

# Research Notes

## Economists' view: And the world champion is...

The question of who will be the next world champion is a topic of endless discussion among the countless fans of that "most beautiful game", football (or "soccer", if you will). Trading at betting shops is booming, and if you take their figures as a benchmark of the economic risk people are prepared to take, Brazil will beat England, Germany and Argentina into the top slot. Italy and France are hot tips according to those in the know.

« Economic analysis: neat tools applied to dirty data,  
Sport analysis: dirty tools applied to neat data. »  
Anonymous, 2006

Interestingly enough, this forecast does not match up with FIFA's rankings. Brazil is undeniably the world number 1, the number 2 spot is however occupied by the Czech Republic, ranked a respectable tenth by betting shops. FIFA's number 5 rank is held by the US, which occupies positions 15 to 20 if you follow the betting shop system. England is ninth in this world ranking and Germany... well, according to the FIFA list they are going to have a tough time getting through to the last sixteen. We, all of us self-proclaimed football experts, aren't quite at ease with the FIFA rankings. We would rather place our trust in the betting shops. As the internet's betting shops are almost entirely British, England has a certain "home bias" and a somewhat higher rating than perhaps deserved. From a subjective point of view we consider the fact that Brazil, Germany, Argentina, and Italy hold the top spots to be largely rational, despite the miserable performance of some of these teams. But is this also justified? To be able to answer this question positively, we need to draw on statistics and econometrics to provide us with a possible FIFA World Cup scenario.

### An exclusive club

FIFA World Cup winners make up a fairly exclusive club. While 2006 will see the hosting of the 18th FIFA World Cup, so far only seven countries have succeeded in lifting the cup. Three of which (Brazil, Germany and Italy) make up two thirds of all World Cup titleholders, and five (the previous three plus Argentina and Uruguay) almost 90%. Semi-finalists are also in a class of their own: 24 countries have so far managed to grab at least one of the 68 semi-final places on offer, with three of the above countries (Brazil, Germany and Italy) occupying 40% of all slots, and seven countries (the previous three plus Argentina, France, Sweden and Uruguay) so far taking up two thirds of all places in the penultimate round.

It is of course a great privilege to be able to take part in such a tournament. Seventy-five national squads have so far managed to make history by winning the 361 World Cup places. This is not as many as it seems though, as FIFA now has a membership of more than 205 national teams. A small elite has also arisen among participants in the FIFA World Cup. Brazil, Germany and Italy have managed to secure 13.9% (of a maximum 14.9%) of all starting places. Ten teams have snapped up 40% of all allocated places, and 25 some 75%.

### 1<sup>st</sup> round and probability to make it to the 2<sup>nd</sup> round

in %

|                   |    |                |    |
|-------------------|----|----------------|----|
| Group A           |    | Group E        |    |
| Germany           | 88 | Italy          | 72 |
| Poland            | 53 | Czech Republic | 63 |
| Costa Rica        | 32 | USA            | 52 |
| Ecuador           | 27 | Ghana          | 13 |
| Group B           |    | Group F        |    |
| England           | 74 | Brazil         | 75 |
| Sweden            | 66 | Croatia        | 56 |
| Paraguay          | 45 | Japan          | 36 |
| Trinidad & Tobago | 15 | Australia      | 32 |
| Group C           |    | Group G        |    |
| Argentina         | 65 | France         | 84 |
| Netherlands       | 61 | Switzerland    | 57 |
| Serbia & Mont.    | 47 | Korea Republic | 48 |
| Ivory Coast       | 27 | Togo           | 11 |
| Group D           |    | Group H        |    |
| Mexico            | 76 | Spain          | 84 |
| Portugal          | 61 | Ukraine        | 56 |
| Iran              | 48 | Tunisia        | 36 |
| Angola            | 15 | Saudi Arabia   | 25 |

**Bold** = qualified

**Bold orange** = hottest outsider

Source: UBS WMR



### Home turf often helps

Based on this assumption, not every country has the same chance of winning the World Cup – some have definite advantages. What's more, the home team has one definite advantage. Six of the seventeen FIFA World Cup titles so far have been won by the host country. If every participating team were to have the same chance, then the statistical likelihood of the host team winning 6 out of the 17 World cups would be a mere 0.0011% of all possible cases. To get a relevant result you need to allocate every host team a prior probability of 33% of winning "their" World Cup. The home advantage therefore gives Germany a definite edge in the competition.

A similar phenomenon is evident when considering the continent of the winning team. The traditional duel of Latin America against Europe, played out since 1930, is most probably set to continue into its eighteenth round at this year's FIFA World Cup. The Latin American nations are currently 9:8 ahead, with all FIFA World Cups ever held there won by one or other of them. European teams have so far won eight of the nine FIFA World Cup tournaments held in Europe. Brazil has won once in Europe (1958 in Sweden) and has also won the two FIFA World Cups held in "neutral territory" (1994 in the USA and 2002 in Japan/South Korea). We have therefore awarded a "Brazil bonus" in the final rounds.

### The economy hardly plays its part

In view of the sporting variables in force, no one socio-economic factor can be pinpointed in favour of one team winning. We have calculated various estimates from demographic data (population size to indicate the potential talent pool, average age of population, number of urban dwellers as a percentage of the total, birth rate etc.) and macroeconomic variables (GDP per capita, average growth in the last five years, inflation, unemployment rate etc.), with the result that neither one nor the other of the variables has a particularly noticeable effect on the result. This shouldn't really come as a surprise as it would be hard to identify a common socio-economic denominator for Brazil, Germany and Italy. Unfortunately, it is not possible to directly quantify the degree of "football craziness" in these countries.

### Football yesterday and today

As proposed above, an exclusive club of teams has formed as a result of the FIFA World Cup. This is not only subjectively evident; it also serves as a useful statistical tool. Two variables are relevant in almost all simulations: the number of FIFA World Cup participants and the number of qualifications for the semi-final.

These "historic" variables are joined by two of more recent origin. The first is the number of outstanding players in a team. We didn't of course calculate this variable ourselves, but left it to a seasoned expert by the name of Pelé. In 2004 he published his own list of the 120 best living footballer players. And 30 of these stars will be lining up at this year's FIFA World Cup. The second variable was the "Elo rating" of the teams in the March before each FIFA World Cup. In contrast with the FIFA ranking, which does not weight the teams' wins and losses, the Elo rating – named after the US-Hungarian physicist and chess player Arpad Elo – is used to assess chess masters and works on the principle that winning against Brazil is a greater achievement than beating Andorra, a home victory is worth less than an away win, an 8:0 win is worth more than a 1:0 victory, and qualifying for the World Cup counts more than a friendly match.

With the aid of a Probit model (an estimate used to express the probability of an event actually happening), the game plan of the FIFA World Cup was determined by specifying and assessing a new model for each round. For the first round (playing for the last 16 places) and the quarterfinals, the

data of all FIFA World Cups held since 1986 were included. For qualification for the semi-finals and finals as well as for the winner, the data of all FIFA World Cups held since 1970 were included. Besides the probability determined by the model, the results of direct encounters involving the 16 finalists in the last ten years were also taken into account. We gave this factor one third of the weighting, and the results of the model two thirds.

### Let's start with the first round

Table 1 lists the teams that have made it through the first round as well as all qualification probabilities and the five hot outsiders. Groups C (the "group of death"), D, E and G will be particularly interesting. Our model has worked successfully for between 13 and 15 of the last 16 from the previous five World Cups. The biggest surprises for the model to date were France's early exit in 2002 and Spain's in 1998, and the successes of Costa Rica and Cameroon in 1990 and Morocco in 1986 in making it to the last 16.

### Sudden death

For the 16 teams that survive the pre-liminary round, we have taken calculated probabilities from the preliminary round to ascertain who will win or come second in their group. Brazil, Spain, France and according to the model, Germany are more or less certain to go through. Due to their varying strengths, this procedure is not as conclusive for teams in the other groups. Figure 2 shows how the FIFA World Cup will continue after the first round.

- Our model has correctly predicted 70% of the winners of all quarter final matches of the previous five FIFA World Cups; 17.5% of other games were in the range of inexactitude, i.e. the relative probability for the winner was between 45% and 55%. Only 12.5% of the matches were incorrectly predicted. The greatest upsets for our model were the qualification of South Korea against Italy in 2002, which was astounding even when taking the home advantage into account, Senegal's win over Sweden in 2002, and Romania's victory against Argentina in 1994. According to our simulation, in 2006 only the "traditional" teams, i.e. six of the seven previous world champions (history matters!) along with Holland and Spain, will make it through to the exclusive last 16.
- Our method has correctly forecast 65% of all winners of the quarter final matches for the previous five World Cups. A further 10% were in the range of inexactitude, and 25% of results were incorrectly predicted. The largest errors produced by the model (and thus greatest performance of the winning teams) were the victory of Bulgaria against Germany in 1994, and Croatia against Germany in 1998, along with Brazil's ouster by France in 1986. As a result of this, the quarter finalists that will make the semi-finals are the most difficult to forecast. Only a win for Brazil against Spain seems to be a foregone conclusion at this year's FIFA World Cup. Germany-Argentina, Italy-France and Holland-England also appear to demonstrate similar predicted probabilities. We will however back the teams with the marginally higher probability, in this case Germany, France and England.
- Our method has correctly predicted 89% of all semi-final winners from the last nine FIFA World Cups. Only Argentina's win over Italy to reach the final in 1990 has to be recorded as an error by the model. It is however much easier to predict the finalists than the semi-finalists. If we've been right up until now (which probably isn't true), then Brazil will beat Holland and Italy will win against Argentina.

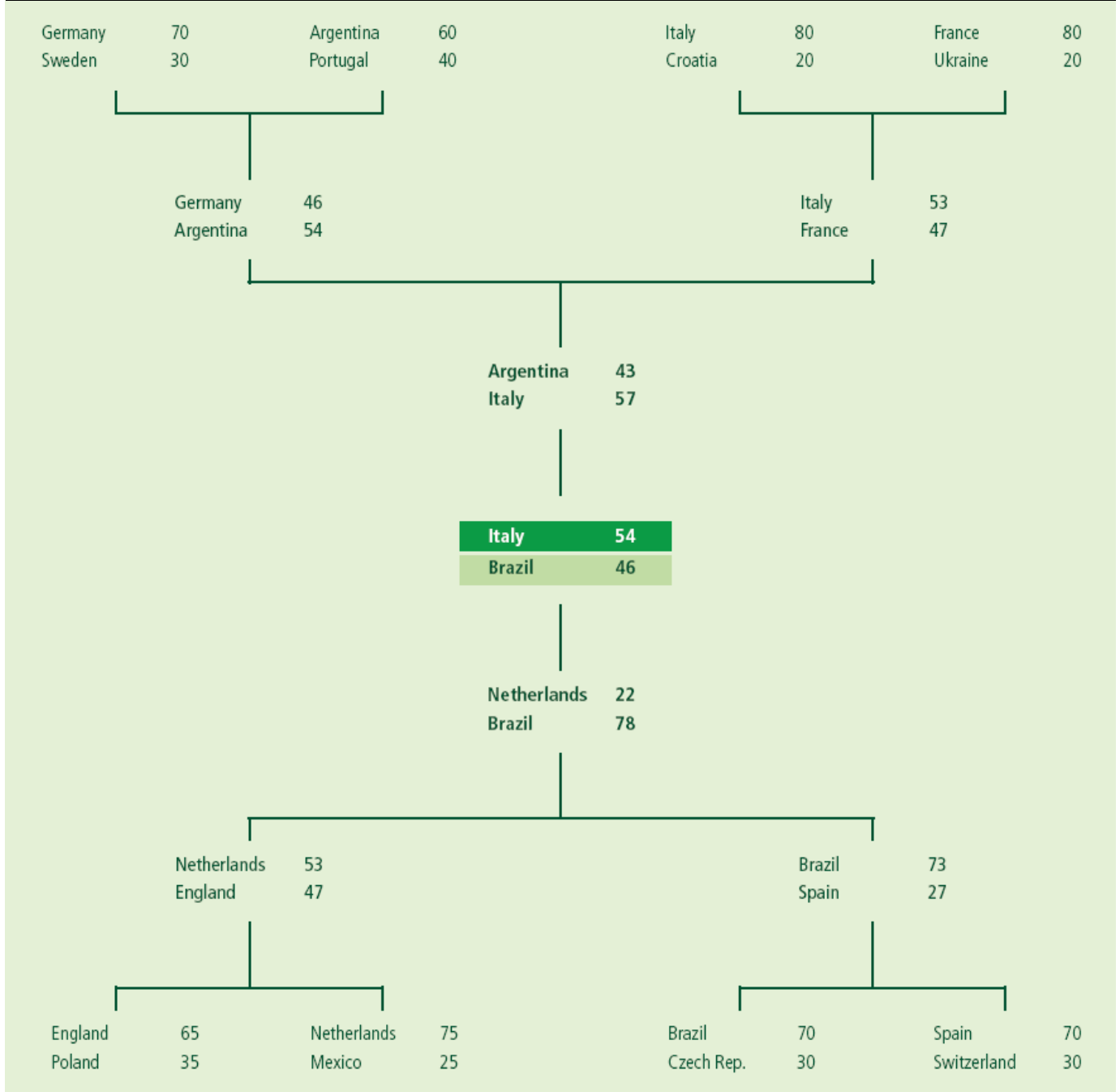
- Brazil or Italy? The Europeans and the Latin Americans have faced each other twice (in 1970 and 1994) in the final. However, our probability model speaks in favour of the Italians. Brazil is the only team to have won FIFA World Cups outside its home continent, but the home-continent factor easily tops the special "Brazil factor". So this means Italy will be world champions.

But wait a minute! How certain is such a forecast at the end of the day? When we follow Italy's route back to the first round, they only have a 9% chance of winning the FIFA World Cup. This is in fact three times more than 1/32, but it's still very low. This is of course where the charm of the tournament lies. To win the title remains an infrequent event full of excitement. At the end of the day, the Greeks can teach us a thing or two – and not their philosophers, but their football players, who succeeded in winning the European Championship in 2004 despite being apparent no-hopers according to this elaborate forecasting model.

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**2nd round and probability to win**

in %



Source: UBS WMR

## Appendix

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