How to play fantasy sports strategically (and win)

Written by

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Category

Strategy & Leadership

Key topics

Strategy

The story of how two researchers made a 350 per cent return on a single NFL season

Fantasy sports are a ubiquitous part of modern life. If you don't play yourself, you'll no doubt have heard friends, colleagues or family members furtively comparing stats in this often unabashedly nerdy pastime.

These are games based on a finely tuned balance of luck and skill.

The element of luck makes the average player feel like they have a chance of causing an upset – and that's true beyond digital fantasy sports (DFS). You might not stand a chance of beating Magnus Carlsen in a game of rapid chess, but with the right hand you might be able to win big at a high-stakes poker championship. (Make what you will of Carlsen announcing a partnership with Unibet by tweeting: "Luck is no coincidence")

In DFS, however, skill is an important factor and has been key to their legal status in the US, where the biggest games – run by DraftKings and FanDuel – see players

entering a small stake with a view to earning a return. Highly experienced players are labelled as such, while low-stakes beginner-only contests are available to those who don't want to get cleaned out.

Sharks vs. minnows

A 2015 report from McKinsey revealed just how central skill is to DFS earnings: 91 per cent of DFS profits for the first half of the 2015 Major League Baseball season went to 1.3 per cent of players – often termed "sharks". Most players (80 per cent) were "minnows", with "big fish" accounting for a further five per cent (around 14 per cent of total players were excluded).

Of the sharks, the top 11 players made an average profit of $135,000, while the rest of the sharks logged an average profit of $2,400. Big fish incurred average losses of $1,100 (these are the key revenue generators for DFS operators); minnows were $25 in the red.

> our strategic portfolio delivered a return of 350 per cent

This does not, however, tell the full story. The sharks – 1.3 per cent of players, remember – paid 40 per cent of total entry fees. Not too far off half of these (17 per cent) were contributed by the top 11 players alone, who had invested an average of two million dollars a head. They may make the most money, but they also invest by far the most, to earn an ROI of seven per cent. At the other end of the scale, minnows had paid in an average of $49 – contributing a mere eight per cent of entry fees between them.

While a certain percentage of DFS games are single entry, many allow players to enter multiple teams up to a certain cap – as long as they're willing to pay for each entry and do not collude with other players to gain an advantage. It's not simply the case that sharks are up there with top real-world managers in terms of their eye for a team: they also seem to be playing strategically, shortening the odds for themselves.

Optimising DFS entries

Bringing certain mathematical tools to bear on the question, Raghav Singal of Columbia University and I decided to see if we could determine optimal strategies to

maximise DFS returns. If you know your Dirichlet regressions from your Monte Carlo simulations and binary quadratic programs, you can access the full paper here.

We used the 2017 American football season as our base. Our focus was on top-heavy contests (those with higher payouts the higher a player finishes in a contest), though we also considered double-up contests (where the top half of a contest double their stake) and quintuple-up contests (where the top fifth quintuple their stake).

You might compare our approach to trying to build a portfolio of stocks (i.e. the real-world players) that would maximise our returns. The finance analogy has it limits, however: in a DFS context we were not simply trying to do well but were specifically trying to do better than other DFS players. Therefore, we sought to construct portfolios that differed from those selected by other DFS players. This wouldn't be an issue generally in playing the markets.

> 91 per cent of profits went to 1.3 per cent of players

Our approach centred on modelling opponents' probable team selections using a mathematical model (a Dirichlet-multinomial data generating process to be precise). We would then aim to select certain less-popular but higher-scoring players in order to gain an edge on non-strategic team selections, so often based on personal likes and dislikes, and unedifying weekly updates.

When submitting a portfolio of teams to top-heavy contests it was also important to try to avoid our own entries competing with one another and this led naturally to a need for portfolio diversity. We therefore developed an algorithm to help us identify optimal additions to our portfolio of teams – so far as optimal selection is possible in a DFS context.

Cashing out

Was it a success? Well, our strategic portfolio delivered a return of 350 per cent over the course of the 17-week season in top-heavy contests. This compares to a return of 50 per cent for a benchmark portfolio that did not take opponents' team selections into account but was otherwise selected in a near-optimal fashion. Clearly, approaching the problem scientifically can pay dividends.

For more detail, you can read the full paper – though be warned, it is technical.

Indeed, the modelling and the resulting algorithms that we developed may be a touch out of reach for the ordinary punter. But on the other hand, we hope we've demonstrated that you stand to maximise your potential returns when playing DFS if you take a carefully considered strategic approach.

We might note that Magnus Carlsen temporarily topped the seven-million strong Fantasy Premier League in December 2019 – a triumph of data mastery according to the Financial Times.

It's also important to remember that our efforts focused on American football. This is significant as the season constitutes a mere 17 rounds of games. We see relatively high variance in performances from week to week and injuries are common. It's only fair to point out that further experimentation would be required to see if our return of 350 per cent holds up in other seasons.

Dark arts

We don't encourage you to get involved with this, but we thought we'd also see what kind of advantage we could get by not playing by the rules.

Insider trading – seeing information on opponents' team selections before choosing one's own – is one way to get an advantage in DFS. This topic hit the headlines in 2015 when it was revealed a DraftKings staffer had used data from his employer to win $350,000 in a FanDuel competition.

Our experiment (using our model) yielded interesting results: we saw insider trading yielded an increase of 20 per cent in estimated earnings in top-heavy contests, versus the strategic player. Sounds good, but this is actually rather modest given the already sizeable gap between the benchmark and a strategic player – and speaks volumes of the value of playing strategically using modelling.

> we were not simply trying to do well but were specifically trying to do better than other players

Collusion is another murky path to DFS success. One much-publicised recent case saw Bachelor contestant Jade Tolbert stripped of a one million dollar prize after being accused of colluding with her husband. Another suspected case saw two

brothers allegedly colluding and winning in a different one million dollar contest.

There are certainly potential advantages to collusion in top-heavy contests – a higher expected payoff and lower risk from greater diversity – but in practice we suspect the benefits would be limited, given the likely diversity in teams submitted by honest players.

This article draws on findings from "How to Play Fantasy Sports Strategically (and Win)" by Martin Haugh (Imperial Business School) and Raghav Singal (Columbia University).

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About Martin Haugh

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Martin joined Imperial Business School in 2017, having spent more than a decade at Columbia University. He also spent four years working in hedge funds in New York and London. His main research interests are: computational finance and risk management; Markov decision processes and suboptimal control; and machine learning, business analytics and big data.

Read Martin's Imperial Profile for more information and publications.