Factors Determining the Fluctuation of the Dow Jones Industrial Index Using SAS Procedures

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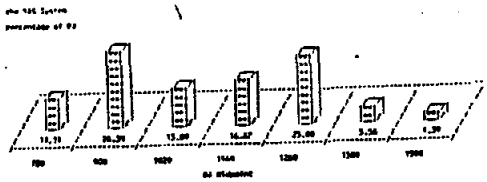
Abstract

Many variables may influence the movement of the Dow Jones Industrial Index. I hypothesize that the Federal Funds Rate, the percentage change in the M2 money supply, and time are three of the most influential determinants. Therefore, through use of the SAS System and SAS procedures, I tested my hyporthesis to determine its reliablity and validity.

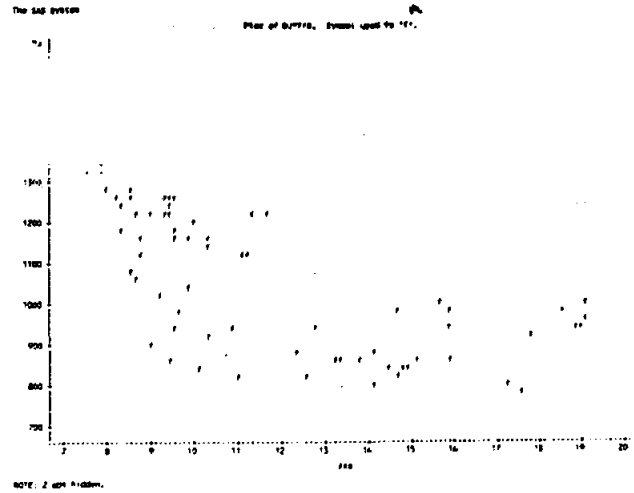
Introduction

The stock market is a very powerful money-making tool that can result in "the best of times and the worst the worst of times." Thus, the purpose of this paper is to show the relationship between the fluctuations of the Dow Jones Industrial Index with the following the independent variables: the Federal Funds Rate, the M2 money supply, and time. These variables are a result of PROCEDURE STEPWISE, which is used to determine the most influential independent variables for the model. PROCEDURE CORRELATION is used to see the degree of correlation between the dependent variable and the independent variables, and amongst each regressor. Then a multiple regression is run, and the results are interpreted through analysis of the t-scores, the F-ratio and the R-squares. The raw data, supplied by Citibase, include 72 observations taken from the years 1980-1985.



The Federal Funds Rate

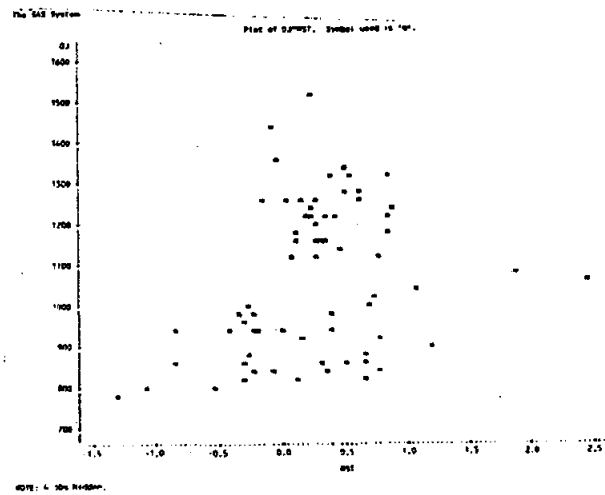
Federal Funds are short term loans, or overnight loans, that are made between two banks. The Federal Funds Rate is the interest on these loans. The Federal Funds Rate (FFR) has a direct relationship with the banks' demand for funds to cover their required reserves, and has an indirect relationship with the movement of the Dow Jones Industrial Index (DJ).



Thus, as the Federal Funds Rate increases, the Dow Jones Industrial Index decreases.

The M2 Money Supply

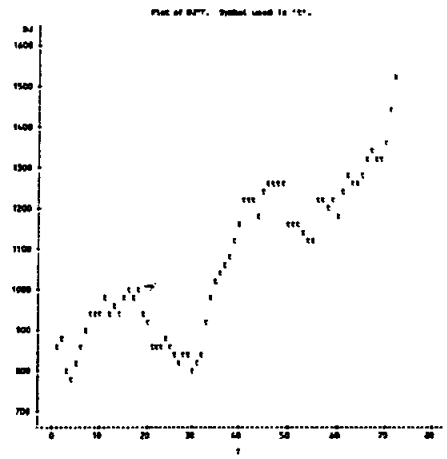
The raw data for this variable represents the percentage change in the M2 money supply for each month within the five years. The M2 money supplies includes: M1 plus overnight repurchase agreements, money market mutual funds, savings deposits, and small time deposits. There is a direct relationship between the M2 money supply (MST) and the rise/fall of the Dow Jones Industrial Index.



Thus, as the M2 money supply increases the Dow Jones Industrial Index increases.

Time

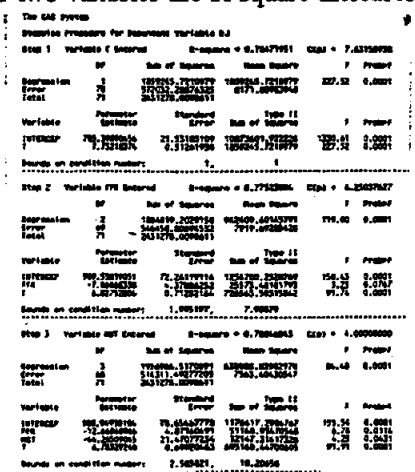
Time is usually one of the most important independent variables that is overlooked in a regression model. Since time is a variable with no quantitative value I created the variable so it equals "N", the number of observations (T = N). According to the following graph, there is a direct relationship between time (T) and the Dow Jones Industrial Index.



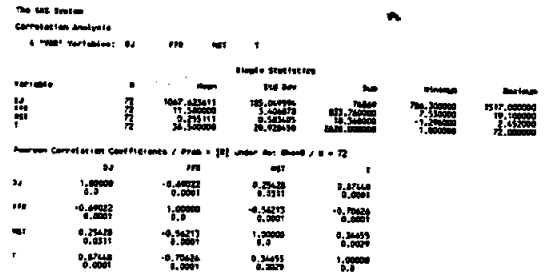
Thus, as time increases, the Dow Jones Industrial Index increases.

The Model and Analysis

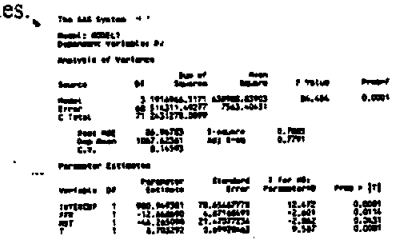
PROC Stepwise is run in order to determine the most influential variables on the fluctuations of the Dow Jones Industrial Index. From studying the results, particularly the R-squares, it is determined that as each variable is included in the model, the overall percentage of explanation by the independent variables increases. The single variable time can explain 76.4%, yet with the other two variables the R-square increases to 78.8%.



PROC Corr is run in order to determine the correlation between DJ and the independent variables. Analysis of the results show that there is some correlation between independent variables that is greater than that with the dependent variable, which suggests there is some multicollinearity within the model.



Together, the dependent variable (DJ) and the independent variables (MST, FFR, T) form the model $DJ = B_0 + B_1MST - B_2FFR + B_3T$. Once the regression is run the results can be determined. The following Analysis of Variance table shows the t-scores, the R^2 value, and the F-values.



The F-value is much greater than the critical value so it can be determined that at least one independent variable has a significant affect on DJ. The t-scores are higher than the critical value. Therefore all three independent variables have a significant affect on DJ. The adjusted R^2 equals .7791. Therefore 77.9% of the fluctuations of the Dow Jones Industrial Index can be explained by the independent variables.

Conclusion

Analysis of the SAS procedures and functions used show that the independent variables do have a significant affect on the Dow Jones, and can explain a big percentage of the fluctuations within the model. Yet, there are also signs of multicollinearity that must be taken into consideration. Furthermore, analysis of the Durban Watson statistic shows some signs of autocorrelation, which must also be considered.

Both of these must be considered when determining the overall reliability and validity of the model. Yet, the signs of significance are strong, so it can be concluded that these three variables do have some significant affect on the fluctuations of the Dow Jones Industrial Index.

References

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Galbraith, James K. Darity, William J. Macroeconomics. Boston: Houghton Mifflin Co., 1994.

Kuhn, Susan E. "The High Anxiety Stock Market." Fortune 2 May 1994: 56.