A does not lending out 900 of the originally received deposit. Instead, Bank A uses the 1000 as reserve with the central bank (entered as an asset on the balance sheet). The 1000 are now used as the new reserve and based on this reserve, new loans amounting to 9000 can be extended. Each individual bank can create credit and money.

Where do the additional 9000 come from? Werner answers the question as follows: [40]

> "The money was not withdrawn by the bank from other uses. It was not diverted or transferred from any other part of the economy. Most of all, although it is shown as a deposit, it was not actually deposited by anyone. The bank simply created the money by writing the figures into its books and the customer's account book. In effect, the bank pretends that its borrower has made a deposit that was not actually made. Unlike the textbook representation, we see that each individual bank can thus create money when it extends a loan."

2.6.4. The role of banks in the modern banking system

Banks are traditionally seen as financial intermediaries

Traditionally, banks have been seen as financial intermediaries that channel deposits to those who want to borrow. Banks are still acknowledged that they can "create credit".[40] However, the view of banks as credit creators is different from the view that is being developed in this paper: Credit creation in the traditional context is defined as the process by which saving is channeled to alternative uses and hence banks are mere financial intermediaries. The understanding of banks is that they gain their profits from borrowing short-term and lending long-term by the extension of loans.

Banks create credit and money out of thin air

Werner takes a different view on banks. He opposes the perception of banks as mere financial intermediaries. He argues that there is no such thing as a loan. The concept of lending implies that the item (in this case the money) is physically removed from the lender and transferred to the borrower. Therefore the lender can't use it anymore. A loan would therefore imply that the money is removed from the bank and can't be used by the same bank. However, the reality looks different. If a bank extends a loan, they do not even need the object they want to lend out – they can simply create it out of nothing. Therefore banks do not lend money, they create it. It is crucial to understand that credit creation by banks is not simply the transfer of existing purchasing power (where banks would be mere intermediaries) but they create new purchasing power.[40] [44] He even goes as far as to claim that the true Holy Grail of understanding economics is to understand the role of credit creation.[45]

Werner's states that the main business of banks is to extend loans: the borrower receives a fictitious deposit receipt or deposit entry in his bank account, although no deposit had been made. **Banks create credit, they do not lend money**. The introduction of central banks did not change this. Central banks are the only entity with the right to print money. But that does not prevent banks from issuing loans out of thin air. Banks create the bulk of all money in the economy by pretending that a borrower has deposited money. However, this system can only work as long as others accept the pretended money. Banks simultaneously create credit and money.[40] **Thus, banks themselves create the deposits, not the customer.**[44] Werner uses here the term credit creation in the sense of the facility of being able

to obtain goods or services before payment, based on the trust that payment will be made in the future. Money is brought into existence ex nihilo as debt.

There are two entities in the economy with the power to create credit. The central bank is the one entity with the official allowance to create credit. However, only about 2-5% of the money supply comes from the central bank. The remaining 95-98% of the credit is created by the second entity that has the power to create credit, which is the private bank sector.[46] This is dangerous as this group of private individuals does not have an interest in the democratic well-being of the population as a whole and simply tries to maximize its own personal interest. According to Werner, the persistent abuse of this public privilege to create and allocate the money supply by theses private operators for the benefit of unproductive speculators leads to crises.[47] It is the main aim of this work to detect mechanisms of credit creation and show its influence on the development of bubbles.

The types of credit creation

Werner's hypothesis is that credit creation is at the heart of a financial crisis. Werner distinguishes credit created for real purposes (C_R) and for speculative transactions (C_F). Credit for real purposes includes loans to the real economy like small and medium manufacturing companies. This is a typical case, as smaller businesses do not have the possibility to get money from the capital markets.[40] That could be a credit to buy goods like cars or computers. Credit for unproductive purposes is divided in two categories: Credit for consumptive or speculative purposes. Credit for consumption includes credit for the purchase of consumer goods such as cars or electronic equipment. Speculative purposes encompass credit for real estate speculation (mortgages, real estate investment funds), loans to SIVs (Special Investment Vehicles), hedge funds, margin loans or loans to non-bank financial institutions.[48]

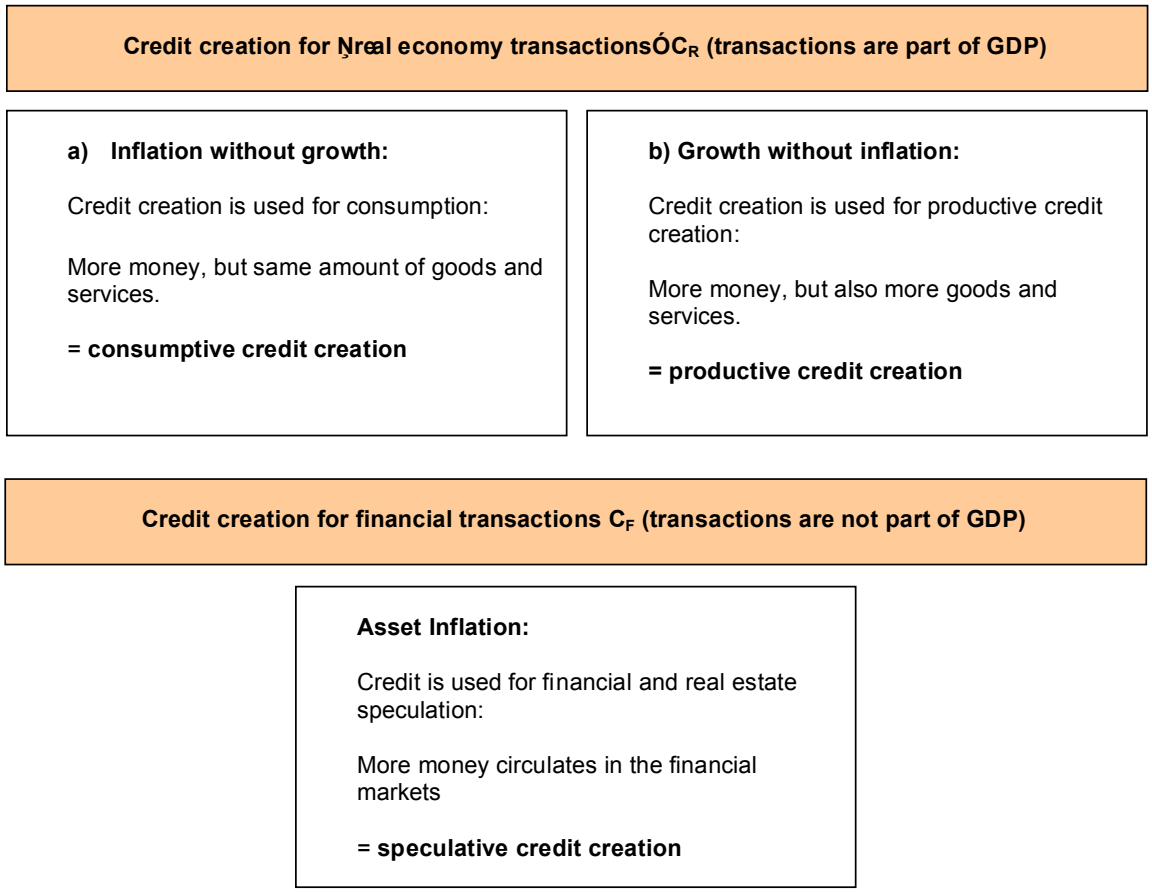

Figure 1: Purposes of credit creation

Werner's quantity theory of money

The quantity of money is what matters. The quantity of new money is the limiting factor on GDP growth (credit rationing). But it depends on what the money is used for. Figure 1 illustrates the different purposes of credit creation. If new purchasing power is used for GDP transactions ("real economy transactions"), nominal GDP will grow. There are two cases of credit creation for real purposes (C_R). Credit creation leads to inflation without growth if it is used for consumption, i.e. the same amount of goods and services are bought with the same amount of money. In the second case, credit creation for productive investment means that there is more money in order to produce more goods and services. This is a productive way of credit creation, which leads to economic growth without inflation.[46]

If newly created credit is used for non-GDP transactions like financial and real estate transactions, asset prices must rise. The use of new purchasing power for non-GDP transactions leads therefore to asset price inflation.[38]

Werner has a different view on the quantity equation and the velocity of money. Equation 5 and Equation 6 are the two key equations characteristic for Werner's model: [40]

Equation 5: $\Delta(P_R Y) = V_R \Delta C_R$
Equation 6: $\Delta(P_F Q_F) = V_F \Delta C_F$

where $P_R Y$= nGDP

nGDP	nominal GDP, output of the economy
P_R	GDP deflator
V_R	velocity
ΔC_R	real credit creation
$\Delta(P_F Q_F)$	value of speculative transactions
P_F	price of financial transactions
Q_F	quantity of transactions
V_F	velocity
ΔC_F	financial credit creation, speculative credit creation
Indice R	transaction part of GDP
Indice F	not part of GDP

Werner uses disaggregated quantity equations to describe money creation. Money comes into existence as credit for real transactions C_R (part of GDP) or financial transactions C_F (Equation 7): [40]

Equation 7: $M = C_R + C_F$

M money supply

In his terms, money is in fact nothing else than credit. Credit is split up in two parts: credit for real purposes C_R and credit for speculative purposes C_F. C_R helps the economy grow whereas C_F only creates artificial wealth that fuels bubbles by increasing the perception of wealth.

C_F/C Ratio of speculative credit creation, this factor serves as an indicator for the health of an economy. An economy tends to be unhealthy if this ratio gets too high.

Werner claims that the velocity of an economy remains stable if measured in the right way. Currently, there has been concern about a velocity decline. The velocity measured as traditionally as $V_M = P_R Y/M$ has indeed declined. But if velocity is measured in real terms as $V_R = P_R Y/ C_R$, velocity turns out stable.[40] Thus, it is not surprising that velocity has declined in those countries where financial and real estate transactions increased disproportionately due to an increased C_F like in the US.

2.6.5. Mechanisms in a financial crisis and the role of credit creation

The vicious circle

Figure 2 and Figure 3 show how boom and bust cycles in an economy work. It shows the pro-cyclicality of the economic process. In the bubble economy, initiated by banks extending more credit for financial purposes, asset prices rise, which leads to a whole series of raises in variables such as corporate balance sheets, collateral values and loan/valuation ratios. The positive feedback encourages creating ever more credit.

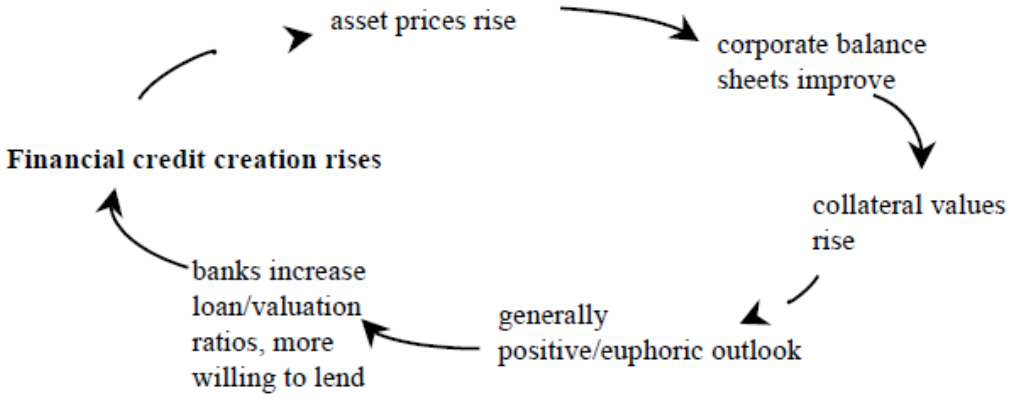

Figure 2: Cycle of bubble economy (Werner 2009)[48]

In the downward spiral, the creation of speculative credit suddenly drops ($C_F\downarrow$) often triggered by central banks. A credit crunch and bankruptcies follow. As a consequence, the state of the economy worsens. Unemployment rises, demand and growth fall and deflationary pressures can be a problem. Non-performing loans and various other coupled processes can make banks even more risk averse and reinforce a falling credit creation.

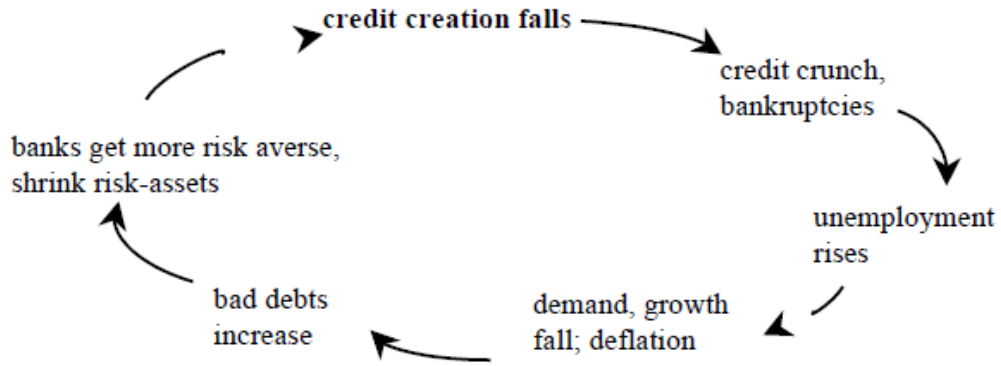

Figure 3: Cycle of banking crises and debt deflation (Werner 2009).[48]

Bad debts

Werner distinguishes two types of bad debts: Bad debt of Type I and Type II. Type I bad debt is considered primary bad debt. Those debts are incurred due to excessive lending for speculative purposes. With the onset of a crisis, lending for such purposes usually declines.

Type II bad debt, or secondary bad debt are not the result of the pre-crisis lending. They are the result of the recession that was induced by the banking crisis and subsequent decline in credit for GDP transactions. Type I debt can be accurately measured (estimated), whereas type II cannot.

2.6.6. Other differences to mainstream economic theory

Fundamental differences from mainstream

Werner thinks that there are fundamental flaws in mainstream economic theory like the belief in general equilibrium and complete information. These misunderstandings of economic processes lead to wrong policy implications like the

prevailing practice of monetary policy through interest rates. In contrast to mainstream economic theory, it is not the monetary aggregates that are the best predictors for economic tendencies. According to Werner, created credit is the better forecaster.

Market clearing, complete information

Markets do no clear and demand does not equal supply. Werner suggests that markets cannot clear because information, time and money are rationed. In rationed markets, quantities, not prices determine the outcome. The "short-side principle" prevails, which means that the transaction is determined by the good that is more limited. The short side can extract additional, non-market benefits.[49] Banks represent the short side in their power to create and allocate credit. Therefore, banks can extract superior returns.

Efficient markets, allocation of goods

Markets are neither efficient nor politically neutral. Allocation of goods does not occur via markets. Powerful allocators make decisions that suit them, which do not suit best for overall economy or society. However, this makes it easy for government intervention to be beneficial for society.

Incentive structures often lead banks to create too much credit, when it is not needed, and for unproductive use. Following this, banks create too little money, when more would be needed.[50]

Disequilibrium economics

Mainstream economics advocates the view that an equilibrium price can be found where markets clear, i.e. the price of goods are such that the total quantity of goods is sold. The view traces back to Walras, who believed in equilibrium economics. Walras model assumes perfect information to derive an equilibrium price. Werner argues that the probability of disequilibrium is much higher in the economy than equilibrium because information is incomplete in reality (large industries like consulting, journalism etc. exist with the sole purpose of providing information) and thus an equilibrium according to Walras model is not likely.

Proposed measurement of the money supply

Money is the center of economic activity. It is what drives the economy. The amount of money in circulation has to be measured. Money comes into the system

when banks and central banks create new credit. Werner therefore suggests measuring purchasing power by the newly created credit that banks bring into the economic system.[51] This gives the best measure of active money in circulation, which is used for transactions. It is the monetary aggregate that shows this amount. The high-powered money from the central bank is not important. It is useless to measure savings, because those are not used for transactions.[52] [53]

Monetarists (like Milton Friedman) propose using measurements like M1, M2 etc. to measure money supply. However, these measurements are rather a measure of deposits and are therefore savings indicators. None of the money supply aggregate measures has a stable link with economic growth, according to Werner.[40]

2.6.7. Interest rates follow economic growth

The meaning of interest rates in mainstream economics

Interest rates can be understood as the price of money. Mainstream economics pays close attention to it. It is easier to measure than the quantity of money – the latest data is available frequently and the Fed often announces future changes in advance. Many economists believe that low interest rates indicate an expanding money supply and vice versa.[52] [54] An expanding money supply is closely related to inflationary tendencies. Thus, interest rates and the yield curve derived from it serve as an indicator and forecasting tool for the business cycle.

Interest rates do not cause economic growth, but they follow economic activity

A negative correlation is observed on scatter plots where interest rates are plotted against economic growth. Low interest rates go along with high economic growth and vice versa. But correlation does not imply causation. If time series of interest rates and economic growth are plotted in a graph, it gets obvious that low interest rates do not cause economic growth but they follow economic growth. Interest rates follow economic activity; they are not the determinant of economic activity.[40] Interest rates are thus an ineffective tool in monetary policy. Credit creation, i.e. the increase in money supply is more effective.

Why interest rates are not the determining factor of economic growth

Werner suggests that his framework shows that the cause of the German recession since 2000 was due to a lack of credit creation.[52] [55] The ECB sets the interest rate for the countries of the European union. In 2002, the ECB told the German

Bundesbank to decrease printing money, whereas Ireland was encouraged to create a lot of money during that time. If interest rates were the determining factor for economic growth, both economies would have shown the same growth. But there was a huge difference. While Ireland lived a boom, Germany went through a recession. Werner uses this evidence to show that credit creation rather than interest rates are a predictor for economic growth and that a lack of credit creation can even be the cause of a recession.

2.6.8. Credit Creation and GDP growth

Banks take a unique role in the economy regarding GDP growth
According to Werner, capital markets or non-bank financial intermediaries (NBFI) cannot substitute bank lending, since only banks (and the central bank) create credit. Non-bank financial intermediaries like pension funds, life insurance companies or venture capital investors are different from banks as they do not accept deposits. Capital markets and NBFI act as mere intermediaries to increase the efficiency in an economy. Banks with their unique ability to create credit take a large influence on the future growth of the economy. With their ability to issue loans, they could create exactly the amount of credit that is needed to fund economic growth. Credit creation precedes GDP growth and future growth of GDP is thus funded on credit (on debt). It follows, that the amount of credit could optimally be adapted to the demand of loans that is requested by companies. Ideally, the supply of credit would be in balance with its demand.

However, this optimal process is disturbed as banks base their loan allocation on the anticipation of the profitability of their investments. This trait facilitates the development of bubbles in two main ways:

a) Over-optimism, a frequent characteristic of developing bubbles, leads to over-valuation of investments and an under-estimation of the probability of default. In the current crisis, over-optimism has lead to an over-estimation of the credit rating that led to many bad investments.
b) Moral hazard is a problem as banks are profit-seeking institutions. In the upturn of the current crisis, they tried to maximize their profit by lending to Alt-A and even subprime clients (called predatory lending) to gain large interests. The popular originate-to-distribute model allowed them to move these assets away from their balance sheets to other investors who would then bear the risk of these loans.

These two aspects encourage banks to extend too much credit for speculative or consumptive purposes. Increased asset prices in a fragile economy characterized by over-leverage are the consequence. Many crises have shown that the bubbles created by overextension of credit to non-productive purposes are unsustainable as they often lead to the burst of the bubble.

Feedback loop credit creation – GDP growth

An additional obstacle for an optimal process is that the feedback to such credit creation does not occur immediately as loans are paid back with a time delay. The economy grows on the loans previously extended. The result of these loans can only be seen in the future. It is suggested that the interplay of credit creation and GDP growth remains a continuous adjustment process in which banks take a crucial role.

Evidence that supports Werner's theory

The research of Sornette and Zhou supports the idea that interest rates do not cause economic growth (GDP growth), but that they follow economic activity. They found evidence for the same causality that support the idea that stock markets determine the Federal Reserve funds rate and that this determines the short-term yields which finally influences the long-term yields (which in turn has direct and instantaneous influence of the stock market on the long-term yields). Their interpretation is that the FRB is "causally slaved" to the stock market, because the later is taken as a proxy for the present and future health of the economy.[56]

In their later work, Zhou and Sornette developed a novel method for the detection of causality between two time series. They used the thermal optimal path (TOP) method to test their former findings). They found confirmation of their earlier results that showed a causal relationship between the US stock market and the Treasury bond yields.[57]

In their work, they found that the interaction between GDP and inflation is subtler than originally assumed. Their work shows that, to a certain degree, each causes the other with a different time lag. They say that any measure of a causal relationship allowing for only one lag is bound to miss such subtle interplay. They found evidence that GDP impacts future inflation with a relatively small delay of about one year while inflation has in the past influenced future GDP with a longer delay of several years.

However, they admit that the predictive skills of models with one-way causality are fundamentally limited and more elaborate measurements are proposed here and models with complex feedbacks are necessary to account for the multiple lagged feedback mechanisms present in the economy.[56]

2.6.9. Werner's theory – a summary

The following Table 10 compares and summarizes Werner's heterodox view and the mainstream view on economy.

Table 10: Comparison of mainstream economic theory with the alternative theory suggested by Werner.[40]

	What it is	**Alternative theory**	**Mainstream (neoclassical view)**
Proponents		Werner (influenced by Schumpeter, Wicksell, Hahn. Similar ideas also by the Austrian school of thought)	Traces back to Keynes, nowadays advocated by Bernanke, Greenspan, Krugman
Interest rates	Tool of monetary policy	Follow growth	Determine growth
Credit creation	New purchasing power brought into the system	Essential! Determines GDP. CR and CF distinguished.	Not crucial.
Central bank		Monetary policy via credit creation power	Monetary policy via interest rates
Monetary aggregates	Measurement of monetary supply	New purchasing power brought into the system (credit creation)	M0, M1, M2, (M3) Liquidity in system or deposit aggregates

Free markets	Self interest leads to optimal outcome	No	Yes
Equilibrium	Market clearing, supply equals demand	No	Yes
Regulation, government intervention	Regulation of banking system via lending standards, capital requirements etc.	Yes, needed	The least possible
Determining factor for economic outcome		Quantities (short-side principle, credit rationing).	Prices (price of money determined by interest rates)
Commercial banks		Banks are special! Power to create and allocate credit. Crucial	Intermediaries, transform savings to those who want to borrow. Not so influential.
Fiscal policy		Not so influential	One of the important tools of the government.
Monetary policy	Influence on money supply	In the form of credit creation rather than interest rates	One of the important tools of monetary policy via the central bank.
How to resolve a crisis		Create credit, central bank should buy toxic waste to encourage credit creation by commercial banks	Lower interest rates, in case of liquidity trap: quantitative easing and stimulus

Velocity	M·V = GDP	Stable, if measured right (nGDP/CR)	Velocity decline (measured as nGDP/M)
Approach	Inductive vs. deductive	Inductive – observe reality and derive laws from it (logically). Empirical tests necessary.	Deductive – start with axioms, derive laws from it by logic (mathematical approach)
Information	Availability of information.	Incomplete	Complete
Money		Endogenously created according to demand	Exogenously brought into existence, supply
Money supply		Created in large part by commercial banks and their credit creation	Determined by central bank and reserve requirements

2.7. Other criticism on mainstream economic theory

Different views of monetary theory and credit creation

This is the textbook representation (view of mainstream economic theory) of how money is created in the economy. However, there are a number of alternative theories that propose a different approach. Especially since the global financial crises, considerable conflict has arisen, among economic theorists and the public. The view of the Austrian school of economics is one of the heterodox schools of thought opposed to the mainstream economic theory.[58] Chartalism and Circuitist money theory (post-Keynesians) and Credit Theory of Money are three other views on the subject

Austrian school of economics

The Austrian school of economics is an alternative school of economic thought and believes in the spontaneous organizing power of the price mechanism. They see the state-sponsored central bank as the main cause of inflation, because it is the institution charged with the creation of new money. They argue that newly created currency reserves, which are injected into the FRB system, lead to an amplification of inflation because private financial institutions (commercial banks) generally further expand the level of bank credit.[59]

ABCT – Austrian Business Cycle Theory

The Austrian school of economics sees business cycles as the unavoidable consequence of excessive growth in bank credit and agrees in this point with Werner's view. The expansion and contraction of access to credit is called the credit cycle. It is seen as the fundamental process driving the business cycle.[59]

Proponents of the Austrian school of economics

The leading proponent of the Austrian school economist is Ludwig von Mises. Back in 1912, Ludwig von Mises had the insight that the process of credit expansion and therefore monetary inflation is the sole basis of all booms and busts.[60] In Ludwig von Mises opinion, there is no means of avoiding the final collapse of a boom brought about by credit expansion. The alternative is only whether the crisis should come sooner as a result of a voluntary abandonment of further credit expansion, or later as a final total catastrophe of the currency involved.[61] [62]

Ron Paul, a Mises Institute scholar, sees central banks as a strong factor, if not the fundamental cause, for the boom and bust cycles. In his opinion, the Federal Reserve tries to control a crisis that it has created. Low interest rates lead first to a boom due to imaginary wealth and finally end in a bust phase.[63]

Although there are many parallels in the Austrian school of thought and Werner's idea, Werner's view deviates from the Austrian school of economics in one point. According to Werner, credit creation leads only to inflation if the credit created is used for nonproductive purposes. Another difference between Werner and the Austrian school of thought are the conclusions drawn from the insights.

These were just a few critics of the fractional reserve banking system and its regulator unit, the central banks. There are many more critics who argue against

the FRB system. A strong proponent of the FRB system and of monetary politics is Paul Krugman who calls the Austrian school as "The Hangover Theory".[64] He and others argue that the Austrian school uses verbal logic rather than mathematical models and econometrics to prove their theories.[65] He criticizes that the Austrian school fails to explain many of the connections in the economy.

Credit Theory of Money and endogenous money

The latter theory is based on Joseph Schumpeter's ideas. Werner has strongly been influenced by Schumpeter's ideas and these days, he is a well-known proponent of this theory. In contrast to mainstream economics, Credit Theory of Money represents the opinion that money is not exogenously created via the central bank but endogenously by demand for credit (credit rationing) and by commercial bank-initiated lending.

Money comes into existence, as it is needed by the real economy. Banking system reserves are enlarged or drained as needed to accommodate the demand for lending at the prevailing interest rates. Money is created out of nothing and lent into the system as debt. There is no theoretical limit to the amount of money. Supporters of the endogenous money theory do not support the concept of a money multiplier.[66]

Werner distinguishes between productive credit creation and unproductive credit creation. The former form of credit creation occurs as a response of a productivity increase and leads to real economic growth. The latter leads to inflation of either the consumer- or asset-price variety. And as some countries like the United Kingdom do not have reserve requirements at all, the textbook representation of FRB becomes inapplicable.

The mainstream view holds that investments come out of savings. First, money has to be deposited on the bank account before credit based on that deposit can be extended. This is opposed to the view of the advocates of the endogenous money hypothesis, who say that investment determines and that credit creation is not based on savings. Credit money is created by a loan being extended. Crucially, this loan need not (in principle) be backed by any central bank money: the money is created from the promise (credit) embodied in the loan, not from the lending or re-lending of central bank money: credit is prior to reserves. They suggest that credit (money) is just lent into existence (created out of nothing).

Suggestions following the alternative views

Potential fragility of bank liquidity, the risk of bank runs and inflationary tendencies are primary criticisms of the fractional-reserve banking system. An alternative would be the full-reserve banking system. Whereas some call for a debt-free fiat currency from the Treasury, others suggest a commodity currency as existed under the gold standard. The representatives of the Austrian school of economics demand for the latter. The theory of endogenous money suggests that monetary policy cannot help to prevent a crisis because monetary policy is exogenous.

3. Credit creation in history

The following section investigates several examples throughout history and highlights the role of credit creation. First, England's goldsmiths in the 17th century are investigated the story show how modern banking developed. The Chinese empire under Kublai Khan in the 13th century serves as an illustration of a case where the government had the power to issue money – in contrast to modern economies where banks have the privilege to create money. Japan's lost decade is a crisis not long ago. It has been selected because it shows parallels to the ongoing crisis.

3.1. England's goldsmiths in the 17th century and the origin of modern banking

The story of England's goldsmiths in the 17th century is at the core of this thesis to illustrate the role of banks in the economy. It is the fundament of Werner's theory of credit creation and the story illuminates the development of modern banking. Goldsmiths play a key role in the history of money and banking. The traditional business of goldsmiths to produce jewelry transformed and over time goldsmiths became the forerunners of British banking.

In the days before the mercantile revolution in England, the demand for luxuries had practically ceased during the seventeenth century in a time of war and insecurity.[40] The original skill of goldsmiths to produce jewelry was not needed during that time. But contemporaneously, goods like silk and spices were brought into England's economy from merchant ships that came back from their trips to the orient. In exchange for their goods, traders amassed huge hoards of gold in the bargain. And since they needed a safe place for their gold and banks did not exist at that time, goldsmiths were the best option to store their wealth. Over time, the general public started to storage their luxuries. It was a welcome business for the goldsmiths and it generated additional small fees for the goldsmiths. Written receipts were used to confirm that the goods were under the goldsmith's custody and these receipts would be presented in case of withdrawal. Instead of transferring the gold to the buyer, only the written receipts as a confirmation of

ownership have been transferred. Over time, the deposit receipts became unnamed in order to make their transfer as a confirmation of ownership easier.

Goldsmiths must have noticed that vast amounts of gold remained deposited in their vaults without being used. Lending these gold deposits at an interest was a promising business model to further increase profits. They had to secure sufficient collateral and ensure enforcement. In addition, goldsmiths cooperated in order to reduce the risk of unexpected withdrawals.

Lending at an interest is a promising business model, as the goldsmiths did not have to work particularly hard for these profits. Werner [40] says:
"Lending at an interest is an attractive business model, because of the common practice to compound the interest. In the case of other businesses, revenues are directly proportional to the provision of goods and services, and hence to costs (though usually at a declining rate). When lending at interest, the revenue stream can rise exponentially, without the provision of any new goods or services, and hence without further costs."

According to Werner, this led to three consequences: [40]

1. From a legal perspective, goldsmiths committed fraud. Their deposit receipts guaranteed that the gold was deposited with them, which was not true in reality.
2. Potentially exponential revenue growth could be generated with disproportionately few inputs required.
3. New purchasing power in the economy increased because the goldsmiths had expanded the money supply.

Other than in economies like in ancient China, where the government had the power to create and allocate money (purchasing power), in the case of the English goldsmiths a group of private businessmen created the money supply.

The goldsmiths saw soon another improvement: instead of lending the gold, they simply gave away the deposit receipts which then could be used as money. This increased the money supply further. Ever since, goldsmiths could simply increase real purchasing power by issuing deposit receipts ("printing money"). Modern banking works with the same principles: Banks give deposit receipts away not only to those who had deposited metal, but also to those who came to borrow it.[40] That

is, banks can create credit. According to Werner, the process of credit creation by England's goldsmiths is in fact a fraudulent action.

Rothbard[67] seems to agree with Werner on how money is created. He is a defender of the Ludwig von Mises theory and is a strong critic of the fractional reserve banking system. In his view all fractional reserve banking is based on fraud. Goldsmiths or deposit bankers are tempted to hold lower cash reserves than the warehouse receipts outstanding. This implies that it is not possible that depositors ever get their money back if they asked for it. This practice can be considered as counterfeiting. The goldsmith or banker might lend out the gold, or even more likely, will issue fake warehouse receipts for gold. These receipts can then be lent as a form of paper money and finally the principal plus interest gets paid back.

Goldsmiths had finally found a way to create credit out of thin air and therefore increased money supply and purchasing power in the economy. According to Rothbard, the deposit banker has suddenly become a loan banker; the difference is that he is not taking his own savings or borrowing in order to lend to consumers or investors. Instead he is taking someone else's money and lending it out at the same time that the depositor thinks his money is still available for him to redeem. Or rather, and even worse, the banker issues fake warehouse receipts and lends them out as if they were real warehouse receipts represented by cash. At the same time, the original depositor thinks that his warehouse receipts are represented by money available at any time he wishes to cash them in. This is a form fractional reserve banking, in which more than one warehouse receipt is backed by the same amount of gold or other cash in the bank's vaults.[68] What is true for England's goldsmiths in the seventeenth century is not far away from how modern banking works. Our modern fractional reserve banking system evolved out of the goldsmiths practice and works in a similar way.[69]

3.2. China under the rule of Kublai Khan in the 13th century and the power to create credit in public hands

Marco Polo's diary of his twenty years spent in Kublai Khan's China in the late thirteenth century during the Sung Dynasty serve as a documentation of China's financial system at that time. The Great Khan had direct control of the money supply in circulation. The emperor purchased gold, silver, precious metals and

other supplies; he did what nowadays would be called open market operations.[40] The money was well accepted because it could be spent on the various goods throughout the emperor's dominions.

It has been the Sung Dynasty in China that introduced the world's first paper money. During this time, the Khan's government had the power to issue money. It did what nowadays central banks do: Printing money and bringing it into circulation. The creation of money by other institutions was punished by death.[54]

The situation in Europe was different. Only gold (and other precious metals) had been accepted as money. But that bears the difficulty that the money supply cannot be controlled because gold cannot be created at will. As European governments were not able to issue money, they relied on taxes to finance their projects. Because the pain threshold was often reached when still more money was needed, the government had to borrow money.

So, who was in control in Europe? Werner presents the answer: the Goldsmiths. Nowadays, the banks do what goldsmiths did centuries ago. The big difference between nowadays banking system and China's paper money centuries ago is that it is not the government that issues paper money, but a private group of businessmen.[40] [70]

In Werner's own words: "Put simply, the goldsmiths could "print" money! By doing so, they could provide purchasing power to whomever they liked. This time, three things happened: First, the number of claims on resources, the money supply, increased further. This created a larger potential for economic booms or inflation of consumer or asset prices. Second, the fraud reached significant proportions, as they issued fictitious deposit receipts far in excess of the gold left in their vaults. This created even larger profits – borrowers would pay back in real money what the goldsmiths had not owned. It also created a larger potential for crises when depositors would demand their money back. Third, banking was born." [40]

The government was in the role of the borrower of funds. Through their lending power, bankers had become the masters who created and allocated purchasing power. The more a government/king was in debt, the more powerful the banks were. Wars are a prime cause of borrowing and national debt. The government being indebted makes the counterparty (financiers) powerful. The financiers saw

the opportunity and asked for special privileges, rights, titles and lands in addition to interest payment.

The power to print money goes along with political influence. In a system where the privilege to print money is in the hand of bankers, they enjoy high political power. Werner observed that since the past, those bankers who had connections to colleagues in other countries, including to bankers on the other side of the front lines, who funded the ruler of the enemy economy - do particularly well. Collaborating with the enemy's bankers must have been especially tempting as this allowed them to maximize their joint benefit. Werner explains that together, they could then decide which king was going to win – the one who had granted them the greatest privileges. They could simply issue more money to their favorite and, with deepest regrets, report to the other that they had run out of cash. If the latter didn't believe them that there was no more money he could simply be shown their empty vaults. After his defeat the spoils could then be divided. Too bad for those soldiers who had died in the process.

Private banks had the almighty power to create and allocate purchasing power until central banks were introduced (in the United States as late as 1913).[71] Theoretically, these central banks were the only entity with the right to print paper money. In practice however, the way that private banks created money just got subtler. Today, it is acknowledged that 95-98% of the money supply stems from private banks.[72]

Credit creation in private hands in modern times

The problem of credit creation in private hands is still a widely discussed issue. It seems that a whole range of thinkers agrees with Werner that the power to create the money supply should not be in the hand of private institutions that seek profits. It is argued that the government would be better off running its own bank. Credit could be allocated in a better way to benefit society. Proponents explain that not only the highly profitable opportunities would be supported by credit but also small but productive businesses.

Robertson[73] argues that the public money supply should not be a source of private profit. The reason why the gap between rich and poor gets bigger is because money itself is created as debt. He suggests a tax shift. Taxes should not be taken off from income and the rising value of land should be taxed. The house prices rise

faster than the salaries of working people. People should be taxed from the rising land value that they get. He defends the opinion that people should be taxed on the profit they take from common resources. In other words, they should not pay for what they contribute but rather for what they take. Also, a shift in government spending is needed. A large part of government money goes to businesses (bank bailouts). The tax income from the workforce however is not redistributed. Politicians are not free in their actions because banks exert a lot of power. The government depends on the banks, as they need funding for their activities. Money comes into the system as debt rather than credit. This diminishes the power to do what would be in the interest of the public.[74]

Fractional reserve banking and seigniorage

The fractional reserve banking system is 500 years old. It was suited to metal money and still needs to catch up with the new payment practices and the accelerating circulation of non-cash money based on modern information and telecommunication technology.

The creators of money can spend the profit from creating money into circulation, as medieval monarchs and local rulers spent the "seigniorage" from minting and issuing coins, explains Robertson. Or they can lend it at interest, as today's commercial banks lend their customers money they have created for that purpose. Or they can lend it interest-free to finance public investment, as recent UK parliamentary motions have proposed the Bank of England should do.[74]

A reform proposal

Huber and Robertson propose a reform that comes in two parts (called the "seigniorage reform"):[75]

1. Central banks should create the amount of new non-cash money (as well as cash) they decide is needed to increase the money supply, by crediting it to their governments as public revenue. Governments should then put it into circulation by spending it.
2. It should become infeasible and be made illegal for anyone else to create new money denominated in an official currency. Commercial banks will thus be excluded from creating new credit as they do now, and be limited to credit-broking as financial intermediaries.

This reform proposed for nowadays economy would give the state a similar role like the Great Khan had during the time he ruled China. It would restore the privilege of

the state to issue legal tender and to capture as public revenue the seigniorage income that arises from issuing it. This reform seems to imply that the government is responsible for the growth of the economy. However, the real growth of the economy is not due to money creation by the government. Thus, the reform proposal is likely to fail in practice.

3.3. Japan's lost decade

Japan's total debt-to-GDP ratio increased substantially as asset prices rose steeply in the real estate and equity markets.[76] Japan had a period of overextended credit creation. This led to three bubbles that occurred in the real estate market, the stock market and the banking system. After the peak in 1989, the Japanese asset bubbles collapsed and caused a financial crisis. In the following years, the rising government debt offset deleveraging by the private sector – contributing to what is called a "lost decade" due to no GDP growth.

Although textbook recommendations of mainstream economics had been implemented, the Japanese recovery did not come. Fiscal spending led to record government debts without a returning to a state of growth. Interest rates had been lowered to zero but there was no following accelerated growth. Instead, Japan's low interest rate policy gave rise to a carry trade. Demand could not be boosted by the implemented structural changes. Instead, it led to increased deflation and bankruptcies.[77]

The time period from 1992 to 2003 is often referred to as a lost decade. But one could wonder whether it was just – or at least in part – an adjustment to the high previous excesses. It is a trait of human nature to always take the last peak as a reference point.

Japan experienced four major banking crises during in the 20th century. There were crises in 1920, 1929 and 1945 and from 1992-2003. The crisis of 1945 after WWII was the most severe crisis during the century, yet the severity of the downturn could be controlled within one year. Japan's crisis of 1992-2003 – often referred to as the "lost decade" - represents the complete opposite. Although the crisis was considered only moderately severe, the following period with a lack of economic growth lasted more than 11 years.

How can this difference in recovery times be explained? Werner suggests that the policy response by the authorities made a large difference.[48] In 1945, the Bank of Japan stepped in and ensured with the right measures a fast recovery. Whereas in the 1992-2003 crisis, neither the Bank of Japan (BOJ) nor the government were able to effectively stem the crisis. Expanding the real credit creation C_R for productive purposes is a way to help the economy recover.[40] Withdrawing the support of the economy in 1997 was too early and endangered the recovery of the Japanese economy.[76] Another cause is the extraordinary amplitude of liabilities and preceding excesses.

Werner sees the privatized creation and allocation of money as the fundamental cause of banking crises. Unlike in China during times of the great Khan where the power to create and allocate money was in the hand of the sovereign, our FRB system allows private banks to create credit. That means that the government has not the full power in the allocation of money supply.[54]

The financial bubble of the 1980s in Japan was mainly due to credit creation for speculative and nonproductive investments. The majority of this primary debt derived from the bank loans to real estate, construction and non-bank financial institutions. Those loans were extended under instruction of the Bank of Japan. Werner blames the Bank of Japan's policies for Japan's recession. The BOJ instructed to reduce credit creation sharply in 1992. Bad debts in the banking system were due to excessive loan growth encouraged by the BOJ during the 1980s. According to Werner, the lack of credit during the 1990s could have been solved. If the central bank had bought the bad debts of the banks they would have taken off the bad debts from the banks balance sheets. Werner argues that this would have come at zero cost as the central bank simply could have created credit in order to perform this transaction. However, in the long run, inflation might be an undesirable consequence of this proposed solution. Werner suggests that increasing the Bank of Japan's own credit creation would have been another way to create a recovery, even without bank lending. However, the lack of profitable investment opportunities might have proven this suggestion wrong.

4. The Global Financial Crisis

This section starts out with an overview of the development of the current Global Financial Crisis (GFC). The recent developments towards deregulation like the repealing of the Glass-Steagall Act and other steps towards deregulation are outlined and it is shown how this gave rise to the shadow banking system (SBS). Different mechanisms of credit creation will be outlined in detail. The role of banks and credit creation to the GFC is shown. In this whole process, leverage is at the core of economic instability. Due to a lack of regulation, the SBS could be highly leveraged. The banking system could take on high risks (of default) and extend loans for speculative purposes like investment in mortgage-backed securities (MBS).

4.1. The evolution of the Global Financial Crisis

The GFC can be split up into five bubbles that led one to another. Sornette and Woodard suggest: [23]

1. New economy – internet, communications and technology bubble
2. Housing bubble: liquidity-to-real-estate bubble deliberately furthered by US Federal Reserve monetary policy
3. Intense creativity in engineering new financial instruments. Credit derivatives were praised to transfer risk and MBS were believed to exploit the real estate market more efficiently
4. Bubbles in commodities such as oil, corn, wheat, gold
5. Stock market bubble

Low interest rate policy after the dotcom bubble burst

The ongoing financial crisis is seen as the worst financial crisis since the Great Depression of the 1930s.[78] The crisis has been triggered by the burst of the United States housing bubble in 2007. The roots of the crisis trace back earlier in history. In 2001, the US Federal Reserve (Fed) lowered the Federal funds rate in order to fight the early 2000s recession after the new economy bubble had burst. The rate came down from 6.5% to 1.75% in 2002 and had finally been lowered to 1% in 2003. The low interest rates encouraged banks to borrow money from the Fed. In addition to the Fed money, there was a vast foreign capital inflow from China, Japan and the Middle East. The financial sector realized that the housing market promised high returns. The goal of the U.S. government was to increase minority

homeowners. In order to do so, president G.W. Bush put tax credits, subsidies and a Fannie Mae commitment into place. In addition, new regulation like the American Dream Downpayment Act was released with the aim to provide a maximum down payment assistance grant. In 2004, the SEC even suspended five firms from the net capital rule. Goldman Sachs, Merrill Lynch, Lehman Brothers, Bear Stearns and Morgan Stanley were freed from the limits of the debt they could assume and thus levered up to 20, 30 and even 40 to 1.[79] The new conditions led to ever decreasing lending standards, which made investments more risky. [80]

The housing market was a welcome alternative investment opportunity after the dot-com bubble had crashed. It was stimulated by the belief that housing is a safe and good investment and that housing prices never fall. During the period of rising real estate prices between 2003 and 2006, the perceived increase in wealth lead people to take money out of their mortgages. Rising house prices gave Americans the confidence and the financial means to spend more than their income would allow. America's household savings rate was zero or even negative. This money has been spent in the US economy and has accounted for two-thirds to three-quarters of growth in the years preceding the crisis.[81]

The crisis unfolds – the burst of the housing bubble

Housing prices kept rising and confirmed the investor's perception of real estate as a profitable investment. After this period of increasing real estate prices, the market finally peaked in fall 2005 after which the housing market came to a halt.[82] As easy initial terms expired, subprime debtors started to default on their debt. Home prices came down, sales decreased and adjustable rate mortgages (ARM) reset higher. As a consequence, defaults and foreclosure activity increased dramatically. The subprime industry collapsed with many declaring bankruptcy. In 2007, the foreclosure activities surged and interest rates increased. The foreclosure epidemic is considered a key factor in the global economic crisis, as it drains wealth from consumers and erodes the financial strength of banking institutions.[83] The subprime markets were no longer the only ones hit by the crisis – the problem spread to the near-prime and prime mortgage markets.

Crash of the credit derivative bubble

It turned out that the housing bubble burst was only the start to a much deeper crisis. New financial innovations like mortgage-backed securities (MBS) had allowed institutions and investors around the world to invest in the US housing

market. A decrease in housing prices meant losses for major global financial institutions that had borrowed and invested heavily in subprime MBS. Defaults and losses on other credit derivatives like collateralized debt obligations (CDOs) followed.[83] [84]

Troubled banks

In 2008 the crisis escalated. Major lenders and investors collapsed. JPMorgan Chase had bought Bear Stearns after the Fed funded Bear Stearns due to a collapse in share price. Finally, Ex-Bear Stearns fund managers were arrested for their fraudulent role in the subprime mortgage collapse. September 2008 was especially turbulent with a pile up of major events. Fannie Mae and Freddie Mac had been nationalized. Bank of America took over Merrill Lynch. On September 15th, Lehman Brothers went bankrupt. Only two days after, the US Federal Reserve bailed out American International Group (AIG). The following day, Treasury Secretary Henry Paulson and Fed Chairman Ben Bernanke proposed a $700 billion emergency package to purchase toxic assets. This package is known under the name Troubled Assets Relief Program (TARP) - designed to buy failing bank assets. In the same month, the acquisition of Washington Mutual by JPMorgan Chase and the takeover of Wachovia by Wells Fargo occurred. At that time, 26 corporate lenders were investigated for the possibility of fraud. The US Fed poured money into the system to avoid a total breakdown of the economy.[80] [85]

Commodities bubble

When the euphoria hit commodities, the prices of commodities such as oil, gas, wheat, soybean and gold soared until the bubble burst in 2008. Contradicting views exist whether the bubble had been driven by speculation of institutional investors[86] or increased demand[87]. Sornette and Woodard are defenders of the latter argument. They observed “the growth of the real-estate bubble, of the MBS bubble, and of the stock market bubble led to a huge extraction of wealth or, in other words, the creation of a lot of wealth and of money. Both money creation and wealth increase led to higher demand in all things that can be consumed. In fact, the demand has been accelerating on basic commodities, which developed clear bubble characteristics.”[23] The commodities bubble worsened the prevailing crisis as increasing food and energy prices made it difficult for the consumers to pay back their debts stemming from mortgages and credit cards. In the meanwhile (April 2010) commodities prices went down with the exception of the gold price, which has approximately doubled since.[88]

Stock market bubble
The exuberant sentiment had been reflected in the stock market. The S&P 500 peaked in 2007 after a continuous upturn since 2002. Since then, the prices came down and finally bottomed at the beginning of 2009. Since then, the share prices increased again in a rally lasting from March 2009, when the S&P 500 had reached a level below 700 and ended in April 2010 at 1200 (Bloomberg). But this does not reflect a real increase of share value. The upturn has been fueled by money printed by the government and triggered by again lowered interest rates, which in turn encouraged borrowing. The cheap money had been invested into the stock market, which drove prices up.

4.2. The GFC from a credit creation perspective

The causes of the Global Financial Crisis most often cited are deregulation, new financial innovation and complexity, sub-prime lending, increased debt burden or over-leveraging, incorrect pricing of risk and the shadow banking system. How do these causes look like from a credit creation perspective? To answer these questions, an investigation of the current system on which our economy is based is indispensable. This will be done in this chapter.

The previous chapters gave an understanding of the fractional reserve banking system. The mainstream view of the basic mechanisms and how credit is created within this system has been outlined. An alternative theory, as suggested by Richard Werner, suggests a different point of view. In the following chapter, the ongoing Global Financial Crisis will be investigated with his theory in mind. The focus is on credit creation. Different mechanisms are explained in relation to credit creation and its contribution to the Global Financial Crisis. It is exposed that in the years leading up to the crisis, many mechanisms have been developed to create much more credit than theoretically foreseen by the fractional reserve banking system.

4.2.1. Causes, Factors and Symptoms of the GFC

Reinhard and Rogoff found a range of common features of financial crisis. They found that the main types of crises include default on domestic and sovereign debt, currency debasement crises, inflation crises and exchange rate crashes. They

observed that crises frequently emanate from the financial centers with transmission through interest rate shocks and commodity price collapses.[89]

Default is not limited to the paper currency system as has been explained in previous chapters. Bank runs, defaults and crises occurred many hundred years ago already. Often, exchange rate crises go hand in hand with inflation crises. Because the last few years before the Global Financial Crisis were very quiet in terms of inflation, people started to believe that "this time is different".[89]

Table 11 gives an overview of possible causes, facilitators and symptoms of the Global Financial Crisis. It is a suggestion rather than set in stone. A clear distinction between causes, facilitators and symptoms would help to gain an understanding for the different mechanisms and interdependencies. However, it is very difficult to make this distinction as the different causes and facilitators are connected. Feedback loops are inherent to the system and often do not allow the separation of cause and consequence.

Table 11: Overview of different factors playing a role in financial crisis.

Factors and facilitators	- loans to poor's - Freddy Mac and Fanny Mae - growth of over-capacity - information asymmetry (leads to moral hazard) - shadow banking system and securitization - new financial innovation - low interest rates - greed (fear) as driving force - weak corporate governance - missing legislation, forbearance - deregulation - lowering lending standards - current system of FRB - speculation (investing with the pure purpose of making money) - outsourcing of risks: bad quantitative risk models in banks (Basel II), rating agency failures - monetary policy that supported credit creation (low interest rates) - increased risk appetite of investors - incorrect prizing of risk (greed stronger than fear)

Possible causes	- a compelling story, new innovation - financial innovations: real-estate loans and MBS as fraction of banks assets, securitization of finance, leverage, under-estimating aggregate risk - credit creation for speculative (real estate) purposes as root cause - moral hazard - credit rationing by banks (according to Werner)
Symptoms of bubbles	- asset price inflation (e.g. in stock prices, housing, commodities etc.) - increased perceived wealth - optimism and euphoria
Symptoms of crisis	- inflation - domestic and sovereign debt - currency debasement / exchange rate crashes - GDP first increases, then declines during crisis - increased unemployment - increased suicide rate - decreased consumption - decreased investment - demand decreases - supply decreases - saving increases - export-import imbalances
Indicators for crisis (also symptoms)	- asset price inflation (asset prices are far higher than their fundamental value would allow) - high leverage - large sustained current account deficits - slowing trajectory of economic growth

4.2.2. Types of credit creation

Origin of credit

Credit can either come from outside the domestic economy or from within. Credit from outside means that the money supply of an economy increases. Credit creation from outside meaning the rest of the world occurred for example during the

Spanish Imperialism. Luxuries such as gold and silver that had been plundered from the Aztecs, Incas and Mayas were brought into the Spanish economy. A more modern case is Iceland, which experienced a large money inflow from other countries. The carry trade is another example how the credit supply can be increased in an economy from outside.

The virtual world can be another source of credit. The goldsmiths extended loans based on reserves they claimed to have.[40] Nowadays, the central bank is allowed to create credit by simply putting numbers into the bank account.

Classification of credit creation processes
Table 12 summarizes the different mechanisms of credit creation that have been identified in this thesis.

Table 12: Classification scheme of different types of credit creation during the GFC

Instrument of credit creation	Who	How credit is created	Example
Credit creation within FRB via reserve requirements	Fractional Reserve Banking System	The economic system allows for credit creation within certain boundaries	Banks are allowed to create credit as long as they fulfill their reserve requirements
Securitization: **MBS** **ABCP** **CDO**	Shadow Banking System	Helped to extend more credit on a lower capital base	Global Financial Crisis
Repo 105	Commercial banks	Moving assets off balance sheet in order to fulfill reserve requirements	Lehman in current crisis
Retail Sweep	Commercial	Operating on lower	Has been used in

Program	Bank	reserves and thus increasing leverage	the U.S. in the last decades.
Ponzi	Can affect single investment funds or even the whole banking system	Fraudulent form. Borrowing money in order to pay back debt	Greece, Albania, Charles Ponzi, Madoff
Outside = rest of the world	Plundering, Foreign Direct Investment, carry trade	New financial resources put into the system from outside the world	Spanish imperialism, Iceland, YEN and USD carry trade
Outside = virtual world	Goldsmiths, central banks, commercial banks	New financial resources are virtually created e.g. by simply putting numbers into the bank account	Goldsmiths, central banks when purchasing government debt

4.3. Trends in the upturn of the GFC

Increasing leverage and financialization were two huge trends that laid the basis for the crisis. The two concepts are discussed in this chapter.

4.3.1. Leverage

Unsustainable high levels of leverage are often mentioned as one of the causes of the current financial crisis. Reinhard and Rogoff show in their work that whoever

borrows the money – the governments, corporations or individuals – aggregate indebtedness sets off a chain reaction that leads to economic deterioration, systemic risk and deflation.[89] Leverage is defined in several contexts. The following section explains how leverage works and how it has been applied in the current crisis. It is shown how leverage contributed to credit creation and therefore contributed to the financial crisis.

Leverage in the macroeconomics

In the macroeconomic context, the term "leverage" is measured through the debt-to-GDP ratio (leverage of a country). An economy with a high debt-to-GDP ratio is more likely to default on its debt. Against the general perception, a study by McKinsey suggests that the growth of debt and leverage leading to the GFC was not mainly in the financial sector, but rather in the household, business and some government sectors.[76] Reinhard and Rogoff state that a countries debt-to-GDP ratio is the primary determinant of a country's health.[89]

Leverage for banks and corporations

The concept of leverage is to borrow capital for an investment, in the expectation that the future profits will be greater than the interest on the borrowed capital. Leverage is the ratio of a company's loan capital (debt) to the value of its common stock (equity).[90] A high debt-to-equity ratio (characteristic for high leverage) means that borrowers are financing their activity with very little of their own capital at risk. This technique can magnify gains and result in a higher return on assets (ROA) but it bears at the same time the danger of higher losses. Leverage magnifies profits during the boom and losses during the bust of a business cycle.[91] Insolvency is more likely for a highly leveraged company.

Leverage by the US consumer

High leverage and low saving characterized the US consumer behavior. Saving rates of the US consumer decreased to levels at zero or even negative – levels not seen since the Great Depression. However, money was not borrowed to finance investment but rather for consumptive purposes and living above their means. Easy money stimulated the economy. As normal mortgages did not boost the economy any further, Greenspan encouraged Americans to take out variable-rate mortgages (ARM). Predatory lenders offered negative amortization loans with payables going up from year to year. The belief that house prices would rise faster than payables

was used to calm the borrowers. The turning point came when borrowers started to default on their mortgages.

Leverage in trading

Margin accounts are commonly used in trading. These accounts allow the customer to purchase securities on cash borrowed from the broker. This allows the customer to magnify not only gains, but also losses.

Leverage via derivatives

Derivative positions create hidden leverage in the economy and increase risk-taking incentives in the financial sector. The belief that it is possible to protect against losses made investors take more risk than they would have if derivatives had not existed. The underlying real economy has difficulty in servicing its debt obligations if it is highly leveraged. A strong proponent of derivatives has been Alan Greenspan (former Fed Chairman) who said in a speech that the extraordinary development and expansion of financial derivatives has by far been the most significant event in finance during the past decade.[92] Derivatives are often used for leveraged speculation and work well in a bull market. However, Greenspan acknowledged that they increase systemic risk and the GFC has shown that derivatives are disastrous in a bear market where the underlying derivative leverage was exposed.[93]

Leverage and credit creation

Leverage in its various forms can be caused by credit creation and vice versa. Credit creation promotes leverage and leverage is the consequence if credit has been extended to finance an activity on debt. The other way round works as well. Leverage can encourage credit creation. Legislation can be a facilitating factor of credit creation through leverage. The lower the reserve requirement of a bank, the higher its leverage, the higher the amount of credit a bank can extend. A high degree of credit creation can lead to a highly leveraged economy, characterized by a high debt-to-GDP ratio.

Werner on leverage via derivatives

Limits to leverage would decrease risk and profits may go down. This may lead to fewer human capital resources, private capital would flow to more profitable industries and finally the size of the financial sector would decrease.[94] Werner considers the common description of leverage as one of the main causes of the

GFC as misleading.[95] He states that it is not leverage in general that made the current financial crisis so severe, but that it was the banking sector that had created significant amounts of credit for transactions that are not part of GDP (i.e. mainly financial and real asset transactions). As banks collectively increased credit for such asset transactions and due to the banks' function as money supply creators, additionally created money supply has been injected into the asset markets concerned. Werner explains that this pushed up asset prices and suggested capital gains that made this process temporarily appear to be sustainable. As soon as banks reduce their asset transaction credit creation, asset prices fall and loans become non-performing. This results in banks becoming more risk-averse, hence reducing credit further. Thus banking activity is always pro-cyclical: banks create the credit that enables the majority of economic transactions.

4.3.2. Financialization

The increase in relative importance of financial activity relative to real non-financial activity, called financialization, is another factor that reflects the increased credit creation in the upturn of the crisis.[96] The credit created is used for speculative purposes and as such harmful for the economy, using Werner's argumentation. The term describes the state where financial leverage tends to override capital (equity). This development often goes along with the usage of financial derivatives and an increase in the volume of debt. It is also associated with an economy where financial markets tend to dominate over the traditional industrial economy. Financialization attempts to reduce all value that is exchanged either into a financial instrument or a derivative of a financial instrument. The idea is to make any work-product or service easier tradable. [97] The degree of financialization is often measured by the financial turnover to GDP. In the years leading up to the crisis, this ratio has increased.

Palley says, that the principal impacts of financialization are to [96]

1) elevate the significance of the financial sector relative to the real sector
2) transfer income from the real sector to the financial sector, and
3) increase income inequality and contribute to wage stagnation.

Financialization goes along with a tendency to overleverage. According to Palley, there are reasons to believe that financialization may put the economy at risk of debt deflation and prolonged recession. Financial markets, financial institutions and

financial elites gain larger influence over economic policy and economic outcomes in an economy with a high level of financialization.[96]

Financialization is highly criticized because the ones who reap the benefits (financial institutions) of this mechanism are not the same as those who bear the cost of the following financial crisis (taxpayer, government). Increased financialization is reflected in higher income of financial markets extracted from corporations. The real economy reacts in a way disadvantageous to the average citizen. They respond with wage and benefit cuts to workers, engagement in fraud and deception to increase apparent profits and they move into financial operations to increase profits.[96]

Werner on financialization and bubbles

An increased speculative credit creation C_F/C must lead to increased financialization and lack of support for productive industries, asset bubbles and busts, banking and economic crises. A vicious circle gains momentum and the myth of continuously rising asset prices (perpetual money machine[23] with increased perceived wealth) comes about. The turning point is reached when creation of speculative credit suddenly drops (Werner 2009).**Fehler! Textmarke nicht definiert.**

The new business cycle and financialization

The new business cycle that developed since 1980 was characterized by an over-valued dollar, trade deficits, disinflation or low inflation, manufacturing job loss, asset price (equities and housing) inflation, widening income inequality, detachment of worker wages from productivity growth, and rising household and corporate indebtedness. The financial boom and cheap imports built the foundation.

Oversized financial sector

A financial industry that becomes too large and takes excessive risks makes the emergence of bubbles more likely. Excessive rents lead to increased risk-taking, which can endogenously generate boom and bust episodes. A large financial sector also encourages the proliferation of complex and opaque financial instruments. Furthermore, it makes the financial system more fragile. There is a trade off between stability and growth.

Little research has been done about the optimal size of financial markets. Its size could be measured e.g. by total loans outstanding, stock market capitalization or foreign financial flows.

Its share of value added, compensation or employment could serve as indicators for the right size of the financial sector. The financial sector has made excessive profits in the time preceding the crisis. Increased profits go hand in hand with a hunt for yield and risk-taking through record pay. Financial innovation and technology further increased profits and thus size of the sector.

Smaghi[98] sees evidence that limits on the size of the financial sector should be imposed. He sees imposed capital requirements as an efficient tool to ensure the stability of the banking system. Furthermore, a limit on leverage ratios and loan supply should be imposed.

4.4. Mechanisms of credit creation within the FRB

4.4.1. Interbank lending

Mechanism of credit creation via the interbank market system

The interbank market refers to the wholesale money market where only the largest financial institutions are able to participate in. In this market, the participating banks are able to borrow from one another for short periods of time to ensure that they have enough cash to maintain normal operations. Normally, the interbank market essentially regulates itself. Banks with surplus liquidity want to put their idle cash to work, and banks with a liquidity deficit need to borrow in order to meet the reserve requirements at the end of the day, for example. Without an interbank market there is no banking "system" because each individual bank would be required to supply all of its own capital all the time.[99]

Those banks that have surplus liquidity (= more than needed for reserve requirement) invest it. This surplus liquidity (funds) is channeled towards other banks that want to borrow (in order to meet the reserve requirement). If a bank has not enough money to meet the requirements, money can simply be borrowed from other banks. In other words, banks can extend credit based on borrowed money (= debt).

Evidence for credit creation

Banks can use interbank loans as a contribution of the margin requirement so that they can extend more loans (by credit creation) than they could otherwise.

Bank money creation entails a forward-looking process that goes from credit to output generation and debt settlement. To the extent that the money advanced via lending is backed by output ex post, the economy gains can mobilize more real resources than if loans had to be backed by output upfront (which is the case when loans are financed with fully collateralized borrowing).

On the risk side, however, a system where banks create money is riskier than if banks were to fully cover their credit. Because banks issue liquid liabilities to finance illiquid assets, they bear liquidity risks and can spread their risks to the economy. Interbank credit in a circuit process allows banks to create the money needed to finance economic activity by supporting banks' mutual debit positions arising from deposit transfers (payments).

The reciprocity of such agreements and the adoption of netting contracts between correspondents can make the cost of interbank credit (and hence of money creation) much cheaper than if banks were to settle their (gross) mutual obligations in central bank money.

Under multilateral net settlement rules, banks are required periodically to use central bank money to settle their multilateral net payment obligations outstanding at the time of settlement. This requirement does not prevent banks from using the interbank credit implicit in the netting arrangement to create the money needed to finance transactions during the interval between settlement cycles. In fact, net interbank debit (credit) positions may in principle be very small, or even zero, and yet banks' mutual gross obligations could be as large as necessary to satisfy deposit transfers of any desired size. Multilateral netting rules thus provide a convenient way for banks to create money.[100]

Interbank credit creation and instability (Minsky)

At times of a positive balance of payment, there are no excess reserves retained in a bank even when the bank refuses to increase loans, because the bank would either lend it to other banks that is running deficit on the balance of payment or

purchase government debt for profits. It is precisely the credit creation process dictated by profit seeking motives that is the source of instability.

4.4.2. Carry trades

Carry trade – how it works

The carry trade is a form of speculation where money is borrowed in a currency with low interest rates and then invested into assets denominated in a higher yielding currency. Japan experienced long years of low interest rates on the Yen. This made Yen a common currency to be sold (borrowed) in a carry trade. Often, assets like bonds denominated in US dollar were bought with the borrowed money. The carry trade enhances returns as on top of the returns on the investment, the trader gets the difference in interest rates. Common pairs of currencies are (the first currency is bought, the second sold): GBP/JPY, GBP/CHF, AUD/JPY, EUR/JPY, CAD/JPY, and USD/JPY.

Dollar carry trade

Holding the short-term interest rates in the U.S. near zero has revived the financial markets in 2009. The problem is that the low U.S. rates do not necessarily encourage bank lending within the U.S. and therefore do not support domestic health. However, the low rates during the crisis made the dollar carry trade popular. Speculators borrow low in the U.S. markets and invest somewhere else, e.g. in emerging markets stocks and gold. As long as the dollar stays weak and the U.S. rates low, this is a way of minting money (creating credit). In other words, the U.S. helps to finance expansion elsewhere. But not only overseas growth, but also inflated asset prices (bubbles) are the consequence.[101] The resulting investment flows lead to new asset price bubbles particularly in oil and gold and the economies in faster-growing emerging markets.

This bet - known as the dollar carry trade - pushed the value of the US dollar further down. At the same time, consumer credit dropped (at a 10.5% annual rate in July) and commercial bank loans fell at a $392 billion annual rate in the second quarter. Interest rates can't fall any further and they will finally rise. Once the trade reverses and the speculators want to get out of their investments, the asset prices will collapse.[102] Interest rates are currently (August 2010) still close to zero.[103] [104] [105]

Credit creation via carry trades

The carry trade facilitates credit creation in two ways. First, it encourages borrowing in cheap currencies (credit creation e.g. in the U.S. thanks to low interest rates). And second, it leads to an increased money supply in another economy as the borrowed money is invested somewhere. The money inflows from the carry trade make credit more available and lead to an increased purchasing power. But this credit might not be economically useful.[106] The mechanism helps to direct money to speculative purposes and fuels bubbles. Engaging in carry trades lead to increased leverage and financial instability. Carry trade do not perform an economic purpose and it is a form of speculative trading activity.

4.4.3. Retail Sweep Programs

Retail sweep programs are at the core of another mechanism that allows for hidden credit creation within the fractional reserve banking system. A retail sweep program is computer software that dynamically reclassifies customer deposits between transaction accounts and money market accounts. The former have a statutory reserve requirement of 10%. Money market accounts are not subject to these restrictions. Sweep software helped banks to significantly reduce the amount of their required reserves. Thus, retail sweep programs are a means that allow banks to extend more credit by bypassing capital requirements.[107]

4.5. The Shadow Banking System (SBS) – facilitator of the current crisis

4.5.1. Emergence of the SBS

The traditional banking system in the economies discussed in this work (with exception of the historical cases) consists of commercial banks and a central bank. In the decades leading to the Global Financial Crisis, a parallel banking system developed, referred to as the shadow banking system (SBS). It has grown out of the traditional banking system. The main difference is that shadow banking institutions are not allowed to accept client deposits. As shadow banking institutions are not considered banks, they are not subject to the same rigorous regulation like the commercial banks and are therefore able to operate in a more risky way than banks do.[108]

McCulley has coined the term shadow banking system in 2007 when he referred to the levered up non-bank investment conduits, vehicles, and structures. Hedge funds, money market mutual funds, pension funds, asset-backed commercial paper (ABCP) conduits, limited-purpose finance companies, structured investment vehicles (SIVs) are examples for such shadow institutions.[108] Many shadow banking entities have emerged between 2000 and 2008. The shadow banking system grew out of the securitization of assets and the integration of banking with capital market developments.[109] During this time, the shadow banking system got an increasingly important role as an intermediary in providing credit across the global financial system. In early 2007, lending through the shadow banking system slightly exceeded lending via the traditional banking system based on outstanding balances.[108] [110]

Investment banks

The main attribute that sets investment banks apart from commercial banks is that investment banks do not accept deposits. They are broker-dealers and are not included in the category of traditional commercial banks as previously defined. Typical examples are JPMorgan and Goldman Sachs. The definition of the term shadow banks is ambiguous. According to some sources, investment banks are part of the shadow banking system and according to others, they have to be treated separately. In this document, investment banks are not included in the shadow banking system.

New regulation facilitated transformation of traditional banking system

The transformation of banks occurred within the legal framework brought about by the Gramm-Leach-Bliley Act of 1999 after the abolishment of the Glass-Steagall Act of 1932. The new legislation allowed financial holding companies (FHC) to engage in non-banking activities that include the opportunity to purchase insurance products and invest in securities. It allowed banks to affiliate with securities firms and insurance companies.[108] The acquisition of broker-dealers and asset managers allowed large banks to transform their traditional process of hold-to-maturity, spread-banking to a more profitable process of originate-to-distribute, fee-banking.

In the run-up to the Global Financial Crisis, the old system was replaced over time by a technique where savers put their money in funds that bought asset-backed commercial paper (ABCP) from special investment vehicles (SIVs). The SIVs

themselves bought collateralized debt obligations (CDS) created from securitized assets like mortgages.

The SBS – what it is and how it works

Shadow banking institutions are characterized by a high leverage. These institutions are typically intermediaries between investors and borrowers. Institutional investors may be willing to lend money short-term. Shadow banking institutions take that money and act as an intermediary to channel those funds to those who seek to borrow them long-term. Corporations may be such potential borrowers. The profits comes either from fees or from the difference in interest rates payable to investors and received from borrowers.[109]

The SBS is tightly connected to the traditional banking system. The SBS funds the traditional banking system. They often fund themselves with un-insured commercial paper. Liquidity lines from real banks do not necessarily back these entities. This makes shadow banking institutions particularly vulnerable to runs.[111]

4.5.2. Mechanisms that facilitate credit creation in the SBS

The concepts of securitization, off-balance-sheet transactions, originate-to-distribute, and credit derivatives all go along with credit risk transfer (CRT) and the development of the shadow banking system. Before looking at the specific instruments of credit creation within the shadow banking system, the concepts will be explained first.

Credit Risk Transfer (CRT)

Credit risk transfer is a way to pass on the risks associated with an asset to those who can take the risk. Assets and its associated risks are transferred away from the balance sheet and pass it on to other investors.[112]

There are two ways of credit risk transfer (CRT) within the shadow banking system:

a) Liabilities can be transferred off-balance-sheet as a way to remove risks from the balance sheet. This can be done by packaging and selling the assets (securitization).
b) “Insurance” in the form of CDS can be purchased. The holder of the assets insures his portfolio against default by buying insurance to decrease his risk.[113]

Credit risk transfer was believed to be beneficial to the financial system as it allows to distribute the risk among many market participants and different regions. It had been seen as a way to improve financial stability by smoothing out the risks among many investors. CRT was appreciated for increasing liquidity of credit markets and the increased supply of assets and hedging opportunities. Duffie[114] still praised benefits of CRT in his work in 2007 although he noticed that even specialists in CDOs are ill equipped to measure the risks and fair valuation of tranches that are sensitive to default correlation. He acknowledged that this was the weakest link in CRT markets, which could suffer a dramatic loss of liquidity in the event of a sudden failure of a large specialty investor or a surprise cluster of corporate defaults, which is exactly what happened.

The outbreak of the crisis changed the common perception of credit risk transfer mechanisms as a beneficial practice. Credit risk transfer creates a high degree of uncertainty that is inherent to the transfer mechanism itself because it is not clear where exactly the risks and losses lie. Major risks had been transferred to special purpose entities (SPEs) that had taken on high levels of credit risk exposure and had performed maturity transformation by financing long-term assets with short-term liabilities. The problem is that these entities are not as well equipped as banks to cope with credit deterioration and a liquidity squeeze in stressed times.[115]

Securitization

Securitization relates to the process through which an issuer combines several financial assets into one financial instrument. The newly created securities are then sold to new investors. Buyers of these assets are often specialty finance companies like special purpose vehicles (SPVs) or special purpose entities (SPEs). The whole pool of assets is sliced into tranches that are categorized according to their risk-return profile. Mortgage backed securities (MBS) are a typical example for product created by securitization. Several mortgages are combined in one big pool and pieces of the package are sold at a price that depends on the tranches' inherent risk.

The development of securitization is closely tied to the development of the shadow banking system and the practice of moving assets off-balance-sheet. This development has taken place over the past three decades but has remained unnoticed by bank regulators and academics for a long time.[116] Securitization is a

mechanism of credit risk transfer and takes place in the context of off-balance-sheet transactions. It supports the creation of hidden leverage.

Securitization was originally supposed to provide liquidity to the market and is *designed to reduce the risk of default*. The credit quality of securitized debt is non-stationary and may change over time. If the transaction is properly structured and the pool performs as expected, the credit risk of all tranches of structured debt improves.[6]

Off-balance-sheet positions (OBS)
Off-balance-sheet transactions occur in the context of credit risk transfer and the shadow banking system. An off-balance sheet position usually refers to an asset, liability or equity (way of financing) not kept on the company's balance sheet. Moving liabilities off-balance-sheet is used to keep a company's debt to equity (D/E = leverage ratio) low by transferring assets to other entities. The asset itself is on the balance sheet of the lessor (lender).[117] Traditionally, credit risk associated with loan remained on the bank's balance sheet. In the years leading up to the crisis, securitization and off-balance sheet have been heavily used by banks to move credit risk to a third party by selling the loans.[6] Entities of the shadow banking system like SPEs, SPVs, SIVs can be such entities that have these assets on their balance sheets.

Originate-to-Distribute (OTD)
The traditional idea of the originate-to-hold model is that banks create credit (originate loans) and hold the credit risk (default risk) on their balance sheet. The new "originate-to-distribute" (OTD) model of lending is that the originator of a loan sells tranches of it to various third parties. The securitized assets should not remain on bank balance sheets in order to get rid of unwanted risk. According to Gorton, there is no basis for this idea. In fact, banks held some of these bonds as collateral for a form of depository banking.[6]

Securitization is a method within the originate-to-distribute framework. It was a popular method of mortgage lending before the onset of the subprime mortgage crisis.[118] The traditional model was the originate-to-hold model where a bank originated a loan (e.g. mortgage) and retained the credit (default) risk on its balance sheet. The new financial innovations gave rise to the "originate-to-distribute" model, where the bank does not keep the loans (mortgages) on its

balance sheet but sells them to investors. That way, the credit risk is transferred to the investors through special instruments like ABS (or MBS in the case of mortgages). The third parties are often conduits like SPVs etc. The conduits pool and repackage the loans and sell tranches according to their risk-return-profile. The issuing bank receives an immediate cash flow but has gotten rid of the risk. The bank is ready to issue new loans with the funds on its balance sheet because the capital requirements are still fulfilled. The transfer of credit risk through the OTD channel facilitates credit creation and further creates wrong incentives to issue loans of bad quality (moral hazard). The overall risk in the system increases.[118] [119]

The Basel accords are being criticized for facilitating securitization. The following quote stems from the Wall Street Journal, Nov. 27th. 2007:
"In 1998, the Basel Accord created the opportunity for regulatory arbitrage whereby banks could shift loans off their balance sheets. A new capital discipline that was designed to "improve" risk management led to a parallel banking system whose lack of transparency explains how the market started to seize up.
The "originate-to-distribute" model reduced the incentive for banks to monitor the credit quality of the loans they pumped into collateralized-loan-obligations and other structured vehicles, the rules failed to highlight contingent credit risk…With Basel II, the question is just how the markets will evolve over the next 20 years…. as the new accord will require banks to hold less capital".[120]

Over-the-counter (OTC)
OTC means that financial instruments are traded directly between two parties rather than on the exchange. In the context of shadow banking, OTC refers to debt securities and other financial instruments such as derivatives that are traded through a dealer network. Instruments such as bonds do not trade on a formal exchange and are, therefore, considered OTC securities.[6]

The OTC derivatives market grew exponentially in the decade prior to the current crisis and reached upwards of $650 trillion dollars in notional contracts traded (BIS.org). A large amount of the SBS trading activity is done OTC. The OTC market allows for increased leverage.

Consequences of the OTD process during the crisis
The crisis has shown, that removing assets from bank balance sheets does not mean that banks are no longer exposed to the risks associated with them. During

the GFC, the bad assets tend to come back to the banks' balance sheet. As borrowers in these times considered that uncertainty in the financial markets is too high, demand for higher borrowing requirements and an increase in regulatory capital requirement has risen and new legislation will be put into place.[121]

Asset-backed securities (ABS)
The shadow banking industry heavily relied on securitized assets. An asset-backed security (ABS) is a security whose value and income payments are derived from and collateralized (or "backed") by a specified pool of underlying assets. Examples for underlying assets are loans, leases, credit card debt or a company's receivables. For example, a mortgage-backed security (MBS) is a type of asset-backed security that derives its value from a collection of underlying mortgages. These securities are often managed by structured investment vehicles (SIVs), who attempt to profit from credit spreads between short-term debt and long-term structured finance products such as ABS.[6] [109]

4.5.3. Instruments for credit creation within the SBS

How could excessive leverage and aggregate risk get built up to such a scale in a financial sector that is so heavily regulated? In particular, how and why did capital adequacy requirements fail in their stated job of limiting bank leverage and risk?
Without doubt, credit risk transfer has economic merits. But at the same time, these tools that allowed for CRT were clever innovations of the financial sector to arbitrage regulation.[122]

Depository banks used special investment vehicles (SIVs) to move assets and liabilities to entities of the shadow banking system. These transactions allowed the depository banks to remove assets from their balance sheet. Having fewer assets on their balance sheet, less capital was needed to meet the requirements. The transaction could therefore be used to bypass existing regulations regarding minimum capital ratios. The consequence was an increased leverage, which magnified profits during the boom but increased losses in the following bust. Following, the mechanisms are explained in more detail.[6]

What follows is a selection of instruments and vehicles that allowed for increased credit creation and leverage within the shadow banking system have been chosen.

The mechanism of the instruments is described as well as the interconnections between the different instruments.

Asset-backed commercial paper (ABCP) conduits

ABCP stands for Asset-backed Commercial Paper. It is a vehicle used for short-term investment with maturity usually between 90 and 180 days. A bank or other financial institution typically issues the security. The notes are backed by physical assets such as trade receivables and they are generally used for short-term financing needs.[123] If a company issues an invoice, they usually would like the client to pay immediately. However, this is not always the case. There are three ways of receiving the money quicker: Invoice discounting, factoring or ABCP. An ABCP is a way to convert a trade receivable into cash from the customer more quickly.[124]

The company can enhance liquidity by selling their receivables to a conduit, which, in turn, will issue them to its investors as commercial paper. The receivables of the company are the assets that back the commercial paper. The company then passes the cash flow to the conduit. The conduit in turn passes these funds to the holders of these notes.

Banks set up off-balance-sheet ABCP conduits where they transferred some of the assets they would have otherwise held on their books, funded them with a sliver of equity and the rest with rollover commercial paper, and provided liquidity enhancement and credit enhancement to these conduits. The enhancements implied that investors in conduits had recourse to banks in case the quality of assets deteriorated. Put simply, investors would return the assets back to the bank once they suffered a loss. Such enhancements were treated as capital-light in existing Basel rules for capital requirements. As banks rolled out more and more ABCP conduits, they increased their short-term liabilities. But their effective of contingent leverage remained in the shadow banking system. Additionally, they were able to free up capital to originate more assets generally of lower quality, and hide them in the shadow banking system. This is a way of foregoing regulation in order to create credit.[125]

Triple-A rated securities

Instead of depositing money or treasury bills in a bank as collateral, institutional investors like hedge funds started to use Triple-A rated bonds (like MBS, see

below) as collateral. These Triple-A rated bonds were treated similar to treasury bills and their default rates were close to zero. Yet they promised higher returns than treasury bills and therefore gained popularity. The default rates were estimated at 0.01% (Moody's) and investors did not proof it as they thought that it was pointless to take the time doing so. Over time, Triple-A rated bonds replaced more and more the retail cash. As these bonds served as collateral, it was possible for the holders of these bonds to create new credit based on them.[126]

Banks exploited the fact that they could get capital relief by simply switching away from loans into investment in the form of AAA-rated tranches of CDOs and collateralized loan obligations (CLOs), which again had a significantly lower capital charge. About 30% of all AAA asset-backed securities remained within the banking system, and if ABCP conduits and SIVs that had recourse are included, this fraction even rises to 50%. While AAA-rated securities are typically expected to carry low absolute risk, the fact that the newer assets originated by banks were down-the-quality-curve was ignored and thus their ratings were overly generous.[125]

Mortgage backed securities (MBS)
Banks with high involvement in the OTD practices during the pre-crisis period originated excessively poor quality mortgages. The originating banks did not screen their borrowers properly enough due to a lack of screening incentives. Banks felt encouraged to extend credit in a reckless way to borrowers that were likely to default. Consequence of this high risk-taking behavior was leverage that significantly contributed to the sub-prime mortgage crisis.[125]

Repo 105: Lehman's Repo 105
A sale and repurchase agreement ("repo") is an instrument used to convert securities and other assets into cash needed for a firm's various activities, such as trading.[127] It allows a borrower to use a financial security as collateral for a cash loan at a fixed rate of interest. In the repo, the borrower agrees to sell immediately a security to a lender and also agrees to buy the same security from the lender at a fixed price at some time later. A repo is equivalent to a cash transaction combined with a forward contract. The difference between the forward price and the spot price is the interest on the loan, which is usually rather low. It is a short-term loan often used in the money markets. Central banks often use repos to boost money supply, buying Treasury bills or other government paper from commercial banks so the banks can boost their reserves, and selling the paper back at a later date.[128]

According to Gorton, the amount of money under management by institutional investors has grown enormously in the years leading up to the crisis. These investors and non-financial firms had a need for a short-term, safe, interest earning transactions account like demand deposits: repo. Repo also grew enormously, and came to use securitization as an important source of collateral.[129]

The Federal Reserve System counted repos in its M3 measure. Repos, used by the shadow banking system, are "money".[129] Leverage ratios of over 30 (Lehman, Bear Stearns) had been achieved with significant short-term repo financing.

The Repo 105 became famous with the collapse of Lehman Brothers. It is an accounting maneuver where a short-term loan is classified as a sale. The cash obtained through this "sale" is then used to pay down debt, allowing to reduce Lehman's apparent leverage by temporarily paying down liabilities – just long enough to reflect on the company's published balance sheet. It had been done in a series of transactions designed to make Lehman's balance sheet look stronger.

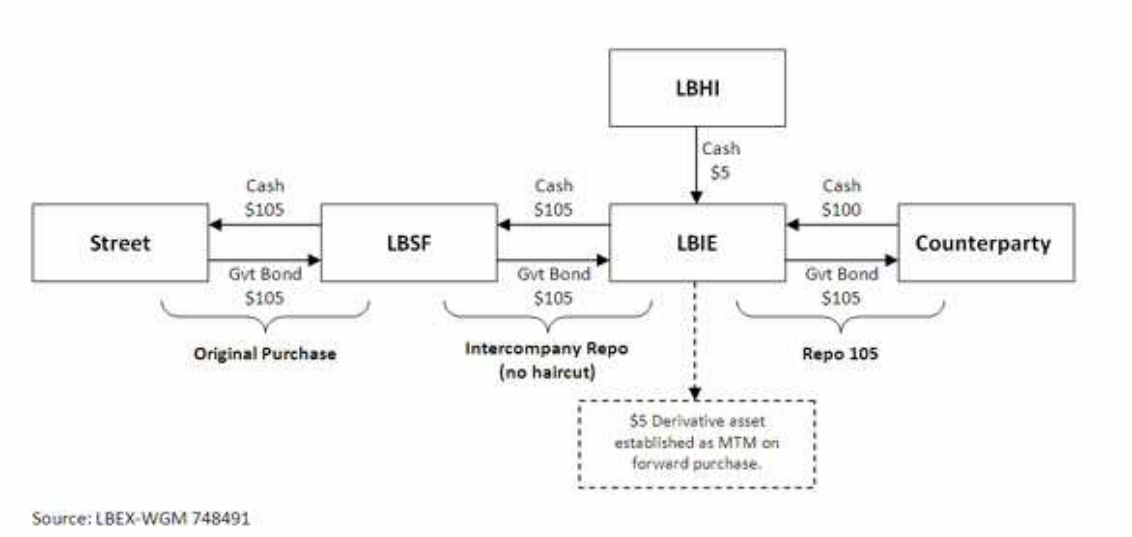

Figure 4: Lehman's repo 105 transaction[130]

In a first step, Lehman bought government bonds from another bank using its Lehman Brothers Special Financing (LBSF) unit in the United States (Figure 4).

This first step was the original purchase. In a second step, an inter-company transfer of the asset took place: Just before the end of the quarter, the U.S. unit transferred the bond to Lehman Brothers International Europe (LBIE), a London affiliate. The actual Repo 105 transaction occurred when LBIE "sold" the bond to a counterparty and agreed to buy it back at the beginning of the next quarter at a slightly higher price.[131] Standard repurchase and resale transactions as such are not illegal. Not only Lehman but also other investment banks used them to secure short-term financing.[132] The problem in the case of Lehman is that these Repo 105 transactions were booked as a "sale" rather than a financing transaction. In doing so, Lehman removed the inventory from its balance sheet. This helped Lehman to hide liabilities and their leverage, thought to be an indicator of bank risk, seemed lower than it actually was.

Lehman was in a bad condition before its collapse. It relied on heavy borrowing, or leverage. Repo 105 transactions helped them to remove up to $50 billion from their balance sheet. This made their leverage - an indicator of risk - look smaller. At the time Lehman Brothers imploded, $25 billion USD in capital was supporting $700 billion USD of assets and liabilities.[133] The case of Lehman is a good example how a bank used sophisticated, but fraudulent accounting techniques to increase its leverage.

Credit creation via securitization

Securitization has three main purposes among others:

a) liquidity of the search for new sources of financing
b) transfer of credit risk
c) arbitrage of regulatory capital

In the context of a loan securitization, if the special purpose entity (SPE) was owned or controlled by the bank whose loans were to be secured, the SPE would be consolidated with the rest of the bank's group for regulatory, accounting, and bankruptcy purposes, which would defeat the point of the securitization. Therefore, many SPEs are set up as 'orphan' companies with their shares settled on charitable trust and with professional directors provided by an administration company to ensure that there is no connection with the sponsor.

Off-balance-sheet financing is designed to be a useful tool to undertake business ventures because it allows shifting risk. But according to Duffie, large dealer banks abused off-balance-sheet financing as a tool to create credit, which helped to fuel

the bubble. In the upturn of the current crisis, large dealer banks extensively used off-balance-sheet financing.[134] For example, a bank can originate of purchase residential mortgages and other loans that are financed by selling them to a special purpose financial corporation or trust that it has set up for this express purpose. Such as special purpose entity (SPE) pays its sponsoring bank for the assets with the proceeds of debt that it issues to third-party investors. The principal and interest payments of the SPE's debt are paid from the cash flows that, hopefully, it will receive from the assets that it has purchased from the sponsoring bank.[134]

Because an SPE's debt obligations are contractually remote from the sponsoring bank, under certain conditions banks have not been required to treat the SPE's assets and debt obligations as their own, for purposes of accounting and of regulatory minimum capital requirements. In this sense, an SPE is "off-balance-sheet." SPEs have therefore allowed some large banks to operate much larger loan purchase and origination businesses, with a given amount of capital, than would have been possible had they held the associated assets on their own balance sheets.[134]

4.5.4. Law suits involving credit derivatives

Merrill Lynch and CDOs
Since 2003, Merrill Lynch (ML) was the leader of the CDO market. In advertisements, they called themselves the "#1 global underwriter of CDOs in 2004". Merrill Lynch did not only provide CDOs to investors but kept a large part of the CDOs on their balance sheets. Merrill Lynch incurred huge losses due to this.[135][136]

In April 2009, MBIA (Municipal Bond Insurance Association) sued Merrill Lynch. MBIA is American's largest bond insurance company that sold insurance contracts (CDS) on CDOs to Merrill Lynch. MBIA accused ML of not revealing accurate information about the quality of these CDOs, i.e. ML estimated default risk of these CDOs too low, which lead to a higher rating than justified. Of several charges that had been made against ML, all but one of the many charges had been disallowed. Finally, MBIA had to pay a large amount of money when the CDOs lost value.[137]

Another accusation against ML came from Rabobank in 2009. Rabobank claimed that the hedge fund Magnetar Capital had chosen assets to go into a CDO called

Norma to finally bet against them. The case is related to the SEC charges against Goldman Sachs and its Abacus transactions.[138] Due to large losses in its CDO portfolio, ML was finally sold to Bank of America in 2008.[139]

Goldman Sachs and synthetic CDOs

An issue discussed in the press in Spring 2010 is the case of Abacus deals used by Goldman Sachs. The investment bank is accused of taking advantage of its clients by withholding "material information". On April 16, 2010 the Securities and Exchange Commission (SEC) has charged Goldman Sachs of misstating and omitting facts in disclosure documents for a synthetic CDO product it originated called Abacus 2007-AC1.[140] ACA, a New York based investment firm and IKB, a German bank were encouraged to take the long side of the created synthetic CDO. At the same time, Paulson & Company, a well-known hedge fund, took the short side – that is, it bet against it.

While the creation of ordinary CDOs is limited by the availability of underlying assets like mortgage securities, an unlimited volume of synthetic CDOs can be created because they are not tied to asset-based securities but to credit default swaps, which themselves can be created in unlimited numbers. Thus, synthetic CDOs satisfied the desire early in the 2000s for investments with high ratings. Because the ratings were poorly done, many mortgage-related securities collapsed in value, and synthetic CDOs magnified the losses.[141]

AIG and CDS

CDS are a form of quasi-insurance against the default risk inherent in the assets underlying the CDOs. They are not regulated as actual insurance contracts. Companies, which sell CDO contracts are not required to maintain sufficient capital reserves to pay off on potential claims. This was the cause for the bankruptcy of AIG, the largest insurance company in the world. AIG was not able to meet the request of settlement on hundreds of billions of dollars of CDS contracts offered by a division of AIG.

CDS are dangerous because they create risk out of thin air and they allow holders to make bets on the non-performance of assets, bankruptcy of firms or even national governments. Market participants could hold risky securities and buy CDS on them. That means essentially, they could bet against the risky assets at the

same time. That way, the participant was protected from any risk. The problem is, that there must be a counterparty that holds all that risk.[142]

4.5.5. Analysis of SBS and current crisis

SBS as one of the causes for the crisis

It is acknowledged that the global shadow banking aggravated the subprime mortgage crisis and helped to transform it to a global credit crunch. Critics like Geithner, Krugman or Roubini argue that the shadow banking system contributed significantly to the current financial crisis. Some even say that it is the main cause. Gorton wants the regulators to accept that the current crisis is a (Shadow) banking panic of the SBS. The SBS contributed to asset bubbles in the real estate markets prior to the financial crisis through their maturity and credit transformation.

Securitization contributed to bad lending as it allowed originators of loans to pass the loans and its associated risk onto others.[143] Stiglitz comments that securitization can give rise to perverse incentives (moral hazard). Insurance allowed to get rid of tail risk cheaply, which encouraged institutions to take on even more systemic risk. Stiglitz wonders whether the growth in securitization has been result of more efficient transactions technologies, or an unfounded reduction in concern about the importance of screening loan applications. He suggests that we should at least entertain the possibility that it is the latter rather than the former.[144]

Derivatives as the cause?

According to Roubini, derivatives are not the direct cause of the credit crisis as debt levels have been building since the 1980s. But unregulated derivatives facilitate leverage and thus the potential for contagion to unrelated markets and the real economy. Roubini says that at the center of the latest crisis were lax lending standards together with regulatory capital arbitrage facilitated by financial innovation and securitization. The result was a shadow banking system of the same size as the traditional banking system but with no capital requirements or lender of last resort.[145]

Risks of the SBS due to maturity mismatch

The SBS borrows short-term e.g. in the money market (MM) or by commercial paper (CP). The money, which has been raised in this way is lent long-term e.g. to corporations or to the real estate market. Mortgage Backed Securities (MBS) were

a typical asset to invest the short-term borrowed funds. This technique makes the SBS vulnerable because of the maturity mismatch, which means borrowing short-term in liquid markets to purchase long-term, illiquid and risky assets. This bears the risk that disruptions in credit markets causes them to deleverage by selling their long-term assets at depressed prices.[146] Large amounts of assets are sold on the market at low prices. This causes losses. The mechanism of the panic triggers the fire sales. When commercial paper investors refuse to re-up when their paper matures, the shadow banks are left with a liquidity problem. They face two options: Either real banks have to help them out by providing them lines of credit or they have to liquidate assets at very low prices.[147]

High leverage due to small capital base

Regulations that limited risk, but also potential profits, were put out of action in the upturn to the crisis (e.g. Glass Steagall). In turn, other legislation was put into place that made conditions for the shadow banking system more favorable (Garn-St.Germain Depository Institutions Act and Gramm-Leach Bliley Act). Politicians had been persuaded to relax the rules. Complex financial arrangements allowed the shadow banks to bypass regulations designed to ensure that banking was save.

The SBS bypassed the banking regulation and found a way to earn the net interest margin associated with maturity, liquidity and quality transformation on a much smaller capital base.[109] The SBS was mirroring the banking model, which had deposits and loans. Instead of a deposit, ABCP (short-term) loans were used instead of securities (long-term). The rating agencies served as de facto regulators. In other words, the smaller capital base means a higher leverage. More credit could be extended on a smaller capital base.

A run on the shadow banking system

A banking system works if the public's ex-post demand for liquidity at par is smaller than its ex-ante demand (McCulley).[148] A bank run is when the public's ex-post demand for liquidity at par equals its ex-ante demand. In that case, the banking system is insolvent.

Krugman and Gorton are among those who argue that the run on the SBS was at the "core of what happened" to cause the crisis.[147] [149] In 2008, Krugman compared the run of the shadow-banking system at the beginning of the current financial crisis to the bank run during the Great Depression in the 1930s (However, he did not assume that the crisis itself would be as bad as the Great Depression at that

time). During that time, people withdrew their money from the bank accounts to put it in their mattresses. The recent panic was a wholesale panic rather than a retail panic. The money was withdrawn from the SBS and put into Treasury bills.[80]

Access to public goods for the biggest investment banks during the crisis

In order to protect depositors from the negative consequences of a bank run and to increase the stability of the financial system, a lender of last resort and deposit insurance have been introduced.[150] That is, in the U.S. the Federal Reserve Bank would step in to guarantee the money to the depositors through the Federal Deposit Insurance Corporation (FDIC). As deposit insurance cannot be a private sector activity, it is a public good provided by a subsidiary of the fiscal authority. Another public good that banks have access to is the Fed's balance sheet (lender of last resort) because they have the right to print money.

During the crisis, the Fed provided help to some of the biggest investment banks that were primary dealers. This included lending to the biggest five investment banks, which used what is called the Primary Dealer Credit Facility (PDCF) to borrow money from the Fed. This overnight loan facility provides funding to primary dealers in exchange for any tri-party-eligible collateral and is intended to foster the functioning of financial markets more generally (NY Fed).[151] The Fed action has been criticized because it increased the Fed's balance sheet by adding riskier positions (riskier debt and MBS). Second, the Fed is criticized for expanding their power compared to other financial regulators such as the SEC and the FDIC.

In addition to the Fed's help, the Federal Deposit Insurance Corporation (FDIC) adopted its Temporary Liquidity Guarantee Progam (TGLP) on October 13th to provide liquidity in the interbank lending market.[80] The Treasury stepped in and provided another public good: the Foreign Exchange Stabilization Fund. So the Fed, the FDIC and the Treasury all stepped in to provide the SBS with the public good that usually only banks have access to. But other than banks, the SBS did not have to meet the same regulation as banks. Krugman and McCulley want that regulation should be imposed on all banking-like activity in order to get the financial system back under control.[152] [153] Consequently, they call for an equal treatment of shadow banks: they should have higher mandated capital requirements, tighter leverage and liquidity restrictions and they should be supervised by the Federal Reserve if they have access to these public goods.[154]

4.6. Ponzi schemes

4.6.1. How the Ponzi scheme works

A Ponzi scheme is a fraudulent investment operation that pays returns to separate investors from their own money or money paid by subsequent investors, rather than from any actual profit earned. Depletions reserve banking that has been described previously is a classic example of a Ponzi (pyramid) scheme. The perpetuation of the returns that a Ponzi scheme advertises and pays requires an ever-increasing flow of money from investors to keep the scheme going. The system is destined to collapse because the earnings, if any, are less than the payments to investors. Knowingly entering a Ponzi scheme, even at the last round of the scheme, can be economically rational if there is a reasonable expectation that government or other deep pockets will bail out those participating in the Ponzi scheme.[155] The Ponzi scheme has to be distinguished from other similar schemes such as the pyramid scheme or a bubble. A pyramid scheme is similar to a Ponzi scheme. However, it differs in some aspects. In a Ponzi scheme, the schemer acts with all investors directly, which is not the case in a pyramid scheme. The Ponzi scheme claims to rely on some esoteric investment approach and often attracts well-to-do investor whereas a pyramid scheme claims that new money will be the source of payout. A Ponzi scheme survives usually longer than pyramid schemes as they can usually persuade their participants to “reinvest” their money. Table 13 lists the most important differences between pyramid schemes and Ponzi schemes.[155] This works with a relatively small number of new participants. A bubble is not the same as a Ponzi scheme. As long as buyers are willing to pay ever-increasing prices, sellers can get out with a profit. There doesn’t need to be a schemer behind a bubble. In fact, a bubble can arise without any fraud at all.

Table 13: Comparison of pyramid schemes and Ponzi schemes

	Pyramid Scheme	**Ponzi Scheme**
Typical “hook”	Earn high profits by making one payment and finding a set number of others to become distributors of a product. The scheme typically	Earn high investment returns with little or no risk by simply handing over your money; the

	does not involve a genuine product. The purported product may not exist or it may only be "sold" within the pyramid scheme.	investment typically does not exist.
Payments / profits	Must recruit new distributors to receive payments.	Recruiting necessary, but not as much as in Pyramid scheme.
Interaction with original promoter	Sometimes none. New participants may enter scheme at a different level.	Promoter often acts directly with all participants.
Source of payments	From new participants – always disclosed.	From new participants – never disclosed.
Collapse	Fast. An exponential increase in the number of participants is required at each level.	May be relatively slow if existing participants reinvest money.

4.6.2. Ponzi schemes in practice

Krugman[156] describes another way how banks found a way to make some extra return. The financial industry has been borrowing money by issuing supposedly safe assets and investing the proceeds in higher-yielding assets. According to Krugman, they could borrow so cheaply because the lenders assumed that their money would be invested into safe assets. But the assets that had been created were perceived safer than they actually were. In the upturn of the current crisis, these assets were mostly asset-backed securities (ABS). The assets were perceived as safe and therefore priced accordingly. The booming housing bubble masked the real risks as the underlying asset prices (the houses) were constantly rising. This corresponds to a leverage of investments: cheap money from investors searching for low risk yield has been borrowed and redirected to high yield but high risk investments. This can be seen as a Ponzi scheme.

According to Shiller, a bubble is a natural Ponzi scheme, which doesn't actually require a deliberate act of fraud yet has the same effect.[157] He suggests that between 1980 and 2008 a financial system in which profits were created by lack of competition was replaced by a system in which profits were created by misinformation and misperceptions. He sees that as a giant Ponzi scheme, which finally went bust. Shiller is not the only one who compares the practices that led to the Global Financial Crisis to a Ponzi scheme. Pytel is another strong proponent of this idea.[158]

4.6.3. Other Ponzi schemes

There are many cases of Ponzi schemes known in history. A recent famous case was the Ponzi scheme run by Bernhard Madoff, who was the operator of the largest Ponzi scheme that had officially been run by one person. He was pleaded guilty in 2009. Ponzi schemes may concern whole economies, as it was the case in Albania. In the mid-1990s, Albania was becoming a liberalized economy after years under a controlled economy; the rudimentary financial system became dominated by Ponzi schemes that collapsed in 1997. These failures were accompanied by unrest and rebellion. A more recent example of a Ponzi scheme at the macroeconomic level is Greece. The Greek government increased its debt to unsustainable levels using a Ponzi scheme. The Greek Ponzi scheme was characterized by a high debt-to-GDP ratio, which is an indicator for a highly leveraged economy. Bad government debt (high risk of default) had been used as collateral to take on more debt. The example of Greece is discussed next.

4.7. Analysis of countries during the Global Financial Crisis

4.7.1. Greece and the Ponzi scheme

Greece was the focal point of the financial crisis in Spring 2010. The Euro member provides an example of a government that has been funded by credit creation. Greece ran a large Ponzi scheme that has finally led to the unavoidable collapse – Greece had to be bailed out. On April 11th, 2010, European Monetary Union (EMU) leaders agreed on a bailout plan for Greece. On April 27th, S&P downgraded Greece's debt rating below investment grade to junk bond status. At the beginning

of May, Greece was granted a Euro 110 billion aid to avert a meltdown.[159] The European Central Bank (ECB) announced that it would accept Greek government bonds as collateral no matter what their rating is. But these loans are only further debt that Greece is supposed to repay. Sequentially, austerity measures had been announced. Greece is unlikely to increase its productivity any time soon and even with the new funding it seems unlikely that Greece will eventually be able to repay its debt. Several proponents have suggested the exit of the European Union. But how did it come so far?

History of Greece – the Greek miracle

After World War II, the Greek economy experienced an impressive growth, also known as the Greece miracle.[160] During the period from 1950-1973, the average growth rate was at 7%, surpassed only by Japan. From 2000 to 2007, the Greek economy was one of the fastest growing in the Eurozone when it grew at an annual rate of 4.2%.

However, the government of Greece ran large deficits during this time. An audit performed by Eurostat in 2004 revealed that the previous Greek government had massively underreported the budgetary statistics. The budget deficit was one of the four criteria to enter the monetary union and had been underestimated at the time of entry to the union. However, even with the revised budget deficit numbers, the criteria for entry had been met. Yet the newly calculated budget deficit was higher, mostly due to previously unrecorded military expenses.[161]

Greece's economic growth turned negative in 2009 for the first time since 1993.[162] The fact that the ratio of loans to savings exceeded 100% during the first half of 2009 can be seen as an indication of the trend of over-lending in recent years.[163] By the end of 2009, Greece faced its most severe crisis after 1993. In 2009, the budget deficit stood at 12.7% of GDP. This, and debt levels of 113% of GDP at that time (end of 2009) led to rising borrowing costs, that finally led to a severe economic crisis. Once again, Greece tried long to cover up its budget deficit by underreporting the budgetary statistics in the wake of the financial crisis. According to the EU guideline, the budget deficit of 12.7% should have been brought down to 3% in 2012.

Indicators of a sovereign debt crisis

Nowadays, Greece is one of the currently most troubled countries within the European monetary union. Greece is one of the members of the PIIGS – a term formed to refer to Portugal, Ireland, Italy, Greece and Spain. The acronym has long been used to refer to the Eurozone countries of southern Europe due to similar economic environments.[164] In early 2010, fears of a sovereign debt crisis developed concerning Eurozone countries, mostly the PIIGS. This led to a crisis of confidence as well as the widening of bond yield spreads and risk insurance on CDS between these countries and other Eurozone members, specifically Germany and France (Figure 5).[165]

Figure 5: Greece's sovereign-debt crunch (The Economist, February 4th 2010)

Greece was not much longer able to borrow money to these favorable conditions, as investors got more and more reluctant to lend their money to Greece. But Greece went on to issue more government debt until in May 2010, when the Greek government deficit was estimated to be at 13.6%. Greece finally went bankrupt and had to be bailed out.

A large bailout had originally not been foreseen by the ECB. The interest rate was thought to go up to 10% (6th April 2010) - a rate that Greece could not afford, their budget would simply collapse.[166] A Greek bailout had been unpopular in Germany. German Chancellor Angela Merkel had been reluctant to promise Greece a cash

bailout. But Germany, which can borrow at the lowest interest rates in the E.U. and has the Union's largest economy, has been one of those countries to help bail out Greece as the Greek government failed to raise the necessary money in the credit markets.

Foundation for the Ponzi scheme: Treaty of Maastricht

The Maastricht Treaty laid the basis for the European Union. The Treaty on European Union (TEU) as the Treaty of Maastricht is formally called, has been signed on February 7th, 1992. It is effective since November 1st, 1993. It led to the creation of a single European currency, the euro. The treaty instituted as one of the objectives of the Union the search of social and economic cohesion among the diverse regions and countries of the community. To achieve it, it was agreed that a denominated Cohesion Fund, created in 1994, would provide less developed regions and countries with financial aid and focused on sectors as environment or transport infrastructures. The member countries eligible to receive this aid were those who's GDP per capita was inferior to 90% of the Union average and comply with convergence criteria. The criteria were reduction of inflation and interest rates, control of government deficit and debt and respect of normal fluctuation margins provided for by the exchange-rate mechanism on the European Monetary system. Greece was among the countries that benefited from this support. Spain was the country that benefited most of it. Portugal and Ireland were others that profited from this aid. These are exactly the countries that nowadays struggle the most.[167][168] [169]

The Maastricht treaty allowed Greece to use Greek government bond as collateral (to fulfill the reserve requirement) to borrow new money. In this way, Greece was able to take on high amounts of debt (leverage). Usually, treasury bonds serve as collateral. In the upturn of the crisis, any treasury could be used by Greece as collateral at the ECB.

How Greece built up debt

Although the danger had been recognized in advance, Greece was able to use the new discovered cheap lending system to run large deficits and build up debt. Funds that Greece had to pay back have been paid back with other debt (ECB debt). As this mechanism of cheap accessible money was available to all nations within the EU, other countries exploited the system as well. Portugal built up debt and the cheap funds helped as well to fuel the real estate booms in Ireland and Spain.[170]

Greece is not the only example where the government helped to create a bubble (and a following crash). Three US presidents fuelled the housing bubble by facilitating access to homes.[171] In the years leading up to the recent crisis, Alan Greenspan and Ben Bernanke lowered interest rates aggressively in 2002/3 to jump-start the economy following the bust of the dotcom bubble. Although unintended, this was one of the ingredients that laid the basis for the housing bubble and its subsequent bust.

Influence of credit creation

The common perception of Greece's problems is that they were caused by the reckless borrowing practices of its government. Werner takes a provocative view. He points out that the European Central Bank (ECB) has to be blamed at least in part for the Greece's problems.[172] The ECB emphasizes its interest rate policy, which is identical across the Eurozone. Unknown to the public however, the ECB encouraged the governments of countries like Greece, Ireland, Italy, Spain and Portugal (PIIGS) to engage in unrealistically high revenue growth projections in the upturn of the crisis.[173] This was conducted by boosting commercial bank credit growth, which was supposed to finance the high spending. Contrary to that, Germany's credit creation had been restricted which led to weak growth and rising unemployment. The ECB implemented regionally diverse credit growth policies, which led to booms and bust in the according countries.[174]

A paradigm shift

Werner's insight is based on the idea that not interest rates are the determinants of economic growth – which is the view that mainstream economics share – but the amount of credit created by banks. He suggests that the mainstream view has been focusing on the wrong indicator (interest rates) in the recent decades. Werner suggests a paradigm shift - from an interest rate determined economy to a credit driven economy.

Credit creation machine

The case of Greece can be seen as an example of a government funded by credit creation. Greece issued mostly debt in form of government bonds (sovereign debt). A form of credit creation that also applies for the Greek economy is the practice where the central bank creates money by buying government bonds. In this case, the central bank "creates" the money (credit) to give money to the government by providing them with loans. At the same time, the same government bonds (the debt

of the country) served as a collateral for banks to borrow at low rate from the ECB money that can buy more debt. These bonds (debt) could then be used as collateral to get again more loans. The earning that remains is the differential between the government bond rate of 3-6% and the rate of the ECB, which was at 1% (in June 2010)[175] This credit creation has been used for consumptive (non-productive) purposes and served as fuel for a bubble.

Greek Ponzi scheme

This mechanism of credit creation however bears the risk of turning into a Ponzi scheme. In a Ponzi game, returns are paid to investors from their own money or from subsequent investors, rather than from any actual profit earned.[176] To keep the scheme going, an ever-increasing flow of investment is necessary to pay back the debt. The system is doomed to collapse because the income is less than the payments to the investors. In the case of the Greek sovereign debt, the income is represented by the differential between the government bond rate and the ECB rate. This income is less than the borrowed money from the ECB that had to be paid back. In a healthy economy, borrowed money is invested in production capacity and productive investments that can provide returns. In the case of Greece however, the lack of sufficient investment of these types and too much spending for non-productive purposes (consumption) led to the collapse of the scheme. Had the Greek bond rate been funded by productivity growth, the collapse would have not occurred. But as Greece continued to spend too much on consumption and continued to build up debt, the system eventually collapsed – Greece defaulted on its debt.

Uncovering the Ponzi scheme

For a long time, Greece was able to borrow cheaply at around 4-4.5% and issue more and more government debt - thereby running the Ponzi scheme for a few years. But since the beginning of 2010, Greece has been forced to pay 6-7% on any new debt issuance. The real concern for Greece was to not being able to issue the required amount of debt to continue running the government. After the true state of Greece had been revealed, the financial markets were adjusting to the fact that Greece's financial position was similar to others banana republics (like Zimbabwe), which are required to pay higher interest rates. In fact, Greece benefited for a long time from being a member of the EU. Without being part of the EU, Greece would have been paying around 10% or more for a ten-year debt issuance, according to Crawford.[177] It is questionable why one would want to lend

money to a country that can only pay its debt back by borrowing more and more money from other institutions.

The vicious circle of the sovereign debt mechanism

To wrap up the mechanism of how sovereign debt accumulation led to the default: The government sells bonds to investors (= government borrows money), which causes sovereign debt to increase. If the process leads to a sufficiently high debt burden, the credit rating decreases and the price of debt gets higher (government has to provide high interest rates and cannot borrow at low rates). The risk of default increases, the credit rating decreases and so on and so forth. The government finally defaults on its debt and has two options. It can decide to i) default or ii) it can be bailed out (as it was the case with Greece).

Historical context and options to deleverage

However, putting the story into a historical context, Greece's default comes as no surprise. Reinhard and Rogoff found that many country defaults came in clusters, as the situation is now with the PIIGS. Greece was more than half of the years since 1800 in default. Such crisis-prone countries tend to over-borrow in good times, which leaves them vulnerable during the inevitable downturns. Defaults often follow in the wake of large spikes in capital inflows. International banking crises often precede sovereign debt defaults and collapsed currencies, as it was the case in Greece.[178]

History shows four archetypes of consequent deleveraging: austerity (belt-tightening via higher taxes or controlled government spending), default, inflation or growing out of debt by GDP growth (Reinhard and Rogoff[89], McKinsey report[76], Roubini[179]). It hasn't been so long ago when Greece had to deleverage. From 1989 to 1998, Greece went through a period of deleveraging via inflation.

Exit of the Euro suggested

In Mai 2010, after the bailout of Greece, the question has been what should happen to Greece next. And besides the different options of deleveraging, several proponents argued that Greece should leave the Euro. Feldstein was one of those who saw pressure for Greece to exit the single currency in order to fix its fiscal crisis. Soros is another advocate of this possibility. Feldstein considered that the Euro may not survive and estimated a 22% chance that Greece will default within

five years.[180] Exiting the Euro was in April 2010 widely discussed in the press as a measure against the crisis[181] [182]

Werner on Greek crisis and the European Central Bank policy

Werner explained that if Greece is being bailed out, the most efficient and least costly method should have been chosen. This would have been the option that the European central bank's Greek branch (aka the Bank of Greece) purchases Greek government bonds. However, another solution has been chosen. According to Werner, it was the more expensive and wasteful method of getting the German government, together with other members of the Eurozone, to buy Greek bonds.

Werner pointed out that when countries joined the EU, they gave up their most powerful economic tool – monetary policy and the issuance of national currency. This makes the possibility of currency devaluation impossible. Greece's costs have to be borne by its business and labor. That means lower wages and higher unemployment in the following years.

Werner explained that although Greece was left without its own monetary policy, there was monetary policy – conducted by the ECB. This specific ECB policy encouraged the governments of countries like Greece, Ireland, Spain and Portugal to engage in unrealistically high revenue growth projections. This was conducted by boosting commercial bank credit growth, which financed the high spending. The growth in bank credit means automatically money supply growth. The ECB implemented regionally diverse credit growth policies, which led to booms and bust in the according countries. Banks in the peripheral countries such as Spain, Greece etc were encouraged to extend credit and thereby to create a boom. By contrast, in Germany, banks credit creation was restricted, which led to weak growth and rising unemployment. However, this is not widely known as ECB emphasizes its interest rate policy, which is identical across the Eurozone.[183]

In Werner's view, it is always risky when sovereign states give up their power to run their own currencies – like Greece did. He thinks that there will be either a "United States of Europe" or that Greece will get kicked out of the Euro. Werner takes an uncommon view, as he does not solely blame Greece for its current position.

4.7.2. Iceland – credit creation from foreign direct investment

Iceland has been seen as one of the most flourishing economies at the beginning of the new century. Prior to the 2008, Iceland had achieved high growth, low unemployment and a remarkably even distribution of income. Huge investments in green energy and aluminum smelting have drawn inflows of foreign investment and promise to underpin exports for years to come. But on these sound foundations, Iceland has also built a financial house of cards. Much of Iceland's economic growth in recent years came as a result of a boom in domestic demand following the rapid expansion of the country's financial sector. Domestic banks expanded aggressively in foreign markets, and consumers and business borrowed heavily in foreign currencies. Privatization and deregulation of banks facilitated this development and Iceland's banks incurred debt further by accumulation of foreign companies. [184] [185]

As Iceland's domestic market is rather small, Iceland's banks have financed their expansion with loans on the interbank lending market. In early 2006, less than 30 cents per Euro in every loan issued was backed by deposits.[185] A second cause for the crisis was the deposits from outside Iceland (external debt), which had been made more recently. Household debt, equivalent to 213% of disposable income, can be seen as a third cause for the crisis.

A McKinsey report[76] about debt and deleveraging suggests that the Icelandic crisis is due to its huge leveraging. According to McKinsey, the leveraging of the banks was mainly obtained by issuance of debt in international markets (borrowing money in foreign countries, debt has to be paid back to foreign countries in a deleveraging period) as well as through a surge in deposit from overseas investors drawn by high interest rates from 2004 to 2008 (capital inflow from other countries via investment, this money also has to be paid back). Borrowing from abroad and capital inflow from abroad led to high debt levels. In their analysis, Reinhard and Rogoff point out that financial liberalization simultaneously facilitates banks' access to external credit and more risky lending practices at home. After a while, following a boom in lending and asset prices, weaknesses in bank balance sheets become manifest and problems in the banking sector begin (Reinhard and Rogoff)[186] The foreign exposure of Icelandic banks, whose loans and other assets totaled more than 10 times the country's GDP, became unsustainable and Iceland's three largest banks, Glitnir, Landesbanki and Kaupthing finally collapsed in late 2008.

The credit creation process usually starts with the central banks, which extend loans to commercial banks. In such a process, money is created within the domestic economy. This does not precisely match the case of Iceland. The McKinsey study[76] states that the Icelandic banks did not get their money from the central bank but mostly by selling debts (= issuance of debt in international markets which is equal to borrowing from abroad) and from deposits (foreign capital inflow).

Credit creation from outside

Thus the reservoir of high-powered money (created out of nowhere) came from outside, which means in this case the rest of the world rather than from outside meaning the virtual world of money as it was the case with goldsmiths where the goldsmiths had been the producers of the domestic money supply. The effect of these two kinds of money creation is the same for a small country like Iceland (Sornette). The credit on which Iceland's economy prospered at the beginning of the 21st century came at the risk that high leverage comes at. The house of cards on which Iceland's banks were built eventually collapsed.

4.7.3. Comparison of Japan's lost decade and the Global Financial Crisis

The current financial crisis in the US and Europe is often compared to Japan's lost decade. After the collapse of the Japanese asset bubbles, rising government debt offset the deleveraging process in the private sector. Today, the US and the UK present a similar case like Japan: private sectors have started to deleverage, whereas the public sector debt is still rising. However, there are several differences. There are two attributes that make the recent crisis look better than the Japanese crisis. First, the destruction of perceived wealth in Japan was higher as asset prices had fallen more sharply after a larger rise in prices. It is said that in Japan, more than 325% of GDP had been destroyed whereas in the US it is around 125%. This is not a destruction of wealth in real terms though. The perceived loss was due to a drop in real estate and stock prices. GDP did not significantly contract. A second distinction to the recent crisis is that US and European banks wrote down their loan losses quicker and authorities responded quicker and with more force by releasing large economic stimulus programs. Other factors like structural rigidities in the labor and product markets and a more rapidly aging population can be taken into account as factors that hindered GDP growth.

But there are also less favorable factors for a recovery. Today, net exports are harder to achieve for countries in crisis than for Japan in the 90s because many other economies are struggling and therefore not healthy enough to have large imports. In addition, the US and UK relies on foreign investors to fund their government debt – whereas Japan could rely on domestic savings.

The current state of US and European economy resembles the post bubble recession in Japan in the late 1990s. European banks are reluctant to extend credit as they try to improve their own finances. Government prevents banks from failing. It is refused to face banking system losses and funds are poured into the economy to recapitalize the system. Many firms and households are making priority of repaying loans over making new investments. Debt owed by firms and households have possibly exceeded the debt level of Japans crisis. The Bank of Japan says that under current conditions, credit easing by US and EU banks might not be enough as a boost for the economy any time soon.[187]

Paul Krugman goes as far as to say that Japan's lost decade starts to look good when considering what the next couple of years might look like in the US and Europe. Unemployment and mass suffering is higher during the current crisis and the misery that millions of Americans will face in the near future will probably exceed anything that happened in Japan during the 90s.[188]

Table 14 summarizes similarities, differences and policy responses for the Japan's crisis and the US during the Global Financial Crisis.

Table 14: Comparison of Japan and the US (Lim Mah Hui, 2007)

	Japan's lost decade	**The US and the Global Financial Crisis**
Similarities	- preceded by loose monetary policy - rapid and unsustainable build-up of asset bubbles, particularly in property - interest rates lowered	- preceded by loose monetary policy - rapid and unsustainable build-up of asset bubbles, particularly in property - interest rates lowered,

	=> liquidity trap	liquidity pumped into the system, quantitative easing
Differences	- low degree of financial complexity - low leverage - local impact - L-shape recession	- high complexity - high leverage - worldwide impact - U-shape, L-shape or even double-dip (W) recession?
Measures taken / policy responses	- interest rates kept high at the beginning of the crisis - NPLs were kept on the books before they were written off => bank lending paralysed, aggravation of credit crunch	- interest rates were lowered immediately (Greenspan, Bernanke) - only a small fraction of the losses quickly accepted - capital raised quickly - high degree of opacity in financial assets - liquidity injection prevented economy from a collapse, credit crunch arrested
Outcome	- stimulus in Japan prevented GDP to plateau rather than collapse, employment remained at reasonably high levels	- stimulus in US worked but is not sustainable

4.8. Minsky's financial instability hypothesis and its relevance to the Global Financial Crisis

Another group that argues that the current crisis is a systemic problem are some Post Keynesian economists following Hyman P. Minsky. Minsky was an American economist (1919-1996) and a post Keynesian. Like Werner, he was a student of

Schumpeter. Minsky was a monetary theorist. He had a pessimistic view on the monetary system and emphasized the instability of the credit system. In his research, he attempted to understand and explain the characteristics of financial crises.[189]

4.8.1. How the Minsky mechanism works

There are three types of borrowers: The hedge borrowers are the harmless borrowers. They are able to pay back both interest and principal. In a second level, the speculative borrowers come into play. They are able to pay back interest, but have to re-borrow to pay back the principal (roll-over). In the last stage of the upturn of a crisis, Ponzi borrowers gain momentum. This is based on the illusion that the value appreciation of an asset will be sufficient to refinance the debt. With this type of borrower, debt levels increase. This is basically a fraudulent type of borrowing.[190]

The system seizes up, as long as asset prices rise and the Ponzi borrower is able to refinance (roll over) the principal. The debt levels increase. In a critical point, the first defaults happen to the weakest participants of the system. In a cascade, the default of the Ponzi borrowers brings down speculative borrowers and finally even hedge borrowers. The debt levels after a crisis are low, as the weak companies collapsed. Depression is seen as useful in capitalist economies to wipe out debt. A recovery with high debt levels is dangerous as it leads to increased fragility. Reinhard and Rogoff found that crisis go along with high debt levels.[89]

The Minsky concept has some parallels with Austrian business cycle theory. Minsky believes that the uncontrolled increase in the monetary base through central banks in the FRB system leads to instability and boom and bust cycles.[191]

Minsky describes the slow transition of the financial system from stability to crisis. It culminates in the “Minsky moment”, which is the turning point. The term “Minsky moment” refers to the time when over-indebted investors are forced to sell even their solid investments to make good on their loans, incurring sharp declines in financial markets and demand for cash that can force central bankers to lend a hand.[192] In his “financial instability hypothesis” (FIH), Minsky describes the swing of the financial system between robustness and fragility. These swings are an integral part of the process that generates business cycles. Opposed to mainstream

economics at that time (1970s), he believed that these swings are inevitable in a free market economy.

4.8.2. The Minsky mechanism applied to the Global Financial Crisis

Minskys financial instability hypothesis is applicable to the current crisis. According to McCulley, the current financial crisis is a "reverse Minsky journey".[193] Many parallels can be found in the ongoing crisis that relate to the mechanism described by Minsky. The structure of debt plays an important role in causing financial difficulties. He found it especially critical when debt was used to leverage the acquisition of speculative assets for subsequent resale.[194] Arguing in the words of Werner, this is related to credit extended for speculative purposes, which encourages the growth of bubbles. However, there are a few deviations from the original idea. In the current crisis, not banks took the risk as in Minsky's model, but subprime borrowers and entities of the shadow banking system such as structured investment vehicles.[78] [195]

Banks no longer bore as well as originated credit risk; banks made exploitative loans to minority borrowers and then generalized these loans as housing prices rose. This form of credit creation is speculative in nature as it does not contribute to a productivity increase in the economy and is solely based on the assumption of rising asset prices. Subprime homeowners and structured investment vehicles became more leveraged than banks. This led to increased systemic instability.

Werner's notion of credit creation is not very different form Minsky's approach. Werner does not see a problem in credit creation in general. The danger is credit creation for unproductive, i.e. speculative (or consumptive) purposes. An exaggerated credit creation for speculative purposes precedes a crisis, as it was the case in the recent crisis.

4.9. Analysis of the Global Financial Crisis with Kindleberger

According to Kindleberger, it is not exogenous shocks that led to the crisis. Bubbles develop endogenously facilitated through financial structures and leverage.
The crisis is therefore not necessarily the fault of central banks and regulatory entities. In the past, many bubbles and crashes occurred during the gold standard.

The problem is that banks always found a way to bypass regulatory trials to limit credit creation and currency flows. New financial instruments were invented to avoid regulatory barriers. The same holds for the current crisis. The shadow banking system was a way to bypass imposed regulation like capital requirements and leverage restrictions. Banks take on more short-term and riskier credit vehicles in order to gain more liquidity. Kindleberger's theory is based on Minsky's ideas. He explains that, in the turn of the time, the Ponzi borrower gains momentum. He explains that banks found more subtle instruments to create credit. ABSs are an example for the recent crisis.[196] [197]

Kindleberger's model (based on Minsky):[198]

1. An exogenous shock (policy switching, technology, financial innovation)
2. The boom created by the profit opportunities after the shock is fed by increasing money supply. There is little to be done about this because the money supply is endogenous (new banks enter, personal credit increases, new credit instruments are used).
3. The boom leads to speculation that initially has positive feedback; speculators earn money and invest more as well as making more people invest. This leads to what Adam Smith calls "overtrading" which can be caused by pure speculation (buying something with the aim of selling it later at a higher price), overestimation of the true expected return and excessive gearing (low initial cash requirements when buying something).
4. The overtrading spreads from one market to another (psychological links and others)
5. Speculation spreads internationally (psychological mechanisms, arbitrage, foreign trade multiplier, capital flows).
6. At the peak some insiders leave the market, there is "financial distress" and bankruptcy or the revelation of a swindle leads to the final stage; the rush for liquidity. The panic (or "revulsion") feeds itself until prices become so low that people are tempted to once again go into less liquid assets, trade is cut off or a lender of last resort convinces the market that there is enough money for all.

As a conclusion of his analysis, Kindleberger suggests to fix money supply in the long run but keep it flexible in the short run. In addition, he supports the idea of a lender of last resort. The recessions following a financial crisis have been longer and more profound without a lender of last resort (crisis of years 1720, 1873, 1882 in France, 1890, 1921 and 1929. However, he does not show why a lender of last resort was helpful in that case. He simply uses historical correlation to make his argument.[196]

4.10. Proposals to solve the Global Financial Crisis

4.10.1. Immediate resolutions (in the short run)

Mainstream view on how to resolve the crisis

There are mainly three ways to deal with banking crises.[199]

1. Lender of last resort: The government bails out banks by lending them money. This is a very common way of bailout. The bank received a loan, which it has to pay back. This happens if there is no market for the collateral and nobody wants to buy the banks' securities (liquidity problem). Often, one or very few big institutions are supported, the too big to fail argument comes here into play. Moral hazard is a problem as banks are tempted to take on even more risk next time. Yet, this is the more popular way of resolution.
2. Nationalization of banks: Government takes over a bank. The banks are closed for a certain period of time to prevent people from getting their money.

What measure is being taken depends largely on the circumstances. During the Global Financial Crisis all three measures occurred.

Mainstream view on how to prevent a crisis (stable banking system)

Grossman says that there is not one specific way in which a banking system should be designed. It is about finding a certain balance between the two poles of a tightly regulated banking system like between 1945-1972 (until end of Bretton Woods) and a more deregulated banking system that developed after. A tightly regulated system is more stable and less crisis prone. However, it might also be less efficient. Canada provides a good example of such a system. There is a high concentration with only few but big banks in Canada. A more dynamic system is more flexible but tends to boom and bust periods. The example therefore is the US with many but smaller banks. However, the US banking system is still dominated by a few large banks. Research has shown that in the context of firms, roughly the 20 largest firms in the US control the market risk.[200] This is remarkable considering that around 10'000 firms are officially quoted in the NYSE. It is necessary to find a balance and this balance depends on many peculiarities of an economy.

4.10.2. Systemic design and structure of the economy in the long run

Regulation is not the answer according to Bookstaber

Bookstaber asks why markets are becoming more crisis-prone. He sees the answer in the new innovation that had taken place years before the crisis. He does not deny the positive effects of these innovations. New innovations helped to make markets more efficient. Information is easier available and markets are more liquid. But at the same time, these innovations increased complexity of the system. Derivatives have often a payoff structure that is difficult to understand with conditional and nonlinear payoffs. Another aspect is that markets are more interconnected. Globalization led to markets and entities that are less independent then they used to be. Tight coupling as a consequence of innovation adds to the problem. Considering the combination of tight coupling and complexity as the predisposition that makes the system crisis-prone, he suggests to reduce both. Regulation is not the answer, as it would not solve the problem at the root. He proposes simpler financial instruments and less leverage. This would create a market that is more robust and survivable.[201]

Hayek on credit expansion (i.e. credit creation)

Hayek, a leading Austrian economist, is critical about credit expansion. He says, that he finds it

> …still more difficult to see what lasting good effects can come from *credit expansion*. The thing, which is most needed to secure healthy conditions, is the most speedy and complete adaptation possible of the structure of production. If the proportion as determined by the voluntary decisions of individuals is distorted by the creation of artificial demand, resources are again led into a wrong direction and a definite and lasting adjustment is again postponed. The only way permanently to 'mobilize' all available resources is, therefore to leave it to time to result in a permanent cure by the slow process of adapting the structure of production (Hayek).[202]

Resolving a crisis: Minsky's approach

The conclusions that Minsky draw from his theory were not much different as mainstream recommendations. He is basically a proponent of countercyclical policy. Minsky saw an important role for the central bank as a lender of last resort.

He has argued that the government needs to step in to control the economy. The appropriate means to do so are regulation and central bank action among others.[203]

Like Grossman, Minsky observed that there is no possibility that we can ever implement the right regulation once and for all. Instability would after time emerge in new guise.[204]

4.10.3. Proposed actions to deal with the SBS

Suggested regulation of the SBS

Gorton wants them to regulate the SBS similar to the banking system with both the benefits and regulations that banks are subject to. He suggests, that this could include:

1. Government insurance for senior tranches of approved asset securitizations;
2. Government supervision and examination of securitizations, in place of that previously supplied by private rating agencies; and
3. Limit access to the securitization market by determining that any firm that enters the securitization market is a bank, subject to government supervision.[149]

This is similar to what had been done after 1934. The examination and insurance of collateral is a lot like what the FDIC does with commercial bank deposits. The third point has his analogue in commercial bank charters, which face barriers if they want to enter the market.[205]

Recommendations for capital adequacy / performance metric / risk

Acharya, Viral and Schnabel recommend moving away from taking the capital ratio as the one single performance metric. To analyze bank balance sheets more thoroughly, one performance metric is not enough. Several aspects should be measured such as loans to deposits, insured deposit to assets, holdings of liquid treasuries etc. They criticize that the current single measurement of the capital ratio tied to individual bank risk is not an adequate risk measure. Thus, another recommendation is to focus more on aggregate risk (interconnections and complexity) rather than the individual risk of a single entity.[206]

The Volcker Rule

The former Federal Reserve Chairman Paul Volcker has proposed the Volcker Rule. The Volcker Rule restricts banks from making certain types of speculative investments and proprietary trading. The Volcker Rule can be seen as a complement to the Glass-Steagall Act. The Volcker Rule prohibits engaging in proprietary trading that is not executed on request of its client. Also, it forbids investing in a hedge fund or private equity funds. A limit is set to the liabilities that the largest banks could hold. The Volcker Rule has not been implemented so far.
It seems that this is similar to Werner's suggestion as he also proposes to limit speculative investments that increase C_F/C.
It is criticized that this solution only tackles part of the problem concerning commercial banking, investment banking and proprietary trading. It acts at the intersection of commercial banks and proprietary trading, but it leaves out the intersection with investment banks. Institutions that act in the overlapping field of commercial banking and investment banking or proprietary trading and investment banking are not regulated by this regulation.[207]

4.10.4. Werner's proposals to resolve the Global Financial Crisis

Summary of crisis resolution

Werner sees the privatized creation and allocation of money as the fundamental cause of banking crises. The quantity of credit is the key budget constraint on growth and thus determines growth, asset prices and should be used for policy making. Free markets do not work because there is no perfect information. Therefore, government intervention is necessary to keep control over the economy. A transparent regulation of the qualitative allocation of credit creation is necessary to avoid bubbles.[40]

Why common restructuring programs often fail

Restructuring programs commonly seek to resolve the problems by demanding:

1) an increase in the capital adequacy ratio; and/or adoption of Basle capital adequacy framework;
2) a tightening of accounting standards for non-performing loans;
3) an abolition of the implicit government guarantee of bank solvency by allowing banks to fail or forcing mergers, takeovers or acquisitions of banks, usually by "foreign strategic partners" (in IMF parlance);
4) the introduction of an independent policy regime for monetary, banking and regulatory policies that implements the above measure;
5) involuntary exit of the bank management;

6) injection of tax money to support write-offs of bad debts;
7) foreclosure on borrowers whose loans were written off and distressed sale of their assets.

Werner argues that these reform policies do not work if introduced at the wrong point of time. In fact, they may even worsen the crisis. If these policies are introduced early enough before the speculative lending takes over, these reforms help to avoid speculative lending and consequent bad debt problems.[40]

If the reforms are being introduced after the crisis, these policies are likely to discourage banks from extending loans, as they need to comply with the required capital requirements and other standards. However, less extended loans means also that the economy cannot grow adequately and therefore will struggle to find its way out of recession.[40]

The Basle accords had been introduced during a time when several economies were in a recession (Japan, Sweden, Norway, Finland). The consequence was a deepening of the recession as banks decreased their lending activities.

The negative feedback loop between such reform policies or a general tightening of capital adequacy standards is not recognized in literature because mainstream literature does not recognize the unique nature of banks as creators of credit and advocates the view that banks are mere financial intermediaries and that their function can easily be replaced by other intermediaries or the capital markets in general.[40] However, this is a contradiction to the mainstream argument that banks need to be bailed out to help the economy. The argument that banks need to be saved would imply that banks cannot easily be replaced and thus are more than intermediaries.

Because banks are likely to abuse their monopoly power to create and allocate credit for their own interests (e.g. predatory lending to maximize profits), Werner suggests putting commensurate accountability and mechanisms that guarantee responsible behavior into place. Banks should make their creation and distribution of new purchasing power render more transparent and subject to checks and balances that reflect the overall objective function of societies (e.g. increased productivity, growth of real wealth).

Werner's suggested solution to the Global Financial Crisis

Werner suggests the implementation of policies that prevent such bad debts before speculative lending sets in. These policies would include tighter capital adequacy, prudential, supervisory and accounting standards, as well as the threat of regulator-determined exit, before the background of such dynamics. That would prevent a financial crisis due to extension of loans for speculative purposes.

As fiscal spending funded by government borrowing and lowering interest rates will not help, other measures are necessary. Because banks are risk averse during crises, they will reduce credit creation. Especially in times of crisis, credit creation is necessary in order to step out of the crisis. Fiscal policy does not lead to new credit creation. Borrowing increases the debt-to-GDP ratio even further. And fiscal spending (if not backed by credit creation) simply crowds out private investment as the same money has previously been removed from the economy in form of taxes (debt financed).[40]

Werner proposes a simple solution: The government could issue new money to buy nonperforming assets from banks and public purchases of bank equity. He argues that national debt and interest liabilities will not increase, but credit creation will. The central banks would pay for the losses, not the taxpayer.

In case the central banks do not cooperate with governments, Werner proposes to trigger credit creation by funding the public sector borrowing through direct borrowing from the commercial banks instead of issuing of government bonds. Werner suggested using the term "quantitative easing" for the policy proposals he made.

Quantitative easing

Describes a form of monetary policy used to increase money in an economy when the interbank interest rate (in the US, this is called the Federal Funds Rate, in other countries the overnight lending rate) is either at, or close to, zero. In practical terms, the central bank purchases financial assets (mostly short-term), including government paper and corporate bonds, from financial institutions (such as banks) using money it has created ex nihilo (out of nothing). Werner has coined the term. He first used it to describe the policy used by the Japanese central bank during the crisis.[40]

However, the term – against his definition – had been used to name the actual policies of the Bank of Japan, which were focused on the expansion of banks' reserves. As he suggested, these policies would not help (and they did not).[40] To create healthy and sustainable growth, bank credit extended for financial transactions and speculation should be banned. Another solution would be to take the public privilege away from the banks and make the creation and allocation of money supply a public monopoly again (see the historical example of China).

4.10.5. Werner on the Global Financial Crisis

Debt-loaded Banks
Banks that are burdened with bad debts from prior misguided speculative lending are reluctant to extend credit. This is the case in the recent Global Financial Crisis. A tightened credit expansion restricts the money supply and hence domestic demand.[174]

Crisis resolution at zero cost
Werner agrees with Minsky that a government intervention into the credit market is necessary to resolve a crisis. Werner suggests as a solution that the central bank buys the loans. He explains that this would be easy to implement as the central bank can simply create money out of nothing. The taxpayer would not be affected. There would be no loss due to zero financing cost. A free lunch, according to Werner.

Werner is not right when he claims that his solution would be a free lunch. The problem with his approach is, that if the central bank engages in quantitative easing and creates money ex nihilo to buy assets, it increases the money supply in the economy. In my opinion, the problem is only prolonged in this way. Commercial banks do not collapse right away and they can continue to operate. However, the amount of money in the economy has been increased and there is a risk of inflation, as the productivity in the economy has not changed.

Control of speculative credit creation
Werner argues that crises could be avoided if the ratio of C_F/C is kept under control and an increase in C_F/C is avoided. The ratio C_F/C describes the credit created for speculative purposes C_F in relation to the total amount of credit C. The total amount of credit is obtained when adding credit for real purposes and speculative purposes

($C = C_R + C_F$). He claims that the amount of credit does not depend on demand but on the risk appetite of banks and their possibilities of refinancing. This possibility is determined by the central bank. Interest rates follow economic growth; they are not the cause for economic growth.

The suggestion to control the C_F/C ratio to avoid crisis is tempting. But I imagine it would be difficult to make the distinction of credit for speculative or real purposes. In speculative credit, Werner includes e.g. loans for M&A, loans to private equity funds and credit for real estate speculation.[208] These types of credit creation are not necessarily purely speculative and they can serve the underlying real economy in their functioning. In the recent housing bubble, the problem was not only that credit has been extended for real estate, but that after a while, conditions allowed subprime borrowers to obtain loans that they wouldn't have otherwise. The quality of credit is another point that would have to be considered.

Banks create the lion share of the money supply

The function of bank as intermediaries is not their most important function, although this is how banks are represented in textbooks. Mainstream economics acknowledges that banks can create credit.[209] In fact, they contribute with the most part of money in the economic system. The main function of bank is their ability to create credit is not taken into account in modern macroeconomic models and theories of the economy or by microeconomic analyses of individual banks, bank risk or portfolio management. It seems that the fact that banks create the most part of the money supply has fallen into oblivion. Decades ago, the idea has been more present (e.g. in Schumpeter's writings[210] [211] [212]).

Banks as allocators of credit

The most important factor in the creation and propagation of the crisis is the function of banks as the creators and allocators of the money supply. Applying Werner's ideas, the reason why the financial crisis became so severe was that the banking sectors of many countries had created significant amounts of credit for transactions that are not part of GDP, both on and off the balance sheets of banks. Credit extension for such transactions is unsustainable, because these transactions do not yield sufficient intrinsic income streams to service and repay the debt created.

Credit creation for consumptive purposes leads to consumer price inflation. Credit creation for financial transactions leads to asset inflation. Only credit creation for productive purposes leads to non-inflationary growth. The boom bust cycles are due to credit for transactions that are not part of GDP. The degree of cyclicality is a function of the quantity of credit created by banks for unproductive purposes. Increased capital requirements do not necessarily help, since it is an indirect policy too. It would be better to prevent excessive credit growth in the first place by a ban or at least restriction on credit creation.

A ban or a strict and low ceiling on bank credit for unproductive and in particular non-GDP transactions (asset transactions) is in Werner's view the best approach to address and eliminate excess cyclicality. Werner criticizes that the measures suggested by the BIS (conference) do not recognize the fact that banks are the main creators of the money supply.

Taxpayer should not pay

As credit creation for asset transactions tend to be highly profitable in the short-term, they are often connected to high bonus payments to bankers. This form of credit creation may have serious medium- to long-term negative consequences for the economy. In the longer run, losses often follow the short-term gains. Bankers keep the benefits of these actions, while the costs are borne by others such as governments or the taxpayer. Werner suggests that aggregate credit creation and its allocation needs to be monitored.

Capital requirements

According to Werner, the current proposals on higher and stricter capital adequacy, the introduction of a maximum leverage ratio, counter-cyclical capital buffers, and more complex "monitoring metrics" are not necessary. Capital requirements are secondary or even unnecessary.

Intervention in efficient markets

It is often criticized that directing credit is an intervention in the operation of otherwise efficient markets. However, individual banks are already making allocation decisions. These individual banks aim to maximize their profits. However, their behavior does not necessarily contribute to an overall improvement in the economy and social welfare. Hence, Werner argues, a regulator has to step in that considers the entire economy.

Risk management is not the fundamental cause

Werner acknowledges that individual banks had problems with risk management. However, the main cause of the crisis is of a systemic nature. Werner comments on Greenspan's testimony to Congress in October 2008, where he said that the "modern risk management, …the entire intellectual edifice, …has collapsed". Werner comments that this is because it does not recognize the macroeconomic implications of banks credit creation and differing consequences of credit allocated to differing use. Attempts to improve liquidity risk management, as well as other risk management, can only be helpful if they recognize the fact that banks create credit and money supply.

Credit-to-GDP ratio as an indicator

Werner considers the credit-to-GDP ratio as a useful monitoring tool that indicates the health of an economy. The credit-to-GDP ratio tends to rise if credit creation for non-GDP transactions rises. The problem is that there is no well-defined critical level of credit creation. An entire banning of non-GDP credit creation would mean that the credit-to-GDP ratio would not rise at all. Speculators (including hedge funds) would still be allowed to speculate, but they would be required to obtain any leverage from the markets rather than from banks. Banks would not benefit from the privilege of creating the money supply for these speculative purposes anymore.

Fiscal policy and monetary policy

Different views exist on how an economy should be managed. Keynesians, Post-Keynesians and fiscalist economists argue that fiscal policy is more effective than monetary policy. Keynes believed that government spending and taxation could steer the economy in the right direction. The assumption was that one dollar of additional government spending would raise national income by the original dollar – perhaps even more than by a factor one. Before Keynes, the prevailing opinion was that government spending simply crowded our private spending. Nowadays, Monetarists (like Milton Friedman) and Neoclassical economists oppose the Keynesian view. They support the opinion that monetary policy is the tool to be applied.

Werner's suggestion to resolve the German recession

For the recovery of the German recession, Werner suggests the application of policies that stimulate bank credit. Even without bank lending, the central bank could create a recovery, by increasing its own credit creation. The government

could have stimulated the economy by funding fiscal expenditure through borrowing from banks.[55] I consider this practice questionable. It would help in the shorter term, but the government is more and more loaded with debt that it has to pay back eventually. In the longer run, the debts are a burden for the economy.

Criticism on bailouts

Werner claims that a collapse would not have occurred without the bailouts in the recent crisis. The problem with bailout-money is that the money is not bound to constraints. Werner criticizes that banks can use that money as they wish. They do not have to extend credit with that money. In addition, the bail-out agreements have been made under pressure, which helped banks to get better deals. He explains that government could exert a lot of pressure on banks. The government could threaten banks to withdraw their banking license.[213]

Werner's minimum requirement would be to prohibit banks from extending credit to companies or projects that have nothing to do with the GDP. He argues that this would avoid all financial speculation and banking crises would be banned once and forever.

5. Present state of the economy and proposed solutions

5.1. Free market ideology and the illusion of a self-regulating system

The prevailing ideology in the years leading up to the crisis was the one of free markets like Adam Smith had proposed. Adam Greenspan was probably the most famous defender of this ideology. The belief that the banking system would be guided to stability as if led by an invisible hand turned out as an illusion. But this belief contributed to the explosive growth of the shadow banking system and a fragile financial system (McCulley 2010).[214]

The possibility of a double dip recession has been widely discussed in July 2010. However, economists, bankers and policy makers are concerned to draw a rather positive picture of the current state.

5.2. Immediate and underlying causes

In order to assess the current state of the economy, it is important to distinguish immediate causes of the crisis such as US mortgage lending practices and US' and Spain's policy of giving access to house ownership. Derivatives and banks leverage are other proximate causes. As deeper causes of the crisis can be seen ideology, deregulation and ineffective regulation, the long-term global savings imbalance, the short-term orientation of executive pay toward this year's profit, the casino mentality in financial markets, the lack of crisis experience by bank managers, regulators and policy makers.[215] [216] With this as a basis, the measures that have been taken to fight the crisis can be put into perspective and their effectiveness can be assessed.

5.3. Current state – the facts

After the U.S. GDP was at a level of about $14.5 trillion USD in 2009, the U.S. GDP is now growing again. U.S. GDP has grown by 3.7% in the first quarter of 2010 and by 2.4% in the second quarter.[217] The unemployment rate was at 9.5% in July 2010.[218] This is a very high rate for the U.S. compared to the pre-crisis level around 4.5% in 2007 and it has not improved in one year. Consumer spending has dropped since the onset of the recession. The savings rate was at 6.4% in June 2010 as opposed to 1-2% before the recession - suggesting that the American economy isn't likely to rebound anytime soon.

Debt ratios in the US corporate sector are not decreasing. Rather, they have been stabilizing at a high level. The U.S. debt was at 89% of GDP in June 2010, (total public debt of the US was $13.3 trillion USD in August 2010[219]). The budget deficit for FY 2010 is at $1.17 trillion USD.[220]

Government debt is an accumulation of budget deficits. Year after year, the government cut taxes and increased spending. In the short run, the economy and voters benefited from deficit spending. But eventually, the debt has to be paid back, which is likely to happen via tax increases.[221]

5.4. Dodd-Frank reform

In July 2010, president Obama signed the Dodd-Frank Wall Street Reform and Consumer Protection Act into law, a bill designed to promote financial stability by protecting consumers from financial abuses, ending taxpayer bailouts of financial firms, dealing with troubled banks that are "too big to fail", and improving accountability and transparency in the financial system – in particular, by requiring certain financial derivatives to be traded in markets that are subject to government regulation and oversight.[222]

The bill tackles many of the problematic issues in the financial system. Similar as proposed by the Volcker Rule, the Bill seeks to limit proprietary trading and bank sponsorship of hedge funds and private equity funds. But these provisions are not as exhaustive as those proposed by Paul Volcker in his initial statement of the Volcker Rule. At least, they seem to be a good start. Further, the Bill requires that

certain risky derivatives are either exchange traded or passed through a clearinghouse. However, it can be criticized that the bill does not lead to immediate changes.

Baker praises the creation of an independent consumer financial products protection bureau and the creation of a resolution authority for large non-bank financial institutions. Also, there are provisions requiring lenders to retain some of the risk of loans they make, so that they cannot make what are essentially fraudulent loans that are quickly sold to the public. However, it can be criticized that the reform will not change the way banks do business and that the Bill does little to break up overly large financial firms. None of the current behemoth firms, that pose severe risks to stability, are to be broken up right away and Fannie Mae and Freddie Mac do not get more regulated. The Bill does not require boosting capital requirements of banks and the financial system participants are not required to act as fiduciaries in dealing with their customers.[223] [224] [225]

In sum the Dodd-Frank Bill is a start but does not go to the root of the problem. As things stand, the Bill does not move to increase transparency in financial reporting for the firms in the financial system, nor does it provide new mechanisms for the public to hold financial firms accountable.

5.5. Two basic approaches: Stimulus vs. Austerity

There are two main opposing views about how to deal with the crisis that have been implemented. One is the idea of austerity – that is when a government reduces its spending and/or increases user fees and taxes to pay back creditors. Austerity (classical economics) is usually required when a government's fiscal deficit spending is believed to be unsustainable. Lenders to governments (financial enterprises such as banks) now widely demand such measures. The problem with austerity is that it is yet another burden during tough times, in addition to high unemployment and reduced global trade.

The other idea is that of stimulus measures. When engaging in fiscal stimulus, the government tries to jump-start the economy by deficit spending. It is believed by Keynesians that when the economy suffers from a recession, the government has to engage in countercyclical policy and fight the downturn by deficit spending.[226]

The problem with fiscal stimulus is that it is believed to be self-defeating. Crowding out private investment and decreased profitability are the feared consequences. Also, an increased government deficit would mean an increase in government bonds, which would reduce their price and encourage high interest rates. That would make it more expensive for businesses to finance their fixed investments and in the longer run, the economy would be hindered in its growth.[226]

Currently, Europe engages in austerity measures. European central bank's chairman Jean-Claude Trichet is a strong proponent of austerity policy. In Britain for example, the new political agenda is about budget cuts, tax increases, pay freezes and lowering public sector spending and war expenses. The policy conducted in the U.S. is in strong contrast to this. The U.S. Federal Reserve Bank, chaired by Ben Bernanke, engages in stimulus measures. Several stimulus packages have been released since the outbreak of the crisis.

The measures taken by the U.S. have shown results. Stock markets recovered in 2009 and GDP is growing again. However, I do not believe in the long-term success of these measures and I think that these measures lead to even larger problems in the future. The U.S. debt-to-GDP ratio is further increasing; a default of the U.S. economy could become a realistic threat. As Reinhard and Rogoff pointed out, the debt-to-GDP ratio is one of the most reliable indicators for the health of an economy.[186] Faber argues, that the U.S. might pay its debt, but that they might choose to do so via inflation. Quantitative easing postponed the problem, but made it more severe. He says that a financial reform is necessary and a war is likely within the next ten years otherwise.[227] [228] I agree with most of what he says, but a war seems unlikely. The U.S. has still the largest economy and is a leader in warfare. I do not think that there is an interest of engaging in a war against the U.S. It seems more likely that the U.S. would receive support from outside.

5.6. Critical views on the state of the economy and potential solutions

5.6.1. Debt problems

Hunt is one of those who are critical towards the measures that had been taken to

cure the crisis. He says that the current over-indebtedness has been the result of recent policy decisions to counter financial crises. The Fed viewed those crises, which included the Long Term Capital Management (LTCM) failure, the 2001 recession, the deflation scare of 2003 and the most recent recession as owing to a lack of liquidity. The Fed reacted with an injection of liquidity. According to Hunt, this merely allowed the economy to increase its debt-to-GDP.[229] A range of other scientists and experts share this view. Sornette sees the approach of injecting liquidity as ill advised, as it will only encourage the government to lever up even more.**Fehler! Textmarke nicht definiert.**

5.6.2. Resolution suggestions

Nersisyan and Wray observe that the fundamental causes of the crisis haven't been addressed yet. They ask for a simplification of the financial system, a reduction of concentration and a decrease in the size of the financial sector. In their opinion, the role of managed money must be reduced.[78] [142]

Roubini suggests radical reform. He thinks that the true causes of the crisis have not been resolved. Rather it has been on the cost of huge public debt in the US and elsewhere. The core problem – moral hazard in his view – has not been tackled yet. Banks have still an incentive to act recklessly because they do not bear the cost for the risk that they take (they can expect to be bailed out).[230]

The current account imbalances threaten the long-term economic stability. The rapidly depreciating dollar adds to this. Central banks should protect the financial system. They should enforce their regulation and prevent speculative bubbles. Central banks must in the future proactively use monetary policy and credit policy to rein in and tame speculative bubbles.[231]

Soros is another advocate of the view that the crisis is not over yet. In his opinion, stability needs to be the objective of public policy. He sees a yet larger bubble occurring.[232]

A McKinsey report suggests that policy makers should revisit the incentives for borrowing, especially in real estate markets. The right tax incentives could be helpful.[233]

5.6.3. Crisis resolution in a broader context

According to Sornette, the crisis is not over. He argues that there are world trade slumps, the risk of a Chinese bubble, European debts / Sovereign debt crises and political and banking crises. Furthermore, there is still a high degree of leverage and the true problems have not been tackled yet.

Sornette sees the solution in a broader context than just implementing new banking regulation. To make the economy healthier, growth based on a return to fundamentals and novel opportunities is necessary. Sornette suggests the implementation of long-term economic stimulation programs and a focus on the fundamentals of wealth growth like infrastructure, education and entrepreneurship. The ultimate goal is the promotion of a productivity growth, which goes along with a promotion of new industry sectors. He proposes that government supports innovations in industry, as the government is able to take high risks and has the ability to invest in long-term R&D projects (like university research).[23]

5.6.4. Assessment of present state

The steps taken seem more like a placebo than a serious improvement in the financial system. The too-big-to-fail (TBTF) problematic is not tackled appropriately. Misleading incentives that reinforce the problems of moral hazard are still in place. Executives are still encouraged to take high risks, as they do not bear the costs if things go bad. The economy is not in good shape. Although the U.S. GDP is growing again, the U.S. job market is still in trouble, consumer incomes are still not growing appreciably and the housing market is not improving. The foundation for long-term growth has not improved - debt-to-GDP ratios are high and productivity has not increased.

6. Potential future outcomes

6.1.1. Short-term

After the stock market rally in the U.S. and Europe in 2009, the markets experienced a pullback in 2010. The European Sovereign debt crisis contributed significantly to the difficult economic situation. The remaining quarter of 2010 does not look too promising. I do not think that there will be another crash within the next months. In Japan, both bank lending and capital market transaction volumes declined and continued to do so for almost two decades. Japan had a debt-to-GDP ratio that had risen from 60% in 1990 to 180% at the beginning of 2010. If the same happens to the U.S. as happened to Japan, the government is likely to spend money for much longer. But global activity is weakening, financial institutions are in bad shape and governments are hugely indebted. High market volatility reflects uncertainty. Unexpected bad new could trigger a meltdown – the potential for another crash is there.

6.1.2. Middle-term

The stimulus policy that the U.S. is engaging is not sustainable and cannot go on forever. The low interest rates, the monetary expansion and the large fiscal deficits are a recipe for a weaker dollar. Some day, interest rates have to rise. If the U.S. has not inflated its way out of the crisis until then, defaults on debt are likely. Interest rates on U.S. debt will go up which will make it hard for the U.S. to service its debt. The expansion in the money supply as an answer to the crisis will drive up asset prices somewhere and thus lead to other bubbles. The money that has been created does not match the real growth in the economy that took place. In fact, economy has not significantly grown whereas money supply did. The created money will once again drive up asset prices artificially. Frequent bubbles in the next years seem likely. The money created in the US is unlikely to be spent in the US as a large part of their consumed goods are imported from countries such as China, India and Brazil. The money would thus flow to emerging economies in whose markets it would lead to bubbles. Another deep crisis within the next ten years seems very likely to me.

6.1.3. Long-term

What will happen to the economy in the longer term seems highly uncertain. In my opinion, the economy will undergo major changes within the longer term. If current trends continue, global power will shift. Besides economic issues, an aging population, controversial geopolitical commitments and divisive politics are major issues for the US. It is not clear whether the US will be able to defend its position as the world's largest economy and if so, for how much longer. Research by Goldman Sachs suggests that the US will lose its position after 2025 and they predict that until 2050, China will have a GDP exceeding by far the GDP of the U.S. Also, India seems likely to catch up until then.[234] I could also see that Europe will lose part of its power. In the longer run, regulation will undergo deeper adjustments regarding transparency of financial instruments and the issue of monopoly power of some institutions. The large size of the financial sector will no longer be accepted after the next larger crisis.

7. Conclusion

7.1. Results

This thesis has reminded us of what has fallen into oblivion over the past few decades: that it is commercial banks, which are private companies, that create most of the money supply. The work has revealed some of the many guises credit creation can take. The influence that credit creation has in the development of bubbles has been illuminated, especially with regards to the recent Global Financial Crisis.

7.2. Credit creation as the fundamental cause for financial crises and the Global Financial Crisis in particular

Werner's theory is a better approach to explain the occurrence of bubbles than the mainstream concepts. Prices set by free markets do not necessarily need to be right and information is not completely available. There are many factors and causes contributing to a crisis. A lack of regulation or institutions such as Fannie Mae and Freddie Mac are more proximate causes but they are insufficient by themselves to explain the crisis. Money is like the fuel that runs through the financial system engine. Without this fuel, economy could not work. But if too much money is created that runs through the arteries of the financial system, it comes to artificially increased asset prices that do not reflect real growth of the underlying economy. Without excess money, which comes into existence as credit, bubbles could not develop. It is excess credit creation that is fundamentally destabilizing. It can be regarded as the fundamental cause that leads to bubbles. Therefore, credit creation should be controlled. However, several of his proposals are debatable, especially how crises should be resolved. Werner's recommendation to withdraw the banks privilege to create money and give that power to the government seems too extreme. Furthermore, his quantitative easing proposals to resolve financial crises are doubtable. It appears that this will only help in the short run. With excess credit being the fundamental cause, the system still needs to be designed appropriately. The way the system is currently designed facilitates the occurrence of bubbles. Regulation has been repealed in the years before the crisis. The

system design needs to be adjusted to the new complex financial environment. Other indispensable factors contributing to financial crises cannot be changed. Without the special traits of human behavior, bubbles would not occur.

7.3. Other causes

7.3.1. Irrationality

Typical human behavior has been shaped long before financial markets came into existence. Experiments on lemurs and capuchin monkeys have shown that our traits of loss aversion and biased decision making have deep roots, tracing over 35 million years back in history.[235] It leads us to assess losses differently from gains. The experiments conducted by Professor Laurie Santos revealed that the human tendency to be risk averse when it comes to gains and to take higher risks when it comes to losses makes us take bad decisions when it comes to investing. When everything goes well and asset prices rise, we do well. But during economic downturns, we tend to hold on to assets because we do not want to realize perceived losses. The losses might not even be real losses. By definition, asset prices in a bubble are not reflecting the true value of its underlying assets and thus artificially high. But in our "exuberant expectations" we tend to take the artificial price as real and tend to assess a decrease in price as a loss rather than an adjustment towards the real value. Therefore, we tend to hold on to the asset in the hope that prices will rise again. In times of serious economic downturns, such behavior can lead to tremendous losses.

7.3.2. Herding

Human beings are rather wrong together with others than right on their own. Or, as John Maynard Keynes has put it: "Worldly wisdom teaches that it is better for reputation to fail conventionally than to succeed unconventionally."[236] Psychological experiments have proven that our tendency to feel uncomfortable on our own can make us act in a way below our intellectual capacities. In the economic environment, we tend to find justifications for our irrational decisions. We tend to ignore facts and rationalize our irrational behavior – models sometimes help to do so.

7.3.3. Belief in models fostered illusion of control

The recent crisis has revealed that the core assumptions of modern portfolio theory, like stable correlations over time, random returns, and emphasis on allocation by asset classes were wrong. Models to assess risks have been flawed and events that models predicted would happen only once in 10'000 years happened for three days in a row during the crisis.[237] Common sense has been replaced by models. Risky investment strategies and high leverage were justified by the belief in the reliability of models in the years preceding the crisis. The crisis has revealed flaws in the models and hopefully the lessons will be learned and integrated within the new models. Market participants should never forget common sense even when using models. But this is easier said than done, especially in the presence of incentives that encourage moral hazard.

7.3.4. Moral hazard – how bad system design encourages credit creation

Moral hazard is one of the core problems that led to the global financial crisis. The practice to reward managers for their short-term successes rather than for the long-term prosperity of their managed business was an incentive that encouraged irresponsible risk taking.

Because gains come from risk taking, there is an incentive to take on risk and make speculative investments. Risk in this context refers to the probability of a certain return with an associated probability. Usually, higher returns have a lower probability and it is more likely that the realized return will be lower than the expected return. Speculative investments refer to irresponsible investing with the sole purpose of making gains from increasing asset prices, preferably short-term. This leads to a demand for credit to make speculative investments, which in turn leads to an increased leverage in the economy. The economy over all becomes more fragile and more prone to collapse. Moral hazard is thus one of factors that reinforces credit creation. However, risk taking is not generally associated with speculation. Forms of risk taking such as providing capital for innovation and entrepreneurship are indispensable for the long-term growth of the economy.

The principle that the owners of money are not the ones that manage the money lead to dangerous incentives.[238] The phenomenon is also known as the principal-

agent-problem. The fact that the owners and managers of the money were not the same led to an incentive for the managers to behave in a reckless way. They were tempted to take on too much risk to make short-term gains because managers are paid by quarterly performance more than by sustainable long-term profit.

It could be argued that it is not the money managers that are bad; it is the system that gives the wrong incentives to go for short-term gains. But this is too myopic. The system is not responsible for the actions of its agents. In fact, it has been the agents that created the system. Bogle points out, that he observed a transformation of absolute morality (there are things that one just doesn't do) to a relative morality (if everyone else is doing it, I can do it as well). If an agent would take on an attitude of absolute morality, he will not act in an irresponsible way just because everyone else is doing it. He will take on responsibility and act in a responsible, moral way. But as human beings have their weaknesses, it would be desirable to design a system that minimizes the incentive to immoral behavior. I agree when Bogle argues that capitalism needs ownership and that only in this way, owners will act in a responsible way.[238]

7.4. Capitalism in question

The recent crisis has led people to doubt about our capitalist system. Roubini's central thesis is that crises are an inherent part of capitalism. The ingredients are always similar: easy money coupled with financial deregulation, irrational euphoria, which lead to a bubble, followed by the inevitable bust. In some cases, the bubble is driven by genuine innovation: the railroads, for example, or dotcom fever, which at least leave the world some benefit when the wreckage is swept up. The current crisis, however, was not driven by real world invention, but by the financial variety.[239]

The capitalist ideology comes closer to human nature than communism. It enforces the trait to act in self-interest and it gives greater freedom to act in the economic environment. There is no good example where communism worked out well. The outset of the crisis has shaken the deep belief in free market capitalism. The question is now whether the predominant narrative of the crisis will be the one that stops us from believing in capitalism or whether it will allow us to believe in capitalism. It is likely that we will stick to an explanation for the crisis that favors

capitalism and gives the blame to deviations from the perfect implementation of it. One of these imperfections is the compensation for risk taking. Human greed is enforced, as the level of expected return is higher than a fair compensation for risks would suggest. Changes in the system with appropriate regulation would be the best solution.

7.5. Suggested measures

Such deep-rooted traits of human nature cannot be changed by instance. But as we are the creators of our financial system, we can design our financial engine in a way that avoids triggering our irrational sabotaging behavior. Our financial system should be designed in a way that promotes i) long-term incentives for growth and ii) avoids the current issue that ownership and management of money is not in the same hands. Long-term growth is achieved by new innovation and increased productivity. The latter issue can be addressed by changing the incentives (for money managers). The current practice of assessing managers by their quarterly results is a well known issue and options have to be found that give managers incentives that promote long-term prosperity of their managed business.

Credit creation should be closely monitored. But it will be difficult to ban credit creation for speculative purposes, as it is difficult to define what that exactly means. It might be helpful to have a close look on leverage and set a limit on the allowed leverage.

7.6. Suggestions for further research

A more sophisticated mathematical model to test Werner's hypothesis of credit creation and its role in the economy would be desirable. Werner's static model is insufficient to prove credit creation as the fundamental cause of the crisis. A model that would include the different interconnections in the economy might provide new insights.

Applying Werner's ideas to other crises than the Japanese crisis or the recent Global Financial Crisis would be another milestone in that process. It needs to be investigated whether Werner's ideas can always be applied or whether certain

characteristics and circumstances are required in order to successfully apply Werner's theory. A refined framework that describes such conditions could be done in a next step.

Is it always credit creation for speculative purposes that leads to bubbles? It might be that credit creation for presumably real purposes can also lead to bubbles. Several bubbles have been forming around new innovations like railroads or the internet. Gisler and Sornette address the topic of bubbles in relation to new innovation in their research.[240] [241] [242] Werner's definition of credit creation for speculative purposes, which focuses mainly on real estate and financial transactions (non-GDP transactions), needs to be revisited.

A set of indicators could be developed to monitor and assess the state of the economy. Together with other methods, this could help to detect bubbles in an early state.

7.7. In a complex wonderland of crisis

The current crisis is large in amplitude and spread, but not fundamentally different from many previous events described by Reinhard and Rogoff. As their analysis has shown, economic and banking crises are the norm rather than the exception. They proceed according to reproducible scenarios, based on fear and greed, and the development of a tipping point when markets lose confidence in the government's ability to pay and the game stops.[186] [243]

Crises allow us to learn. Human beings and societies mainly learn at times of stress. But they also forget... and repeal previous regulations (such as the Glass-Steagall Act, which was designed in the 1930s to control speculation by banks) put in place to prevent financial instabilities to occur again, on the false but attractive premise that things have changed, that we are better, more clever, more innovative, with better risk management instruments. The problem might not be the complexity, only the hubris that we have changed calling this a ``new economy''.[244]

Our modern environment has gotten more complex with the new technology that is available. Modern life of city-dweller humans is considered more complex and than the primitive environment of our ancestor hunter-gatherers. The complex world

today is not less understandable than before. After all, the complexity added has been created by the humans themselves. Our knowledge has increased and led to new innovations, also in the financial markets. Although the newly created instruments have not been properly understood, this is not a reason to forbid them. With improved methods that help to assess the risks, these instruments add to a better functioning of the financial markets. It is not complexity or interdependence that is fundamentally destabilizing, but the uncontrolled excess creation of credit.

With the right methods and an appropriate precision, bubbles can be detected. But this will not prevent future bubbles. Perhaps, an economy without bubbles is not even desirable. Nature is in a constant process of change and adaptation. Often, the more we try to control nature, the more we lose control. What holds true for nature might apply for the financial system. The focus should not be to completely avoid bubbles but to avoid another global disaster.

A better understanding of the bubble mechanisms could assist in designing the financial system in a more resilient way. A tactical institutional design and a strategic allocation of credit would allow for a more purposeful use of resources and more ambitious goals could be implemented in the future. It is likely that these measures would lead to a reduction of bubbles, consequent recessions and unemployment.

The microscopic forces that drive human beings will not change anytime soon. Even if credit creation would be generally recognized as the fundamental cause for financial crises and even if measures would be put into place to restrict excess credit creation and allocate credit to best regarded use – a complete avoidance of bubbles seems not possible. The next bubble will come in new guise and one thing is certain: there will be another compelling story, another new invention that will help us to once again delude ourselves into the belief that this time, it is different and that we have everything under control.

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