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THE DETERMINANTS OF WOMEN'S INTERNATIONAL SOCCER PERFORMANCES

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by

Benno Torgler*

Abstract: The expansion of economics to "non-market topics" such as football has received increased attention in recent years. However, most of the studies focus on men's performances, whereas this paper reports empirical evidence of women's international team performances. In line with the previous studies who analyzed the performance of men, the results reveal that economic, demographic, and climatic factors have a strong impact on teams' performances. In this paper we analyze furthermore whether there is a correlation between women's and men's team performances. In general, countries with a stronger football tradition have not only strong men's teams, but also women's teams. The findings also indicate that there is a certain competitive balance between the different football regions.

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

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I. Introduction

The expansion of economics to other spheres of life, including sports, politics, war, crime, or religion has received increased attention in recent years. The economic analysis of football (soccer) has shown how effective traditional economic tools are to analyze this sport. First pioneering works in the economics of football have been made in the 70s (e.g., Sloane 1971). However, most research papers in the economics of sports are "North America oriented", where football is hardly treated (see, e.g., Kern 2000). It is surprising that economists do not have written more papers on that topic, as football offers a splendid field for empirical studies, thanks to large and well registered data sets. Until now, the main focus has been on the commercial structure and the competitive balance and uncertainty of the outcome in the football market, migration tendencies of players (consequences of the Bosman ruling), the superstar effect (players' wages), player discriminations, or the effects of management changes (see, e.g., Dobson and Goddard 2001, Feess and Muehlheusser 2003, Preston and Szymanski 2001, Gius and Johnson 2000).

The literature mostly analyses football at the club level. Events as the World Cup, UEFA Cup, or the Champions League are not treated empirically very often. Some studies at the international level use the FIFA World Ranking to analyze soccer performance (see, e.g., Hoffmann et al. 2002a, Houston and Wilson 2002). In line with the study of Hoffmann et al. (2002a) and Houston and Wilson (2002) we analyze what determinants have an impact on the success of national teams at the international level. However, contrary to most of the studies, we investigate the performance of the women teams. It surprises that the performances of women in different sports have scarcely been analyzed empirically, despite the growing recognition of women's sports. The first women's World Cup was held in 1991 in China. The next three tournaments were held in Sweden (1995) and the United States (1999, 2003). The 1999 final in the United States reached an attendance of 90'185; the whole tournament had a total of 1'194'215 spectators and an average attendance of 37'319 per game were counted. All 32 games where broadcasted live on television with an estimated 40 million viewers in the United States of America watching the finals (see http://fifaworldcup.yahoo.com). FIFA is trying to promote and support women's football with slogans such as "The future of football is feminine". Similar

tendencies are observable in other sports. One of the best examples is tennis. It is interesting to notice that the tournament earnings of men and women are comparable[1].

In line with previous papers we will check whether economic, demographic, and climatic factors have an impact on teams' performances. This will help us find out whether the determinants are consistent for both sexes. However, the paper goes a step further, investigating whether there are differences between the football regions UEFA, AFC, CAF, CONCACAF, CONMEBOL and OFC. We will thus investigate the extent of competitive balance in women's football. Furthermore, we analyze whether there is a correlation between women's and men's team performances. This allows to see to whether football tradition matters. Section II presents the model and Section III the empirical findings. The paper finishes with some concluding remarks.

II. Model

1. Independent Variables

The dependent variable of our study is the performance of nations in women's international competitive football. The best way to get a proxy for the performance is to use the FIFA Women's World Ranking system (WWR). In line with the men's ranking the key criteria are: 1) the actual result of the match (winning or losing, goal difference, goals scored), 2) neutral ground or home vs. away (correction to consider home advantages) and 3) importance of the match (using a match factor to measure differences between competitive and friendly matches). The team's evaluations are shown in *Table A1* in the Appendix (ranking of October, 24, 2003). Out of 113 countries, only 99 have been evaluated because some data regarding the control variable are unavailable. These are still more countries than Hoffmann, Ging and Ramasamy (2002a) have included in their study (they used 76 out of 203)[2]. Instead of using only the ranking *points* as dependent variable, we present estimations using the ranking of the teams as dependent variable (the lower the score the higher the ranking). The following independent variables have been included:

[1] Grand Slam Tournaments 2003: Australian Open (men and women: 654'000$), French Open (men: 983'000$, women: 958'000$), Wimbledon (men: 960'250$, women: 954'000$), and U.S. Open (men and women: 1'000'000$, see Sports Almanac 2004).

[2] We also used England to represent the United Kingdom as the largest UK nation (Scotland, Wales and Northern Ireland are excluded).

Wealth/Development (proxy: GDP per capita)

Hoffmann, Ging and Ramasamy (2002a) point out that a higher GDP per capita goes in line with a better infrastructure (physical and organizational), a better access to equipments and the availability of leisure time. This allows to better foster football talents. On the other hand, the authors point out that football is a relatively capital-unintensive sport and young talents in countries with a higher GDP per capita have substitute leisure possibilities (e.g., indoor activities such as electronic entertainments). But focusing on women rather than men might enforce the positive impact of the GDP. More wealth (higher GDP per capita) might go in line with a more advanced emancipation of women. Football has often been seen as an exclusively male sport. Emancipation helped women to express themselves in different walks of life and thus also in traditional man sports such as football. Lower society restrictions allow to get more talented women football players, which should have an impact on team's performances. Thus, we would expect a positive correlation between GDP per capita and women's football performances[3].

Potential Pool

Countries with a bigger population have a greater pool of potential football talents (Hoffmann, Ging and Ramasamy 2002a). A previous study focusing on Olympic Games found a positive correlation between success and the size of population (Hoffmann, Ging and Ramasamy 2002b). However, Hoffmann, Ging and Ramasamy (2002a) did not found that the size of a country's population has a significant impact on men's performances. They argue that populous countries such as China, India and the USA are not so successful in men's football. They found that only interacting the variable population with the culture variable Latin (covering the countries in Central and South America, Portugal and Spain) was significant. However, looking at the women's ranking system, the countries China (ranking position=5) and USA (ranking position=2) perform at a high level. Thus, we would predict that there is a positive correlation between the size of a country's population and the performance in international football.

[3] Newest data from the WDI 2003 (World Development Indicators, year 2001) are used, see also the following variable (POPULATION).

Temperature as a restriction

The 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. Climatic factors seem therefore to be 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. Football is played all over the country and is not concentrated 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.

Football Regions

Contrary to previous studies we control for the football regions (UEFA, AFC, CAF, CONCACAF, CONMEBOL and OFC). UEFA and CONMEBOL countries have strong football performances in men's competitions. The UEFA regions also include the major club leagues (e.g., Spain, Italy, England, and Germany) where many of the best players are engaged. Maguire and Pearton (2000) report that European clubs employed 62 percent of the players in the 1998 World Cup in France. However, focusing on women's performances, football regions might be less relevant taking into consideration, e.g., the strong performances of countries such as the United States or China (see Appendix Table A1).

Football Tradition

We will also analyze whether football tradition has an impact on the performance. This will allow to go beyond the previous research attempts. Based on the short history of women's football, we use country experiences in the past, which were influenced by men's football activities. To check the robustness, we will use several proxies:

HOSTING A WORLD CUP TOURNAMENT

As already mentioned, the first women's World Cup tournament was held in China in 1991. Since then, only Sweden and the United States (twice) have hosted tournaments. Based on the lack of observations we focus on the men's hosting activities (1930-2002). 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 under the top four teams. The authors found that the variable is statistically significant at the 10%-level. Similarly, Torgler (2004) shows with data from the World Cup 2002 that being at home strongly increases the probability of winning a game, controlling in a multivariate analysis for additional factors. 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) considering all previous World Cups since 1930.

The next two variables measure men's performances in World Cups between 1930 and 2002:

WORLD CUP WINNER

We use a dummy variable to catch whether a team has previously won a World Cup. It can be argued that such a success produces strong enthusiasm for football in a country over time and thus helps maintain a strong football tradition. However, qualifying for the final World Cup tournament and thus seeing the country performance in the World Cup might also produce enthusiasm. Thus, to get a better proxy for this we develop the following variable:

ALL-TIME WORLD CUP RANKING

This variable ranks the performances of all nations that have ever qualified for a World Cup final tournament by points earned. Victories between 1930-90 earned two points, victories between 1994 and 2002 were awarded with three points (see Brown and Morrison 2004, p. 748). The ranking goes from 1 (highest amount of points) to 59 (zero points). To include all available countries in our estimation, we ranked countries that never participated in a World Cup tournament with the value 60.

MEN'S INTERNATIONAL RANKING

With the next variable we go a step further, considering the performances of men's teams that go beyond the World Cup using the FIFA/Coca-Cola World Ranking (December 15, 2003, published on the FIFA website www.fifa.com). This allows to consider not only World Cup performances but also all international matches over the previous eight years. As independent variable we use both measurements (the RANKING POINTS and the RANKING). It also helps to analyze whether there is a correlation between women's and men's team performances.

2. Models

The basic estimation equation reads as follows:

$$RANKING_i = \beta_0 + \beta_1 GDP_i + \beta_2 POP_i + \beta_3 TEMP_i + \beta_4 REGION_i + \varepsilon_i \qquad (1)$$

In a second step we add the football tradition variables in the model. This allows to check the robustness of the other independent variables and to check the relevance of football tradition. Furthermore, as these variables are developed from the men's performances it makes sense to consider them as additional variables.

$$RANKING_i = \beta_0 + \beta_1 GDP_i + \beta_2 POP_i + \beta_3 TEMP_i + \beta_4 REGION_i + \beta_5 TRAD_i + \varepsilon_i \qquad (2)$$

The variables are summarized in Table 1.

Table 1. Empirical Variables

Variables	Description	Source
RANKING POINTS (DEP. V.)	FIFA Women's World Ranking (October 24, 2003)	FIFA homepage
RANKING (DEP. V.)	FIFA Women's World Ranking (October 24, 2003)	FIFA homepage
GDP PER CAPITA	GDP per capita (constant 1995 US$), YEAR 2001	WDI 2003
POPULATION	total population ages 15-64, year 2001	WDI 2003
TEMPERATURE	representative country values, years 1961-1990	Mitchell et al. (2003)
FOOTBALL REGIONS	UEFA, AFC, CAF, CONCACAF, CONMEBOL and OFC dummy variables (UEFA in the reference group)	FIFA homepage
HOST (MEN)	dummy variable (1=countries that have hosted a World Cup between 1932 and 2002	FIFA homepage
ALL TIME WORLD CUP RANKING (MEN)	ranking from 1 (highest points) to 60 (never been in a World Cup)	Brown and Morrison 2004
WORLD CUP WINNER (MEN)	dummy variable (1=winner of a World Cup)	FIFA homepage
RANKING POINTS (MEN)	FIFA/Coca-Cola World Ranking (December 15, 2003)	FIFA homepage
RANKING (MEN)	FIFA/Coca-Cola World Ranking (December 15, 2003)	FIFA homepage

III. Empirical Results

Table 2 presents the empirical results of the first estimations. In the Eq. 1a to 3a we use the *ranking points* as the dependent variable. More ranking points is correlated with a better performance. In Eq. 1b to 3b, we use the *ranking* as the dependent variable. A lower ranking goes in line with a better team performance. Thus, compared to the Eq. 1a to 3a, we should observe a change in the coefficient signs of the independent variables in Eq. 1b to 3b. 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.

GDP PER CAPITA and POPULATION have a statistically significant impact on the women's international performances. This result is in line with our predictions. We do not report estimations of a quadratic relationship between football success and GDP per capita. The coefficient GDP_i^2 was not statistically significant (negative sign with *ranking points* as dependent variable, positive with *ranking* as dependent variable, GDP_i remained significant)[4]. Thus, contrary to the results of Hoffmann, Ging and Ramasamy (2002a), the relationship cannot be described as an inverted U-shape.

[4] Data is available upon request.

Our results confirm that TEMPERATURE has an impact on team's success. Contrary to the study of Hoffmann, Ging and Ramasamy (2002b), analyzing the Olympic success, the coefficient is negative. A higher temperature leads to a lower performance of women's teams. 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 statistically not significant and has a positive sign with relatively high *beta* values. Thus, we cannot observe an inverted U-shape relationship between football performance and average temperature.

Looking at the football regions we find that there is a tendency that OFC and CONMEBOL countries perform better than the reference group (UEFA). However, these results are not robust, when further estimations are included (see Table 3 and 4, exception: OFC countries). The results show that there is a certain competitive balance between the football regions. In line with Hoffmann, Ging and Ramasamy (2002a), we also tested whether Luso-Hispanic countries (Central and South America as well as Portugal and Spain) perform better, as football is very popular in these countries. In line with their results the coefficient was not statistically significant but had a positive sign. We also entered the variables POPULATION and LATIN as an interactive term in Eq. 1a and 1b, taking into consideration that the effect of an increase in population works more strongly for countries where football is more popular. In line with Hoffmann, Ging and Ramasamy (2002a) we found that the coefficient was statistically significant (e.g., t= 9.60, coefficient value: 6.36e-06).

Table 3 and 4 present the results for the impact football tradition has on women's football success. All coefficients are highly statistically significant with the expected sign. The beta-coefficients indicate relatively high values, especially for the ranking variables. Thus, football tradition seems to be a key determinant of women's performance. It is worthwhile to mention that we observe an increase of the R-squared, especially in the estimations 5a,b, 7a,b and 8a,b. The findings also indicate that there is a strong correlation between women's and men's team performances. The strength of the football tradition variables can also be investigated using a Wald-test for coefficient restrictions to test for *joint* significance. Not surprisingly, the *F*-statistics 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.

Table 2. Determinants of Performance

least squares	**Dep. Var.: *Ranking Points***									**Dep. Var.: *Ranking* (the lower the score the higher the ranking)**								
Independent Var.	**Coeff.**	***Beta***	**t**	**Coeff.**	***Beta***	**t**	**Coeff.**	***Beta***	**t**	**Coeff.**	***Beta***	**t**	**Coeff.**	***Beta***	**t**	**Coeff.**	***Beta***	**t**
	Eq. 1a			**Eq. 2a**			**Eq. 3a**			**Eq. 1b**			**Eq. 2b**			**Eq. 3b**		
a) Wealth/Development																		
GDP per capita	0.010***	0.406	4.76	0.015***	0.591	7.50	0.010***	0.416	4.82	-0.001***	-0.364	-4.62	-0.01***	-0.557	-8.17	-0.001***	-0.368	-4.56
b) Potential Pool																		
POPULATION	8E-07***	0.268	3.78	9E-07***	0.306	3.59	8E-07***	0.296	3.47	-7E-08***	-0.231	-3.83	-8E-08***	-0.271	-3.81	-7E-08***	-0.248	-3.15
c) Restrictions																		
TEMPERATURE	-13.042***	-0.362	-4.23				-13.221***	-0.367	-3.15	1.442***	0.382	4.29				1.419***	0.376	3.05
$(TEMP - 14)^2$				0.062	0.014	0.15							0.004	0.009	0.09			
d) Football Region																		
AFC							-45.682	-0.050	-0.47							2.868	0.030	0.26
CAF							-53.236	-0.062	-0.63							7.949	0.089	0.81
CONCACAF							7.502	0.009	0.10							1.973	0.024	0.23
CONMEBOL							149.088*	0.147	1.70							-15.886*	-0.149	-1.72
OFC							100.108	0.084	1.22							-10.553	-0.084	-1.14
Number of observations	99			99			99			99			99			99		
Prob > F	0.000			0.000			0.000			0.000			0.000			0.000		
R-squared	0.515			0.419			0.5531			0.473			0.366			0.516		

Notes: Robust standard errors. In the reference group is UEFA. Significance levels: * 0.05 < p < 0.10, ** 0.01< p < 0.05, *** p < 0.01.

Table 3. Performance and Football Tradition (Dependent Variable: Ranking Points)

least squares	**Dependent Variable: Ranking Points**														
Independent Variable	**Coeff.**	***Beta***	**t**	**Coeff.**	***Beta***	**t**	**Coeff.**	***Beta***	**t**	**Coeff.**	***Beta***	**t**	**Coeff.**	***Beta***	**t**
	Eq. 4a			**Eq. 5a**			**Eq. 6a**			**Eq. 7a**			**Eq. 8a**		
a) Wealth/Development															
GDP per capita	0.008***	0.307	3.36	0.008***	0.325	3.71	0.009***	0.365	4.34	0.006***	0.256	3.73	0.007***	0.265	3.81
b) Potential Pool															
POPULATION	8E-07***	0.277	3.76	7E-07***	0.265	3.75	8E-07***	0.272	3.43	6E-07***	0.227	4.43	7E-07***	0.241	4.54
c) Restrictions															
TEMPERATURE	-12.123***	-0.336	-2.92	-11.686***	-0.324	-3.16	-14.317***	-0.397	-3.51	-11.331***	-0.314	-3.98	-10.990***	-0.305	-3.75
d) Football Region															
AFC	-60.644	-0.067	-0.66	67.935	0.075	0.77	-6.66	-0.007	-0.07	107.857	0.119	1.64	104.782	0.116	1.56
CAF	-70.696	-0.083	-0.86	1.134	0.001	0.02	-29.713	-0.035	-0.36	-50.603	-0.059	-0.78	-52.603	-0.062	-0.81
CONCACAF	-18.177	-0.023	-0.25	82.037	0.103	1.23	36.000	0.045	0.46	136.170**	0.172	2.4	127.028**	0.160	2.19
CONMEBOL	60.275	0.059	0.68	87.888	0.086	1.09	100.092	0.098	1.22	75684	0.072	1.08	75.8	0.075	1.06
OFC	99.099	0.083	1.17	212.033***	0.177	2.64	129.765	0.109	1.59	354.610***	0.297	4.98	346.562***	0.290	5.02
e) Football Tradition															
HOSTING (MEN)	203.067***	0.238	3.35												
ALL TIME WORLD CUP RANKING (MEN)				-5.667***	-0.382	-4.43									
WORLD CUP WINNER (MEN)							242.419***	0.203	2.71						
RANKING POINTS (MEN)										0.9602***	0.562	8.33			
RANKING (MEN)													-3.127***	-0.551	-8.32
F-Test football tradition	11.23***			20.16***			18.88***			37.32***			69.20***		
Number of observations	99			99			99			99			99		
Prob > F	0			0			0			0			0		
R-squared	0.593			0.644			0.586			0.729			0.724		

Notes: Robust standard errors. In the reference group are UEFA, NOT HAVING HOSTED A WORLD CUP, NOT A WORLD CUP WINNER. ALL TIME WORLD CUP RANKING (MEN) and RANKING (MEN): The lower the value, the higher the performance. Significance levels: * $0.05 < p < 0.10$, ** $0.01 < p < 0.05$, *** $p < 0.01$. F-Test is a statistics on the joint significance of the mentioned variable.

Table 4. Performance and Football Tradition (Dependent Variable: Ranking)

least squares	**Dependent Variable: Ranking (the lower the score the higher the ranking)**														
	Coeff.	***Beta***	**t**	**Coeff.**	***Beta***	**t**	**Coeff.**	***Beta***	**t**	**Coeff.**	***Beta***	**t**	**Coeff.**	***Beta***	**t**
	Eq. 4b			**Eq. 5b**			**Eq. 6b**			**Eq. 7b**			**Eq. 8b**		
a) Wealth/Development															
GDP per capita	-0.001***	-0.272	-3.09	-0.001***	-0.278	-3.30	-0.001***	-0.328	-4.02	-0.001***	-0.206	-3.22	-0.001***	-0.198	-3.36
b) Potential Pool															
POPULATION	-7 E-08***	-0.231	-3.42	-6E-08***	-0.217	-3.46	-7E-08***	-0.228	-3.06	-5E-08***	-0.188	-4.23	-6E-08***	-0.175	-4.34
c) Restrictions															
TEMPERATURE	1.318***	0.349	2.84	1.262***	0.334	2.97	1.509***	0.399	3.25	1.210***	0.309	3.81	1.169***	0.320	3.6
d) Football Region															
AFC	4.24	0.045	0.40	-8.785	-0.092	-0.84	-0.338	-0.004	-0.03	-14.129*	-0.147	-1.92	-14.007*	-0.149	-1.89
CAF	9.551	0.107	0.99	2.373	0.027	0.27	6.016	0.067	0.62	7.582	0.088	1.01	7.878	0.086	1.04
CONCACAF	4.329	0.052	0.52	-5.671	-0.068	-0.74	-0.368	-0.004	-0.04	-12.270*	-0.137	-1.9	-11.431*	-0.148	-1.74
CONMEBOL	-7.738	-0.073	-0.82	-9.609	-0.090	-1.12	-11.86	-0.111	-1.36	-7.428	-0.072	-1.03	-7.666	-0.070	-1.02
OFC	-10.46	-0.084	-1.01	-22.240**	-0.176	-2.35	-12.989	-0.104	-1.29	-38.726***	-0.305	-4.74	-38.193***	-0.309	-4.88
e) Football Tradition															
HOST (MEN)	-18.629***	-0.208	-3.35												
ALL TIME WORLD CUP RANKING (MEN)				0.581***	0.374	4.23									
WORLD CUP WINNER (MEN)							-19.917**	-0.159	-2.47						
RANKING POINTS (MEN)										-0.106***	0.590	-8.78			
RANKING (MEN)													0.351***	-0.594	8.59
F-Test football tradition	18.47***			22.80***			21.14***			43.59***			44.270***		
Number of observations	99			99			99			99			99		
Prob > F	0.000			0.000			0.000			0.000			0.000		
R-squared	0.547			0.604			0.537			0.714			0.712		

Notes: Robust standard errors. In the reference group are UEFA, NOT HAVING HOSTED A WORLD CUP, NOT A WORLD CUP WINNER. ALL TIME WORLD CUP RANKING (MEN) and RANKING (MEN): The lower the value, the higher the performance. Significance levels: * 0.05 < p < 0.10, ** 0.01< p < 0.05, *** p < 0.01. F-Test is a statistics on the joint significance of the mentioned variable.

IV. CONCLUSIONS

In recent years, we observe a strong expansion of economics to 'non-market topics', such as the economics of sports. Empirical analysis is mainly done on North American sports. Thus, empirical investigations on the economics of football are still in their infancy. Furthermore, most studies focus on men's performances. This paper as a novelty reports empirical evidence of women's team performances. The paper uses estimation models close to the study done by Hoffmann, Ging and Ramasamy (2002a) and Houston and Wilson (2002) who analyzed men's performances. This allows to compare the determinants of men's and women's performances and thus helps to check to which extent influences are robust among different sexes. However, the paper goes a step further analyzing possible differences between the football regions (UEFA, AFC, CAF, CONCACAF, CONMEBOL and OFC) and investigates with several proxies whether football tradition has a positive impact on a team's success.

We find that a higher GDP per capita and a bigger population lead to a better performance. A higher average national temperature is correlation with a lower performance. Thus, in line with previous studies national characteristics such as the economic development or geographical or demographical factors are important determinants of team's performances. However, we did not find support for an inverted U-shape relationship with respect to the temperature and the per-capita wealth. Furthermore, it should be noticed that our R-squared values (between 0.366 and 0.729) are considerably higher than the one reported by Hoffmann, Ging and Ramasamy (2002a) (0.318).

Differences among the regions are relatively small, which indicates that there is a relatively high competitive balance between the football regions. This ensures the uncertainty about the outcome of international games. Dobson and Goddard (2001) point out that

> "uncertainty of the outcome is the lifeblood of any sporting event: take away the element of uncertainty and competitive sport degenerates into sterile exhibition. Unpredictability is a key characteristic of the product that professional sports teams sell to their spectators" (pp. 125-126).

Finally, our findings also indicate that football tradition matters. Taking into consideration the short history of women's performances, we use country experiences with men's football. To check the robustness, we used several proxies: having hosted a World Cup, the all-time World Cup Ranking, whether a nation has won a World Cup. Furthermore, we investigate whether there

is a correlation between women and men's team performances, using the men's FIFA/Coca-Cola World Ranking as a proxy. All estimations indicate that a stronger football tradition leads to higher team performances, and that there is a strong correlation between women's and men's performances in football.

As a general result, this study has shown that analyzing women's performances in economics of sports is highly promising and will bring interesting new insights.

APPENDIX

Table A1. Ranking of the Countries in the Data Set

Team	World Cup Points	Ranking	Football Region
Germany	2201	1	UEFA
USA	2166	2	CONCACAF
Norway	2131	3	UEFA
Sweden	2095	4	UEFA
China PR	2064	5	AFC
Brazil	2042	6	CONMEBOL
Denmark	1981	8	UEFA
France	1967	9	UEFA
Italy	1947	10	UEFA
Canada	1911	11	CONCACAF
Russia	1897	12	UEFA
England	1861	13	UEFA
Japan	1841	14	AFC
Netherlands	1815	15	UEFA
Australia	1810	16	OFC
Iceland	1796	17	UEFA
Ukraine	1778	18	UEFA
Finland	1773	19	UEFA
Spain	1767	20	UEFA
New Zealand	1760	21	OFC
Czech Republic	1741	23	UEFA
Nigeria	1738	24	CAF
Korea Republic	1721	25	AFC
Hungary	1717	26	UEFA
Belgium	1715	27	UEFA
Switzerland	1697	28	UEFA
Mexico	1674	31	CONCACAF
Portugal	1666	32	UEFA
Poland	1661	33	UEFA
Romania	1656	34	UEFA
Colombia	1615	35	CONMEBOL
Slovakia	1615	35	UEFA
Ireland Republic	1613	37	UEFA
Argentina	1604	38	CONMEBOL
Peru	1603	39	CONMEBOL
Trinidad and Tobago	1595	40	CONCACAF
Thailand	1587	41	AFC
Belarus	1571	42	UEFA
Vietnam SR	1569	43	AFC
Croatia	1561	44	UEFA
Costa Rica	1545	45	CONCACAF
Bulgaria	1529	47	UEFA
Austria	1522	48	UEFA
Uzbekistan	1505	49	AFC
Ghana	1495	50	CAF
Chile	1487	51	CONMEBOL
Ecuador	1473	52	CONMEBOL

Morocco	1462	53	CAF
Tonga	1461	54	OFC
Haiti	1457	55	CONCACAF
India	1436	57	AFC
Greece	1431	58	UEFA
Papua New Guinea	1418	59	OFC
Indonesia	1416	60	AFC
Kazakhstan	1390	61	UEFA
South Africa	1372	62	CAF
Mali	1370	63	CAF
Panama	1368	64	CONCACAF
Hong Kong	1355	65	AFC
Paraguay	1354	66	CONMEBOL
Uruguay	1347	68	CONMEBOL
Turkey	1344	69	UEFA
Fiji	1340	70	OFC
Malaysia	1332	71	AFC
Israel	1324	72	UEFA
Jamaica	1305	73	CONCACAF
Guatemala	1290	74	CONCACAF
Venezuela	1287	75	CONMEBOL
Philippines	1257	77	AFC
Estonia	1234	78	UEFA
Ethiopia	1234	78	CAF
Bosnia-Herzegovina	1218	80	UEFA
Bolivia	1216	81	CONMEBOL
Cameroon	1215	82	CAF
Armenia	1214	83	UEFA
Vanuatu	1208	84	OFC
Surinam	1200	85	CONCACAF
Dominica	1199	86	CONCACAF
Singapore	1199	86	AFC
Honduras	1194	88	CONCACAF
Moldova	1190	89	UEFA
Angola	1172	91	CAF
Zimbabwe	1165	92	CAF
El Salvador	1160	93	CONCACAF
St. Lucia	1158	94	CONCACAF
Dominican Republic	1138	97	CONCACAF
St. Vincent / Grenadines	1138	97	CONCACAF
Samoa	1122	99	OFC
Senegal	1092	101	CAF
Malta	1078	102	UEFA
Nepal	1063	103	AFC
Swaziland	1044	104	CAF
Puerto Rico	1036	105	CONCACAF
Zambia	1027	106	CAF
Botswana	1026	107	CAF
Mozambique	1026	107	CAF
Cyprus	1023	109	UEFA
Gabon	1023	109	CAF
Belize	917	112	CONCACAF

REFERENCES

Dobson, S. and J. Goddard (2001). *The Economics of Football*. Cambridge: Cambridge University Press.

Brown, G. and M. Morrison (eds.) (2004). *2004 ESPN Sports Almanac*. New York: Hyperion.

Feess, E. and G. Muehlheusser (2003). Transfer Fee Regulations in European Football, *European Economic Review*. 47: 645-668.

Gius, M. and D. Johnson (2000). Race and Compensation in Professional Football, *Applied Economics Letters*. 7: 73-75.

Hoffmann, R., L. Chew Ging and B. Ramasamy (2002a). The Socio-Economic Determinants of International Soccer Performance, *Journal of Applied Economics*. 5: 253-272.

Hoffmann, R., L. Chew Ging and B. Ramasamy (2002b). Public Policy and Olympic Success, *Applied Economics Letters*. 9: 545-548.

Houston, R. G., Jr. and D. P. Wilson (2002). Income, Leisure and Proficiency: An Economic Study of Football Performance, *Applied Economics Letters*. 9: 939-943.

Kern, W. S. (ed.) (2000). *The Economics of Sport*. Michigan: W.E. Upjohn Institute for Employment Research.

Maguire, J. and B. Pearton (2000). Global Sport and the Migration Patterns of France '98 World Cup Finals Players: Some Preliminary Observations, *Soccer and Society*. 1: 175-189.

Mitchell, T. D., T. R. Carter, P. D., Jones, M. Hulme, and M. New (2003) A Comprehensive Set of High-Resolution Grids of Monthly Climate for Europe and the Globe: The Observed Record (1901-2000) and 16 Scenarios (2001-2100), unpublished manuscript, Tyndall Centre.

Preston, I. and S. Szymanski (2000). Racial Discrimination in English Football, *Scottish Journal of Political Economy*. 47: 342-363.

Sloane, P. (1971). The Economics of Professional Football: The Football Club as Utility Maximiser, *Scottish Journal of Political Economy*. 17: 121-146.

Torgler, B. (2004). The Economics of the FIFA Football Worldcup, *KYKLOS*. 57: 287-300.