NBA Free Agency can be an exciting time for teams, players, and fans. Players want to know which teams want them. Teams want to know who can help and how much salary can they offer. I want to be able to predict a salary range for players based off advanced NBA statistics. To do this, I scraped certain data from www.basketball-reference.com.
This is the kind of data that was obtained:

Data	**Description**
Player Name	The name of the NBA player
Player ID	The unique identifier used by the website
Pos	NBA Position: Point Guard (PG), Shooting Guard (SG), Small Forward (SF), Power Forward (PF), Center (C)
Age	Age of Player at the start of February 1st of that season.
Tm	Team that the NBA player belonged to
G	Total # of games played
MP	Total # of minutes played
PER	Player Efficiency Rating: A measure of per-minute production standardized such that the league average is 15.
TS%	True Shooting Percentage: A measure of shooting efficiency that takes into account 2-point field goals, 3-point field goals, and free throws.
3PAr	3-Point Attempt Rate: Percentage of FG Attempts from 3-Point Range
FTr	Free Throw Attempt Rate: Number of FT Attempts Per FG Attempt
ORB%	Offensive Rebound Percentage:An estimate of the percentage of available offensive rebounds a player grabbed while he was on the floor.
DRB%	Defensive Rebound Percentage: An estimate of the percentage of available defensive rebounds a player grabbed while he was on the floor.
TRB%	Total Rebound Percentage: An estimate of the percentage of available rebounds a player grabbed while he was on the floor.
AST%	Assist Percentage: An estimate of the percentage of teammate field goals a player assisted while he was on the floor.

STL%	Steal Percentage: An estimate of the percentage of opponent possessions that end with a steal by the player while he was on the floor.
BLK%	Block Percentage: An estimate of the percentage of opponent two-point field goal attempts blocked by the player while he was on the floor.
TOV%	Turnover Percentage: An estimate of turnovers committed per 100 plays.
USG%	Usage Percentage: An estimate of the percentage of team plays used by a player while he was on the floor.
OWS	Offensive Win Shares: An estimate of the number of wins contributed by a player due to his offense.
DWS	Defensive Win Shares: An estimate of the number of wins contributed by a player due to his defense.
WS	Win Shares: An estimate of the number of wins contributed by a player.
WS/48	Win Shares Per 48 Minutes: An estimate of the number of wins contributed by a player per 48 minutes (league average is approximately .100)
OBPM	Offensive Box Plus/Minus: A box score estimate of the offensive points per 100 possessions a player contributed above a league-average player, translated to an average team.
DBPM	Defensive Box Plus/Minus: A box score estimate of the defensive points per 100 possessions a player contributed above a league-average player, translated to an average team.
BPM	Box Plus/Minus: A box score estimate of the points per 100 possessions a player contributed above a league-average player, translated to an average team.
Salary	Salary for player during that year
Season	Year that was played

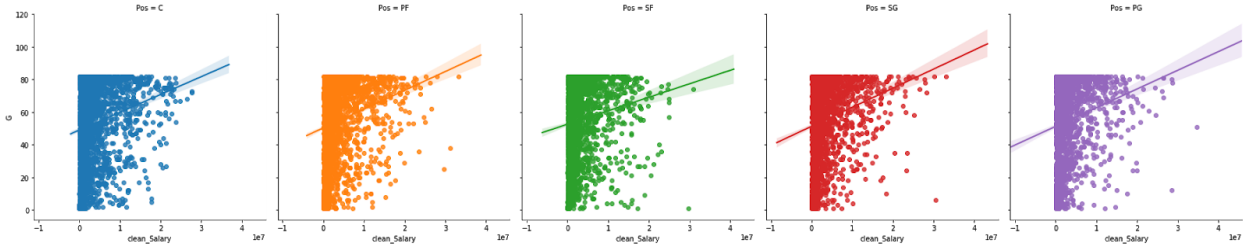
When trying to find what can determine an NBA players salary, the first thing I asked was if there's a difference in salary based on position.

We can see from this that Centers usually get paid more. This may be true, due to the height of a player and the talent. Since my data does not include height, I plotted the advanced statistics against salary for player positions to see if there's any positive and/or negative correlation.

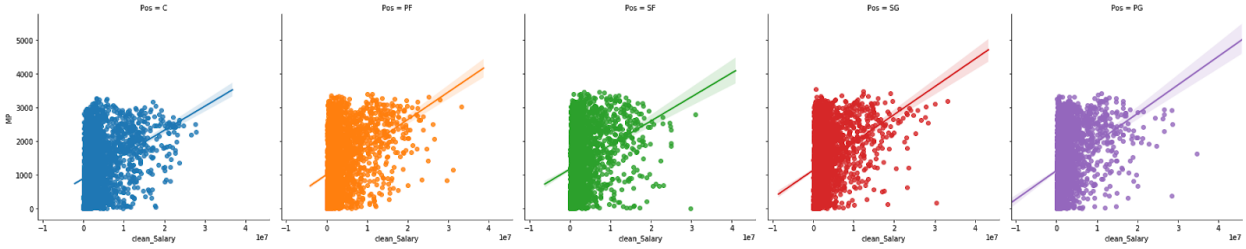
All Positive Correlations

From these plots, we can see that there's a positive correlation between most of the advanced statistics and salary across all player positions. The better the player performs in these statistics, the higher the salary they receive.

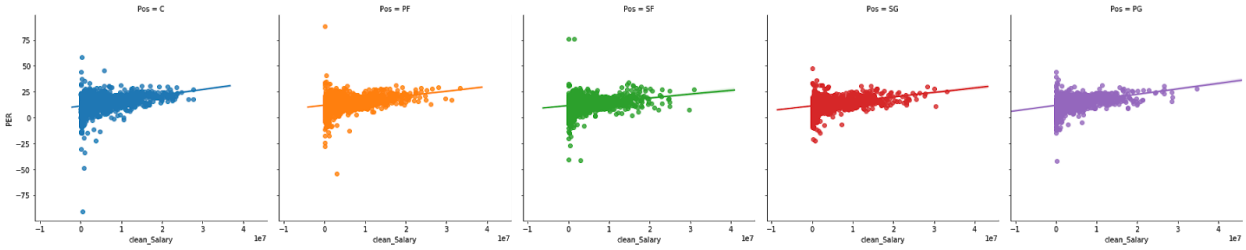
Games played vs Salary by Position



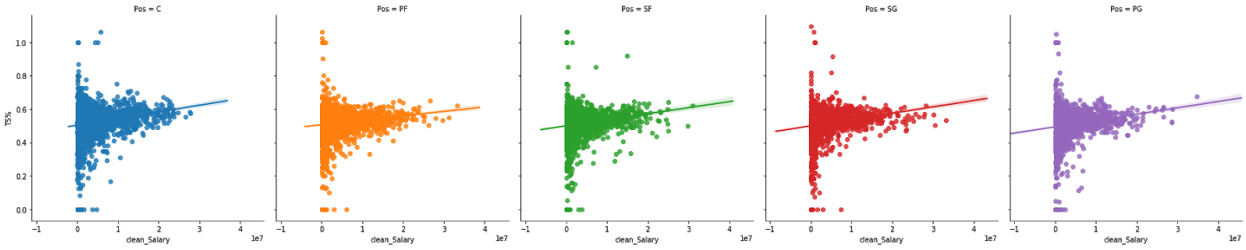
Minutes Played vs Salary by Position



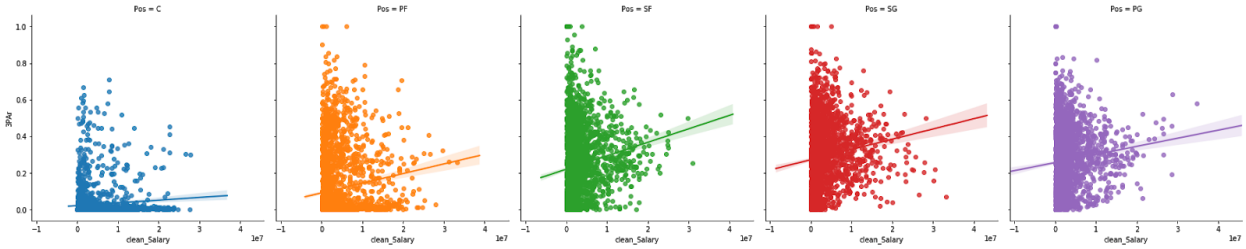
PER vs Salary by Position



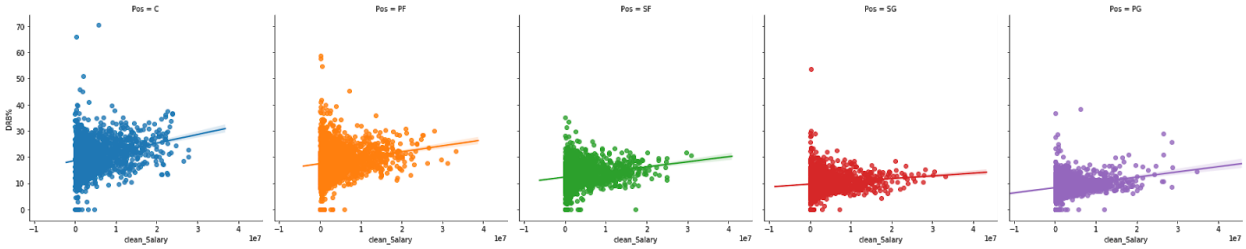
TS% vs Salary by Position



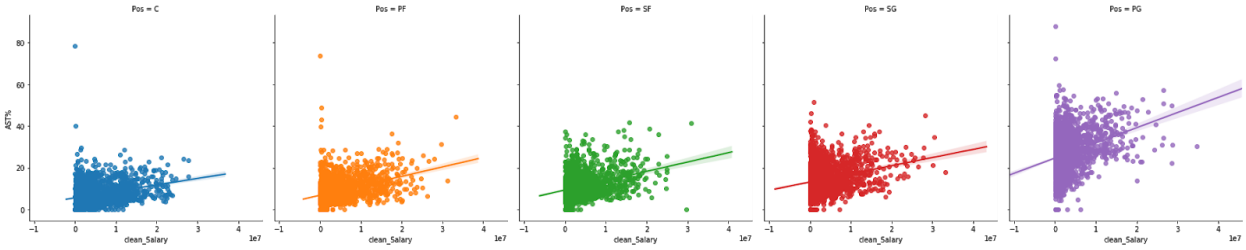
3PAr vs Salary by Position



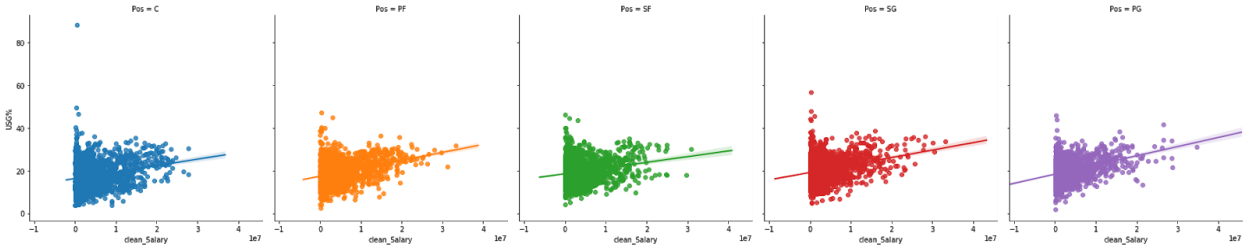
DRB% vs Salary by Position



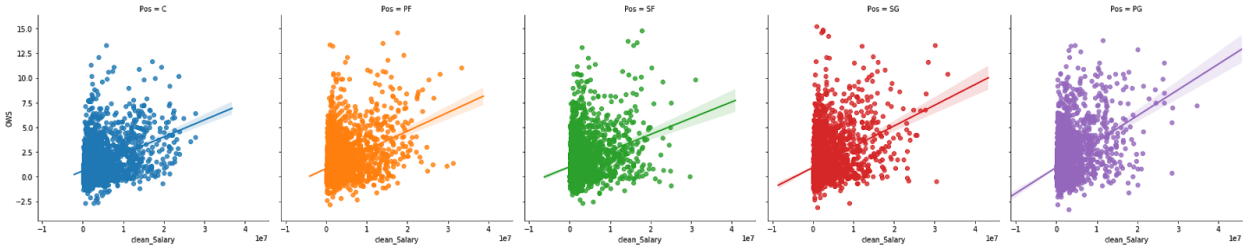
AST% vs Salary by Position



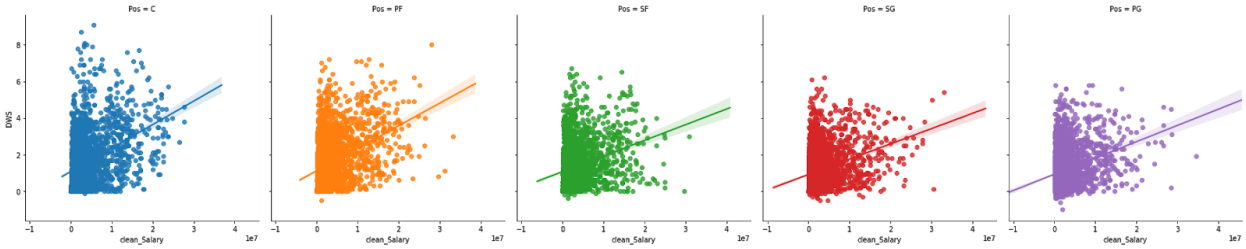
USG% vs Salary by Position



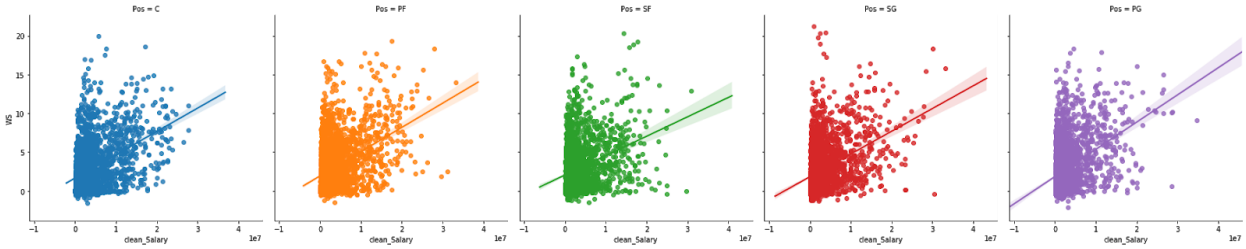
OWS vs Salary by Position



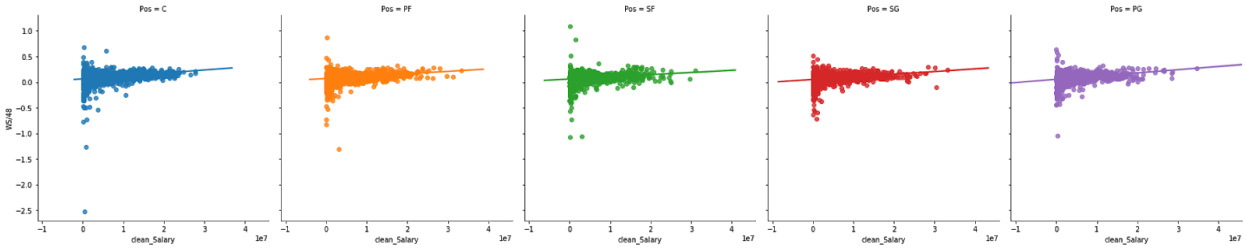
DWS vs Salary by Position



WS vs Salary by Position

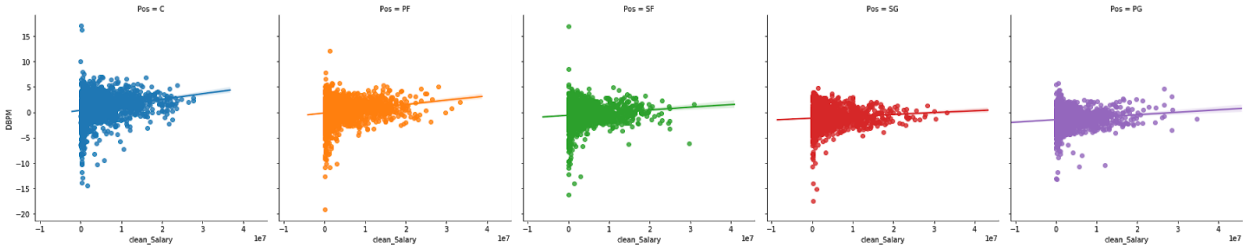


WS/48 vs Salary by Position



OBPM vs Salary by Position

DBPM vs Salary by Position

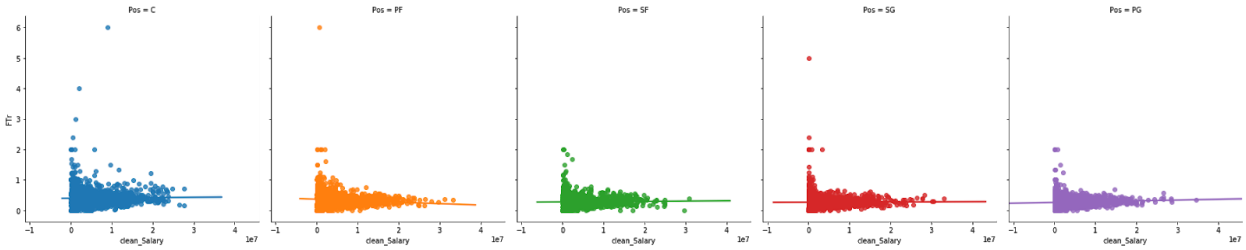


BPM vs Salary by Position

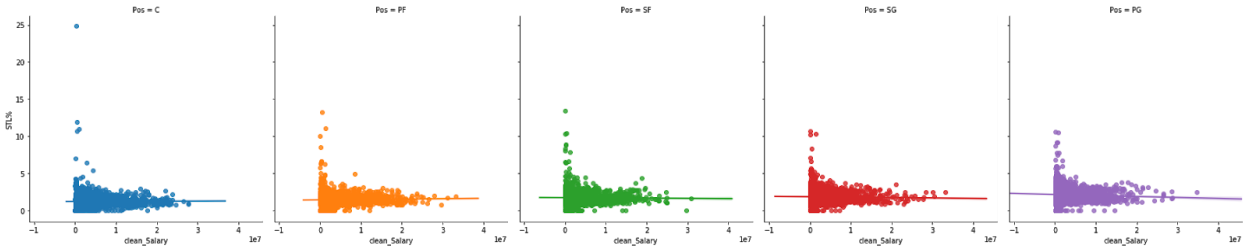
Positive and Negative Correlations

There is a positive and negative correlation between stats and salary across positions for free throw attempt rate and steal percentage. I would say that this would affect the salary the least.

FTr vs Salary by Position



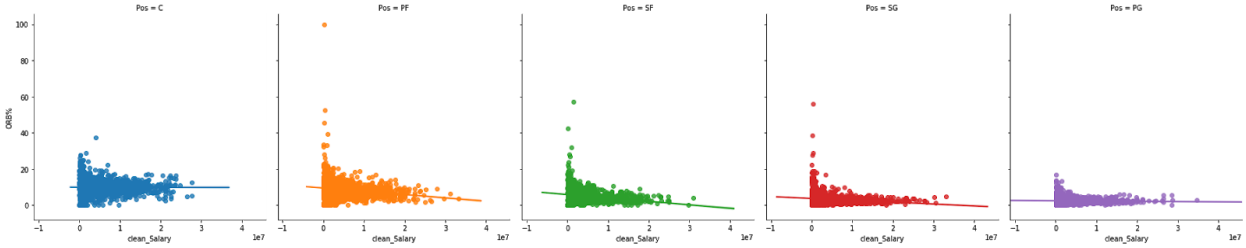
STL% vs Salary by Position



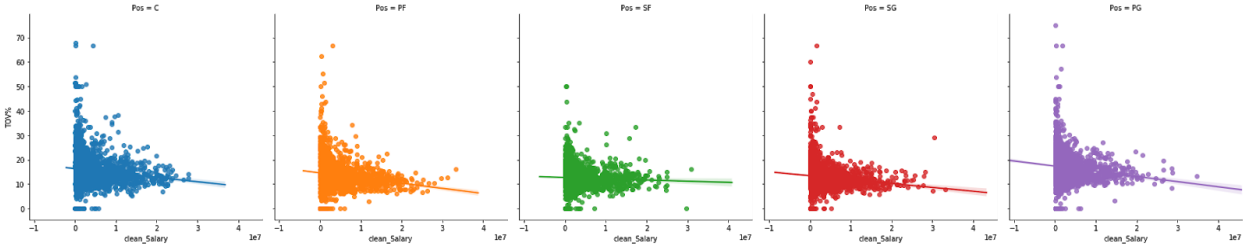
All Negative Correlations

Offensive rebound percentage and turnover percentage are the only stats that show a negative correlation. Turnover percentage makes sense since teams will pay players who take care of the ball and do not turn it over at a high rate. As for offensive rebound percentage being negatively correlated, it seems that the amount of offensive rebounds a player gets has little to do with how much the player is paid.

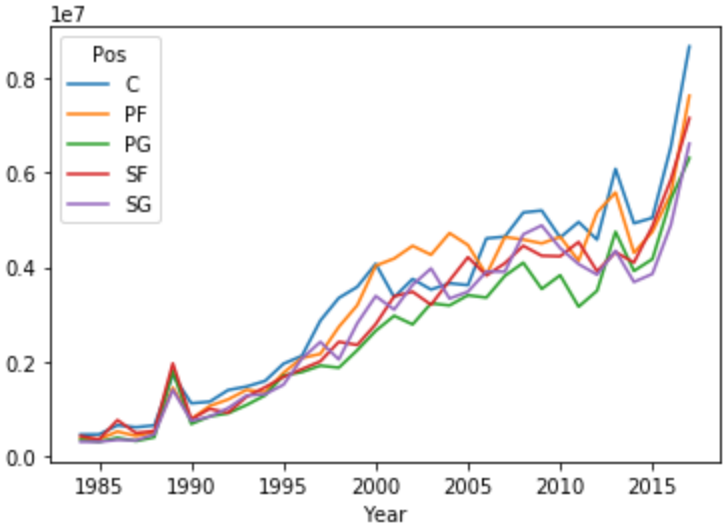
ORB% vs Salary by Position



TOV% vs Salary by Position



Knowing that my data is spread out from 1984-2017, I wanted to see the change in salary by position.



When plotting this, I noticed a sharp spike around 1989 that drops and then increases starting in 1990. This was not something I was expecting, I was expecting a much smoother increase.

player_id	clean_Salary	
Year		
1984	206	4.005534e+05
1985	287	3.729150e+05
1986	40	5.430333e+05
1987	295	4.576483e+05
1988	311	5.303875e+05
1989	64	1.670938e+06
1990	347	8.386110e+05
1991	346	9.928526e+05

What I found was that for the year 1989, there were only 64 players in the dataset and their salaries were much higher. I feel that this is slightly skewing the data by year, but overall since I am looking at advanced stats this may not be a big issue.

In conclusion, it seems that the better the players perform in desirable stats (the positively correlated stats) and have lower values for the non-desirable stats (the negatively correlated stats) the better the player is expected to get paid. Position will be a factor in how much the player could earn, especially for those players that are not deemed “star players”.