How Dominant Are Red Bull Really?

An Analysis of Dominance in Formula 1 Across the Years

(Accurate as of 02/11/23)

Overview

Formula 1 is the most data-driven sport in the world. From designing & developing the car, to the race-defining decisions made by the strategy team, everything in F1 is determined by data.

Red Bull Racing are currently the kings of Formula 1. They have just broken the record for most consecutive wins by a team (15) and most consecutive wins by a driver (10), but they are not the first team to obliterate the competition. I was curious to see how they compare to previous teams who have dominated in F1 over the years. For my analysis, I compared Red Bull's record-breaking 2023 season with some of the most famous dominant seasons in F1 history: Mercedes 2015, Ferrari 2002, McLaren 1988.

The data is sourced from the Ergast API (http://ergast.com/mrd/) where they have the live timing data from every F1 race. I saved the relevant seasons in .csv files, then I wrote a Python script to clean & analyse the data. Finally, I used Microsoft PowerBI to visualise the data in a clear and intuitive manner.

Here are my findings:

About Formula 1

If you don't know much about F1, here's a quick crash course. Formula 1 is primarily an engineering competition. The objective is to build the fastest racecar that meets clearly defined regulations (*a formula*). There are 10 teams, and they compete on 23 different racetracks around the globe.

There are two concurrent championships: The Drivers Championship and the Constructors Championship. Each team has two drivers. Points are awarded to a driver based on their finishing position, and a team's points are the sum of their two drivers' points. At the end of the year, the driver with the most points is the Drivers' World Champion, and the team with the most points is the Constructors' World Champion

At each race, there is a qualifying session to set the grid for the race. The drivers compete to set the fastest timed lap around the circuit on Saturday, and on Sunday they line up at the starting grid in descending order from the fastest lap.

Terminology

- Quali – Qualifying session to set the starting grid for the race
- Pole - First place in qualifying
- Podium – Top 3 finish in the race
- 1-2 Finish – When a team has both their cars finish 1st and 2nd

Abbreviations

- VER - Max Verstappen: Youngest F1 Race Winner & 2(3) Time World Champion,
- MSC - Michael Schumacher: 7 Time World Champion
- HAM - Lewis Hamilton: 7 Time World Champion, Most F1 Wins & Poles
- SEN - Ayrton Senna: 3 Time World Champion

Metrics

Formula 1 has evolved massively over the last 70 years, so it's essential to be careful when comparing results from different eras. We must choose our comparison metrics wisely. For example, in 1988 there were only 16 races in a season, while in 2023 there were 23. Thus "Wins in a Season" would not be a fair comparison. With this in mind, I chose the following comparison metrics:

- Average Winning Margin
- Average Qualifying Gap
- Win Percentage
- Podium Percentage
- 1-2 Finish Percentage

A well-designed car is crucial for success in Formula 1, but having an excellent driver to make the most out of the machinery is equally important. Therefore, on top of comparing team performance (both drivers) I also compared the performance of each team's dominant driver (with some interesting results)

Average Winning Margin

This stat measures how much the lead driver wins a race by on average.

For the team metric, it gives the difference in time between when the lead driver crosses the finish line, and when the next driver *not from his team* crosses the line.

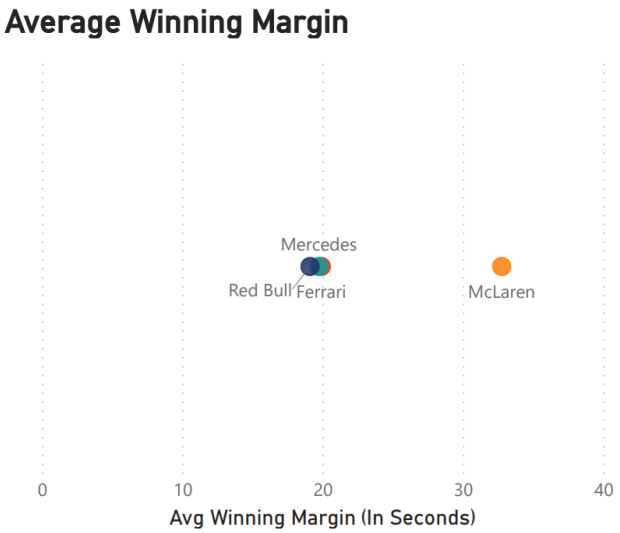
For the driver metric, it gives the difference in time between when the lead driver crosses the finish line, and when the 2nd place driver crosses the line (which could be his teammate)

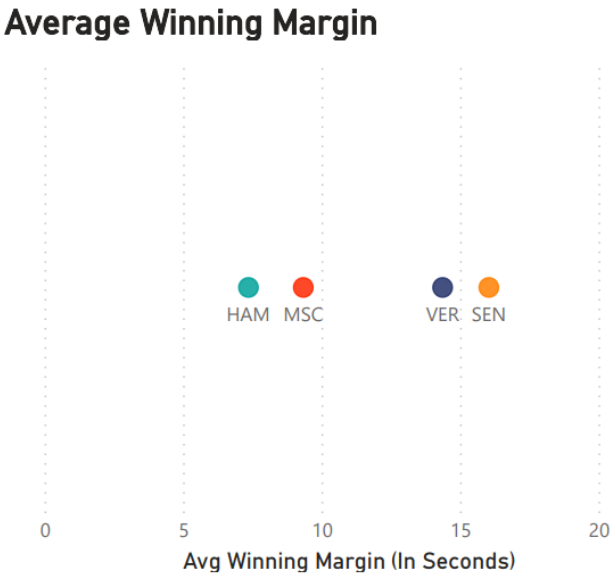
In this way, the team metric measures how far ahead the team finishes from the next fastest team on average, while the driver metric measures how far ahead the driver finishes from the next fastest driver on average

Team Winning Margin

As you can see from this graph, each team wins by approximately 20 seconds on average, while McLaren eclipses them with an astounding average winning margin of 30+ seconds!

McLaren is clearly the standout team in this regard. While each of the teams is an impressive distance ahead of the rest of the field, McLaren is simply on another level.





Driver Winning Margin

Interestingly in this graph, while McLaren's Senna still leads, Red Bull's Verstappen is right on his heels, each of them winning by approximately 15 seconds over 2nd place on average. This is very impressive as it includes gaps to their teammates in equal machinery, showing that they are contributing a large part to the team's success

Average Qualifying Gap

This stat measures how much the lead driver gets pole by.

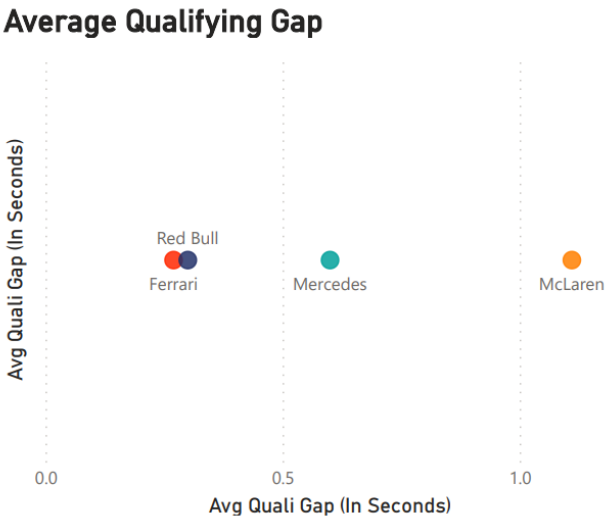
For the team metric, it gives the difference between the fastest time set by the team & the fastest time set by the next quickest team

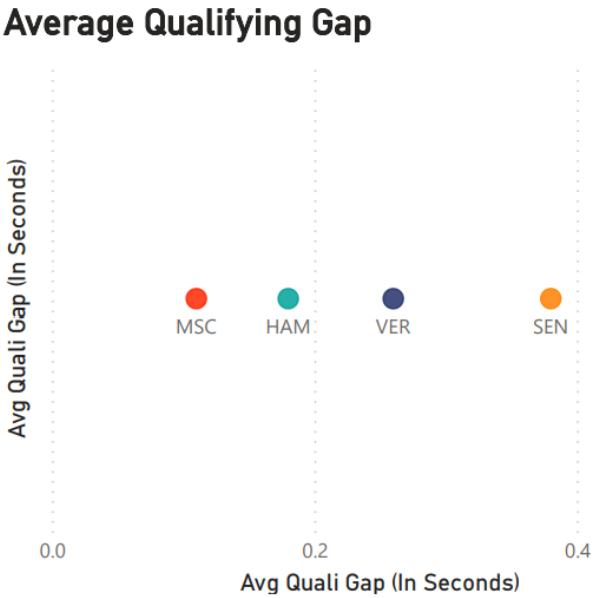
For the driver metric, it gives the difference between the fastest time set by the lead driver & the fastest time set by the next quickest driver

In this way, the team metric measures how much faster the team is than the next fastest team on average over one lap, while the driver metric measures how much quicker the lead driver is over one lap than the next fastest driver

Team Qualifying Gap

From this graph we can really see just how dominant McLaren was over the field, outqualifying the next fastest team by more than a second on average! Mercedes' 0.6-second qualifying advantage is also very impressive. They were clearly head & shoulders above the rest that year. Ferrari & Red Bull only outqualified the other teams by approximately 0.3 seconds on average, which is a reasonably close margin, much more so than I would have expected for such dominant seasons.





Driver Qualifying Gap

This graph shows McLaren's Senna still in the lead, this time with a roughly 0.4-second advantage over second place. This is quite impressive as more often than not 2nd would have been his teammate, which shows both Senna's skill and McLaren's strength. Interestingly Hamilton & Schumacher fall back quite a lot in this metric. This could indicate that their teammates were closer in performance to them.

Win Percentage

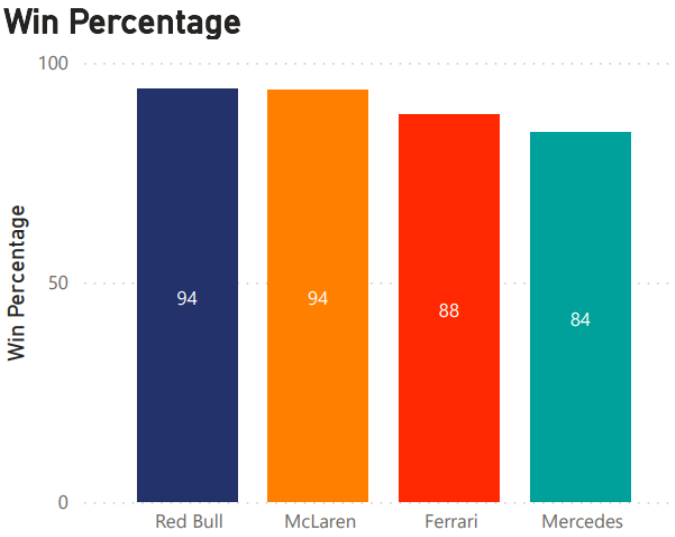
This stat measures what percentage of the races that season each team won

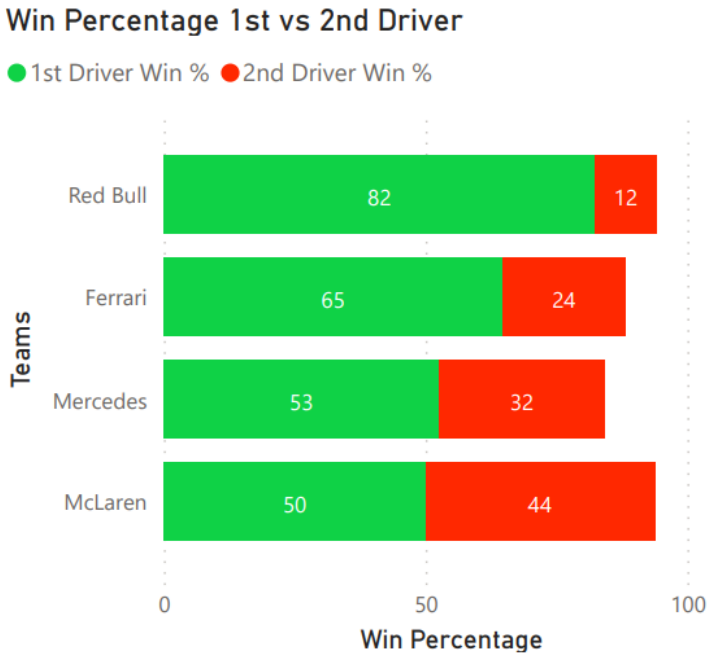
For the team metric, it gives the percentage of races won by one of that team's cars

For the driver metric, it gives the percentage of races won by that driver only

Team Win Percentage

This graph really just shows a common trend: All the dominant teams won a lot. Red Bull's season is still ongoing so their percentage may rise, but there isn't really much to differentiate the teams here. They all lost between 1 and 3 races over the whole year. It gets far more interesting in the driver section





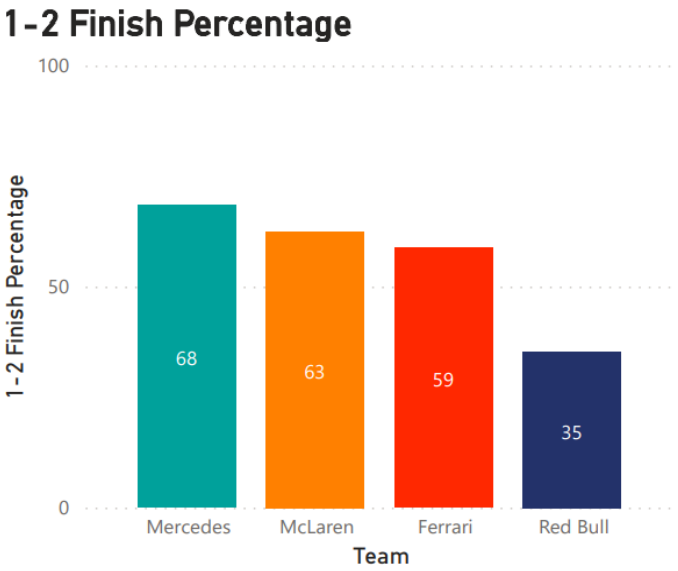
Driver Win Percentage

Here we can see that Senna & Hamilton had a fierce rivalry with their teammates, Senna was almost equal with his teammate, earning slightly more of McLaren's wins that year while Hamilton also fought hard with his teammate, but won a larger share of his team's wins. The competition was far less close for Verstappen & Schumacher, who had to do most of the heavy lifting behind their teams' successes, winning far more races than their teammates.

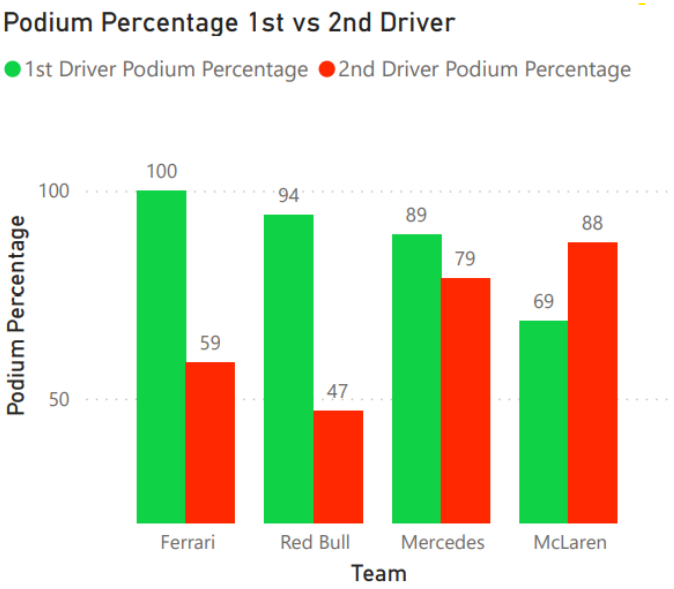
1-2 Finish Percentage

This stat measures what percentage of the races that season that a team had both cars finish 1st & 2nd. It can give us an insight into both the quality of the car & also the quality of the driver lineup. To have a car fast enough to beat all the others and to have two drivers who can both get the most out of it.

Mercedes tops this chart, incredibly scoring a 1-2 finish in almost 70% of the races that year. They had the perfect combination of two very talented drivers and a car that was far superior to the competition. McLaren & Ferrari also had a very impressive record of 1-2 finishes in approximately 60% of their races.



Red Bull however scored abysmally in this category, with a mere 35% 1-2 finish rate. The graph below gives us more insight into this



From this graph of podium percentage by driver, we see that in the case of Schumacher & Verstappen, all of their teams' podiums came from or involved them. The same is true for Hamilton but his teammate was much closer to him in this regard. Interestingly, despite having a higher win percentage than his teammate, Senna actually has a considerably lower podium percentage.

Conclusion

So, all in all, how dominant are Red Bull really? Red Bull Racing's 2023 season has undoubtedly been phenomenal, breaking numerous records such as the most consecutive wins by a team (15) and most consecutive wins by a driver (10), as well as dominating almost every race this year. However comparing their performance to previous years, it's hard to rank them above the 1988 McLaren season. Red Bull's winning margin of around 20 seconds is in line with Ferrari & Mercedes' dominant seasons, but McLaren's is absolutely crushing, winning by over 30 seconds on average. On top of this, the qualifying gap between Red Bull and the rest is quite small at only 0.3 seconds, whereas McLaren's monumental 1.1-second qualifying gap is another level of dominance. Also, McLaren's dominant displays came fairly equally from both drivers, while at Red Bull Max Verstappen is bringing almost all the results, and the other side of the garage is quite lacking.

Overall, Red Bull racing have been superb this season, cruising to the championship in dominating fashion, but this dominance is far from unprecedented, and in the grand scheme of things fails to rival the insurmountable gulf between the 1988 McLaren team and the rest of their competition.