4. Big 3 Serve Stats at their Favorite Slams

This notebook explores the average percentage of points won on 1st serve by the Big 3 (Nadal, Federer and Djokovic) at three Grand Slam Tournaments: Australian Open, Roland Garros and Wimbledon. Each one of the Big 3 has the record number of titles at one of these three tournaments. This notebook will explore their serve statistics at each of these tournaments and later on, will be compared to the average match winner's serve statistics on the same surface.

Table of Content

1. Import Libraries and Data

```
#Set Path
path = r'/Users/tristansavella/Desktop/Important Things/Data
Analytics/CareerFoundry/Data Immersion/Achievement 6/Master Folder
ATP/02 Data'

#Import libraries
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import os
import scipy
import matplotlib
```

```
#Import df_matchstats
df_matchstats = pd.read_pickle(os.path.join(path, 'Prepared
Data','df_matchstats.pkl'))

#Show all columns
pd.set_option('display.max_columns', None)

#Show all rows
pd.set_option('display.max_rows', None)

df_matchstats.head()
```

```
       tourney_id  Year tourney_name surface tourney_level
winner_id  \
119317   2000-301  2000     Auckland    Hard             A    103163

119318   2000-301  2000     Auckland    Hard             A    102607

119319   2000-301  2000     Auckland    Hard             A    103252

119320   2000-301  2000     Auckland    Hard             A    103507

119321   2000-301  2000     Auckland    Hard             A    102103


       winner_ioc          winner_name  winner_age  winner_rank
winner_ht  \
119317        GER           Tommy Haas        21.7         11.0
188.0
119318        ESP        Juan Balcells        24.5        211.0
190.0
119319        ESP       Alberto Martin        21.3         48.0
175.0
119320        ESP  Juan Carlos Ferrero        19.9         45.0
183.0
119321        USA         Michael Sell        27.3        167.0
180.0

       loser_id loser_ioc           loser_name  loser_rank
loser_ht  \
119317   101543       USA         Jeff Tarango        63.0     180.0

119318   102644       ARG     Franco Squillari        49.0     183.0

119319   102238       ESP  Alberto Berasategui        59.0     173.0

119320   103819       SUI        Roger Federer        61.0     185.0

119321   102765       FRA       Nicolas Escude        34.0     185.0
```

```
        loser_age best_of round  minutes  w_#ServeGames  w_#aces
w_#dfs  \
119317       31.1       3   R32    108.0           17.0     18.0
4.0
119318       24.3       3   R32     85.0           12.0      5.0
3.0
119319       26.5       3   R32     56.0            8.0      0.0
0.0
119320       18.4       3   R32     68.0           10.0      5.0
1.0
119321       23.7       3   R32    115.0           13.0      1.0
2.0

        w_#ServePoints  w_#1stServesIn  w_#2ndServePoints  w_
%1stServesIn  \
119317            96.0            49.0               47.0
51
119318            76.0            52.0               24.0
68
119319            55.0            35.0               20.0
63
119320            53.0            28.0               25.0
52
119321            98.0            66.0               32.0
67

        w_#1stWon  w_%1stWon  w_#2ndWon  w_%2ndWon  w_bpSaved
w_#bpFaced  \
119317       39.0         79       28.0         59        3.0
5.0
119318       39.0         75       13.0         54        5.0
6.0
119319       25.0         71       12.0         60        1.0
1.0
119320       26.0         92       15.0         60        0.0
0.0
119321       39.0         59       14.0         43        6.0
11.0

        l_#ServeGames  l_#aces  l_#dfs  l_#ServePoints  l_#1stServesIn
\
119317           17.0      7.0     8.0           106.0            55.0

119318           12.0      5.0    10.0            74.0            32.0

119319            8.0      0.0     6.0            56.0            33.0

119320           10.0     11.0     2.0            70.0            43.0

119321           12.0      8.0     8.0            92.0            46.0
```

```
        l_#2ndServePoints  l_%1stServesIn  l_#1stWon  l_%1stWon
l_#2ndWon  \
119317               51.0              51       39.0         70
29.0
119318               42.0              43       25.0         78
18.0
119319               23.0              58       20.0         60
7.0
119320               27.0              61       29.0         67
14.0
119321               46.0              50       34.0         73
18.0

        l_%2ndWon  l_bpSaved  l_#bpFaced
119317         56        4.0         7.0
119318         42        3.0         6.0
119319         30        7.0        11.0
119320         51        6.0         8.0
119321         39        5.0         9.0
```

Step 2: Filter for Specified Tournaments and Players

```
# Tournaments and players of interest
tournaments = ['Australian Open', 'Roland Garros', 'Wimbledon']
players = ['Rafael Nadal', 'Novak Djokovic', 'Roger Federer']

# Filter for the specified tournaments
df_big3slams =
df_matchstats[df_matchstats['tourney_name'].isin(tournaments)]

# Filter for matches where the specified players participated
df_big3slams = df_big3slams[
    (df_big3slams['winner_name'].isin(players)) |
    (df_big3slams['loser_name'].isin(players))]

# Extract year from tourney_date
df_big3slams['Year'] = df_big3slams['Year'].apply(lambda x: str(x)
[:4]).astype(int)

# Initialize a DataFrame to store the results
result_df = pd.DataFrame()

# Calculate the average percentage of points won on first serve for
each player by tournament and year
for player in players:
```

```
    player_df = df_big3slams[
        (df_big3slams['winner_name'] == player) |
(df_big3slams['loser_name'] == player)
    ]

    player_df['%1stWon'] = player_df.apply(
        lambda row: row['w_%1stWon'] if row['winner_name'] == player
else row['l_%1stWon'], axis=1
    )

    avg_df = player_df.groupby(['Year', 'tourney_name'])
['%1stWon'].mean().reset_index()
    avg_df['Player'] = player

    result_df = pd.concat([result_df, avg_df], ignore_index=True)


/var/folders/lt/jbcyjbgd47xcv2f0lf4fdq2h0000gn/T/
ipykernel_79700/2134900133.py:7: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation:
https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#
returning-a-view-versus-a-copy
  player_df['%1stWon'] = player_df.apply(
/var/folders/lt/jbcyjbgd47xcv2f0lf4fdq2h0000gn/T/ipykernel_79700/21349
00133.py:7: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation:
https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#
returning-a-view-versus-a-copy
  player_df['%1stWon'] = player_df.apply(
/var/folders/lt/jbcyjbgd47xcv2f0lf4fdq2h0000gn/T/ipykernel_79700/21349
00133.py:7: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation:
https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#
returning-a-view-versus-a-copy
  player_df['%1stWon'] = player_df.apply(

df_big3slams.head()

       tourney_id  Year   tourney_name surface tourney_level winner_id
\
121496   2000-520  2000  Roland Garros    Clay             G    103819
```

```
121535   2000-520  2000  Roland Garros    Clay             G    103819

121555   2000-520  2000  Roland Garros    Clay             G    103819

121565   2000-520  2000  Roland Garros    Clay             G    102374

121606   2000-540  2000      Wimbledon   Grass             G    102338


       winner_ioc         winner_name  winner_age  winner_rank
winner_ht  \
121496        SUI       Roger Federer        18.8         54.0
185.0
121535        SUI       Roger Federer        18.8         54.0
185.0
121555        SUI       Roger Federer        18.8         54.0
185.0
121565        ESP       Alex Corretja        26.1         10.0
180.0
121606        RUS  Yevgeny Kafelnikov        26.3          5.0
190.0

       loser_id loser_ioc           loser_name  loser_rank
loser_ht  \
121496   101885       AUS        Wayne Arthurs       106.0     190.0

121535   102998       USA  Jan Michael Gambill        69.0     190.0

121555   103356       SUI    Michel Kratochvil       120.0     185.0

121565   103819       SUI        Roger Federer        54.0     185.0

121606   103819       SUI        Roger Federer        35.0     185.0


        loser_age best_of round  minutes  w_#ServeGames  w_#aces
w_#dfs  \
121496       29.1       5  R128    147.0           19.0      5.0
4.0
121535       22.9       5   R64    132.0           15.0      8.0
3.0
121555       21.1       5   R32    265.0           28.0     14.0
7.0
121565       18.8       5   R16    156.0           16.0      5.0
3.0
121606       18.8       5  R128    128.0           18.0     13.0
9.0

        w_#ServePoints  w_#1stServesIn  w_#2ndServePoints  w_
%1stServesIn  \
```

```
121496           135.0            80.0               55.0
59
121535           124.0            80.0               44.0
64
121555           179.0           101.0               78.0
56
121565           107.0            52.0               55.0
48
121606           122.0            73.0               49.0
59

        w_#1stWon  w_%1stWon  w_#2ndWon  w_%2ndWon  w_bpSaved
w_#bpFaced  \
121496       59.0         73       31.0         56       11.0
13.0
121535       56.0         70       25.0         56        9.0
10.0
121555       75.0         74       40.0         51       10.0
16.0
121565       45.0         86       28.0         50        3.0
5.0
121606       55.0         75       23.0         46        5.0
8.0

        l_#ServeGames  l_#aces  l_#dfs  l_#ServePoints  l_#1stServesIn
\
121496           18.0     16.0     7.0           119.0            57.0

121535           15.0      6.0     3.0            98.0            63.0

121555           28.0      6.0    15.0           212.0           101.0

121565           16.0      9.0     6.0           126.0            74.0

121606           18.0     10.0     2.0           115.0            67.0


        l_#2ndServePoints  l_%1stServesIn  l_#1stWon  l_%1stWon
l_#2ndWon  \
121496               62.0              47       49.0         85
31.0
121535               35.0              64       41.0         65
17.0
121555              111.0              47       67.0         66
60.0
121565               52.0              58       53.0         71
18.0
121606               48.0              58       43.0         64
28.0
```

```
        l_%2ndWon  l_bpSaved  l_#bpFaced
121496         50        7.0         9.0
121535         48        2.0         6.0
121555         54       17.0        23.0
121565         34        9.0        14.0
121606         58        2.0         7.0

df_big3slams.tail()

       tourney_id  Year tourney_name surface tourney_level
winner_id  \
186907   2022-540  2022    Wimbledon   Grass             G    104745

186908   2022-540  2022    Wimbledon   Grass             G    104925

186911   2022-540  2022    Wimbledon   Grass             G    104745

186912   2022-540  2022    Wimbledon   Grass             G    104925

186914   2022-540  2022    Wimbledon   Grass             G    104925


       winner_ioc     winner_name  winner_age  winner_rank  winner_ht
\
186907        ESP    Rafael Nadal        36.0          4.0      185.0

186908        SRB  Novak Djokovic        35.0          3.0      188.0

186911        ESP    Rafael Nadal        36.0          4.0      185.0

186912        SRB  Novak Djokovic        35.0          3.0      188.0

186914        SRB  Novak Djokovic        35.0          3.0      188.0


       loser_id loser_ioc               loser_name  loser_rank
loser_ht  \
186907   122298       NED  Botic Van De Zandschulp        25.0
188.0
186908   206173       ITA            Jannik Sinner        13.0
188.0
186911   126203       USA             Taylor Fritz        14.0
193.0
186912   111815       GBR           Cameron Norrie        12.0
188.0
186914   106401       AUS             Nick Kyrgios        40.0
193.0

        loser_age best_of round  minutes  w_#ServeGames  w_#aces
w_#dfs  \
186907       26.7       5   R16    142.0           15.0      9.0
```

```
2.0
186908       20.8       5    QF    215.0           23.0      8.0
5.0
186911       24.6       5    QF    261.0           28.0      5.0
7.0
186912       26.8       5    SF    155.0           18.0     13.0
1.0
186914       27.1       5     F    181.0           22.0     15.0
7.0

        w_#ServePoints  w_#1stServesIn  w_#2ndServePoints  w_
%1stServesIn  \
186907            88.0            56.0               32.0
63
186908           128.0            85.0               43.0
66
186911           164.0           107.0               57.0
65
186912            88.0            57.0               31.0
64
186914           119.0            75.0               44.0
63

        w_#1stWon  w_%1stWon  w_#2ndWon  w_%2ndWon  w_bpSaved
w_#bpFaced  \
186907       41.0         73       21.0         65        2.0
4.0
186908       70.0         82       18.0         41        5.0
9.0
186911       75.0         70       27.0         47        6.0
14.0
186912       47.0         82       18.0         58        1.0
4.0
186914       62.0         82       27.0         61        5.0
6.0

        l_#ServeGames  l_#aces  l_#dfs  l_#ServePoints  l_#1stServesIn
\
186907           16.0     11.0     7.0           101.0            62.0

186908           22.0      8.0     7.0           134.0            72.0

186911           27.0     19.0     3.0           172.0           109.0

186912           17.0      7.0     3.0           114.0            65.0

186914           20.0     30.0     7.0           125.0            91.0


        l_#2ndServePoints  l_%1stServesIn  l_#1stWon  l_%1stWon
```

```
l_#2ndWon  \
186907                39.0                61       42.0          67
17.0
186908                62.0                53       50.0          69
31.0
186911                63.0                63       76.0          69
30.0
186912                49.0                57       46.0          70
20.0
186914                34.0                72       64.0          70
18.0

        l_%2ndWon  l_bpSaved  l_#bpFaced
186907         43        6.0        11.0
186908         50        9.0        15.0
186911         47        7.0        14.0
186912         40        9.0        14.0
186914         52        2.0         4.0
```

```
df_big3slams.shape
```

```
(847, 46)
```

```
result_df.head(10)
```

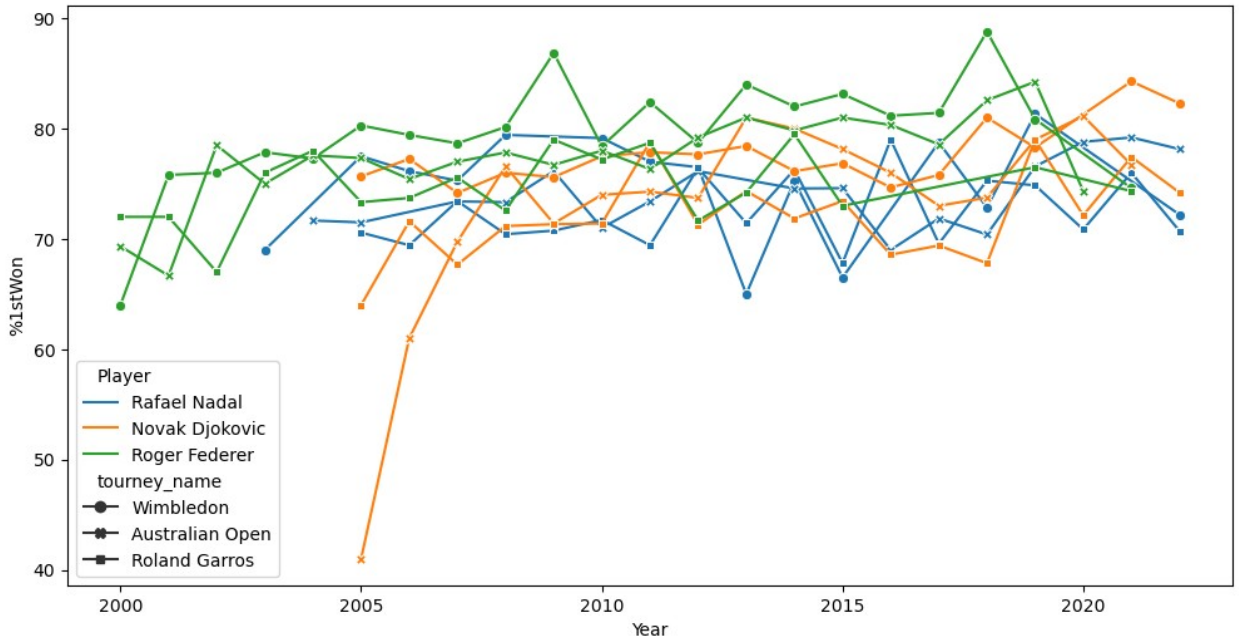
```
   Year     tourney_name    %1stWon        Player
0  2003        Wimbledon  69.000000  Rafael Nadal
1  2004  Australian Open  71.666667  Rafael Nadal
2  2005  Australian Open  71.500000  Rafael Nadal
3  2005    Roland Garros  70.571429  Rafael Nadal
4  2005        Wimbledon  77.500000  Rafael Nadal
5  2006    Roland Garros  69.428571  Rafael Nadal
6  2006        Wimbledon  76.142857  Rafael Nadal
7  2007  Australian Open  73.400000  Rafael Nadal
8  2007    Roland Garros  73.428571  Rafael Nadal
9  2007        Wimbledon  75.285714  Rafael Nadal
```

Plotting

Line graph

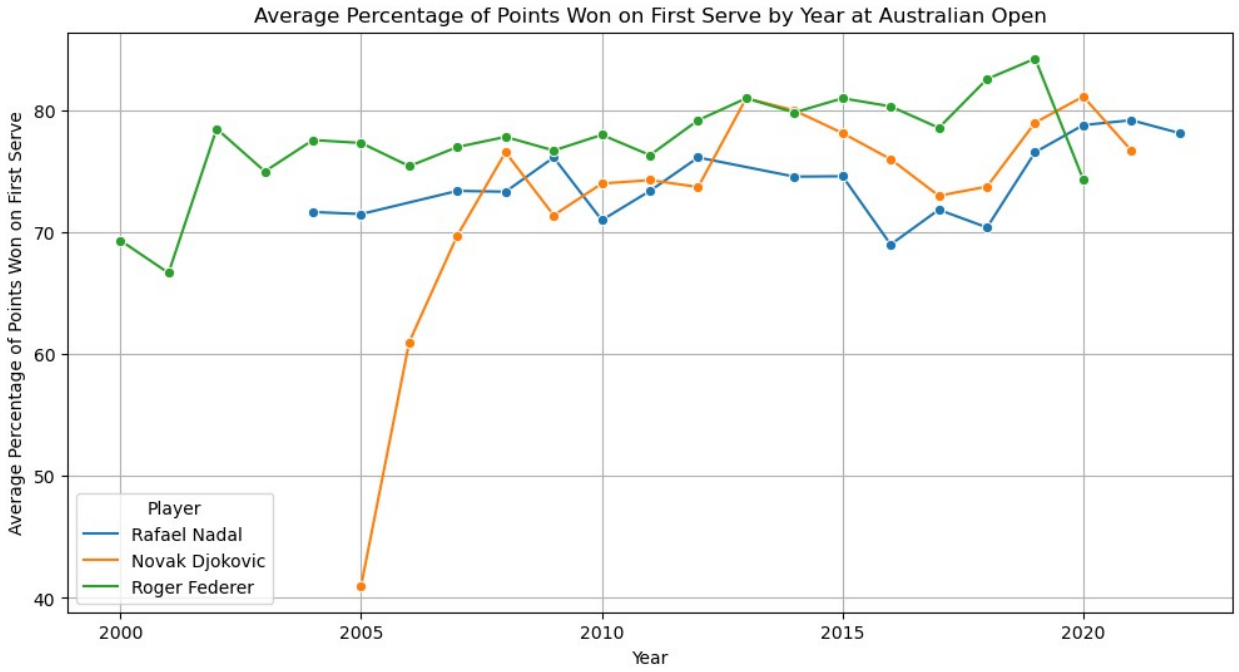
```
plt.figure(figsize=(12, 6))
sns.lineplot(data=result_df, x='Year', y='%1stWon', hue='Player',
style='tourney_name', markers=True, dashes=False)
```

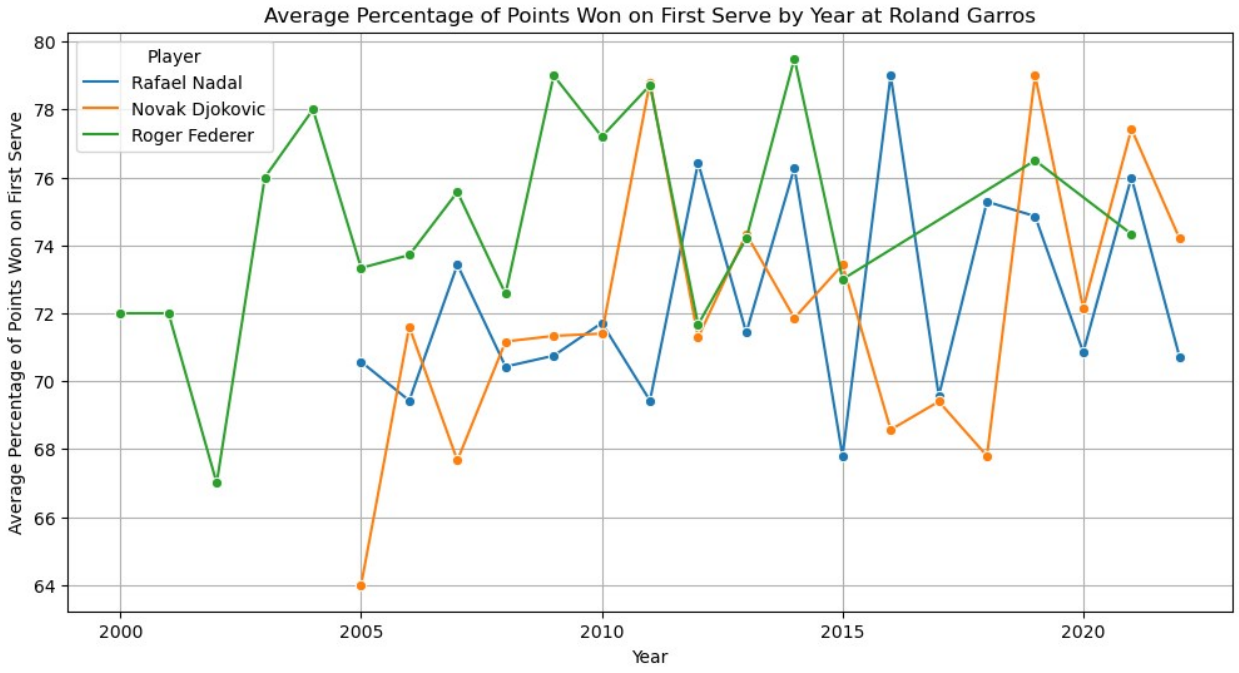
```
<Axes: xlabel='Year', ylabel='%1stWon'>
```

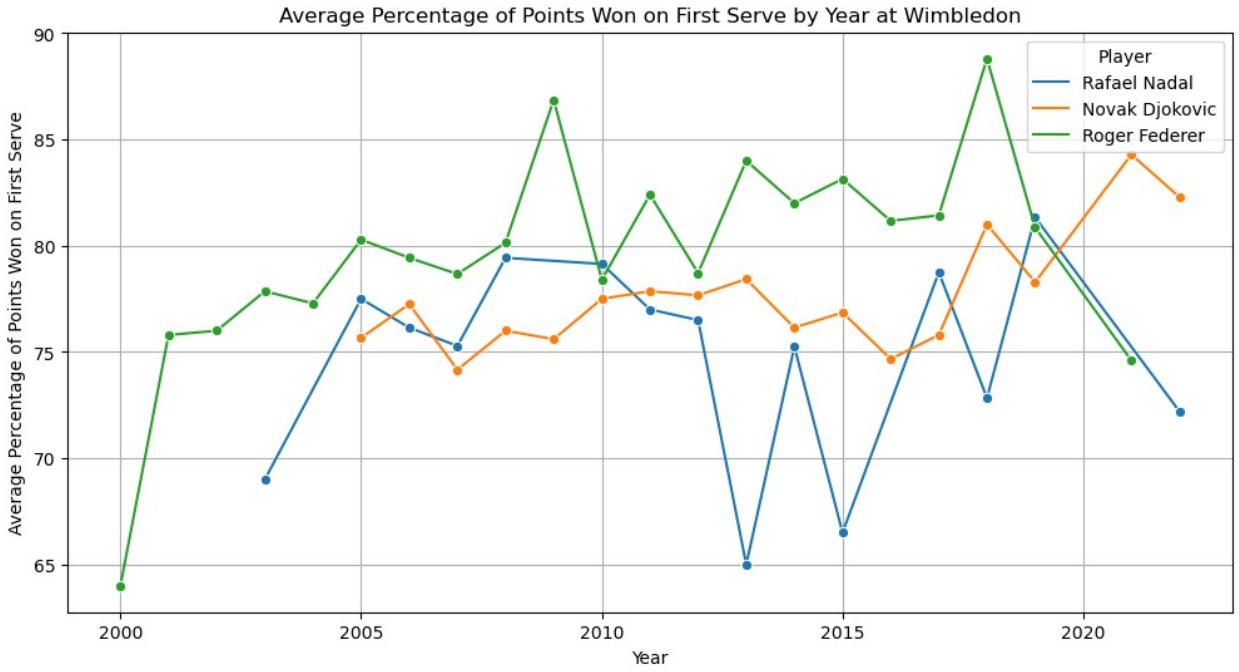


Separate Line Graphs for Each Tournament

```
# Plot separate line graphs for each tournament
for tournament in tournaments:
    tournament_df = result_df[result_df['tourney_name'] == tournament]

    plt.figure(figsize=(12, 6))
    sns.lineplot(data=tournament_df, x='Year', y='%1stWon',
hue='Player', marker='o')

    # Customize the plot
    plt.title(f'Average Percentage of Points Won on First Serve by
Year at {tournament}')
    plt.xlabel('Year')
    plt.ylabel('Average Percentage of Points Won on First Serve')
    plt.legend(title='Player')
    plt.grid(True)

    # Show the plot
    plt.show()
```

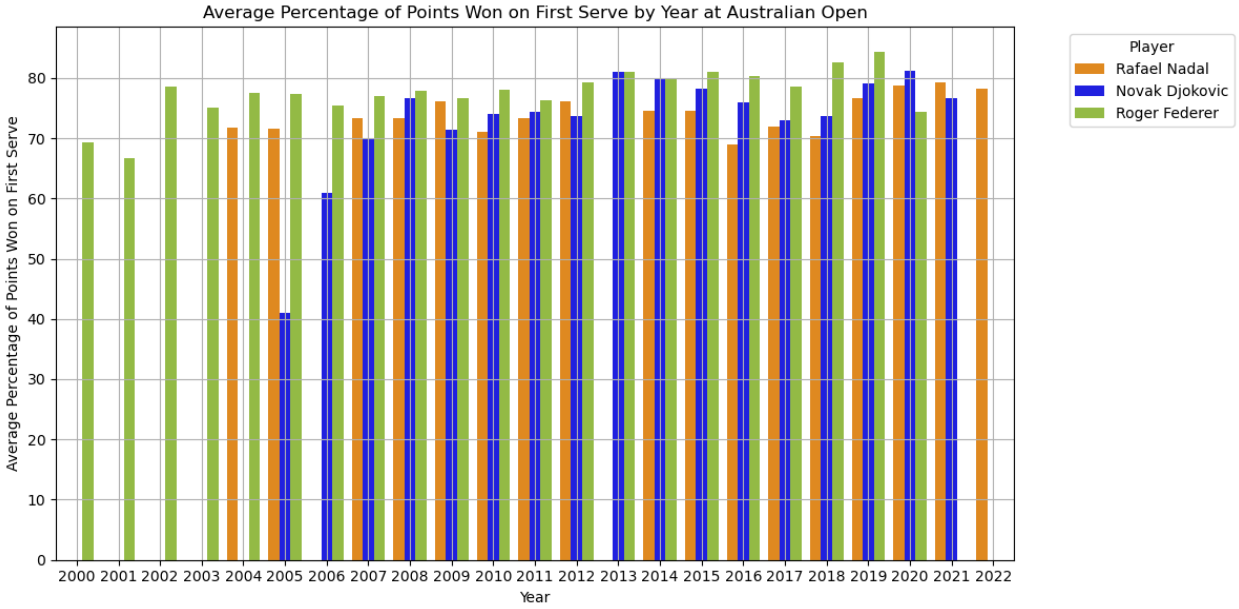

Average Percentage of Points Won on First Serve by Year at Australian Open
Average Percentage of Points Won on First Serve
Year
Player
Rafael Nadal
Novak Djokovic
Roger Federer
40
50
60
70
80
2000
2005
2010
2015
2020

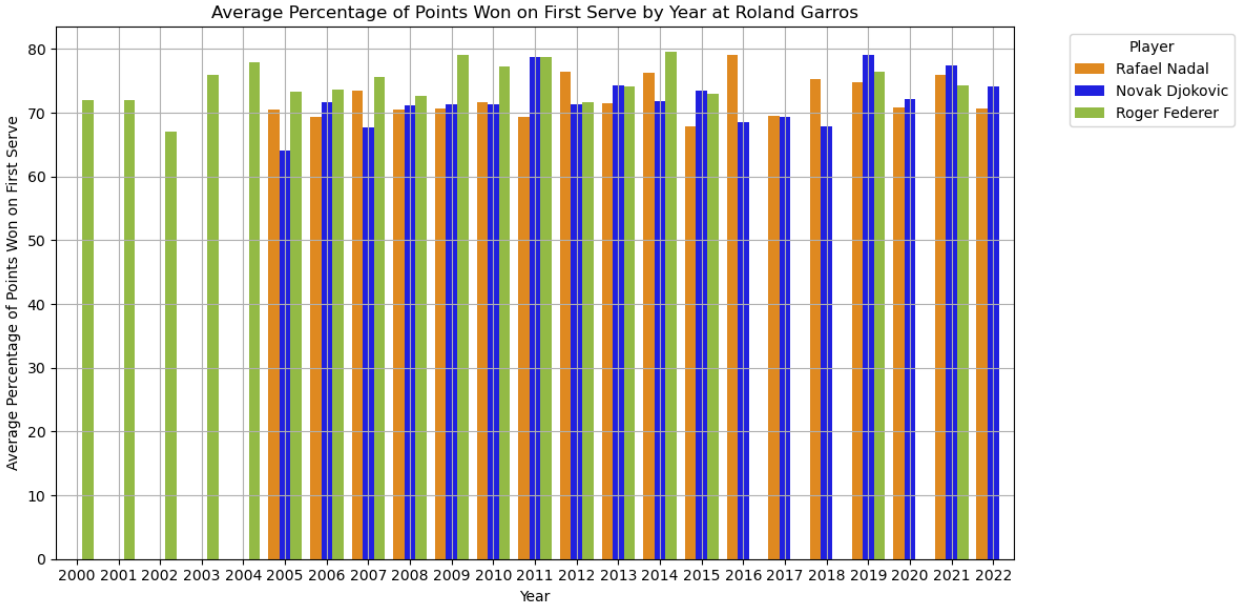

Average Percentage of Points Won on First Serve by Year at Roland Garros
Average Percentage of Points Won on First Serve
Year
Player
Rafael Nadal
Novak Djokovic
Roger Federer
64
66
68
70
72
74
76
78
80
2000
2005
2010
2015
2020

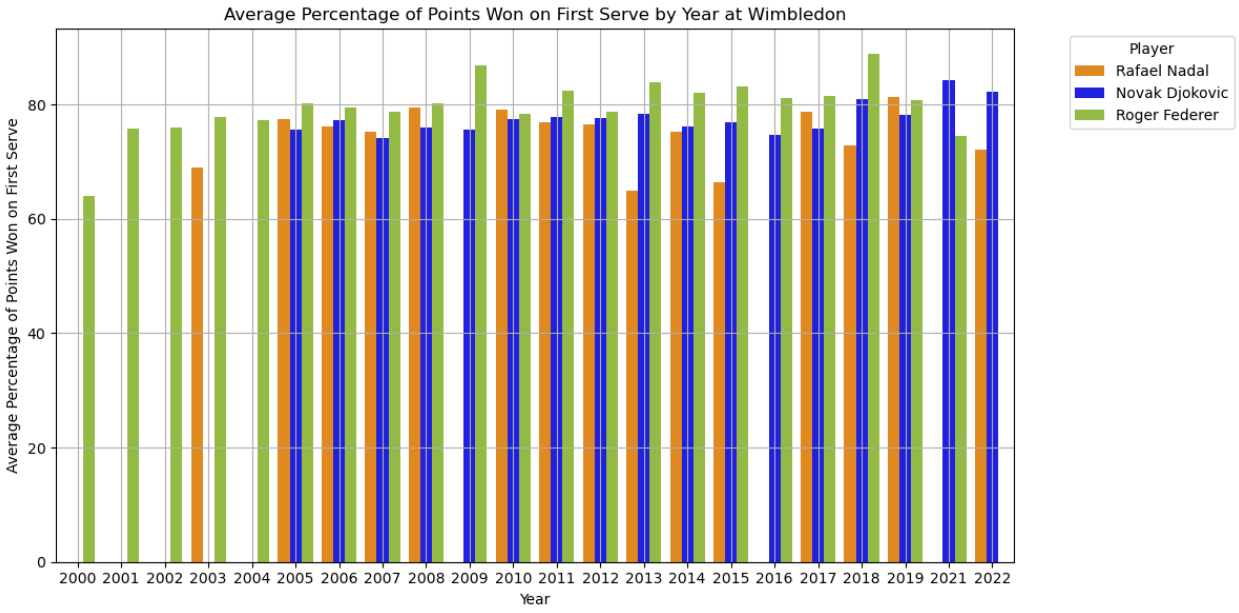


Separate Bar Graphs for Each Tournament

```
# Define custom palette
palette = {'Roger Federer': 'yellowgreen', 'Rafael Nadal':
'darkorange', 'Novak Djokovic': 'blue'}

# Plot separate bar charts for each tournament
for tournament in tournaments:
    tournament_df = result_df[result_df['tourney_name'] == tournament]

    plt.figure(figsize=(12, 6))
    sns.barplot(data=tournament_df, x='Year', y='%1stWon',
hue='Player', palette=palette)

    # Customize the plot
    plt.title(f'Average Percentage of Points Won on First Serve by
Year at {tournament}')
    plt.xlabel('Year')
    plt.ylabel('Average Percentage of Points Won on First Serve')
    plt.legend(title='Player', bbox_to_anchor=(1.05, 1), loc='upper
left')
    plt.grid(True)

    # Show the plot
    plt.tight_layout()
    plt.show()
```


Average Percentage of Points Won on First Serve by Year at Australian Open
Average Percentage of Points Won on First Serve
Year
Player
Rafael Nadal
Novak Djokovic
Roger Federer


Average Percentage of Points Won on First Serve by Year at Roland Garros
Average Percentage of Points Won on First Serve
Year
Player
Rafael Nadal
Novak Djokovic
Roger Federer



4. Export 'result_df'

```
#as pkl
result_df.to_pickle(os.path.join(path, 'Prepared
Data','result_df.pkl'))

#as csv
#save df_matchstats as CSV
result_df.to_csv(os.path.join(path,'Prepared Data
CSV','result_df.csv'))
```