Analysing and Modeling Inefficiencies
in the Sports Betting Market

Masterarbeit

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1 Introduction

The sports betting market has grown immensely over the past few years and has evolved into a highly competitive global industry. Its total value is estimated to be around 700 billion $ and 1000 billion $.[1] Betting systems, with the purpose of beating the market, are in constant development. It is important to highlight the differences between betting and gambling.

While gamblers rely purely on luck in order to win, other variables, such as knowledge and information are of great importance in being successful in betting. With the help of research and statistical analysis, professional bettors try to make the right predictions. It is one thing to get the right picks one or two weeks in a row and it's another thing to win more than 50% of the sports bets over the course of a season. Few sports bettors are able to do the latter. The legendary investor, Warren Buffet, said: "invest in what you know"; I don't know the sports market well enough to claim that my predictions can have the edge over the market in the long run. Instead, this thesis takes another approach to this matter, where forecasting skills don't come into play.

This analysis involves an empirical experiment which was conducted with the motivation that sports events are quoted inefficiently and that arbitrage possibilities exist in the sports betting market. The experiment is based on a unique dataset which consists of 704 betting contracts from various sports leagues. A direct violation of the *law of one price* is found; homogenous goods are priced differently which creates an opportunity for riskless profit through arbitrage. The focus of the experiment is the exploitation of these inefficiencies and the determination of its upper boundaries.

Section 2 makes a general analysis of the sports betting market and introduces its participants and betting products. Section 3 identifies similarities to financial markets. They can be considered as an upgraded form of the sports betting market which makes it easier to spot its weaknesses in the market organization. Based on the literature, objectives for future development in the sports market are proposed and bets are

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[1] Statistics and facts about sports betting. http://www.statista.com/topics/1740/sports-betting/m. Last seen on 27.04.2016

introduced as financial derivatives. In addition, Section 4 focuses on the *theory of efficient markets*. It describes the types of efficiency and the conditions required for it to hold. Behavioral biases and arbitrage opportunities are presented as inefficiency drivers in the sports betting market. Fama (1970) laid down the groundwork for academic studies to undertake efficiency tests. Section 4 concludes with a summary of results from studies that have tested efficiency in the sports betting market. In Section 5 the methodology and data collection process of the experiment are discussed in detail. Finally, Section 6 presents the results and possibilities for future research and Section 7 concludes.

2 Analysis of the Sports Betting Market

2.1 The Bookmaker

Bookmakers serve as the classic distribution platform and provide liquidity in the sports market. They announce odds on future sports events at which they are willing to accept bets. In this thesis the terms "odds/quotes" and "price" are used interchangeably, since by price is meant the reciprocal of the odds/quotes. Bettors place money on the outcome they believe will happen in a certain sports event. If they win, they receive the amount of money they invested multiplied by the odds. This can be made clear via a concrete example.
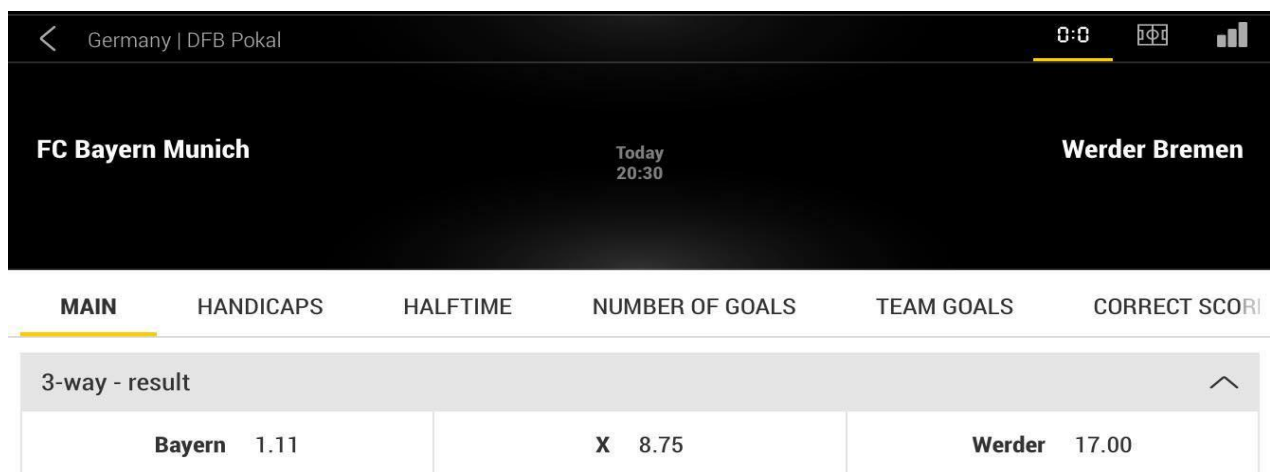

Figure 1: The quotes of Bwin for the match FC Bayern Munich vs Werder Bremen.

Figure 1 shows how Bwin quotes the semifinal of the DFB – Cup between Bayern Munich and Werder Bremen. Wagering 10€ has a potential return of:

allows for a 'clean' betting profile and decreases the risk of being limited. In pre-match arbitrage, being picky at choosing leagues and sports can be time-consuming. However, over the course of this experiment the betting activity was not 'clean' and betting accounts were limited only at two bookmakers, Winner and Marathonbet.

7 Conclusions

This thesis examines inefficiency issues in the sports betting market. The dataset contains a unique set of 704 bets that was acquired by following two betting strategies. The first one is the central part of the empirical experiment and focuses on exploiting pre-match arbitrage opportunities. A sample of 684 arbitrage bets, with an AAR of 0.8% yielded a return on investment of 10,8%. The mistakes that happened due to inexperience and were removed from the sample and it lead to a MFAR of 1,83%. In this case, the return on investment increased to 20,58%.

A distinction is made between soft and sharp bookmakers depending on the business strategy they follow and based on the experience with their services. The latter ones are keen on having arbitrageurs as their customers and set higher maximal stakes. The objective of their odd-setting approach is to publish efficient odds which explains why in the end, the balance at them was negative. If a market is efficient it cannot be beaten in the long run.

Soft bookmakers attract a specific type of bettor through advertising and bonus offers. They know the betting profile of their customers and segment the customers based on it. According to Franck et al. (2013), they intentionally offer inefficient odds for marketing purposes and in order to target individuals with behavioral biases. Soft bookmakers are one of the triggers of arbitrage opportunities, which in turn, are a confirmation of inefficiency in the sports betting market.

Betting exchanges were introduced as a new emerging betting platform where customers can bet against each other. This modern type of betting offers more efficient odds that come as a result of a continuous matching of supply and demand. Matchbook, a sports betting exchange, was intensively used in the second betting strategy. The objective of this strategy was to collect a bonus from a soft bookmaker. A bet was bought at the

bookmaker and the same bet line was laid at the exchange. The costs of this strategy were 25,88€ and the net profit was 74,22€. During the second strategy shortcomings in liquidity of the betting exchange were identified. It can be concluded that only once they reach a certain maturity, are they able to fully outperform bookmakers. Matchbook is relatively new compared to the big exchange players Betfair, Betdaq and Smarkets.

In order to attain some conclusions about upper boundaries of exploiting arbitrage in the sports market, the first betting strategy was simulated with a 14.720€ capital. This resulted in a 17,98% return on investment using the AAR and 44,17% using the MFAR. Return from arbitrage opportunities would be even higher but inefficiency in the sports market is artificially disguised through discrimination against skilled bettors.

From the high frequency of arbitrage opportunities and the positive actual average return, we can conclude that real profits can be made from engaging in arbitrage bets. These results provide evidence that the sports betting market is inefficient. Future research can lay its focus on analysing inefficiencies in the live betting market.