

The Intriguing Correlation Between Financial Investment and Formula 1 Racing Performance

Bowen Yao

St. Michael's College School, Toronto, Canada

ABSTRACT

This paper examines the intriguing correlation between financial investments and the performance in Formula 1 motorsport racing, underscored by prominent athlete Lewis Hamilton's leave from Mercedes Petronas to Scuderia Ferrari beginning in 2024. Using the data from 1994 to 2010, this paper identifies a clear link between financial allocation to F1 teams and their success in races. Overall, the paper reveals that teams backed by significant investments from their parent companies, such as Daimler for Mercedes and Ferrari for Scuderia Ferrari, tend to secure a leading position in the F1 Constructors' Championship. The research further extends to operational spending in respective teams. This includes updating the newest technologies to augment their cars' performance. The paper outlines the critical margin of Advantage held by Mercedes over Red Bull, mainly attributed to their significantly high expenditure, proving the causation in investment and performance. The research goes into depth by evaluating racers' salaries and their performance metrics, suggesting a pattern where higher earning aligns with a preferable result. Sponsorship investments are also mentioned and have proven to play a pivotal role, with well-sponsored teams typically finishing higher each season. In summary, the paper argues that financial investment is a critical determinant of a team's capacity for dominance in Formula 1 racing. While driver skill is essential, the financial contributions explain its influence on performance, offering insights into the broader implications of financial strategies in high-stakes competitive sports.

Introduction

The Formula One (F1) racing world was astonished in the early days of February 2024, when seven-time world champion Lewis Hamilton announced his decision to leave with Mercedes Petronas to Scuderia Ferrari after 11 years. This abrupt news was proclaimed to be one of Hamilton's "hardest decisions" but is still unclear to fans what the motives behind this leave are. Ever since he left, numerous conspiracy theories have been spread across social platforms, with numerous controversies around social media claims about what led to his leave. However, it was claimed that Hamilton left since "he no longer believed [Mercedes Petronas] could deliver a car that can stop Red Bull's juggernaut" (Srivastava 2024). It's apparent that the seven-time world champion wants to win not merely with his skill, but also with the most advanced racing cars invented, but how is it that different racing teams can manufacture completely different racing cars throughout Formula 1 racing? Many people characterize F1 racing as a science fair, with the best technologies and science in aerodynamics and engines to win the final price, but often the most money spent on a science project usually leads to the best outcomes. Through examining the investments in F1 racing teams, it is seen that like science fairs, team investment, and team expenses all contribute to a preferable outcome in performance.

Influence of Financial Investments on F1 Team Performance

The success of the F1 racing team is significantly influenced by the team's commitment to advancing the technology of their race cars, and investments and sponsorships from their car manufacturers and parent companies play a pivotal role in these developments. Although racing is the most expensive sport in the world, the F1 racing teams are not publicly listed to be invested on stock exchanges. As a result, the biggest investors and supporters of respective teams are often the parent company, as the performance of these car brands symbolizes the status of a certain car brand. Looking back in 2019, Mercedes' parent company, Daimler, invested \$80 million into the team to help them in the Constructors Championship (Srinivasan 2023). This investment directly affected the team's performance; in that very year, Mercedes-AMG Petronas earned first place in the season. This money and performance causation can also be seen in Ferrari S.p.A., where Ferrari, the parent company of Scuderia Ferrari S.p.A. The F1 racing team also invests more than \$400 million each year in formulating the dominating, and most valuable Ferrari team today. Furthermore, with Charles Leclerc and Sebastian Vettel placing 3 and 4th, there's no doubt that throughout that more investments usually lead to a stronger team and better overall performance. On the contrary Haas F1 Team Principal Guenther Steiner recently stated that even a \$100 million investment won't get them closer to Mercedes (Chauhan 2023), and looking at the recent performance of HAAS, the team only ranked 8th (RacingNews365, 2022) out of 10 F1 racing teams, earning only 37 points in the entire season.

Technological Investments and Their Impact on F1 Team Performance

Another major contribution to team results is individual team's spending in inventing technologies which can influence the speed and performance of race cars. Looking at the fierce recent rivalry between Mercedes Petronas and Red Bull racing, in 2018, Mercedes-AMG Petronas "was a minuscule 0.058% quicker than Red Bull on average throughout the season. Over a typical 90-second lap, that's an advantage of just five-hundredths of a second" (Will, 2024). Although the number seems minuscule, this resulted in Lewis Hamilton and Mercedes-AMG Petronas achieving first standing in the 2018 season, but how much did this cost? Mercedes reported a \$400 million operating spending in the season, earning a \$5 million profit at season end. This team consists of 950 workers who spent the fewest dollars per point earned thanks to Lewis Hamilton. His teammate Valtteri Bottas spend \$0.61 million for each of the team's 655 points (Jacobs, 2018). This \$400 million operating expense led to Mercedes ranking first in terms of team spending in the season, and these costs mainly consist of tires, DRSs, and countless technologies in buying the race car. Behind Mercedes lays Red Bull, which spent \$310 million: \$181.1 million on team operation, of which 5.7 million dollars were poured into Investment in new production machinery, new hardware, and track equipment. On the other hand (Sylt, 2022). Despite earning the same amount of profit, \$5 million, Mercedes-AMG outspent Red Bull by more than \$90 million. It is striking to note that for Mercedes to gain a mere 1% faster speed than RedBull, the team must invest over \$1.5 billion into the development of these vehicles. However, due to these huge contracts in monetary spending, Mercedes did beat Red Bull in the season, highlighting how a higher number in investment can lead to a direct boost in performance even by just a minuscule number.

Technological Investments and Their Impact on F1 Team Performance

Another major contribution to team results is individual team's spending in inventing technologies which can influence the speed and performance of race cars. Looking at the fierce recent rivalry between Mercedes Petronas and Red Bull racing, in 2018, Mercedes-AMG Petronas "was a minuscule 0.058% quicker than Red Bull on average throughout the season. Over a typical 90-second lap, that's an advantage of just five-hundredths of a second" (Will, 2024). Although the number seems minuscule, this resulted in Lewis Hamilton and Mercedes-AMG Petronas achieving first standing in the 2018 season, but how much did this cost? Mercedes reported a \$400 million operating spending in the season, earning a \$5 million profit at season end. This team

consists of 950 workers who spent the fewest dollars per point earned thanks to Lewis Hamilton. His teammate Valtteri Bottas spend \$0.61 million for each of the team's 655 points (Jacobs, 2018). This \$400 million operating expense led to Mercedes ranking first in terms of team spending in the season, and these costs mainly consist of tires, DRSs, and countless technologies in buying the race car. Behind Mercedes lays Red Bull, which spent \$310 million: \$181.1 million on team operation, of which 5.7 million dollars were poured into Investment in new production machinery, new hardware, and track equipment. On the other hand (Sylt, 2022). Despite earning the same amount of profit, \$5 million, Mercedes-AMG outspent Red Bull by more than \$90 million. It is striking to note that for Mercedes to gain a mere 1% faster speed than RedBull, the team must invest over \$1.5 billion into the development of these vehicles. However, due to these huge contracts in monetary spending, Mercedes did beat Red Bull in the season, highlighting how a higher number in investment can lead to a direct boost in performance even by just a minuscule number.

Advancements in F1 Engine Technology and Their Impact on Racing Performance

The Research and Development investment in F1 cars can highlight the key correlation between monetary expense and the outcome of each team. While the respective team's investments in technology play a major role in affecting the outcome of the team's performance, the specific allocation of various technologies can further influence the outcome. Throughout the 84 years of developing the fastest racing cars in Formula 1 Racing, aerodynamics testing, material science, data analytics, fins, and DRS have always been the leading sciences pushing the bounds of human technology. Among these advanced technological tests and sciences, the engine has always been the most expensive and invested compartment in F1 cars. Undoubtedly, the engines used in F1 assert their dominance as one of the most important pieces of equipment, extremely sophisticated and a huge factor in improving the speed and performance of the car. Ever since 2014, the FIA set the rules that the engine must be a four-stroke, hybrid, V6 engine with a displacement of 1.6 litres and a turbocharger to boost the power output (with an 80mm bore and 53mm stroke). The turbocharger forces more air into the engine, which results in more power. This is achieved by using exhaust gasses to spin a turbine, which powers a compressor that forces more air into the engine (Gururaj, 2023). Although all engines in Formula 1 are hybrid V6 engines, we can see a direct correlation between cars' performances with more expensive engines than that of racing cars from prior years. According to Sportsnet, Unsurprisingly, the engine is the most expensive component. A singular turbocharged 1.6-litre V6 engine is worth approximately \$10.5m (€130.3m), with teams allowed to use three of them throughout the season". In 2023, the fastest F1 speed recorded was 366 km/h in the Las Vegas Grand Prix by Ferrari SF-23 driver Carlos Sainz (Fans, 2023). In contrast, if we compare the top speed in 2013, Felipe Massa's Williams-Mercedes topped 342 km/h (Motorsports, 2014), compared with the fastest V8 engine. This small yet significant difference of 24 km/h faster marks the evolution of the F1 engine. Throughout the years of developing and refining these articulate metals, investments in science do appear to boost the performance of F1 race car speeds.

Salary and Performance Correlation in Formula 1 Racing

In the sports world, racer performance is a key indicator of their respective salaries, especially in Formula 1 racing. These million-dollar contracts are not only a reflection of the athlete's prowess on the course, but also a significant factor when evaluating their performances in every season. In the 2024 season, Forbes's top-paid athlete Max Verstappen ranks first out of the 20 racers with a commanding salary of \$70 million. This pinnacle salary ranking is well reflected in his performance, with a total of 575 points in the 2023 season, significantly outranking his second-place teammate Sergio Pérez - who is fourth in salaries ranking earning a total of \$34 (Longman, 2024) million - by 290 points. The salary-performance correlation extends to other notable racers, most notably seven times world champion Lewis Hamilton, earning a total of \$45 (Longman, 2024) million in 2024. Hamilton's salary ranked him third amongst the earners, but his direct performance correlation: a total of 234 points in 2023, suggests his ability to grapple with exceptional outcomes. Looking at the lower end of the

salary spectrum, the last five racers reveal a pertinent contrast, with their annual earnings fluctuating between \$1-3 million (Longman, 2024): 70 times less than Verstappen's, corresponding with their lower performance ranking. This pattern reveals a strong link between financial rewards and competitive success in Formula 1 Racing.

F1 Racer Salary and Performance (2023 Season)

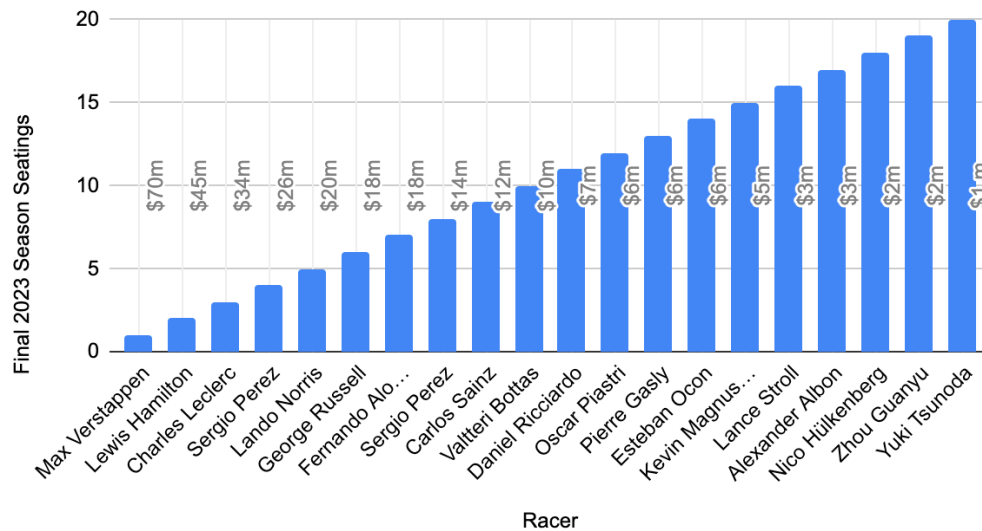


Figure 1. Racers ranked from left to right based on performance and their indicated salary.

Financial Investments and Team Performance in Formula 1 Racing

Sponsorship investments in Formula 1 racing teams have augmented the overall results of each team. In F1 racing, the largest share of the revenue stream comes from sponsorships. However, sponsorships and direct investment from investors, sponsors' monetary input gives them the right to control stake. Despite the difference in ways of investing, the money stored in Formula 1 racing has also led to quality results. Often, the teams with the most sponsors are the teams with the best outcomes:

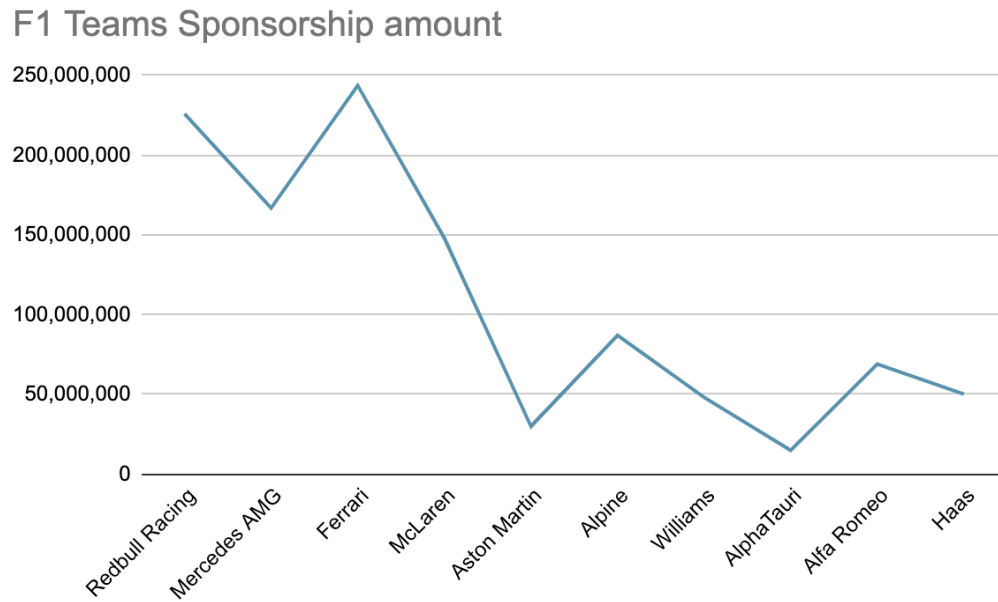


Figure 2. F1 racing teams ranked from left to right based on performance and their respective Sponsorship.

In the graph above, the teams in the x-axis are the final team seating in the 2023 Formula 1 racing season, and the y-intercept is each team's respective sponsorship received. Red bull Racing and Ferrari - \$226 (Admin, 2023) and \$243 (Admin, 2023) million - both with the highest sponsorship invested, finished first and fourth in the season. In comparison, Alpha Tauri and Haas racing, with only \$15 and \$20 million worth of sponsorships finished last and third-last throughout the entire season (Admin, 2023). This difference of more than \$225 million has displayed a significantly higher ranking throughout the season, showing how there is a direct correlation between financial investment and the very performance of Formula 1 teams.

Conclusion

Overall, the analysis presented in this research paper unequivocally highlighted the strong correlation between financial investment and the performance of Formula 1 racing. Investigating the strategic infusion of capital in various forms such as direct team investment, technological development, or sponsorship investments, consistently yields a competitive edge on the racetrack. The cases of Mercedes-AMG Petronas and Scuderia Ferrari alongside victorious racers like Max Verstappen and Lewis Hamilton, underscore the notion that financial contributions can critically affect the success of teams and drives in this high-stakes sport. Discounting talents and strategical planning's pivotal role, the evidence illustrated in this research suggests that the monetary subsidy of a team significantly influences its capacity to innovate, excel, and ultimately dominate in the fast-paced world of Formula 1 racing. This financial-performance link not merely illuminates the successful dynamics in motorsport racing, but also reflects on a broader theme of investment and return, resonating with the patterns observed in various competitive sectors where innovation and excellence become a paramount role in reaching first.

Acknowledgments

I would like to thank my advisor for the valuable insight provided to me on this topic.

References

- Admin, K. (2023, June 26). *Top Ten current sponsor partners of Scuderia Ferrari*. Sportcal.
<https://www.sportcal.com/data-insights/top-10-sponsor-partners-scuderia-ferrari/>
- Chauhan, D. (2023, August 9). *\$100,000,000 investment not enough to beat F1 big boys Mercedes, states Haas Boss Guenther Steiner*. Sportskeeda. <https://www.sportskeeda.com/f1/100-000-000-investment-enough-beat-f1-big-boys-mercedes-states-haas-boss-guenther-steiner>
- Fans, S. (2023, November 21). *Top speeds from 2023 F1 Las Vegas GP: Carlos Sainz reached 366 km/h!* Scuderia Fans. <https://scuderiafans.com/top-speeds-from-2023-f1-las-vegas-gp-carlos-sainz-reached-366km-h/#:~:text=During%20the%20Las%20Vegas%20Grand,by%20Bottas%20in%20Mexico%202016.>
- Gururaj, T. (2023, May 16). *Formula One: The science, engineering, and innovation behind the speed*. Formula One: The science, engineering, and innovation behind the speed.
<https://interestingengineering.com/innovation/formula-one-f1-racing-speed-engine-power>
- Jacobs, C. (2018, December 28). *Top 3 Formula 1 teams spent over \$1.1 billion in 2018: Report*. The Drive. <https://www.thedrive.com/accelerator/25691/top-3-formula-1-teams-spent-over-1-1-billion-in-2018-report>
- Longman, W. (2024, March 21). *F1 driver salaries: How do much Formula 1 drivers earn?* Motorsport Tickets Blog. <https://motorsporttickets.com/blog/f1-driver-salaries-how-much-formula-1-drivers-earn/>
- Mayne, J. (2024, March 1). *How much does an F1 car cost in 2024? key parts, history of most expensive Formula 1 cars*. Sporting News Canada. [https://www.sportingnews.com/ca/formula-1/news/f1-car-cost-key-parts-most-expensive/sbvxis3e0fveuzxevx56b470#:~:text=A%20singular%20turbocharged%201.6%2Dlitre,\(%E2%82%AC663%2C285\)%20to%20manufacture.](https://www.sportingnews.com/ca/formula-1/news/f1-car-cost-key-parts-most-expensive/sbvxis3e0fveuzxevx56b470#:~:text=A%20singular%20turbocharged%201.6%2Dlitre,(%E2%82%AC663%2C285)%20to%20manufacture.)
- Motorsport.com. (2014, September 1). *Top speeds at Monza are to be lower than expected*. Motorsport.com: F1 News, MotoGP, NASCAR, Rallying and more. <https://www.motorsport.com/f1/news/top-speeds-at-monza-to-be-lower-than-expected/456040/>
- RacingNews365. (2022). *F1 standings 2022*. <https://racingnews365.com/formula-1-standings-2022>
- Srinivasan, H. (2023, July 5). *Here's how F1 teams and drivers make Millions*. Investopedia. <https://www.investopedia.com/the-economics-of-formula-1-here-s-how-f1-teams-and-drivers-make-millions-7555800>
- Srivastava, P. (2024, February 2). *Why Ferrari? Lewis Hamilton became a master and man at Mercedes but appeared stuck in recent years*. Hindustan Times. <https://www.hindustantimes.com/sports/others/why-ferrari-lewis-hamilton-became-a-master-and-man-at-mercedes-but-appeared-stuck-in-recent-years-101706844199947.html>
- Sylt, C. (2022, October 12). *Red Bull reveals how much it costs to run an F1 team*. Forbes. <https://forbes.com/sites/csylt/2020/01/14/red-bull-reveals-how-much-it-really-costs-to-run-an-f1-team/?sh=7679a58277c1>
- Will Wood, K. C. (2024, February 9). *Analysis: Did Hamilton or Verstappen have the quickest car for their title fight?* RaceFans. <https://www.racefans.net/2022/01/17/analysis-did-hamilton-or-verstappen-have-the-quickest-car-for-their-title-fight/#:~:text=Based%20on%20these%20figures%2C%20the,five%2Dhundredths%20of%20a%20sec> ond.