

3/21/2014

CBS INC.

## WORLD SERIES DATA ANALYSIS REPORT

Additional Source of Revenue | Brionna Barnes

Dear CBS Financial Staff,

This report is from Brionna Barnes, president of CBS Broadcasting, Inc. I have come to you with regards for the upcoming World Series of 2014. In best interest of having an additional source of revenue for our company this year, I have done the honors to come up with a mathematical report using the past World Series that played best 4-out-of-7 dating back to 1905 (excluding 1903, 1919, 1920, and 1921 because these were played best 5-out-of-9, as well as 1904 and 1994 because a World Series was not played) to figure out an estimate on how much we should bid to pay the baseball league for the exclusive rights to televise the World Series of 2014. However, I would love for you to look at the data I've analyzed, analyze it yourself, and provide me with your input at our next meeting.



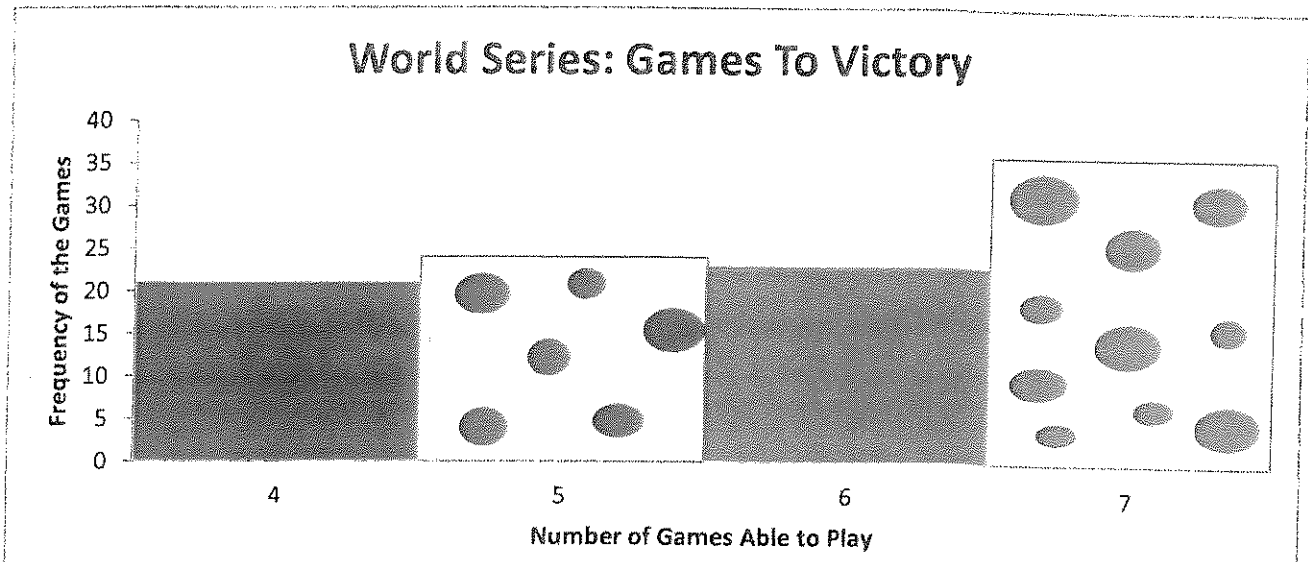
Measure of Frequency of the World Series

In order to determine which series has the highest probability to happen is creating a frequency chart for each games, best 4-out-of-7.

Data Table: *The Frequency of the Games Played to Win the World Series*

Number of Games to Win World Series	Frequency of the Games that Won the World Series	Total Number of Frequency
4		21
5		24
6		23
7		36

As we plot the frequency of the World Series, it makes it easier to see the trend of what has the highest probability for the outcome.



## Measures of Central Tendency and Spread of Data for the World Series

The mean is a good way to describe the center of data and the standard deviation is a good way to describe the spread of data; both being mathematically proven. The mean is an average that uses the exact value of each entry to find the center of data. The standard deviation is specifically used to describe the spread of data using the mean. As we use these techniques, it is our job to analyze the results we received after completing our calculations.

Data Table: *Grouped Data*

# of games	Frequency	X (mp)	xf	$(x - \bar{x})$	$(x - \bar{x})^2$	$(x - \bar{x})^2 f$
4	21	4	84	-1.7	2.89	60.69
5	24	5	120	-0.7	0.49	11.76
6	23	6	138	0.3	0.09	2.07
7	36	7	252	1.3	1.69	60.84
	n= 104		$\bar{x} = 5.7$			$\sum(x - \bar{x})^2 f = 135.36$

Calculations:

## Techniques to Measures of Central Tendency and Spread of Data for the World Series

Although the mean and standard deviation are great ways to describe aspects of a data set, there are other techniques available for us to describe the data set as well.

To describe the center of data, we can use the measure of central tendency: mode. Mode, also known as most, is the number that is the most frequently displayed in the data set. After performing a complete count of the numbers, the mode of our data set is 7 as it was displayed 36 times compared to 4 with 21 times, 5 with 24 times, and 6 with 23 times. Although slightly different than the mean, it still indicates that there is a high probability that the World Series will last 6 or 7 games.

To describe the spread of data, we can use Chebyshev's Theorem. For any set of data and any constant greater than one, the proportion of the data must lie within a standard. For any data set, at least:

- 75% of the data falls in the interval  $\bar{x} - 2s$  to  $\bar{x} + 2s$
- 88.9% of the data falls in the interval  $\bar{x} - 3s$  to  $\bar{x} + 3s$
- 93.8% of the data falls in the interval  $\bar{x} - 4s$  to  $\bar{x} + 4s$

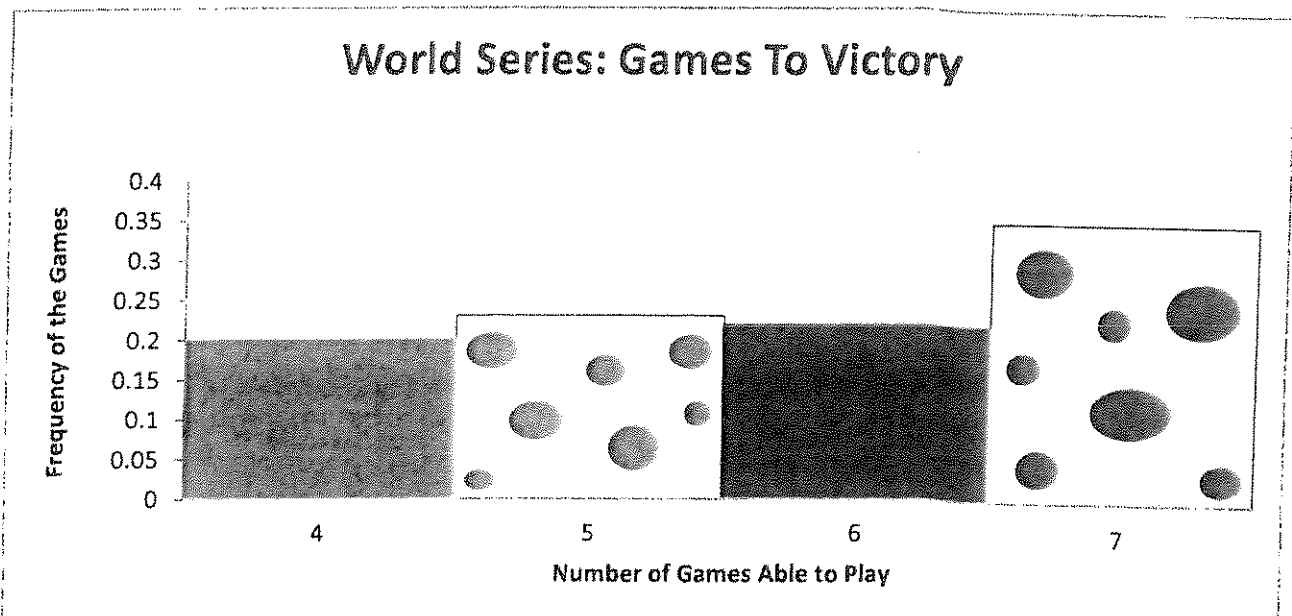
## Understanding Probability

The technique of using relative frequency is a common way of finding the probability of an event. The underlying assumption is that if events occurred a certain percentage of times in the past, they will occur around the same percentage in the future. As the sample size increases, the relative frequencies of outcomes get closer and closer to the theoretical probability value.

Data Table: *Probability Model of the World Series*

Number of Games	Frequency	Calculations	Relative Frequency
4	21	$21/104 = 0.20$	20%
5	24	$24/104 = 0.23$	23%
6	23	$23/104 = 0.22$	22%
7	36	$36/104 = 0.35$	35%

As we plot the frequency of the World Series, it makes it easier to see the trend of what has the highest probability for the outcome.



### Bid to Televising the World Series of 2014

Before I suggest I bid, I need you all to be aware of the estimated advertising revenue that could be made. Each game aired on television earns about \$2 million in revenue. As I analyze the data results calculated, I suggest we bid \$9.5 million - \$10 million. However, we have to have a sub group formed on our financial staff to create a report of the final teams that have a chance to make it to the 2014 World Series. I want all relevant statistics at the meeting. My desire for this report is so that we are aware of who we are bidding on. If it two very strong competitive teams, the full seven games have a stronger chance of being played. However, if it is one potentially stronger team than the other, we have to be aware of this chance which in fact will affect our revenue. Another factor I want us to consider is how important this would benefit the company to obtain this engagement.

Data Table: *Calculations to Bid*

Series	Potential Revenue	Bid: \$9.5 million	Gross Revenue	Bid: \$10 million	Gross Revenue
4	\$8 million	\$-1.5 million	Lose \$1.5 million	\$-2 million	Lose \$2 million
5	\$10 million	\$+0.5 million	Gain \$0.5 million	\$+/- 0	No loss or gain
6	\$12 million	\$+2.5 million	Gain \$2.5 million	\$+2 million	Gain \$2 million
7	\$14 million	\$+4.5 million	Gain \$4.5 million	\$+4 million	Gain \$4 million

## Conclusion

In conclusion, I have come to you with regards for the upcoming World Series of 2014. In best interest of having an additional source of revenue for our company this year, I have done the honors to come up with a mathematical report using the past World Series that played best 4-out-of-7 dating back to 1905 (excluding 1903, 1919, 1920, and 1921 because these were played best 5-out-of-9, as well as 1904 and 1994 because a World Series was not played) to figure out an estimate on how much we should bid to pay the baseball league for the exclusive rights to televise the World Series of 2014. In order to figure out how much we should bid, I have analyzed the data by using different techniques to figure out what looks best for our company in interest of revenue. I would sincerely appreciate that this is read over, discussed, analyze, and very well prepared for our next meeting. Thank you

President of CBS Broadcasting Inc,

-Brionna Barnes

