Reaction of Bank Stock Returns to Macroeconomic News

Bachelor Thesis Finance

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[version: final]

June 6, 2012

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GLOSSARY

Abbreviation	Long description	Definition
BB	Big-sized banks	Return of bank stocks for the group holding bigger banks according to their asset size
B	Beta	Coefficient in regression results
CPI	Consumer Price Index	Measures changes in the price level of consumer goods and services purchased by households, used as indicator for inflation
CRSP	Center for Research in Security Prices	Is a vendor of historical data
CUSIP	Committee on Uniform Security Identification Procedures	Number that identifies securities, stocks and bonds
F	-	Regression coefficient e.g. if equal to zero, there is no relation between X and Y
NBER	National Bureau of Economic Research	Gives insight into business cycle data
N.P.	Nonfarm Payroll	Used as indicator for calculating the effect of unemployment on bank stock returns
OLS	Ordinary Least Square	Establishes co-linearity between the introduced variables
PPI	Producer Price Index	Measures the average change over time in the selling prices received by domestic producers for their output, used as indicator for GDP
R^2	R squared	Shows how much is explained in the model in a regression e.g. model fit
SB	Small-sized banks	Return of bank stocks for the group holding smaller banks, according to their asset size
SIC	Standard Industrial Classification	Codes assigned to business establishments to identify the primary business of the establishment
SPSS	Statistical Package for the Social Sciences	Software used for data gathering, analyzing, and statistical analysis

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1 Introduction

1.1 Background Information Investors and policy makers are constantly faced with a high frequency rate of newly released information that can either equal their expectations or hold unexpected components. In both situations, the future expectations should be updated by incorporating the new information herein as stock prices may be affected which again is of influence on the market efficiency. The relevance and the effect of the released information on stock prices can vary at different stages in time (T. Cenesizoglu (2006), A.Beber & M.W. Brandt (2010)). For example, if negative announcements are released on GDP growth or interest rates during expansionary periods, it may be considered as good news for stock prices. However, good news in times of recession comes from a different angle e.g. good news on GDP growth and higher interest rates (N. Funke & A. Matsuda (2006)). This subject will be discussed more elaborately in the upcoming chapters.

The subject on how macroeconomic news is affecting stock prices has been of great value for economists over the years. However, the main focus has shifted to the unexpected part of released news and has found its roots in the eighties (N. Funke & A. Matsuda (2006)). It has been found that changes in stock prices are solely reflected by the unexpected part of announcements that is called ''true news'' as announcements that are equal to investors' expectations should already be incorporated into the stock prices and no changes should occur (D.K. Pearce & V.V. Roley (1984)). Basically it comes down to the difference between what investors have been expecting and what is truly announced. Before the eighties it was found by Waud *(1970)*, Fama et al. (1965) and others that newly released information leads to a rapid change in stock prices but no distinction was made between expected and unexpected announcements or the exact timing it took such a response to be actually incorporated. What this report will try to accomplish is to determine if bank stocks are truly influenced by the news announcements released of multiple variables, like inflation, unemployment, and GDP, not taking into consideration the actual time needed for this news to be implemented into bank stocks.

Nevertheless, a significant role in the matter is fulfilled by the state of the economy. The state in which an economy occurs has a significant impact on how macroeconomic news will influence stock prices. The influence of true news on stock prices is altered when the economy shifts from an expansion to a recession, and vice versa. News of the same magnitude changes stock prices in a different manner when released in a period of economic wealth rather than in periods of economic contraction. Research by Beber & Brandt (2010) but also by Cenesizoglu (2006) shows that stock prices will rely more on bad news during expansions whilst in periods of recession good news will be more essential. For example, when news is revealed about inflation, it will be of greater importance during contraction periods than in times of expansion. By using a regression equation to determine the return on bank stocks, several independent variables (inflation, GDP and

unemployment) will be tested as to see to what extent they will influence the dependent variable. The state of the economy is to be introduced as a dummy variable that is of influence on the news announcement of the independent variables, altering the effect it has on bank stocks.

1.2 Defining the Structure This report will focus on the response of returns of commercial-bank stocks to unexpected announcements about inflation, GDP growth and the unemployment rate in the United States during the period of January 1991 to December 2010. As mentioned above, only the unexpected part of macroeconomic news will move stock prices, so the emphasis here will as well be on the unexpected component. The 1991-2010 period has been chosen as it covers different economical conditions, which have a different impact on the stock prices as it was described above.

1.2.1 Problem Statement How do bank stocks react to macroeconomic news announcements?

1.2.2 Research Questions In order to properly answer the main questions stated above, it is necessary to divide it into multiple smaller questions to be researched first. These questions will each be given separate attention in the report and will ultimately lead to our main conclusion.

- How are stock prices influenced by macroeconomic announcement news in general?
- Which banks will be used in the research?
- How are unexpected announcements incorporated in stock prices?
- Is there a difference in reactions if the state of economy changes?

The report will continue with chapter 2, which contains the theoretical framework, explaining the most crucial variables introduced in this report and including the relevant hypotheses drawn from the variables that have an impact on bank stocks. In chapter 3 the data and tests to be used are described whilst chapter 4 will summarize the empirical results that have been drawn from the tests. The last part of the report, chapter 5, will give a brief conclusion on the results that arose from chapter 4.

2 Theoretical Framework

2.1 Graphical Representation

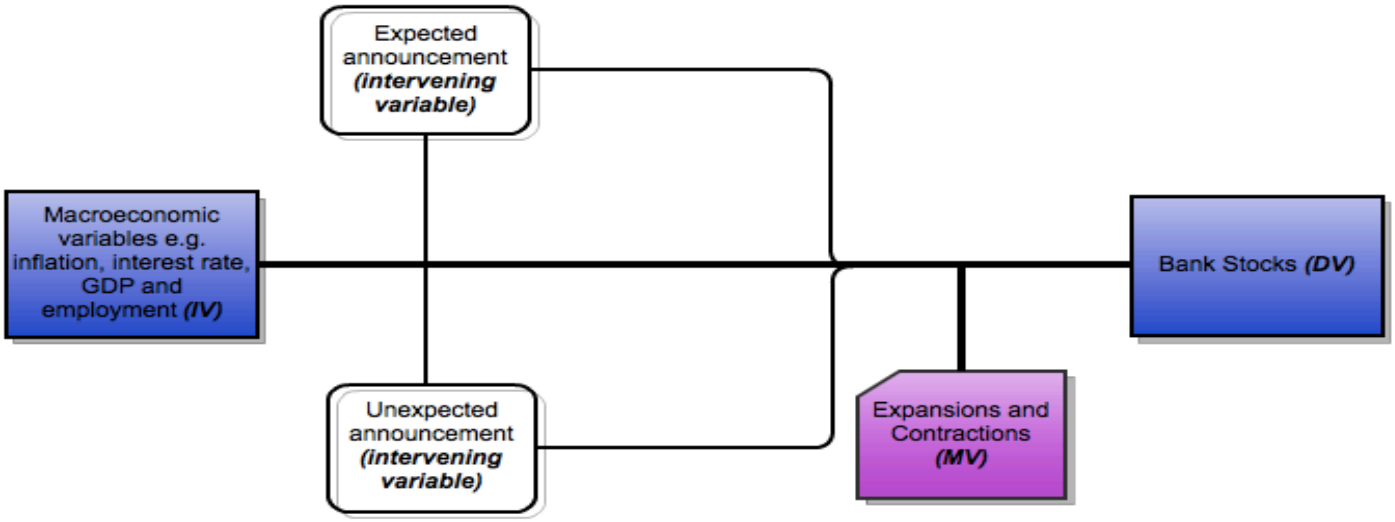

Figure 1 – theoretical framework incl. all relevant variables
Source: *Research Methods for Business (book)*

2.2 Defining the Conceptual Model The banks stocks are reflected as the dependent variable that is to be explained in this report. All research questions are supposed to lead towards the banks stocks and differences herein. The macroeconomic variables (also called independent variables) have a direct effect on bank stocks, showing that a change in one of the macroeconomic variables can influence the returns of bank stocks. As described in chapter 1, the macroeconomic variables and their effect on bank stocks rely on the intervening variable e.g. expectation of announcements.

If announcements on the macroeconomic variables are expected (upper white box), no significant change will occur in the return of bank stocks. However, if the news is unanticipated (lower white box), the return of banks stocks will be influenced and altered (D.K. Pearce & V.V. Roley (1994)). As the announcements of the macroeconomic variables (inflation, GDP and unemployment) are the sole factor influencing the bank stocks, the relationship between the two is represented by the thick black line in figure 1. This part will be tested by using a regression on all independent variables and their unexpected component, reflected in the following hypothesis:

H1: The return of bank stocks is influenced by news on macroeconomic variables

Do keep in mind that changes in macroeconomic variables and their effect are influenced by the unexpected component and that the influence of the unexpected part on return of bank stocks can vary depending on the state in which an economy occurs. Above the role of the intervening variable has been described, being the most important factor to influence the effect that the independent variables have on bank stocks. Nonetheless, the moderating variable is a second factor of great importance. If such a variable may occur, it will modify the original relationship between the dependent and independent variables. This report will have an emphasis on expansions and recession as the moderating variable.

The effect that macroeconomic variables have on bank stocks is usually to be considered in expansionary periods. However, if the economy is to fall in a recession, the effect of the news component with the same magnitude could have an entirely different effect on the bank stocks. Business cycle data, retrieved from the NBER website, will be used to determine the state of economy, introducing the information into a dummy variable. For the second part of the report and to test the above assumptions, another hypothesis has been created:

H2: The return of bank stocks is influenced by the state in which an economy occurs

3 Research Method

3.1 Sampling Design and Data Analysis As this research is centered around providing insight into the problem and hypothesis testing, the use of the following research designs is mandatory: exploratory and descriptive. By using journals and books written by experts to the macroeconomic field, the problem statement and hypotheses have been concluded. From here on the specific hypotheses will be tested within which the relationship between the dependent and independent variables will be explained, resulting in an answer to the problem statement. In order to test the hypotheses, datasets will be created using CRSP and Compustat from which the conclusion is to be drawn. The datasets will be representing large and small U.S. commercial banks and their stock returns in the dependent variable as well as the independent variables (inflation, GDP and unemployment) to be found at Bloomberg, CPSP, Bureau of Labor Statistics and more.

The banks will be grouped into large and small-sized banks according to their asset size. The 3 banks with the largest assets will represent the large-sized banks and the lowest 3 banks will again account for the small-sized banks. However, only banks that have stock return information available for the entire sampling period will be considered. As previously mentioned, the CRSP and Compustat are of great assistance in providing the necessary bank stock information to be included in the dataset, using data on daily basis from January 1991 to December 2010. From here on the monthly information on all independent variables will be included. By using the monthly information on the independent variables, the exact day of release can be found that influences the returns of bank stocks. From here on all other daily information on returns can be excluded from the dataset.

3.2 Testing the Surprise Part of Independent Variables A regression analysis will be conducted to determine whether or not the news component of the independent variables has an impact on the return of bank stocks. As differences exist in macroeconomic variables and their effects, standardizing macroeconomic news is the best way in retrieving the unexpected component (A. Beber & M.W. Brandt (2010)). To do this, the calculation used by Andersen, Bollerslev, Diebold and Vega (2003) can be used:

$$S_{kt} = \frac{A_{kt} - E_{kt}}{\hat{\sigma}_k}$$

Where A_{kt} is the announced value of indicator k and E_{kt} is the expected value of k, divided by the sample standard deviation, denoted by $\hat{\sigma}_k$. In order to determine the return of U.S. bank stocks, the following linear regression is to be applied separately for each macroeconomic variable. The regression already includes the above calculation for each independent variable:

$$R_{i,t} = \beta_{0,k} + \beta_{1,k} M_{k,t} + \varepsilon_{k,t}$$

In the above regression, the k stands for the type of macroeconomic variable. Brooks mentions in his book on *Econometrics for Finance* that it is useful to combine the dependent and independent variables in a regression equation in order to determine the effect that each independent variable will have on the return of bank stocks. Inflation has been included as it affects income distribution and can lead to distortions and uncertainty in the market whilst employment and unemployment reflect welfare but also indicate how an economy is using its resources (O. Blanchard (2011)). Each independent variable mentioned will be drawn separately and included in the dataset. CPI (consumer price index) is to be used for the inflation rate, PPI (producer price index) as an indictor of GDP and finally, the unemployment rate as well as the nonfarm payroll information will be used for unemployment. In table 1, a summary can be found of the fundamental regressions used for each of the independent variables separately the give a clear indication of the above regression.

Independent Variables:	**Regression:**
Inflation (π)	$R_{\pi,t} = \beta_{0,\pi} + \beta_{1,\pi}\mathrm{CPI}_t + \varepsilon_{\pi,t}$
GDP *(g)*	$R_{g,t} = \beta_{0,g} + \beta_{1,g}\mathrm{PPI}_t + \varepsilon_{g,t}$
Unemployment *(u)*	$R_{u,t} = \beta_{0,u} + \beta_{1,u}\mathrm{UR}_t + \varepsilon_{u,t}$

Table 1 – IV regression
Source: *C. Brooks, 'Econometrics for Finance'*

The ordinary least square test (OLS) can be applied in order to establish co-linearity between the introduced variables (A. Khan, H.Ahmad, Z. Abbas (2011)). The OLS is a widely used method to check if data is closely related to the line when drawing up a scatter plot by firstly using the squared distance of each dot to the line and secondly by using the sum of squared areas to minimize (C. Brooks (2008)). The co-linearity is of importance to determine which of the independent variables has an impact on the bank stocks. As it is expected that all independent variables introduced in the regression equation cause a significant shift in bank stocks, a conclusion will be drawn in this report whether this is indeed the case and which variables have a larger impact compared to the others. Bank stock are considered to react negatively to news announcements that exceed the expectations of investors, will react positive to negative news announcements and will not show a change if the unexpected component equals investors' expectations (T. Cenesizoglu (2006)). Nonetheless, chapter 4 and 5 will solely focus on concluding how the return of bank stocks is influenced by announcements that do not equal investor's expectations.

3.3 Testing the Dummy Variable The next step will be to introduce information on expansions and recession that occurred in the period of 1990-2010. This is to be done by using information on business cycle data and including the data into a dummy variable. The Business Cycle Dating Committee of the National Bureau of Economic Research *(NBER)* has listed several dates that indicate the starting and ending periods of contractions and expansions. The NBER has identified that the latest recession showed a beginning in December 2007 and ended in June 2009, where a period of expansion begun e.g. a period of recovery. A recession in the context of NBER is as following: ''a significant decline in economic activity spread across the economy, lasting more than a few months, normally visible in real GDP, real income, employment, industrial production and wholesale-retail sales''. In table 2 the business cycle dates are given as of World War II to the end of the very last recession in order to show that the recent contraction period lasted 18 months, which is the longest downturn since World War II.

Business Cycle Reference Dates		**Duration in Months**	
Peak	*Trough*	**Contraction**	**Expansion**
Quarterly dates are in parentheses		*Peak to trough*	*Previous trough to this peak*
February 1945 (I)	October 1945 (IV)	8	80
November 1948 (IV)	October 1949 (IV)	11	37
July 1953 (II)	May 1954 (II)	10	45
August 1957 (III)	April 1958 (II)	8	39
April 1960 (II)	February 1961 (I)	10	24
December 1969 (IV)	November 1970 (IV)	11	106
November 1973 (IV)	March 1975 (I)	16	36
January 1980 (I)	July 1980 (II)	6	58
July 1981 (III)	November 1982 (IV)	16	12
July 1990 (III)	March 1991 (I)	8	92
March 2001 (I)	November 2001 (IV)	8	120
December 2007 (IV)	June 2009 (II)	18	73

Table 2 – dates and duration on contraction/expansion periods
Source: *NBER business cycle (website)*

In the table the trough indicates the end of a recession and the start of an expansion e.g. a rising phase of the business cycle. From the above, a conclusion can be drawn that, for example, a recession started in January 1980 (ending July 1980), after which a relatively short expansion period arises until July 1981. In July 1990, the economy gets captured in another contraction lasting slightly shorter than a year. It is also visible that a

recession started in March of 2001 (ending November 2001) following a quit large expansion period that starts deteriorating as of December 2007 and leading to a new period of contraction. The last mentioned dates are of great importance in this report, as they fall within the sample period used in the report.

The website of the Federal Reserve Bank of Philadelphia offers historical data on coincident monthly indices dating from January 1979 to February 2012. The indices provide insight in all 50 states separately, as well the overall U.S. approximation, showing the monthly estimates of probability that the U.S. economy may have been in a recession in that particular month. Looking more closely to the numbers provided for the sample period used in this report, similarities can be found between the NBER data and overall U.S. coincident indices e.g. deteriorations are found in March 2000 as well December 2007, indicating the start of a recession. However, the end of the recession periods does not equal the NBER data as the recent contraction shows an end in September 2009 whilst NBER has indicated June 2009. In order to proceed correctly, NBER data will be applied as it uses a great amount of different indicators to determine periods of recessions and is therefore more reliable. The exact measures can be found on the website of NBER. This data is to be implemented as a dummy variable in the used dataset. Each month as of January 1991 until December 2010 will be assed and marked by either recession (1 - dummy) or expansion (0-dummy). Two dummies will be created e.g. one dummy is to represent contractions whilst the other will embody expansions. Each regression from table 1 will again be used to assess the return of bank stocks by including the proper macroeconomic variable and calculating the regression using the dummy for recessions first and the dummy for expansions second, in order to be able to get proper insight whether or not a difference in returns exists depending on the state of economy. This will be done for the large-sized banks as well as for the small-sized banks.

The dummy variable for recessions, explaining the return of bank stocks holds the following regression and is to applied for every macroeconomic variable separately:

$$R_{t,k} = \beta_0 + \beta_{1,k}(1\text{-}D_C)\, S_{k,tk} + \beta_1 D_C S_{k,tk} + \varepsilon_{t,k}$$

The k represents the macroeconomic variable to be used, D_C stands for period of contraction and is enacted as 0 in the dummy whilst 1- D_C stands for a period of expansion and is to be used as 1 in the dummy. As mentioned above, a dummy variable for expansions will be used as well and is represented by the following regression:

$$R_{t,k} = \beta_0 + \beta_{1,k}(1\text{-}D_E)\, S_{k,tk} + \beta_1 D_E S_{k,tk} + \varepsilon_{t,k}$$

Here the k again stands for the macroeconomic variables while the D_E indicates periods of expansions and is once more represented by 0 in the dummy. The 1- D_E answers for the 1 in this second dummy and stands for recessions.

After gathering the necessary data on the unexpected component of macroeconomic announcements, the return on bank stocks and dummy variables, a regression can again be applied. Herein the return will represent the depending variable whilst the dummy and unexpected component of inflation, GDP and unemployment can be included as independent variables, resulting into a conclusion for the second hypothesis. The results are expected to show more significant shifts in bank stocks after having introduced the dummy variable (G. McQueen & V.V. Roley (1993)), resulting in the conclusion that macroeconomic news is of greater essence in periods going through expansions (A. Beber & M.W. Brandt (2010)). If this is actually the case is to be discussed in chapter 4 where the empirical results are to be described.

4 Empirical Results

4.1 Data Gathering The first approach to data gathering was to access Compustat in order to get insight into the total assets of U.S. commercial banks. The 6020 SIC-code was used to indicate commercial banks, from which the following information was required as well: company name, tickers, CUSIP, SIC, and the total assets for the year of 2010, as this is the last year in the sampling period. From here on the dataset was sorted, starting with the company with the largest assets.

After possessing and sorting the data on total assets, information on bank stock returns could be accessed through CRSP datasets. The CUSIP was used to transfer/merge data from Compustat to CRSP, using the top 3 and bottom 3 banks to gain daily stock returns from. The 9-character long CUSIP from Compustat equals the 8-character CUSIP from CRSP, excluding the very last number and indicates the banks to be used. Tickers and other codes were expelled due to changes over time and not being readable in the CRSP databases. Many banks that were gained from the Compustat dataset, didn't equal our sample size e.g. they were smaller, most of which started as of 1995 that resulted in a large quest for the right banks that do fit the sample size. For the smaller-sized banks, the total assets as of $ 1000 could only be used in order to have banks fitting in the sample size. Below the banks that could be used are given, including their assets in 2010:

- (BCS) Barclays PLC - $ 2.292.862
- (MTU) Mitsubishi UFJ Financial Group - $ 2.142.231
- (JPM) JPMorgan Chase & Co - $ 2.117.605
- (PEBK) Peoples Bancorp NC Inc.- $ 1.068
- (SAVB) Savannah Bancorp Inc. - $ 1.067
- (NRIM) Northrim Bancorp Inc. - $1.055

As no data was available on bank stock returns, the price was used to calculate the returns in Excel. As previously mentioned, daily data as of January 1991 up to December 2010 was provided but also the stock price at each of these particular dates. To calculate the bank stock returns, the following formula has been implemented: (price 'today' – price day before) / price day before * 100. Now that the returns have been calculated, a distinction needs to exist between large-sized banks and small-sized banks. To create this distinction, the banks and their returns were split into two groups e.g. group one consisting of BCS, MTU and JPM whilst group 2 was represented by PEBK, SAVB and NRIM. For each group, the daily returns of each bank were added up and divided by three, creating an average representation for big banks and small banks.

4.2 Macroeconomic Variables The information on macroeconomic variables was provided in two different datasets. A first dataset was MMS, which held information up to 2004 and a second dataset that contained macroeconomic information that dates from the late 1990 to 2010. In order to get a proper insight into the macroeconomic variables, both datasets had to be merged, using MMS data up to 20004 and BB data as of 2004 up to January 2011.

The datasets hold information on CPI percentage change (for inflation), PPI percentage (for GDP), as well as Unemployment rate and Nonfarm Payroll (for unemployment) for which the median value, actual value and dates of macroeconomic news releases were given. However, data on the Unemployment rate was denoted in codes, which were difficult to decipher. Due to this reason the variable has been left out of the calculation, leaving the Nonfarm Payroll as sole variable to test the unemployment. After the necessary data was merged, the standard deviation could be calculated by using Excel, which leads to standardizing the variables as described in chapter 3, by using the following formula for each of the three macro-variables:

$$S_{kt} = \frac{A_{kt} - E_{kt}}{\hat{\sigma}_k}$$

This calculation enables the possibility to match the news component of macroeconomic variables and its release dates to bank stock return dates. The average return for big banks was listed next to daily return dates, together with the dates of macroeconomic announcements. From here on, all other irrelevant dates could be eliminated until each return date equaled the announcement dates. The same was done for the average return of small banks as well as for each macro-variable separately due to the fact that the variables are all released on a different date. In the process of manual elimination, a peculiar matter arose, being that the small and big sized banks contained many negative return information as well as that some dates did not match. The latter problem was discarded by using the next closest date to the announcement date in order to keep the news effect viable. This was mainly visible in the month of April due to Easter holidays.

By holding all the necessary information, a first glance of the data is given in table 3 below, containing summary statistics for both the standardized macroeconomic news and averaged returns of big and small-sized banks. Herein the N indicates the number of valid observations, where a sample size of 20 years is used over 12 months, coming to a total of 240 months. The mean represents the average and the standard deviation is the spread of the observations. The larger the spread, the more spread-out the observations are, from which is to be concluded that news on GDP has the largest spread and unemployment has the lowest.

DESCRIPTIVE STATISTICS FOR MACROECONOMIC VARIABLES AND BANK RETURNS					
	N	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**
CPI (inflation)	240	-3.277	3.277	-0.111	1.073
PPI (GDP)	240	-3.781	4.945	-0.041	1.244
Payroll (unemployment)	240	-2.846	3.544	-0.143	0.890
Big bank returns	5041	-135.43	20.92	-4.414	18.150
Small bank returns	5042	-207.31	10.32	-48.089	48.830

Table 3 – Descriptive statistics for macroeconomic news and bank returns
Source: *SPSS*

4.3 Results for H1 In order to test the first hypothesis drawn in chapter 2 of this report, the use of SPSS and its linear regression will be of assistance. A first step consisted of creating a dataset, holding all the necessary information on bank stock returns as well as on the macroeconomic variables. The dataset consisted of inflation news in the first column, followed by big bank returns and small bank returns, repeated again for the GDP and unemployment news variable. The tests to be conducted have the big bank and small bank returns as dependent variable, as mentioned previously in the report, as well as the macro variable news as independent variable.

Prior to the obtained results, a brief explanation is provided of the tests conducted in SPSS:

- Pearson's correlation – indicates how well the variables correlate together and if a negative or positive correlation exists. A high correlation is said to exist above 0.80.
- Significance – indicates the probability that the H_0 (null-hypothesis) is correct and should be close as close to zero as possible. Usually, p-values under 0.05 are considered significant.
- R^2 – is the goodness-of-fit e.g. how much is explained by the model and should be preferable be close to 1.
- F – is the regression coefficient b. If b = 0, there is no relation between the dependent and independent variable.
- B coefficient – provides information on the linear equation.

In table 4 on the upcoming page, the output provided by SPSS is summarized for all the macroeconomic variables. A first test has been conducted with inflation (CPI percentage) as independent variable to explain the return of bank stocks, being the dependent variable. It can be concluded that news announcements about

inflation have very little effect on the return of bank stocks on the same day as news is released. This is effective for both large and small banks and can largely be explained by the high significance. As described in the brief explanation above, the significance should be as close to zero as possible, indicating that the null-hypothesis is rejected and that the testing-hypothesis is correct e.g. H1 being 'return of bank stocks is influenced by news on macroeconomic variables', which is not the case for inflation. This is also visible when looking at the R^2 that almost equals the zero point, concluding a very poor model fit. The Pearson's correlation as well as the F in the table, both indicate a low correlation between inflation and bank stock returns as both again lie on the border of zero.

	Sig.	**Pearson's correlation**	**R^2**	**F**	**t-test**	**B**	**Linear equation**
Inflation & BB return	0.579	0.036	0.001	0.308	0.555	0.581	$\hat{Y} = -4.285 + 0.581x_1$
Inflation & SB return	0.548	0.039	0.002	0.362	0.602	1.839	$\hat{Y} = -51.597 + 1.839x_1$
GDP & BB return	0.993	0.001	0.000	0.000	0.009	0.000	$\hat{Y} = -3.230 + 0.000x_1$
GDP & SB return	0.377	-0.057	0.003	0.784	-0.885	-0.037	$\hat{Y} = -49.767 – 0.037x_1$
Unemployment & BB return	0.063	0.120	0.014	3.480	1.865	3.059	$\hat{Y} = -5.549 + 3.059x_1$
Unemployment & SB return	0.154	0.093	0.009	2.048	1.431	4.862	$\hat{Y} = -45.387 + 4.862x_1$

Table 4 – regression results
Source: *SPSS*

The same goes for the news announcement about GDP (PPI), where the variable does not seem to be of any significance to explaining the return of banks and is of less value than the inflation. The Pearson-correlation for big banks and PPI is very low, being at 0.001 with significance of 0.993, showing that there is basically no relation between the dependent and independent variable. For small banks there is even a negative correlation e.g. when true news in released on GDP, stock returns of small banks will decrease. The same can be concluded from the R^2. By looking at the R^2 (0.001), it is clear that the model doesn't predict the return at all.

Even though the inflation and GDP are of low value, the unemployment variable is showing great significance in the model, mainly for the larger sized banks. As seen above, p-values under 0.05 are considered significant whereas the Nonfarm Payroll used for unemployment is 0.063 for big banks and 0.154 for the smaller banks, lying very close to 0.05 significance point. The significance for big banks indicates that 94% confidence is used to support the testing hypothesis and 85% for small banks, leading to a conclusion that news on unemployment does influence the return of bank stocks. However, the R^2 is still very low, meaning that the model fit is not good. Nonetheless, if the variables are compared, it can be said that the unemployment is of influence when it comes to bank stock returns, whilst the inflation and especially GDP show no relevant relation to the returns.

4.4 Results for H2 To proceed correctly with testing the second hypothesis, two dummy variables had to be created manually with the business cycle data retrieved from the NBER website, to be found in table 2. The first dummy represents recessions that are denoted by a 0 whilst expansionary periods are denoted by a 1. The business cycle data as of January 1991 until December 2010 has been used and incorporated into the dataset. The second dummy was created to represent expansions, where expansions are denoted by 0 and contractions by 1. Two dummy variables have been created in order to get proper insight into the real influence of the state of economy on bank stock returns.

The first regression results can be found in table 5, holding information on inflation as macroeconomic variable for both big and small-sized banks in periods of contractions as well as expansions. It immediately gets clear that newly released information on inflation has a greater impact on small-scaled banks than on the larger bank group. Looking at the significance level of inflation and its influence on big banks in both recessions and expansions, it can be said that no relation exists. The total significance amounts for inflation and recession together, whilst the separate p-values have been denoted as well, in order to see which of the two has a greater impact. The significance of inflation and its influence on small banks is however of more use in both business cycles. Inflation does have an influence, in both expansions and recession, on small bank returns as 74% confidence exists. Looking more closely to the separate p-values, it immediately gets clear that news on inflation has very little impact on its own and depends on whether the information is released in periods of economic wealth or economic downturn. Another peculiar matter is that almost no difference exists between the results for big banks in both expansion and recession. The significance, R^2, and F are identical. The same goes for the smaller-scaled bank. The main difference occurs within the Pearson's correlation where correlation between inflation and big as well as small banks stay the same, like seen in table 4, while the correlation between inflation and recession, as well recession and stock returns do hold the same magnitude of correlation but move from negative to positive and vice versa. Recession and big banks correlate positively whilst expansion and big banks correlate in a negative manner.

EXPANSION AND RECESSION RESULTS FOR INFLATION							
	Sig.	**Pearson's correlation**	**R^2**	**F**	**t-test**	**B**	**Linear equation**
CPI & BB returns in recession	Total = 0.655, inflation = 0.547, recession = 0.463	BB & inflation = 0.036, BB & recession = 0.045, inflation & recession = -0.068	0.004	0.424	Inflation = 0.604, Recession = 0.736	Inflation = 0.634, Recession = 2.466	$\hat{Y} = -6.427 + 0.634x_1 + 2.466x_2$
CPI & BB returns in expansion	Total = 0.655, inflation = 0.547, expansion = 0.463	BB & inflation = 0.036, BB & expansion = -0.045, inflation & expansion = 0.068	0.004	0.424	Inflation = 0.604, Expansion = -0.736	Inflation = 0.634, Expansion = -2.466	$\hat{Y} = -6.427 + 0.634x_1 - 2.466x_2$
CPI & SB returns in recession	Total = 0.264, inflation = 0.619, recession = 0.129	SB & inflation = 0.039, SB & recession = -0.101, inflation & recession = -0.068	0.011	1.340	Inflation = 0.498, Recession = -1.522	Inflation = 1.521, Recession = -14.851	$\hat{Y} = -38.699 + 1.521x_1 – 14.851x_2$
CPI & SB returns in expansion	Total = 0.264, inflation = 0.619, expansion = 0.129	SB & inflation = 0.039, SB & expansion = 0.101, inflation & expansion = 0.068	0.011	1.340	Inflation = 0.498, Expansion = 1.522	Inflation = 1.521, Expansion = 14.851	$\hat{Y} = -38.699 + 1.521x_1 + 14.851x_2$

Table 5 – regression results CPI for inflation

Source: *SPSS*

However, what is most crucial is the relation between the macro variable with recessions and expansions. The relation between inflation and recession for big bank returns can as well be found in table 5, which shows that contractions have a negative impact on inflation but expansions will have a positive influence on inflation. The same is applicable for the returns of small banks. Nonetheless, it is clear that the results are very poor and that a greater part is showing no relation between the testing variables, which is of importance to mention before moving on to the next table. The main goal is to compare the results and see whether there is a difference like done above.

Moving on to GDP, table 6, it is again of great importance to mention that this variable has a greater impact on small-sized bank. It is actually the only number that falls under the 0.05 p-value level, making it the most significant value in the result tables. Again, when looking at the significance separately it becomes obvious that the state of the economy exceeds the impact in the total significance over the macroeconomic variable with a p-value of 0.016, concluding that approximately 98% is correctly explained. Yet, comparing the Pearson's correlations shows that GDP actually correlates in a positive manner when released in recession periods and negatively in expansionary periods, which is the opposite of what has been seen in the table for inflation. It also visible that the model fit is somewhat larger for GDP than for the other variables, especially for small banks at 0.027 and having a larger regression coefficient (F), denoted at 3.330.

The next step leads to table 7, holding the regression results for unemployment by using the Nonfarm Payroll as indicator. Table 4, that holds the regression results excluding the dummy variables, shows that unemployment has the greatest influence on bank stock returns. This can partly be supported by the results in table 7. The significance levels are not the lowest when comparing to the other tables, but does show relatively lower levels for both big and small banks whilst in the previous discussed results, a great significance was only found in the smaller bank compartment. What is conspicuous is that in the results of unemployment the state of economy has very little impact in the total significance and is mostly allocated to the macro variable itself (0.055 and 0.169), determining that recession and expansions hold no significant value in the influence of bank stock returns. The correlation again proofs that unemployment and recessions move positively together whilst unemployment and expansions have a negative relation. Once more a slightly higher model fit and regression coefficient are provided, indicating that unemployment has a larger influence on bank stock returns than inflation.

EXPANSION AND RECESSION RESULTS FOR GDP							
	Sig.	**Pearson's correlation**	**R^2**	**F**	**t-test**	**B**	**Linear equation**
PPI & BB returns in recession	Total = 0.437, GDP = 0.821, recession = 0.199	BB & GDP = 0.001, BB & recession = -0.082, GDP & recession = 0.168	0.007	0.831	GDP = 0.226, Recession = -1.289	GDP = 0.003, Recession = -3.598	$\hat{Y} = -0.084 + 0.003x_1 - 3.598x_2$
PPI & BB returns in expansion	Total = 0.437, GDP = 0.821, expansion = 0.199	BB & GDP = 0.001, BB & expansion = 0.082, GDP & expansion = -0.168	0.007	0.831	GDP = 0.226, Expansion = 1.289	GDP = 0.003, Expansion = 3.598	$\hat{Y} = -0.084 + 0.003x_1 + 3.598x_2$
PPI & SB returns in recession	Total = 0.037, GDP = 0.636, recession = 0.016	SB & GDP = -0.057, SB & recession = -0.163, GDP & recession = 0.168	0.027	3.330	GDP = -0.474, Recession = -2.421	GDP = -0.020, Recession = -23.682	$\hat{Y} = -29.056 - 0.020x_1 - 23.682x_2$
PPI & SB returns in expansion	Total = 0.037, GDP = 0.636, expansion = 0.016	SB & GDP = -0.057, SB &expansion = 0.163, GDP & expansion = -0.168	0.027	3.330	GDP = -0.474, Expansion = 2.421	GDP = -0.020, Expansion = 23.682	$\hat{Y} = -29.056 - 0.020x_1 + 23.682x_2$

Table 6 – regression results PPI for GDP

Source: *SPSS*

EXPANSION AND RECESSION RESULTS FOR UNEMPLOYMENT							
	Sig.	**Pearson's correlation**	**R^2**	**F**	**t-test**	**B**	**Linear equation**
N.P. & BB returns in recession	Total = 0.151, N.P. = 0.055, recession = 0.558	BB & N.P. = 0.120, BB & recession = -0.021, N.P. & recession = 0.140	0.016	1.907	N.P. = 1.926, Recession = -0.586	N.P. = 3.195, Recession = -2.575	$\hat{Y} = -3.288 + 3.195x_1 – 2.575x_2$
N.P BB returns in expansion	Total = 0.151, N.P. = 0.055, expansion = 0.558	BB & N.P. = 0.120, BB & expansion = -0.021, N.P. & expansion = -0.140	0.016	1.907	N.P. = 1.926, Expansion = 0.586	N.P. = 3.195, Expansion = 2.575	$\hat{Y} = -3.288 + 3.195x_1 + 2.575x_2$
N.P. & SB returns in recession	Total = 0.350, N.P. = 0.169, recession = 0.797	SB & N.P. = -0.093, SB & recession = 0.029, N.P. & recession = 0.140	0.009	1.053	N.P. = -1.378, Recession = 0.258	N.P. = -4.738, Recession = 2.349	$\hat{Y} = -47.448 + 4.738x_1 + 2.349x_2$
N.P. & SB returns in expansion	Total = 0.350, N.P. = 0.169, expansion = 0.797	SB & N.P. = -0.093, SB & expansion = -0.029, N.P. & expansion = -0.140	0.009	1.053	N.P. = -1.378, Expansion = -0.258	N.P. = -4.738, Expansion = -2.349	$\hat{Y} = -47.448 + 4.738x_1 - 2.349x_2$

Table 7 – regression results Nonfarm Payroll for unemployment

Source: *SPSS*

5 Conclusion

Macroeconomic variables are known for their effect on the economy. It has been seen throughout the report that the unexpected component is the real factor of influence when it comes to bank stocks. Previous research, like by Cenesizoglu (2006) has also proven this fact, saying that bank stock react in different manners to expected and unexpected news, with emphasis on unexpected, which shows the largest effect.

According to the findings in chapter 4 on the first hypothesis, news on inflation has very little influence on bank stock returns on the same day, proven by the high significance, low model-fit and poor correlations as well as a poor F. The GDP even shows that it has as good as no influence on the returns of big banks, with an amazingly low correlation of 0.001 and high significance of 0.993. It does show slightly better results for small banks but enough to conclude that GDP actually influences the bank stock returns. Even though the previous two variables show no impact, the third variable of unemployment is showing quite low significance levels of 0.063 and 0.154. Even the model fit is somewhat higher than the previous results. It can be said that the return of bank stocks is not influenced by news on inflation and GDP, but does show a slightly higher impact when it comes to the unemployment rate.

Tests on the second hypothesis show there is not enough evidence to proof that inflation has no influence on big bank returns but does show a greater impact on small banks. The significance of small banks is 0.264, where 0.619 comes from inflation and 0.129 by the state of economy, concluding that the return of bank stocks is influenced by the state in which an economy occurs when information is released on inflation. The results even show that inflation negatively correlates with recessions and positively with expansions, indicating that a higher inflation is to be expected in recessions and lower in expansions. Moving on to GDP, it can again be said there is larger effect on small banks and that the effect mostly comes from the state in which the economy occurs. The numbers are as following: total significance of 0.037 for small banks, with 0.636 for GDP and 0.016 for expansions and recessions. Again it is to be concluded that bank stock returns are influenced by the state of economy when news on GDP is revealed. What is striking is no evidence has been found at all that the state of economy influences bank stock returns when talking about unemployment.

It has been seen that the effect of macroeconomic variables are more profound on smaller banks than on bigger banks as they have a higher significance and higher Betas. From the perspective of Blanchard (2011) this could actually hold, as big banks are more immune and less sensitive to macroeconomic news than smaller banks due to lower financial means.

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