Is football[1] an indicator of development at the international level?

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Abstract: The aim of this paper is to examine whether football can be considered an indicator of development at the international level. An empirical econometric model is designed in order to analyse development in terms of both levels of GDP per capita and GDP growth. Cross-sectional and time series information is used. The results suggest that FIFA rankings of national teams can be used to complement our understanding of multidimensional development in those countries where the availability of information is not as good as researchers would like.

Keywords: football, development, economic growth, international, instrumental variable

JEL classification: C23, L83, O11

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[1] Or soccer, depending on the culture and language in use.

1 Introduction

The United Nations assumes that there is a relationship between sport and development: in 2001 the United Nations Office of Sport for Development and Peace (UNOSDP) was created. In the words of Ban Ki-moon, Secretary-General of the United Nations:

> *"Sport has become a world language, a common denominator that breaks down all the walls, all the barriers. It is a worldwide industry whose practices can have a widespread impact. Most of all, it is a powerful tool for progress and development."*
> (Ban Ki-moon, United Nations Secretary-General, 11 May 2011, Geneva, Switzerland.)

There are reasons to believe that the practice of sport has beneficial effects on health, education and the general welfare of the population. In any case, sport, and football in particular, plays a non-negligible role in the economy of many countries, especially among developed nations. Indeed, Dimitrov et al. (2006), cited by the European Commission's *White Paper on Sport*, estimated that the sports industry in the European Union accounted for around 3.7% of total GDP and 5.4% of total employment. More recently, the European Sport Satellite Accounts suggested that sport accounts for between 3 and 3.7% of consumer expenditure, between 2.2 and 4.0% of gross value added and between 2.0 and 5.8% of employment across countries (European Commission, 2011).

Football is considered the most popular sport in the world, and its importance is illustrated by the fact that the 2002 FIFA World Cup was watched by over a billion television viewers worldwide (Hoffman et al., 2002b). According to FIFA estimates, there are currently around two hundred and seventy million active football players. Besides, football is one of the few sports that are played worldwide (Murray, 1996).

Thus, if there is a relationship between sport and development and football is such a popular sport, there should be a connection between football and development. If Nigeria, for instance, improves its performance in the Football World Cup, can we infer that the country has achieved higher development? Alternatively, should we expect the Chinese football team to improve their performance in the coming years? The current World (2010) and European (2008, 2012) champions, Spain, was a relatively poor country in 1982 when it organized the World Cup, but since joining the European Union in 1986 it has experienced 25 years of continued growth and convergence with other European countries. Other examples of a relationship between football

and the economy can, of course, be found, both positive and negative leading to the question: Can a national football team's performance be used as an indicator of development at the international level?

The paper addresses this question through five further sections. Section II reviews the literature on the topic. Section III introduces the theoretical analytical framework used in this research. Section IV presents the data sources. Section V sets out the empirical model and presents the estimation results. Finally, section VI offers some conclusions.

2 Literature review

Several studies seem to indicate that, football, and sport in general, has a bearing on development. Indeed, the literature review indicates that the relationship goes in both directions: on the one hand, development may influence sporting success; on the other, it could be the case that sporting success has an influence on development.

2.1 Development influencing sporting success

Economists have already shown that GDP[2] can be considered a good indicator of sporting success. Several studies (Hoffman et al., 2002a and 2002b; Houston and Wilson, 2002; Jiang and Xu, 2005; Leeds and Leeds, 2009; Li et al., 2009; Monks and Husch, 2009; Rathke and Woitek, 2008; Condon et al., 1999) have analysed success in football or at the Olympic Games as a dependent variable, and have included several explanatory variables, such as GDP, in an attempt to explain what sporting success is dependent on. These studies conclude that development may indeed have an influence on sporting success, and argue that as more developed countries are able to allocate greater resources to promote sport, they are more likely to be successful.

Hoffman et al. (2002b) and Houston and Wilson (2002) observed decreasing returns in the effect of per capita wealth on success on the football pitch. Specifically, when developing countries increase their per capita wealth they have, on average, more success in sport because

[2] Apart from per capita wealth, other variables can be considered important to account for differences in sporting success between countries. GDP per capita is not the only variable that explains sporting success, government involvement, for example, is argued to be a fundamental factor (Li et al., 2009).

they can allocate more resources to achieving this goal. However, for countries with high enough income levels any subsequent increase in the level of per capita wealth does not lead to greater sporting success. Consequently, one might expect that the relationship between sporting success and GDP would be more important in developing countries.

2.2 Sporting success influencing development

Studies of how sport might influence development have typically inspected the impact a new sports facility or franchise might have at the local level in terms of GDP per capita, employment, etc. Such studies of regional and local structures have reached opposing conclusions as regards the existence of such an effect.

Some studies have compared differences (again in terms of GDP per capita or employment) between regions or cities that have sports colleges, franchises or mega-events and those that do not (Baade, 1996; Baade et al., 2006; Baade et al., 2008; Barclay, 2009; Coates and Humphreys, 1999, 2003 and 2008; Hagn and Maennig, 2008 and 2009; Lertwachara and Cochran, 2007; Matheson, 2006; Matheson and Baade, 2004 and 2006) and conclude that there is no impact on the economy. The argument supporting this negligible impact is that although these sports facilities or events generate income and/or create jobs, this only happens at the expense of income or jobs in neighbouring localities or at the expense of other sectors. In other words, they identify a substitution (or trade-off) effect. Hence, these studies typically conclude that the money invested in American football or other sports would be better invested elsewhere.

The authors who find a positive impact of sport generally use case studies rather than cross-sectional methods. The results can be organized according to the various issues addressed:

- Some authors find positive employment effects or a positive growth rate effect as a result of sporting spectacles (Hotchkiss et al., 2003; Bohlmann and Van Heerden, 2005; Lentz and Laband, 2009).
- Others identify additional income from tourism by virtue of visitors bringing new money to the area where mega-events are held (Kang and Pardue, 1994; Gelan, 2003; Mondello and Rishe, 2004; Baumann et al., 2009), or additional income through the positive effect of winning the FIFA World Cup on the value of the tourism market (Nicolau, 2012).

- A few authors report positive effects on real estate due to the presence of sports facilities and teams, which generate intangible benefits that are capitalized into housing values (Tu, 2005; Feng and Humphreys, 2008; Jasmand and Maennig, 2008).
- Carlino and Coulson (2004) find differences in wages and rents in cities or metropolitan areas that have franchises. These authors argue that when people appreciate having a professional sports franchise in their community, they are presumably willing to pay for it. This indirectly implies an increased willingness to pay for housing in the area, and also an increased willingness to accept marginally lower wages.

Taken together, these findings suggest that sporting success may indeed influence local development, and thus football could have a positive impact on the creation of income and/or employment at local level.

The aim of this paper is to add to this debate on the link between sporting success and development by determining whether there is such a relationship at the international level in the world of football. To our knowledge, there is no economic literature on this subject. In this paper we establish the extent to which football may be related to certain determinants of growth through a framework analysis based on the theory of economic growth.

3 Building up a theoretical framework of analysis

We start by recognizing that the true explanatory variables of growth cannot in fact be identified by economists (Sala-i-Martin, 1997), and that there is no consensus on the theoretical framework which should guide empirical work on economic growth[3]. Kormendi and Meguire (1985) argue that although such studies are very useful for understanding the detailed structure of economic growth, they do not yield an understanding of the forces that affect it. According to Levine and Renelt (1992), existing models do not completely specify the variables that should be held constant when making statistical inferences about the relationship between growth and the variable of primary interest.

Despite their empirical limitations, two theoretical frameworks have proved useful. The first of these, endogenous growth models, such as those described by Romer (1986), Lucas (1988),

[3] We can nevertheless agree on a theoretical framework for the study of some of these variables: FDI (Borensztein et al., 1998), exports (Feder, 1982), government size (Ram, 1986), trust (Zack and Knack, (2001) and institutions (Glaeser et al., 2004).

Rebelo (1991) and Barro (1991), recognises just two specific variables as producing growth: human capital and technical progress. As such, sport, in general, and football, in particular, will be related to economic growth if they have a positive influence on human capital and technical progress, for instance by improving health, education or productivity.

However, the relationship between sporting success and health, education and productivity is not straightforward, and is based on the assumption that such success means that a significant proportion of the population practises a given sport. On the basis of this assumption, sporting success can be linked to the benefits that people are considered to derive from sport.

In the case of health, it is widely acknowledged that physical inactivity is a modifiable risk factor for cardiovascular disease and a wide variety of other chronic diseases, including diabetes mellitus, cancer (colon and breast), obesity, hypertension, bone and joint diseases (osteoporosis and osteoarthritis) and depression (Blair and Brodney, 1999; Blair et al., 1989; Bouchard and Shephard, 1994; McAuley, 1994; Paffenbarger et al., 1986; Warburton et al., 2001a, 2001b, and 2006).

Sport also has an impact on education. Indeed, many studies have found that sport has a statistically significant and positive effect on educational attainment (Pfeifer and Corneliβen, 2010; Robst and Keil, 2000; Smith, 2009; Tucker, 2004; Long and Caudill, 1991; McCormick and Tinsley, 1987; Tucker and Amato, 1993; Mixon and Treviño, 2005; Anderson, 2001; Lipscomb, 2007), since practising sport may enhance the development of discipline, self-confidence, motivation, a competitive spirit or other subjective traits that encourage success in education.

As far as productivity is concerned, one way to boost productivity is by raising levels of happiness, which may be engendered by the successes of a national football team. Indeed, research on the psychological impact of team success supports this notion of enhanced productivity through a rise in happiness (Davis and End, 2010; Hirtz et al., 1992; Kavetsos and Szymanski, 2010; Kavetsos, 2012; Berument and Yucel, 2005). The effects of happiness on productivity were also studied by Oswald et al. (2009), Compte and Postlewaite (2004), Wright and Staw (1999) and Royuela and Suriñach (2013), who conclude that human happiness has powerful causal effects on labour productivity, to the extent that increased happiness leads to greater productivity. Amabile et al. (2005) provide further evidence that happiness generates greater creativity and, therefore, more productivity. It is therefore reasonable to propose that sport or football may be linked to development through its ability to boost productivity.

The second major theoretical framework of economic growth is provided by the neoclassical model[4], as described by Ramsey (1928), Solow (1956), Cass (1965) and Koopmans (1965). In this model, in which every variable is exogenous, any variable can affect the steady-state position and, as such, influence the possibility of growth. If the long-term or steady-state level of per capita output is dependent on many variables (Barro, 1996), then we can add to our framework of analysis two additional aspects associated with sporting success that also support the belief that such success can affect economic development.

The first of these aspects is related to the fact that many authors show that football serves a social function, comprises a series of public assets and has a number of intangible effects, all of which are good for development. These include greater integration, civic pride among a country's citizens, community spirit, self-confidence, international status, national prestige, a unifying element to civic life, nation building and a potential feel-good factor (Süssmuth et al., 2010; Johnson and Whitehead, 2000; Johnson et al., 2001a and 2001b; Rappaport and Wilkerson, 2001; Maennig and du Plessis, 2007; Walton et al., 2008).

The second positive aspect of football is that as a sector it has great potential to promote the growth of developing countries due to border liberalization between these countries and the European Union. Indeed, the success of the world of football in general, coupled with the strong international expansion of the sport, has benefited such development. Two factors have played a determining role in this liberalization process:

a) The Bosman ruling (Frick, 2009) establishing the freedom of sports professionals to work in the EU.
b) The Cotonou Agreement, which allows the citizens of Africa, the Caribbean and Pacific countries, covered by the principle of non-discrimination with respect to EU citizens, to work freely in the EU, especially in the world of sports.

This border liberalization has enabled the football sector to become more globalized and to be a more effective driver of development in the least developed countries, whose workers (in this case, football players) can now enter those countries where football is more consolidated (EU member countries). This is not the case in all sectors. For example, sectors such as engineering or law place specific restrictions on the entry of workers from developing countries into their markets. Football therefore offers greater development opportunities for developing countries

[4] Other variables (control variables) are analysed simply through their influence on the steady-state position (Barro and Lee, 1994).

due to the mobility of workers and the remittances it generates, which are beneficial for the growth of the least developed countries.

To summarize, the economic literature has established that development has an influence on sporting success. But, the impact of sporting success on development at the international level has yet to be studied by economists. The theoretical framework proposed here draws on both the endogenous and neoclassical economic growth models and suggests that sporting success may well be an indicator of development due to the influence of sport on health, education, happiness and social function. In order to determine whether the performance of a country's national team can be considered a good indicator of development at the international level, we now turn to see if this hypothesis is supported by empirical data.

4 Data

Development is a broad concept, ranging from a purely economic to a more social/human interpretation such as that provided by the Millennium Development Goals (MDGs) adopted by the UN General Assembly. Human development has been defined as a process of enlarging people's choices and enhancing human capabilities (the range of things people can be and do) and freedoms, enabling them to live a long and healthy life, have access to knowledge and a decent standard of living, and participate in the life of their community and decisions affecting their lives (UNDP, 1900). Similarly, Sen (1999) has defined human development as the command of basic capabilities, such as a long and healthy life, and the enlarging of people's choices to have a meaningful and creative life. In line with the discussion in the preceding section, we would therefore expect sport to be more closely related to this concept of development than to that which is defined more strictly in economic terms.

Nevertheless, in order to test both interpretations of development, we consider both GDP per capita and the Human Development Index (HDI).[5] As a measure of development, Sagar and Najam (1998) note that the HDI has become a relevant alternative to the traditional one-

[5] Data on GDP per capita and HDI come from the Hybrid HDI data, available at http://hdr.undp.org/en/data/trends/hybrid/

dimensional measure of development (GDP per capita), given that the HDI captures more dimensions of development.

The HDI, published annually by the United Nations Development Programme (UNDP), contains three indicators: GDP per capita, life expectancy at birth and an index of education, which in turn comprises the adult literacy and enrolment rates. Arguably, the HDI is a good index as it takes into account these two social variables.

As for the variable that represents the degree of sporting success enjoyed by a country, and specifically its success at football, we use the FIFA ranking[6]. This variable, which is published monthly by FIFA, ranks each national team according to their success in international football. However, a complication arises if we seek to standardize the FIFA ranking variable with other databases because the UK is not represented as a single country: FIFA recognizes England, Scotland, Northern Ireland and Wales individually as independent teams with the right to play in international competitions. Following Hoffman et al. (2002b), we have therefore opted to include England as the representative of the UK as a whole.

The FIFA ranking orders the performance of national football teams using a points system. According to Leeds and Leeds (2009), FIFA began to rank its members in 1993 on the basis of their accumulated points, i.e., simple eight-year averages of their annual performances in 'A' matches, which were determined by applying a complex calculation that involved the average number of points awarded per game. In 2005, and in response to criticisms of its ranking system, FIFA simplified these calculations. The new ranking method, launched in July 2006, is the sum of the current year's performance and a three-year weighted average of previous annual performances. The annual performance is measured by average points per game, which are determined in a relatively transparent fashion on the basis of the match result, the importance of the match, the strength of the opponent and the strength of the regional confederation. The method for calculating the current FIFA rankings is shown in Annex 1.

[6] The FIFA ranking has been used by Hoffman et al. (2002b), Houston and Wilson (2002), Leeds and Leeds (2009) and Macmillan and Smith (2007) to analyse the relationship between the success of national football teams and economic development. The FIFA ranking is available at http://www.fifa.com/worldranking/rankingtable/index.html

The period for which both variables will be analysed as controls (specified below) covers the years from 1993 to 2010[7]. The analysis includes a total of 135 countries[8].

Having defined the key variables in our analysis we need to consider whether, *a priori*, there is any relationship between them. Table 1 presents quantitative results for the correlation between FIFA rankings and GDP per capita and between FIFA rankings and the HDI. It can be seen that although there is a strong negative correlation of -0.4355/-0.4302, respectively, in the case of the raw data (overall variation) this relationship decreases when controlling for country and time effects (-0.0278/-0.0644, respectively). In order to determine which of these dimensions affects the correlation, we control separately for country and time effects. It can be seen that the observed correlation disappears when the country effects are removed (-0.00/-0.0194, respectively), whereas it becomes stronger (-0.4399/-0.4371, respectively) when only the time dimension is controlled for. These outcomes are very similar both for the economic dimension (GDP per capita) and the HDI.

Table 1. Correlation between FIFA ranking, log GDP and HDI

corr (log GDP, FIFA ranking)		Time Fixed Effects	
		NO	*YES*
Country fixed Effects	*NO*	-0.4355	-0.4399
	YES	-0.0000	-0.0278

corr (HDI, FIFA ranking)		Time Fixed Effects	
		NO	*YES*
Country fixed Effects	*NO*	-0.4302	-0.4371
	YES	-0.0194	-0.0644

As we have assumed above, development involves a set of explanatory factors. In order to isolate the correlation between a country's success at football and its development, we also consider other control variables that are routinely used in the economics literature to explain the determinants of development.

[7] This period is chosen because FIFA rankings commenced in 1993 and the Hybrid HDI ends in 2010.
[8] This is the number of countries available in the Hybrid HDI. The full list of countries analysed can be consulted in Annex 2.

- *Openness*[9]. This variable reflects the sum of exports plus imports relative to GDP. In addition, this variable provides information about the extent to which an economy is open to the outside. Trade openness is a variable of interest, since different agencies, including UNCTAD, argue that economic liberalization is a key factor in developing countries. From this point of view, it is often argued that trade restrictions have a negative effect on the efficiency of an economy because of the failure to exploit comparative advantage, and hence they reduce aggregate output. If this were true, countries that reduced trade restrictions over time should experience higher economic growth.
- *Population*[10]. Kormendi and Maguire (1985) argue that, under standard neoclassical growth theory, the steady-state growth rate should equal the growth rate of the labour force plus the growth rate of exogenous technological change. Thus, if all countries are in the steady state there should be a one-for-one effect of population growth on growth. In the transition to the steady state, however, the effect may be less than one-for-one if either capital accumulation or labour force growth does not keep pace with population growth.
- *Investment (% GDP)*[11]. This variable covers the total investments made by a particular country relative to its GDP. Harrod (1939), Domar (1946) and Rostow (1959) argue that countries with higher investment relative to their GDP are the fastest growing countries, while countries in which investment has less weight are those with the lowest growth.
- *Inflation*[12]. Stockman (1981) argues that in a 'cash-in-advance' economy, higher anticipated inflation reduces economic activity, in which case greater growth in anticipated inflation would lower economic growth.
- *Government Consumption (% GDP)*[13]. Grier and Tullock (1989) found a significantly negative relation between the growth of real GDP and the growth of the government share of GDP.

The descriptive statistics for all the variables used in the present study are summarized in Table 2, and the correlations between all the variables are shown in Tables 3 and 4. It can be seen that football is correlated with GDP per capita, the HDI, population growth, life expectancy at birth, the adult literacy rate and trade openness; however, these correlations disappear when country and time effects are taken into account (this being the case for all other correlations).

[9] Openness data come from the Penn World Table (PWT) 7.1.
[10] Annual population data come from the PWT 7.1.
[11] Data on investment relative to GDP come from the PWT 7.1.
[12] Inflation data come from the World Development Indicators.
[13] Government Consumption data come from the PWT 7.1.

Table 2. Descriptive statistics

		Standard Deviation				
	Mean	Overall	Between	Within	Max	Min
lgdp	8.69	1.37	1.36	0.18	11.3	5.1
HybridHDI	0.66	0.18	0.18	0.03	0.94	0.12
fifa_r	82.24	53.27	51.1	17.92	201	1
openk	80.62	45.73	42.87	16.3	398.18	8.78
POP	42188.7	143739.8	143951.5	9170.911	1330141	96.947
infl_GDPd	47.82	668.87	187.25	641.83	26762.02	-32.81
kg	9.89	5.94	5.62	1.98	58.64	0.9
ki	21.93	8.61	7.11	4.89	58.08	0.69

Note: lgdp= logarithm GDP per capita, PPP$; HybridHDI= Hybrid HDI values, HDI=(Lifex*EDUx*GDPx)^(1/3); fifa_r = FIFA ranking; openk = Openness at 2005 constant prices (%); POP = Population (in thousands); infl_GDPd = Inflation, GDP deflator (annual %); kg = Government Consumption Share of PPP Converted GDP Per Capita at 2005 constant prices; ki = Investment Share of PPP Converted GDP Per Capita at 2005 constant prices.

Table 3. Correlation Raw Data (overall variation)

	fifa_r	HybridHDI	lgdp	kg	ki	openk	infl_GDPd
HybridHDI	-0.43						
lgdp	-0.44	0.96					
kg	0.36	-0.40	-0.39				
ki	-0.04	0.37	0.38	-0.15			
openk	0.22	0.27	0.28	-0.12	0.26		
infl_GDPd	-0.00	-0.05	-0.06	-0.03	-0.06	-0.04	
POP	-0.03	-0.04	-0.06	0.07	0.13	-0.20	-0.00

Table 4. Correlation, Country and Time Effects Controlled Data

	fifa_r	HybridHDI	lgdp	kg	ki	openk	infl_GDPd
HybridHDI	-0.06						
lgdp	-0.03	0.62					
kg	0.05	-0.01	-0.19				
ki	-0.01	0.25	0.20	-0.08			
openk	0.11	0.03	0.16	-0.06	0.11		
infl_GDPd	0.02	0.07	0.05	-0.09	-0.03	-0.03	
POP	0.08	0.17	0.13	0.05	0.04	-0.00	-0.00

5 Empirical model

The above analysis revealed bivariate correlations between football and development. What is required next, therefore, is to determine whether football can be considered an indicator of development once all other aspects are considered. Below, we study the contemporaneous

relationships between football and GDP per capita, on the one hand, and between football and the HDI, on the other.

Our starting point here is to analyse levels of GDP[14] per capita according to a list of variables that can be considered determinants of development. Moreover, regional dummy variables are included to complete a regional analysis[15].

The model employed assumes a panel specification, considering both cross-sectional and time-series information. Its essential advantage is that it is able to control for country and time specificities in the fixed-effects estimation.

$$\ln GDP_{i,t} = \alpha + \beta_1 fifa\_r_{i,t} + \beta_2 kg_{i,t} + \beta_3 ki_{i,t} + \beta_4 openk_{i,t} + \beta_5 \text{infl}\_GDPp_{i,t} + \beta_6 POP_{i,t} + u_{i,t}$$

The estimations were performed using different procedures (see Table 5). All estimates, even the fixed effects estimate, gave a negative and significant result for the FIFA variable. The Hausman test (not reported here) applied to the fixed and random effects estimations rejected the null hypothesis of equal vectors of parameters, which implies endogeneity in the random effects estimation. Consequently, the fixed effects estimation is preferable to the random effects estimation, although in both cases football is significant.

Interestingly the coefficient of the 'between' estimation (0.00814) is around thirty times larger than that of the fixed effects regression (-0.000285), and the parameter in the random effects estimation (-0.000340) is also higher than that in the fixed effects estimation. In other words: country A with a FIFA ranking ten places higher than that of country B can be expected to have a GDP per capita that is around 8% higher. Similarly, if a country rises ten places in the FIFA ranking one year, we expect it to experience a parallel growth in its GDP per capita of around 0.3%.

Table 5. Panel regressions – log(GDP)

	(1) OLS	(2) OLS	(3) Fixed Effects	(4) Between	(5) Random Effects
FIFA_r	-0.000340**	-0.00850***	-0.000285**	-0.00814***	-0.000340**
	(0.000135)	(0.000403)	(0.000132)	(0.00175)	(0.000135)
kg	-0.0127***	-0.0250***	-0.0123***	-0.0211	-0.0127***
	(0.00132)	(0.00437)	(0.00130)	(0.0138)	(0.00132)
ki	0.00430***	0.0354***	0.00411***	0.0455***	0.00430***
	(0.000517)	(0.00248)	(0.000503)	(0.0106)	(0.000517)

[14] Following Easterly (2007), the current level of GDP is the result of consecutive years of economic growth.
[15] Regional dummy variables CONCACAF, CONMEBOL, AFC, CAF, and OFC are the regional football confederations. UEFA is the omitted confederation.

openk	0.00123***	0.00499***	0.00117***	0.00476***	0.00123***
	(0.000177)	(0.000393)	(0.000173)	(0.00172)	(0.000177)
infl_GDPd	9.16e-06**	-7.74e-05**	9.42e-06**	-0.00107***	9.16e-06**
	(4.21e-06)	(3.46e-05)	(4.09e-06)	(0.000403)	(4.21e-06)
POP	1.22e-06***	-7.35e-07***	1.82e-06***	-8.53e-07*	1.22e-06***
	(2.30e-07)	(8.56e-08)	(2.59e-07)	(4.79e-07)	(2.30e-07)
CONCAFAF	-0.591**	-0.266***		-0.446*	-0.591**
	(0.240)	(0.0672)		(0.262)	(0.240)
CONMEBOL	-0.719***	-0.582***		-0.695***	-0.719***
	(0.249)	(0.0419)		(0.254)	(0.249)
AFC	-1.038***	-0.434***		-0.602***	-1.038***
	(0.179)	(0.0638)		(0.223)	(0.179)
CAF	-2.250***	-1.693***		-1.836***	-2.250***
	(0.167)	(0.0464)		(0.201)	(0.167)
OFC	-0.462	0.293***		0.269	-0.462
	(0.347)	(0.0808)		(0.390)	(0.347)
Constant	9.400***	9.056***	8.426***	19.05***	9.400***
	(0.116)	(0.0963)	(0.0261)	(4.290)	(0.116)
Time Dummies	NO	YES	YES	---	YES
Observations	2,360	2,360	2,360	2,360	2,360
R-squared		0.668	0.636	0.766	
Number of coun_id	135		135	135	135

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

The next step is to analyse the HDI, instead of GDP per capita, as the dependent variable. The equation to be estimated is:

$$HDI_{i,t} = \alpha + \beta_1 fifa\_r_{i,t} + \beta_2 kg_{i,t} + \beta_3 ki_{i,t} + \beta_4 openk_{i,t} + \beta_5 \text{infl}\_GDPp_{i,t} + \beta_6 POP_{i,t} + u_{i,t}$$

The results displayed in Table 6 show that the FIFA ranking has a significant and negative relationship with the HDI. As with GDP per capita, the random and fixed effects estimates differ widely. It should be noted that the HDI has a large between standard deviation compared to the within standard deviation. This result needs to be given careful consideration when examining the meaning of the parameters. Thus, the parameter at the between estimation (-0.000984) implies that a rise of ten places in the FIFA ranking is associated with an HDI that is around 1% higher. This means that, around the median of the distribution, a rise of ten places in the FIFA ranking is associated with an improvement in the HDI ranking of five places. Alternatively, the fixed effects estimate (7.16e-05) implies that when a country climbs ten places in the FIFA ranking in one year its HDI can be expected to improve by 0.07%, close to a tenth of the average annual growth rate of the HDI.

Table 6. Panel regressions – HDI

	(1) OLS	(2) OLS	(3) Fixed Effects	(4) Between	(5) Random Effects

FIFA_r	-0.000966***	-0.000970***	-7.16e-05***	-0.000984***	-8.24e-05***
	(4.35e-05)	(4.43e-05)	(1.93e-05)	(0.000189)	(1.98e-05)
kg	-0.00345***	-0.00339***	-2.31e-05	-0.00321**	-0.000140
	(0.000351)	(0.000417)	(0.000189)	(0.00149)	(0.000194)
ki	0.00417***	0.00411***	0.000880***	0.00553***	0.000917***
	(0.000231)	(0.000244)	(7.34e-05)	(0.00114)	(7.59e-05)
openk	0.000621***	0.000569***	1.63e-05	0.000541***	3.24e-05
	(4.51e-05)	(3.82e-05)	(2.52e-05)	(0.000186)	(2.58e-05)
infl_GDPd	-7.95e-06***	-6.44e-06***	2.44e-06***	-0.000109**	2.38e-06***
	(3.05e-06)	(2.16e-06)	(5.97e-07)	(4.35e-05)	(6.19e-07)
POP	-6.12e-08***	-6.65e-08***	3.02e-07***	-8.03e-08	1.64e-07***
	(1.35e-08)	(8.36e-09)	(3.77e-08)	(5.18e-08)	(3.08e-08)
CONCAFAF	-0.0347***	-0.0341***		-0.0430	-0.0792***
	(0.00711)	(0.00693)		(0.0283)	(0.0262)
CONMEBOL	-0.0564***	-0.0578***		-0.0625**	-0.0745***
	(0.00716)	(0.00433)		(0.0274)	(0.0271)
AFC	-0.0789***	-0.0782***		-0.0861***	-0.153***
	(0.00602)	(0.00578)		(0.0241)	(0.0195)
CAF	-0.279***	-0.280***		-0.285***	-0.349***
	(0.00524)	(0.00553)		(0.0217)	(0.0182)
OFC	0.0679***	0.0657***		0.0729*	-0.0271
	(0.0106)	(0.00889)		(0.0421)	(0.0378)
Constant	0.732***	0.715***	0.598***	1.146**	0.744***
	(0.00740)	(0.0104)	(0.00381)	(0.463)	(0.0128)
Time Dummies	NO	YES	YES	---	YES
Observations	2,360	2,360	2,360	2,360	2,360
R-squared	0.773	0.779	0.688	0.846	
Number of coun_id			135	135	135

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

In our view these results merit some attention. In the 'between' and random effects estimations, where the between variance of the variables plays a role, it can be seen that a country's football performance is related to its long-term development: higher levels of development and better FIFA rankings are observed simultaneously, even after controlling for different factors. We believe this to be evidence of a relationship between football and development, and that football can, in particular, be used as an indicator of long-term development at the international level. The endogeneity which results in larger values of the estimates indicates that football is related to non-observable factors that are associated with GDP per capita or the HDI, thereby lending further support to our hypothesis that football is associated with development.

Interestingly, the significant results hold when we perform a fixed effects estimation: there is a year-to-year association between football and development once a country's specific characteristics have been controlled for. Consequently, in the short term also, the performance of a national football team is associated with higher levels of development, albeit that the impact is of a lower magnitude.

The above estimates show the contemporaneous relationship between success on the international football pitches and development. However, it may be the case that some of the channels by which the two are related may take several years to develop. Consequently, we estimated the fixed effects model for development in alternative equations where football is lagged by up to 10 years. Tables 1 and 2 in the appendix 3 show the main results. In the case of GDP, we find the strongest impact when lagged for nine years, whereas in the case of the HDI, the parameter is strongest in the contemporaneous relationship (no lag) while the impact disappears over time (no longer significant when lagged for seven years).

6 Conclusions

We have examined whether football can be considered a good indicator of development at the international level. Considering a panel of 135 countries over the period 1993 to 2010, we have estimated a list of models in which both GDP per capita and the HDI depend on the country's FIFA ranking, as well as on other more traditional factors of development, including education, health, trade openness, inflation, population growth and the investment ratio. In all the model specifications considered ('between' estimators, random and fixed effects), football has been shown to be a significant factor with the expected sign. This result can be interpreted as demonstrating that a country's FIFA ranking may be considered an indicator of development, both in the long- and short-run. However, as in Kavetsos (2012), estimated results cannot be taken as casual evidence per se. Yet Downie and Koetner (2008) find that sports do mirror society, and while claims about causality and its direction are never straightforward, we understand that a significant association does exist.

As such, the findings reported here can be used to complement our broader understanding of multidimensional development. And, in those countries where the availability of information is not as good as researchers might like, the performance of the national football team might usefully serve as an additional indicator. Finally, the study provides a further practical outcome for applied scientists: a country's football performance can be used as an instrument in those studies in which development might be an endogenous variable (as in Biagi et al., 2011).

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Annex

Annex nº1:

How are points calculated in the FIFA/Coca-Cola World Ranking?

A team's total number of points over a four-year period is determined by adding:

- the average number of points gained from matches during the past 12 months; and
- the average number of points gained from matches older than 12 months (depreciates yearly).

Calculation of points for a single match

The number of **p**oints that can be won in a match depends on the following factors:

• Was the **m**atch won or drawn? (**M**)

• How **i**mportant was the match (*ranging from a friendly match to a FIFA World Cup™ match*)? (**I**)

• How strong was the opposing **t**eam in terms of ranking position and the **c**onfederation to which they belong? (**T and C**)

These factors are brought together in the following formula to ascertain the total number of points (**P**).

P = M x I x T x C

The following criteria apply to the calculation of points:

M: Points for match result

Teams gain 3 points for a victory, 1 point for a draw and 0 points for a defeat. In a penalty shoot-out, the winning team gains 2 points and the losing team gains 1 point.

I: Importance of match

Friendly match (including small competitions): I = 1.0

FIFA World Cup™ qualifier or confederation-level qualifier: I = 2.5

Confederation-level final competition or FIFA Confederations Cup: I = 3.0

FIFA World Cup™ final competition: I = 4.0

T: Strength of opposing team

The strength of the opponents is based on the formula: 200 – the ranking position of the opponents. As an exception to this formula, the team at the top of the ranking is always assigned the value 200 and the teams ranked 150th and below are assigned a minimum value of 50. The ranking position is taken from the opponents' ranking in the most recently published FIFA/Coca-Cola World Ranking.

C: Strength of confederation

When calculating matches between teams from different confederations, the mean value of the confederations to which the two competing teams belong is used. The strength of a confederation is calculated on the basis of the number of victories by that confederation at the last three FIFA World Cup competitions. Their values are as follows:

UEFA/CONMEBOL 1.00 CONCACAF 0.88 CAF 0.86 AFC/OFC 0.85

Note: FS-590_10E_WR_Points.Doc 11/02 Content Management Services 2/3 on FIFA website

Annex nº2

1.-	Afghanistan	35.-	Czech Republic	69.-	Kyrgyzstan	103.-	Portugal
2.-	Albania	36.-	Denmark	70.-	Laos	104.-	Qatar
3.-	Algeria	37.-	Djibouti	71.-	Latvia	105.-	Romania
4.-	Argentina	38.-	Dominican Republic	72.-	Lebanon	106.-	Russian Federation
5.-	Armenia	39.-	Ecuador	73.-	Lesotho	107.-	Rwanda
6.-	Australia	40.-	Egypt	74.-	Liberia	108.-	Samoa
7.-	Austria	41.-	El Salvador	75.-	Libyan Arab	109.-	Saudi Arabia
8.-	Azerbaijan	42.-	Estonia	76.-	Lithuania	110.-	Senegal
9.-	Bahrain	43.-	Ethiopia	77.-	Luxembourg	111.-	Slovakia
10.-	Bangladesh	44.-	Fiji	78.-	Madagascar	112.-	Slovenia
11.-	Belarus	45.-	Finland	79.-	Malawi	113.-	Spain
12.-	Belgium	46.-	France	80.-	Malaysia	114.-	Sudan
13.-	Benin	47.-	Georgia	81.-	Mali	115.-	Swaziland
14.-	Bolivia	48.-	Ghana	82.-	Malta	116.-	Sweden
15.-	Botswana	49.-	Greece	83.-	Mauritius	117.-	Switzerland
16.-	Brazil	50.-	Guatemala	84.-	Mexico	118.-	Tajikistan
17.-	Brunei Darussalam	51.-	Guyana	85.-	Moldova (Rep.)	119.-	The f. Rep Macedonia
18.-	Bulgaria	52.-	Honduras	86.-	Mongolia	120.-	Togo
19.-	Burkina Faso	53.-	Hong Kong SAR	87.-	Morocco	121.-	Tonga
20.-	Burundi	54.-	Hungary	88.-	Mozambique	122.-	Trinidad and Tobago
21.-	Cambodia	55.-	Iceland	89.-	Nepal	123.-	Tunisia
22.-	Cameroon	56.-	India	90.-	Netherlands	124.-	Turkey
23.-	Canada	57.-	Indonesia	91.-	New Zealand	125.-	Uganda
24.-	Central African Rep.	58.-	Iran, Islamic Rep.	92.-	Nicaragua	126.-	Ukraine
25.-	Chad	59.-	Ireland	93.-	Niger	127.-	United Arab Emirates
26.-	Chile	60.-	Israel	94.-	Nigeria	128.-	United Kingdom
27.-	China	61.-	Italy	95.-	Norway	129.-	United States
28.-	Colombia	62.-	Jamaica	96.-	Oman	130.-	Uruguay
29.-	Congo	63.-	Japan	97.-	Pakistan	131.-	Uzbekistan
30.-	Congo DR	64.-	Jordan	98.-	Panama	132.-	Venezuela, RB
31.-	Costa Rica	65.-	Kazakhstan	99.-	Paraguay	133.-	Viet Nam
32.-	Côte d'Ivoire	66.-	Kenya	100.-	Peru	134.-	Zambia
33.-	Croatia	67.-	Korea (Republic of)	101.-	Philippines	135.-	Zimbabwe
34.-	Cyprus	68.-	Kuwait	102.-	Poland		

Annex 3.

Table A3.1. Fixed effects estimate. Endogenous variable log(GDP)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
FIFA_r	-0.000285**										
	(0.000132)										
LAG1.FIFA_r		-0.000269**									
		(0.000134)									
LAG2.FIFA_r			-0.000339**								
			(0.000135)								
LAG3.FIFA_r				-0.000458***							
				(0.000133)							
LAG4.FIFA_r					-0.000467***						
					(0.000132)						
LAG5.FIFA_r						-0.000546***					
						(0.000134)					
LAG6.FIFA_r							-0.000584***				
							(0.000132)				
LAG7.FIFA_r								-0.000583***			
								(0.000131)			
LAG8.FIFA_r									-0.000613***		
									(0.000129)		
LAG9.FIFA_r										-0.000656***	
										(0.000125)	
LAG10.FIFA_r											-0.000600***
											(0.000117)
kg	-0.0123***	-0.0149***	-0.0169***	-0.0184***	-0.0186***	-0.0169***	-0.0158***	-0.0154***	-0.0148***	-0.0144***	-0.0137***
	(0.00130)	(0.00139)	(0.00145)	(0.00152)	(0.00156)	(0.00157)	(0.00157)	(0.00161)	(0.00165)	(0.00165)	(0.00166)
ki	0.00411***	0.00377***	0.00369***	0.00369***	0.00341***	0.00304***	0.00288***	0.00250***	0.00191***	0.00191***	0.00251***
	(0.000503)	(0.000511)	(0.000521)	(0.000528)	(0.000540)	(0.000562)	(0.000569)	(0.000579)	(0.000584)	(0.000571)	(0.000551)
openk	0.00117***	0.00131***	0.00131***	0.00129***	0.00113***	0.00110***	0.00101***	0.000842***	0.000635***	0.000460**	0.000436**
	(0.000173)	(0.000176)	(0.000180)	(0.000184)	(0.000187)	(0.000194)	(0.000195)	(0.000196)	(0.000206)	(0.000214)	(0.000220)
infl_GDPd	9.42e-06**	1.54e-05***	3.47e-05	3.56e-05	1.82e-05	2.88e-05	-0.000192*	-0.000245*	-0.000382**	-0.000717**	-0.000390
	(4.09e-06)	(4.11e-06)	(2.59e-05)	(2.54e-05)	(2.44e-05)	(2.42e-05)	(0.000111)	(0.000127)	(0.000175)	(0.000307)	(0.000297)
POP	1.82e-06***	1.81e-06***	1.82e-06***	1.86e-06***	1.99e-06***	2.13e-06***	2.36e-06***	2.67e-06***	3.03e-06***	3.40e-06***	3.56e-06***
	(2.59e-07)	(2.73e-07)	(2.90e-07)	(3.06e-07)	(3.24e-07)	(3.47e-07)	(3.70e-07)	(3.95e-07)	(4.20e-07)	(4.45e-07)	(4.65e-07)
Constant	8.426***	8.454***	8.784***	8.544***	8.583***	8.594***	8.830***	8.644***	8.675***	8.863***	8.672***
	(0.0261)	(0.0269)	(0.0304)	(0.0277)	(0.0285)	(0.0297)	(0.0336)	(0.0313)	(0.0319)	(0.0356)	(0.0334)
Observations	2,360	2,230	2,099	1,968	1,835	1,702	1,569	1,436	1,302	1,168	1,035
R-squared	0.636	0.641	0.639	0.641	0.639	0.636	0.638	0.638	0.643	0.651	0.653
Number of coun_id	135	135	135	135	135	135	135	135	134	133	133

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A3.2. Fixed effects estimate. Endogenous variable Hybrid HDI

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
FIFA_r	-7.16e-05***										
	(1.93e-05)										
LAG1.FIFA_r		-6.68e-05***									
		(1.95e-05)									
LAG2.FIFA_r			-6.92e-05***								
			(1.91e-05)								
LAG3.FIFA_r				-5.42e-05***							
				(1.81e-05)							
LAG4.FIFA_r					-3.89e-05**						
					(1.67e-05)						
LAG5.FIFA_r						-3.46e-05**					
						(1.64e-05)					
LAG6.FIFA_r							-2.93e-05*				
							(1.59e-05)				
LAG7.FIFA_r								-2.54e-05			
								(1.56e-05)			
LAG8.FIFA_r									-1.78e-05		
									(1.54e-05)		
LAG9.FIFA_r										-1.70e-05	
										(1.48e-05)	
LAG10.FIFA_r											-1.89e-05
											(1.38e-05)
kg	-2.31e-05	-0.000115	-0.000328	-0.000500**	-0.000647***	-0.000566***	-0.000574***	-0.000540***	-0.000437**	-0.000464**	-0.000511***
	(0.000189)	(0.000201)	(0.000205)	(0.000207)	(0.000197)	(0.000193)	(0.000189)	(0.000191)	(0.000195)	(0.000196)	(0.000195)
ki	0.000880***	0.000811***	0.000736***	0.000673***	0.000639***	0.000587***	0.000499***	0.000420***	0.000325***	0.000287***	0.000361***
	(7.34e-05)	(7.41e-05)	(7.36e-05)	(7.17e-05)	(6.82e-05)	(6.88e-05)	(6.85e-05)	(6.88e-05)	(6.93e-05)	(6.77e-05)	(6.47e-05)
openk	1.63e-05	4.09e-05	5.37e-05**	6.74e-05***	5.51e-05**	7.46e-05***	9.43e-05***	0.000102***	8.45e-05***	6.46e-05**	5.23e-05**
	(2.52e-05)	(2.56e-05)	(2.54e-05)	(2.50e-05)	(2.37e-05)	(2.37e-05)	(2.34e-05)	(2.33e-05)	(2.44e-05)	(2.54e-05)	(2.58e-05)
infl_GDPd	2.44e-06***	2.74e-06***	6.61e-06*	3.59e-06	-1.21e-06	-1.99e-06	-1.63e-05	-2.76e-05*	-3.58e-05*	-4.24e-07	3.11e-05
	(5.97e-07)	(5.97e-07)	(3.66e-06)	(3.44e-06)	(3.08e-06)	(2.96e-06)	(1.34e-05)	(1.51e-05)	(2.07e-05)	(3.64e-05)	(3.49e-05)
POP	3.02e-07***	3.03e-07***	3.07e-07***	3.16e-07***	3.35e-07***	3.56e-07***	3.83e-07***	4.12e-07***	4.42e-07***	4.58e-07***	4.42e-07***
	(3.77e-08)	(3.96e-08)	(4.09e-08)	(4.15e-08)	(4.09e-08)	(4.25e-08)	(4.45e-08)	(4.69e-08)	(4.99e-08)	(5.28e-08)	(5.46e-08)
Constant	0.598***	0.601***	0.661***	0.615***	0.621***	0.623***	0.660***	0.631***	0.635***	0.664***	0.645***
	(0.00381)	(0.00391)	(0.00429)	(0.00377)	(0.00360)	(0.00364)	(0.00405)	(0.00372)	(0.00379)	(0.00422)	(0.00393)
Observations	2,360	2,230	2,099	1,968	1,835	1,702	1,569	1,436	1,302	1,168	1,035
R-squared	0.688	0.684	0.683	0.691	0.711	0.712	0.711	0.708	0.702	0.699	0.705
Number of coun_id	135	135	135	135	135	135	135	135	134	133	133

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1