

Case Study Report

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25705 Financial Modelling and
Analysis

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Introduction

We'll be doing case studies on three stocks. Ansell (ANN-AU), Westpac (WBC-ASX) and Metcash (MTS-AU).

For the first question we compute the descriptive statistics for the three stocks. These can be found in the excel datasheet.

Firstly, we can see that the average daily return for all three securities is relatively low, ranging from 0.002% to 0.04%. This suggests that these securities are not particularly volatile and are potentially more suited for long-term investment strategies.

Secondly, the average daily volatility for the securities ranges from 1.00% to 1.43%, with a maximum volatility of 12.63%. This indicates that there is some degree of risk associated with these securities and investors should be aware of the potential for fluctuations in price.

Thirdly, we can see that there is a significant difference in the average daily volume traded for each security, ranging from 646,002 shares for Ansell to 7,298,958 shares for Westpac. This suggests that some securities

may be more liquid than others, with more shares traded daily.

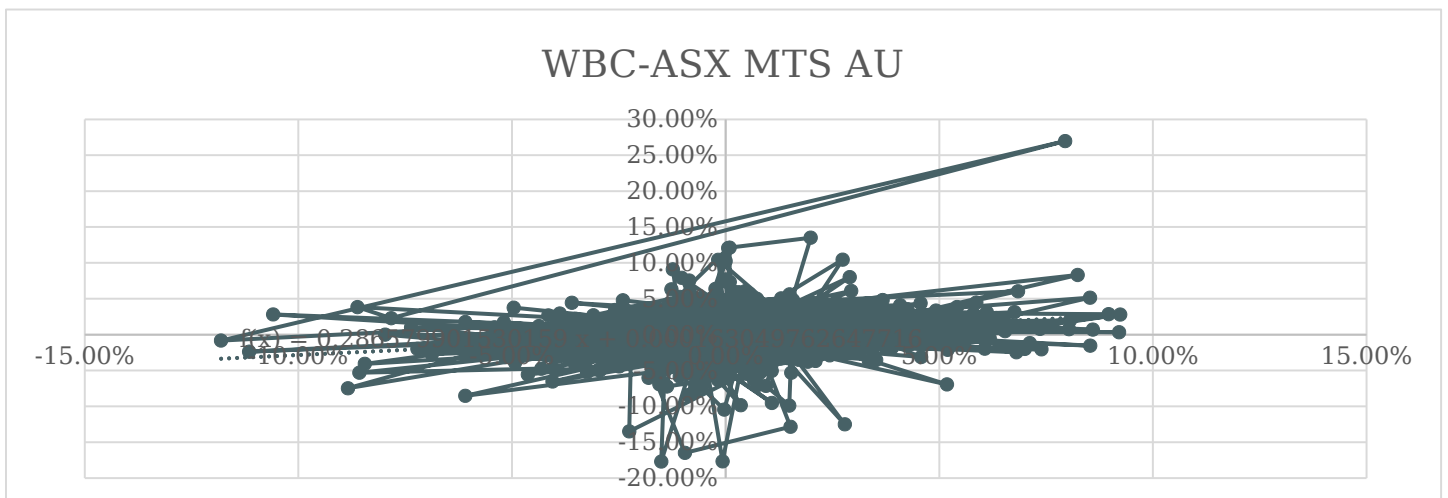
Correlations

ANN-AU	Correlations	
	Return	Volatility
Volatility	0.011925	
Volume	-0.05686	0.361665

WBC-ASX	Correlations	
	Return	Volatility
Volatility	-0.05152	
Volume	-0.05261	0.531869

MTS-AU	Correlations	
	Return	Volatility
Volatility	-0.0595	
Volume	-0.03282	-0.0595

CHARTS FOR CROSS CORRELATIONS





FURTHER ANALYSIS

Correlations

After comparing the correlations across returns, volatility, and volume we can comment about their relationships. Ansell's return does not show a strong correlation with volatility, however there is a significant negative correlation with volume of 5.6%. There's a 36% positive correlation between volatility and volume suggestive of trading activity influencing the opening and closing of the share prices. For WBC-ASX, the correlation between return and volatility is weak and negative (-0.0515) and between volatility and volume is moderately strong and positive 53%. This suggests that there is a positive relationship between daily volatility and trading volume for this security. Metcash also shows correlation between volatility and volume is very weak and negative (-0.0328). One thing to note about Metcash is that all its correlations have an inverse relation to each other.

Overall, these correlation coefficients indicate that the relationships between return, volatility, and volume for these securities are generally weak or very weak. However, the positive correlation between volatility and volume for WBC-ASX suggests that there may be a higher degree of trading activity and liquidity for this security compared to the other two.

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Cross Correlations

The correlation coefficients of ANN-AU, WBC-ASX, MTS-AU, and WBC-ASX indicate that there may be some degree of positive relationship between the daily returns of these three securities. For ANN-AU with WBC - ASX the correlation is moderately strong and positive (0.2667), For MTS-AU with MTS-AU the correlation is weak and positive (0.1746), while for WBC-ASX and MTS-AU the

	Correlation s	
	WBC- ASX	MTS-AU
ANN-AU	0.2666794	0.174648
MTS-AU	0.2458614	

correlation is weak and positive (0.2459).

Overall, these correlation coefficients indicate that there may be some degree of positive relationship between the daily returns of these three securities, although the relationships are generally weak to moderately strong. It is important to note that correlation does not necessarily imply causation, and other factors not captured in this analysis could be driving the relationships between these securities. If an investor is to invest, I would suggest Metcash and Ansell since they have the least correlation and would benefit the most from diversification. Benchmark stock MTS-AU here provides more benefit and reduces risk.

Hypothesis Testing

The hypothesis being tested is whether there is a significant difference between the mean returns of ANN-AU and WBC-ASX. The null hypothesis (H_0) is that there is no difference between the means, while the alternative hypothesis (H_a) is that there is a difference. The t-statistic measures the difference between the sample means in terms of the variability within the samples. If the t-statistic is large enough, we reject the null hypothesis and conclude that there is a statistically significant difference

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between the means. We shall use a Two - tail test as we do not do the direction of the variables.

In this case, the calculated t-statistic is 0.6783820. We compare this to the critical value of 2.5761537 at the 99% confidence level, which is the value that the t-statistic would need to exceed to reject the null hypothesis. Since the t-statistic is less than the critical value, we fail to reject the null hypothesis and conclude that there is insufficient evidence to support the claim that there is a significant difference between the mean returns of ANN-AU and WBC-ASX.

The p-value of the test is another way to interpret the results. In this case, the p-value is 0.4975398, which is greater than the alpha value of 0.01. Therefore, we do not have enough evidence to reject the null hypothesis.

In summary, the hypothesis test indicates that we cannot conclude that there is a statistically significant difference between the mean returns of ANN-AU and WBC-ASX at the 99% confidence level.

Looking at the two-tailed t-test results for the returns of ANN-AU and MTS-AU, the calculated t-statistic of -0.333734 is less than the critical value of 2.576069543, and the p-value of 0.73858371 is greater than the significance level of 0.01. This indicates that we fail to reject the null hypothesis that there is no significant difference between the returns of the two stocks.

Furthermore, the noise (standard error of the difference between the means) is relatively large compared to the signal (difference between the means), indicating that any observed differences between the two stocks' returns may be due to chance.

Therefore, based on this analysis, we can conclude that there is no significant difference between the returns of ANN-AU and MTS-AU at a 99% confidence level.

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SES ANALYSIS

Single Exponential Smoothing is a time series forecasting method that uses a weighted average of past observations to make future predictions. Initially assuming α to be 60% we make a SES forecast for Ansell yielding a MSE of 5.18106E-05.

The estimation period was from January 1, 2005, to June 30, 2022, and the holdout period was from July 1, 2022, to December 31, 2022. The re-estimation period covered the entire range from January 1, 2005 to December 31, 2022, during the estimation period solver gives an α of 19.3% yielding an MSE of 4.52097E-05 during the holdout period, we use the same 19.3% yielding an MSE of 3.79367E-05 during the re-estimation period. The forecast for 2023 was generated using an α recalculated by solver value of 19.1% and yielded an MSE of 4.50047E-05.

Based on this information, it appears that single exponential smoothing was able to generate relatively accurate forecasts for ANN-AU's price history, with lower values of α generally producing better results. The Forecast for 2023 using the optimized α of 19.1% gives an SES forecast value of 0.002089 of Volatility.

α		
19.1%		
Date	Volatility	SES forecast
12/30/22	0.004871	0.001431
1/1/2023		0.002089

Linear Regression

After analyzing the data from the three companies, Ansell Limited (ANN-AU), Westpac Banking Corporation (WBC-ASX), and Metcash Limited (MTS-AU), there are some interesting findings.

Firstly, looking at the regression statistics of the data from 2018-2019 and 2021-2022, it can be observed that the multiple R values for all three companies have decreased over time, indicating weaker correlations between the market average market returns and the stocks returns.

In terms of individual companies, the strongest correlation was observed for Westpac Banking Corporation (WBC-ASX) in both 2018-2019 and 2021-2022, with an R-squared value of 0.4226 and 0.2607, respectively. In comparison, the correlations for Ansell (ANN-AU) and Metcash Limited (MTS-AU) were weaker, with R-squared values of 0.3722 and 0.1098, respectively, in 2018-2019. In 2021-2022, the R-squared values further decreased to 0.121 and 0.04214, respectively, indicating even weaker correlations.

It is also interesting to note that the P-values for the regression analysis of the data from all three companies were statistically significant, indicating that there is a relationship between the market returns and stock returns. The beta for Ansell is 1.094 for 18-19 and 0.815 for 21-22. For Westpac Banking Corporation (WBC-ASX) it has changed from 1.211 to 0.926. Metcash also saw a drop in its measure of systematic risk from 1.081 to 0.651. The trend seems to be weaker return in the year 21-22 to the index for these stocks.

Multiple Regression

The regression is done on two models with three independent variables (COGS incl. D&A, Gross Income, EPS (recurring) in Model 1 and COGS incl. D&A, Gross Income, Dividends per Share in Model 2) with respect to sales.

The ANOVA table shows the results of the analysis of variance, which tests the overall significance of the regression model. Both models have a very high F-statistic and a very low p-value, indicating that they are highly significant.

The coefficients table shows the estimated regression coefficients for each independent variable in the model, along with their standard errors, t-statistics, and p-values. In both models, COGS incl. D&A and Gross Income have coefficient estimates of 1 and 0.999999999

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respectively, which suggests a strong positive relationship with the dependent variable. In Model 1, EPS (recurring) has a coefficient estimate of $2.39097\text{E-}07$, but it is not statistically significant at the 5% level. In Model 2, Dividends per Share has a coefficient estimate of $6.00659\text{E-}08$, but it is also not statistically significant at the 5% level.

The R-squared values for both models are 1, indicating that the models explain all of the variation in the dependent variable. However, this could be due to overfitting or other issues, so it is important to perform further analysis to ensure that the models are valid and useful for making predictions.

Both the models are great, model 2 is better as the MSE has a lower value when we used the training data on the last 4 periods .
