Microsoft's share price and its determinants

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As many know, the US government has ordered that Microsoft split in two, to prevent the abuse of dominant market power. Louise Owens, in an econometric analysis, studies the effect of this court decision on Microsoft's share price, as well how the consumer price index and the Nasdaq affect the share price. She concludes that, while not the only factors, such external pressures play a large role in shaping Microsoft's success.

Introduction

In this project, I will attempt to show that a relationship exists between the share price of Microsoft and three independent variables. These variables are the NASDAQ 100 index, the consumer price index and the court case in which Microsoft was accused of anti-competitive behaviour. I will use a simple econometric model in my attempt to define a relationship between these variables and the share price of Microsoft.

Established in 1975, Microsoft Corporation has been a worldwide leader in software for personal and business computing. It was ranked number 5 in The Top Ten American companies in 2000.[1] Despite its global success, the year 2000 has proven somewhat dismal for Microsoft.[2] In April 2000, the world's largest software company was found guilty of using "anti-competitive means" to maintain monopoly power in PC operating-system software. Two months later, the firm was ordered to split into two companies. Naturally, Microsoft appealed against this ruling by Judge T. Jackson but, not surprisingly, its share price plummeted.

As a public company, Microsoft inevitably suffers from both macroeconomic and firm specific risk. The current downturn in the US economy, for example, will have a knock-on effect for multinationals and open economies alike. It is certain that Microsoft can do little to avoid macroeconomic factors, but it can protect itself against systematic risk. As such, Microsoft will diversify to ensure consistent increases in profits. Recently, Microsoft's Windows 2000 operating system has been performing less than expected, and so too has its Office 2000

[1] Fortune Magazine, February 2001. Rank is based on the votes received from all respondents across all industries. Microsoft fell 3 places from the previous year.

[2] Microsoft is a registered Trademark for Microsoft Corporation.

applications suite. These account for half of Microsoft's revenues. The current crisis for Microsoft is due to the risk of a slow down in the PC industry coupled with the shift from PC based to Internet based computing.

As with all companies, it is imperative to hedge against firm-specific risk, as shareholders do when selecting their portfolios. It was therefore no surprise to observe Microsoft's diversifying strategy to take advantage of the profitability increase of the Internet.

The challenge facing Microsoft is to penetrate the Internet sector, combating slowing applications revenues and avoiding the threat of break-up. Microsoft's plan is .NET. If successful, Microsoft's focus will have been diverted away from the PC and hopefully they will gain from the rising proliferation of non-PC devices such as smart telephones.[3] No doubt Microsoft will ensure that .NET will be best used on PC's running Windows creating demand for its powerful software, including of course Windows 2000. This strategy not only ensures a positive response to the growth of the Internet, but also insulates the firm in the event of its possible division into an operating-system company (which would own Windows) and an applications company (owning Office).

Econometric Analysis

The Model

Econometricians pride themselves on the ability to produce "good" estimators. We must meet certain criteria to guide our ultimate choice of preferred estimators. Measures of "goodness" used in this evaluation will be described within a certain number of criteria. The method of Ordinary Least Squares (OLS) was applied in Microfit, the computer package used for estimation. Equation 1 denotes the model applied in OLS analysis.

Equation 1: $$Y=\beta_0+\beta_1X_1+\beta_2X_2+\beta_3D+\mu$$

The Y term depicts the dependant variables and X depicts the independent variables. D represents the Dummy variable, the β's correspond to the co-efficient terms and μ represents the errors ignored in the regression.

[3] Pg 53, The Economist, January 6th – 12th 2001.

The Dependent variable:

The Y variable is the share price of Microsoft. It is the variation in the share price, which I will attempt to explain. I have chosen 20 quarterly observations from the second quarter in 1996 to the first quarter in 2001. I have also chosen three explanatory variables in my attempt to depict the variations in the share price of Microsoft, however there are variables omitted from my analysis. It is undisputed that there exists more than three factors determining the variation in the share price but it is not possible to analysis them all. Indeed, it is very probable that we are not aware of many explanatory factors.

Independent Variables:

X1-The NASDAQ 100 index

The Nasdaq Stock Market represents 100 of the largest non-financial U.S. and non- U.S. companies. It was established 30 years ago. It reflects Nasdaq's largest companies across industry groups, including computer hardware and software, telecommunications, retail/wholesale trade and biotechnology. Investors can participate in the combined performance of large household names from Microsoft to Amazon.com. The Nasdaq-100 Index is a modified capitalization-weighted index, which is designed to limit domination of the Index by a few large stocks while generally retaining the capitalization ranking of companies

Because Nasdaq-100 Index Tracking Stock reflects the collective performance of 100 companies, the impact of price fluctuations caused by a specific company development will be reduced for holders of Nasdaq-100 Index Tracking Stock. Nasdaq-100 Index Tracking Stock will still be subject, however, to risks specific to the performance of a few component securities that currently represent a highly concentrated weighting in the Nasdaq-100 Index.

X2-The Consumer Price Index

The Consumer Price Index is a widely used measure of inflation and used as an economic indicator. It represents changes in the prices of all goods and services purchased for consumption by urban households. Prices for the goods and services used to calculate the CPI are collected in 87 urban areas throughout the USA and from about 23,000 retail and service establishments.

X3-The Dummy variable

Dummy variables are a proxy for the explanatory variable of a qualitative nature. It is an artificial variable constructed to take the value of 1 when the event or qualitative phenomenon occurs and zero when it doesn't occur. The qualitative variable is given by the co-efficient of the related variable αD plus an error term. $Y = \alpha pD + \epsilon$ but when D = 1, the equation becomes $Y = \alpha + \epsilon$.

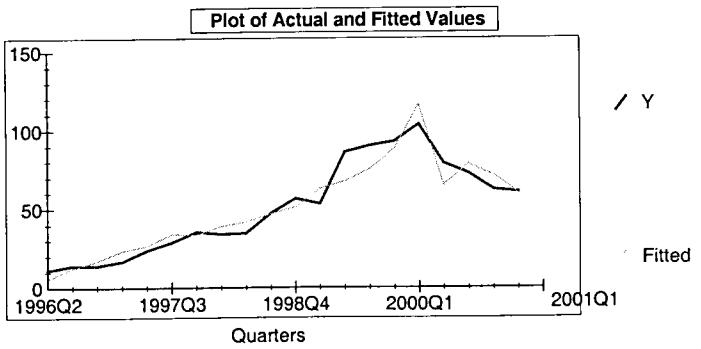
The Regression

Equation 2: $Y = -532.9793 + 0.019262X_1 + 3.4062X_2 - 43.4427D$ $R^2 = 0.91476$

Independent Variables	Coefficient	T-ratio	Probability
A (constant term)	-532.9793	-3.6444	0.002
X1	0.019262	4.7757	0.000
X2	3.4062	3.6461	0.002
Dummy variable	-43.4427	-5.3781	0.000

It is evident from the regression that each variable has explanatory power in illustrating the variation in Y. The effect of the court case on the share price of Microsoft was extremely significant as the coefficient of the dummy variable depicting the court case outcome is –43.4427. This means that the share price fell dramatically after the incident.

Regression of Y on the X variables



The Coefficient of determination R^2

The co-efficient of determination is representative of the proportion of the variation in the dependent variable by variation in the independent variable. It does this in a meaningful sense in the case of a linear relationship estimated by OLS (Kennedy, 1998: 13). It allows us to determine how our sample regression equation obtained best fits the sample observations, i.e. minimises the sum of the squared residuals. It is desirable to have a measure of "goodness of fit" of a sample regression equation estimated by OLS. The total variation in the dependent variable (Y) is the sum of the squared deviations of the dependent variable. The coefficient must be between zero and unity. The closer R^2 is to one, the better the fit. At the highest extreme value of 1, all the observations would lie on the regression line giving a perfect fit.

In my regression, the ratio of the explained variation to the total variation is 0.91476. This means that 91.48% of the variations in the share price of Microsoft can be explained by the three combined independent variables chosen for this regression. It can therefore be said that the estimated line fits the regression line extremely well and although it is not a perfect fit, it is clear that the model has explanatory power.

Durbin-Watson Statistic

The D-W *d* statistic is the ratio of the sum of squared differences in successive residuals to the residual sum of squares (Thomas, 1985). It is used to detect first-order correlation (autocorrelation). The DW statistic in my analysis was 2.0937.

The T-Test

The t ratio is the ratio of an estimate to its estimated standard error and is sometimes presented in parentheses in place of the estimated standard error (Thomas, 1985). In my regression X_1 X_2 and X_3 are all significant at the 1% level as $0.002 \leq 0.01$.

Multicollinearity

It is necessary to examine whether the explanatory variables are indeed independent. We can do this by checking for multicollinearity between the variables.

From my regression I obtained a high R^2 of 0.74502 between X_1 and X_2 suggesting a high level of correlation between them. When regressed on X_3, the R^2 was less significant at 0.38438.

The F statistic

The F statistic combines the effect of the individual t statistics. It is a test of overall significance instead of testing the significance of the estimated partial regression coefficients individually, that is, under the separate hypothesis that each true population partial regression coefficient was zero (Gujarati, 1995). As it is similar in nature to the correlation coefficient, I expected it to be quite high. The value of the F statistic was 57.2377, which is a high value.

Independent Variable	**Coefficient**	***t*-ratio**	**Probability**
A	6.4504	0.95251	0.353
X1	0.024143	7.5082	0.000
			$R^2 = 0.75798$
A	-625.2179	-4.8520	0.000
X2	4.1334	5.2491	0.000
			$R^2 = 0.60485$
A	46.3769	6.4802	0.000
X3	22.1156	1.3820	0.184
			$R^2 = 0.95926$

Conclusion

The U.S. is presently experiencing a down turn in the economy. For investors, slower economic growth means reduced expectations and increased uncertainty, quite a different climate from what they had become used to.[4] The collapse in consumer confidence after the court case is undoubtedly an integral factor in the fall of Microsoft's share price, which plummeted from 103.75 to 78.94 points in the second quarter (April) of 2001. This dramatic decrease is illustrated in Figure 1A. The fall has been maintained by the ominous economic conditions in the United States since the second half of 2000. For example, unit labour costs increased extensively in the last two quarters of 2000, the fastest increase since 1993. This relentless crippling of profit margins dampens the expectations of investors. Likewise, high energy costs have applied pressure to costs in 2000. Not only are investors dubious, consumers also are creating revenue problems as they are not buying new PC's. Although Microsoft is hit by falling sales, it still managed to make the top 25 in earnings in 2000.[5]

The NASDAQ index halved its value last year and the number of flotations have fallen Sharply.[6] From figure 3 it can be seen that the NASDAQ 100 index increased consistently from the second quarter in 1996 to the first quarter in 2000. However, the year 2000 was a bad year for the index. In the second quarter of 2000 the index fell from 3968.46 to 3444.64 points, coincidently at the same time as the Microsoft court case?[7]

Therefore, the openness of Microsoft to macroeconomic risk has shown that success is not entirely innate and that Microsoft as an entity is not wholly responsible in determining its success as a global competitor.

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[4] Pg 58, Business Week, 26th February 2001

[5] According to S&P Institutional Market Services in Business Week.

[6] Money Week, 2nd Feb 01. Does not apply specifically to NASDAQ 100 index.

[7] I can only speculate that causation exists, though the data does suggest the fall in Microsoft's share price caused this dramatic drop. The correlation coefficient of the NASDAQ regressed individually on the share price was $R^2 = 0.75798$, representative of the proportion of the variation in the dependent variable by variation in the independent variable

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