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THE SOCIO-ECONOMIC DETERMINANTS OF INTERNATIONAL SOCCER PERFORMANCE

ROBERT HOFFMANN, LEE CHEW GING AND BALA RAMASAMY*
The University of Nottingham

This paper reports regression results identifying the variables influencing a country's performance in international soccer games. The results reveal that economic, demographic, cultural and climatic factors are important. In particular, inverted U-shape relationships are identified with respect to temperature and per-capita wealth. We also find a significant interaction between Latin cultural origin and population size, while both variables are individually insignificant. Explanations for our results are offered.

JEL classification codes: L83, H50
Key words: football, FIFA World Ranking, Latin culture

I. Introduction

Football[1] is commonly regarded as the most popular sport in the world. During the 2002 world championship in Korea/Japan, 32 survivors of the 170-nation qualifying tournament competed for the coveted FIFA[2] World Cup. The tournament was watched by over a billion television viewers worldwide. In terms of participation, football is one of the few sports played in all parts of the world (Murray, 1996, p. 4). According to FIFA estimates, there are a currently around two hundred million active players.

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* E-mail address of corresponding author: Robert.Hoffmann@nottingham.ac.uk.

[1] This study focuses on *Association Football*, known also as soccer. The term football is used in this context throughout this article.

[2] Fédération Internationale de Football Association, the world governing body for the sport.

While interest and participation in football is a universal phenomenon, the international football success of individual nations differs markedly. Firstly, pronounced inter-regional performance differentials exist. The seventeen world cups since the first tournament in 1930 have produced world champions from only two continents, South America and Europe. North American, Asian, African as well as Antipodean teams have so far failed to make a mark in international events. Secondly, intra-regional football performance is also variable. World championship wins by European and South American sides have been concentrated in the hands of a few nations. Only seven individual countries have won, five of these more than once (see Table 1). Among Asian countries, a concentration of football excellence among the oil-rich and emerging economies in the continent has been noted (Sugden and Tomlinson, 1998). These clear differentials in performance point to underlying systematic factors influencing international football performance. The current paper is intended to uncover these. To our knowledge, no work on this issue has been published to date.

Economists have only recently begun taking a professional interest in sports generally and football in particular. In addition, the majority of contributions towards an economics of sport are located at the micro-level of individual club and league analysis, rather than the macro-level of international performance that concerns us here (see, for example, Downward and Dawson, 2000). Zimbalist's (2001) book contains a collection of seminal articles in this area). On both counts, the current paper may therefore require some justification. We believe there are two important such rationales for the current work. To begin with, football has over the past few years become a multi-billion dollar global industry. Football is generating huge revenues for private individuals, clubs as well as national and international organizations (Dobson and Goddard, 2001; Sugden and Tomlinson, 1998). These accrue mainly on the basis of broadcasting and other media rights as well as through merchandise and ticket sales. The performance of national football sides arguably has an important impact on the way these resources are allocated internationally. The football success of a nation’s team can have significant positive external

Table 1. World Cup Semi-finalists and Hosts, 1930-2002

Year	Host	1st place	2nd place	3rd place	4th place
1930	Uruguay	Uruguay	Argentina	USA*	Yugoslavia*
1934	Italy	Italy	Czechoslovakia	Germany	Austria
1938	France	Italy	Hungary	Brazil	Sweden
1950	Brazil	Uruguay	Brazil	Sweden	Spain
1954	Switzerland	W. Germany	Hungary	Austria	Uruguay
1958	Sweden	Brazil	Sweden	France	W. Germany
1962	Chile	Brazil	Czechoslovakia	Chile	Yugoslavia
1966	England	England	W Germany	Portugal	U.S.S.R
1970	Mexico	Brazil	Italy	W. Germany	Uruguay
1974	W. Germany	W. Germany	Holland	Poland	Brazil
1978	Argentina	Argentina	Holland	Brazil	Italy
1982	Spain	Italy	W. Germany	Poland	France
1986	Mexico	Argentina	W. Germany	France	Belgium
1990	Italy	Germany	Argentina	Italy	England
1994	USA	Brazil	Italy	Sweden	Bulgaria
1998	France	France	Brazil	Croatia	Holland
2002	Korea/Japan	Brazil	Germany	Turkey	South Korea

Notes: * joint third place. Source: www.fifa.com.

effects on the financial performance of domestic clubs and leagues, and possibly related industries. For instance, Sugden and Tomlinson (1998) note this type of relationship between the poor success rate of Asian nations in international football and the popularity of the European Champions League there.

The second rationale for the economic analysis of international football is based on considerations of the sport's political economy. In many countries, football is used as a vehicle for the expression of nationalism, and for the

promotion of individual nations' power and status internationally (Sugden and Tomlinson, 1998). In this sense, football may have an additional impact on a country's economy. In the process of nation-building, in particular among developing countries, the performance of a national sports team in international competitions is able to bring together diverse tribes and races behind one national flag. Improved solidarity eases policy implementation. In some cases, regions striving for nationhood recognition, such as Palestine, have in the past used FIFA membership as part of these types of effort. Representation in international sporting organizations not only facilitates access to international funds but also encourages international economic activities.

This study aims to identify the reasons for the differential football success of nations from this economic perspective. This analysis is designed to uncover the connection between countries' levels of economic development and sporting success. The issue is approached from an econometric angle. In particular, we identify important variables which contribute to the performance of a country in international football competitions. These are chosen to capture various economic, geographical, cultural and demographic influences on football performance. In addition, our study attempts to uncover the relationships among the variables. Our hypotheses, data sources and method are explained in section II. Section III contains our regression results. Additional tests designed to further explain our results are reported in section IV. Section V concludes the paper with an interpretation and discussion of the wider implications of our findings.

II. Model, Data and Method

We begin by outlining our hypotheses concerning the sources of international football performance. As we are not aware of prior literature on this issue, we partly draw on previous macro-level work on the determinants of success in the Olympic Summer Games (Bernard and Busse, 2000; Condon et al., 1999; Hoffmann et al., 2002; Johnson and Ali, 2000; Szymanski, 2000) as a starting point for our hypotheses. These studies have found that the number

of medals won by a country at the Olympic Games is partially explained by factors such as its per-capita GNP, population size as well as certain geographical, political and cultural influences. It would seem reasonable to suspect that variables explaining performance over a range of sports should partially explain the success of countries in international football. In addition, we use anecdotal evidence from the literatures on the history (e.g. Murray, 1996; Sugden and Tomlinson, 1998) and sociology (e.g. Lever, 1995; Archetti,1999; Giulianotti, 1999) of football.

The dependent variable of this study is the performance of nations in men's international competitive football. In this context, the FIFA/Coca-Cola World Ranking is possibly the best available data source. A nation's points in the FIFA/Coca-Cola World Ranking as of January 2001, as published on the FIFA website (www.fifa.com), are used as a proxy. These are calculated on a monthly basis using the performance of a given country's "A"-Team in all international matches, including friendlies, over the previous eight years. The procedure awards points on the basis of the games' results, goals scored, strength of the opponents, importance and venues of the matches (home or away). The top twenty teams according to these data are shown in Table 2.

Out of 203 teams in the FIFA/Coca-Cola World Ranking Table, only 76 countries are chosen because some data for certain countries are unavailable. To avoid a bias in the selection of countries for this study, a simple sampling device was used. The 76 countries selected constitute the medal winners at the Sydney 2000 Olympic Games. Four of the medal-winning countries, North Korea, Chinese Taipei, Cuba and Yugoslavia, are excluded due to unavailability of certain data. Another issue concerns the representation of all four UK home nations in international football due to historical factors. Here, England is chosen to represent the United Kingdom as the largest UK nation, while Scotland, Wales and Northern Ireland are excluded. Our sampling procedure covers countries in all continents and across the FIFA Ranking Table.

The first independent variable in the study is a country's population. More populous countries can draw on a greater pool of potential world-class football talent and therefore are expected to be relatively more successful at the sport.

Table 2. FIFA World Ranking (January 2001)

Rank	Country	Points
1	Brazil	821
2	France	801
3	Argentina	771
4	Czech Rep.	742
5	Italy	742
6	Portugal	738
7	Spain	734
8	Netherlands	708
9	Yugoslavia	707
10	Paraguay	706
11	Germany	705
12	Mexico	691
13	Romania	683
14	Norway	675
15	Colombia	671
16	United States	659
17	England	657
18	Croatia	655
19	South Africa	635
20	Russia	634

Source: www.fifa.com

This variable has been shown to be significant in the context of the Olympic Games.

The second variable concerns the initial development of football talent. Youth development is dependent on the existence of football physical and organizational infrastructure, as well as the availability and standard of

equipment. Private access to equipment and available leisure time for participating in sporting activities are also important in this context. These factors would seem to be dependent on both private and public funding. We use GDP per capita data as a proxy for this influence.

However, increases in GNP per capita may not generate proportionate increases in sporting performance. In previous work of the Olympic Games (Hoffmann et al., 2002), this relationship has been found to be subject to diminishing returns, i.e. performance increases with per-capita wealth at a decreasing rate. In the context of football, there are additional arguments to suggest that, after a certain point, additional increases should impact *negatively* on international success. We offer two reasons. First, football is a relatively capital-unintensive sport. It can be played with a modicum of equipment and organization, in contrast to sports such as equestrianism, yachting, car racing etc. In many societies, football therefore presents relatively attractive financial opportunities for children from under-privileged backgrounds. As poorer children have almost equal access to this sport, they may be over-proportionally active in it. Our second argument revolves around the availability of alternative forms of entertainment. With rising per-capita GNP, parents can increasingly afford to buy their children electronic forms of entertainment. These have to be regarded as substitutes in consumption to football. It may therefore be argued that when a country becomes wealthier, youngsters will increasingly shift from outdoor to indoor activities. As a result, we estimate a quadratic relationship between football success and GNP per capita. Both GNP per capita and population data used in this study originate from World Bank data sources.

The next two independent variables concern specific cultural influences promoting a country's international football success. To begin with, the popularity of football, both as a spectator and participation sport, is important in this context. First, the popularity of football in terms of spectating raises financial and status incentives for players. In turn, greater player rewards may contribute to the popularity of football as a participation sport, enlarging the pool of potential national players.

The popularity of football in these terms depends on the cultural make-up of a country. A number of writers have highlighted the complex relationships between football and culture (Archetti, 1999; Giulianotti, 1999; Lever, 1995). First, cultural factors influence the way in which the inherent aesthetical and physical aspects of a sport are assessed within a country. In addition, the popularity of a sport depends on its broader significance within a nation's culture. For instance, football has in some countries served as a platform for religious or regional rivalries, to express nationalist sentiment or political aspirations.

Inspection of both Table 1 and 2 reveals some conspicuous cultural commonalities among the world's top footballing nations. First, of the top ten teams in the FIFA ranking, eight have predominantly catholic populations. The exceptions are Germany and England, which have catholic minorities of 34 and 15% respectively. Seven of these are countries in which a romanic language is spoken.[3] Only two of seven past world champions, again Germany and England, do not share these two features. These commonalities reveal a shared cultural factor apparently promoting the football success of the countries concerned.

While both language and religion are important and potentially interrelated conduits for a shared culture, we use language as a proxy.[4] Romanic-speaking countries are commonly referred to as *Latin*.[5] However, among the Latin countries, clear distinctions between French, Italian and Iberian culture would seem to exist. For instance, both the US and Canadian Census Bureaus use separate categories for the three (see Fellmann et al., 1999, p.197). Similarly,

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[3] Romanic or *romance* tongues are a group of languages which evolved from vulgar Latin. The most important ones spoken today include French, Portuguese, Spanish and Romanian.

[4] Tests were conducted which show that the results of this study are unaffected by this choice.

[5] According to the *American Heritage Dictionary of the English Language*, this adjective means "of or relating to the languages that developed from Latin, such as Italian, French, Spanish, and Portuguese, or to the peoples that speak them."

the US Library of Congress holds a single Luso-Hispanic collection on the basis of the cultural commonalities among Spanish-Portuguese countries both in Europe and in the Americas. As a result, we follow established convention and identify as well as focus on a common *Luso-Hispanic* culture, which comprises countries in Central and South America as well as Portugal and Spain in Europe.[6] In the following, we use the term Latin to denote Luso-Hispanic countries. In particular, we use a dummy variable *Latin* which assigns a value of 1 to all Latin Central and South American countries as well as to Spain and Portugal and a value of 0 to others. Our hypothesis is that certain underlying cultural factors common to Luso-Hispanic countries support the high popularity of men's football both as a spectator and participation sport in these countries.

Our second cultural variable concerns nations' records in staging world cup tournaments. Inspection of Table 1 also suggests a positive relationship between world cup hosting activity and subsequent tournament success of a nation. Most of the nations which have hosted the tournament in the past have strong football traditions. In eleven out of the seventeen past championships, the host nation came among the top four. South Korea's unexpected fourth place in the 2002 tournament provides a potent case in point. Host nations featured in eight world cup finals, winning six of these encounters. The reasons may include the effect of sympathetic audiences and other home advantages (Brazil in 1958 and again in 2002 is the only country so far to win the world cup outside its own continent, see Table 1) and/or the cultural affinity towards football a hosting history reveals. Hosting activity is an indicator of sporting culture and, in particular, cultural affinity towards football. Hosting does not only require the financial capability and suitable physical infrastructure, but also the support of the public towards staging the event. It is presumed that a cultural affinity towards football will result in better national performance in the game. To test this effect, we employ a

[6] All discrete cultural classification schemes as the one we employ here are inherently fraud with difficulties (Fellmann et al. 1999, p. 189). While the one we employ is no exception, it draws on widely-used and accepted conventions.

dummy variable called *Host* which assigns a value of 1 to the countries which have hosted the world cup Finals tournament since its inception in 1930.

Our next independent variable concerns the countries' geographical setting. Previous work (Hoffmann et al., 2002) has shown that countries with temperate climates are more successful at sports generally. In particular, an average annual temperature in the region of 14 degrees Celsius is associated, *ceteris paribus*, with the best sporting performance. Deviations in either direction hamper it. One explanation is that such countries tend to be more conducive to outdoor sporting activities. Extreme daytime outdoor temperature and excessive humidity will have a negative impact on the popularity of outdoor sports. Climates with extremes of heat or cold discourage youngsters from actively participating in outdoor activities. Therefore, informal sporting talent development at a young age becomes compromised the more extreme climate and climatic variations are. Temperature data is easily available and can be used as a suitable proxy for geography. In the current work, we therefore test for a inverted U-shape relationship between football performance and average temperature with an optimum at 14 degrees Celsius. The appropriate transformation of this variable for modeling purposes is its squared deviation from the 14 Celsius mark. Since temperature varies both across the seasons as well as regions of countries, we use average annual Celsius temperatures in their capital cities. Most frequently, the capital is the main population center of a country, so that climatic extremes and changes here will affect a large proportion of its population.

III. Regression Results

In the model selection processes, we observed a number of interesting issues not reported here in detail. First, in contrast to our own and other previous studies on Olympic success (Hoffmann et al., 2002), we found that the size of a country's population as a single independent variable has no significant impact on its performance in international football. This may be illustrated by the fact that the world's most populous countries, China, India, the USA and Indonesia have not enjoyed football success in the world cup

tournaments (Table 1). Likewise, *Latin* on its own generates insignificant coefficients. As a result, we use a final specification of the model in which these two variables are entered as an interactive term. The rationale is that while increases in population are expected to generate a greater pool of potential football talent, this is exploited only to the extent that additional individuals participate in football rather than in rival activities. This would seem to partially depend on a country's cultural predisposition towards football, proxied by our *Latin* variable.

Equation (1) encapsulates our model of football success.[7] The variables are summarized in Table 3. The equation was estimated using the Ordinary-Least-Squares technique. Regression results are displayed in Table 4.

$$Y_i = \alpha + \beta_1 GNP_i + \beta_2 GNP_i^2 + \eta\,(TEMP_i - 14)^2 + \varrho\, HOST_i + \varphi\, LATIN_i \; x \; POP_i + \varepsilon_i \qquad (1)$$

Table 3. The Regression Variables

Variable	Description
Y_i	FIFA/Coca-Cola World Ranking points (Jan. 2001)
GNP_i	GNP per capita of country i
$TEMP_i$	Average annual Celsius temp. in country i's capital
POP_i	Country i's share of world population
$HOST_i$	Host dummy
$LATIN_i$	Latin dummy
ε_i	Error term
$\alpha, \beta_1, \beta_2, \eta, \varrho, \varphi$	Parameters

[7] The final specification of our model was derived on the basis of the Hendry general-to-specific method. In the testing process, a number of potential independent variables were rejected after initial analysis, including countries' continents, rainfall and humidity levels.

Table 4. Regression Results

Variable	Estimate	*t*-value	*p*-value
Constant	492.5865	19.2582***	0.0000
GNP	0.0107	2.3742**	0.0203
GNP^2	-2.45×10^{-7}	-1.6875*	0.0960
$(TEMP - 14)^2$	-0.4895	-1.9848*	0.0511
HOST	81.0510	1.8238*	0.0725
LATIN × *POP*	8587.4616	2.1828**	0.0324
	$\overline{R}^2 = 0.3180$		

Note: *, ** and *** denote significance at the 10, 5, and 1%-levels respectively.

Note that GNP^2, $(TEMP\text{-}14)^2$ and *HOST* are statistically insignificant at the 1- and 5%-levels but significant at the 10%-level based on their respective *t*-statistics. The former fact does not constitute evidence that football performance of a country is unaffected by the variables concerned. To determine whether these variables should be retained in our model, we use the Wald-test for coefficient restrictions. The null hypothesis for this test is $\beta_2 = \eta = \varrho = 0$. Under the null hypothesis, the Wald-statistic has an asymptotic $\chi^2(r)$ distribution, where *(r)* is the number of restrictions. If the random error, ε_i, is assumed to be independent and identically normally distributed, a finite-sample *F*-statistic is obtained. The *F*- and Chi-square statistics and their corresponding *p*-values are reported in Table 5.

The null hypothesis is rejected at the 5% by the *F*-statistic, and at the 1% significance levels by the Chi-square statistic. Squared GNP per capita, the deviation of average temperature from 14 degrees Celsius and the hosting effect therefore have a significant effect on a country's football performance.

In order to detect specification errors in our model, we use Ramsey's

Table 5. Results Testing H_0: $\beta_2 = \eta = \varrho = 0$

	Test statistic	*p*-value
F-statistic	3.9694	0.0113**
Chi-square	11.9081	0.0077***

Note: *, ** and *** denote significance at the 10, 5, and 1%-levels respectively.

RESET test (1969, 1970). This is a general test for omitted variables, incorrect functional form and correlation between right-hand side variables of a regression equation and disturbance terms. First, we estimate,

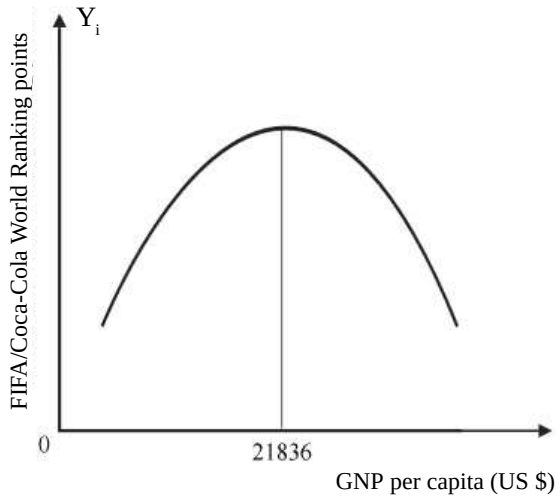
$$Y_t = \alpha_0 + \alpha_1 X_{1t} + \alpha_2 X_{2t} + ... + \alpha_k X_{kt} + \beta_1 \hat{Y}_t^2 + \beta_2 \hat{Y}_t^3 + ... + \beta_h \hat{Y}_t^{h+1} + \varepsilon_t \quad (2)$$

where the $\hat{Y}_t$ -terms are the OLS fitted values from equation (1). We test the null hypothesis of $\beta_1 = \beta_2 = ... = \beta_h = 0$ with test statistics which can be calculated in the standard *F* or χ^2 form. Rejecting the null suggests the presence of some sort of specification error. Here, the *Xs* in equation (2) are all the right-hand side variables in equation (1). We have selected $k = 2$. The calculated *F*- and χ^2 -statistics are 0.3668 and 0.8156 respectively. On the basis of both tests, we accept the null even at the 10% significance level, indicating that equation (1) is correctly specified.

Equation (1) confirms that the football performance of a country and GNP per capita form a quadratic relationship. Since the estimated β_2 takes a negative value, holding other variables unchanged, such a quadratic relationship is best described as an inverted U-shape. Initial increases in per-capita GNP improve a country's football performance, albeit at a decreasing rate. However, when GNP per capita exceeds a certain "optimal" level, any additional increases actually lowers world ranking points. The optimal level in our results is US$ 21,836, slightly less than the current per-capita GNP figures for most Western European countries. When GNP per capita exceeds this value, an

increase in GNP per capita actually leads to a decline in FIFA/Coca-Cola World Ranking points. This relationship is illustrated in Figure 1. Note that the exact position of the inverted U-shape curve is dependent on the values of other independent variables.

Figure 1. Football Performance and Per-Capita Income



The deviation of average temperature from 14 degrees Celsius, *TEMP-14*, is also quadratically specified, as previously explained. Since the estimated coefficient of this variable is negative, the relationship between a country's football performance and deviation of average temperature from 14 Celsius also constitutes an inverted U-shape. The maximum of FIFA/Coca-Cola World Ranking points occurs when the deviation of average temperature from 14 degrees Celsius is zero. In other words, any deviation of temperature from this "ideal" temperature lowers total ranking points. World ranking points fall at an increasing rate the larger is the size of a negative or positive deviation. This value is close to those for Spain, Italy, Portugal and the River Plate estuary in South America. Our interpretation is that temperate, Mediterranean climates are confirmed to be most conducive for outdoor playing activities.

The estimated coefficient corresponding to the dummy for past hosting of the world cup, *HOST*, is 81.051. This indicates that a country which has hosted in the past should win this number of points more than other countries which have not, *ceteris paribus*, i.e. exhibit the same values for GNP per capita and for our other variables. The results indicate that world championship hosting activity has an impact on performance in international games both inside and outside the world cup, as all competitive games constitute the data for our dependent variable. This implies that some of the host effect is due to sympathetic audiences, and some to the underlying football culture which generates both good squads and viable hosting bids.

Interestingly, an interaction term between Latin origin and population size is significant in our study, as reported. This implies that population size has no impact on football performance if a country has no Latin origin, or has only a Latin minority. The result also indicates that the larger the population size for a country with Latin origin the more points that country will win. The estimated coefficient of interaction term of 8587.46 can be interpreted as follows. If a country with Latin origin is able to increase its population size by 1% relative to the world population, its world ranking points will increase by about 86. Increasing population is of benefit to a nation's footballing success only to the extent that these additional youngsters engage in football rather than in competing activities. In other words, our *Latin* variable seems to measure the popularity of football as a participation sport compared with alternative sporting pursuits. Our result herefore documents the greater popularity of football in Latin countries as a participation sport. In other countries, it would appear that football is competing with too many rival activities for population increases to have a significant positive effect. In contrast, population as a single variable is a significant factor or success in the Olympic games, where a range of sports are concerned.

IV. Additional Tests

Our regression results show Latin cultural origin, combined with population

size, to be a significant influence on international football success. Much anecdotal evidence reveals the long football tradition and prowess of Latin nations on which our original hypothesis was based. To begin with, Latin countries such as Portugal, Argentina, Chile and Uruguay were among the first nations outside Britain to adopt the game and to establish domestic football associations. Here, football spread initially through the influence of British traders, workers and engineers (Murray, 1996, p.30; Giulianotti, 1999, p.8).[8] The Latin nation's early enthusiasm for football was matched by early international successes in the game. Uruguay, for instance, won the first international football competitions at the 1924 and 1928 Olympic Games as well as hosting and winning the first dedicated world cup in 1930 (Table 1). This record of Latin excellence has been maintained since. Nine out of a total of seventeen world cups have been won by South American teams (Table 1). Many celebrated international footballers are South Americans. These facts make impressive reading considering the small population size of South America (481 million compared with 730 million Europeans, 771 million Africans and over 3.6 billion Asians) and low-per capita incomes compared with Europe. As far as European Latin nations are concerned, both Spain and Portugal rank in the top 7 (Table 2). The Spanish domestic football league is often considered to be among the best in the world. Spanish Clubs such as Real Madrid and FC Barcelona feature prominently in international club competitions. Real have won more European cups than any other club (8 wins). Barcelona are the current record holders for the European Cup-Winners' Cup (4 wins). Barcelona is also the only club to have qualified for one of the

[8] As Association Football in its current form originated in England, one would expect the sport to have diffused initially among the British Isles and the overseas colonies, like rugby and cricket. However, the USA as well as Commonwealth countries such as Australia, New Zealand, Pakistan, India and Canada have weak football traditions. Instead, football spread most quickly where the British had strong trading ties rather than direct colonial control. The reason appears to be the working-class base of the game in England.

many Europe-wide competitions in every year since their introduction in 1955. Barcelona's Camp Nou stadium is the largest in Europe.[9]

This interesting issue clearly requires further explanation, which may lie in the particular social and cultural make-up of Latin societies. The question is which cultural aspects of Latin countries generate their shared enthusiasm for football. We conducted additional tests to draw out potential underlying factors. Our approach was to examine the determinants of the probability of a given country being Latin. In particular, we test two hypotheses. Firstly, a number of authors have pointed to a connection between sport and cultural values concerning gender and gender roles (e.g. Archetti, 1999; Melnick, 1992). It is possible that the cultural gender roles prevalent in Latin society may be partially responsible for these countries' excellent international football performance.[10] Proxies for such a variable are difficult to obtain. We use data on the labor force participation ratio of female to male in the formal sector for our sample of countries. This takes a value between zero and one, higher values indicating higher degrees of female participation.

Our second hypothesis concerns our previous argument that football may provide opportunities especially for underprivileged children (Murray, 1996, p. 49). This effect is expected to be stronger the more unequal the distribution of income is in a country. This argument is a possible explanation for the success of Latin nations in international football to the extent that they are characterized by relative income inequality. As a proxy, we use a Gini index which measures the equality in the distribution of income within countries. The Gini index assumes a value between zero and one hundred. A Gini index of zero represents perfect equality. Higher values indicate increasing inequality.

We use a logit model to test these two hypotheses. To make the analysis

[9] However, note that as most domestic leagues are open to foreign players, the international achievements of a country's clubs are indirect indicators for its football success.

[10] Latin nations fare conspicuously less well at international women's football. Here, teams such as USA, China, Norway and Germany consistently succeed in international games.

simpler, we estimated two separate one-variable logit equations of the general form:

$$ln\left(\frac{p(LATIN_i=1)}{1-p(LATIN_i=1)}\right)=\alpha_0+\alpha_1\ X_i+\varepsilon_i \quad (3)$$

where $p(LATIN_i = 1)$ is the probability that a country is Latin and X_i is the assigned explanatory variable. In the first estimation, the independent variable is the labor force participation ratio. In the second test, the independent variable is our Gini coefficient. Both data series were sourced from the *World Development Indicators 2001* of the World Bank.

In the logit equation, the estimated value of α_1 is - 4.7970 for the Labor force participation ratio and 0.1589 for the Gini Index. Both these variables are significant. The McFadden R^2-values are 0.1096 and 0.2926, respectively. The negative coefficient for labor force participation indicates that the probability that a country is Latin decreases with the degree of equality in labor-force participation. The positive coefficient for the Gini index indicates the larger the extend of unequal distribution of income the more likely a country is Latin.

The significance of Latin cultural origin in our study implies an underlying popularity of men's football as a participation sport in the countries concerned. The reasons are probably imbedded in the inherent make-up of Latin society, an issue clearly beyond the remit of the paper and possibly beyond the expertise of its authors. It is however an interesting issue which merits further theoretical investigation. Two factors which our economic analysis shows to be important in this context are gender roles and income inequality. This can be interpreted as tentative support for the notion that Latin males consider football a potential channel for the enhancement of their individual status and wealth.

V. Conclusions

Our results show the importance of country-inherent factors, such as culture, demography and geography, in the context of international football

performance. While per-capita wealth is also important, we find that beyond a certain level, greater wealth can harm a country's football performance.

Most countries spent significant national resources to promote the performance of their teams at international sporting events. The results presented here may be interpreted to suggest a limit to this type of government intervention. However, government sports policy may be useful for two reasons. First, as the R^2-value indicates, we offer only a partial explanation of football success. A more complete approach could include data regarding central sports funding in general and expenditure on football in particular. However, for the range of countries we consider, such data is difficult to obtain. Secondly, widespread sport participation, irrespective of international success, has significant positive externalities in terms of population health and well-being. These activities are therefore likely to be provided at a level below social efficiency. Suitable government policy fostering sports in general can clearly help offset this deficit as well as contribute to international sporting success.

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