The influence of the business cycle on the financial health of sustainable banks in comparison to traditional banks.

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Abstract:

In this thesis the difference in financial health between sustainable and traditional banks is researched. We find significant differences between the financial health of sustainable banks and traditional banks over the business cycle. The financial health of the sustainable banks is not influenced by the business cycle. The financial health of the traditional banks is significantly influenced by the business cycle for the profitability and the solvency. A combined panel data analysis shows that the difference in financial health between sustainable and traditional banks is not caused by the business cycle

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List of Abbreviations:

ADF	-	Augmented Dickey-Fuller
BCBS	-	Basel Committee on Banking Supervision
BIS	-	Bank for International Settlements
CSR	-	Corporate Social Responsibility
FEBEA	-	European Federation of Ethical and Alternative Banks
FSI	-	Financial Soundness Indicator
GABV	-	Global Alliance for Banking on Values
GSIFI	-	Global Systemically Important Financial Institutions
IMF	-	International Monetary Fund
NBER	-	National Bureau of Economic Research
ROA	-	Return on Assets
ROE	-	Return on Equity
TARP	-	Trouble Asset Relief Program

1. Introduction

1.1. Background

After the Subprime Mortgage Crisis in 2007 the world economy was severely hit. In the US the unemployment rate rose towards almost ten percent in October 2009 (Bureau of Labor Statistics, 2013). In Europe, due to the depletion of capital, a banking crisis followed. Europe is currently seeing its most severe crisis since the Great Depression in the 1930's (Stewart, 2008). In the Netherlands, for example, banks were severely hit by the financial crisis: two banks received state support, and two others have even been nationalized. Also in the rest of Europe and the United States multiple banks went bankrupt or received state support. The current crisis shows a malfunctioning of the traditional banking system as it is and shows the need for research about the performance of alternative banking strategies, such as sustainable banking.

Therewithal, the concept of sustainability is receiving a lot of political and media attention. The topics of global warming, pollution and living conditions are receiving attention from initiatives like the Millennium Goals of the UN and by governmental intervention on the goods and services markets (UN, 2010). In many economic decisions the social and environmental side effects of economic growth have not or nearly not been taken into account. Slowly this paradigm is switching and, also in the banking sector, the social and environmental impact of investments is taken into consideration. Banks are increasingly incorporating sustainable goals into their strategies. The increased attention for sustainability raises the question what the effects are of the sustainable decision making on the performance of the banking sector.

Additionally, articles are appearing in the media about sustainable banks outperforming the traditional banks with respect to profits and returns (Thomson, 2012). The difference in financial health between sustainable banks and traditional banks has not been researched extensively till now. Previous research by the Global Alliance for Banking on Values, GABV (2012) proves sustainable banks have had a better return on assets and lower volatility in the return on equity compared to global systemically important financial institutions (GSIFI). Their research did compare individual sustainable and traditional banks, but did not take into account bank specific effects,

while in this thesis the bank specific effects of traditional banks are excluded by using financial soundness indicators (FSI) of different counties' banking sectors. And finally in the research of the GABC, the results presented in their analysis did not show the robustness of the results. It is our opinion that we offer a better alternative to compare the financial health of sustainable banks with traditional banks by including more measures of financial health.

The main function of banks is to channel money through time and between investors and entrepreneurs (Merton and Bodie, 1995). Sustainable banks incorporate a different risk assessment concerning their investments by taking into account environmental and social risks (Jeucken and Bouma, 1999). Earlier articles by Albertazzi and Gambacorta (2009) and Bolt et al (2010) have shown that the banking sector moves in accordance with the business cycle. The purpose of this thesis is to focus on the difference between financial health of sustainable banks and traditional banks through the business cycle.

In the next subsection we state the research question and hypotheses.

1.2. Research Question and Hypotheses

In this thesis we answer the following research question:

Does the business cycle have a different effect on the financial health of sustainable banks in comparison to traditional banks?

We are measuring the financial health of a bank in this thesis by its profitability, solvency, and liquidity. We are using a recession dummy to show the state of the business cycle at a specific time period. Three hypotheses are constructed to help answer our research question. In this subsection we will explain our choice for the different financial health indicators of the banks. We use three hypotheses to determine the effect of the business cycle on the difference of the financial health indicators between sustainable and traditional banks.

The first indicator of financial health that we are using is the profitability of a bank. The profitability of a bank is affected by the returns of the bank. Both the sustainable and the traditional bank's profits are expected to decrease during an economic downturn.

Therewithal, sustainable banks make different investment choices compared to traditional banks. The sustainable banks affiliated to the GABV and European Federation of Ethical and Alternative Banks (FEBEA) only invest in the real economy and not in the financial economy (FEBEA, 2012) (GAVB, 2012). This means that the sustainable banks affiliated to the FEBEA and GABV do not invest in financial instruments in the money market. The traditional banks on the other hand do invest in the money and capital market. The traditional banks are expected to be more susceptible to the changing business cycle. Therefore we state the following hypothesis.

Hypothesis 1: The profitability of sustainable banks is less susceptible to the business cycle in comparison to the profitability of traditional banks.

The second indicator that we are using to measure financial health is the liquidity of the bank. The Bank of International Settlements, BIS (2008) defines liquidity as 'the ability of a bank to fund increases in assets and meet obligations as they come due, without incurring unacceptable losses'. Because banks convert liquid assets into illiquid loans, they are always at risk of liquidity shortage. We do not expect the business cycle to influence the liquidity of the traditional and sustainable banks differently. Even though we are aware that a bank run always threatens the liquidity position of sustainable and traditional banks and therefore we state the following hypothesis:

Hypothesis 2: The liquidity of sustainable banks is equally susceptible to the business cycle as the liquidity of the traditional banks.

The third indicator of financial health we are using is solvency of a bank. Solvency is the ability to withstand shocks in the capital and loan market. One indicator of solvency for example is the ratio of equity over total assets. During an economic downturn banks have to write off loans; this will affect their solvency negatively. We expect the solvency ratio of a traditional bank to be affected more heavily than the ratio of a sustainable bank. During a financial crisis all banks have more bad loans and as mentioned before, we expect traditional banks to bear a higher risk because they have riskier assets in their portfolio. Furthermore during a financial crisis more assets are sold to keep the solvency ratio fixed, pushing the price of the assets down, further worsening the solvency positions (Adrian and Shin, 2010). We therefore state the following hypothesis

Hypothesis 3: Sustainable banks have a higher solvency ratio that is less susceptible to economic downturns than traditional banks.

The structure of this thesis is as follows. In the second chapter (2.) a literature review is given on sustainability, banking and the business cycle, and sustainable banking. In the third chapter (3.) an explanation is given for the methodology and the collected data. The fourth chapter (4.) the analysis is performed and the outcomes are presented. In the fifth and final chapter (5.) the conclusions, the limitations, and recommendations for further research are stated.

2. Literature Review

The related literature in this thesis can be divided into three different strands. First, we describe the literature on the concept of sustainability (2.1.). In the second section we present the literature on banking, the business cycle and financial crises (2.2.). In the third section we introduce sustainable banking as a strategy in the literature (2.3.).

2.1. Sustainability

Sustainability is a comprehensive concept. According to the UN sustainable development is defined as follows: 'Sustainable development seeks to meet the needs and aspirations of the present without compromising the ability to meet those of the future.' (UN, 1987)

Three different components of sustainability need to be considered in order to reach a sustainable state, that is to say: economic, social, and ecological sustainability. Economic sustainability means efficient use of labour, industrial growth, and agricultural growth. Social sustainability means equity (expansion of capabilities and opportunities), participation, and social mobility. And ecological sustainability means biodiversity and sustainable use of natural resources, clean air, and water (Jeucken, 2001). The three components of sustainability may conflict with one another on the short term; this leads to difficulties in reaching perfect sustainability (UN, 2013). In the Millennium Goals of the UN the different aspects of sustainability are included (UN, 2010). Many international and national institutions are participating in reaching sustainability on a social, economic and ecological level. The World Bank, International Monetary Fund (IMF) and national government agencies are developing policies to stimulate sustainable behaviour of companies and consumers.

2.2. Business Cycle and Financial Crisis

Banks are 'financial institutions that accept money deposits and make loans' (Mishkin, 2010). The main function of banks is to 'facilitate the allocation of resources, across space and time, in an uncertain environment' (Merton and Bodie, 1995). In this subsection we first describe the literature on the business cycle and the banking sector. Secondly we describe the theory about financial crises as stated in Mishkin (2010),

followed by an application on the current crisis, to understand the effect of the business cycle on the financial health of banks. Finally we present the Basel agreements: the BIS constructed a framework for understanding the 'key supervisory issues and improve the quality of banking supervision worldwide.' (BIS, 2013) The Basel agreements have imposed requirements for financial health of banks, which banks need to meet.

Albertazzi and Gambacorta (2009) show that bank profits are pro-cyclical, and the net interest income and the loan loss provision are influenced by GDP. Furthermore Bikker and Hu (2002) find real GDP growth and other cyclical variables to have a significant effect on bank profits. Also other indicators of financial health move in accordance with the business cycle. Demirguç-Kunt and Huizinga (1999) analyze the reserves of banks and find these to be pro-cyclical. Meh and Moran (2009) conclude that adverse financial shocks that cause sudden decrease in bank capital lead to sizeable declines in bank lending and economic activity. Laeven and Majnoni (2001) conclude that loan loss provisioning also moves with the business cycle. Banks put less money aside when facing an economic boom and more money when facing economic downturn. The research of Bolt et al (2010) also shows the empirical relationship between bank profitability and cyclical movements in the economy.

The previous paragraph shows that previous research focuses on the movement of the bank profits with the business cycle. This thesis adds to this field of researching by researching the different profitability, liquidity, and solvency ratios through the business cycle of sustainable and traditional banks.

With regard to bank solvency, previous research shows that solvency measures are pro-cyclical. In Adrian and Shin (2010) bank solvency is also proved to be moving with the business cycle. The change in the net worth of the assets with the business cycle influences the capital ratios of the bank. The banks will adjust their ratios and thereby attract more debt and lend more money during an economic boom. The business cycle affects the net worth of the assets and thereby affects the solvency ratios (Adrian and Shin, 2010).

In the next paragraph we present the literature on financial crises. According to Mishkin (2010) financial crises have different stages. In the first stage multiple triggers alone or

simultaneously may set off a financial crisis: financial innovation, asset price boom and busts, high interest rates, and increase in uncertainty (Mishkin, 2010). These triggers deteriorate the balance sheets of financial institutions, worsening adverse selection and moral hazard problems, declining economic activity and inclining banks to start deleveraging (Mishkin, 2010). In stage two the confidence of depositors in the banking sector may decline, triggering a bank run, which may result in a banking crisis or a bank panic. Stage three arises if debt inflation occurs when the economic downturn leads to a sharp decline in prices, further worsening the mentioned consequences of the crisis.

The current financial crisis is still affecting the world economy. This crisis shows the flaws in the current financial system. The public and governments are holding the banks responsible for the crisis, because the banks fail to perform their tasks of allocating resources. As a result of this crisis, multiple banks face liquidity and solvency shortages, leaving the stockholders with no money and in some cases the governments had to intervene. Examples from the USA are the Lehman Brother bankruptcy and the government intervention in the mortgages banks Fannie Mae and Freddy Mac (Ivashina and Scharfstein, 2010).

Trading of securities is one of the weaknesses of the current financial sector; slicing and swapping of mortgages and other loans make the debt market non-transparent (Mellor, 2009). Different mortgages were bundled into standard debt securities. These securities were popular, but the risks were spread through the whole financial system. A second weakness is the short term funding of banks, while not changing the asset side of the balance sheet this leads to liquidity problems. A third weakness in the financial market is the credit growth through global imbalances, giving rise to asset bubbles (Brunnermeier, 2009). The current worldwide crisis was triggered by the decrease in housing prices in the United States and through the mentioned moral hazard and adverse selection problems it widespread through the financial system worldwide (Leaven, 2011). Sustainable banks do not trade in securities; therefore the effect of the financial crisis is expected to be smaller for the sustainable banks with regard to the financial health. (FEBEA, 2012)

The current crisis and its consequences on the economy trigger different policy measures. The BIS designed the Basel III agreement. The BIS aims at international

financial stability by providing guidelines to the central banks for supervising the financial market. Their authority is strengthening regulation, supervision, and practices of banks worldwide.

The most important directives of the Basel III agreements are the capital requirements banks need to meet. 'Basel III is a comprehensive set of reform measures, (…) to strengthen the regulation, supervision, and risk management of the banking sector' (BCBS, 2013). Basel III has three different aims: firstly to increase the ability of the banks to absorb shocks, secondly to improve risk management and governance of banks and finally to strengthen bank transparency (BCBS, 2013).

The Basel agreements and the BIS are mentioned in this thesis because its requirements do affect the solvency and liquidity ratios of both the sustainable and traditional banks. The solvency requirements (capital requirements) in Basel II and III range from 4,2 % till 8%, the solvency ratios of the banks are not allowed to be lower than this ratio (BIS, 2013b). In Basel III liquidity requirements are added to the accord, which was implemented after the time series in this thesis

In addition policy measures are taken by the central governments. In the US a policy measure is implemented after the start of the crisis in 2007, namely the Trouble Asset Relieve Programm (TARP). The TARP's main aim is the ability of the government to buy bad loans, such as subprime mortgages, of troubled banks to relieve the financial burden (Mishkin, 2010b). As a response to the crisis in Europe, the European Financial Stability Facility by the European Central bank was established to bail out governments and banks in trouble. Norway, which is not a EU member, was less severely hit by the financial crisis, which was mainly due to the expansionary fiscal stance at the start of the crisis (OECD, 2010). Denmark, not included in the Euro zone, created a bailout fund to support financial institutions when liquidity and solvency issues should arise (OECD, 2009).

2.3. Sustainable Banking

The change of the financial sector towards sustainability descends from the pressure of governments, society and firms (Jeucken, 2001). Since the 1980s for example in the US the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)

held the banks responsible for the environmental actions of their clients or for example the demand of sustainable investment funds by consumers. In this subsection we will clarify the concept of sustainable banking. First we outline the explanation of sustainable banking according to Jeucken (2001), followed by the definitions and principles of sustainable banking by the GABV and the FEBEA. Furthermore we will mention other initiatives driving the emergence of a more sustainable banking sector.

A bank can incorporate a sustainable strategy internally or externally. With internal sustainability a bank tries to incorporate sustainability in its own process; digitalizing their offices, building sustainable office buildings, and reducing the amount of paper mail they send out (Jeucken, 2001). With external sustainability, a bank also considers the impact of its loans and the behaviour of its clients. The clients of the bank need to invest the loans sustainable in order to receive it. In the investments the economic, social and ecological consequences are taken into account, for example when a loan is given for investing in a biological supermarket, the bank has to collect additional information about the projects the client is investing in. By becoming external sustainable, banks publicly announce their sustainable intentions and their sustainable reputation is at stake (Jeucken, 2001).

Jeucken (2001) gives four phases of sustainable banking. In the first, defensive phase, the bank is not acting towards sustainability. Only the necessary adjustments according to regulations are enforced. The second phase is preventive banking, where the bank takes some actions to minimize costs, for example saving water, paper and electricity. Furthermore future changes in regulations are taken into consideration to be able to anticipate. From this phase on the bank will be external sustainable. The third phase is offensive banking: the banks now are taking a progressive standpoint concerning sustainability. It sees business opportunities and profits in investing sustainable. The fourth phase is sustainable banking, which can be interpreted as an on-going process because sustainability is not a static concept. At this phase all activities of the bank will be sustainable (Jeucken & Bouma, 1999).

As an example, sustainable banking according to Triodos bank is described as '… using money with conscious thought about its environmental, cultural and social impacts, and with the support of savers and investors who want to make a difference, by meeting

present day needs without compromising those of future generations' (Triodos, 2013). A sustainable bank aims at implementing the concept of sustainability in its core business.

We have found two associations that are involved in sustainable banking: the European Federation of Ethical and Alternative Banks (FEBEA) and the Global Alliance for Banking on Values (GABV). The FEBEA is a non-profit organization with the following purpose: 'developing the ethical and solidarity-based finance in Europe in a concrete way' (FEBEA, 2013). The FEBEA gives the following definition for an ethical bank: 'The role of an ethical bank is to work for the common good and to ensure the right to receive credit through a bank activity consisting in raising funds and reallocating them in the form of credits for cultural, social and environmental projects' (FEBEA, 2012). The GABV is 'an independent network of banks using finance to deliver sustainable development for unserved people, communities and the environment' (GABV, 2013). The banks affiliated to the GABV share the same values towards banking. The banks have integrated people, planet, and prosperity in their approach (GABV, 2012).

The GABV executes research about the performance of members of the GABV, GSIFIs, and the US commercial and retail banks. The performance measures include the ROA, the ROE, and a solvency ratio. This research concludes as follows: sustainable banks have higher and better quality capital; sustainable banks have better return on assets and equal returns on equity with lower volatility on returns (GABV, 2012).

The research of the GABV has some shortcomings that we will address to in this thesis. First of all, the analysis is descriptive and does not include a panel with control variables and robustness tests. Secondly it does not control for the business cycle to analyze if the business cycle has an effect on the financial health ratios or on the difference between the sustainable banks and the GSIFI and the US commercial and retail banks. In this thesis we will try to explain the difference between the sustainable and traditional banks by the business cycle. Thirdly, the research of the GABV does compare individual sustainable and traditional banks; this might lead to biases because the banks might differ in activities and cannot be compared individually. Furthermore only GSIFI and US banks are included in the research by the GABV, which limits the geographical area. In this thesis we will use the financial soundness indicators (FSI) for the traditional banks

to control for the firm specific differences. Using the FSI of the consolidated banking sector in a country will include a more complete measure of the banking sector.

Finally, in this thesis we will include a liquidity-ratio. The liquidity of banks is subject to regulation of the BIS to prevent bank runs such as happened to traditional banks in the current financial crisis.

Besides the initiatives of the FEBEA and GABV towards sustainable banks, we will present other initiatives within and outside the banking sector. Examples are the commitment of multiple traditional banks to produce a sustainability report or a CSR report and to supply sustainable funds. Furthermore the non-profit organization of Banktrack is publishing information about the projects invested in by banks. If these projects are negatively affecting the environment or society, Banktrack tries to force banks to withdraw the investment with the help of negative publicity (Banktrack, 2013).

3. Methodology and Data Description

In this thesis we analyse the financial health of sustainable banks and traditional banks through the business cycle. We will measure the financial health of banks through ratios of the profitability, solvency, and liquidity of banks on a yearly base. We will use a dummy variable to describe the state of the business cycle in a certain country at a certain time period. In this section we will outline the data and research methodology. First we describe the data description and data sources, in the second section an outline of the research methodology and the used variables is stated.

3.1. Data Description

The list of sustainable banks included in this research can be found in appendix A. The sustainable banks were selected by their membership of the GABV or the FEBEA. We include 18 sustainable banks in the research: 6 are member of the GABV, 6 of the FEBEA, 4 are members of both, and 2 are non-members.[1] The banks are all situated in developed economies, 5 banks are from North America, and the other 13 are European banks.

We retrieve the financial yearly data of the sustainable banks from Bankscope. The database of Bankscope consists of financial data of banks, including their financial statements for multiple years. In Bankscope the banks have been given a consolidation code; this code gives information about the inclusions of the consolidated partners in the financial statement. Some banks might have two different datasets because a transition has taken place. For further explanation on the consolidation code we refer to the table in appendix B. Different dummies about the consolidation code we have included in the analysis.

We include the business cycle in this research by the use of a dummy variable. The NBER recession dummy is used to determine if the specific year in the specific country is in an upturn (0) or downturn (1) of the economy. We use this dummy variable to show the state of the economy through multiple countries. According to the NBER the following

[1] ASN bank is a Dutch sustainable bank, but not affiliated. Assiniboine Credit Union Canada became member of the GABV in 2012; the year 2012 is not yet included in the data. Both banks do invest with sustainable guidelines and are therefore included in this thesis

definition holds for recessions: 'Contractions (recessions) start at the peak of a business cycle and end at the trough.' (NBER, 2010) In a recession there is a slowdown of economic activity.

The recession dummy for the different countries we took from the Federal Reserve Bank of St. Louis, which originated from the NBER. The dummies are reported monthly. In this paper the analysis is on a yearly base, and therefore we make an adjustment. The total of zeroes and ones per year is added and, if the sum is larger than six, we presume the country was in a recession this year, if the sum is smaller than or equal to six, we presume the country was in a period of expansion. We include the dummies of the following countries: UK, USA, Canada, the Netherlands, France, Germany, Spain, Italy, Denmark, Switzerland, Denmark, and Norway. Unfortunately we do not have business cycle information for Malta, so as a proxy we will use the dummy of Italy as the recession dummy.

We use the financial soundness indicators (FSI) of the IMF for measuring the financial health of the traditional banks. These indicators are used to overcome the problem of using individual traditional bank data, because this might lead to a bias of individual bank effects and inclusion of sideline activities of banks. The FSI indicator gives a good inside in the financial health of the traditional banks in a specific country. The IMF has been constructing the FSI for countries' banking sectors. The IMF constructs the FSI 'with the aim of supporting macro prudential analysis and assessing strengths and vulnerabilities of financial systems' (IMF, 2013). FSI are 'indicators compiled to monitor the health and soundness of financial institutions and markets, and of their corporate and household counterparts' (Sundararajan et al, 2002). We use the FSI to exclude bank specific developments. Because the FSI-measure determines the state of the banking sector in a country, the country's sustainable banks are also included in the FSI. But because the market share of sustainable banks is assumed to be sufficiently low, we presume the financial health of sustainable banks will not influence the FSI in our analysis.

We extract the data of the FSI from the IMF website. Because of the short time series for the multiple countries, we also use data of the national central banks to compute our data set. We use various control variables, which originate from IMF reports on the FSI,

complemented by data of the different central banks and financial stability reports. In appendix C we state a full list of data sources for the dataset.

3.2. Research Methodology

In this paragraph we will outline the research methodology. First we present the different measures of financial health, followed by an explanation of the control variables. Finally we will present and explain the regression formula.

3.2.1. Financial Health Indicators

We use the measures for financial soundness of the IMF for the analysis. Different ratios for profitability, liquidity and solvency that best project the financial health are included in the analysis, because we want to compare the financial health of sustainable and traditional banks. The FSI and the ratios are listed in Table 1.

Financial Health Indicator	**Measure**	**Abbreviation**
Profitability	Return on Assets	ROA
	Return on Equity	ROE
Liquidity	Liquid assets / total assets	LIQ1
	Liquid assets / short term liabilities	LIQ2
Solvency	Regulatory capital / risk weighted assets	SOL1
	Total capital / total assets	SOL1B
	Regulatory Tier 1 capita / risk weighted assets	SOL2
	Common equity / total assets	SOL2B

Table 1: Dependent Variables.

There are two ratios of profitability included, respectively the return on assets (ROA), and the return on equity (ROE). We will use the same calculations for our sustainable banks to make a clear comparison of the financial health between sustainable and traditional banks. The ROA and ROE are ratios of profitability. The ROA is measured by dividing the net income by the value of the total assets. The ROA is the ability of the bank to generate profits. The ROE is a ratio that calculates the returns to shareholders (Athanasoglou, 2008). The ROE is measured by dividing net income by the total capital. Because the ROA and ROE are based on balance sheet value of the assets, they have a

mature downside: banks do have off-balance sheet accounts, which are not stated on the balance sheet but do earn a return. We include more ratios of bank profitability to show multiple aspects (Brealy et al, 2009).

The second included measurement for financial health is the liquidity of the bank. We use two different calculations for liquidity to account for the liquidity position of banks. First, we include the ratio of the liquid assets to the total assets, which is an indicator of the ability of the bank 'to meet demands for cash' (IMF, 2013). The second variable we include gives an indication of liquidity problems on the short run. This liquidity ratio shows the ability of a bank to pay its debts in the short-run with the use of short-run assets: if the rate is 100% the bank can meet its obligations (Vodová, 2011).

The banks solvency ratio is the third and final indicator of financial health we include. The FSI have two different measures for solvency: regulatory capital to risk-weighted assets and regulatory Tier 1 capital to risk-weighted assets. The first is a capital adequacy measure; it shows the robustness of banks to endure shocks. The second measure focuses on the capital adequacy of banks with respect to the Tier 1 capital. Tier 1 capital is calculated by adding common shares plus stock surplus plus retained earnings and is used by the Basle Committee (BCBS, 2013).

Due to missing data in both the FSI measure of the IMF for the traditional banks and the bank-data of the sustainable banks with regard to risk-weighted assets and the Tier 1 capital, we add two measures in the analysis: the total capital to total assets ratio and the common equity to total assets ratio. We replace the SOL1 variable by the SOL1B variable of the capital to total capital ratio. We will not present the results of the SOL1 in the panel and multivariate analysis. We include the common equity or tier 1 capital to total assets (SOL2B) for the limited availability of SOL2. Because for this variable the data for the traditional banks is scarce, we include both SOL2 and SOL 4.

3.2.2. Explanatory Variables

In this subsection we will explain the used explanatory variables. In the analysis of this research, the relationship between the recession dummy variable and a financial health measure is scrutinized with respect to sustainable and traditional banks. As mentioned

previously, we will calculate the financial health of sustainable and traditional banks by profitability, liquidity, and solvency ratio of banks.

To explain the movements of the financial health ratios of both the sustainable and traditional banks, we include a variable for the business cycle. In this research, we use the NBER dummy for the business cycle.

The control variables in this thesis are listed in Table 2. We choose the control variables in accordance with the research of Dewenter et al (2004). We use this paper because in their analysis the profitability and leverage of companies are researched. In the research of Dewenter et al (2004) the difference in profitability and leverage between state-owned and privately owned firms is studied. The motivation of Dewenter et al (2004) to use control variables is that the firm size, business cycle and productivity might systematically influence the profitability and the leverage of the companies. In Bhatti (2010) the bank size is checked because larger banks do have more diversified loan portfolios leading to different returns. Thereby we include the natural log of the personnel expenses to control for the labour intensity. The labour intensity describes the productivity of the bank, and it might affect the financial health. The labour intensity might influence the financial health by the different activities of different banks. A sustainable bank is expected to be more labour intensive because investing in loan requires more labour compared to investing in securities. We take the log of the total assets, interest margin and personnel expenses to measure the elasticity of the effects.

Variable	**Abbreviation**
Natural log of the total assets	LN_ASSETS
Natural log of interest margin	LN_INTMARG
Natural log of personnel expenditures	LN_WAGE
Consolidation Dummy (only for sustainable banks)	CONS
Member dummy (only for sustainable banks)	GABV

Table 2: Control Variables

We include the consolidation dummy to control for the consolidation code of the bank; we expect this will not make a difference in the analysis. We include the member dummy to control for membership of one of the two alliances. The GABV was founded in

2009 and the FEBEA in 2008. The dummy is set to zero in all cases before the founding date. [2]

3.2.3. Regression Formula

We will first perform a panel data analysis for the sustainable and traditional banks separately. Testing the effect of the NBER for the sustainable and traditional bank health independently will give us more understanding on the effect of the recession dummy on the banks' health. We will use the following panel data formula for the sustainable banks:

$$y_{it}^{st} = \alpha^{st} + \beta_1^{st} NBER_{ct}^{st} + \beta_2^{st} X_{it}^{st}$$

Where y_{it} is the profitability, solvency, or liquidity measure of a sustainable bank, α the constant, β_1 the coefficient for the state of the economy, the variable $NBER_{ct}$ is the dummy for the business cycle, β_2 is the coefficient for the control variables and X_{it} the control variables and ε is the error term. The subscript *i* stands for the bank, the subscript *c* for country, and the subscript *t* for time. The subscript *c* refers to the country the bank is situated in. The superscript *st* means the analysis is for the sustainable banks

For the traditional banks, we use the following panel data formula:

$$y_{ct}^{tr} = \alpha^{tr} + \beta_1^{tr} NBER_{ct}^{tr} + \beta_2^{tr} X_{ct}^{tr}$$

Where y_{ct}^{tr} is the profitability, solvency, or liquidity measure of a traditional bank, α the constant, β_1 the coefficient for the state of the economy, the variable $NBER_{ct}$ is the dummy for the business cycle in a certain country, β_2 is the coefficient for the control variables and X_{ct} the control variables and ε is the error term. The subscript *c* refers to the country the traditional bank is situated in. The superscript *tr* means the analysis is for traditional banks.

[2] The effect of the GABV is expected to be insignificant. The membership is not expected to affect the financial health of the sustainable banks

To further determine whether the difference in financial health between sustainable and traditional banks is caused by the NBER susceptibility or the difference in control variables we perform a panel data analysis on the difference in financial health.

$$(y_{it}^{st} - y_{ct}^{tr}) = \alpha + \beta_1 NBER_{ct} + \beta_2 (X_{it}^{st} - X_{ct}^{tr}) + \varepsilon$$

The difference panel data analysis regression formula is generated by taking the sustainable banking data of a sustainable bank in a specific country, and subtracts the data of the FSI for the traditional banks in that country. This is done for the financial health indicators and the logs of the control variables. The NBER is the business cycle for the country where the difference is measured.

In chapter four we will first show the descriptive statistics of all variables. The averages of the dependent variables are presented, their standard deviation, and number of observations. We will use a two-sided t-test to test equality of the mean between the sustainable and traditional banks, to show the differences in values between the banks.

4. Analysis

In this section we will present the outcomes of the statistical analyses. First we present the descriptive statistics. Second, we will present a two-sided t-test to test equality of the mean between the sustainable and traditional banks. Third, we will carry out a panel analysis on the influence of the financial health and the NBER dummy for both the sustainable and traditional banks separately. Finally we carry out a combined panel data analysis of the differences in the financial health between sustainable and traditional banks. We will present the different steps and the outcomes here.

4.1. Descriptive Statistics

The results of the descriptive statistics are presented in Table 3. In the table we present the average value of the sustainable and traditional dependent variables and their standard deviation.

		Sustainable Banks			Traditional Banks			Test of Equality	
		Average Value	Standard Deviation	Number of Observations	Average Value	Standard Deviation	Number of Observations	T-test	
Profitability	**ROA**	0,002	0,016	152	0,006	0,005	89	-2,385	**
	ROE	0,062	0,101	152	0,113	0,085	89	-3,998	***
Liquidity	**LIQ1**	0,207	0,191	152	0,211	0,124	74	0,162	
	LIQ2	0,275	0,289	152	0,829	0,658	70	-8,646	***
Solvency	**SOL1B**	0,106	0,105	142	0,055	0,018	81	4,284	***
	SOL2	0,093	0,072	152	0,054	0,021	53	3,848	***
	SOL2B	0,171	0,150	63	0,103	0,022	84	4,065	***

Table 3: Descriptive statistics panel data

This table shows the descriptive statistics of both the sustainable and traditional banks in the period 1998-2012. The last column shows the significance levels of the t-test: * Significant at 10% level. ** Significant at 5% level. * Significant at 1% Level. T-test is a two-sided test of equality**

The ratios of bank profitability are the ROA and the ROE. The average values of the sustainable banks are lower than the traditional banks for both measures. The standard deviation for the ROA and the ROE is higher for the sustainable banks. The average returns are higher for traditional banks. An explanation for the lower average of the

sustainable banks might be their relative youth; new banks might have lower returns because they are smaller and therefore are less efficient. Furthermore, the traditional banks are expected to have more off-balance sheet activities, which might cause the higher returns relatively. The higher standard deviation might arise from the growing market share of the sustainable banks; during 1998 and 2011 the sustainable banks have increased their market share, the returns might have increased due to increased efficiency (GABV, 2012).

The first measure of liquidity we present is the liquid assets to total assets. The average value for the sustainable bank is negligible higher. The standard deviation of the sustainable bank is also higher, but here again, the difference is negligible. The second measure of liquidity is the liquid assets to the short-term liabilities and deposits (LIQ2). The average value of the measure is higher for traditional banks. An explanation for this might be that the sustainable banks do not invest in short term securities and the stock market, but only in loans that are accounted for as long-term assets. The numerator for the sustainable banks is lower. The traditional banks on the other hand, invest in short term securities. The high standard deviation of the traditional banks might be explained by the fast changing prices in the securities market.

To determine the solvency position of banks we include three different measures. As mentioned before, SOL1 is excluded from the analysis. The results are presented in Table 3. The average value of the SOL1B is higher for the sustainable banks. The relative amount of capital is higher for the sustainable banks. The same applies for the SOL2 and SOL2B, with both also higher means for sustainable banks. An explanation for the higher average value of solvency ratios of the sustainable banks might be the relative young age of the sustainable banks because its total assets might be lower.

The standard deviations for all the solvency ratios are found to be higher for the sustainable banks. The solvency ratios of banks are bound to regulations and banks will try to keep them up to a certain level at all times. The higher variation of the sustainable banks might be caused by the fact that the sustainable banks are not adjusting their solvency ratios according to the business cycle; Adrian and Shin (2010) show this for investment banks: when there is an upswing of the economy, the net worth of the assets on the balance sheet might increase; in order to keep the solvency constant a bank can

issue more debt and buy more assets. When there is a downturn of the economy the net worth of the assets decreases, the bank can sell assets to keep solvency constant (Adrian and Shin, 2010). Keeping the solvency constant increases the risk of the need to sell assets cheap when there is an economic downturn. The results might show that the sustainable banks do not respond to the business cycle in the same manner as the traditional banks. Furthermore the relative young age of the sustainable banks might play a role. The sustainable banks are of younger age and have smaller amounts of assets, capital and equity; a small change has larger effects on the solvency ratio.

The results of the descriptive statics show there are some differences in the values of the ratios financial health of banks. In the next section we will explain if these differences are significant.

4.2. Test of Equality

We present the t-statistic of the test of equality in the last two columns of table 3 on page 25. The t-statistics shows whether or not there is a significant difference in the mean values of the financial health indicators of sustainable and traditional banks. The t-test is a two-sided test. The difference is tested on both sides. We will present the results in this subsection.

The t-statistic of the difference between the two averages is significant at a 1% confidence interval. The ROA is significantly different for the sustainable and traditional banks. The same applies for the ROE. The results present a significant difference in the mean value of profitability between sustainable and traditional banks; the profitability of the sustainable banks appears to be lower. In our analysis we will focus on the question whether the business cycle is influencing the difference between the profitability ratios of sustainable and traditional banks.

The t-test of the liquidity shows the difference in liquid assets to total assets is insignificant. The sustainable and traditional banks hold the same ratio of liquid assets to total assets. We might explain this by the same risks sustainable and traditional banks face towards liquidity. The BIS constructed principles for sound liquidity management, influencing the liquidity of the banks. (BIS, 2008)

The LIQ2 ratio is significantly different between sustainable and traditional banks. The t-statistic is significant at a 1% confidence level and negative, suggesting the value of the sustainable banks is lower. An explanation for this difference might be the different types of assets sustainable and traditional banks hold. This liquidity ratio might differ over time and further research might be needed to show whether the business cycle influences the difference between the sustainable and traditional banks.

The average values of our solvency measures are all significantly different between the sustainable and traditional banks according to the t-test. The average of the traditional banks is significantly lower than the average of the sustainable banks. In this research we research if this difference is explained by the business cycle.

4.3. Panel Data Analysis

In this section we present the panel data analysis for the sustainable and traditional banks separately. In the panel data analysis, the regression formulas, which we present in chapter 3, are estimated and tested. We have an unbalanced panel data. We test the effect of the business cycle on the sustainable and traditional bank's financial health. First we present the results for the sustainable banks. In the second subsection we present the results for the traditional banks. Finally we perform robustness tests on our analysis.

4.3.1. Sustainable Banks

In this subsection we present the results of the panel data analysis for the sustainable banks. The results of the analysis are presented in the tables 9 till 12 in Appendix D. First we will discuss the results of the profitability ratios.

The coefficients estimates of the ROA and the ROE are given in table 9 in Appendix D. For the return on assets, the NBER is insignificant in the estimations. The logs of the total assets, interest margin, and the personnel expenses are also insignificant. Also the ROE shows an insignificant NBER. The control variables LN_ASSETS and LN_WAGE are insignificant. The log of the interest margin does have a positive effect and is significant at 10% value.

The results for the profitability present that the profitability of the sustainable banks is not susceptible to the business cycle. The tendency of the business cycle is negative, but this is not significant. The results for the control variables show a change in the profitability ratios is not affected by the size of the sustainable bank. An explanation for this might be that the sustainable banks did attract depositors during recent years, but due to the financial crisis they where unable to invest in projects with high returns. The profitability of the sustainable banks does not seem to be significantly susceptible to the business cycle. The movements of the business cycle do not explain the change in the profitability of the sustainable banks.

Next, we present the results of the panel data analysis for the liquidity ratios of the sustainable banks, these results are stated in Table 10 of Appendix D. The outcomes of the analysis show that the NBER does not influence both liquidity ratios of sustainable banks significantly. The estimated coefficient shows the log of the total assets does not affect the ratio LIQ1. The interest margin on the other hand is significant at a 10% confidence interval. When the interest income is growing compared to the interest expenses, the bank invests in assets with higher return, which are most of the time long term loans. The LIQ1 will decrease in this case. The log of the personnel expenses does not affect the LIQ1.

For the LIQ2-measure of liquidity the coefficients of the control variable are negative. When the bank size of the sustainable bank increases the LIQ2 ratio decreases, the liquidity position of the sustainable bank decreases. During the current financial crisis, the sustainable banking market share increased, they attracted more deposits. The portfolios of the sustainable banks contain more long-term loans, decreasing the liquidity when the sustainable bank is growing. The labour intensity has a negative effect on the liquidity of the sustainable banks. The labour intensity depends on the kind of investment choices; long-term loans are more labour intensive, decreasing liquidity.

The liquidity ratios of the sustainable banks are not affected by the business cycle. The size of the bank does influence the liquidity. When a sustainable bank grows, the amount of deposits increases, changing the ratio of the short-term assets to the short-term liabilities negatively.

The final financial health indicator of the sustainable banks is the bank solvency; the results of the panel data analysis can be found in table 11 in Appendix D. SOL1 is dropped from the analysis, and therefore we will start with the SOL1B ratio of capital to total assets.

The NBER is not influencing the SOL1B significantly. The control variables of the total assets and the interest margin are negative and significant at respectively a 5% and 1% confidence level. The SOL1B decreases with the size of a sustainable bank. When a sustainable bank is larger, the capital to total assets ratio decreases. The size of the sustainable banks during the current crisis did increase; this increase might have been nourished by an increase in depositors, causing the decrease in the ratio. The SOL1B did increase with the log of the personnel expenses.

The second measure included for the solvency is the Tier 1 capital to the risk weighted assets (SOL2). There are not a lot of observations, which is why common equity to total assets (SOL2B) is explained here. The NBER variable for SOL2B is insignificant; the business cycle does not affect the SOL2B significantly. The control variables for the size of the bank do influence the profitability negatively and are significant at a 1% confidence level. The explanation for this can be found in the explanation for SOL1B: the larger sustainable banks hold more deposits of clients, changing the solvency ratio. The log of the personnel expenses is affecting the SOL2B opposite sign from how it affects the SOL1B.

The business cycle does not affect the solvency ratios of the sustainable banks significantly. Sustainable banks do not behave as mentioned in the descriptive statistics. The size of the sustainable banks does affect the solvency ratio. This means that the larger the sustainable bank, the lower its solvency ratio. This might be explained by the increase in depositors of the sustainable banks, decreasing the solvency. For the labour intensity the signs of the two solvency ratios are reverse opposite.

The personnel expenses might influence the solvency in two different ways: first the average wage rate might rise, which influences the solvency negatively because the costs are higher. Secondly more personnel is hired, which could mean more direct personnel, thereby increasing the solvency ratio, or indirect personnel, decreasing the solvency

ratio because of the higher cost. In the case of the sustainable banks, the higher personnel expenses did increase the solvency, and therefore the higher of more direct personnel is the most plausible. Further research should look in to this.

A final note in the analysis of the sustainable banks has to be made on the GABV dummy. The GABV variable shows the membership of a sustainable bank of the FEBEA or the GABV. The variable GABV is also significant in the analysis of the LIQ1. The relationship between the LIQ1 and the GABV is negative. When a sustainable bank becomes member of one of the two organisations or both, the liquidity decreases. This might also come from the requirements of the two organisations; both the FEBEA and the GABV do not allow their members to invest in securities market.

For the SOL2B the GABV variable is significant at a 1% confidence level and positive. The solvency of the sustainable bank increases when the sustainable bank becomes member. Further research on the requirements of the organisations might find an explanation for this. There is no record of capital requirements the GABV and the FEBEA have for their members.

4.3.2. Traditional Banks

Next we present the panel data analysis results for the traditional banks. In Table 12 till Table 14 of Appendix E the results are stated. In this subsection we will discuss the results. Again, we will first start discussing the results for the profitability, followed by the liquidity and finally the solvency.

For the ROA and ROE measures of profitability of the traditional banks the NBER dummy is significant at a 1% level. The relation is as expected negative. When there is a recession the returns on assets and on equity are lower. The log of the total assets is negative for the ROA, which is the reverse of the results of the sustainable banks. When the traditional bank is larger, this does influence the profitability negatively. Because of the FSI data for traditional banks, the results suggest that if the traditional banking sector is larger in a country, it might generate less return. The results do not support this for the log of interest margin, which are insignificant, implying the size of the bank does not influence the returns. The labour intensity of the traditional banks is negative

and significant at a 1% confidence level for both the ROA and the ROE. The results imply that the more intense the labour is, the less the returns.

The business cycle does affect the profitability of the traditional banks negatively. The control variables of the traditional banks do show different outcomes as do for the sustainable banks.

Table 13 shows the results of the panel data analysis for the liquidity of traditional banks. The first measure of liquidity is the LIQ1. The NBER is insignificant. The only significant estimator is the interest margin, which is positive, at a 5% confidence level. This is opposite from the results of the sustainable banks. The interest margin might increase the liquidity because the traditional banks hold short-term securities, which are short-term assets, and which do generate interest returns for the bank.

The second measure of liquidity is the liquid assets to short-term liabilities, LIQ2, for which the NBER is again insignificant. The log of the total assets is also insignificant. The interest margin is significant at a 10% confidence level. The sign of the interest margin is opposite to the sign for LIQ1. The larger the interest margin, the more deposits a traditional bank holds. This is negative for the LIQ2 ratio.

The personnel expenses are particular high and are significant at a confidence level of 5%. The larger the labour intensity of a traditional bank, the higher the LIQ2 ratio. The sign is opposite from the sign of the sustainable banks. The opposite effect of the traditional banks might be explained by the difference in investments between sustainable and traditional banks. The traditional banks do invest in short-term securities and when hiring more staff the liquidity increases because one employee can trade multiple securities. This is different from the sustainable banks: when hiring new staff, more long term investment will take place, decreasing liquidity of sustainable banks. The liquidity of the traditional banks is not influenced by the business cycle.

In Table 14, we present the results of the panel data analysis for the solvency ratio of the traditional banks. The NBER is not significantly affecting the capital to total assets (SOL1B). The solvency ratio of the traditional banks is not susceptible to the business cycle. The control variables for the bank size show a negative relation between the size

of the traditional bank and the solvency ratio. This is similar to the results of the sustainable banks.

The second measure of solvency of the Tier 1 capital to total assets (SOL2) shows all variables to be insignificant. The SOL2B shows the solvency ratio of the traditional firms is affected negatively by the business cycle. When there is a recession, the solvency ratios of the traditional bank decrease. This result is calculated from a small number of observations and the adjusted R^2 is high. We should be careful to draw conclusions from these results. The results of the SOL2 might be more accurate for the traditional banks. The business cycle does not affect the SOL2. Furthermore the control variables are insignificant. The SOL2 of the traditional banks is not explained by the bank size or the labour intensity. The conclusion of the solvency for the traditional banks is that it is not influenced by the business cycle.

4.3.4. Robustness tests

In this section we test the panel data analysis on robustness. First the error term normality is presented with the use of the Jarque Bera statistic, followed by a paragraph for the unit root test. Thirdly we explain the use of the White standard errors. And finally the correlation table is presented.

In the tables of the panel data analysis from both the sustainable and the traditional banks, we present the Jarque Bera statistics to check the normality of the error term. For the results of the sustainable banks we do reject the Jarque Bera, we do find evidence of error term normality. For the traditional banks the results cannot be rejected in all cases. The results from the traditional banks might be skewed. The small amount of observations can explain why the results might be skewed.

Next we perform a unit root test to check for a random walk of the explanatory and dependent variables. In the table 4 we present the results of the Augmented Dickey-Fuller (ADF) chi-square statistic of the dependent variables. The unit root test in Eviews gives two different test statistics from which the Fisher Chi-square test statistic is used to test the null hypothesis of a unit root. We use this statistic because Athanasoglou et al (2008) defend the use of this statistic because it performs better than other unit root tests, and it does not need a balanced panel dataset.

Dependent Variables		Sustainable		Traditional	
Profitability	**ROA**	74,020	***	20,533	
	ROE	53,408		19,863	
Liquidity	**LIQ1**	77,810	***	15,624	
	LIQ2	97,613	***	20,113	
Solvency	**SOL1B**	79,163	***	24,023	
	SOL2	47,498	***	19,457	
	SOL2B	98,347	***	36,653	***

Table 4 Augmented Dickey-Fuller Fisher chi-square statistic for unit root for dependent variables

For the sustainable banks the unit roots of the ROE cannot be rejected. For the traditional banks only the unit root for the SOL2B is rejected. The failure of rejections leads to bias in the analysis. The inclusion of a lag in the analysis is not possible due to a lack of subsequent years in the analysis. Therefore the unit root needs to be considered when reading the analysis.

The results for the explanatory variables are presented in the table 5. Here the ADF for the sustainable banks can be rejected. For the traditional banks unit root of the log of the interest margin and the log of the personnel expenses cannot be rejected.

	Sustainable		Traditional	
ln_assets	75.2821	***	49.7606	***
ln_intmarg	69.0460	***	12.1756	
ln_wage	80.3150	***	28.2324	

Table 5 Augmented Dickey-Fuller Fisher chi-square statistic for unit root of explanatory variables

In Table 9 till Table 14 the results of a second unit root test are presented. The Durbin-Watson statistic is a popular test for autocorrelation. When the value of the Durbin-Watson statistic is close to two, the first order autocorrelation coefficient is close to zero. When the statistic is significantly smaller than two, there might be positive autocorrelation (Verbeek, 2008). The results for both the sustainable and traditional banks, present a small Durbin-Watson statistic. There is autocorrelation present in the model.

In the analysis, we only use White standard errors. The use of these standard errors is done precautionary. The program Eviews does not provide heteroskedasticity tests for panel data. The use of the White error terms controls for possible presentence of heteroskedasticity.

Finally, we present in every analysis of financial health a normal panel result and fixed effects results (Table 9 till Table 14). The results of the fixed effects show a higher adjusted R^2. The cross sectional fixed effects model includes a bank specific intercept term in the model. The unobservable effects of independent banks are controlled for.

Table 6 shows that the LN_ASSETS, LN_INTMARG and LN_WAGE are correlated and cannot be included in the panel data analysis simultaneously. For the sustainable banks, the consolidated dummy is excluded because of singular matrix.

	LN_ASSETS	**LN_INTMARG**	**LN_WAGE**
LN_ASSETS	1		
LN_INTMARG	0,98	1	
LN_WAGE	0,98	0,99	1

Table 6: Correlation Control Variables Sustainable Banks

The correlation of the explanatory variables is presented in table 7. The same applies as for the sustainable banks; the control variables cannot be included in the regression simultaneously.

	LN_ASSETS	**LN_INTMARG**	**LN_WAGE**
LN_ASSETS	1		
LN_INTMARG	0,86	1	
LN_WAGE	0,85	1,00	1

Table 7: Correlation Control Variables Traditional Banks

4.4. Combined Panel Data Analysis

In this section we present the analysis of the difference in the financial health between the traditional and sustainable banks and if this is explained by the business cycle. The White cross-period standard errors are used again as a precaution for controlling for heteroskedasticity. First we present the descriptive statistics, second the robustness of the analysis, followed by the regression results.

The results of the descriptive statistics are presented in table 6. The average values of the profitability indicators are all negative showing that the profitability of traditional banks on average is higher than the profitability of the sustainable banks. The solvency

measures are higher for the sustainable banks. The number of observations for the SOL2 variable is low and this dependent variable will be excluded from the combined panel data analysis.

		Average Difference	Standard Deviation	Number of Observations
Profitability	**ROA**	-0,031	0,017	126
	ROE	-0,057	0,114	126
Liquidity	**LIQ1**	0,046	0,264	108
	LIQ2	-0,501	0,699	103
Solvency	**SOL1B**	0,051	0,105	108
	SOL2	0,040	0,168	50
	SOL2B	0,076	0,084	82

Table 8: Descriptive Statistics in difference between sustainable and traditional banks

Next we present the results from the combined panel data analysis. We will start with the results of the profitability, followed by the liquidity, and finally the solvency. Because we perform a difference analysis, the results do not need to be in fixed effects. The 'differences takes care the unobservable fixed effects and controls for unobservable differences between individuals.' (Griffith et al, 2011) The results are presented in table 15.

The following formula is constructed for the different financial health ratios:

$$(y_{it}^{st} - y_{ct}^{tr}) = \alpha + \beta_1 NBER_{ct} + \beta_2 (X_{it}^{st} - X_{ct}^{tr}) + \varepsilon$$

For the ROA the estimate of the NBER dummy is insignificant. The difference in the profitability between the sustainable and traditional banks is not caused by the business cycle. The results of the analysis with the highest adjusted R^2 are presented in Table 15. The control variable of the log of the personnel expenses in significant. Before we mentioned the effect of the personnel expenses might be explained by hiring more direct personnel. This has more effect in a traditional bank because the personnel in the traditional bank might invest in securities, which are less labour intensive.

For the ROE the estimates of the NBER dummy are positive and significant at a 5% confidence interval. When there is a recession the difference between the sustainable and traditional banks is larger, supporting the hypothesis of a more susceptible profitability of the traditional banks to the business cycle. The increase in the difference could mean an increase in the ROE for sustainable banks, or more likely a decrease in the ROE for traditional banks. The log of the interest margin is insignificant. The size of the bank does not explain the difference between a sustainable and a traditional bank.

The estimates of the NBER with respect to the difference in liquidity are expected to be insignificant according to hypothesis 2. The results of the regression confirm this outcome. The difference between the sustainable and traditional banks in liquidity is not influenced by the business cycle. The log of the interest margin is significant at a 10% confidence interval and is negatively affecting the liquidity. This means that if the difference in size between sustainable and traditional banks decreases, the differences in liquid assets to total assets increases. In the previous subsection we see that the log of the interest margin affects the LIQ1 of the sustainable and traditional banks oppositely: the interest margin affects the LIQ1 of the sustainable banks negatively, and the interest margin affects the LIQ1 of the traditional banks positively. There might be a difference in the assets the sustainable and traditional banks hold, and this might explain the increase in liquidity differences when the interest margin difference decreases.

The business cycle is expected to influence the difference in the solvency ratios between the sustainable and traditional banks. The results do not confirm hypothesis 3. The NBER estimations for the solvency health indicators are insignificant in all cases. The log of the interest margin has a negative tendency for SOL1, and is significant negative at 10% confidence level for SOL2. The difference in the size between the sustainable and traditional banks, negatively affects the difference in the solvency ratio.

5. Conclusion

The following research question is central in this thesis:

Does the business cycle have a different effect on the financial health of sustainable banks compared to traditional banks?

In the first part of the analysis, the descriptive statistics, we show there are differences in the average value of the financial health between sustainable and traditional banks. In the second part of the analysis we test the effect of the business cycle on the financial health of the sustainable and traditional banks separately. For the sustainable banks the business cycle does not affect the financial health, for the traditional banks the business cycle does affect the financial health in the profitability and solvency ratios. In the third part of the analysis we test the robustness of the results. The results for the autocorrelation need to be controlled for in future research and puts a question mark to some of the results. In the final part of the analysis we check if the differences in the financial health is caused by the business cycle or the differences in size and labour intensity of the banks. We find the business cycle to be significant ROE but not for the other indicators of financial health. The differences in size and labour intensity do explain some of the difference between the sustainable and traditional banks.

On the basis of our hypotheses, we will try to answer the research question. Followed by a conclusion of the results we find, the limitations to this thesis and recommendations to further research. We state the first hypothesis next:

Hypothesis 1: The profitability of sustainable banks is less susceptible to economic downturns compared to the profitability of traditional banks.

The results provide no conclusive answer. The results of the ROA do not confirm the hypothesis, the results of the ROE on the other hand do. The unit root of the ROE was not rejected, and therefore we will reject the hypothesis.

Hypothesis 2: The liquidity of sustainable banks is equally susceptible to the business cycle as the liquidity of the traditional banks.

We find no significant effect of the business cycle on the difference in liquidity between sustainable and traditional banks. In the separate panel data analyses we already show the liquidity ratios of both sustainable and traditional banks are not affected by the business cycle. The results in the combined panel data analysis are therefore expected. However the liquidity ratios are proven not to be the same. The liquid assets to short-term liabilities and deposits are significantly different between sustainable and traditional banks. Further research should focus on the difference in asset holding of both sustainable and traditional banks.

Hypothesis 3: Sustainable banks have a higher solvency ratio that is less susceptible to economic downturns than that of traditional banks.

The third hypothesis is also rejected by the combined panel data analysis. The difference in solvency is not significantly correlated to business cycle. The difference between sustainable and traditional banks in solvency ratios is explained by the bank size and the labour intensity. A larger bank is more efficient in using its resources and can bring down the solvency rate. More research should focus on the difference in size of sustainable banks and traditional banks and the difference in lending activities.

We do not find support that the financial health of sustainable banks is affected differently by the business cycle from the financial health of traditional banks. We do find support there is a difference in financial health between sustainable and traditional banks. The difference in financial health might be explained by the difference in interest margin between sustainable and traditional banks.

There are multiple limitations in this thesis. First of all the robustness of the research can be questioned in some cases. There is a small amount of data, which might bias the outcomes. Furthermore the unit root cannot be rejected in all cases, and statistical adjustments by including lags in the analysis are not possible also due to a lack of data, including lags in the analysis might reject the unit root. Secondly the inclusion of more control variables could extend the research. The control variables in this thesis are correlated and cannot be used simultaneously. The inclusion of more control variables for bank specific effects might explain the difference in the financial health of the sustainable and traditional banks. Furthermore control variables for the business cycle such as the inflation rate or the unemployment rate could help explain the movements.

The data for the business cycle in this thesis is limited. By using a dummy variable, this thesis measures a discrete movement of the business cycle. The inclusion of more phases in the business cycle could better show the movements of the business cycle and the response of the financial health.

Further research should focus on the explanation of the difference in the financial health between sustainable and traditional banks. This thesis finds there is a significant difference, but does not find the cause of this difference.

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Appendix

Appendix A: Sustainable Banks

Bank Name	Country
ABS	Switzerland
APS	Malta
ASN	The Netherlands
Assiniboine Credit Union	Canada
Banca Popolare Etica*	Italy
BBK*	Spain
Colonya, Caixa d'Estalvis de Pollensa	Spain
Cassa Centrale Banca*	Italy
Credit Cooperatif	France
Cultura Sparebank	Norway
First Green Bank	USA
GLS	Germany
La Nef	France
Merkur	Denmark
New Resource Bank	USA
OnePacificCoast	USA
Social Wirtschaft	Germany
Sunrise	USA
Triodos	The Netherlands
Vancouver City Savings CU	Canada

*** Additional consolidated statements are included of this bank in the analysis**

Appendix B: Consolidation Code BankScope

C1	Statement of a mother bank integrating the statements of its controlled subsidiaries or branches with no unconsolidated companion
C2	Statement of a mother bank integrating the statements of its controlled subsidiaries or branches with an unconsolidated companion
C*	Additional Consolidated statement
U1	Statement not integrating the statements of the possible controlled subsidiaries or branches of the concerned bank with no consolidated companion.
U2	Statement not integrating the statements of the possible controlled subsidiaries or branches of the concerned bank with a consolidated companion.
U*	Additional Unconsolidated statement

Appendix C: Sources FSI and Control Variables Countries

Country	Year	Source FSI	Source Control
CN	2005-2011	FSI.IMF.org	FSI.IMF.org
DK	2004-2011	statbank.dk	statbank.dk
FR	2003-2007	FSI.IMF.org	missing
	2008-2011	FSI.IMF.org	FSI.IMF.org
DE	2005-2007	FSSA	FSI.IMF.org
	2007-2011	FSI.IMF.org	FSI.IMF.org
IT	1998-2004	FSSA	Banca d'Italia
	2005-2011	FSI.IMF.org	FSI.IMF.org
MT	2005-2011	FSI.IMF.org	FSI.IMF.org
NL	2004-2011	DNB	DNB
NO	2004-2011	Statistics Norway	Statistics Norway
ES	2005-2011	FSI.IMF.org	FSI.IMF.org
CH	2004-2011	Schweizerische National Bank	Schweizerische National Bank
USA	2005-2011	www2.fdic.gov	www2.fdic.gov

*** due to a unavailability of data from the IMF website, the data of central banks and other governmental organisations are used to complement the IMF data**

Appendix D: Panel Data Analysis Sustainable Banks

Profitability Sustainable Banks

	Profitability ROA								ROE							
	1		2		3		4		1		2		3		4	
Constant	-0,091		-0,044		-0,032		-0,021		0,017		-0,004		0,07		-0,067	
	(0,078)		(0,031)		(0,033)		(0,015)		(0,158)		(0,073)		(0,075)		(0,078)	
NBER	-0,004		-0,004		-0,004		-0,001		-0,015		-0,016		-0,014		0,001	
	(0,003)		(0,003)		(0,003)		(0,002)		(0,011)		(0,011)		(0,011)		(0,013)	
ln_assets	0,012						0,003	*	0,006						0,017	*
	(0,010)						(0,002)		(0,012)						(0,009)	
ln_intmarg			0,012								0,019	*				
			(0,008)								(0,011)					
ln_wage					0,011								-0,001			
					(0,011)								(0,014)			
GABV																
Adjusted R2	0,564		0,590		0,534		0,147		0,700		0,707		0,700		0,120	
Observations	152		150		150		152		152		150		150		152	
Fixed Effects	yes		yes		yes		no		yes		yes		yes		no	
Cross Period White Standard errors	yes		yes		yes		yes		yes		yes		yes		yes	
Durbin Watson	0,711		0,799		0,681		0,315		1,538		1,564		1,529		0,46	
Jarque-Bera	2363,141	***	2695,962	***	2580,724	***	5884,856	***	2363,141	***	2695,962	***	2580,724	***	5884,856	***

Table 9: Panel Analysis Results for the profitability of the sustainable banks with cross period White standard errors to control for heteroskedasticity. The fixed effects models are cross-sections fixed effects. The model without fixed effects is presented to show the necessity of the fixed effects model. The following significant levels are used: * Significant at 10% level. ** Significant at 5% level. * Significant at 1% Level.**

Liquidity Sustainable Banks

	Liquidity LIQ1								LIQ2							
	1		**2**		**3**		**4**		**1**		**2**		**3**		**4**	
Constant	0,488		0,511	***	0,497	***	0,327	***	1,928	**	1,237	***	1,214		0,505	***
	(0,444)		(0,176)		(0,197)		(0,115)		(0,869)		(0,39)		(0,456)		(0,176)	
NBER	0,025		0,026		0,023		0,037		0,022		0,034		0,022		0,029	
	(0,018)		(0,018)		(0,017)		(0,036)		(0,0250		(0,025)		(0,021)		(0,043)	
ln_assets	-0,034						-0,017		-0,215	*					0,031	
	(0,058)						(0,014)		(0,112)						(0,21)	
ln_intmarg			-0,081	*							-0,253	**				
			(0,046)								(0,102)					
ln_wage					-0,096								-0,302	**		
					(0,062)								(0,145)			
GABV	-0,022	**														
	(0,011)															
Adjusted R2	0,813		0,832		0,809		0,026		0,648		0,72		0,687		0,037	
Observations	152		150		150		152		152		150		150		152	
Fixed Effects	yes		yes		yes		no		yes		yes		yes		no	
Cross Period White Standard errors	yes		yes		yes		yes		yes		yes		yes		yes	
Durbin Watson	1,219		1,207		1,163		0,28		1,402		1,473		1,309		0,546	
Jarque-Bera	1550,09	***	267,502	***	520,568	***	61,907	***	5447,083	***	1416,478	***	2680,758	***	390,456	***

Table 10: Panel analysis results for the liquidity of the sustainable banks with cross period White standard errors to control for heteroskedasticity. The fixed effects models are cross-sections fixed effects. The model without fixed effects is presented to show the necessity of the fixed effects model. The following significant levels are used: * Significant at 10% level. ** Significant at 5% level. * Significant at 1% Level.**

Solvency Sustainable Banks

	Solvency SOL1B								SOL2								SOL2B							
	1		2		3		4		1		2		3		4		1		2		3		4	
Constant	0,853	**	0,493	***	0,471	***	0,256	***	2,327		1,1	**	1,353	**	0,341	***	0,748	***	0,420	***	0,399	***	0,196	***
	(0,346)		(0,122)		(0,17)		(0,069)		(1,411)		(0,41)		(0,605)		(0,089)		(0,27)		(0,1)		(0,135)		(0,05)	
NBER	-0,018		-0,013		-0,019		-0,028	**	0,035		0,034	*	0,005		-0,008		0,001		0,004		-0,0001		-0,006	
	(0,015)		(0,014)		(0,015)		(0,014)		(0,026)		(0,019)		(0,019)		(0,013)		(0,005)		(0,005)		(0,006)		(0,007)	
ln_assets	-0,095	**					-0,018	**	-0,275						-0,021	**	-0,098	***					-0,013	**
	(0,044)						(0,008)		(0,18)						(0,01)		(0,036)						(0,006)	
ln_intmarg			-0,099	***							-0,231	**							-0,099	***				
			(0,031)								(0,102)								(0,026)					
ln_wage					0,112	**							-0,34	*							-0,111	**		
					(0,052)								(0,174)								(0,046)			
GABV																	0,015	***	0,017	***	0,015	***		
																	(0,004)		(0,005)		(0,005)			
Adjusted R2	0,459		0,511		0,473		0,128		0,405		0,629		0,572		0,105		0,612		0,693		0,624		0,139	
Observations	142		140		140		140		63		63		63		63		152		150		150		152	
Fixed Effects	yes		yes		yes		no		yes		yes		yes		no		yes		yes		yes		no	
Cross Period White Standard errors	yes		yes		yes		yes		yes		yes		yes		yes		yes		yes		yes		yes	
Durbin Watson	0,896		0,956		0,859		0,572		1,263		1,556		1,401		1,09		0,983		1,074		0,891		0,539	
Jarque-Bera	393,8	***	430,6	***	335,3	***	1414,2	***	1170,4	***	283,1	***	242,6	***	5545,4	***	3142,2	***	1992,3	***	1906,4	***	4994,4	***

Table 11: Panel analysis results for the solvency of the sustainable banks with cross period White standard errors to control for heteroskedasticity. The fixed effects models are cross-sections fixed effects. The model without fixed effects is presented to show the necessity of the fixed effects model. The following significant levels are used: * Significant at 10% level. ** Significant at 5% level. * Significant at 1% Level.**

Appendix E: Panel Data Analysis Traditional Banks

Profitability Traditional Banks

	Profitability ROA								Profitability ROE							
	1		2		3		4		1		2		3		4	
Constant	0,029	***	0,009		0,157	***	0,01	***	0,372	***	0,442		2,523		0,281	***
	(0,007)		(0,016)		(0,035)		(0,003)		(0,129)		(0,302)		(0,667)		(0,056)	
NBER	-0,004	***	-0,004	***	-0,004	***	-0,004	***	-0,08	***	-0,08	***	-0,083	***	-0,083	***
	(0,001)		(0,001)		(0,001)		(0,001)		(0,014)		(0,014)		(0,016)		(0,015)	
ln_assets	-0,001	***					-0,000	*	-0,016	**					-0,01	***
	(0,000)						(0,000)		(0,007)						(0,003)	
ln_intmarg			-0,0002								-0,027					
			(0,003)								(0,044)					
ln_wage					-0,013	***							-0,205	***		
					(0,004)								(0,069)			
Adjusted R^2	0,467		0,381		0,587		0,162		0,561		0,472		0,551		0,242	
Observations	81		82		77		81		81		82		77		81	
Fixed Effects	yes		yes		yes		no		yes		yes		yes		no	
Cross Period White Standard errors	yes		yes		yes		yes		yes		yes		yes		yes	
Durbin Watson	1,103		0,781		1,1		0,501		1,108		1		1,255		0,643	
Jarque-Bera	23,117	***	16,54	***	2,856		1,729		8,905	**	9,192	**	4,103		3,692	

Table 12: Panel analysis results for the profitability of the traditional banks with cross period White standard errors to control for heteroskedasticity. The fixed effects models are cross-sections fixed effects. The model without fixed effects is presented to show the necessity of the fixed effects model. The following significant levels are used: * Significant at 10% level. ** Significant at 5% level. * Significant at 1% Level.**

Liquidity Traditional Banks

	Liquidity															
	LIQ1								LIQ2							
	1		2		3	4			1		2		3		4	
Constant	0,259	**	-1,346	***	0,023	0,191	*		-2,68		5,261	***	-12,656	***	1,275	
	(0,127)		(0,248)		(0,6)	(0,112)			(2,706)		(1,701)		(3,731)		(0,771)	
NBER	0,022		0,016		0,012	-0,023			-0,093		-0,074		-0,016		-0,191	**
	(0,018)		(0,015)		(0,011)	(0,022)			(0,069)		(0,069)		(0,05)		(0,083)	
ln_assets	-0,004					0,001			0,230						-0,024	
	(0,006)					(0,008)			(0,386)						0,053	
ln_intmarg			0,127	**							-0,373	*				
			(0,051)								(0,209)					
ln_wage					0,015								1,166	**		
					(0,072)								(0,441)			
Adjusted R^2	0,827		0,89		0,929	-0,025			0,858		0,869		0,896		-0,017	
Observations	66		67		62	66			62		63		58		62	
Fixed Effects	yes		yes		yes	no			yes		yes		yes		no	
Cross Period White Standard errors	yes		yes		yes	yes			yes		yes		yes		yes	
Durbin Watson	0,414		1,03		0,926	0,069			0,362		0,347		0,571		0,068	
Jarque-Bera	0,856		0,833		1,153	17,399	***		11,443	***	15,392	***	34,527	***	16,291	***

Table 13: Panel analysis results for the liquidity of the traditional banks with cross period White standard errors to control for heteroskedasticity. The fixed effects models are cross-sections fixed effects. The model without fixed effects is presented to show the necessity of the fixed effects model. The following significant levels are used: * Significant at 10% level. ** Significant at 5% level. * Significant at 1% Level.**

Solvency Traditional Banks

	Solvency SOL1B								SOL2								SOL2B							
	1		2		3		4		1	2	3		4		1		2		3		4			
Constant	0,29	***	0,198	***	0,252	***	-0,057	***	0,076	-0,044	-0,326	*	0,09	***	0,056	***	0,051	*	0,13	*	-0,054	***		
	(0,064)		(0,048)		(0,087)		(0,01)		(0,034)	(0,078)	(0,192)		(0,019)		(0,009)		(0,028)		(0,073)		(0,01)			
NBER	-0,002		-0,002		-0,003		-0,002		-0,006	-0,007	-0,006		-0,008	**	-0,004	***	-0,004	***	-0,004	***	-0,005	*		
	(0,003)		(0,002)		(0,002)		(0,002)		(0,004)	(0,004)	(0,004)		(0,003)		(0,002)		(0,001)		(0,001)		(0,003)			
ln_assets	-0,015	*					0,007	***	0,002				0,001		0,000						0,007	***		
	(0,008)						(0,001)		(0,001)				(0,001)		(0,000)						(0,000)			
ln_intmarg			-0,012	*						0,012							0,000							
			(0,006)							(0,014)							(0,001)							
ln_wage					-0,017						0,037								-0,006					
					(0,016)						(0,031)								(0,009)					
Adjusted R^2	0,882		0,874		0,866		0,647		0,582	0,600	0,609		0,009		0,975		0,975		0,975		0,728			
Observations	74		74		74		74		76	77	72		76		46		46		46		46			
Fixed Effects	yes		yes		yes		no		yes	yes	yes		no		yes		yes		yes		no			
Cross Period White Standard errors	yes		yes		yes		yes		yes	yes	yes		yes		yes		yes		yes		yes			
Durbin Watson	1,034		0,969		0,969		0,326		0,571	0,563	0,613		0,207		1,377		1,374		1,433		0,533			
Jarque-Bera	2,183		1,308		1,037		2,545		2,098	2,892	0,947		8,526	***	0,189		0,247		0,007		65,834	***		

Table 14: Panel analysis results for the solvency of traditional banks with cross period White standard errors to control for heteroskedasticity. The fixed effects models are cross-sections fixed effects. The model without fixed effects is presented to show the necessity of the fixed effects model. The following significant levels are used: * Significant at 10% level. ** Significant at 5% level. * Significant at 1% Level.**

Appendix F: Combined Panel Data Analysis

	Profitability			Liquidity			Solvency		
	ROA		ROE	LIQ1		LIQ2	SOL1B		SOL2B	
Constant	0,009		-0,029	-0,065		-0,79 ***	0,022		-0,003	
	(0,006)		(0,038)	(0,087)		(0,251)	(0,024)		(0,018)	
NBER	0,000		0,052 **	0,081		0,180	-0,013		0,004	
	(0,003)		(0,024)	(0,055)		(0,118)	(0,018)		(0,011)	
ln_assets						-0,024 *				
						(0,013)				
ln_intmarg			0,005	-0,011	*		-0,004		-0,005	*
			(0,003)	(0,006)			(0,003)		(0,002)	
ln_wage	0,002	**								
	(0,001)									
Adjusted R2	0,207		0,061	0,037		0,008	0,017		0,090	
Observations	118		124	106		102	108		82	
Fixed Effects	no		no	no		no	no		no	
Cross Period White Standard errors	yes		yes	yes		yes	yes		yes	
Durbin Watson	0,412		0,554	0,195		0,048	0,529		0,743	
Jarque-Bera	3482,011	***	48,221 ***	1,925		6,381 **	1526,399	***	757,937	***

Table 15Combined panel data analysis results with cross period White standard errors to control for heteroskedasticity. The fixed effects models are cross-sections fixed effects. The following significant levels are used: * Significant at 10% level. ** Significant at 5% level. * Significant at 1% Level.**