

The Effect of U.S. Real GDP on different S&P500 sector indices' market capitalizations

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Multiple macroeconomic factors suspected to influence stock market activities:

- Real GDP
- Unemployment Rate
- Crude Prices
- Federal Debt
- Federal Rate

Factors, which affect the financial markets most likely to have influence on market capitalization values.

Research Question

"What is the effect of U.S. Real GDP on different S&P500 sector indices' market capitalization?"

Quarterly Paneldata, 2007 - 2021

- Market Capitalization of all the companies listed in the S&P500 Index in Million U.S. Dollars (Bloomberg¹)
- All Macroeconomic Factors either expressed in percentage points or Million U.S. Dollars (FRED)

¹As an approximation of the index, we used the constituents of the iShares Core S&P 500 UCITS ETF

For each sector:

$$Y_t^{sector} = \beta_0 + \beta_1 X_{1,t} + \beta_2 X_{2,t} + \beta_3 X_{3,t} + \beta_4 X_{4,t} + \beta_5 X_{5,t} + u_t \quad (1)$$

Table 1: Variable Description

| Variable in Model | Representative for |
|-------------------|---------------------------------------|
| Y_t^{sector} | Average Sector Market Capitalization |
| $X_{1,t}$ | U.S. Real GDP (mio.) |
| $X_{2,t}$ | U.S. Unemployment Rate |
| $X_{3,t}$ | U.S. Crude Prices (mio.) |
| $X_{4,t}$ | U.S. Federal Debt (mio.) |
| $X_{5,t}$ | U.S. Federal Rate |
| β_0 | Constant |
| β_1 | Coefficient of U.S. Real GDP |
| β_2 | Coefficient of U.S. Unemployment Rate |
| β_3 | Coefficient of U.S. Crude Prices |
| β_4 | Coefficient of U.S. Federal Debt |
| β_5 | Coefficient of U.S. Federal Rate |
| u_t | Error Term |

Table 2: Regression Outputs (1/2)

| | Communication | Consumer Discretionary | Consumer Staples | Energy | Financials |
|-------------------|------------------------------|--------------------------|-------------------------|--------------------------|-------------------------|
| Intercept | -426623.13*** (131825.81) | -101575.7* (53595.73) | 63161.8* (33392.26) | 140636.60* (75401.66) | -61152.26 (49080.77) |
| Real GDP | 0.026*** (0.009) | 0.005 (0.004) | -0.003 (0.002) | -0.005 (0.005) | 0.005 (0.004) |
| Unemployment rate | 1384.53 (1875.38) | 345.46 (762.46) | -1996.10*** (475.04) | -4172.22*** (1072.68) | -1083.3 (698.23) |
| Crude price | -225.78*** (69.59) | 10.86 (28.29) | -26.06 (17.63) | 293.33*** (39.80) | 4.13 (25.91) |
| Federal debt | 0.004* (0.002) | 0.003*** (0.0009) | 0.003*** (0.0006) | 0.0009 (0.001) | 0.001 (0.0008) |
| Federal rate | 6599.31*** (1593.94) | 3160.23*** (648.04) | 959.4** (403.76) | -923.95 (911.70) | 2118.24*** (593.5) |
| R-squared | 0.9673 | 0.9473 | 0.9611 | 0.73 | 0.93 |
| R-squared Adj. | 0.96 | 0.94 | 0.96 | 0.7 | 0.92 |

Table 3: Regression Outputs (2/2)

| | Health Care | Industrials | Information Tech. | Materials | Real Estate | Utilities |
|-------------------|-------------------------|-------------------------|---------------------------|------------------------|---------------------------|-------------------------|
| Intercept | -40738.04 (35376.81) | 13095.09 (23911.53) | -100640.41 (139211.18) | -12439.71 (14591.8) | -29193.64** (12536.17) | -24398.88 (16485.33) |
| Real GDP | 0.0025 (0.003) | -0.0006 (0.002) | 0.0008 (0.01) | 0.0007 (0.001) | 0.002** (0.0009) | 0.002 (0.001) |
| Unemployment rate | -590.88 (503.28) | -1244.28*** (340.17) | 2037.27 (1980.44) | -160.34 (207.59) | -370.10** (178.34) | -61.43 (234.52) |
| Crude price | -51.38*** (18.67) | 34.42*** (12.62) | 58.77 (73.49) | 38.74*** (7.70) | -8.08 (6.62) | -7.1 (8.70) |
| Federal debt | 0.002*** (0.0006) | 0.002*** (0.0004) | 0.01*** (0.002) | 0.0007*** (0.0002) | 0.0009*** (0.0002) | 0.0008*** (0.0003) |
| Federal rate | 2100.13*** (427.75) | 1395.31*** (289.12) | 8851.46*** (1683.24) | 572.21*** (176.43) | 375.95** (151.58) | 1085.08*** (199.33) |
| R-squared | 0.97 | 0.95 | 0.89 | 0.93 | 0.98 | 0.96 |
| R-squared Adj. | 0.97 | 0.94 | 0.88 | 0.92 | 0.98 | 0.95 |

Communication Services:

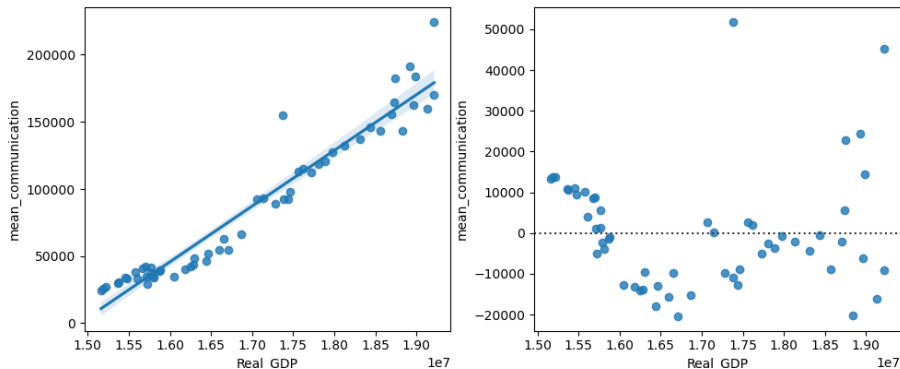


Figure 1: Regression and residual plot for the Communication Services sector

- Positive significant effect
- No homoscedasticity

Real Estate:

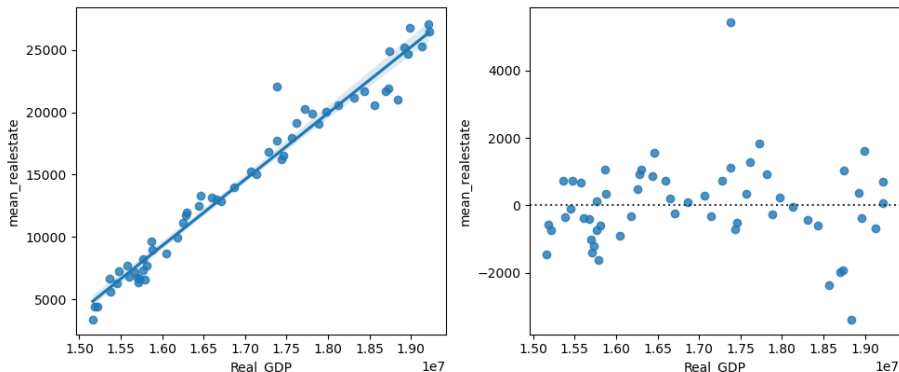


Figure 2: Regression and residual plot for the Real Estate sector

- Positive significant effect
- Possible homoscedasticity

- Real GDP statistically significant positive effect on average market capitalization in sectors Communication Services and Real Estate
 - Communication Services no sign of homoscedasticity
 - Real Estate shows possible homoscedasticity
- Control variables:
 - Unemployment Rate statistically significant effect in sectors Consumer Staples, Energy, Industrials and Real Estate
 - Crude Prices statistically significant effect in sectors Communication, Energy, Health Care, Industrials and Materials
 - Federal Debt statistically significant effect in all sectors except Energy and Financials
 - Federal Rate statistically significant effect in all sectors except Energy

Data sources:

- <https://fred.stlouisfed.org/>
- Bloomberg

Thank you for your attention!