Analyse inflation in Germany and the UK

Abstract

This project has introduced the hypothesis and given a brief explanation justifying it. The project clearly lays out its objectives to make it clear how I was going to test my hypothesis. The data collection involved searching for relevant prices in order that I could establish rates of inflation so that I could carry out my analysis. The project analysis was undertaken logically following my lecture notes in order that I could establish some coherency and uniformity when presenting my results. The analysis started with me laying out basic graphs in order that I could establish trends. Further analysis involved creating regression slopes and then testing to show to what extent the correlation supported my hypothesis. The conclusions drawn from my project highlight where the project could be improved and in which direction it could be expanded with further research and study.

Introduction

My hypothesis is that there will be a positive relationship between the inflation rates of Germany and the UK.

Inflation is a sustained general rise in prices over time. The rate of inflation measures the percentage increase in prices over time. The reason for this hypothesis is that both economies are open to international trade and active members of the global economy; this means that they both rely on each other for trade causing a certain dependency between the two economies. Due to this reliance if one economy is suffering from high inflation then this will either affect the other or they will both be experiencing the same economic conditions in the world economy causing there rates of inflation to be similar.

My objectives for this project will be as follows:

1. Obtain a sufficient data set in order that I can perform my analysis.
2. Apply appropriate statistical methodology.
3. Interpret my results in order I can prove or disprove my hypothesis.
4. Further analyse to what extent my hypothesis is accurate using further statistical methods.

Statistical Methodology

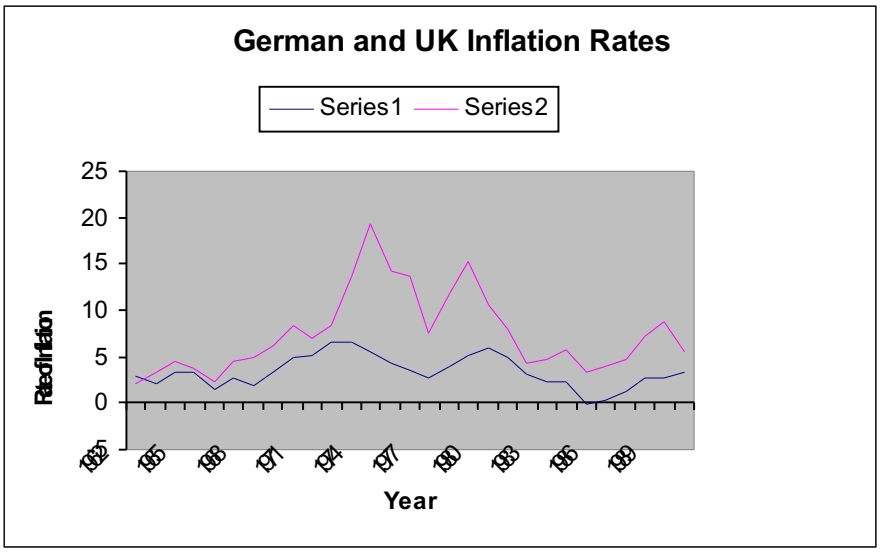
The project consists of the analysis of two variables, German and UK inflation rates. The techniques I wish to employ are Index numbers in order that I can create a rate of inflation from my data. Basic graphical techniques will be used in order that I can acquaint myself with the data and its trends, for example using the three period moving average. I will use Correlation Analysis to prove or disprove my hypothesis. I

will continue with regression analysis, as it is a more sophisticated way of examining correlation. I will then establish the elasticity's and the goodness of fit to prove or disprove to what extent my findings about my hypothesis are correct. I will then use the t statistic and the critical value to highlight the significance of my results.

Data Set

The data in appendix 1 was collected from Main Economic Indicators (OECD) and it shows inflation from 1962 to 1991. This data gives a reasonable range of results, which is broad enough to prove my hypothesis, but small enough that I can use more advance statistical techniques. The x-axis is German consumer price index and the y-axis is UK consumer price index. I choose Consumer Prices as they directly affect the greatest proportion of people living within the two countries as opposed to agricultural prices, which don't have such a direct effect on the two societies. The base year for both data sets is 1985, and from these data sets I calculated rates of inflation. This was done using the calculation in appendix 2. The year's in which the data is for is significant as the impacts and changes in this period have been thoroughly researched still effect decision making and theories today to a large extent.

Estimation, Presentation and Interpretation of Results



Key: German Inflation Rates = Blue, UK Inflation Rates = Pink.

The graph above along with appendix 4 shows that the two countries rate of inflation does not identically mirror each other. Appendix 4 was used as it lessons the impact of outlying figures so general trends are more obvious. It does show that their general trends are similar, for example in 1978 they both fall to a low rate of inflation. The UK after 1965 has a higher rate of inflation than Germany, the UK has a mean of 7.5 (1d.p.) and Germany has a mean of 3.4(1d.p.). The range and standard deviation of rates of inflation is much greater in the UK than in Germany, shown in appendix 3.

Using the Correlation, Slope and Intercept calculated and shown in appendix 5, this enables me to write the formulae for the regression line, which is y = 1.7030x + 1.7338. This linear relationship between my data points shows that there is a positive relationship between the Inflation rates in Germany and the UK. Appendix 6 shows the points plotted and the fitted regression line.

To prove to what extent the regression line fits my data set I calculated the standard error shown in appendix 5. The standard error for my results is 3.28 (2dp) showing that there is a significant variation between my fitted results created from the regression and my actual results for my data set. Using R^2 the coefficient of determination shows clearly the goodness of fit, shown in appendix 5. The coefficient of determination is 0.455 (3dp); this result is closer to 0 than 1. Showing that the goodness of fit to the regression line is closer to being no use at all than perfect correlation. However it is basically in the middle so correlation is a long way from perfect but it is worth considering.

To consider to what extent one variable effects another, shown by the elasticity. This is shown as 0.77, the average elasticity for the entire sample of data, meaning changes in UK Inflation Rates are not elastic with respect to changes in German Inflation Rates as the elasticity is less than 1.

The t- statistic in appendix 8 equals 4.75; the t-statistic is compared with a critical value. By doing this we can see whether to accept or reject the null hypothesis. The critical value is 2.048, t*, meaning as my t-statistic is above this value I can reject the null.

Conclusion

To summarise my project laid down clear and concise objectives. This enabled me to use appropriate methods in order that I could prove my hypothesis and also understand to what extent my hypothesis would hold up to debate. The results produced left room for discussion and also enabled me to see with how I might improve my project if I was to do it again.

The improvements and opportunities for further study are to use a more accurate data set. As I achieved my figures for inflation using Consumer Price Index accurate to one decimal place it meant due to previous rounding up that my figures for inflation are not accurate. This did not affect the analysis as all trends were visible but in further research I would use different figures for my analysis. Also to extend the study I would sample prices from other areas of the economy such as wholesale prices as it is possible that some of the affects of inflation were cushioned from consumer prices by wholesalers taking the impact of the loss in value themselves instead of passing it on. I would also extend the study to look at a range of different countries from different continents and also less economically powerful countries.

However I obtained enough information that I could perform my analysis, which was my first objective. The second was to apply appropriate methods in order to analyse my data. The methods used were appropriate except it was not necessary to perform the Three Period Moving Average as the trends were already clear when first plotted.

I was also capable to prove my hypothesis with the analysis that I employed. The further analysis that I undertook showed clearly to what extent I was successful in proving my hypothesis.

The correlation between German and UK inflation rates is clear to see. This I believe is due to them both being more developed countries and also being members of Europe. There is however differences in the make up of there economies, the UK have a large service sector for example. Also some differences in the way the economies are managed leading to different tactics being employed. These reasons are a few examples but the affect is that there is not perfect correlation between the two countries rates of inflation.

Bibliography

- Statistics for Economics, Accounting and Business Studies, Mike Barrow, 3rd Edition.
- Economics, Alain Anderton, 1993.
- Main Economic Indicators, OECD, 1962-1991, UK: 332, Germany: 172.
- http://learn.lboro.ac.uk/

Appendices

Appendix 1

Data Set

Year	Germany = X	Rate of Inflation (%)	UK = Y	Rate of Inflation (%)
1962	40.5	2.877697842	14.2	2.068965517
1963	41.7	2.112676056	14.5	3.333333333
1964	42.6	3.401360544	15	4.458598726
1965	44.1	3.289473684	15.7	3.680981595
1966	45.6	1.51187905	16.3	2.395209581
1967	46.3	2.731092437	16.7	4.571428571
1968	47.6	1.855670103	17.5	4.891304348
1969	48.5	3.386454183	18.4	6.12244898
1970	50.2	4.924242424	19.6	8.411214953
1971	52.8	5.206463196	21.4	6.956521739
1972	55.7	6.543624161	23	8.366533865
1973	59.6	6.5830721	25.1	13.74570447
1974	63.8	5.621301775	29.1	19.39058172
1975	67.6	4.249291785	36.1	14.25178147
1976	70.6	3.551912568	42.1	13.7295082
1977	73.2	2.659574468	48.8	7.575757576
1978	75.2	3.959131545	52.8	11.85308848
1979	78.3	5.205811138	59.9	15.2758133
1980	82.6	6.029579067	70.7	10.61946903
1981	87.9	4.972972973	79.1	7.916181607
1982	92.5	3.141361257	85.9	4.34298441
1983	95.5	2.351738241	89.8	4.772004242
1984	97.8	2.2	94.3	5.7

1985	100	-0.1001001	100	3.288201161
1986	99.9	0.1998002	103.4	3.992571959
1987	100.1	1.282051282	107.7	4.690265487
1988	101.4	2.687140115	113	7.224958949
1989	104.2	2.61682243	121.8	8.695652174
1990	107	3.342366757	133.4	5.52407932
1991	110.7		141.2	

Appendix 2

Calculating Rate of Inflation

$R = 100 - ((I_1 \div I_2) \times 100)$

R= Rate of Inflation.

I_1 = Initial consumer price index (eg: 1989 = 104.2).

I_2 = The consumer price index for the year after I_1 (eg: 1990 = 107).

For example: 100-((104.2/107) × 100) = 2.61682243

Appendix 3

Statistics Summarising Data Set

German Statistics	
Mean	3.392912458
Standard Error	0.321321305
Median	3.289473684
Mode	#N/A
Standard Deviation	1.730368184
Sample Variance	2.994174053
Kurtosis	-0.35393841
Skew ness	0.088555063
Range	6.6831722
Minimum	-0.1001001
Maximum	6.5830721
Sum	98.39446128
Count	29

UK Statistics	
Mean	7.511901543
Standard Error	0.81095331
Median	6.12244898
Mode	#N/A
Standard Deviation	4.367117225
Sample Variance	19.07171286
Kurtosis	0.553043743
Skew ness	1.078202757
Range	17.3216162
Minimum	2.068965517
Maximum	19.39058172
Sum	217.8451447
Count	29

The above information is calculated using the following formulae:

Sample Mean is $\bar{x} = \sum x / n$

Sample Variance is $\sum(X - \bar{x})^2 \div n - 1$

Standard Deviation is $\sqrt{\frac{\sum(x - \bar{x})^2}{n-1}}$

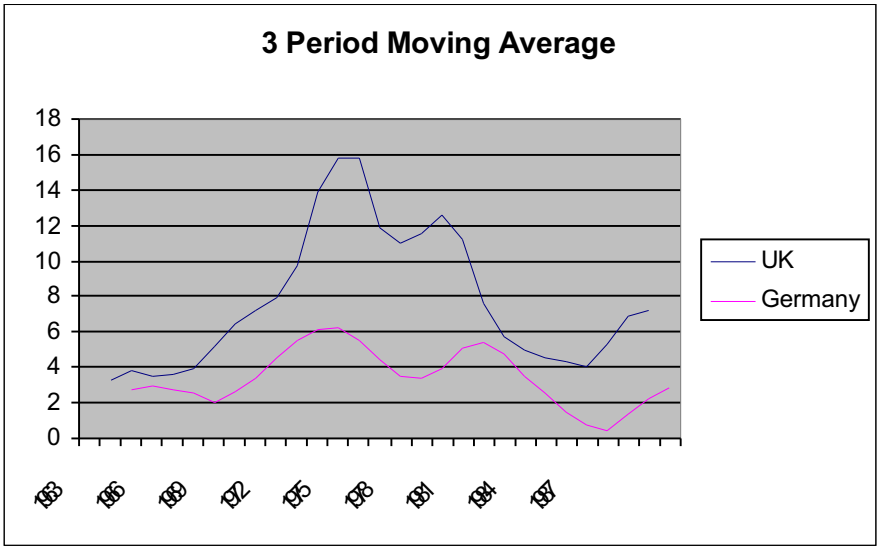
Median is the middle value within the Sample Data.

$\bar{x} =$ Sample Mean, x = Individual Data Plot, n = Number is the Sample Size,

s^2 = Sample Variance, s = Standard Deviation.

Appendix 4

Three Period Moving Average of the Sample Data.



This shows the graph produced using a three period moving average, calculated using the following formulae $= \frac{x_{t+1}+x_t+x_{t-1}}{3}$

Appendix 5

Correlation	0.67477464
Slope	1.703001696
Intercept	1.733765874

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.67477464
R Square	0.455320814
Adjusted R Square	0.435147511
Standard Error	3.282179836
Observations	29

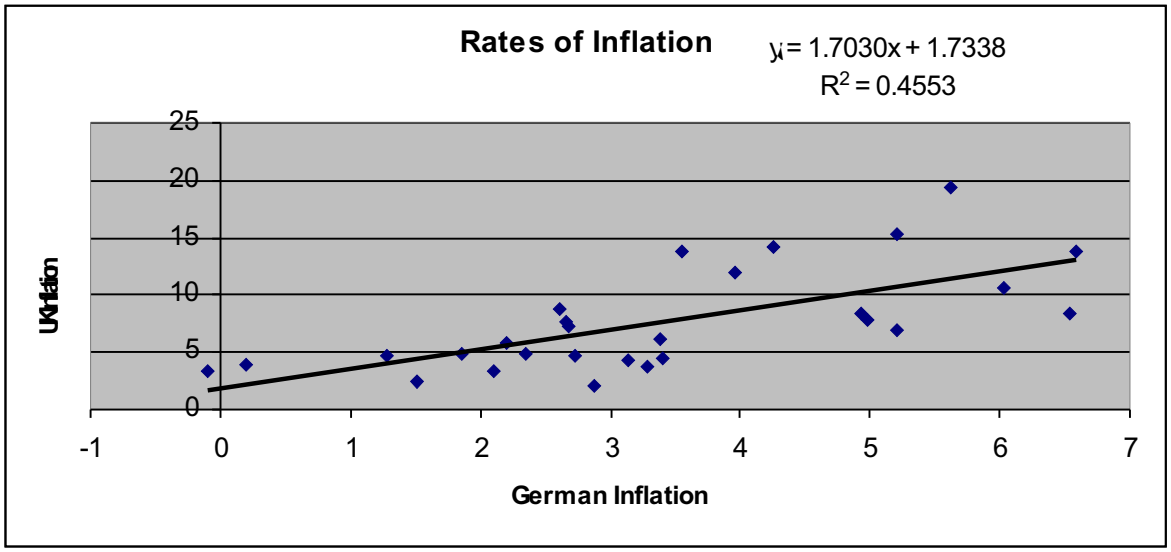
ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	243.1449392	243.14494	22.57046	5.95011E-05
Residual	27	290.8630208	10.772704		
Total	28	534.00796			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*
Intercept	1.733765874	1.360404388	1.2744489	0.213364	-1.057551494	4.5250832	-1.057551494
Rate of Inflation (%)	1.703001696	0.358463413	4.7508382	5.95E-05	0.967496017	2.4385074	0.967496017

Appendix 6

Scatter Plot showing the rates of inflation for Germany and the UK, with a regression line.



Slope of Regression, b = $\frac{n\sum xy - \sum x \sum y}{n\sum x^2 - (\sum x)^2}$, b = 1.70 (2dp)

Appendix 7

The elasticity is $\eta = b\frac{\bar{x}}{\bar{y}}$, η =0.77 (2dp)

Appendix 8

The t statistic is t = $\frac{r\sqrt{n-2}}{\sqrt{1-r^2}}$, t=4.75 (2dp)

Go to t-tables and look up area of 0.025 for each tail and 28 leaving a critical value of 2.048.