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Stoccer Portfolio Returns

Motivation & Summary

- European soccer is **35 Billion** dollar per year industry.
  - To put that into context **Capital One Financial** did **32 Billion** and **Coca-Cola did 31 Billion** in revenue in 2019. (https://fortune.com/fortune500/2020/searcn/)
- In European soccer the revenue of each team depends on…
  - the leagues they play in and their final standing,
  - the competitions they participate in,
  - the competitions they win.
- In other words winning games means more money.
  - ***But what is the cost of winning***?
  - ***What is the Return on Investment (ROI) for team owners?***
  - ***And how much should teams invest in purchasing top players?***

Questions & Data

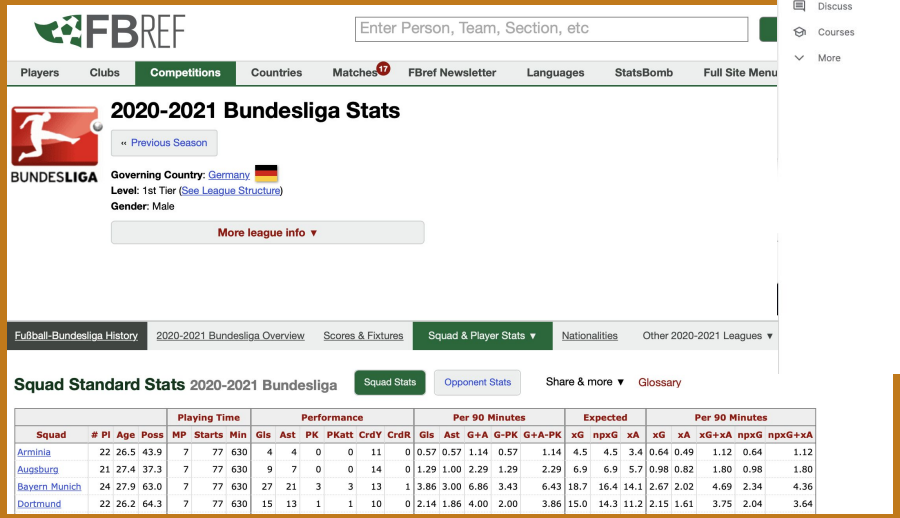
We chose PSG as the model team to analyze because they have been one of the most active teams in the transfer market.

PSG was acquired by the king of Qatar in 2011 when it value was approximately €1.17Bn.

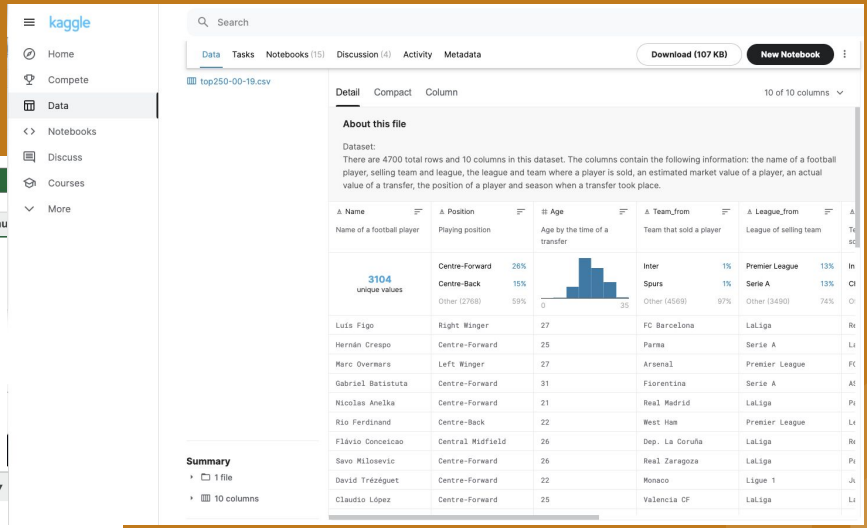
- We set out to understand the correlation of money spent on individual players vs. the revenue that a team generates.
- Is the return on the money invested in the club greater than traditional investments?
  - Would team owners do better by investing in traditional stock?

- Hows has PSG performed compared to other comparable clubs in Europe?
- Have their acquisitions been impactful on the team's revenue.

Data Cleanup & Exploration



				Playing Time			Performance						Per 90 Minutes					Expected			Per 90 Minutes			
Squad	# Pl	Age	Poss	MP	Starts	Min	Gls	Ast	PK	PKatt	CrdY	CrdR	Gls	Ast	G+A	G-PK	G+A-PK	xG	npxG	xA	xG	xA	xG+xA	npxG	npxG+xA
Arminia	22	26.5	43.9	7	77	630	4	4	0	0	11	0	0.57	0.57	1.14	0.57	1.14	4.5	4.5	3.4	0.64	0.49	1.12	0.64	1.12
Augsburg	21	27.4	37.3	7	77	630	9	7	0	0	14	0	1.29	1.00	2.29	1.29	2.29	6.9	6.9	5.7	0.98	0.82	1.80	0.98	1.80
Bayern Munich	24	27.9	63.0	7	77	630	27	21	3	3	13	1	3.86	3.00	6.86	3.43	6.43	18.7	16.4	14.1	2.67	2.02	4.69	2.34	4.36
Dortmund	22	26.2	64.3	7	77	630	15	13	1	1	10	0	2.14	1.86	4.00	2.00	3.86	15.0	14.3	11.2	2.15	1.61	3.75	2.04	3.64



Data Exploration

- While exploring our data, we observed that data was entered inconsistently over the course of several year. For example, we noticed that certain soccer statistics only began appearing on stats sheets within the last few years, possibly due to the current use of advanced metrics.

- Publicly available, high-quality data is rare and one must usually contend with very incomplete data

- Pulling data from Alpaca required the use of the alpacaenv but plotting the data required using the pyvizenv

Data Cleanup

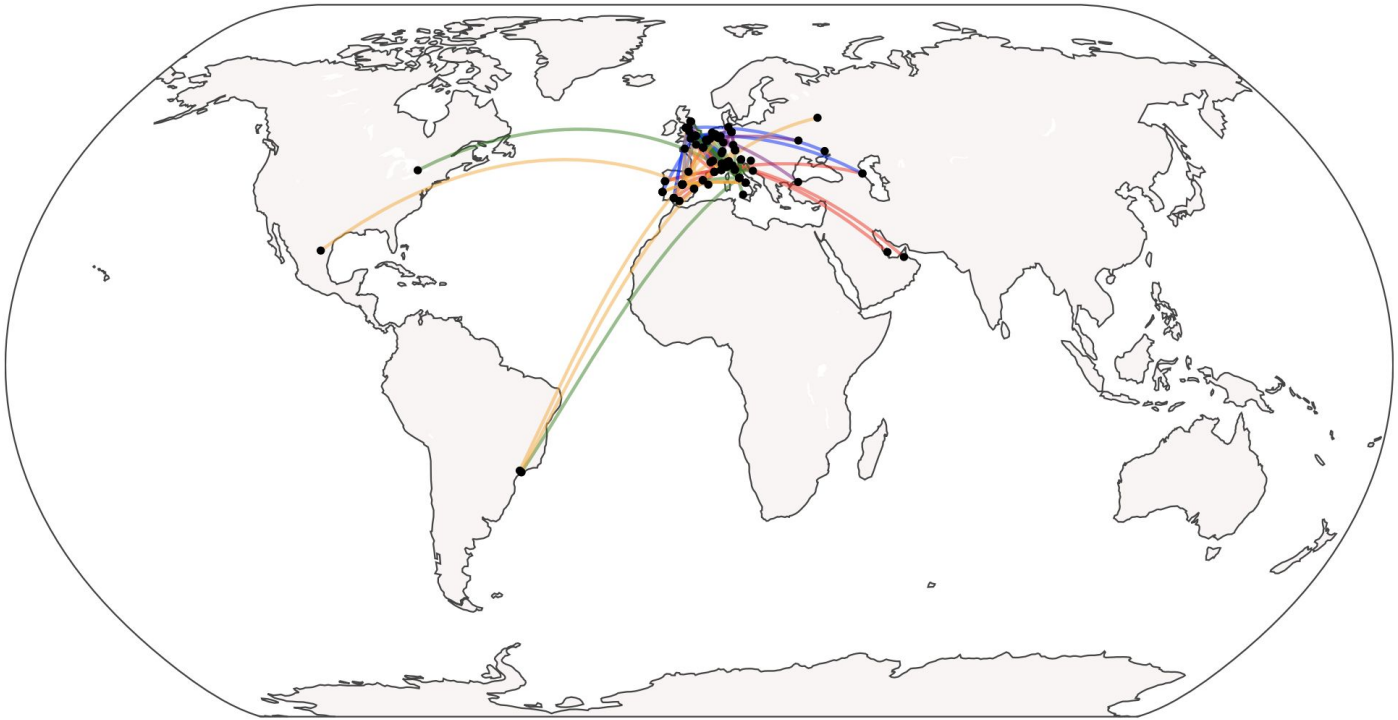
- There are instances when dropping null values is not advantageous. For example, when plotting returns of two assets with disparate value, changing a null to a zero instead of dropping it starts both the assets from zero
- There are ways of slicing data that does not actually produce a subset of data but shows you a view of that data
- Data cleanup was time consuming but extremely important

Data Analysis

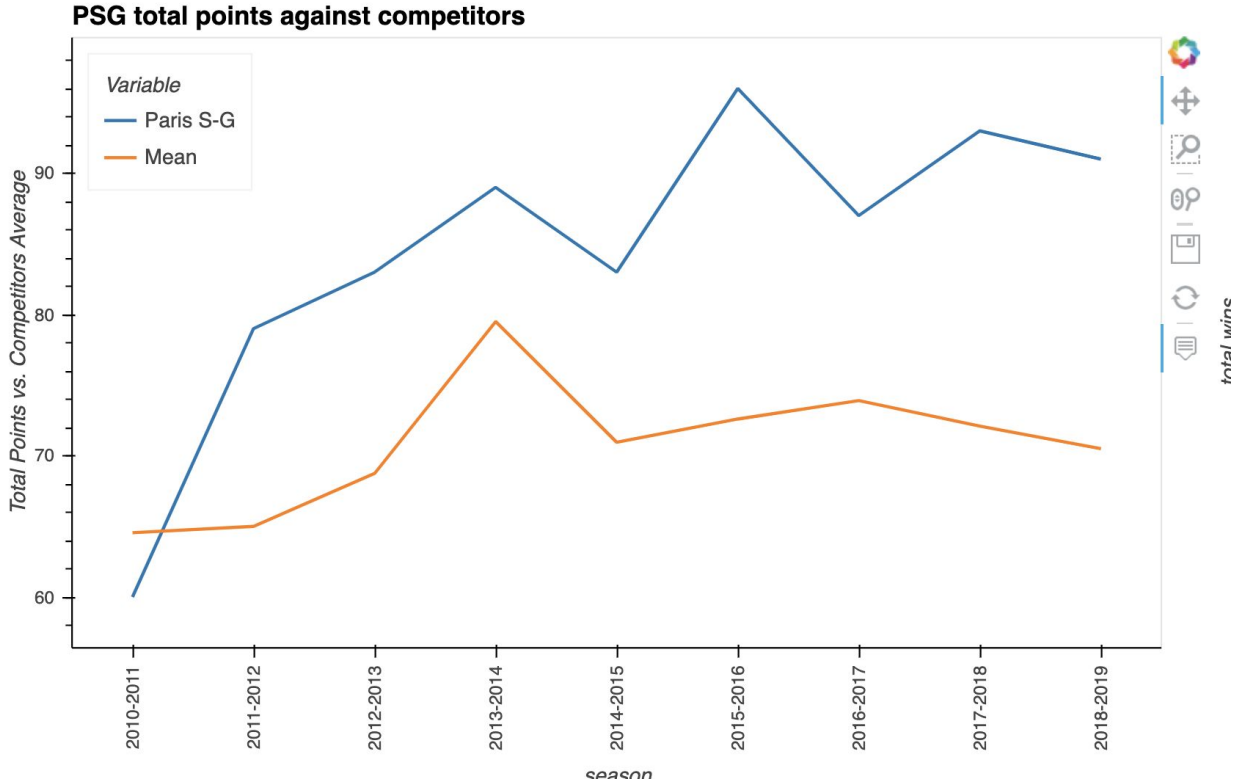
Legend:

French League, English League, Spanish League, German League, Italian League

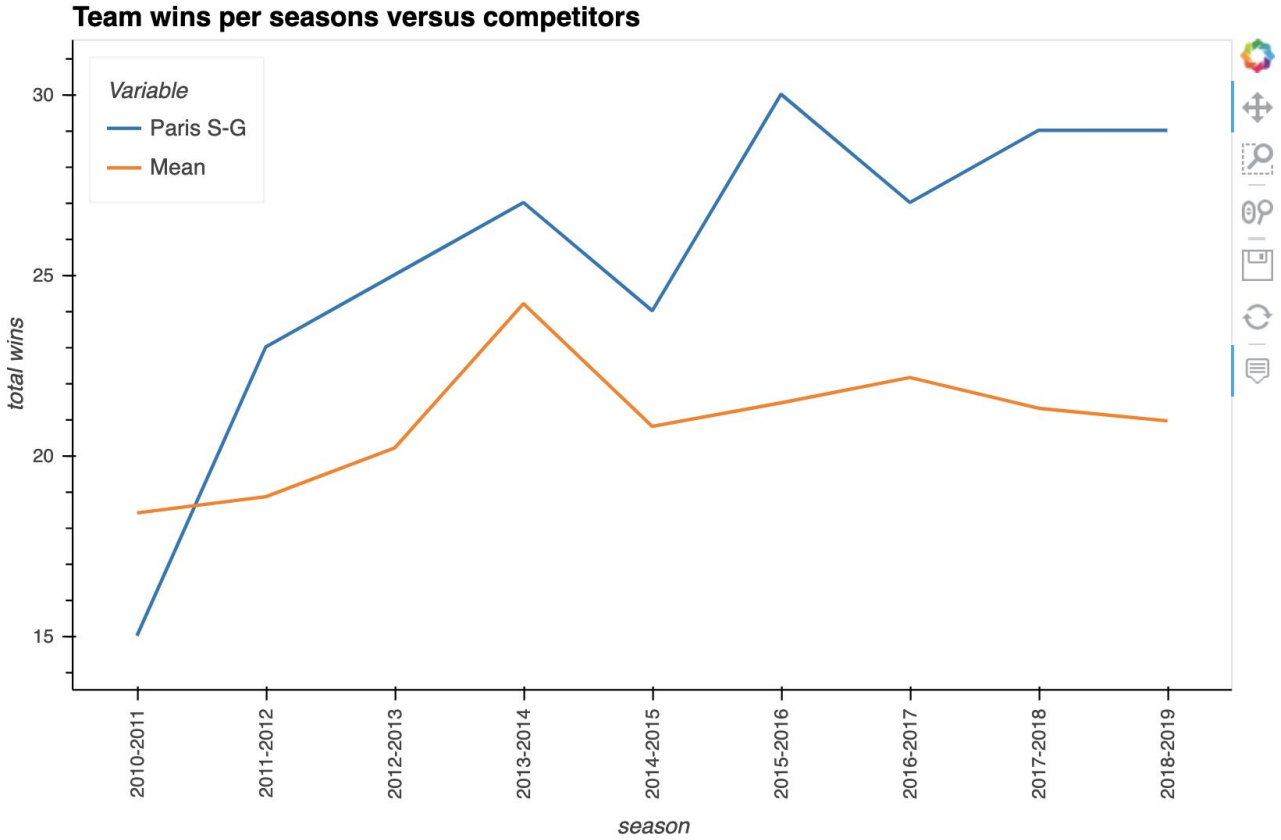
Season 2013-2014 Player Transfers



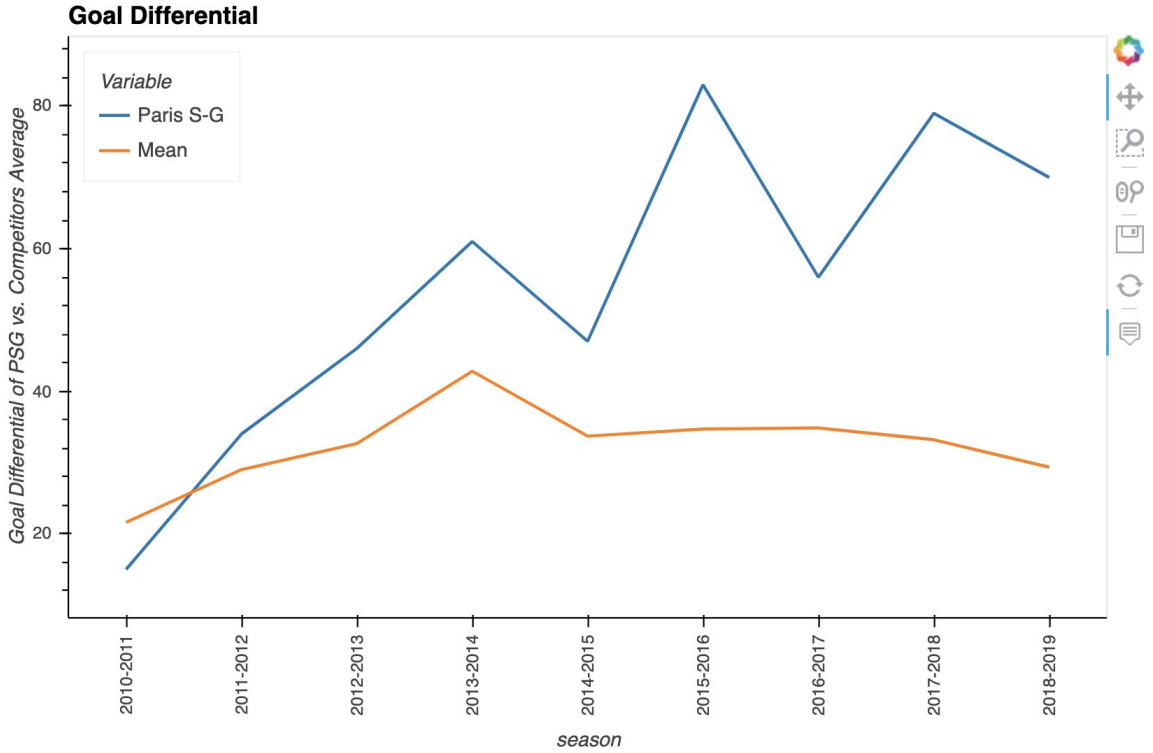
Team Performance



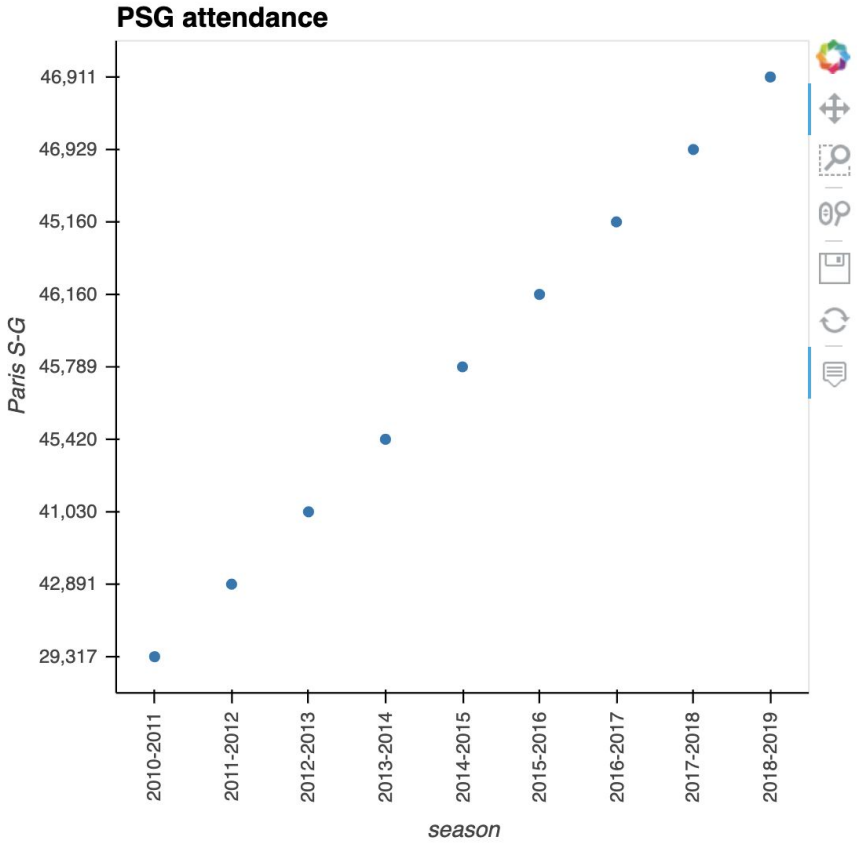
Team Performance



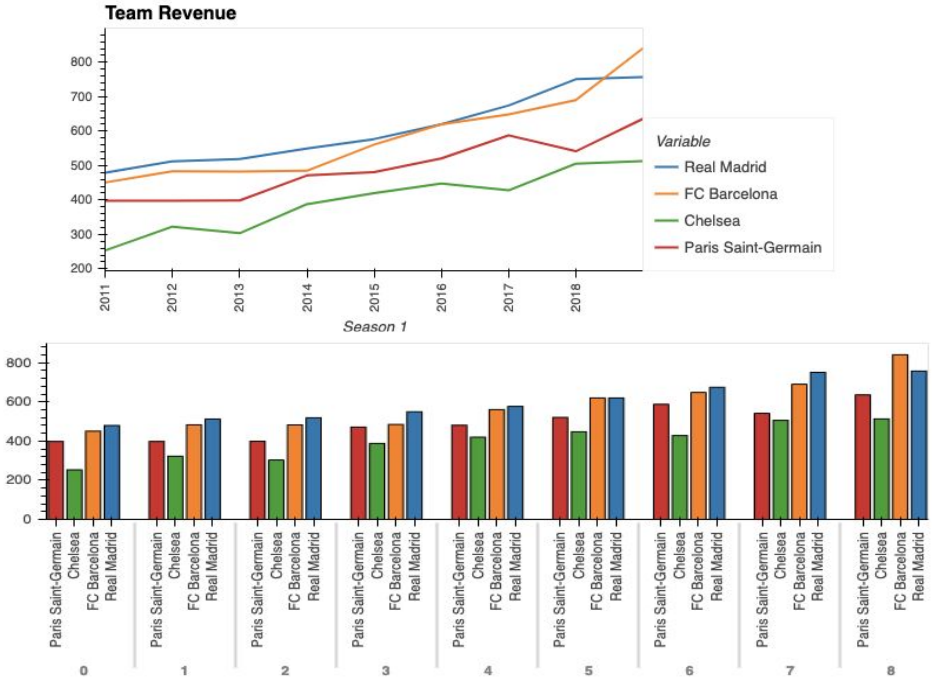
Goal Differential



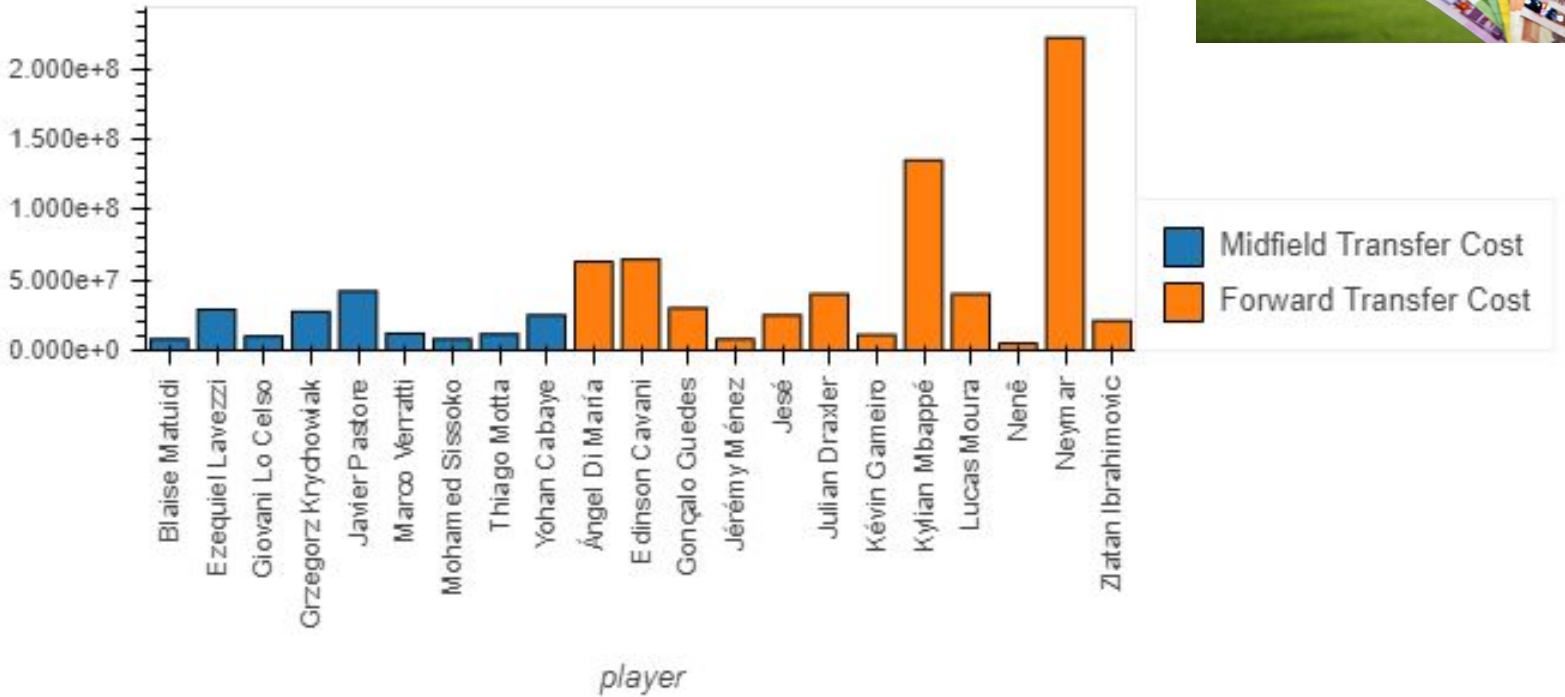
Attendance


PSG attendance
Paris S-G
46,911
46,929
45,160
46,160
45,789
45,420
41,030
42,891
29,317
2010-2011
2011-2012
2012-2013
2013-2014
2014-2015
2015-2016
2016-2017
2017-2018
2018-2019
season

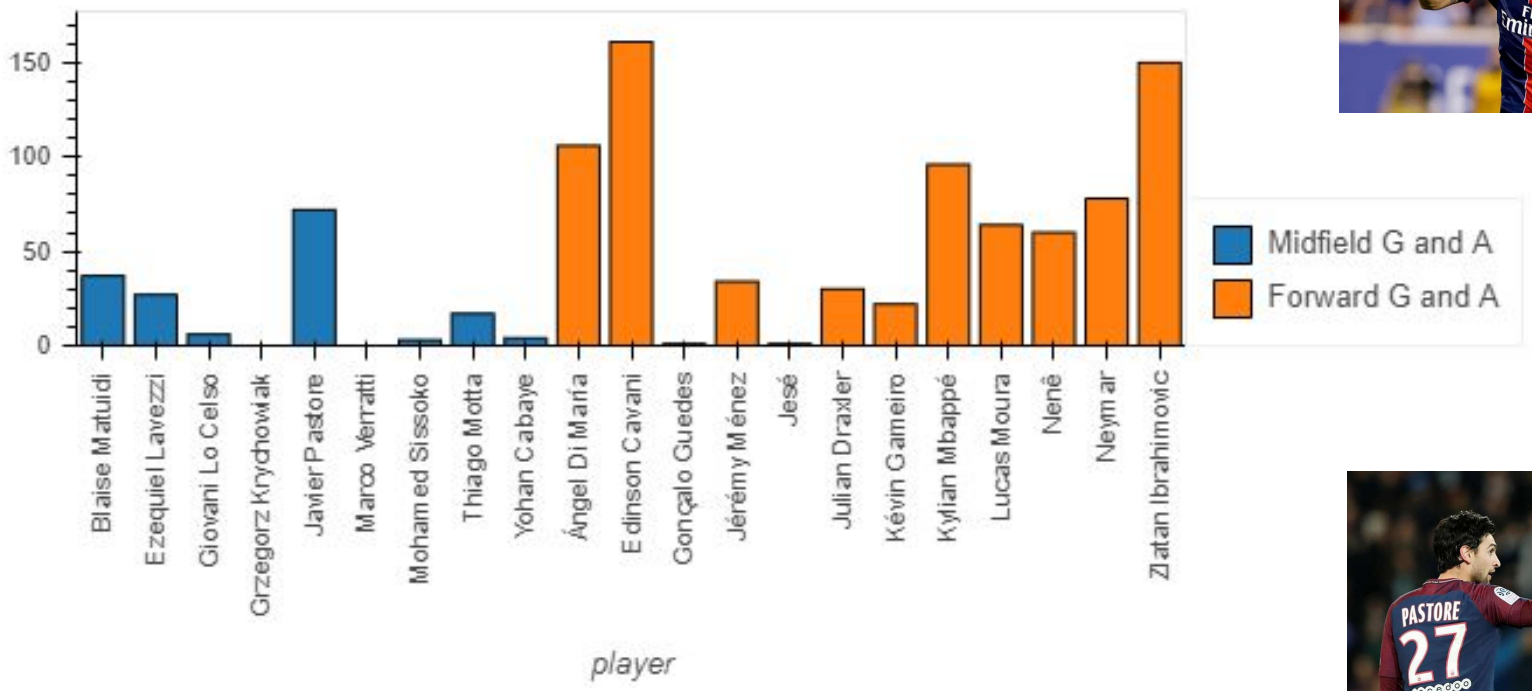
Team Revenue by Year and Transfers per Year



Forwards vs Midfielders Cost

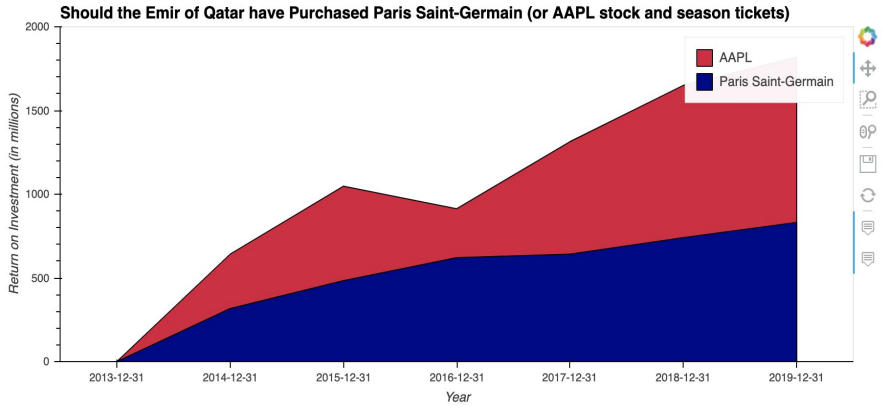


Forwards vs Midfielders Productivity



Analysis of the Emir of Qatar's Investment in Paris Saint-Germain

- Used Alpaca to pull AAPL stock prices 2013-2019
- Used a csv file with Paris Saint-Germain's estimated value from 2013(1st year available)-2019
- Calculated AAPL daily returns and converted to yearly returns by resampling
- Plotted the yearly returns



Discussion

Reason vs. Passion?

Findings:

- Transfer of high quality players for PSG significantly improved teams performance relative to its competitors.
- Increased performance also contributed to higher attendance.
- Passion project?
  - The yearly returns on the investment in the Paris Saint-Germain soccer club are very good--it is now worth 8x as much as when it was purchased
  - It appears that certain traditional investment such as an investment in AAPL would have been better
  - Our project will ultimately add transfer fees into the analysis, which should skew the results even more in AAPL's favor

Postmortem

Additional Questions...

- Extend our in-depth analysis to include more teams and more seasons...
- Assess PSG's expenditure in transfer players versus other teams…
- *Was PSG just particularly effective?*
- Monte Carlo Simulation to predict the probability of buying players with certain qualifications.

Difficulties…

- A lot of data to sift through…
  - Making decisions on which data to concentrate on very difficult.
- Inconsistent data sets over numerous years and across various sources
- Comparing a privately held soccer club, Paris Saint-Germain (PSG), to a traditional investment, Apple stock, proved difficult due to incompatible data timeframes
  - (i.e., daily price for stock vs. yearly valuation for a soccer club)
- Our data included words in languages other than English, which multiplied the potential spelling variations (e.g., accent marks, hyphens, etc.)

Questions?