WHAT MACROECONOMIC VARIABLES DRIVE THE STOCK RETURNS OF AUSTRIAN FINANCIAL INSTITUTIONS?

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Abstract: *The stock prices of companies are influenced by many variables; the predominant ones are macroeconomic factors. The objective of this paper is to analyze the existence of a relationship between select macroeconomic variables and the stock returns of financial sector companies listed on the Vienna Stock Exchange. The institutions that were chosen are CA Immobilien Anlagen, Erste Group Bank AG, Immofinanz AG, Raiffeisen Bank International AG, Uniqa Insurance Group AG and Vienna Insurance Group AG. The focus is on Austria due to the lack of empirical literature on stock prices, stock returns and the indicators that influence them. A time series with a quarterly frequency is used to examine the occurrence of long term and short-term relationship links using the Johansen cointegration test and the Vector Error Correction Model (VECM). The empirical estimates are calculated for the 2005 – 2015 period, which includes the global financial crisis. Our main finding is that the macroeconomic factors used have a primarily negative impact on the stock returns of the select institutions.*

Keywords: *Financial sector, Macroeconomic variables, Austria, Cointegration, Global financial crisis.*

JEL Classification: *G01, O52, F41, E000, C58.*

Introduction

Company stock prices are influenced by many variables. There are two basic categories of factors that affect stock prices as follows; macroeconomic factors and microeconomic factors. This study is focused on stock prices and identifying the factors that affect the stock returns of financial institutions in Austria. We selected the financial sector because it is an important component of every national economy and contributes a significant portion of the GDP. We focus on the Vienna Stock Exchange because it is one of the oldest stock exchanges in the world and is a driving force that contributes substantially to the development of the Austrian market. The market capitalization of the Vienna Stock Exchange is approximately 105.23 billion EUR. The capitalization has improved in recent years through a combination of higher capital and reduced risk-weighted assets. In the third quarter of 2015, the banking system in Austria had a common equity tier-1 ratio of 12.1 %, a tier-1 capital ratio of 12.2 % and a total capital adequacy ratio of 15.9 %. The net profits of Austrian banks improved in the third quarter of 2015 to 4.5 billion EUR. Net interest income, a major income component of the business model of Austrian banks, continued to decrease from 19.3 billion EUR at the end of 2014 to approximately 13.8 billion EUR in 2015Q3.

The objective of our paper is to analyze the existence of the relationship between several macroeconomic variables and the stock returns of financial sector companies listed on the Vienna Stock Exchange. Therefore, certain institutions are considered,

including CA Immobilien Anlagen, Erste Group Bank AG, Immofinanz AG, Raiffeisen Bank International AG, Uniqa Insurance Group AG and Vienna Insurance Group AG. All financial institutions are included in the ATX Financials. The ATX Financials (ATX FIN) is one of five capitalization-weighted price indexes, and is composed of 11 financial sector stocks. The capitalization of ATX FIN is approximately 13.34 billion EUR in 2016Q4. We chose only 6 financial institutions due to the significance of their market shares and the attainment of the required time series.

Erste Group Bank AG is the leading bank in Central and Eastern Europe for advising and servicing private clients. This bank operates in Serbia, Croatia, Romania, Hungary, Slovakia, Austria and the Czech Republic. Erste Group Bank AG is the owner of Česká spořitelna and Slovenská sporiteľňa. The total assets of Česká spořitelna were 1 037.3 billion CZK, Slovenská sporiteľňa had 14 billion EUR in assets in 2015. The total assets of Erste Group Bank AG increased to 204.5 billion EUR in 2015.

With a premium volume of approximately 9 billion EUR in 2015, Vienna Insurance Group is one of the leading insurance groups in Austria and Central and Eastern Europe. The Vienna Insurance Group now operates in 25 markets; the core markets are Austria, the Czech Republic, Slovakia, Poland, Romania, Bulgaria, Croatia, Hungary, Serbia and the Ukraine. The Vienna Insurance Group has a market share of approximately 24 %, which makes it the largest insurance group in Austria. The VIG is currently represented by three insurance companies in the Czech Republic: Kooperativa (market share, 21 %), Česká podnikatelská pojišťovna (market share, 5 %) and Pojišťovna České spořitelny (market share, 15 %).

The home market of Raiffeisen Bank International is Austria and Central and Eastern Europe. Raiffeisen is a leading commercial and investment bank in Austria with an internet market share of 42 percent. Raiffeisen Bank International AG has 21.7 % market share in Albania, a 16.3 % share in Slovakia, and a 15.8 % share in Bosnia and Herzegovina, an 8.3 % share in Romania, a 4.5 % share in the Czech Republic, and a share of other Central and Eastern European country markets.

The UNIQA Group is one of the leading insurance groups in its core markets of Austria and Central and Eastern Europe. The group operates 19 countries and with Raiffeisen Versicherung has the two strongest insurance brands in Austria. The year 2016 was important for the UNIQA Group in Austria because the four primary insurers previously operating in Austria were merged into one company. Versicherungsgesellschaften FinanceLife Lebensversicherung AG, Raiffeisen Versicherung AG and Salzburger Landes-Versicherung AG merged with UNIQA Österreich Versicherungen AG, the acquiring entity. UNIQA Österreich, which is the largest insurer operating in Austria, achieved a market share of over 22 % in 2015.

Immofinanz AG is a commercial real estate company that is focused on the retail and office segments in European markets . The company’s core business includes the management and development of properties; the company has a real estate portfolio of approximately 5.4 billion EUR. Additionally, the last company, CA Immobilien Anlagen, is a real estate company that operates in Central European markets; its core business involves leasing, managing and developing high-quality office buildings. The company controls property assets of approximately 3.7 billion EUR in Germany, Austria and Eastern Europe.

Macroeconomic variables include the interest rates, the inflation, the gross domestic product, the money supply M3 and the unemployment rate. The problem is that the body of available empirical literature focuses on many stock markets; however, our research focuses on Central European countries. The published empirical literature on Austria is focused on linkages between stock prices or stock returns and macroeconomic variables or on the interdependence of Central and Eastern European stock markets. We reference these two bodies of literature in our study.

The paper is divided into four sections. The method section follows the introduction. The next section, findings, discusses the results of the tests. The last section concludes.

1 Review of the Literature

Much empirical research has been conducted to examine the relationship between macroeconomic factors and stock prices or stock returns. The relationship can be determined using select macroeconomic variables, through the development of the stock market or using particular methodologies. We solely considered literature that is relevant. We cite relevant papers on macroeconomic variables; we also citate papers that discuss the Central and Eastern European markets in general but that do not directly address the relationship between macroeconomic factors and stock prices or stock returns.

Errunza and Hogan (1998) researched European stock returns from 1959 – 1993 using the VAR model. The researchers found that money supply volatility Granger caused equity volatility in Germany and France, and the volatility of industrial production Granger caused equity volatility in Italy and the Netherlands. The results demonstrate that macroeconomic factors did not affect equity returns in the United Kingdom, Switzerland, Belgium and in United States.

Hanousek and Filer (2000) investigated the possibility that newly emerging equity markets in Central Europe exhibit semi-strong form efficiency such that no relationship exists between the lagged values of changes in economic factors and the changes in equity prices. They found that there are connections between the real economy and equity market returns in Poland and Hungary.

Nasseh and Strauss (2000) confirmed the existence of significant long- run relationships between stock market prices and domestic and international economic activity in six countries (France, Germany, Italy, Netherlands, Switzerland and the UK). The researchers found that stock price levels are significantly related to industrial production, business surveys of manufacturing orders, short- and long-term interest rates, short-term interest rates, and production.

Hess (2003) calculated the importance of various macroeconomic shocks for Swiss stock market sector indices. In accordance with the VECM approach, Hess analyzed the variance decompositions derived from models that were estimated in closed and open economies. The researcher used three main macroeconomic indicators (GDP, CPI and exports) not only from Switzerland but also from the G7 countries. The results showed important divergences in the stock sub-index sensitivities to innovations in various fundamental variables. Export oriented sectors reacted as expected to foreign shocks; other sectors appeared to be largely unaffected.

Kulhánek (2011) analyzed the relationship between macroeconomic variables and stock prices in the Czech Republic, Poland, Slovak Republic, Austria, Germany and the United Kingdom. Kulhánek discovered that there is a long-run co-integration relationship between the money supply, stock prices and output. In addition, the researcher determined that the money supply and the stock market development are predictive of real economic activity.

Kulhánek (2012) researched the causal relationship between stock prices, output and the money supply development in Austria, the Czech Republic, Hungary, Poland, and the Slovak Republic. The researcher used the Vector Autoregressive and Vector Error Correction models to test long-run equilibrium and short-run dynamics between macroeconomic factors and stock prices. The researcher discovered the long-run relationships among variables in all cases.

Stoica et al. (2014) provided empirical evidence of the impact of domestic and international short-term interest rate shocks on Central and Eastern Europeans capital markets movements. The results showed that effect of the international interest rate had a noticeable effect on the stock market indexes ofin the case of the Czech Republic, Hungary, Poland and Romania.

Martínez et al. (2015) examined the relationship between changes in interest rates and the Spanish stock market. The empirical results indicate that Spanish industries exhibit, in general, a significant interest rate sensitivity. The linkage between movements in interest rates and industry equity returns is strong. This finding is consistent with the idea that investors with long-term horizons are more likely to follow macroeconomic fundamentals, such as interest rates, in their investment decisions.

Gajdka and Pietraszewski (2016) examined the cross-country correlation between long-term stock rate of return and real GDP growth. The result show that the correlation coefficients were slightly positive in the period before financial crises and slightly negative after financial crises.

Österholm (2016) investigated the long-run relationship between stock prices and GDP in Sweden. The findings suggest that the two variables are cointegrated and, hence, that there exists a long-run equilibrium relationship between them.

Peirö (2016) analyzed the dependence of stock prices on macroeconomic variables (industiral production, long-term interest rates) in France, Germany and the United Kingdom. The findings revail that both factors are important, but the weight of these factors has clearly moved from interest rates to production.

2 Methods

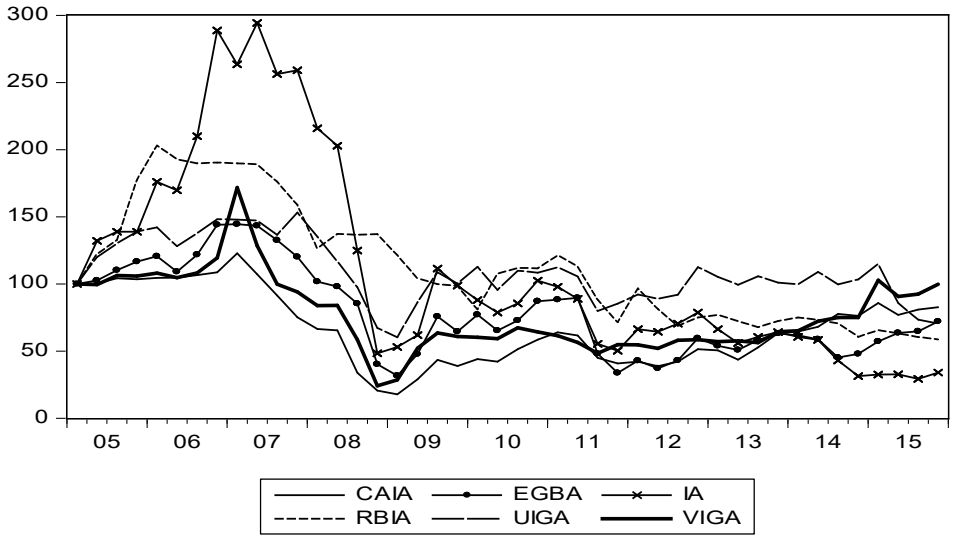
We used six financial institutions that are listed on the Vienna Stock Exchange: CA Immobilien Anlagen (CAIA), Erste Group Bank AG (EGBA), Immofinanz AG (IA), Raiffeisen Bank International AG (RBIA), Uniqa Insurance Group AG (UIGA) and Vienna Insurance Group AG (VIGA). Quarterly data from the 2005 – 2015 period in EUR are used. The stock price data are from the Vienna Stock Exchange database.

The macroeconomic variables studied are as follows: short-term interest rates in percent per annum (IR); inflation measured by the Harmonized Index of Consumer Prices (HICP) in percent (INF); the unemployment rate in percent per annum (UNE); the gross domestic product (GDP) in billion EUR; and the money supply M3 (M3) in

billion EUR. The gross domestic product is in market prices and represents the expenditure on final goods and services less imports. These time series are from the OECD statistical database.

Before calculating the empirical estimations, we utilized charts that show the behaviour of stock prices and macroeconomic variables; thus, we could find descriptive statistics. Fig. 1 shows the behaviour of the stock prices of CAIA, EGBA, IA, RBIA, UIGA and VIGA from 2005 – 2015; the values are quarter end, and all data are in EUR. Fig. 1 shows that the fluctuation of stock prices in the RBIA, CAIA and VIGA were very similar. The development of EGBA and UIGA were nearly identical. The development of stock price of the IA stock price has the most pronounced changes, mainly a sharp decline at the beginning of 2009. All stock prices decreased in 2009; however, IA decreased the most. A decrease in stock prices in 2009 may have been caused by the beginning of the global financial crisis and fears regarding the economic development in Central and Eastern European countries. This finding mean lower capital and lower capital quality, higher risk exposure, problems with loan repayments, underpricing of risks, higher volatility, and lower profitability; all these represent potential losses for the financial sector.

Fig. 1: Development of stock prices in % (2005Q1=100 %)



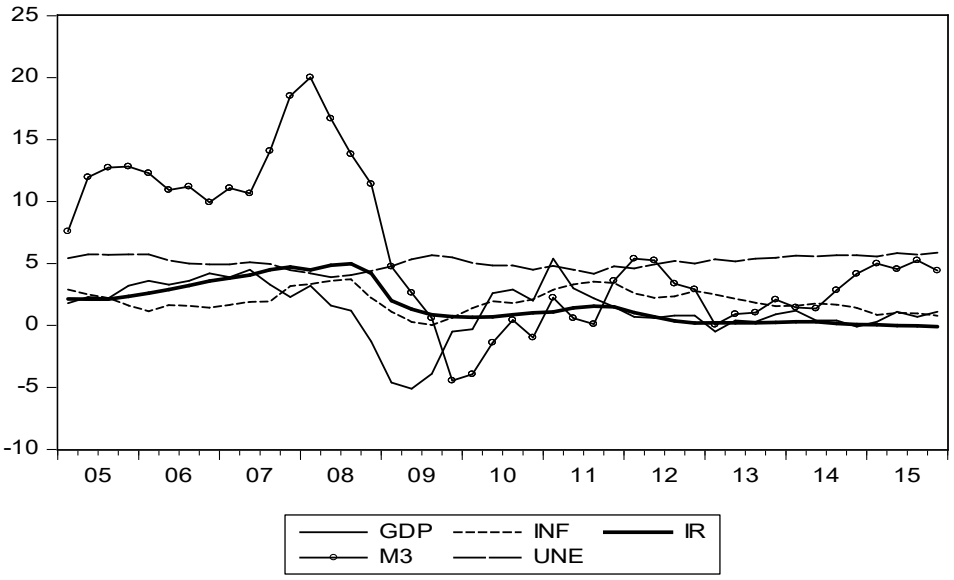
Source: Vienna Stock Exchange, 2016

Fig. 2 shows, the development of the GDP growth, the inflation, the interest rate, the money supply M3 growth and the unemployment rate. We demonstrate the GDP and the money supply as quarterly growth because they are better indicators to illustrate the macroeconomic environment. The GDP and the money supply M3 have a typical similar development trend. The decrease of the GDP and the money supply is evident at the beginning of and during the global financial crisis. The inflation and unemployment rate were not typical, experiencing high fluctuations. The last macroeconomic variable, the interest rate decreased at the beginning of the global financial crisis in Europe and the debt crisis in 2012.

According to the Austrian National Bank the Austrian economy is currently influenced by the very gradual growth in the euro area and the decreasing demand for imports from Austria and other countries. The Austrian economy nearly stagnated in 2014 and 2015; it was the lowest, since the crisis years of 2008 and 2009, as shown in Fig. 2. Austria's economy is suffering from rising unemployment and a negative

business climate. The unemployment rate remains low (5.7 %) compared to Europe; however, is has been rising for the third year in a row, and the number of long-term unemployed has doubled primarily due to adverse wage impacts and rising unemployment. Since the launch of the euro in 1999, HICP inflation has averaged 1.9 % in the euro area and Austria, thus in accordance with the ECB's price stability target. However, since September 2012, Austria has experienced higher inflation rates.

Fig. 2: Behavior of macroeconomic variables over time (in %)



Source: OECD database, 2016

As regards to the methodology, we checked the stationarity of the time series. Then, data were subjected to correlation analyses to determine the linear relationship between the stock returns and the macroeconomic variables.

Thereafter, we examined the long-term equilibrium relationships using the Johansen test to determine the presence of cointegrating vectors, VAR. The equation used for the VAR model is (Johansen and Juselius, 1990):

$$\Delta Y_t = C_0 + \sum_{i=1}^{p-1} \Gamma_i \Delta Y_{t-1} + \Pi Y_{t-1} + \eta_t \qquad (1)$$

where Y_t is a vector of non-stationary variables, C_0 is a constant, p is an order of autoregressive polynomial, i is a number of the periods, and η_t is the white noise term. u_t denotes a n×1 vector of unobservable error terms, Δ is a difference operator, ΔY_t and Δy_t means rate of growth or changes. The information on the coefficient matrix between the levels of the Π is decomposed as $\Pi = \alpha\beta'$ where the relevant elements of the α matrix are adjustment coefficients, and the β matrix contains the cointegrating vectors. The variables Π and Γ in the matrix contain the value of the cointegrating vectors. The first likelihood ratio statistics for the null hypothesis of the precise r cointegrating vectors against the alternative $r + 1$ vector is the maximum eigenvalue statistic. The second statistic for the hypothesis of at most r cointegrating vectors against the alternative is the trace statistic.

If the factors are non-stationary and are cointegrated, the method to investigate the issue of causation is the Vector Error Correction Model (VECM), which is a Vector Autoregressive Model (VAR) in first differences with the addition of a vector of

cointegrating residuals. Therefore, this VAR system does not lose long-run information. We apply the following VECM specification:

$$\Delta y_t = \Pi y_{t-k} + \Gamma_1 \Delta y_{t-1} + \Gamma_2 \Delta y_{t-2} + \mathrm{K} + \Gamma_{k-1} \Delta y_{t-(k-1)} + u_t \quad (2)$$

Furthermore the analysis of the short-term causality of the relationship between stock returns and macroeconomic variables is performed using the Granger test; the causal model in the mathematical equation is in accordance with Granger (1969):

$$\Delta Y_t = \beta_0 + \sum_{i=1}^{q} \beta_{1i} \Delta Y_{t-i} + \sum_{i=1}^{q} \beta_{2i} \Delta X_{t-i} + \varepsilon_{1t} \quad (3)$$

$$\Delta X_t = \varphi_0 + \sum_{i=1}^{r} \varphi_{1i} \Delta X_{t-i} + \sum_{i=1}^{r} \varphi_{2i} \Delta Y_{t-i} + \varepsilon_{2t} \quad (4)$$

where Y_t and X_t represent stock returns and macroeconomic variables, respectively. Coefficient t symbolizes the time period, and are uncorrelated stationary random variables. ε_{1t} and ε_{2t} denote potentially autocorrelated and cross-correlated stationary time series. β_0 and φ_0 are constants, β and φ are estimated coefficients for stock returns and macroeconomic variables, q and r are the order of moving-average polynomial. The objective of this test is to reject the H_0: $\beta_{21} = \beta_{22} = ... = \beta_{2q} = 0$. This hypothesis implies that macroeconomic variables do not Granger cause stock returns. Similarly, failing to reject H_0: $\varphi_{11} = \varphi_{12} = ... = \varphi_{1r} = 0$ suggests that stock returns do not Granger cause macroeconomic factors.

3 Findings

At the beginning, we calculated correlation coefficients between the stock returns and the macroeconomic variables and identified the lag used in the cointegration tests. The resulting correlation matrix is provided in Tab. 1.

The correlation coefficients between the stock returns and the interest rate are negative in all cases, while the correlation coefficients between the stock returns and the other macroeconomic variables are negative or positive. The results are not absolutely in accordance with theoretical assumptions. The increasing GDP, the money supply and the price level should be accompanied by rising stock prices, and the increasing interest and unemployment rates are likely to exist with the decreasing stock prices. The sole macroeconomic variable that displays significant correlation coefficients in nearly all cases is the interest rate. The coefficients of the other macroeconomic variables are frequently insignificant; this indicates that the co-movements with stock returns are not sufficiently strong. Then, there are differences between the returns of the institutions analyzed. While RBIA and VIGA show a statistically insignificant coefficient with all macroeconomic factors, the stock returns of UIGA display a statistically significant correlation with all fundamentals except for the unemployment rate. Additionally, the stock returns of CAIA, EGBA and IA demonstrate statistically significant coefficients with only one or two fundamentals.

Tab. 1: Correlation Matrix

	CAIA	EGBA	IA	RBIA	UIGA	VIGA
IR	-0.4195*	-0.6025*	-0.2870***	-0.0934	-0.4312*	-0.1401
GDP	-0.1337	-0.3216**	0.0448	0.0911	-0.2774***	0.1711
INF	-0.1483	-0.2027	-0.1600	-0.2151	-0.2564***	0.0696
UNE	0.8637	0.2140	0.0930	-0.0499	0.2012	-0.2350
M3	-0.3239**	-0.1882	-0.1219	0.1794	-0.2867***	0.0495

Source: (Authors'calculations)

*Note: *, ** and *** denote significance at the 1 %, 5 % and 10 % levels*

In Tab. 2, we found that macroeconomic factors and stock returns proved to be cointegrated in all six cases. Both statistics are important for our conclusion because both provide a similar outcome. For five of the six models, we revealed one cointegrating vector; thereafter, the cointegrating equations could be constructed. These results show a negative relationship between stock returns and macroeconomic factors. Certain macroeconomic factors have no negative influence in the models. Although the results are not the same for all estimations, in four of the six equations, the gross domestic product and the unemployment rate are negatively cointegrated. Conversely, in four cases, the money supply M3 has a positive influence on the macroeconomic variables. We must also note that the inflation and interest rate results do not provide an obvious conclusion.

Tab. 2: Results of Johansen test

	r=0	r ≤1	r ≤2	r ≤3	r ≤4	r ≤5
CAIA / IR, GDP, INF, UNE, M3						
Trace Statistics	153.2993*	101.4688*	67.9653*	47.1872*	27.8981*	12.6821**
Max-Eigen Statistics	51.8304*	33.5035***	20.7780	19.2891	15.2159***	122.6821**
Equation	CAIA = -7.7028 - 0.1367 GDP – 1.5734 INF + 1.4465 IR + 0.0029 M3 + 0.3738 UNE (38.3509) (0.8171) (2.3371) (1.6424) (0.0051) (5.0299)					
EGBA / IR, GDP, INF, UNE, M3						
Trace Statistics	154.2264*	94.8071*	66.9193*	43.7472*	23.4646**	9.7821**
Max-Eigen Statistics	59.4192*	27.8878	23.1720	20.2855***	13.6825	9.7821**
Equation	EGBA = -48.3659 - 0.6127 GDP + 3.4072 INF + 0.3582 IR + 0.0073 M3 + 5.3916 UNE (30.9481) (0.7220) (1.9128) (1.3336) (0.0045) (4.0824)					
IA / IR, GDP, INF, UNE, M3						
Trace Statistics	145.8475*	95.3578*	65.3455*	43.9365*	25.7385*	10.4999**
Max-Eigen Statistics	50.4897*	30.0122	21.4090	18.1979	15.2386***	10.4999**
Equation	IA = 37.9027 – 2.7555 GDP + 1.4429 INF – 3.1431 IR + 0.0210 M3 – 1.3894 UNE (56.3042) (1.2247) (3.4081) (2.4287) (0.0076) (7.3386)					
RBIA / IR, GDP, INF, UNE, M3						
Trace Statistics	131.2931*	90.9078*	62.8593*	42.3170*	24.2902**	9.7957**
Max-Eigen Statistics	40.3853***	28.0485	20.5422	18.0268	14.4947***	9.7954**
Equation	RBIA = 157.9899 – 2.7555 GDP + 1.4429 INF – 3.1431 IR + 0.0210 M3 – 1.3894 UNE (61.6947) (1.2247) (3.4081) (2.4287) (0.0076) (7.3386)					

UIGA / IR, GDP, INF, UNE, M3						
Trace Statistics	141.4492*	92.7533*	66.5419*	42.8185*	22.9914**	8.1568***
Max-Eigen Statistics	48.6958*	26.2114	23.7233	19.8271	14.8346***	8.1568***
Equation	UIGA = 47.7336 + 2.6569 GDP – 12.7436 INF – 4.6163 IR – 0.0179 M3 – 27.5666 UNE (37.3844) (1.3078) (3.7601) (2.6369) (0.0081) (8.0968)					
VIGA / IR, GDP, INF, UNE, M3						
Trace Statistics	140.3333*	91.7069*	62.5389*	41.4560*	23.8259**	10.1902**
Max-Eigen Statistics	48.6263*	29.1679	21.08291	17.6300	13.6357	10.1902**
Equation	VIGA = -19.1307 + 0.3240 GDP – 0.7977 INF + 1.9529 IR – 0.0003 M3 – 0.9973 UNE (28.3494) (0.6365) (1.7519) (1.2117) (0.0040) (3.7611)					

Source: (Authors'calculations)

*Note: *, ** and *** denote significance at the 1 %, 5 % and 10 % levels.*

Given the VEC mechanism that is inserted in the Johansen procedure, the deviation from the long-run equilibrium is corrected through a series of partial short-run adjustments. The number of lags is set to one for all models, similar to prior estimations; the optimal number was set in accordance with the Akaike information criterion. Tab. 3 shows the estimates of the VECM for each model.

The significance of each model is computed using the F-statistics coefficient, the coefficient R-squared (R2) explains a proportion of the total variability managed through a created VECM.

Tab. 3: Results of the Vector Error Correction Models

	CAIA	**EGBA**	**IA**	**RBIA**	**UIGA**	**VIGA**
CointEq1	-0.5831 (0.2175) [-2.6801]	-1.3745 (0.24155) [-5.6907]	-0.4742 (0.2142) [-2.2139]	-0.1820 (0.1294) [-1.4067]	-0.3559 (0.1977) [-1.7995]	-0.7168 (0.2362) [-3.0341]
Stock Return (-1)	0.0766 (0.2019) [0.3794]	0.0408 (0.1441) [0.2836]	-0.3229 (0.1664) [-1.9395]	-0.3865 (0.1378) [-2.8040]	-0.2895 (0.1987) [-1.4573]	-0.1126 (0.1877) [-0.6000]
GDP (-1)	6.2643 (3.7914) [1.6522]	6.0734 (3.1706) [1.9155]	4.7339 (5.1230) [0.9240]	1.5117 (3.2573) [0.4641]	1.1497 (3.4504) [0.3332]	4.8719 (2.8938) [1.6835]
INF (-1)	-5.7391 (4.8698) [-1.1785]	-2.2931 (5.0647) [-0.4527]	-11.1817 (6.7434) [-1.6581]	2.6866 (3.9467) [0.6807]	-4.5552 (3.9627) [-1.1495]	-8.7405 (3.5803) [-2.4412]
IR (-1)	-0.0947 (6.2771) [-0.0151]	-23.6526 (7.3831) [-3.2036]	-4.6965 (9.4735) [-0.4957]	0.6975 (4.3967) [0.1586]	-1.3734 (5.5994) [-0.2452]	-4.6800 (4.2175) [-1.1096]
M3 (-1)	0.0021 (0.0174) [0.1203]	0.0316 (0.0181) [1.7430]	0.0067 (0.0242) [0.2780]	0.0129 (0.0140) [0.9197]	0.0080 (0.0147) [0.5446]	0.0121 (0.0142) [0.8506]
UNE (-1)	6.2763 (8.0603) [0.7786]	5.0738 (8.0563) [0.6298]	1.2390 (10.9603) [0.1130]	11.1240 (6.2781) [1.7718]	-0.5457 (6.5170) [-0.0837]	-8.4928 (6.2468) [-1.3595]
R2	0.3184	0.6309	0.4146	0.3965	0.3305	0.4828
Adj. R2	0.2015	0.5676	0.3142	0.2930	0.2157	0.3941
F-statistics	2.7250**	9.9721	4.1319	3.8332	2.8802**	5.4453

Source: (Authors' calculations)

Note: Standard errors are in round brackets, and t-statistics are in square brackets. All variables used in the VECM are first differenced.

The results of the VECM show that two models meet the criterion of significance (F-statistics) at the 5 % level of significance. The VECM coefficients of the cointegration equation (CointEq1) are statistically significant in five models (CAIA, EGBA, IA, UIGA, VIGA). The sign of the coefficient is, negative in all cases; this indicates that an increase in macroeconomic fundamentals has a negative impact on stock prices. The highest adjustment coefficients of the statistically significant models were VIGA (72 %) and CAIA (58 %).

The short-term relationship between the stock returns and macroeconomic fundamentals were also analyzed using the Granger causality test. We detected examples in which Granger causes stock returns. We determined the causality between the CAIA stock returns and the money supply M3, the EGBA stock returns and both the inflation and interest rates. Then, we determined the relationship between the IA stock returns and inflation, the UIGA stock returns and inflation and the causality between the VIGA stock returns and inflation. We also detected causality in the opposite direction from the stock returns to the interest rates, the gross domestic product for CAIA, the interest rates for EGBA, the interest rates, the gross domestic product and the inflation for IA, the gross domestic product for UIGA and the interest rate and the gross domestic product for VIGA.

Conclusion

The objective of this study was to analyze the existence of the relationship between select macroeconomic variables and the financial sector stock returns of stocks listed on the Vienna Stock Exchange. In the 2005 – 2015 period examined, there was a volatile increase in GDP growth; however, the Austrian economy outperformed the euro area in the 2006 to 2013 period. The financial sector was influenced by both the global financial crisis and the Eurozone crises.

We used the Johansen cointegration test to investigate long-run equilibrium relationships between the stock returns of Austrian financial institutions and macroeconomic variables. We detected a significant relationship to all variables for the Trace statistics, however; only certain macroeconomic variables are cointegrated with macroeconomic variables using the Max-Eigen Statistics. Since the results of the cointegration tests differ among financial institutions it is difficult to provide a general conclusion and confirm our findings with studies of Martínez et al. (2015) and Peirö (2016) who confirmed the existnce of the linkage between interest rates and stock prices (returns). And with study of Österholm (2016), his findings suggest that there exists a long-run equilibrium relationship between stock prices and GDP. Thus, we can summarize that the macroeconomic factors used have a primarily negative impact on the stock returns of the select institutions. The most important indicator of the development of the Austrian financial stock returns is the money supply M3; this has a positive impact. This finding is in accordance with theory, with Kulhánek (2012) who found long-run relationship between stock prices and the money supply, and with our expectations.

We supplemented the long-run equilibrium relationship results with the results of the short-run dynamics between the stock returns of Austrian financial institutions and the macroeconomic factors using Granger causality tests and using VECM estimations. We found very rare examples of macroeconomic variables that explain changes in stock prices using VECM estimations. The highest adjustment coefficients

of statistically significant models occurred for VIGA and CAIA. Mixed results with significant role of interest rates and gross domestic product in determining in the Granger sense the stock return was revealed for several stocks. Kulhánek (2012) has similar findings, he also detected short-run dynamics between macroeconomic factors and stock prices in several cases.

In general, our main finding is that we discovered the existence of certain linkages. However, for certain financial institutions, the relationship between the macroeconomic variables and the stock returns have not been confirmed as in the study by Errunza and Hogan (1998). This paper's conclusion shows whether investors can find opportunities in the Austrian financial sector to profit from trading in stock market shares using the transfer and absorption of information from the macroeconomic environment. The results show that the opportunity to invest capital and make a profit has been created.

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