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TIME SERIES ANALYSIS AND PREDICTION OF AMD EQUITY PRICE

JOHN WISEHEART
ST JOHN'S UNIVERSITY

Time Series Analysis and Prediction of AMD Equity Price

I. Introduction

The following analysis is done to predict the future price of AMD stock price using a time series analysis. This paper benefits any persons or professions that necessitate the accurate prediction of equity prices.

II. Previous Research

Research in this area has been conducted before but none in the vein as this paper.

III. Methodology

There are 23 observations of cross section data. The data was collected from www.Factset.com. All statistical analysis and graphing were done in R. Statistical techniques that were used include, descriptive statistics, correlation, regression analysis, general additive modeling(GAM) as well as the use of histograms time series plots and a scatter plot for each independent variable. Missing values were dropped from analysis.

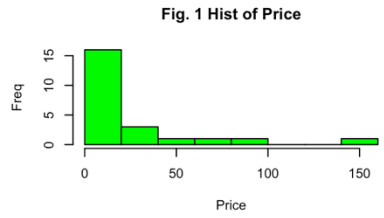
(1.Book value per share, 2. Earnings per share, 3. OBS)

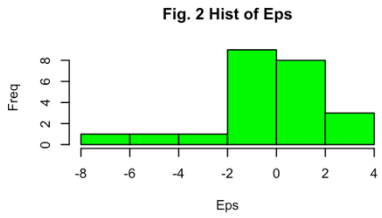
$$\text{Price} = f(\text{EPS}, \text{BVPS}, \text{OBS}) \quad \text{Eqn. 1}$$

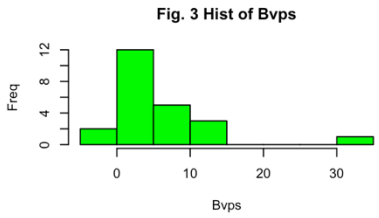
$$\text{Price} = \alpha + \beta_{EPS}\text{EPS} + \beta_{BVPS}*\text{BVPS} + \beta_{OBS}*\text{OBS} \quad \text{Eqn. 2}$$

$$\text{Price} = a + b_{EPS}\,\text{EPS} + b_{BVPS}*\text{BVPS} + b_{OBS}*\text{OBS} \quad \text{Eqn. 3}$$

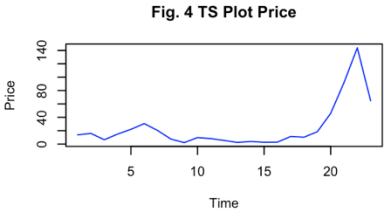
IV. Results

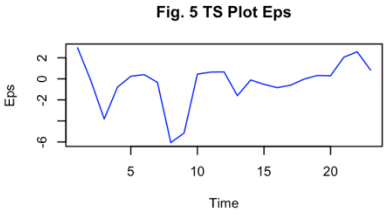


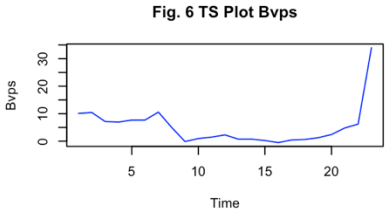




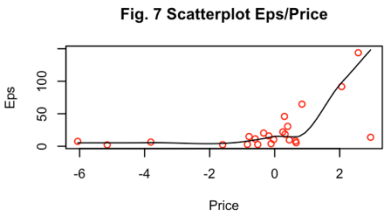
The price and Bvps are skewed to the right and seem to contain outliers. While Eps is skewed left and appears more normally distributed.

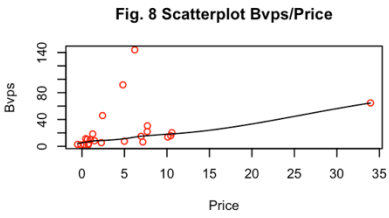




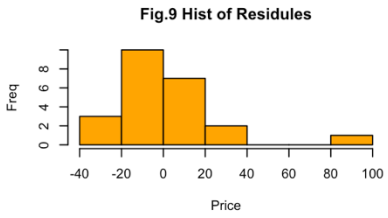


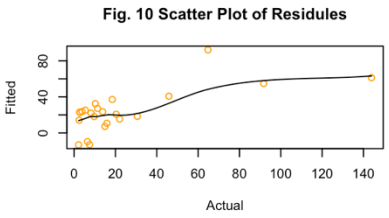
Positive trends associated with Price and Bvps over time. The Eps plot is noisier with trends less clear.

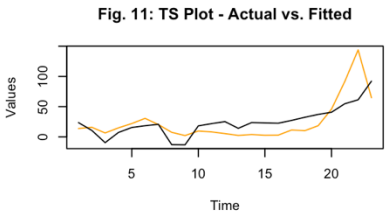




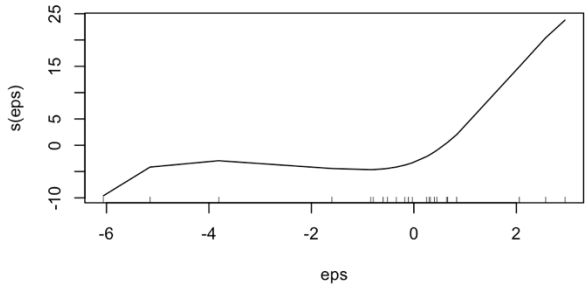
There seems to be a positive relationship between both Eps/Price as well as Bvps/Price . Possible outlier in x space in the Bvps/price plot.

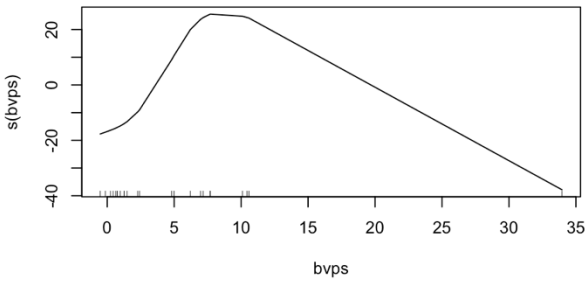






GAM Non-linear Non-parametric





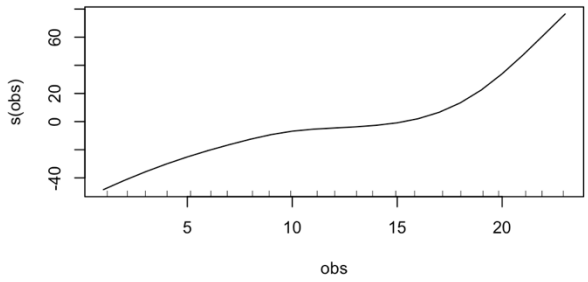


Table I **Descriptive Statistics**

Name	OBS	MAX	MIN	MEAN	MED	STD	SKEW	KURT
PRICE	23	143.90	2.16	24.13	11.34	34	2.24	8.22
BVPS	23	33.96	-0.52	5.27	2.42	59.60	2.6	11.7
EPS	23	2.95	-6.06	-0.37	-.03	10.20	-1.12	4.39

Table 2 **Correlation Matrix**

	Price	*BVPS*	*EPS*	*OBS*
Price	1.00	.351	.496	.518
BVPS	.351	1.00	.203	.002
EPS	.496	.203	1.00	.294
OBS	.518	.002	.294	1.00

Some moderate correlations, weak correlations for the most part however.

No strong evidence of multicollinearity.

Table 3 **Regression**

Eqn. 4 Price = - 6.70 + 4.95EPS + 1.34 BVPS + 2.13OBS

t-stat (1.75**) (1.68**) (2.44***)

p value (0.095) (0.107) (0.024)

n = 23 r-sq. = .47 F = 5.75** SE = 26.47

* - Significant at the 10% level of significance

** - Significant at the 5% level of significance

*** - Significant at the 1% level of significance

The F statistic for the equation was 5.75 which crosses the threshold of significance. All the independent variables were found to be significant EPS and BVPS at the 5% level and OBS at the 1% level. The r squared was moderate at only .47 . So, while the equation itself and the variables were significant, the moderate r squared suggests that only around half of the variation in price can be explained by the variation in the independent variables.

V Conclusion

The results of the analysis were successful and the assumptions were satisfied. The equation explained 47 precent of price variation. All the independent variables were deemed significant. One way this research could be improved would be to use more observations or adding in more independent variables.

VI Bibliography

www.FACTSET.com

VII Appendix i

Tkr	Date	Price	eps	OBS
AMD	12/31/2000	13.8125	2.95	1
AMD	12/31/2001	15.86	-0.18	2
AMD	12/31/2002	6.46	-3.81	3
AMD	12/31/2003	14.9	-0.79	4
AMD	12/31/2004	22.02	0.25	5
AMD	12/31/2005	30.6	0.4	6
AMD	12/31/2006	20.35	-0.34	7
AMD	12/31/2007	7.5	-6.06	8
AMD	12/31/2008	2.16	-5.15	9
AMD	12/31/2009	9.68	0.45	10
AMD	12/31/2010	8.18	0.64	11
AMD	12/31/2011	5.4	0.66	12
AMD	12/31/2012	2.4	-1.6	13
AMD	12/31/2013	3.87	-0.11	14
AMD	12/31/2014	2.67	-0.5247	15
AMD	12/31/2015	2.87	-0.84	16
AMD	12/31/2016	11.34	-0.6	17
AMD	12/31/2017	10.28	-0.03	18
AMD	12/31/2018	18.46	0.32	19
AMD	12/31/2019	45.86	0.3045	20
AMD	12/31/2020	91.71	2.0638	21
AMD	12/31/2021	143.9	2.5728	22
AMD	12/31/2022	64.77	0.8402	23

VII Appendix ii

```
install.packages(readxl)
library(readxl)
spMerge <- read_excel("spMerge.xlsx",sheet = "Sheet1")
View(spMerge)
spData<-spMerge
dim(spData)
names(spData)

spdf<-spMerge



spdf$date
spdf$year<-as.numeric(substring(spdf$date,7,10))


library("YRmisc")
#TIME SERIES REGRESSION
unique(spdf$tkr)


names(spdf)
tsdf<-spdf[spdf$tkr=="AMD",c("tkr","price","eps","bvps","cr","dta","year")]
tsdf
tsdf<-df.sortcol(tsdf,"year",FALSE)
dim(tsdf)
names(tsdf)
tsdf$obs<-1:23
names(tsdf)
tsdf[,2:5]<-round(tsdf[,2:5],2)

par(mfrow=c(3,3))
hist(tsdf$price,xlab="Price",ylab="Freq",main="Fig. 1 Hist of Price",col="green")
hist(tsdf$eps,xlab="Eps",ylab="Freq",main="Fig. 2 Hist of Eps",col="green")
hist(tsdf$bvps,xlab="Bvps",ylab="Freq",main="Fig. 3 Hist of Bvps",col="green")

par(mfrow=c(3,3))
ts.plot(tsdf$price,xlab="Time",ylab="Price",main="Fig. 4 TS Plot Price",col="blue")
ts.plot(tsdf$eps,xlab="Time",ylab="Eps",main="Fig. 5 TS Plot Eps",col="blue")
ts.plot(tsdf$bvps,xlab="Time",ylab="Bvps",main="Fig. 6 TS Plot Bvps",col="blue")

par(mfrow=c(3,3))
scatter.smooth(tsdf$eps,tsdf$price,xlab="Price",ylab="Eps",main="Fig. 7 Scatterplot Eps/Price",col="red")
scatter.smooth(tsdf$bvps,tsdf$price,xlab="Price",ylab="Bvps",main="Fig. 8 Scatterplot
Bvps/Price",col="red")
```

```
#analyticalmethods
ds.summ(tsdf[,c("price","obs","eps","bvps","cr","dta")],2)
round(cor(na.omit(tsdf[,c("price","obs","eps","bvps","cr","dta")])),3)
fit<-lm(price~eps+bvps+obs,na.action=na.omit,data=tsdf)
summary(fit)

#ResidualPlots

par(mfrow=c(3,3))
      hist(fit$residuals,xlab="Price",ylab="Freq",main="Fig.9 Hist of Residules",col='orange')
  scatter.smooth(tsdf$price,fit$fitted.values,xlab="Actual",ylab="Fitted",main="Fig. 10 Scatter Plot of
Residules",col = 'orange')
                ts.plot(cbind(tsdf$price, fit$fitted.values),
                        col = c("orange", "black"),
                        xlab = "Time",
                        ylab = "Values",
          main = "Fig. 11: TS Plot - Actual vs. Fitted")



                                    install.packages("gam")
                                    library("gam")
#nonparametricNON-LINEARREGRESSION
                        fit2<-gam(price~s(eps)+s(bvps)+s(obs),na.action=na.omit,data=tsdf)
          cor(tsdf$price,fit2$fitted.values)^2 # R-squared
                                    summary(fit2)
 par(mfrow=c(2,2)); plot(fit2)
```