CMSE 201 Final Project

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Section 006

12/3/2023

Does Defense Win Championships in the NBA?

Background and Motivation

I am really big fan of the NBA, as basketball is my favorite sport. Nowadays, teams as a whole seem to focus more on the offensive end than the defensive, and it can lead to really entertaining games, and sometimes just snooze fests. There is a common phrase in sports: "Defense wins championships". It makes me wonder why teams focus more on offense now, and if defense really is more important than offense, because it 'wins championships'. The point of this project is use data analysis to see if defense wins championships.

Methodology

Loading in my data sets with pandas.

```
In [1]: import pandas as pd
        import matplotlib.pyplot as plt
        import numpy as np
```

In [2]:
```
nba_finals_winners = pd.read_csv('nba_finals_winners.csv')
nba_finals_winners
```

Out[2]:

	Year	Lg	Champion	Runner-Up
0	2023	NBA	Denver Nuggets	Miami Heat
1	2022	NBA	Golden State Warriors	Boston Celtics
2	2021	NBA	Milwaukee Bucks	Phoenix Suns
3	2020	NBA	Los Angeles Lakers	Miami Heat
4	2019	NBA	Toronto Raptors	Golden State Warriors
...	...	...	...	...
81	1951	NBA	Rochester Royals	New York Knicks
82	1950	NBA	Minneapolis Lakers	Syracuse Nationals
83	1949	BAA	Minneapolis Lakers	Washington Capitols
84	1948	BAA	Baltimore Bullets	Philadelphia Warriors
85	1947	BAA	Philadelphia Warriors	Chicago Stags

86 rows × 4 columns

In [3]:
```
nba_defensive_ratings = pd.read_csv('NBA Defensive Ratings.csv')
nba_defensive_ratings
```

Out[3]:

	SEASON	RANK	TEAM	G	W	L	DEF RTG	RTG vs. LEAGUE AVG
0	1996-97	1.0	Miami Heat	82.0	61.0	21.0	99.20	0.944948
1	1996-97	2.0	New York Knicks	82.0	57.0	25.0	99.50	0.947806
2	1996-97	3.0	Atlanta Hawks	82.0	56.0	26.0	100.30	0.955426
3	1996-97	4.0	Chicago Bulls	82.0	69.0	13.0	100.70	0.959237
4	1996-97	5.0	Cleveland Cavaliers	82.0	42.0	40.0	100.80	0.960189
...	...	...	...	...	...	...	...	...
731	2019-20	27.0	Cleveland Cavaliers	25.0	6.0	19.0	113.70	1.048990
732	2019-20	28.0	Atlanta Hawks	26.0	6.0	20.0	114.30	1.054525
733	2019-20	29.0	New Orleans Pelicans	26.0	6.0	20.0	114.40	1.055448
734	2019-20	30.0	Washington Wizards	23.0	7.0	16.0	116.40	1.073900
735	2019-20	NaN	League Avg	NaN	NaN	NaN	108.39	1.000000

736 rows × 8 columns

I want to first see how many times the best defense in the league won a championship, so I need to create a subset by masking the nba_defensive_ratings data set to get the best defense every season.

In [4]:
```
best_defense_every_year = nba_defensive_ratings[nba_defensive_ratings['RANK']
best_defense_every_year
```

Out[4]:

	SEASON	RANK	TEAM	G	W	L	DEF RTG	RTG vs. LEAGUE AVG
0	1996-97	1.0	Miami Heat	82.0	61.0	21.0	99.2	0.944948
30	1997-98	1.0	Cleveland Cavaliers	82.0	47.0	35.0	97.5	0.943884
60	1998-99	1.0	San Antonio Spurs	50.0	37.0	13.0	93.6	0.932239
90	1999-00	1.0	Los Angeles Lakers	82.0	67.0	15.0	96.4	0.942072
120	2000-01	1.0	San Antonio Spurs	82.0	58.0	24.0	96.6	0.951304
150	2001-02	1.0	New Jersey Nets	82.0	52.0	30.0	98.1	0.951408
180	2002-03	1.0	New Jersey Nets	82.0	49.0	33.0	96.6	0.945588
210	2003-04	1.0	San Antonio Spurs	82.0	57.0	25.0	93.1	0.918396
240	2004-05	1.0	San Antonio Spurs	82.0	59.0	23.0	97.8	0.935796
271	2005-06	1.0	San Antonio Spurs	82.0	63.0	19.0	98.7	0.941375
302	2006-07	1.0	Chicago Bulls	82.0	49.0	33.0	98.8	0.938598

I'm working with two datasets here, and the nba_defensive_rankings one only is from 1997 to 2020, so I have to subsest nba_finals_winners to match it. I then want to create a list of all of the champions from 1997-2020. I also had to reverse the order of list to match the nba_defensive_ratings data set.

In [5]:
```
champs = nba_finals_winners[(nba_finals_winners['Year'] >= 1997) & (nba_finals
champs['Champion']
champs_1997_2020 = []

for team in champs['Champion']:
    champs_1997_2020.append(team)


champs_1997_2020 = champs_1997_2020[::-1]
print(champs_1997_2020)
```

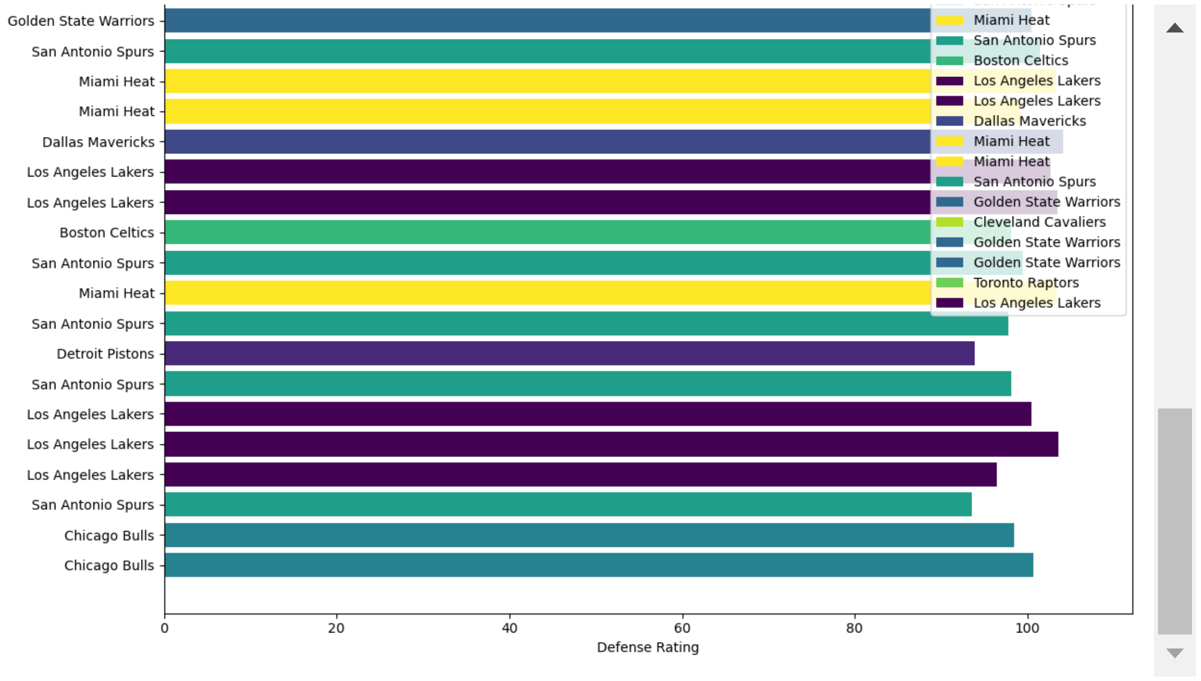
```
['Chicago Bulls', 'Chicago Bulls', 'San Antonio Spurs', 'Los Angeles Lakers',
'Los Angeles Lakers', 'Los Angeles Lakers', 'San Antonio Spurs', 'Detroit Pis
tons', 'San Antonio Spurs', 'Miami Heat', 'San Antonio Spurs', 'Boston Celtic
s', 'Los Angeles Lakers', 'Los Angeles Lakers', 'Dallas Mavericks', 'Miami He
at', 'Miami Heat', 'San Antonio Spurs', 'Golden State Warriors', 'Cleveland C
avaliers', 'Golden State Warriors', 'Golden State Warriors', 'Toronto Raptor
s', 'Los Angeles Lakers']
```

Next is to assign the defensive rating of every championship team to itself. This had to be done by looping over the list of champions and corresponding years they won, so that once I had these two values, I could then subset to find the defensive rating of the champions.

In [6]:
```
finals_winner_def_rtg = []

for i in range(min(len(champs_1997_2020), len(best_defense_every_year))):
    team = champs_1997_2020[i]                          #Looping through the list
    years = best_defense_every_year.iloc[i, 0]      #Looping through the years

    champ_defense = nba_defensive_ratings[(nba_defensive_ratings['TEAM'] == te

    # The line above now loops through the subset of just the champion teams a
    # champions and their defensive ratings.

    if not champ_defense.empty:
        champ_defense_tuple = (champ_defense.values[0], team)
        finals_winner_def_rtg.append(champ_defense_tuple)     # Storing the de
    else:
        print(f"No defensive rating found for {team} in {years}.")

print(finals_winner_def_rtg)
```

```
[(100.7, 'Chicago Bulls'), (98.4, 'Chicago Bulls'), (93.6, 'San Antonio Spur
s'), (96.4, 'Los Angeles Lakers'), (103.6, 'Los Angeles Lakers'), (100.4, 'Lo
s Angeles Lakers'), (98.1, 'San Antonio Spurs'), (93.9, 'Detroit Pistons'),
(97.8, 'San Antonio Spurs'), (103.4, 'Miami Heat'), (99.4, 'San Antonio Spur
s'), (98.1, 'Boston Celtics'), (103.5, 'Los Angeles Lakers'), (102.7, 'Los An
geles Lakers'), (104.1, 'Dallas Mavericks'), (99.2, 'Miami Heat'), (103.2, 'M
iami Heat'), (101.4, 'San Antonio Spurs'), (100.4, 'Golden State Warriors'),
(103.9, 'Cleveland Cavaliers'), (103.4, 'Golden State Warriors'), (106.8, 'Go
lden State Warriors'), (106.8, 'Toronto Raptors'), (103.4, 'Los Angeles Laker
s')]
```

In [7]:
```
best_defense_every_year = best_defense_every_year.sort_values(by='SEASON')

# Get unique teams and assign a color to each team using the 'viridis' colorma
unique_teams = list(set(best_defense_every_year['TEAM']))
team_colors = plt.cm.viridis(np.linspace(0, 1, len(unique_teams)))

# Create subplots
fig, (ax1, ax2) = plt.subplots(2, 1, figsize=(12, 18), sharex=True)

# Plot Defense Rating by Best Defensive Team that Year
for i, (_, row) in enumerate(best_defense_every_year.iterrows()):
    color = team_colors[unique_teams.index(row['TEAM'])]
    ax1.barh(i, row['DEF RTG'], color=color, label=row['TEAM'])

ax1.set_yticks(range(len(best_defense_every_year)))
ax1.set_yticklabels(best_defense_every_year['SEASON'])
ax1.set_xlabel('Defense Rating')
ax1.set_title('Defense Rating by Team')
ax1.legend()

finals_winner_def_rtg = [(rating, winner) for rating, winner in finals_winner_

# Get unique champions and assign a color to each champ using the 'viridis' co
unique_winners = list(set(winner for _, winner in finals_winner_def_rtg))
winner_colors = plt.cm.viridis(np.linspace(0, 1, len(unique_winners)))

# Plot Defense Rating by NBA Champion that Year
for i, (rating, winner) in enumerate(finals_winner_def_rtg):
    color = winner_colors[unique_winners.index(winner)]
    ax2.barh(i, rating, color=color, label=winner)

ax2.set_yticks(range(len(finals_winner_def_rtg)))
ax2.set_yticklabels([winner for rating, winner in finals_winner_def_rtg])
ax2.set_xlabel('Defense Rating')
ax2.set_title('Defense Rating by Winner')
ax2.legend()

plt.tight_layout()

plt.show()

# Chatgpt was used to help make these plots. I tried many things and couldn't
```



I can see from the graphs which years teams with the best defense won the finals, but I want to verify with code. I just do this looping through all of the teams in the list of champions and then asking if the champion is equal to the best defensive team that year, then add it to the list of best_def_won_finals.

In [8]:
```
best_def_won_finals = []

for i in range(min(len(champs_1997_2020), len(best_defense_every_year))):
    season = best_defense_every_year.iloc[i, 0]
    best_defense_team = best_defense_every_year.iloc[i, 2]

    if champs_1997_2020[i] == best_defense_team:
        best_def_won_finals.append(champs_1997_2020[i])

print(best_def_won_finals)
```

```
['San Antonio Spurs', 'Los Angeles Lakers', 'San Antonio Spurs', 'Boston Celt
ics', 'Golden State Warriors']
```

Loading in my data set again so I don't accidentally mix things up and values or whatever.

In [9]:
```
nba_defensive_ratings2 = pd.read_csv('NBA Defensive Ratings.csv')
nba_defensive_ratings2
```

Out[9]:

	SEASON	RANK	TEAM	G	W	L	DEF RTG	RTG vs. LEAGUE AVG
0	1996-97	1.0	Miami Heat	82.0	61.0	21.0	99.20	0.944948
1	1996-97	2.0	New York Knicks	82.0	57.0	25.0	99.50	0.947806
2	1996-97	3.0	Atlanta Hawks	82.0	56.0	26.0	100.30	0.955426
3	1996-97	4.0	Chicago Bulls	82.0	69.0	13.0	100.70	0.959237
4	1996-97	5.0	Cleveland Cavaliers	82.0	42.0	40.0	100.80	0.960189
...	...	...	...	...	...	...	...	...
731	2019-20	27.0	Cleveland Cavaliers	25.0	6.0	19.0	113.70	1.048990
732	2019-20	28.0	Atlanta Hawks	26.0	6.0	20.0	114.30	1.054525
733	2019-20	29.0	New Orleans Pelicans	26.0	6.0	20.0	114.40	1.055448
734	2019-20	30.0	Washington Wizards	23.0	7.0	16.0	116.40	1.073900
735	2019-20	NaN	League Avg	NaN	NaN	NaN	108.39	1.000000

736 rows × 8 columns

The results of the first test were a little disappointing so I need to expand the parameters. Now I will be looking at the top 5 defensive teams every season, as I consider the top 5 the best defensive teams in the league. I do this by masking nba_defensive_ratings to only include teams that were 1-5 in defensive ratings every season.

In [10]:
```
mask = (nba_defensive_ratings2['RANK'] >= 1) & (nba_defensive_ratings2['RANK']
vals_masked = nba_defensive_ratings2[mask] # Masking the whole data set.
top5_def_1997_2020 = vals_masked
top5_def_1997_2020
```

Out[10]:

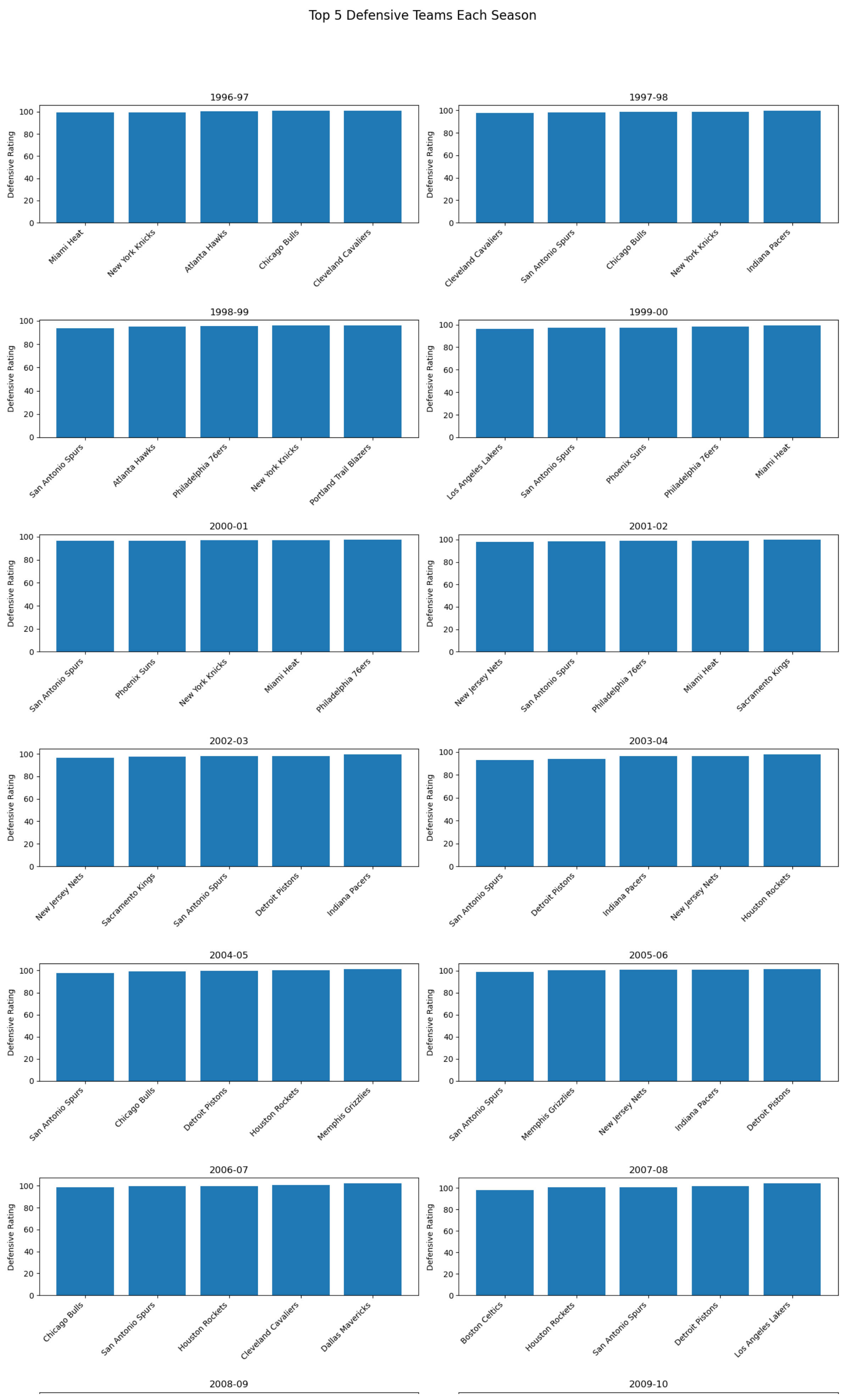
	SEASON	RANK	TEAM	G	W	L	DEF RTG	RTG vs. LEAGUE AVG
0	1996-97	1.0	Miami Heat	82.0	61.0	21.0	99.2	0.944948
1	1996-97	2.0	New York Knicks	82.0	57.0	25.0	99.5	0.947806
2	1996-97	3.0	Atlanta Hawks	82.0	56.0	26.0	100.3	0.955426
3	1996-97	4.0	Chicago Bulls	82.0	69.0	13.0	100.7	0.959237
4	1996-97	5.0	Cleveland Cavaliers	82.0	42.0	40.0	100.8	0.960189
...	...	...	...	...	...	...	...	...
705	2019-20	1.0	Milwaukee Bucks	26.0	23.0	3.0	101.3	0.934588
706	2019-20	2.0	Denver Nuggets	23.0	15.0	8.0	102.5	0.945659
707	2019-20	3.0	Toronto Raptors	24.0	16.0	8.0	103.3	0.953040
708	2019-20	4.0	Philadelphia 76ers	27.0	20.0	7.0	103.4	0.953963
709	2019-20	5.0	Los Angeles Lakers	26.0	23.0	3.0	103.4	0.953963

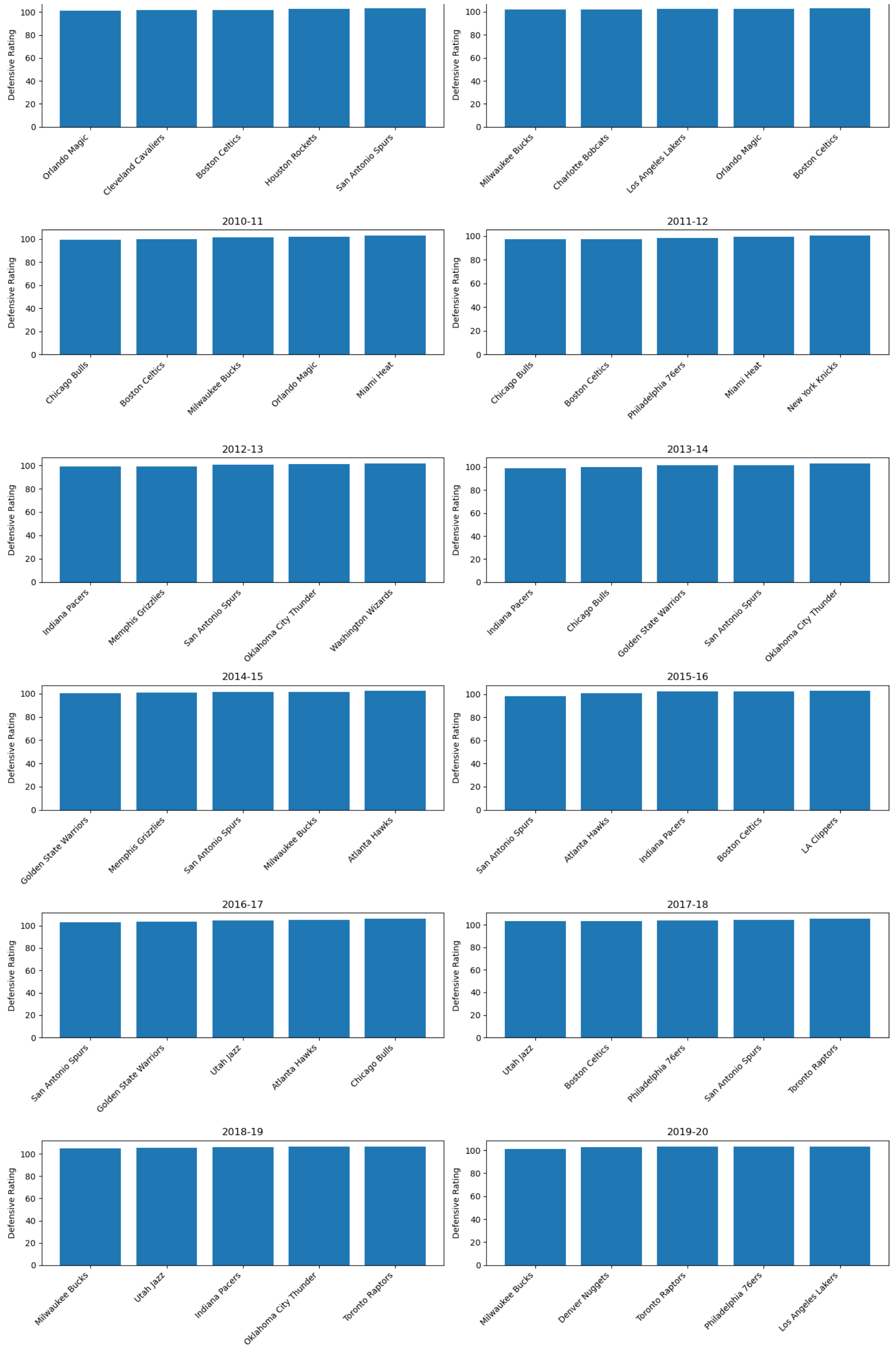
120 rows × 8 columns

To now see the top 5 defensive team every season, I graph by subplotting every year.

In [11]:
```
# Sort by SEASON and DEF RTG
top5_def_1997_2020 = top5_def_1997_2020.sort_values(['SEASON', 'DEF RTG'])

# Get unique seasons
unique_seasons = top5_def_1997_2020['SEASON'].unique()

# Calculate the number of rows and columns for subplots
num_rows = len(unique_seasons) // 2 + len(unique_seasons) % 2  # for odd numbe
num_cols = 2

# Create subplots
fig, axs = plt.subplots(num_rows, num_cols, figsize=(15, 4 * num_rows))
fig.suptitle('Top 5 Defensive Teams Each Season', fontsize=16)

# Flatten the axs array for easier iteration
axs = axs.flatten()

# Iterate over unique seasons and plot the top 5 defensive teams
for i, season in enumerate(unique_seasons):
    season_data = top5_def_1997_2020[top5_def_1997_2020['SEASON'] == season].h

    # Select the subplot
    ax = axs[i]

    # Plot the data
    ax.bar(season_data['TEAM'], season_data['DEF RTG'])

    # Customize the subplot
    ax.set_title(season)
    ax.set_ylabel('Defensive Rating')
    ax.set_xticklabels(season_data['TEAM'], rotation=45, ha='right')

# Adjust layout and show the plot
plt.tight_layout(rect=[0, 0, 1, 0.96])
plt.show()
```

```
C:\Users\pgleh\AppData\Local\Temp\ipykernel_22608\82152364.py:31: UserWarnin
g: FixedFormatter should only be used together with FixedLocator
  ax.set_xticklabels(season_data['TEAM'], rotation=45, ha='right')
```

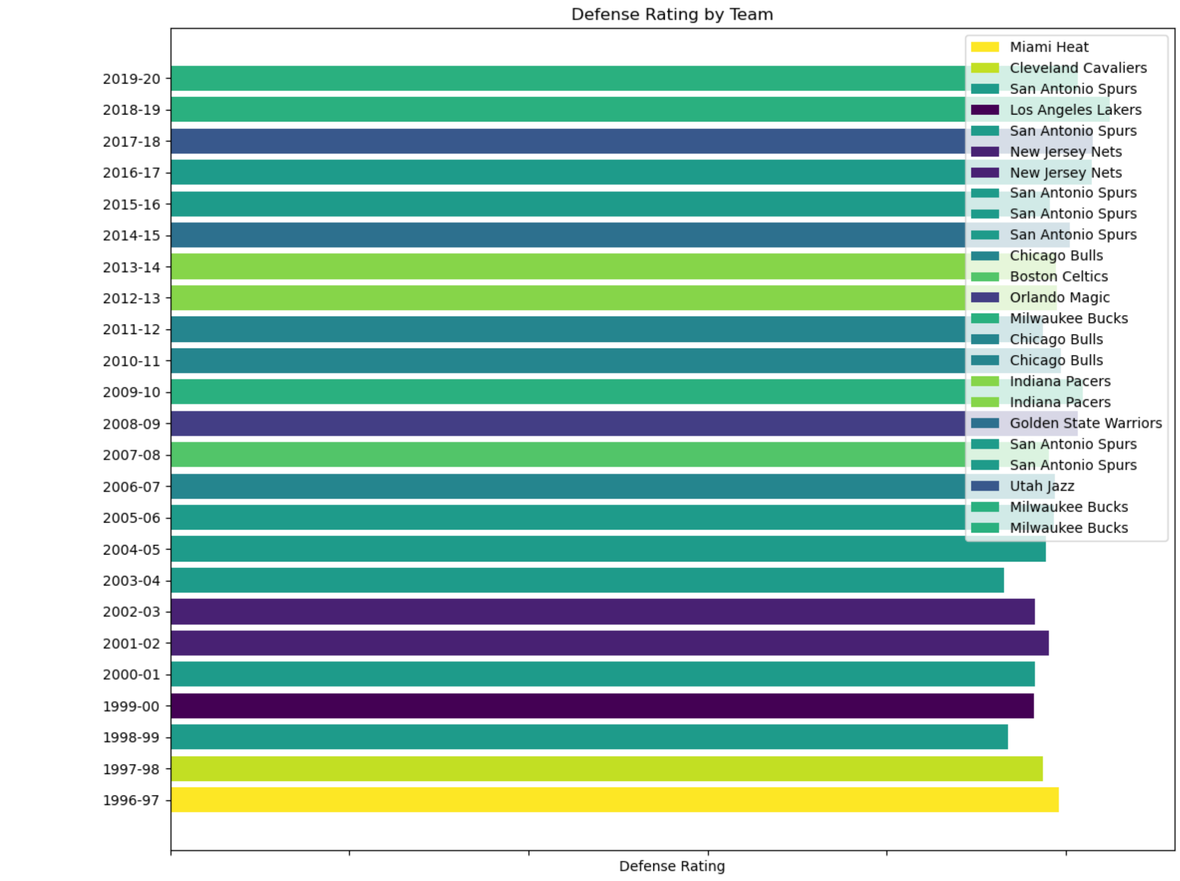

Top 5 Defensive Teams Each Season
1996-97
Defensive Rating
Miami Heat
New York Knicks
Atlanta Hawks
Chicago Bulls
Cleveland Cavaliers
1997-98
Cleveland Cavaliers
San Antonio Spurs
Chicago Bulls
New York Knicks
Indiana Pacers
1998-99
San Antonio Spurs
Atlanta Hawks
Philadelphia 76ers
New York Knicks
Portland Trail Blazers
1999-00
Los Angeles Lakers
San Antonio Spurs
Phoenix Suns
Philadelphia 76ers
Miami Heat
2000-01
San Antonio Spurs
Phoenix Suns
New York Knicks
Miami Heat
Philadelphia 76ers
2001-02
New Jersey Nets
San Antonio Spurs
Philadelphia 76ers
Miami Heat
Sacramento Kings
2002-03
New Jersey Nets
Sacramento Kings
San Antonio Spurs
Detroit Pistons
Indiana Pacers
2003-04
San Antonio Spurs
Detroit Pistons
Indiana Pacers
New Jersey Nets
Houston Rockets
2004-05
San Antonio Spurs
Chicago Bulls
Detroit Pistons
Houston Rockets
Memphis Grizzlies
2005-06
San Antonio Spurs
Memphis Grizzlies
New Jersey Nets
Indiana Pacers
Detroit Pistons
2006-07
Chicago Bulls
San Antonio Spurs
Houston Rockets
Cleveland Cavaliers
Dallas Mavericks
2007-08
Boston Celtics
Houston Rockets
San Antonio Spurs
Detroit Pistons
Los Angeles Lakers
2008-09
2009-10

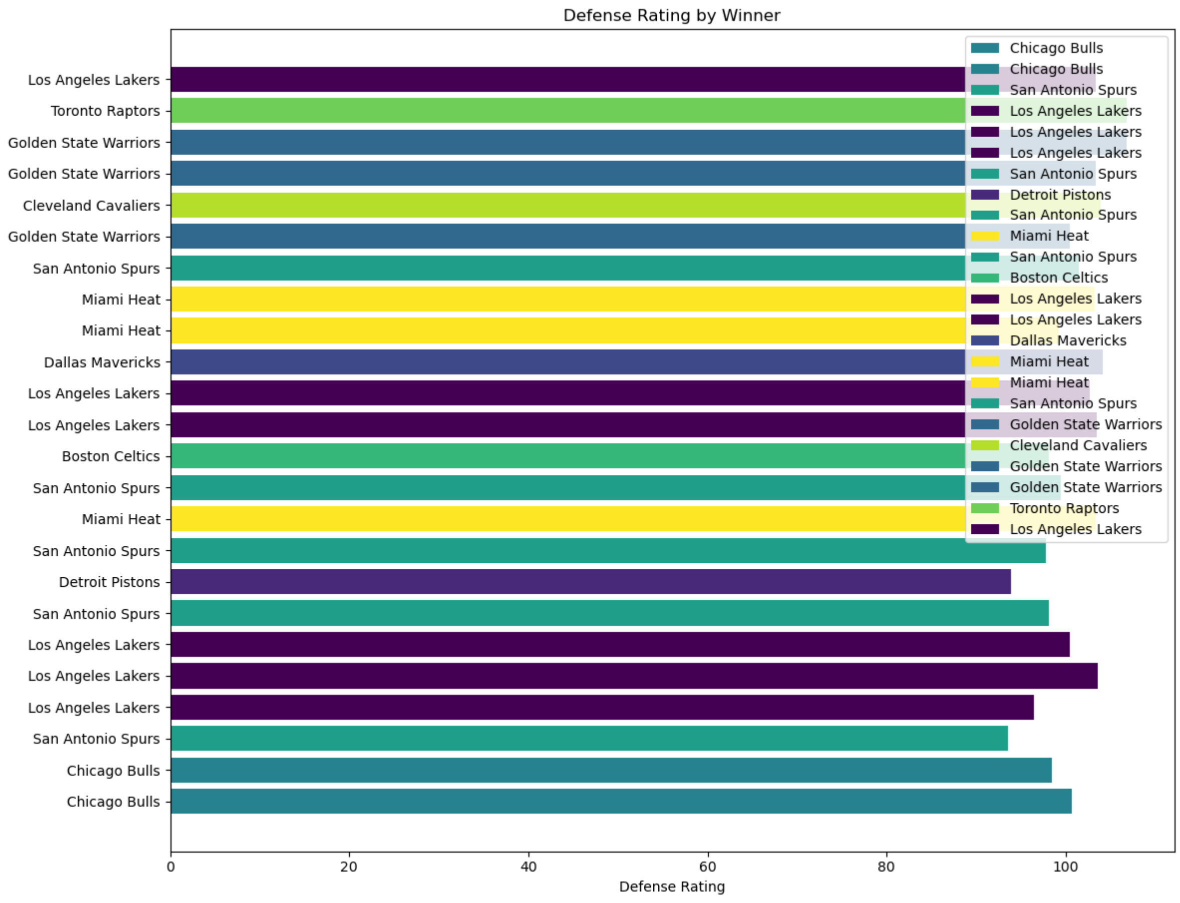

Defensive Rating
Orlando Magic
Cleveland Cavaliers
Boston Celtics
Houston Rockets
San Antonio Spurs
Milwaukee Bucks
Charlotte Bobcats
Los Angeles Lakers
Orlando Magic
Boston Celtics
2010-11
Chicago Bulls
Boston Celtics
Milwaukee Bucks
Orlando Magic
Miami Heat
2011-12
Chicago Bulls
Boston Celtics
Philadelphia 76ers
Miami Heat
New York Knicks
2012-13
Indiana Pacers
Memphis Grizzlies
San Antonio Spurs
Oklahoma City Thunder
Washington Wizards
2013-14
Indiana Pacers
Chicago Bulls
Golden State Warriors
San Antonio Spurs
Oklahoma City Thunder
2014-15
Golden State Warriors
Memphis Grizzlies
San Antonio Spurs
Milwaukee Bucks
Atlanta Hawks
2015-16
San Antonio Spurs
Atlanta Hawks
Indiana Pacers
Boston Celtics
LA Clippers
2016-17
San Antonio Spurs
Golden State Warriors
Utah Jazz
Atlanta Hawks
Chicago Bulls
2017-18
Utah Jazz
Boston Celtics
Philadelphia 76ers
San Antonio Spurs
Toronto Raptors
2018-19
Milwaukee Bucks
Utah Jazz
Indiana Pacers
Oklahoma City Thunder
Toronto Raptors
2019-20
Milwaukee Bucks
Denver Nuggets
Toronto Raptors
Philadelphia 76ers
Los Angeles Lakers

Results

From my first test I found that only 5 teams out of the 24 seasons I sampled won the NBA championship as the best defensive team. Only 20.8% of the time did it work out. Way more often than not did a not number one defense win. 1999 San Antonio Spurs, 2000 Los Angeles Lakers, 2005 San Antonio Spurs, 2008 Boston Celtics, and 2015 Golden State Warriors were the only teams to make it all the way as the best defense. You can see this in the subplots below, were the colors mostly match up with teams in each.

In [12]:
```
best_defense_every_year = best_defense_every_year.sort_values(by='SEASON')

# Get unique teams and assign a color to each team using the 'viridis' colorma
unique_teams = list(set(best_defense_every_year['TEAM']))
team_colors = plt.cm.viridis(np.linspace(0, 1, len(unique_teams)))

# Create subplots
fig, (ax1, ax2) = plt.subplots(2, 1, figsize=(12, 18), sharex=True)

# Plot Defense Rating by Best Defensive Team that Year
for i, (_, row) in enumerate(best_defense_every_year.iterrows()):
    color = team_colors[unique_teams.index(row['TEAM'])]
    ax1.barh(i, row['DEF RTG'], color=color, label=row['TEAM'])

ax1.set_yticks(range(len(best_defense_every_year)))
ax1.set_yticklabels(best_defense_every_year['SEASON'])
ax1.set_xlabel('Defense Rating')
ax1.set_title('Defense Rating by Team')
ax1.legend()

finals_winner_def_rtg = [(rating, winner) for rating, winner in finals_winner_

# Get unique champions and assign a color to each champ using the 'viridis' co
unique_winners = list(set(winner for _, winner in finals_winner_def_rtg))
winner_colors = plt.cm.viridis(np.linspace(0, 1, len(unique_winners)))

# Plot Defense Rating by NBA Champion that Year
for i, (rating, winner) in enumerate(finals_winner_def_rtg):
    color = winner_colors[unique_winners.index(winner)]
    ax2.barh(i, rating, color=color, label=winner)

ax2.set_yticks(range(len(finals_winner_def_rtg)))
ax2.set_yticklabels([winner for rating, winner in finals_winner_def_rtg])
ax2.set_xlabel('Defense Rating')
ax2.set_title('Defense Rating by Winner')
ax2.legend()

plt.tight_layout()

plt.show()

# Chatgpt was used to help make these plots. I tried many things and couldn't
```


Defense Rating by Team
2019-20
2018-19
2017-18
2016-17
2015-16
2014-15
2013-14
2012-13
2011-12
2010-11
2009-10
2008-09
2007-08
2006-07
2005-06
2004-05
2003-04
2002-03
2001-02
2000-01
1999-00
1998-99
1997-98
1996-97
Miami Heat
Cleveland Cavaliers
San Antonio Spurs
Los Angeles Lakers
San Antonio Spurs
New Jersey Nets
New Jersey Nets
San Antonio Spurs
San Antonio Spurs
San Antonio Spurs
Chicago Bulls
Boston Celtics
Orlando Magic
Milwaukee Bucks
Chicago Bulls
Chicago Bulls
Indiana Pacers
Indiana Pacers
Golden State Warriors
San Antonio Spurs
San Antonio Spurs
Utah Jazz
Milwaukee Bucks
Milwaukee Bucks
Defense Rating


Defense Rating by Winner
Los Angeles Lakers
Toronto Raptors
Golden State Warriors
Golden State Warriors
Cleveland Cavaliers
Golden State Warriors
San Antonio Spurs
Miami Heat
Miami Heat
Dallas Mavericks
Los Angeles Lakers
Los Angeles Lakers
Boston Celtics
San Antonio Spurs
Miami Heat
San Antonio Spurs
Detroit Pistons
San Antonio Spurs
Los Angeles Lakers
Los Angeles Lakers
Los Angeles Lakers
San Antonio Spurs
Chicago Bulls
Chicago Bulls
Chicago Bulls
Chicago Bulls
San Antonio Spurs
Los Angeles Lakers
Los Angeles Lakers
Los Angeles Lakers
San Antonio Spurs
Detroit Pistons
San Antonio Spurs
Miami Heat
San Antonio Spurs
Boston Celtics
Los Angeles Lakers
Los Angeles Lakers
Dallas Mavericks
Miami Heat
Miami Heat
San Antonio Spurs
Golden State Warriors
Cleveland Cavaliers
Golden State Warriors
Golden State Warriors
Toronto Raptors
Los Angeles Lakers
0
20
40
60
80
100
Defense Rating

My second test had much better results. 16/24 top 5 defensive teams won. This 66.67%, and ~46% increase. This test was way more representative of the data. The only teams to not win as top 5 defenses were:

the 2001 Lakers (2 OFF / 21 DEF),

the 2002 Lakers: (2 OFF / 7 DEF),

the 2006 Heat: (7 OFF / 9 DEF),

the 2009 Lakers: (3 OFF / 6 DEF),

the 2011 Mavs: (8 OFF / 8 DEF),

the 2013 Heat: (2 OFF / 9 DEF),

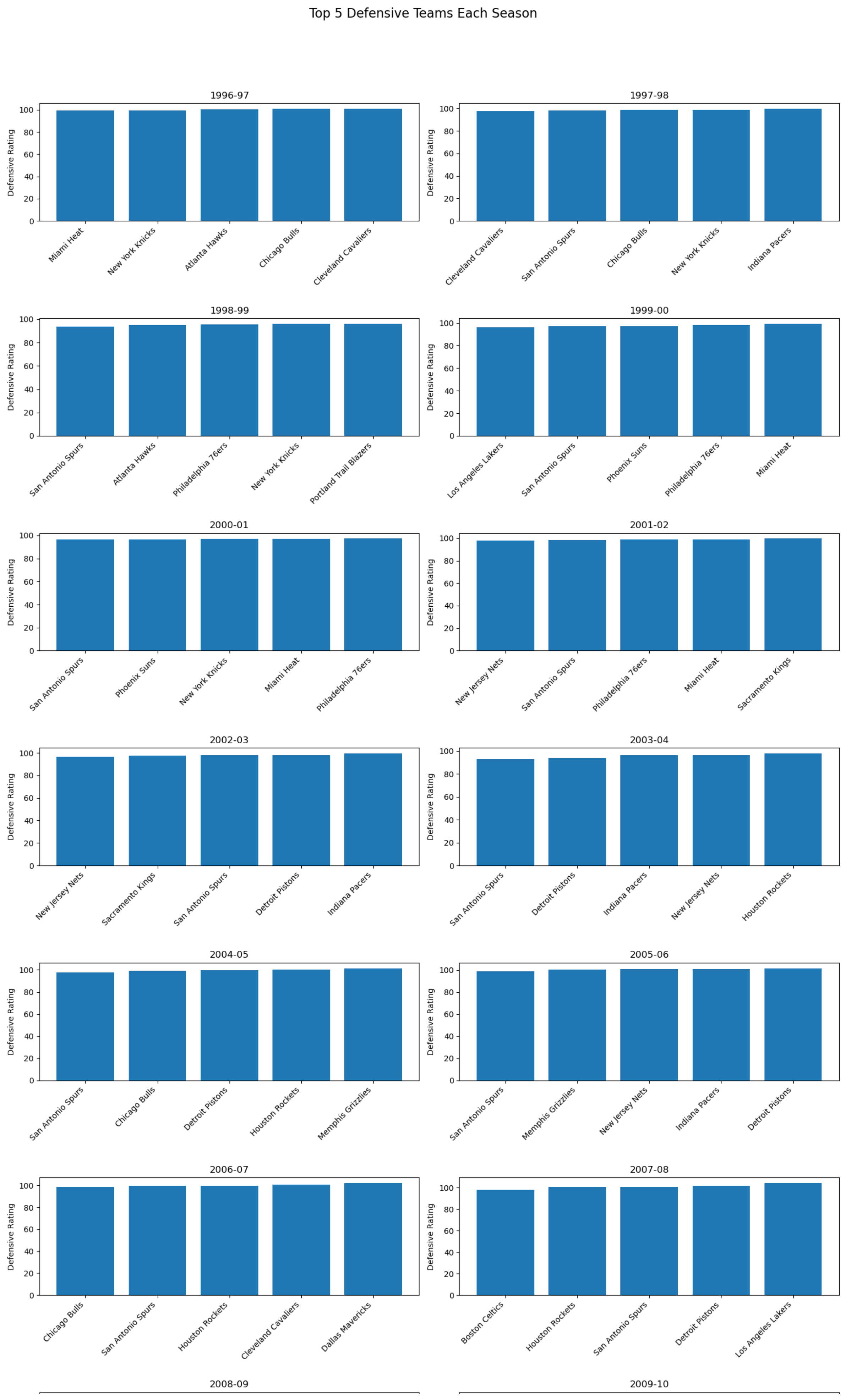
the 2016 Cavs: (3 OFF / 10 DEF)

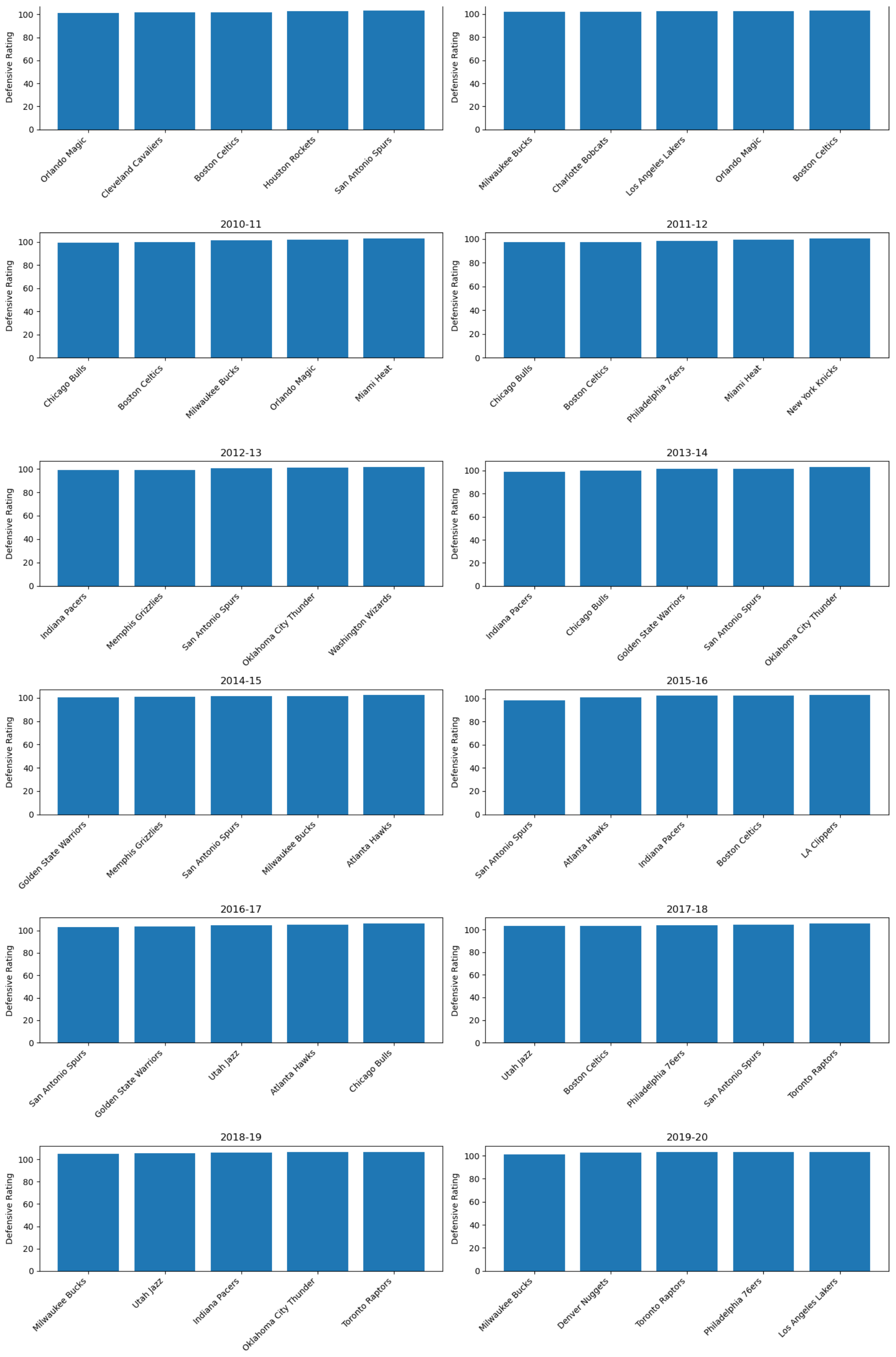
and the 2018 Warriors: (3 OFF / 11 DEF).

23/24 (95.83%) won with a top 10 or better defense.

In [13]:
```
# Sort by SEASON and DEF RTG
top5_def_1997_2020 = top5_def_1997_2020.sort_values(['SEASON', 'DEF RTG'])

# Get unique seasons
unique_seasons = top5_def_1997_2020['SEASON'].unique()

# Calculate the number of rows and columns for subplots
num_rows = len(unique_seasons) // 2 + len(unique_seasons) % 2  # for odd numbe
num_cols = 2

# Create subplots
fig, axs = plt.subplots(num_rows, num_cols, figsize=(15, 4 * num_rows))
fig.suptitle('Top 5 Defensive Teams Each Season', fontsize=16)

# Flatten the axs array for easier iteration
axs = axs.flatten()

# Iterate over unique seasons and plot the top 5 defensive teams
for i, season in enumerate(unique_seasons):
    season_data = top5_def_1997_2020[top5_def_1997_2020['SEASON'] == season].h

    # Select the subplot
    ax = axs[i]

    # Plot the data
    ax.bar(season_data['TEAM'], season_data['DEF RTG'])

    # Customize the subplot
    ax.set_title(season)
    ax.set_ylabel('Defensive Rating')
    ax.set_xticklabels(season_data['TEAM'], rotation=45, ha='right')

# Adjust layout and show the plot
plt.tight_layout(rect=[0, 0, 1, 0.96])
plt.show()
```

```
C:\Users\pgleh\AppData\Local\Temp\ipykernel_22608\82152364.py:31: UserWarnin
g: FixedFormatter should only be used together with FixedLocator
  ax.set_xticklabels(season_data['TEAM'], rotation=45, ha='right')
```


Top 5 Defensive Teams Each Season
1996-97
Defensive Rating
Miami Heat
New York Knicks
Atlanta Hawks
Chicago Bulls
Cleveland Cavaliers
1997-98
Cleveland Cavaliers
San Antonio Spurs
Chicago Bulls
New York Knicks
Indiana Pacers
1998-99
San Antonio Spurs
Atlanta Hawks
Philadelphia 76ers
New York Knicks
Portland Trail Blazers
1999-00
Los Angeles Lakers
San Antonio Spurs
Phoenix Suns
Philadelphia 76ers
Miami Heat
2000-01
San Antonio Spurs
Phoenix Suns
New York Knicks
Miami Heat
Philadelphia 76ers
2001-02
New Jersey Nets
San Antonio Spurs
Philadelphia 76ers
Miami Heat
Sacramento Kings
2002-03
New Jersey Nets
Sacramento Kings
San Antonio Spurs
Detroit Pistons
Indiana Pacers
2003-04
San Antonio Spurs
Detroit Pistons
Indiana Pacers
New Jersey Nets
Houston Rockets
2004-05
San Antonio Spurs
Chicago Bulls
Detroit Pistons
Houston Rockets
Memphis Grizzlies
2005-06
San Antonio Spurs
Memphis Grizzlies
New Jersey Nets
Indiana Pacers
Detroit Pistons
2006-07
Chicago Bulls
San Antonio Spurs
Houston Rockets
Cleveland Cavaliers
Dallas Mavericks
2007-08
Boston Celtics
Houston Rockets
San Antonio Spurs
Detroit Pistons
Los Angeles Lakers
2008-09
2009-10



Synthesis and Discussion

From my first test I found that only 5 teams out of the 24 seasons I sampled won the NBA championship as the best defensive team. This starts to disprove my question, since it seems only 20% of the time being the best defensive team mattered. But, I am also not being representative as the best population. Not every team is going to be the best defensive team, and not every number one defensive will win every year. This is sports, statistics matter, but sometimes they are thrown out of the window. This test let me know defense isn't the single-most important reason teams win a championship, because if it was, there wouldn't be as many best defensive teams not winning it all.

To get a better understanding of defenses impact, I increased the parameters to top 5 defenses every year. The amount of winners went from 5 to 16 out of the 24 seasons. A top 5 defense is still considered one of the best defenses in the league.

It is of importance to note the impact of offense on winning too. Just from looking at the teams that didn't win with a top 5 defense:

the 2001 Lakers (2 OFF / 21 DEF),

the 2002 Lakers: (2 OFF / 7 DEF),

the 2006 Heat: (7 OFF / 9 DEF),

the 2009 Lakers: (3 OFF / 6 DEF),

the 2011 Mavs: (8 OFF / 8 DEF),

the 2013 Heat: (2 OFF / 9 DEF),

the 2016 Cavs: (3 OFF / 10 DEF)

and the 2018 Warriors: (3 OFF / 11 DEF).

6/8 (75%) of this group intead with a top 3 offense. The 2001 Lakers even won with the 21st ranked defense. The two outliers (2006 Heat and 2011 Mavericks) aren't explained with either of my tests, and would need more data and research to determine what happened.

Based off of the results of my two tests, defense is indeed very important, but it is not the deciding factor to whether a team can win it all. Most of the best defensive do go on to win, but this can be due to many other factors not covered in this project. The other biggest factor to a team winning will be their offensive rating. It is clearly evidenced in the groups that didn't have a top 5 defense. Their offense was so elite it made up for the lack of defense. From my tests, there were 22/24 times a team won the championship with a top 5 defense and/or top offense. 16 of those 22 was a team with a top 5 defense, and 12 were a team with a top 5 offense. There does seem to be slightly more importance then on defense, but it is merginal. This perhaps could even be debunked with more tests and a larger data set.

The limitations I had could definitely affected the results. The NBA has been around since 1946, and defensive rating has only been around since 1977-78. There are 50+ years I wasn't able to include in the tests, so this project was a representative as possible, but still not the best. I was also not able to find a dataset with offense and defensive ratings, as this would have greatly helped see if there is a relationship between the two factors leading to championships. Based on this project, you can however say being a really good defensive team leads to more championships than being a really good offensive team. Defense is slightly more important for

Citations

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