

Analysis of AFL Results from year 2012 – 2017 using Massey Constant Rating models

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Abstract: Australian rules football is a vibrant sport, based on the principle of territorial foray. It adorns with both a large playing field and more number of participants predominantly athletes who are dynamic with multifaceted skills. The research consists of the score data analysis for the years 2012 to 2017. From the given score data of the 18 AFL playing teams, it was required to build severable working Massey Constant Rating models to come up with the structured report and understanding of the performance of the teams and interpretation various results from the analysis. Primarily, it was noted that the home advantage does have an impact on the well performing teams. Then the teams' ratings were calculated based on the standard rating value of 100 to initiate our analysis and calculation to find the actual ratings. It reveals interesting observations about the teams' performance based ratings and their consistency. Facts show critical aspects of the home advantage and the evenness of the competition for the past six year

Index Terms: Consistency, Criticality, Massey constant ratings, Performance.

I. INTRODUCTION

Australian is a fast, free-flowing game that is the most popular sport in Australia. The game looks to be hybrid of rugby and soccer with a bit of basketball thrown in for good measure. The game is played on an oval ground that is about twice as long and wide as an American football field. There are 18 players on each side. The objective is to kick the ball between the two middle posts at each end. A goal is worth scored if the ball is kicked through the middle posts and is worth 6 points. If the goal is kicked between the middle post and the smaller side post or if the ball goes between the middle posts without being kicked, then 1 point is scored. There is no offside, so players can move anywhere on the field and can pass the ball in any direction. The Australian Football League (AFL) is the pre-eminent professional competition in the sport of Australian football in Australia and features only Australian teams. The league currently consists of 18 teams spread over five of Australia's five states. Our objective as part of this report is to analysis the performance of the teams from the year 2012 to 2017. To do this, we shall be using the Massey Constant Rating model to come up with the ratings for each team during these years. It would also be using the calculation of the correlation coefficients to understand the

evenness of the competition. And based on the comment from one of the commentators who claimed that "Good Teams are Consistent Teams", It would be essential to know if team strength affects consistency and if the good teams' performances are more consistent than those of weak teams.

II. STATEMENT OF PROBLEM

The aims of this research are multi-fold with the given data and the requirements. Starting point is to analyse the home advantages that the teams had during each year and plotting the variation to explore the home advantage, followed by calculating the ratings for each team during between 2012 to 2017. It is also intending to understand the performance of the teams based on the team ratings during the years 2012 to 2017. It would investigate the evidence for increasing consistency with the team rating and the explore evidences that shows any variation in consistency with the team ratings.

III. LITERATURE REVIEW

Massimo Franceschet, Enrico Bozzo (2017) has applied the temporalized Massey's method to investigate a temporalized version of the popular Massey's technique for rating actors in sport competitions. Tim Chartier ,et.al(2010), applied two popular rating methods , Colley Method and the Massey Method that are also used by the Bowl Championship Series, the organization that determines which college football teams are invited to which bowl games.

IV. METHODS

A. Variation of H Value

Based on the data for all the years, the look up table was given with the rating of 100 for all the teams to start with to start our data analysis to come up with the ratings and relative home advantage values for each year. Firstly, we calculate the ratings of team A and team B and then we calculate the expected team ratings of A and B assuming the home advantage value to be 10. Subsequently, we then calculate actual and the expected margin, followed by signed difference and the squares of the signed difference. Now, the summation of squared difference, will help us derive the corrected Home advantage value with the use of the solver.

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Table:1 H value calculation

Year	H Value
2012	11.25
2013	5.66
2014	6.61
2015	11.93
2016	11.98
2017	7.69

There was an interesting observation in the values and trend line of the H (home advantage) value. There seemed to be a significant influence of the home advantage during the year 2012, 2015 and 2016. And may be minor influence of the home advantage during the year 2013, 2014 and 2017. The linear trend line shows that there is a slight increase on the home advantage every year. The polynomial trend line shows that there an increase and decrease in the home advantage every two consecutive years. It is critical to note that we do not want to overfit the trend, so it is optimal to interpret the linear view on the home advantage.

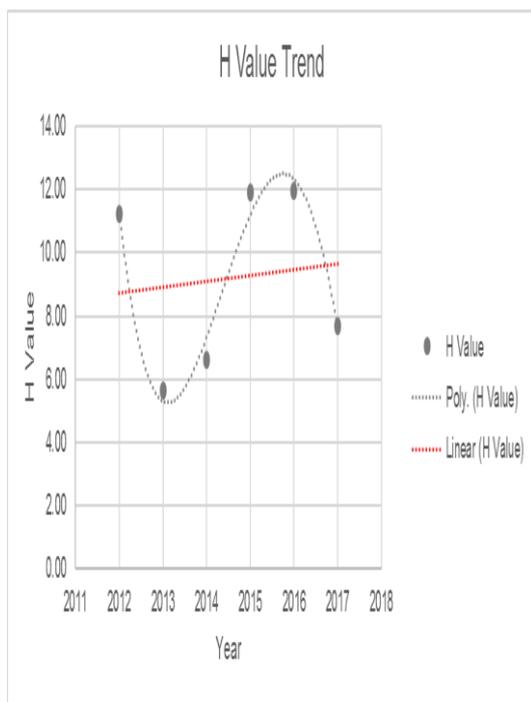


Figure 1:H value trend

B. Team Ratings in Each Season

Based on the data for all the years, the look up table was given with the rating of 100 for all the teams to start with to come up with the actual and expected ratings for the teams. The table is sorted based on the alphabetical order of the teams.

Table 2: Team ratings in each season

Teams	2012	2013	2014	2015	2016	2017
Adelaide	121.6	107.7	110.2	112.7	131.6	129.3
Brisbane Lions	88.4	88.4	71.9	66.0	52.4	72.1
Carlton	108.7	107.2	90.7	64.7	79.9	81.5
Collingwood	117.4	116.2	97.4	103.5	96.4	101.1
Essendon	101.7	105.2	105.1	78.7	59.8	104.0
Fremantle	111.6	120.4	122.4	114.5	78.8	76.8
Geelong	116.9	130.1	111.7	101.7	127.5	114.3
Gold Coast	55.0	85.6	92.2	74.2	74.5	73.8
Greater Western Sydney	35.6	35.1	76.4	95.6	132.0	113.7
Hawthorn	141.1	131.9	132.7	137.6	115.3	93.0
Melbourne	65.3	42.5	72.9	79.2	98.4	103.5
North Melbourne	107.3	120.1	111.1	103.9	106.9	85.3
Port Adelaide	83.5	100.1	122.7	109.2	104.3	120.8
Richmond	109.5	118.0	102.2	115.3	81.7	111.5
St Kilda	117.1	86.8	59.3	81.1	94.8	98.0
Sydney	127.9	123.4	129.4	119.4	133.4	118.5
West Coast	121.4	97.7	110.4	132.1	120.8	104.9
Western Bulldogs	70.0	83.4	81.3	110.6	111.5	97.7

There are few teams who had a varied performance in the past 6 years. A bar chart for each year would show us how the teams have performed based on the ratings. The team that stands out as a varied performance in the past 6 years is Greater Western Sydney, who did not perform well in the first 2 years, 2012 & 2013 and then started improving their game. The other couple of teams to note are Melbourne and St. Kilda. Some of the teams were consistent in their performance like Adelaide, Sydney and Geelong, followed by few other teams who did have minor consistency for about 3 or 4 years, like Collingwood, Hawthorn, Gold Coast, Western Bulldogs, Westcoast and Fremantle.

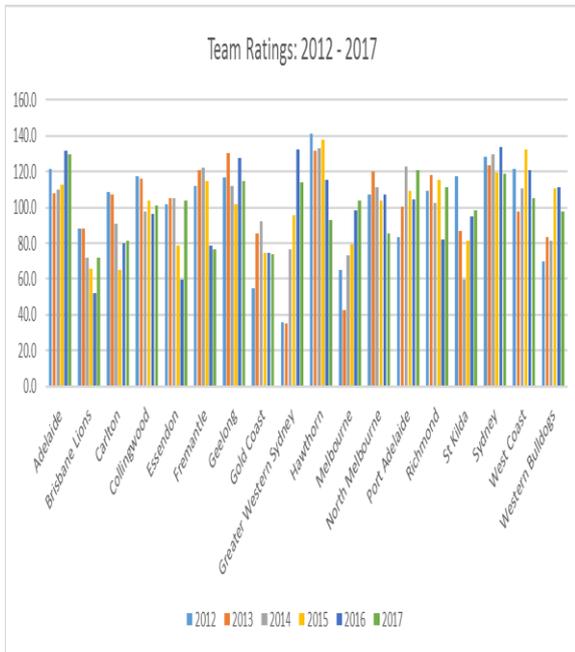


Figure 2: Team ratings in each season

C. Stacked Pair Analysis

A scatter plot was plotted pairing the ratings for each year in a stacked fashion. The ratings of all the teams were pair against the ratings of all the teams from the consecutive year. As an example, the ratings of 2012 and the ratings of 2013 was paired and then the ratings of 2013 and the ratings of 2014 was paired and so on till the pair of the ratings for 2016 and 2017. These ratings were stacked and then a scatter plot was created between X and Y. This shows that the teams have been improving their performance every year from 2012 to 2017.

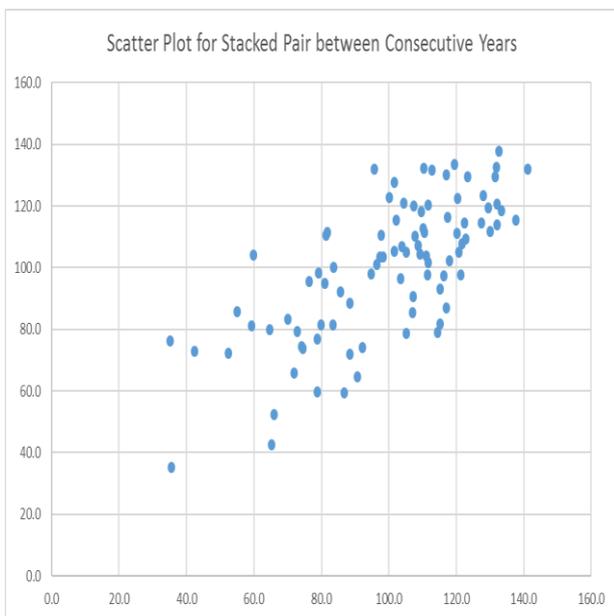


Figure 3: Scatter plot for stacked pair between consecutive years

D. Correlation Coefficient

Based on the stacked pairs for each and the ratings of the all the teams that was calculated before, the correlation coefficients were calculated for consecutive years, it shows that that highest correlation was during the year 2012 and 2013, where it seems that the competition has been even. And then it has been becoming less even from then on comparing the correlation coefficients, which start with 0.837315 during the year 2012 and 2013, and then the next year between 2013 and 2014, the correlation coefficient had reduced to 0.734256 and then reduced again to 0.701498 and 0.6286628 between the years 2014 & 2015 and 2015 & 2016 respectively. And then the correlation coefficient slightly bumped back to 0.675844 between the years 2016 and 2017 making more even than the previous year.

Table 3: Correlation matrix

Years	2012	2013	2014	2015	2016	2017
2012	1					
2013	0.837315	1				
2014	0.560728	0.734256	1			
2015	0.475812	0.442464	0.701498	1		
2016	0.141176	0.006421	0.312722	0.6286628	1	
2017	0.124713	-0.01653	0.25027	0.434276	0.675844	1

V. RESULTS

A. Evidence of Consistency

To determine the evidence of consistency of the ratings for the teams, we used the Massey Constant Rating model. As indicated before in this report, the team ratings were calculated with the given data and Ratings of the teams were calculated along with the signed difference. Signed difference was calculated based on the difference between the actual and expected margins. Actual margin is the difference between the team points and expected margin is the difference between the expected ratings and ratings of the teams. It is evident that the teams have been consistent in their performance over the period of 6 years.



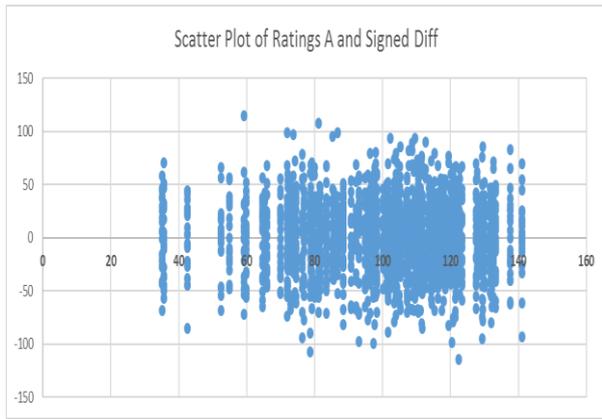


Figure 4: Scatter plot of Ratings A and signed Difference

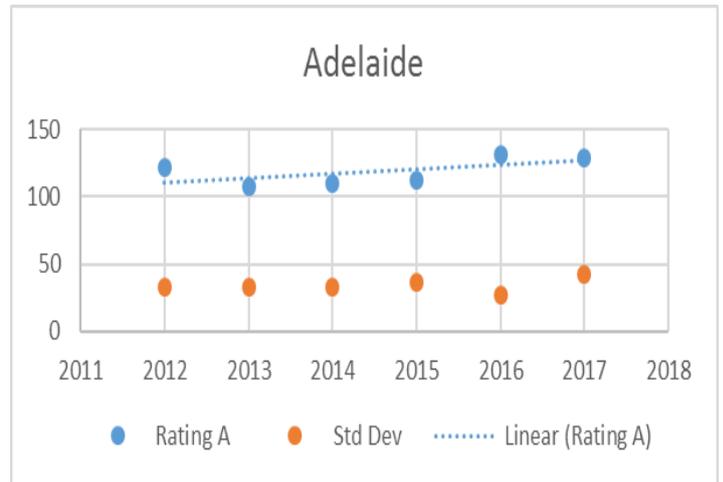


Figure 7: Performance based Rating consistency for Adelaide

B. Performance based Rating consistency

A chart was plotted between the ratings and the standard deviation of the signed difference against the year measured. The scatter plot showed interesting observations about the consistency of the teams' performance during the seasons over the past 6 years from 2012 to 2017.

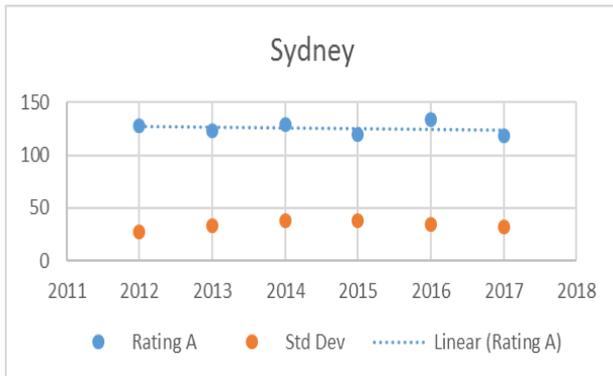


Figure 5: Performance based Rating consistency for Sydney

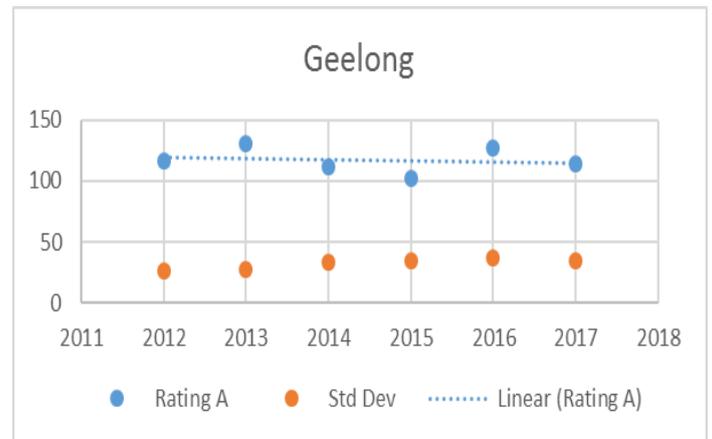


Figure 8: Performance based Rating consistency for Geelong

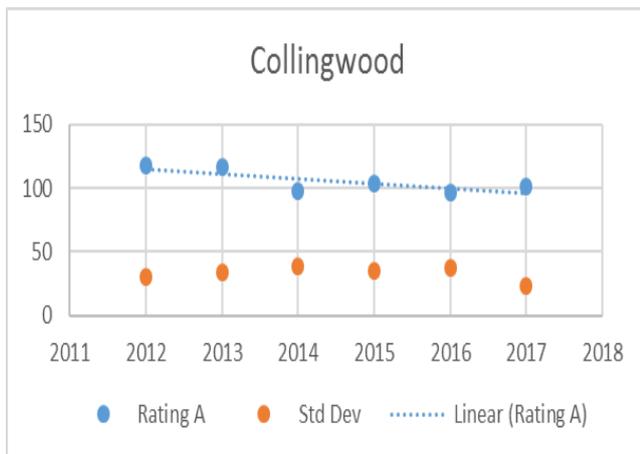


Figure 6: Performance based Rating consistency for Collingwood

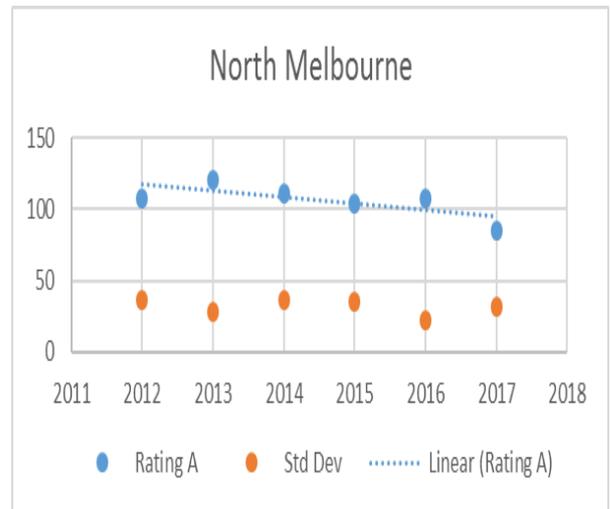


Figure 9: Performance based Rating consistency for North Melbourne

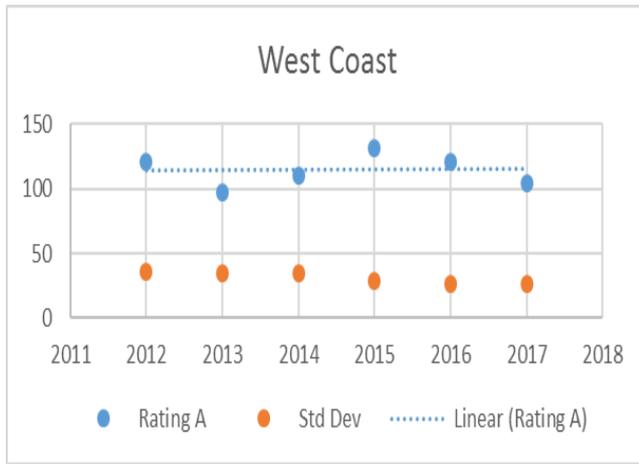


Figure 10: Performance based Rating consistency for West Coast

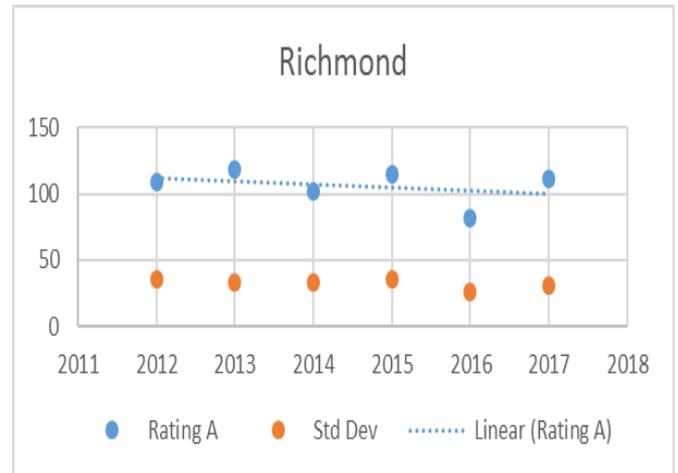


Figure 12: Performance based Rating consistency for Richmond

C. Most Consistent Teams

Based on the calculated ratings and the standard deviation of the signed difference, a chart plotted as depicted in the charts on the left side for each team that were the most consistent. Variance of the ratings was determined to check for the consistency of the team ratings. It was considered that the 6 teams with least variance were considered the most consistent and the next 6 teams were not consistent nor inconsistent. And the 6 teams with the highest variance were considered most inconsistent teams. Sydney stood out as the most consistent team out of all the 18 teams compared. They had the least variance of 28.9111 followed by a distant second team, Collingwood with a variance of 71.9196. Other teams that were part of the most consistent bracket based on the order of the variance values are Adelaide, closely followed by Geelong, who continued to have a consistent performance.

Table 4: Variance and Average Ratings

Teams	Variance	Avg Ratings
Sydney	28.9111	125.3465593
Colling Wood	71.9196	105.3164077
Adelaide	86.2548	118.8976451
Geelong	91.8913	117.1466792
North Melbourne	110.3790	105.7745316
West coast	131.2545	114.5508767

It is evident that Sydney topped the rating and they were the most consistent team for the past 6 years.

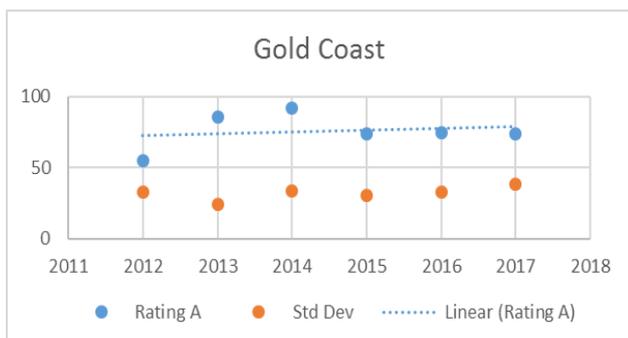


Figure 11: Performance based Rating consistency for Gold Coast

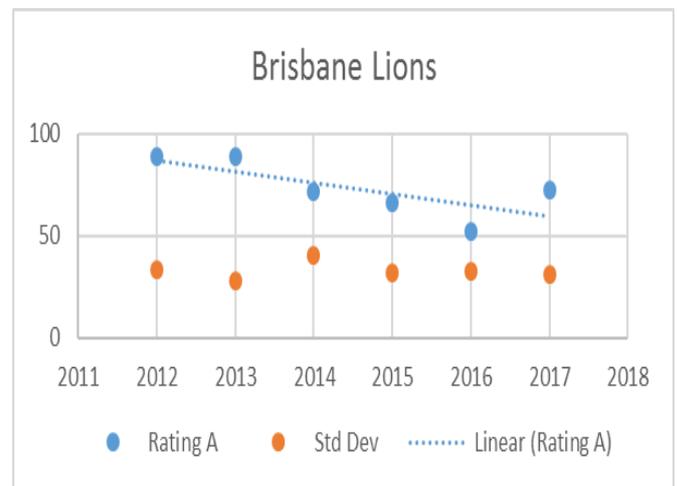


Figure 13: Performance based Rating consistency for Brisbane Lions

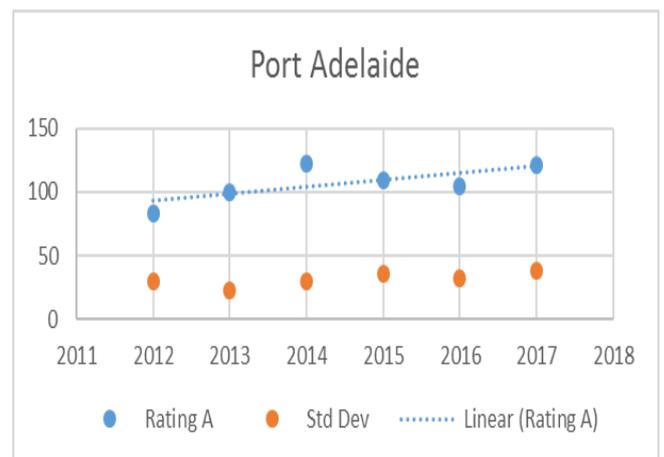


Figure 14: Performance based Rating consistency for Port Adelaide



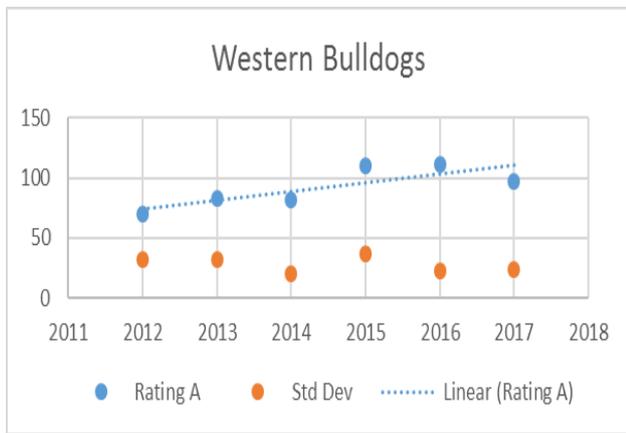


Figure 15: Performance based Rating consistency for Western Bulldogs

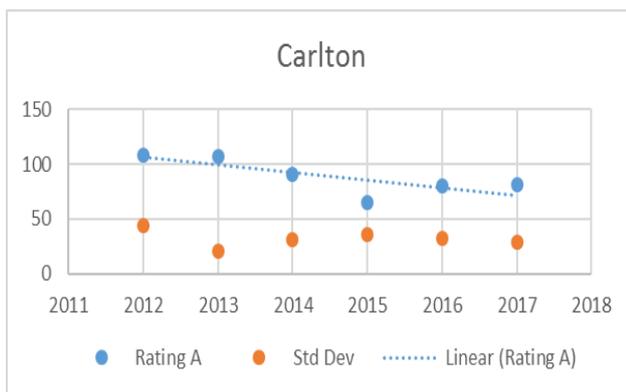


Figure 16: Performance based Rating consistency for Carlton

D. Consistent nor inconsistent

Based on the analysis and the bracket of considering the top 6 and bottom 6 teams as most and least consistent team respectively, teams that fell in between are understood to be neither consistent nor inconsistent. The average ratings of the teams do prove a point that their performances were no considerable either for the past 6 years, except Richmond and Port Adelaide.

Table 5: Variance and Average Ratings

Teams	Variance	Avg Ratings
Gold Coast	134.5597	75.8903453
Richmond	146.1911	106.3847982
Brisbane Lions	158.3450	73.19097456
Port Adelaide	174.5223	106.7887896
Western Bulldogs	238.1680	92.41148963
Carlton	241.0806	88.79635552

Port Adelaide and Richmond came 6th and 7th best performing teams based on the overall average ratings for the year 2012 to 2017. Interestingly, the weakest teams based on the average ratings for the past 6 years from 2012 to 2017 were part of this category. They were Brisbane Lions and Gold coast, who were the least performing teams in the same order. Western Bulldogs, winners of 2016 have been consistent only for the past 3 years, but that did not categorise them to be part of being on the consistently performing teams. Carlton’s performance has been consistent during the initial years as

part of the analysis but did not cut to the chase.

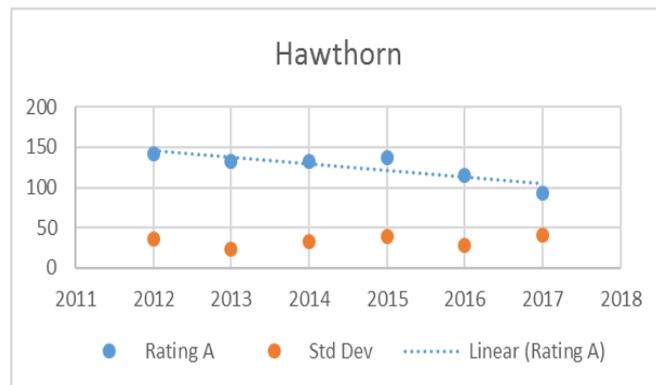


Figure 17: Performance based Rating consistency for Hawthorn

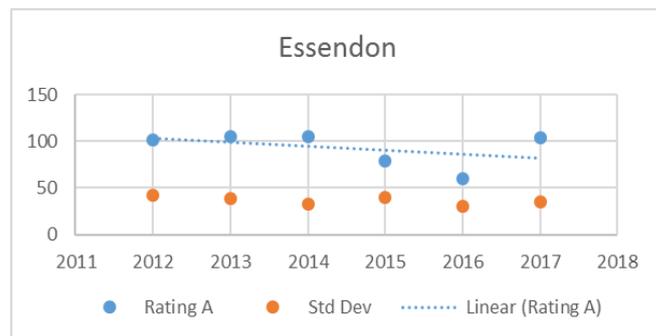


Figure 18: Performance based Rating consistency for Essendon

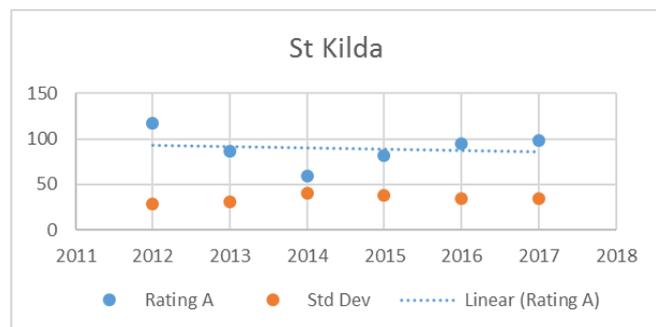


Figure 19: Performance based Rating consistency for St Kilda

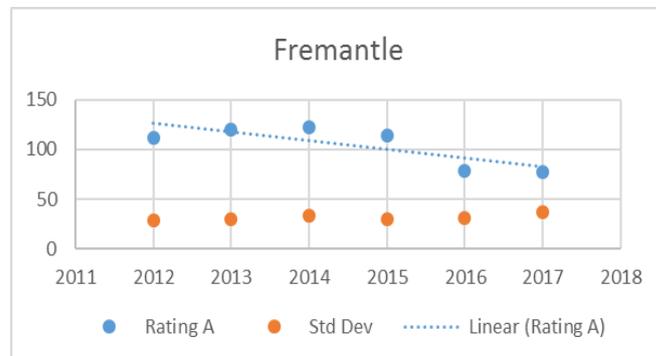


Figure 20: Performance based Rating consistency for Fremantle

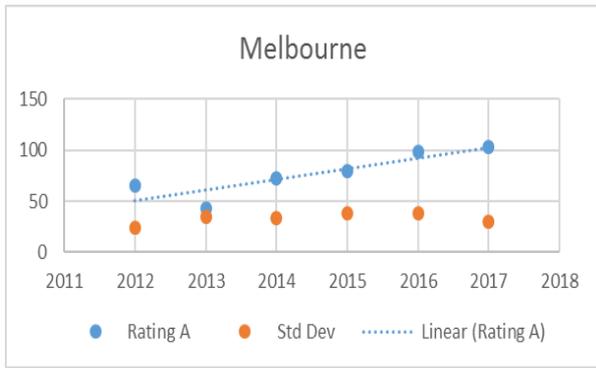


Figure 21: Performance based Rating consistency for Melbourne

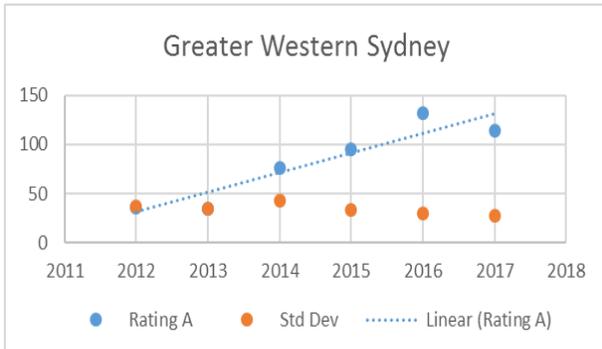


Figure 22: Performance based Rating consistency for Greater Western Sydney

E. Least Consistent Teams

As indicated before the least consistent teams were determined by the teams least variance values based on the average ratings of the teams. Most interesting this to note here is the inconsistency of the performance by Hawthorn, who were the champions for 3 years and then failed to maintain their consistency and dropped down to being inconsistent in their performance. Their presence in the inconsistent category is due to the fact that they were the champions for few years.

Table 6: Variance and Average Ratings

Teams	Variance	Avg Ratings
Hawthorn	274.4876	125.2719697
Essendon	298.9661	92.41127782
St Kilda	309.2067	89.52143616
Fremantle	357.8681	104.0939503
Melbourne	418.3770	76.96307535
Greater Western Sydney	1345.4761	81.40406514

Though Fremantle was not a least performing team, they are inconsistent due to their varied performance. Essendon’s average performance had also fetched them to be part of the inconsistently performing teams. Perhaps, St Kilda, Melbourne and Greater Western Sydney have been inconsistent as well as not been performing well based on the average ratings for the years 2012 to 2017. Out of these, Greater Western Sydney has been the most inconsistent teams of all the 18 teams.

VI. CONCLUSION

From the given score data of the 18 AFL playing teams, it was required to build severable working Massey Constant Rating models to come up with the structured report and understanding of the performance of the teams and interpretation various results from the analysis. Primarily, it was noted that the home advantage does have an impact on the well performing teams. Then the teams’ ratings were calculated based on the standard rating value of 100 to initiate our analysis and calculation to find the actual ratings. The Scatter plot revealed that the teams were improving their performance based on the ratings derived. Based on the calculation of the correlation coefficient based on the stacked pair method, the evenness of the competition was determined to be good during the first 3 years 2012 to 2015 and then dropped to become not so even. Then again with the Massey Constant rating model, the consistency of the teams were measured based on the analysis the teams’ average ratings. A pivot was created to consolidate the ratings of the teams and the standard deviation of the signed difference and then scatter plot was created between them to reveal the most consistent teams and the least consistent teams. From the view of the commentator that “Good Teams are consistent teams” was not always true, because, there were cases where the teams were strong but were not consistent, except for Sydney, which was strong with the highest rating and was the most consistent of all. To a large extent the statement made by the commentator holds true, that, the stronger teams were consistent, with an exception of Hawthorn, which was the second best performing team based on the 6 years score data but was one of the inconsistent teams.

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