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**Article**

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Weekly Report

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# Weekly Report

## Money Predicted Spain as Football World Champion

*Historically, football<sup>1</sup> experts' predictions<sup>2</sup> were the only method of predicting the outcomes of championships. Former players, coaches, and nearly all fans have tried their hand at it. And most of these predictions were wrong, since subjective desires and prevailing public opinions always played a major role. In the meantime, however, reliable methods are being used to make scientific predictions. And the methods utilized are becoming more and more complex.<sup>3</sup>*

The question of how best to predict the outcome of the World Cup in modern football—a highly commercialized sport worldwide—is much easier to answer than sports fans may want to hear, given their desire to believe in the unpredictability of the game and the possibility of surprise upsets. But especially in the case of the World Cup, a team's overall skill level is basically nothing more than the sum of the skill levels of its individual players and coach. At the World Cup, national teams take the field that are not nearly as experienced and attuned to playing together as the club teams are: in the age of globalization, national team players are scattered around the world playing for different clubs far away from home. Therefore, the team with the best chances of winning is simply the one with the best individual players and the best coaching staff. While this simple calculation does not entirely do justice to the realities of team sports, which also rely on the interactions among players, it is easy to see that a forecast based on the players' individual skill levels is highly plausible. This forecasting method is convincing above all in its simplicity; at the same time, it fully utilizes expert knowledge about the players' skill levels and market value.

### Market value method

How does one determine the skill levels of the individual players? Football today is a highly efficient market in which players' past, present, and particularly future

<sup>1</sup> We use the British term "football" rather than the American "soccer".

<sup>2</sup> The former coach of the German team, Rudi Völler, points particularly to "gurus and ex-gurus" who slip into the role of experts.

<sup>3</sup> Jürgen Gerhards and Gert G. Wagner, "Marktwert gegen Zufall – Wer wird Fußball-Europameister?" in *Wochenbericht des DIW Berlin* 75, No. 24 (2008), 326-328, here: 326-27.

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skill levels are revealed in the form of the prices teams pay to “buy” the players. It used to be different when there were players who could not or did not want to play abroad and when football leagues had more restrictive rules limiting foreign players. But football has become a more and more global sport. There are well-known Latin American, African, and Asian players, many of whom play for European clubs. Today, players tend to go wherever they can earn the most money. And since this is a globalized market, transfer value tends to be an accurate reflection of the athletic performance of the individual players, and indeed of entire teams.

Of course, one can argue interminably about what constitutes the exact market, or transfer, value. It is only partially observable: a player’s transfer value can be determined only when a transfer actually takes place, that is, when a player is “sold.” But experts know the transfer value fairly well. Before the World Cup started, the website [www.transfermarkt.de](http://www.transfermarkt.de), regarded as a serious source by leading sports economists, presented the picture described in the following (which, however, does not take coaches or coaching staff into account).

As of late May 2010, the Spanish team had a total transfer value of an incredible 650 million euros (see Table 1). Although the world’s most sought-after player, Lionel Messi, did not play for the Spanish but for the Argentinean team, Spain had four of the ten most valued players in the world—Xavi, Iniesta, Fábregas, and Torres. Occupying second place in the table and at some distance behind Spain was England, with a market value of 540 million euros. The world’s two most expensive teams were followed by a group with market values ranging between 390 and 350 million euros; these were the famed French, Brazilian, Argentinean, and Italian national teams. With Ballack’s injury, the German team’s market value had declined significantly to 308 million. The host country, South Africa, occupied the third-to-last place with a market value of 32 million euros: for them, the motto was undoubtedly that “being there is everything,” since they had no real chance of winning the title.

And in fact, the team predicted by the market value method to win the 2010 World Cup—Spain—did indeed win. Furthermore, this method correctly predicted the last European Championships in 2008 as well.<sup>4</sup> Spain had the most expensive team going in and actually did win the title. The market value method also accurately predicted the outcome of the

2006 World Championship: Brazil and Italy were the most expensive teams, and in fact, Italy won.<sup>5</sup>

Furthermore, this method predicted the teams that made it to the quarter-finals in 2006 fairly well: of the eight quarter-finalists, six were in the transfer market value list of the top eight. And out of the top ten by transfer market value, seven reached the quarter-finals. In the semi-finals, this method correctly predicted three out of four teams—the exception being the German team, which had a fairytale summer season behind it and was able to benefit from its home advantage. But the idea that “money shoots goals”—that the quality of the individual players ultimately decides the game’s outcome—was clearly evident in the semi-finals between Italy and Germany: in the 118th minute, when Klinsmann’s men were reaching their personal limits and couldn’t give any more, a back-heel shot by Andrea Pirlo decided the game. The Italians simply had more high-potential players on their squad. That, too, proved to be the downfall of the French team in the final.

Apparently, the forecasts for 2010 were not nearly as accurate. The teams that made it to the quarter-finals were not the eight at the top of the transfer market value table, but only four of those. And only one of the top four made it to the semi-finals. There was only one of the two top teams in the finals, but this was Spain, which topped the list by a wide margin and did in fact become World Champion as predicted. But without a doubt, chance played a major role in South Africa as well.

### The role of chance in football

Only the total commercialization of football will generate new potential for big surprises: it will create a setting in which national teams are more or less equally strong because all the players are playing in the world’s top leagues, which are in turn equally strong because of the players’ global mobility. Then, exceptional individual skills—that is, rare cases that cannot be planned or trained for—will become decisive. But football has not yet reached that point: the differences in transfer market value between teams are huge (see Table 1 above).

The transfer market value of the players and the teams is a value that is simply estimated by experts. Furthermore, markets do not function perfectly, and the market can make mistakes regarding a player’s skill level. So even if the exact market values of

<sup>4</sup> Jürgen Gerhards and Gert G. Wagner, “Geld besiegt Zufall,” *Der Tagesspiegel*, June 8, 2008, 19.

<sup>5</sup> Jürgen Gerhards and Gert G. Wagner, “So wird man Weltmeister,” *11 Freunde – Das WM-Magazin des Tagesspiegel*, (June 21, 2006), 12.

all the players and teams were known, predictions based on them would still be inexact.

Chance plays a much stronger role in football than in other sports like basketball, handball, and tennis, often even determining who goes home with the coveted trophy in hand. And there are systemic reasons for the crucial role of chance in football. First of all, very few points are actually scored in this game, so even a single goal can mean victory, while a mistake by the referee or a ball that skids unpredictably off wet turf can decide the game in the other team's favor. Furthermore, the probability that any given shot at the goal will go into the net is quite small in football compared to other sports. You need a particular, sometimes even chance constellation of offensive moves and maneuvers for a shot to actually land in the goal. Basketball is completely different. The Premier League winner in 2010, Chelsea London, shot 103 goals during the whole season, while a basketball team sometimes scores more points in a single game. It can be proven that in sports like basketball or handball, the nominally weaker team wins less frequently. But in football—according to a statistician from the Los Alamos National Laboratory—almost 50 percent of the games are won by the weaker team, that is, the team with the lower market value.<sup>6</sup> In tennis, on the other hand—where, in a good game, a player needs approximately 100 points to win the match—the better player almost always wins. In tennis, the outcome is uncertain and the game is exciting only when two approximately equally good players take the court against each other.

### Predictions for the 2010 FIFA World Cup

Prior to the 2010 World Cup, a number of scientific predictions were made based on much more complicated methods than the market value method proposed here. We provide just a brief overview of these. What they all share in common is the attempt to determine a team's skill levels better than we are able to do based on market values. No method, however, can systematically predict the role of chance in detail.<sup>7</sup>

<sup>6</sup>Ben-Naim, E., et al.: Randomness in Competitions (Los Alamos, Texas, USA), <http://cnls.lanl.gov/~ebn/talks/sports-mich.pdf>.

<sup>7</sup> Our overview does not take into account the predictions of "Pulpo Paul," the octopus that impressively predicted every World Cup game involving Germany as well as the outcome of the World Cup final and thus obviously analyzed the influence of chance correctly. It is unclear whether his success is the result of pure chance or the expert knowledge of his zookeepers, who may have influenced his astonishingly accurate predictions in a non-transparent way (see Max Chrambach, "Follow the money, not the octopus," Reuters Africa, July 15, 2010: <http://af.reuters.com/article/oddyEnoughNews/idAFTRE66C3ZE20100713>, and "The Oracle of Oberhausen – 'Pulpo Paul' Predicts Spanish Victory in

Table 1

### Transfer market values of the national football teams in 2010

In Millionen Euro

	Ø Market value	Total value
Spain	28.26	650
England	18.05	542
Argentina	12.94	388
Italy	13.46	377
France	15.98	368
Brazil	15.35	353
Germany	12.37	308
Portugal	11.98	292
Netherlands	10.04	271
Ivory Coast	6.63	199
Serbia	7.96	191
Cameroon	5.07	152
Uruguay	5.28	137
Nigeria	4.43	133
Switzerland	4.49	103
Ghana	3.44	103
Greece	3.36	101
Denmark	3.28	99
Mexico	3.71	89
Slovakia	3.03	88
Paraguay	2.68	80
Chile	3.33	80
Australia	2.46	76
Japan	3.17	73
USA	2.06	62
South Korea	1.74	52
Algeria	2.07	52
Honduras	1.62	49
Slovenia	1.69	47
South Africa	1.12	32
New Zealand	0.56	13
North Korea	0.42	10

Source: [www.transfermarkt.de/de/weltmeisterschaft-2010/teilnehmer/pokalwettbewerb\\_WM10.html](http://www.transfermarkt.de/de/weltmeisterschaft-2010/teilnehmer/pokalwettbewerb_WM10.html).

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At 650 million euros, the Spanish team had the highest transfer value of all World Cup teams.

The football betting industry, which is now organized at a global level, apparently shares a similar view (see Table 2): Spain, Brazil, and England were the favorites at the top of the betting markets. Thus, winnings were low for anyone betting on these teams, while one could theoretically have gotten rich betting on Algeria or South Africa. The fact that two simple forecasting methods like betting odds and the market value method came to similar results is not surprising since a great deal of information is used to calculate betting odds. Apparently this information also includes the players' market values. In the quarter-final, the betting odds did slightly better than the market value approach: five of the eight quarter-

World Cup", SPIEGEL online, July 9, 2010: <http://www.spiegel.de/international/zeitgeist/0,1518,705573,00.html>. Source: <http://www.welt.de/finanzen/article7742653/Boerse-kuert-Spanien-zum-Favoriten-bei-Fussball-WM.html> (accessed May 22, 2010).

Table 2

**Bets placed on sports betting exchanges (certificates)**

In Prozent

	Odds
Spain	394
Brazil	464
England	610
Argentina	720
Netherlands	1 135
Germany	1 158
Italy	1 377
France	1 823
Ivory Coast	3 179
Ghana	7 253
Cameroon	11 948
Nigeria	14 186
South Africa	15 285
Algeria	33 233

Quelle: [www.welt.de/finanzen/article7742653/Boerse-kuert-Spanien-zum-Favoriten-bei-Fussball-WM.html](http://www.welt.de/finanzen/article7742653/Boerse-kuert-Spanien-zum-Favoriten-bei-Fussball-WM.html).

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*Bets on Spain* to win the World Cup had the lowest betting odds, at 394 percent.

finalists were at the top of the odds table. However: as with the market value method, in the semi-final there was only one out of the four top teams from the odds table. And in the final, both methods predicted just one team. The right one: Spain.

The team of the German-based DekaBank Makro Research arrived at very similar results using much more elaborate methods.<sup>8</sup> Based on the skill levels of the teams playing in the last World Cup and the so-called Elo Ratings, which take into account all recent match results to determine a team's strength relative to its competitors,<sup>9</sup> DekaBank Makro Research simulated the results of the upcoming World Cup championships. The outcome was a final pitting Brazil against Spain, with Brazil as the new World Champion. It should be kept in mind, of course, that the Elo Ratings and the players' market values are strongly correlated. This indicates that using market value directly is a highly efficient forecasting method.

The DekaBank team also used the well-known "Delphi method" to make expert predictions: the members of the Makro Research team acted as experts, making predictions on each individual game. Their results were identical to those generated by computer: in this scenario, Brazil would have faced off against Spain in the final to win the World Cup.

<sup>8</sup> Makro Research der DekaBank – Deutsche Girozentrale, "Ein Drittel? Nee, mindestens ein Viertel" – Deutschlands wahre Chancen beim Cup der guten Hoffnung, Frankfurt (2010).

<sup>9</sup> <http://www.eloratings.net/world.html>.

The Europe Equity Research team of J. P. Morgan came to a very similar conclusion.<sup>10</sup>

In a simulation based on the so-called Quant Model, J.P. Morgan used the teams' FIFA rankings as well as past match results, the J.P. Morgan "Team Strength Indicator" (which is not based on intersubjectively verifiable expert knowledge), and finally, the players' market values. In J.P. Morgan's computer-simulated FIFA World Cup, Spain faced England in the final, and England won the Cup, with the Dutch team taking third.

Using an almost unfathomable mix of empirical analyses that included probably spurious correlations like "percentage of Catholics in the population and football success," and with the explicitly stated aim of being "holistic" ("The whole is more the sum of its shining stars"), a group of political scientists from Tübingen predicted Brazil to win the Cup. According to their forecast, the German team would have taken second ahead of France and Italy.<sup>11</sup>

The market value method proposed here arrives at very similar results to the other methods, but with significantly less complex instrumentation. In addition, we believe that this method is more reliable, since market values reflect current abilities of players, whereas all the simulation methods rely to a much greater extent on past results.

The Chief Economist at the UniCredit Group in Germany refined our approach to look not just at the overall strength of a team based on the total market value of its players but also at the distribution of market values, and especially the important role of chance—for example, due to an injury of the best player on the team.<sup>12</sup> The results showed that, for example, the loss of a player like Samuel Eto'o would have lessened the worth of a secret favorite like Cameroon by 30%. For Portugal, a Ronaldo injury would have had a significant negative impact at 26%, and the case would have been similar for Argentina with the loss of Messi (23%). The lower percentages for the English (-12%), Italian (-12%), Spanish (-10%), and German (-9%) teams indicate that they were much more homogeneous in skill levels. On the basis of this more sophisticated market value model, UniCredit predicted Spain as

<sup>10</sup> See Matthew Burgess und Marco Dion, England to Win the World Cup! A Quantitative Guide to the 2010 World Cup. European Equity Research, May 18, 2010 (J.P. Morgan).

<sup>11</sup> Volquart Stoy, Rolf Frankenberger, Daniel Buhr, Lisa Haug, Benedikt Springer, Josef Schmid, "Das Ganze ist mehr als die Summe seiner Lichtgestalten – Eine ganzheitliche Analyse der Erfolgchancen bei der Fußballweltmeisterschaft 2010," WiP Working paper 46. Tübingen 2010.

<sup>12</sup> Andreas Rees, "Wer wird Fußballweltmeister? Eine ökonomische Analyse," Hamburg 2010 (<http://www.dasinvestment.com/pdf.php?id=7718>).

the winner of the World Cup.<sup>13</sup> The forecasts for the German team were exceptionally good: “With respect to the German team, we have to be realistic. Other countries have better individual players. One bullish factor for Germany is the favorable constellation between reward and risk. Germany has a homogeneous team and can better offset injuries and below-average performances by individual players than other countries (tournament team!). Reaching the semi-final is therefore within the realm of the possible.” Comparing all the forecasts, the pure market value method came to similar results as the more complicated procedures, but with much less effort—and in the end, the simplest method was right, and Spain won the FIFA World Cup.

Looking at the results of the last three major football championships (2006 and 2010 World Cup, 2008 European Cup) we see that chance has taken on increasing importance—not for the winner of the Cup but for the teams that placed second and below. The statistical correlation between the value of the individual teams and their actual performance at the championship was lower for the World Cup in South Africa than for the 2006 World Cup or the 2008 European Cup. The “rank correlation,” which shows the relationship between the market value table and performance at a championship like the World Cup, was 0.58 in 2006 and 0.49 in 2008. And this time it was just 0.40, although Spain—the favorite—won. If the Netherlands had won, the correlation between the market value and placement in the final ranking would have been just 0.31. But at the same time: if the goal that was not awarded to the England against Germany had been counted, the English team would have had a very real chance of winning. An important counter-goal just before the halftime break can turn a game around. And if England had reached the semi-finals, the value of the rank correlation would have been 0.42.

### Outlook for future research

On the whole, the remarkably parsimonious forecasting method developed at DIW Berlin in 2006 to predict the winner of a major football championship has been successful three times. And parsimony is a well-known quality criterion for scientific work. In the future, the market value method should, however, incorporate UniCredit’s improvement of including the overall distribution of the players’ market values.

<sup>13</sup> A more in-depth analysis by UniCredit of possible speculative distortions of transfer values in the Spanish and English premier leagues, in which they introduced a control variable in the form of the point system in the FIFA world rankings (past performance), produced the result that Spain was only marginally overvalued.

One further improvement should be tested in the future as well. The market value method takes solely the value of the players into account without considering the importance of the coach. But the coaching market is becoming more globalized as well; more and more national teams are being coached by people who come from a different country than the players. If this process continues, it will soon be possible to determine the value of the coaches better and to take their market value into account in the forecast. But even then, there is no guarantee of an accurate forecast.

The relatively weak connection that existed at the FIFA World Cup 2010 between the teams’ market value and their actual performance was partly the result of numerous mistakes by the referees. Since players and sports fans feel that such decisions are unjust, this development could provide a strong argument for FIFA to finally accept video evidence. Then, the better team will win more often.

On the other hand, one could also argue that because of the improved training methods and particularly the tactical training, the well-trained top teams can hardly ever slip up. The Spanish team’s exceptional level of training and discipline also contributed to their win in the final. Such wins always make the fans of the winning team happy, but they’re not good for football. The game only stays interesting if—every now and then—chance or the occasional mistake by a referee causes the favorites to stumble. This might be an argument not to permit video evidence.

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