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'HISTORICAL EXCELLENCE' IN FOOTBALL WORLD CUP TOURNAMENTS

EMPIRICAL EVIDENCE WITH DATA FROM 1930 TO 2002

Benno Torgler

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by

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Abstract: Most of the football papers that measure the international performances focus on the ranking system provided by the FIFA. Surprisingly, the World Cup per se has not been analyzed intensively. This paper as a novelty reports empirical evidence of international team performances in the World Cup tournaments between 1930 and 2002. The paper investigates to which extent economic, demographic, cultural and climatic factors have an impact on national teams' performances. Strong evidence is reported that nations with a stronger football tradition perform better.

JEL Classification codes: L830
Keywords: football, soccer, FIFA, culture

* Georgia State University, Andrew Young School of Policy Studies, Atlanta (USA), Center for Research in Economics, Management and the Arts (Switzerland). For advice and suggestions thanks are due to Doris Aebi. E-Mails: ecobtx@langate.gsu.edu, benno.torgler@unibas.ch.

I. INTRODUCTION

The economics of football is an area of research that has been receiving increased attention in the last few years. Fruitful insights have been generated analyzing, e.g., the commercial structure, the competitive balance or the uncertainty of the outcome (for a detailed overview see, e.g., Dobson and Goddard 2001). Changes in the rules also offer a new investigation ground. For example, the Bosman rule allowed to better observe migration tendencies of players. However, studies that go beyond the club level are rare (exemptions, see Hoffmann et al. 2002, Houston and Wilson 2002, Torgler 2004a, 2004b). Hoffmann et al. (2002) and Houston and Wilson (2002) analyzed what determinants have an impact on the success of national teams working with the *FIFA World Ranking*. However, the disadvantage is that the ranking system covers only eight years. The evaluation also started quite late (mid 1993), which reduces the possibility to go back in history till the beginnings. Our analysis is the first to go back to 1930, when the first World Cup was held. Furthermore, we will focus on teams' performance during the World Cup, not on their overall results. Thus, our dependent variable measures the *historical excellence* at the FIFA World Cup final tournament. Torgler (2004a) on the other hand takes only a look at the FIFA World Cup 2002. However, contrary to previous studies, the paper analyzes the determinants of success during a game. In another paper, Torgler (2004b) takes into consideration the growing recognition of women's effort and spectators' interest in women's football performance, and thus with the Women's World Ranking system (WWR) investigates the determinants of success.

The World Cup has become a great spectacle and one of the world's biggest sporting events, being broadcasted in 2002 in more than 200 countries and regions around the world, covering over 41'100 hours of programming and reaching an estimated 28.8 billion television viewers (see FIFA Media Information, November 21, 2002, http://fifaworldcup.yahoo.com). This enhances economists' interest to better understand the determinants of success. The paper thus investigates the determinants of *historical excellence*. The major aim is to check whether economic, demographic, climatic factors and especially football tradition have an impact on teams' performances. We will also see whether there is a consistency with previous studies. Section II presents the model and Section III the empirical findings. The paper finishes with some concluding remarks in Section IV.

II. MODEL

1. Dependent Variable

The dependent variable of our study is the performance of national teams during the World Cup tournaments between 1930 and 2002. Victories between 1930 and 1990 were awarded with two points, the ones between 1994 and 2002 with three points (change in the rules). *Table 1* presents the "all-time" World Cup Ranking table. It should be noticed that "Germany" means "West Germany" from 1954-1990, the united country before and after that. We also used England to represent the United Kingdom, as it is the largest UK nation. This procedure is in line with previous studies (see Hoffmann, Ging and Ramasamy 2002a and Torgler 2004b). Thus, Scotland, Wales, and Northern Ireland are excluded in the analysis and in *Table 1*, because several control variables such as, e.g., GDP per capita and population size are only available at the aggregated (UK) level. Furthermore, some data are not available for certain countries (North Korea, Iraq, East Indies, and Cuba). Thus, our sample covers 60 countries. It is interesting to mention that Brazil has been the only team that played in all 17 final tournaments.

Table 1

World Cup Final Tournament Ranking 1930-2002

TEAM	**POINTS**
Brazil	141
Germany	123
Italy	96
Argentina	72
England	61
Spain	54
France	49
Sweden	42
Russia	41
Yugoslavia	40
Uruguay	40
Netherlands	37
Poland	34
Hungary	33
Mexico	33
Belgium	30
Austria	28

Czech Republic	27
Romania	21
Chile	20
Denmark	18
Paraguay	18
South Korea	17
Cameroon	16
USA	16
Portugal	15
Switzerland	15
Turkey	15
Bulgaria	14
Croatia	13
Ireland Republic	12
Peru	11
Nigeria	9
Colombia	8
Costa Rica	8
Morocco	8
Senegal	8
Japan	7
Norway	7
South Africa	6
Algeria	5
Saudi Arabia	5
Tunisia	5
Iran	3
Jamaica	3
Ecuador	2
Egypt	2
Honduras	2
Israel	2
Australia	1
Bolivia	1
Kuwait	1
Canada	0
China PR	0
El Salvador	0
Greece	0
Haiti	0
New Zealand	0
Slovenia	0
UAE	0
Zaire	0

Notes: Not included in the table are Scotland (15 points), Wales (5 points), Northern Ireland (11 points), North Korea (3 points), Iraq (0 points), Cuba (3 points) and East Indies (0 points). Source: Brown and Morrison (2004, p. 748)

2. Independent Variables

Wealth/Development (proxy: GDP per capita)

In wealthier countries, people have the tendency to spend more time and resources on leisure activities such as, e.g., football (Houston and Wilson 2002). They have a better infrastructure (physical and organizational), a better access to equipments, and spare time (Houston and Wilson 2002, Hoffmann, Ging and Ramasamy 2002a). Young football talents can therefore be better fostered. However, previous studies on football (Houston and Wilson 2002, Hoffmann, Ging and Ramasamy 2002a) and Olympic Games (see Hoffmann, Ging and Ramasamy 2002b) have empirically found diminishing returns, which means that the success increases with per-capita wealth, but at a decreasing rate. Thus, we observe an inverted U-shape relationship. Hoffmann, Ging and Ramasamy (2002a) point out that football is a relatively capital-unintensive sport, which opens opportunities for children from under-privileged backgrounds. Furthermore, young talents in countries with a higher GDP per capita have more substitute leisure possibilities (e.g., more indoor activities such as electronic entertainments). This makes it relevant to consider a quadratic relationship between performance and the GDP per capita.

Potential Pool

Countries with a bigger population have a greater pool of potential football talents. Thus, a higher population increases the probability of having individuals with a higher ability to play football (see Houston and Wilson 2002, Hoffmann, Ging and Ramasamy 2002a). Houston and Wilson (2002) looking at football and Hoffmann, Ging and Ramasamy (2002b) focusing on Olympic Games found a positive correlation between success and the size of population. However, Hoffmann, Ging and Ramasamy (2002a) did not find that the size of a country's population has a significant impact on men's football performance. They argue that populous countries such as China, India, and the USA are not so successful in men's football. Torgler (2004b) on the other hand also found that the size of the population has a statistically significant impact on women's international performances.

Temperature as a restriction

Geographical conditions of a country might have a strong impact on teams' performances. Climatic extremes (very high or low temperatures) have a negative impact on outdoor sporting activities such as football. Thus, the incentive for young sporting talents to perform under these conditions decreases. Hoffmann, Ging and Ramasamy (2002b, p. 547) found that

the optimal average temperature for Olympic success is around 15° Celsius. The results indicate that climatic factors are significant. Hoffmann, Ging and Ramasamy (2002a) used the squared deviation from the 14-Celsius as a variable and found that the coefficient was statistically significant at the 10%-level. Both studies use the annual Celsius temperatures in capital cities. However, it might be relevant to use representative temperature values for the whole country, as Football is played everywhere and not only in the capital. Especially youngsters play in regional leagues. Furthermore, in many countries temperatures vary between regions. Thus, contrary to previous studies, we take representative country values (see Mitchell et al. 2003). To increase the representativeness of the data we use the averages for the years 1961 to 1990. This also takes into consideration that temperature affects potential talents over a longer period than one year. The study by Torgler (2004b) shows that temperature has an impact on team's success, but contrary to the study by Hoffmann, Ging and Ramasamy (2002b), the coefficient is negative. A higher temperature reduces the success of women's teams.

Football Tradition

One of the major variables that we are going to analyze is countries' football tradition. It can be argued that football tradition should have a positive impact on the performance. To check the robustness, we will use several proxies:

HOSTING A WORLD CUP TOURNAMENT

Hoffmann, Ging and Ramasamy (2002a) point out that most of the nations, which have hosted a tournament, have a strong football tradition. In 11 out of 17 World Cups, the host team was among the top four teams. The authors found that the variable is statistically significant at the 10% level. Similarly, Torgler (2004a) shows with data from the World Cup 2002 that being at home strongly increases the probability of winning the game, controlling in a multivariate analysis for additional factors. The findings of Torgler (2004b) also indicate that football tradition has a strong impact on the success of women's football teams. In general, hosting a World Cup is an indicator that a nation has a strong cultural affinity towards football (Hoffmann, Ging and Ramasamy 2002a). We will use a dummy variable (HOSTING IN THE PAST =1) to consider whether a nation has been a hosting nation.

JOINING THE FIFA

The popularity of football is different in each country that participates in the World Cup tournaments. This affects the time and resource spent for and the commitment towards football (Houston and Wilson 2002). The years a nation has been a FIFA member may be a good proxy for the degree of football tradition and thus the popularity of the sport. Countries such as Germany, France, Spain, the Netherlands, Italy, or England were among the first members of the FIFA (the first four 100 years ago, the last two one year later). However, Houston and Wilson (2002) found a positive correlation between this variable and the performance, but the coefficient was not statistically significant.

3. Model

Based on the previous subsection, the basic estimation equation reads as follows:

$$POINTS_i = \beta_0 + \beta_1 GDP_i + \beta_2 (GDP_i)^2 + \beta_3 POP_i + \beta_4 TEMP_i + \beta_4 TRAD_i + \varepsilon_i \qquad (1)$$

The variables are summarized in *Table 2*. The equation is estimated using the OLS technique. The control variables go back as far as possible. However, it was not possible to go farther back than the 60s with the best available data sources. Nevertheless, taking averages that cover more than 40 years should give a representative picture four each country.

Table 2

Empirical Variables

Variables	**Description**	**Source**
POINTS (DEP. V.)	Points made between 1930 and 2002	Brown and Morrison 2004
GDP PER CAPITA	GDP per capita (constant 1995 US$), AVERAGE YEARS 1960-2001	WDI 2003
POPULATION	Total population ages 15-64, AVERAGE YEARS 1960-2001	WDI 2003
TEMPERATURE	Representative country values, years 1961-1990	Mitchell et al. (2003)
HOST	Dummy variable (1=countries that have hosted a World Cup between 1930 and 2002)	FIFA homepage
YEARS FIFA	Number of years being a member of the FIFA (till 2002)	Goldblatt (2003)

III. EMPIRICAL RESULTS

Table 3 presents the results. We also estimate *beta* or *standardized* regression coefficients. This allows to compare the magnitude and thus helps to see the relative importance of the used variables. We first consider the football tradition proxies in two different estimations (see Eq. 1 and 2). Both coefficients are positive and statistically highly significant. However, HOSTING A WORLD CUP seems to have a stronger impact on team's performances than YEARS IN FIFA. The independent variables in Eq. 2 account for 45% of the variances in the points obtained during the tournaments, compared to 26% in Eq. 1. Subsequently, we present in Eq. 3 the result for a fuller specification. Eq. 3 has the obvious advantage of presenting a more balanced view of the role of different football traditional variables separating the effects of the independent variables. Because of a correlation (0.37) below the critical values, we can use these two sets of variables in the same estimation[1]. Both factors remain highly significant with a higher *beta value* for HOSTING A WORLD CUP. The strength of these two variables can also be investigated using a Wald-test for coefficient restrictions to test for *joint* significance. Not surprisingly, the *F*-statistic (10.5) and the corresponding *p*-value (0.0001) show that the null hypothesis is rejected at the 1% significance levels, which means that football tradition has a significant effect on a country's football performance during the tournaments.

TEMPERATURE is statistically not significant, and switches the sign in Eq. 2. Thus, it seems that the temperature of a country does not affect tournament performances. We also used the squared deviation from the 14-Celsius (proxy of Hoffmann, Ging and Ramasamy 2002a). However, contrary to their findings, the coefficient is not statistically significant either, but shows also a positive tendency.

The coefficient GDP PER CAPITA is positive and statistically significant. The results support the hypothesis that an increase in countries' wealth will enhance football performances. However, the second-order effect of wealth is negative and statistically significant. Thus, in line with previous studies we observe diminishing marginal returns. An increase in wealth, which should go in line with an increase in available time and resources dedicated to football, is likely to yield progressively smaller returns of success. The relationship between success and wealth is quadratic and best described as an inverted U-

[1] There is no fixed rule on how highly correlated two variables have to be before multicollinearity becomes a problem. However, Allison (1999) points out that values above 0.80 almost certainly are problematic, but there may be difficulties that appear below that value.

shape. This brings up the interesting question about the optimal level of wealth. In our study the optimal level is 18'980 US$ per capita. Belgium, France and the Netherlands are the countries closest to this optimal level, followed by other Western European and the Northern American countries (Canada and USA)[2].

Table 3

Determinants of Performances

Dep. Var.: Points	**Coeff.**	***Beta***	**t-value**	**Coeff.**	***Beta***	**t-value**	**Coeff.**	***Beta***	**t-value**
	Eq. 1			**Eq. 2**			**Eq. 3**		
a) Football Tradition									
YEARS IN FIFA	0.590***	0.508	3.31				0.352***	0.304	3.20
HOSTED A WORLD CUP				42.927***	0.654	3.74	36.998***	0.563	3.53
b) Restrictions									
TEMPERATURE	0.464	0.132	0.69	-0.259	-0.074	-0.58	0.227	0.065	0.44
c) Wealth/Development									
GDP per capita	0.002**	0.608	2.22	0.001*	0.396	1.69	0.001*	0.414	1.92
(GDP per capita)^2	-6E-08**	-0.571	-2.29	-5E-08**	-0.507	-2.38	-5E-08***	-0.539	-2.79
d) Potential Pool									
POPULATION	10E-09	0.044	0.36	-4E-09	-0.020	-0.28	-2E-09	-0.009	-0.13
Number of observations	60			60			60		
Prob > F	0.000			0.000			0.000		
R-squared	0.260			0.445			0.503		

Notes: Robust standard errors. In the reference group is NOT HAVING HOSTED A WORLD CUP. Significance levels: * 0.05 < p < 0.10, ** 0.01< p < 0.05, *** p < 0.01.

Eq. 1 to 3 indicate that the coefficient of POPULATION is not statistically significant. This is not a surprise, given the strong performances of countries with a small population size such as Belgium, The Netherlands, Sweden, or Portugal. However, it may be worthwhile to interact POPULATION with a cultural variable, as Hoffmann, Ging and Ramasamy (2002a) did. They found that the culture variable *Latin* (covering the countries in Central and South America, Portugal and Spain and thus the *Luso-Hispanic* culture) was statistically significant. They point out that in these countries football has a high popularity. Latin countries have been very successful in the World Cup tournaments. In 13 out of 17 World Cups, Latin nations

[2] The optimal level has been evaluated isolated from other factors. The exact position of the inverted U-shape curve certainly depends also on the values of other independent variables.

have been among the 3 best tournament teams, and 9 times they won the competition. Uruguay hosted and won the first tournament. Brazil is the only country that won the tournament 5 times. The Spanish football league is at the moment the best in the world, a great number of superstars playing in clubs such as Real Madrid or Barcelona. The two teams are also record holders of *European* cups (Real) and *European Cup-Winner* cups (Barcelona). In other countries football may have to compete more strongly with other sports. Thus, a bigger population size does not go in line with a stronger performance, as more *potential* football talents are active in other sports. In the next estimation presented in *Table 4* we therefore build the interaction term POPULATION * LATIN.

Table 4

Performances and Potential Pools

Dep. Var.: Points	**Coeff.**	***Beta***	**t-value**
	Eq. 4		
a) Football Tradition			
YEARS IN FIFA	0.412***	0.355	3.32
HOSTED A WORLD CUP	28.546***	0.435	3.22
b) Restrictions			
TEMPERATURE	0.221	0.063	0.50
c) Wealth/Development			
GDP per capita	0.001	0.264	1.32
$(\text{GDP per capita})^2$	-4E-08**	-0.406	-2.03
d) Potential Pool			
POPULATION	-2E-08*	-0.069	-1.70
POPULATION* LATIN	7E-07***	0.457	2.84
e) Culture Region			
LATIN	-20.121***	-0.319	-3.34
Number of observations	60		
Prob > F	0.000		
R-squared	0.644		

Notes: Robust standard errors. In the reference group is NOT HAVING HOSTED A WORLD CUP, NON LATIN COUNTRIES. Significance levels: * $0.05 < p < 0.10$, ** $0.01 < p < 0.05$, *** $p < 0.01$.

Interestingly, the interaction term is also statistically significant. The beta-coefficient has the highest value among all independent variables. It implies that the population size has the strongest impact on football success if it is a country of LATIN origin. Eq. 4 indicates that an increase in the population size relative to the non-LATIN population would have a substantial impact on success.

IV. CONCLUSIONS

Surprisingly, little research has been conducted on what influences success in the FIFA World Cup final tournaments. According to the author's knowledge the *historical excellence* between the years 1930 and 2002 has not been analyzed before. Strong support has been found that football tradition has a significant impact on teams' performances. Robustness has been analyzed using two different proxies. Both coefficients are highly significant showing relatively high *beta* coefficients. We also observed that greater wealth leads to a higher performance, but the success is subject to the "law of diminishing marginal return". On the other hand, temperature did not affect team performances. The population size had only an impact on football success if a country is of Latin origin. The larger the population size for a country with Latin origin, the more points the national team wins in tournaments. Future tournaments will allow to gain more observations and more statistical data to investigate more in depth one of the greatest spectacles and biggest sporting events around the world.

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