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| Title A | Online bookmakers’ odds as forecasts: The case of European  soccer leagues |
| Authors | E. Štrumbelj & M. Robnik Šikonja |
| Research Methodology | Quantitative |
| Objectives | * Determine whether bookmaker odds are effective as forecasts of match results. * Determine whether bookmaker odds are equally effective as forecasts of match results. * Determine whether bookmaker odds are equally effective as forecasts of match results in different domestic leagues. |
| Implications | * Odds are effective as means of forecasting * Bookmakers are not equally effective * Bookmakers are not equally effective in different leagues. |
| Findings | * Odds on the Scottish premier league are the best for forecasting. * Odds on the French League are the worst for forecasting. |
| Conclusion | * This study concludes that through all leagues and outcome tested, bookmakers are not equally good at forecasting the results. * Odds in some of the leagues are better than in others. * Improvements can be seen over the years has been highlighted when using odds for forecasts. |
| Research Methods Used | * Brier Score – A proper score function that calculates accuracy of prediction. * Ranked Probability Score – Odds on each probability (Home, Draw or Away) is evaluated. The sum of the differences between the cumulative forecast and the cumulative outcome represent the RPS. |
| Cresswell | * *“Employs Statistical procedures”* * *“Observes and Measures information numerically”* * *“Test or verifies theories or explanations”* |

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| Title B | The Favourite‐Longshot Bias and Market Efficiency in UK Football betting |
| Authors | Michael Cain, David Law and David Peel |
| Research Methodology | Quantitative |
| Objectives | * Confirm the presence of the ‘Favourite-Longshot Bias’ * Determine whether betting market is inefficient (Bettors can take advantage and have consistent positive returns) |
| Implications | * The market is inefficient in some areas * Biases are present within the market |
| Findings | * Irrespective of opposition, goals for home team are approximately the same from match to match * Odds against longshot-bets perform poorly |
| Conclusion | * Confirmation of the presence of the Favourite-Longshot Bias. * Market is inefficient in some areas, both on overall results and correct score bets |
| Research Methods Used | * Poisson Regression – Regression analysis on contingency tables * Negative Binomial regression – A Generalisation of poisson regression where variance can be different than mean. |
| Cresswell | * *“Employs Statistical procedures”* * *“Test or verifies theories or explanations”* * *“Identifies Variables to study”* |

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| Title C | Analysis of the predictive qualities of betting odds and FIFA World Ranking:  evidence from the 2006, 2010 and 2014 Football World Cups |
| Authors | Fabian Wunderlich & Daniel Memmert |
| Research Methodology | Quantitative |
| Objectives | * Identify which of the means (Odds / FIFA world ranking) has the best predictive qualities. |
| Implications | * Both means have reliable predictive qualities * Odds have better predictive qualities than ranking |
| Findings | * Predictive quality of the world ranking has increased since calculation method was altered after the 2006 World Cup. * World ranking outperformed odds in predictive quality. |
| Conclusion | * Despite the results obtained further study should be done as data is quite limited and only expands after every world cup. |
| Research Methods Used | * Model – Free Prediction where value is predicted without a concrete model |
| Cresswell | * *“Uses Unbiased Approaches”* * *“Observes and measures information numerically”* |

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| Title D | Football Match Results Prediction Using Artificial Neural Networks; The Case of Iran Pro League |
| Authors | S. Mohammad Arabzad, M.E. Tayebi Araghi, S.Sadi-Nezhad & Nooshin Ghofrani |
| Research Methodology | Quantitative |
| Objectives | * Predicted results with the use of an Artificial Neural Network |
| Implications | * By training the ANN with data gathered from prior seasons, Correct predictions can be made on matches included in study |
| Findings | * In most cases the home team is predicted to outscore the away team * None of the matches were predicted to end up in a draw * ANN correctly predicted the winner of the league and teams to be relegated |
| Conclusion | * ANN can predict results and standings (5 out of 6 teams were placed correctly whether in relegation or top 3 zone) * It is difficult even for sport experts to predict results as there are many factors that affect the result |
| Research Methods Used | * Artificial Neural Networks |
| Cresswell | * *“Identifies Variables to study”* * *“Test or verifies theories or explanations”* |

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| Title E | Efficiency in betting markets: evidence from english football |
| Authors | Bruno Deschamps and Olivier Gergaud |
| Research Methodology | Quantitative |
| Objectives | * Find any inefficiencies within the betting markets specific to within English football |
| Implications | * Determine whether betting market is inefficient (Bettors can take advantage and have consistent positive returns) * Biases exist that allow those who bet to yield constant positive returns |
| Findings | * Although betting strategies that generate abnormal returns exist, none of them are profitable * Draw biases exist – Draw odds return higher winnings than home or away draw * Longshot bias is present for both home and away matches |
| Conclusion | * Market is slightly inefficient – although no positive returns were produced, there are multiple strategies that yield abnormal returns. |
| Research Methods Used | * Over-round 𝞴 - difference between the sum of the inverse of the odds and one * Implicit probability |
| Cresswell | * *“Uses Unbiased Approaches”* * *“Observes and measures information numerically”* |

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| Title F | Profiting from arbitrage and odds biases of the European football gambling market |
| Authors | Anthony. C. Constantinou & Norman E. Fenton |
| Research Methodology | Quantitative |
| Objectives | * Determine whether betting market is inefficient (Bettors can take advantage and have consistent positive returns) |
| Implications | * Market is not efficient – Strategies exists or can be made were constant winnings are possible. |
| Findings | * Reduction in profit margin is stronger in recent seasons (2009/10 onwards) * Lower divisions suffer from increased profit margins * Accuracy of odds between bookmakers is extremely consistent * Arbitrage size per match has increased and is more common when moving towards the season 2011/12 * No increase in accuracy has been spotted within the 7 seasons and 14 leagues included in study |
| Conclusion | * Market is not entirely efficient – The use of modern-day technology that perform automated analysis has made it possible to spot real time arbitrage opportunities thus punter can yield a better profit. This can harm bookmakers in the future. |
| Research Methods Used | * Rank Probability Score * Biases were tested out by simulating £1 bets on relevant odds and compare the respective cumulative/final returns |
| Cresswell | * *“Test or verifies theories or explanations”* * *“Employs Statistical procedures”* |

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| Title G | Modelling football match results and the efficiency of fixed-odds betting |
| Authors | John Goddard and Ioannis Asimakopoulos |
| Research Methodology | Quantitative |
| Objectives | * Correct prediction of match results * Identify strategies that have a constant positive return |
| Implications | * Using historical data can be used to create profitable betting strategies |
| Findings | * Multiple factors such as geographic distance between home and away teams, big team effect and involvement in cup competition contribute to model’s performance * Negative returns of between about 10% and 12% reflect the size of the bookmakers’ margins * A strategy where only bets appearing in the top 15% of the expected returns were included have produced positive return of at least 4% in all seasons in the data set. |
| Conclusion | * Market is weak-form efficient |
| Research Methods Used | * Ordered Probit Regression Model |
| Cresswell | * *“Identifies Variables to study”* * *“Employs Statistical procedures”* |

# Comparisons

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| *Paper 1* | *Paper 2* | *Comparisons* |
| *Online bookmakers’ odds as forecasts: The case of European*  *soccer leagues (Štrumbelj and Šikonja, 2010)* | *Profiting from arbitrage and odds biases of the European football gambling market (Constantinou and Fenton, 2013)* | *Both papers use two means to arrive to the objectives set. A common method used within these papers in is Ranked Probability score. The (Štrumbelj and Šikonja, 2010) then use Brier score while the second simulate £1 bets to collect results. Although using a common method these papers have a disagreement within the findings. (Štrumbelj and Šikonja, 2010) suggest that the predictive ability of odds has increased over the years while (Constantinou and Fenton, 2013) state that no improvement was monitored. The first paper also notes how the predictive ability of odds is not the same in every league.* |
| *Profiting from arbitrage and odds biases of the European football gambling market (Constantinou and Fenton, 2013)* | *Modelling football match results and the efficiency of fixed-odds betting (Goddard and Asimakopoulos, 2003)* | *Although using different techniques (Constantinou and Fenton, 2013) and (Goddard and Asimakopoulos, 2003) both papers use statistical approaches and have somewhat the same objectives of finding inefficiencies within the betting market. (Goddard and Asimakopoulos, 2003) use an ordered probit regression model to obtain their results. (Goddard and Asimakopoulos, 2003) conclude that the market is weak-form efficient (past odds cannot be used to predict future results).* |
| *Football Match Results Prediction Using Artificial Neural Networks; The Case of Iran Pro League (S. Mohammad Arabzad et al. 2014)* | *Analysis of the predictive qualities of betting odds and FIFA World Ranking:*  *evidence from the 2006, 2010 and 2014 Football World Cups (Wunderlich and Memmert, 2016)* | *While most papers tackle europe’s top leagues and predictive quality of odds alone (Wunderlich and Memmert, 2016) and (S. Mohammad Arabzad et al. 2014) are somewhat different. The former tackle the most prestigious international football competition there is, the FIFA World cup. Competition aside (Wunderlich and Memmert, 2016) are the only ones to tackle the predictive quality of something other than odds. (S. Mohammad Arabzad et al. 2014) tackle the highest division of Iranian football. Both use computational means to obtain results. While (S. Mohammad Arabzad et al. 2014) uses a machine learning algorithm (an artificial Neural network) to obtain the needed results, (Wunderlich and Memmert, 2016) use a model-free prediction (A prime example of such is a monte carlo-algorithm). (Wunderlich and Memmert, 2016) Highlight how FIFA World Rankings performed better than odds to predict results in the context of international matches. (S. Mohammad Arabzad et al. 2014)* |
| *The Favourite‐Longshot Bias and Market Efficiency in UK Football betting (Cain, Law and Peel, 2000).* | *Efficiency in betting markets: evidence from english football*  *(Deschamps & Gergaud, 2007)* | *Both (Cain, Law and Peel, 2000) and (Deschamps & Gergaud, 2007) base their studies specifically on market efficiency within English Football. While and (Deschamps & Gergaud, 2007) use the difference between the sum of the inverse of the odds and one and Implicit probability to obtain results, (Cain, Law and Peel, 2000) use Poisson Regression and Negative Binomial regression. These studies are set 7 years apart however, they both highlight how the market is inefficient meaning that no improvement was made within the market. Both highlight biases, the study conducted by (Cain, Law and Peel, 2000) is the only one to mention the existence of a draw biases and that longshot bias is applicable both for home and away teams.* |

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