DOCUMENTS DE TREBALL
DE LA FACULTAT D'ECONOMIA I EMPRESA

Col.lecció d'Economia

E12/275

Is football an indicator of development at the international level?

Robert Gásquez and Vicente Royuela

Adreça correspondencia:

Robert Gásquez:
Grup de recerca "Organització Econòmica Internacional i Integració Europea", Departament de Dret i Economia Internacionals, Universitat de Barcelona.
Av. Diagonal, 690. 08034 - Barcelona, Espanya. E-mail: robertgasquez@hotmail.com
Tel. (+34) 93 402 19 39
Vicente Royuela:
Grup de recerca AQR-IREA, Departament d'Econometria, Estadística i Economia Espanyola, Universitat de Barcelona.
Av. Diagonal, 690. 08034 - Barcelona, Espanya.
E-mail: vroyuela@ub.edu Tel. (+34) 93 403 57 32

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.

Resumen: El objetivo de este trabajo es examinar si el fútbol puede ser considerado como un indicador de desarrollo a nivel internacional. Se ha diseñado un modelo econométrico empírico con el fin de analizar el desarrollo en términos de niveles de PIB per cápita y del crecimiento del PIB. Se utiliza información transversal y temporal. Los resultados sugieren que la clasificación FIFA de las selecciones nacionales se puede utilizar para complementar nuestra comprensión del desarrollo multidimensional en aquellos países donde la disponibilidad de la información no es tan buena como los investigadores quisieran.

JEL codes: C23, L83, O11
Key words: football, development, economic growth, international, instrumental variable

I. INTRODUCTION

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). Moreover, there are reasons to believe that the practice of sport has beneficial effects on health, education and the general welfare of the population.

Football is considered to be 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). In terms of participation, football is one of the few sports that are played all over the world (Murray, 1996). According to FIFA estimates, there are currently around two hundred million active football players.

Despite the importance of football in Spain the national side was unable to reach the quarter finals when the country hosted the 1982 World Cup. Spain at that time was a poor country in European terms, and did not join the European Union until 1986. However, after 25 years of continued growth and convergence with other European countries, Spain eventually won both the European (2008) and World (2010) football championships. Other examples of a relationship between football and the economy can, of course, be found, both positive (Australia, Croatia, Israel or Ukraine) and negative (Belgium, Malta, Mozambique or Zimbabwe). However, if we have no idea about international economics and we see Nigeria, for instance, playing good football at the World Cup, does this also mean that the country is developing? Alternatively, should we expect the Chinese football team to improve in the coming years? In this context the question addressed by the present study is: Can a national football team's performance be used as an indicator of development at the international level?

In answering this question the paper is organized as follows. Section II reviews the literature on the topic, while in section III we present the data sources used. Section IV then sets out the empirical model and presents the estimation results. Finally, section V offers a number of conclusions.

II. LITERATURE REVIEW

Football, and sport in general, may be related to economic development. On the one hand, the economy may influence sporting success, while on the other it could be that sporting success has an influence on economic development.

As regards the former possible relationship, economists have already shown that GDP[1] can be considered as a good indicator of sporting success. Several studies (Hoffman et al., 2002a and 2002b; Houston et al., 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 in the Olympic Games as a dependent variable, and have included several explanatory variables such as GDP in an attempt to explain what sporting success depends on. These studies conclude that development may indeed have an influence on sporting success, and argue that because more developed countries can allocate greater resources to enhance the game they are therefore more likely to be successful.

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

As to the second possible relationship, i.e. the influence of sporting success on the economy, this has, to our knowledge, only been studied in terms of the impact of such success on regional or local structures, and there is no economic research on whether sporting success is linked with development at the international level. Rather, the extant literature has attempted to analyse whether sports colleges, franchises or mega-events have a positive effect on regional economic growth. These studies on regional and local structures have reached opposing conclusions as regards the existence of such an effect.

[1] Apart from per capita wealth there are other variables that are important when explaining differences in sporting success between countries. Therefore, it cannot be concluded that GDP per capita is the only variable that explains sporting success, since there are other important factors such as government involvement, which according to Li et al. (2009) is the most fundamental feature (more than per capita income).

The studies which conclude that there is no effect on the economy are those that only analyse the impact of American football colleges or of other sports in the locality as a whole (Baade, 1996; Baade et al., 2006; Baade et al., 2008; Barclay, 2009; Coates and Humphreys, 1999; Coates and Humphreys, 2003; Coates and Humphreys, 2008; Hagn and Maennig, 2008; Hagn and Maennig, 2009; Lertwachara and Cochran, 2007; Matheson, 2006; Matheson and Baade, 2004; Matheson and Baade 2006). These studies usually argue that the money invested in American football or other sports would be better used in other investments.

Most of these studies compare differences 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. The argument supporting their negligible impact is that although these sporting events generate income and/or create jobs this happens at the expense of income or jobs in neighbouring localities, such that there is a trade-off between the two localities. This is known as the substitution effect.

The authors who reach a positive conclusion regarding the relationship between sporting success and the economy 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 (Baim, 1994; Hotchkiss et al., 2003; Bohlman and Van Heerden, 2005; Lentz and Laband, 2009).
- Others identify additional income from tourism by virtue of visitors bringing new money to the area (Kang and Pardue, 1994; Gelan, 2003; Mondello and Rishe, 2004; Zimbalist and Adelaide, 2006; Bauman 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 substantial intangible benefits that are capitalized into housing values (Tu, 2005; Feng and Humphreys, 2008; Jasmand and Maennig, 2008).
- Many authors show that football has a social function, a series of public assets and 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., 2001; Johnson et al., 2007; Rappaport and Wilkerson, 2001; Maennig and du Plessis, 2007; Walton et al., 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 like 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 and the approach we take aims to establish the extent to which football may be related to certain determinants of growth by using the theory of economic growth.

There is no consensus on the theoretical framework which should guide empirical work on economic growth[2]. 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 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. Similarly, Sala-i-Martin (1997) states that true explanatory variables of growth are not really known by economists.

In the neoclassical growth model[3], in which every variable is exogenous, any variable can affect the steady-state position and, therefore, may influence the possibility of growth. The long-term or steady-state level of per capita output depends on many variables (Barro, 1996),

[2] We can nevertheless found theoretical framework of 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 (La Porta et al., 2004).

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

such that the task in this study would be to follow the deductive logic of this model and see whether any of these variables are indeed related to football.

In endogenous growth models, such as those described by Lucas (1988), Rebelo (1991) and Barro (1991), two specific variables produce growth: human capital and technical progress. Applying these models would mean investigating whether football can be a factor that improves human capital or technical progress, and thus serve as an indicator of development.

On the basis of these endogenous growth models we will argue that the FIFA ranking, as our reference variable for football, may be an indicator of development. The argument runs as follows. The FIFA ranking is related to sporting success in the world of football and, as will be shown below, it can be argued that sporting success is, in general, related to health, education and productivity. If this is indeed the case, and given that health, education and productivity improve human capital and technical progress, then sporting success may be considered as an indicator of development.

However, the relationship between sporting success and health, education and productivity is not straightforward, and it 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 which people are considered to derive from sport.

Some of these benefits are related to health, it being generally 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 (Warburton et al., 2006; Blair and Brodney, 1999; Blair et al., 1989; Bouchard and Shephard, 1994; McAuley, 1994; Paffenbarger et al., 1986; Warburton et al., 2001a; Warburton et al., 2001b).

Sport also has an impact on education. Indeed, many studies have found that sport has a statistically significant and positive effect on educational attainment, since practising sport may enhance the development of discipline, self-confidence, motivation, a competitive spirit or other subjective traits that encourage success in education (Pfeifer and Cornelißen, 2010; Robst and Keil, 2000; Smith, 2009; Tucker, 2004; Long and Caudill, 1989; McCormick and Tinsley, 1987; Tucker and Amato, 1993; Mixon and Treviño, 2003; Anderson, 2001; Lipscomb, 2006).

The contribution of sport to both health and education would therefore appear to be fundamental, since endogenous growth models tell us that the improvement of human capital is essential for growth and development. Consequently, football, or sport in general, may be linked to development through its contribution to improving the quality of the labour force.

As regards productivity, endogenous growth models consider that greater productivity tends to increase the growth rate and the investment ratio. One way to improve productivity is by raising levels of happiness, which may follow from the success 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, 2008; Hirtz et al., 1992; Kavetsos and Szymanski, 2010; Kavetsos, 2011; Berument and Yucel, 2005). The effects of happiness on productivity were also studied by Oswald et al. (2009), Compte and Postlewaite (2004) and Wright and Staw (1999), who conclude that human happiness has powerful causal effects on labour productivity, such that a rise in 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 help improve productivity.

So far we have analysed the aspects linked to sporting success that can affect growth through their influence on the fundamentals of endogenous growth models, i.e. human capital and technical progress. We have also seen that the neoclassical growth model tells us that any variable can affect the steady-state position, and may therefore influence the possibility of growth. However, there are two additional aspects linked to sporting success which also support the idea that such success can affect economic development.

The first concerns the impact of football on the stock market. In this context, studies have shown that the success of a specific team is related to its stock market quote (Scholtens and Peenstra, 2009; Edmas et al., 2007; Renneboog and Vanbrabant, 2000; Stadman et al., 2006; Brown and Hartzell, 2001). In particular, Ashton et al. (2003) found a statistically significant and positive relationship between the performance of the English national football team and the change in the price of shares traded on the London stock exchange.

Another specific 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 to work of sport professionals 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 due to the mobility of workers and the remittances it generates, which are beneficial for the growth of the least-developed countries.

In summary, it is reasonable to propose that football may be considered a good indicator of development at the international level. The economic literature has established that development has an influence on sporting success in general, especially in developing countries. By contrast, the impact of sporting success on development at the international level has yet to be studied by economists. Here we have argued that sporting success may be an indicator of development due to the influence of sport on health, education and happiness. The next stage of this analysis involves testing whether this theory is supported by empirical data.

III. DATA

As explained in the literature review the variable that provides information about a country's development is GDP per capita[4], while the variable representing the degree of sporting success, and specifically the degree of success in football, is the FIFA ranking[5].

[4] Data on GDP per capita come from the database of the World Bank.

The FIFA ranking, which is published monthly by FIFA, indicates the position of each national team at the international level according to their success. However, a complication arises when we try to standardize the FIFA ranking variable with other databases because the UK is not represented as a 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. (2009), we have therefore opted here to include England as representative of the UK.

The FIFA ranking is calculated as follows (see Leeds and Leeds, 2009). In 1993, FIFA began to rank its members on the basis of their accumulated points, simple eight-year averages of annual performances in 'A' matches, which were determined through a complex calculation involving the average points per game. In 2005, and in response to criticism about the ranking system, FIFA simplified the 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 relatively transparently by the outcome of the match, the importance of the match, the strength of the opponent and the strength of regional confederation. The method for calculating the current FIFA rankings is shown in Appendix 1.

The period for which both variables will be analysed as control variables (specified below) covers the years from 1993 to 2009[6]. The analysis involves a total of 140 countries[7].

Having defined the key variables in our analysis we need to consider whether, *a priori*, there is any relationship between them. The scatter plots below show the relationship between FIFA ranking and GDP per capita (Figure 1 a-c).

[5] FIFA ranking has been used by Hoffman et al. (2002b), Houston et al. (2002), Leeds and Leeds (2009), Torgler (2004) and Macmillan and Smith (2007) to analyse the relationship between the success of national football teams and economic development.
[6] This period is chosen because FIFA rankings started in 1993.
[7] 140 countries is the total number of countries that are available for analysing all the variables in our models. The full list of the countries analysed is given in Appendix 2.

Figure 1. Scatter plots for FIFA ranking and log GDP per capita

Figure 1a. Overall variation

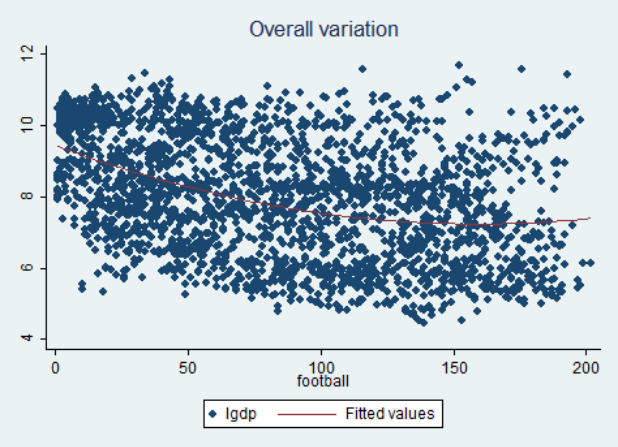


Figure 1b. Between variation

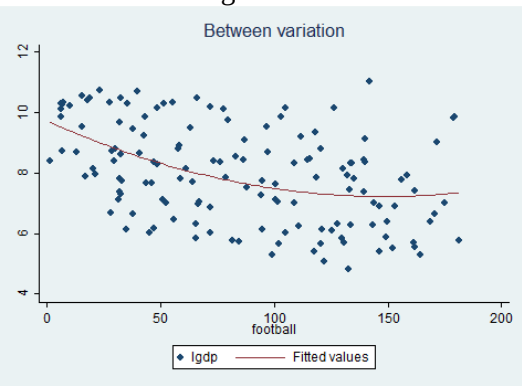


Figure 1c. Within variation

Figure 1a shows a slightly negative relationship between the football ranking and GDP performance: a better ranking would imply a higher GDP per capita. The scatter plot for the *between variation* (Figure 1b) analyses the differences between countries using each country's average over the considered period, and it shows a negative slope. This outcome supports a relationship between football and GDP per capita.

By contrast, the scatter plot for the *within variation* (Figure 1c), which analyses the differences for each particular country over a period of time once their own average has been subtracted, shows no relationship between FIFA ranking and GDP per capita. Figures 2 and 3 (below) present maps of both key variables for the 2009 ranking[8], and confirm the findings

[8] To produce these maps, 2009 was chosen as a representative year for the period, and a total of 161 countries were included. This is because there are now more countries than in 1993. In terms of GDP per capita, countries are ranked from 1 (for countries with higher GDP per capita) to 6 (for countries with lower GDP per capita). Similarly, in the FIFA rankings countries are ranked from 1 (for countries with a better FIFA ranking) to 6 (for countries with a worse ranking FIFA). No FIFA rankings are available for Antarctica, Greenland, Guyana and Western Sahara, since these territories are not recognized by FIFA for playing in official competitions. No per capita GDP data are available for the territory of Antarctica.

for the *between variation* (Figure 1b): countries that are better positioned in the FIFA ranking seem to be countries with higher GDP per capita.

Figure 2. Quantile map of the 2009 FIFA ranking

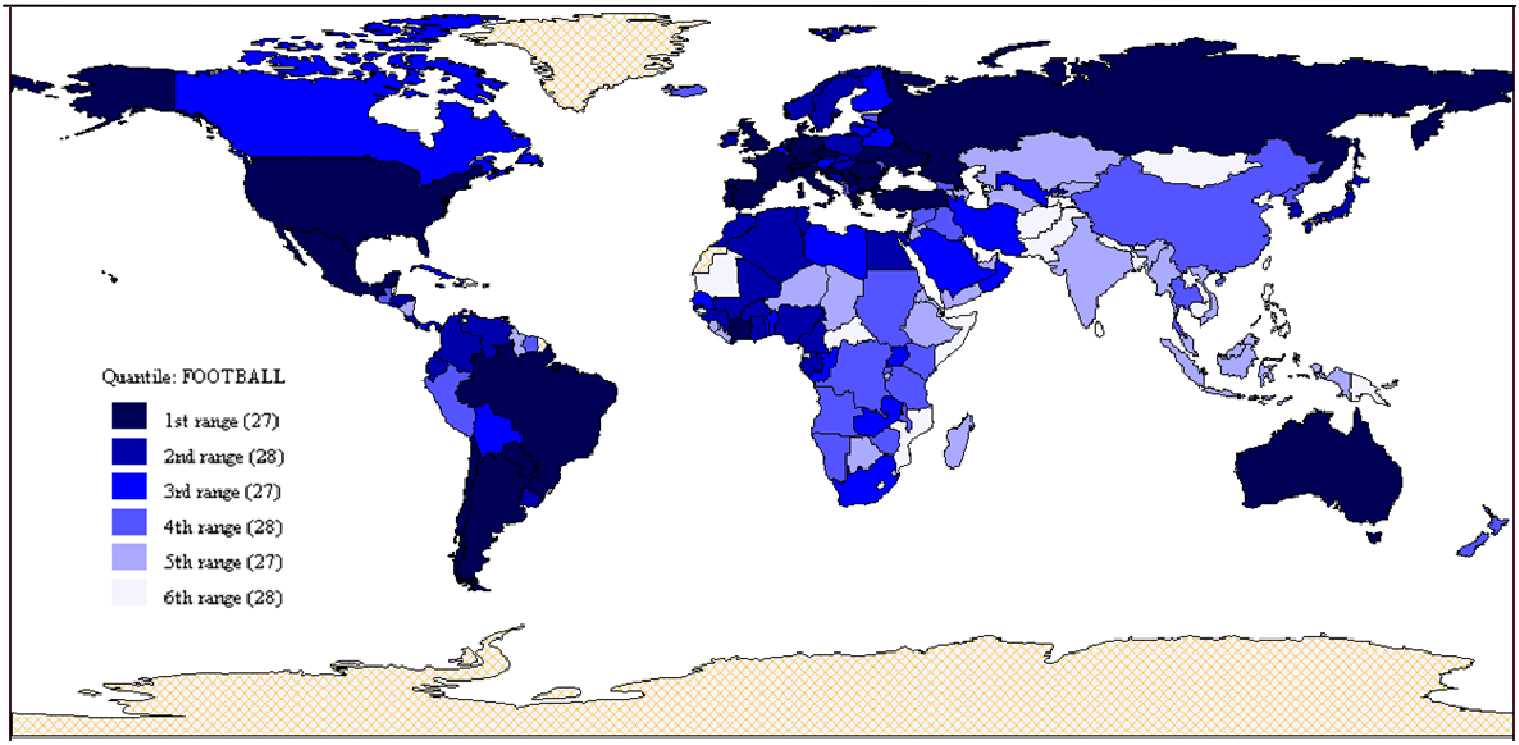
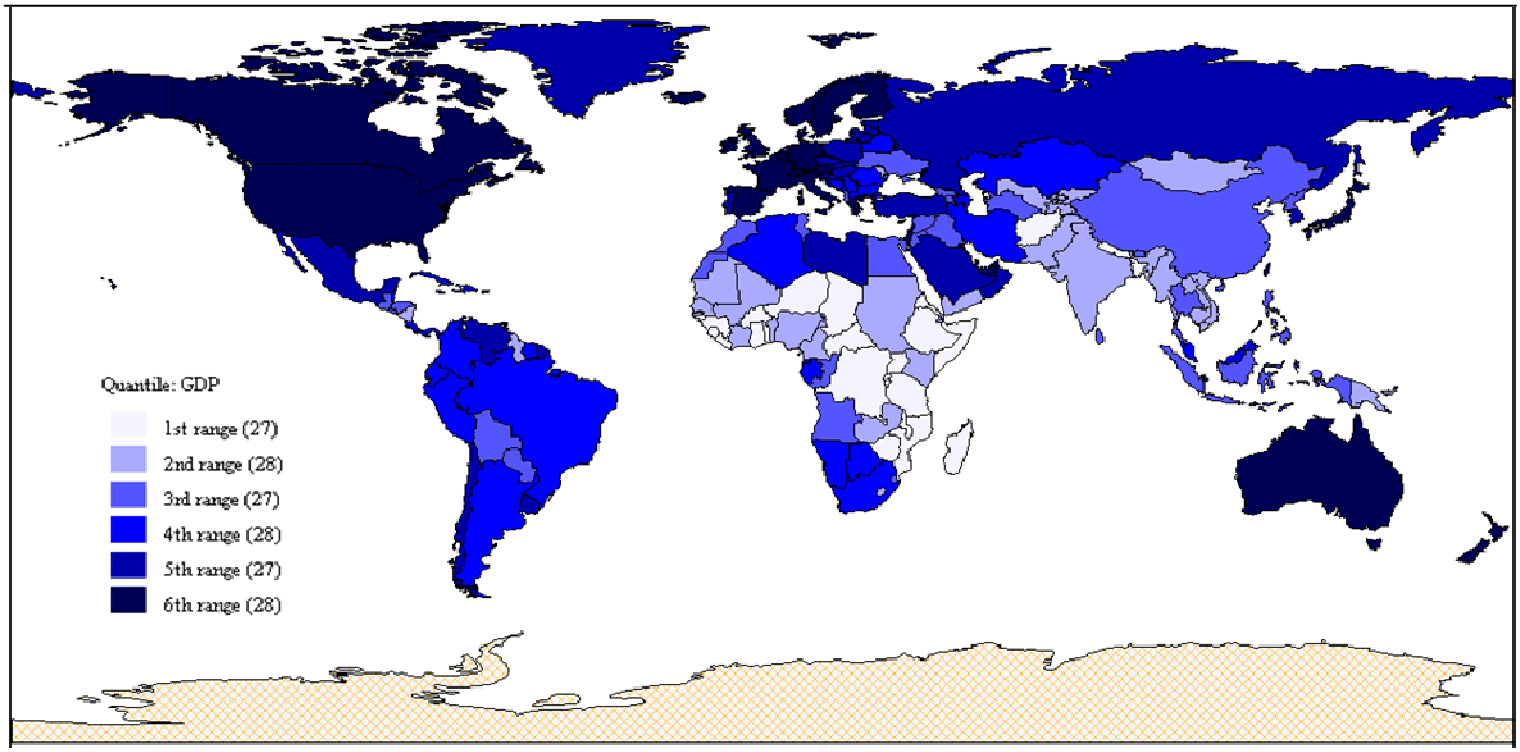


Figure 3. Quantile map of GDP per capita in 2009



Finally, Table 1 presents quantitative results for the correlation between FIFA ranking and GDP per capita. It can be seen that although there is a strong negative correlation of -0.39 for the raw data (overall variation) this relationship disappears once we control for country and time effects (-0.06). In order to determine which dimension is affecting the correlation we control separately for country and time effects. It can be seen that the observed correlation disappears if we remove the country effects (-0.03), whereas it becomes even stronger (-0.40) if we just control the time dimension.

Table 1. Correlation log GDP and FIFA ranking

corr(log GDP, FIFA ranking)		Time Fixed Effects	
		NO	*YES*
Country fixed Effects	*NO*	-0.3883	-0.4001
	YES	-0.0336	-0.0613

On a separate issue, it should be noted that there are other control variables which, in addition to the fundamental variables of our analysis (referring to both development and football success), can be used to determine with greater confidence whether the relationship between football and development is reliable or not. The control variables that will be incorporated here are as follows[9]:

- *Literacy rate, adult*[10]. In endogenous growth models such as those of Lucas (1988), Rebelo (1990) and Barro (1990), human capital plays a decisive role in explaining the determinants of growth.
- *Life expectancy at birth*[11]. This variable is important to the extent that a country may have a better or worse work force depending on the health of its population.
- *Openness*[12]. 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 such as 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

[9] These variables are routinely used in the economic literature to explain the determinants of development.
[10] The adult literacy rate is only used as representative of the education index, due to the difficulty of finding reliable data about enrolment rate. Data on the adult literacy rate are based mainly on information from the World Bank, as well as on the UNESCO database and the interpolation between different periods.
[11] Life expectancy data come from the database of the World Bank.
[12] Openness data come from the World Bank database and that of Summers and Heston.

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 growth*[13]. 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.
- *Gross capital formation (% GDP)*[14]. 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*[15]. 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.

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

[13] Annual population growth data come from the World Bank database.
[14] Data on investment relative to GDP come from the World Bank database and that of Summers and Heston.
[15] Inflation data come from the World Bank database and the World Economic Outlook database.

Table 2. Descriptive statistics

	Mean	Standard Deviation Overall	Between	Within	Max	Min
lngdp	7.958	1.634	4.830	6.624	11.678	4.449
football	85.06	85.06	50.10	18.29	202	1
openness	87.4	87.4	51.6	14.8	438.1	11.5
pop_growth	0.0152	0.0152	0.0106	0.0045	0.0603	-0.0375
inflation	210115	210115	2485880	9945047	500000000	-14
inv_ratio	22.58	22.58	5.94	5.03	74.50	-23.76
educ	80.27	80.27	21.41	3.39	99.79	9.39
life_ex	67.39	67.39	10.51	1.80	82.93	38.17

Note: lngdp= logarithm of gross domestic product per capita (current US$); football = FIFA ranking; openness = exports plus imports of goods and services (% GDP); pop_growth = population growth (annual %); inflation = inflation, consumer prices (annual %); inv_ratio = gross capital formation (% GDP); educ = literacy rate, adult total (% of people age 15 and above); life_ex = life expectancy at birth, total (years).

Table 3. Raw correlation data (overall variation)

	lgdp	football	Openness	pop_growth	inflation	inv_ratio	educ	life_ex
lngdp	1							
football	-0.388	1						
openness	0.302	0.246	1					
pop_growth	-0.466	0.333	-0.067	1				
inflation	-0.027	-0.001	-0.017	-0.025	1			
inv_ratio	0.131	0.103	0.246	-0.119	0.006	1		
educ	0.748	-0.305	0.303	-0.627	0.011	0.225	1	
life_ex	0.839	-0.312	0.234	-0.489	-0.045	0.241	0.752	1

Table 4. Correlation data with controlled country and time effects

	Lgdp	football	Openness	pop_growth	inflation	Inv_ratio	educ	life_ex
lngdp	1							
football	-0.061	1						
openness	-0.175	0.028	1					
pop_growth	0.080	0.022	0.025	1				
inflation	-0.117	0.017	-0.059	-0.028	1			
inv_ratio	0.064	-0.029	0.002	0.142	0.019	1		
educ	-0.082	-0.010	-0.061	-0.091	0.005	0.032	1	
life_ex	0.071	0.015	0.004	0.228	-0.051	0.149	-0.093	1

IV. EMPIRICAL MODEL

The above analysis revealed bivariate correlations between football and development. The next step is therefore to determine whether football can be considered an indicator of development once other aspects are considered.

There are two alternative ways of determining the possible significance of this relationship: one could look at the contemporaneous relationship between football and GDP per capita, or consider growth in GDP over a long period of time. Following Easterly (2007), the current level of GDP is the result of consecutive years of economic growth and, consequently, both variables can be considered as alternative approaches to the same concept: development. However, they will produce different perspectives. An example in this regard would be China, which is a fast-growing economy that continues to have low levels of GDP per capita.

Our starting point here will be to analyse levels of GDP per capita according to a list of variables which are determinants of development.

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

$$\ln GDP_{i,t} = \alpha + \beta_1 football_{i,t} + \beta_2 educ_{i,t} + \beta_3 life\_ex_{i,t} + \beta_4 inflation_{i,t} + \beta_5 inv\_ratio_{i,t} + \beta_6 openness_{i,t} + \beta_7 pop\_growth_{i,t} + u_{i,t}$$

Table 5. Panel regressions

	Ordinary Least Squares	Ordinary Least Squares	Country Fixed Effects	Between Estimation	Random Effects
football	-0.00410***	-0.00423***	-0.000590***	-0.00480***	-0.000773***
	(0.000361)	(0.000364)	(0.000220)	(0.00156)	(0.000230)
Educ	0.0218***	0.0217***	-0.00635***	0.0217***	0.000597
	(0.00128)	(0.00132)	(0.00151)	(0.00530)	(0.00149)
life_ex	0.110***	0.108***	0.00490*	0.114***	0.0180***
	(0.00266)	(0.00278)	(0.00284)	(0.0110)	(0.00286)
inflation	2.75e-10	-4.91e-10**	-2.43e-09***	6.43e-09	-2.29e-09***
	(1.47e-09)	(2.02e-10)	(4.04e-10)	(2.48e-08)	(4.27e-10)
inv_ratio	-0.0158***	-0.0186***	0.00215**	-0.0325***	0.00161*
	(0.00214)	(0.00233)	(0.000835)	(0.0119)	(0.000881)
openness	0.00340***	0.00329***	-0.00269***	0.00407***	-0.00204***
	(0.000333)	(0.000301)	(0.000295)	(0.00137)	(0.000302)
pop_growth	10.65***	11.26***	2.643***	14.03	1.834*
	(1.884)	(1.949)	(0.963)	(8.858)	(1.010)
CONCAFAF	-0.377***	-0.373***		-0.279	-1.085***
	(0.0565)	(0.0534)		(0.226)	(0.207)
CONMEBOL	-0.794***	-0.821***		-0.815***	-1.393***
	(0.0653)	(0.0465)		(0.255)	(0.250)
AFC	-0.396***	-0.395***		-0.322	-1.159***
	(0.0565)	(0.0583)		(0.235)	(0.185)
CAF	0.277***	0.208***		0.314	-2.501***
	(0.0692)	(0.0674)		(0.278)	(0.185)
OFC	-0.154	-0.164**		-0.130	-0.884**
	(0.112)	(0.0744)		(0.435)	(0.434)
Constant	-0.870***	-0.752***	7.915***	-0.836	7.804***
	(0.193)	(0.204)	(0.228)	(0.801)	(0.283)
Time Dummies	NO	YES	YES		YES
Observations	2380	2380	2380	2380	2380
R-squared	0.799	0.810	0.721	0.835	.
Number of Countries			140	140	140

Note: Dependent variable: log GDP per capita. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

The estimations were performed using different procedures, which are shown in Table 5. All the estimates, even the one for fixed effects, gave a negative result for the FIFA ranking. The Hausman test (not reported) 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 should be preferred to the random effects one, although in both cases football is significant.

Interestingly the coefficient of the 'between' estimation (-0.00480) is eight times larger than that of the fixed effects regression (-0.000590), and the parameter in the random effects estimation (-0.000773) is also higher than that in the fixed effects estimation.

In our view these results are worthy of attention. We interpret the fixed effects estimation as the year-to-year relationship between football and development once a country's specific characteristics have been controlled for. Consequently, in the short term, better football performance is associated with higher levels of development, although the relationship is not particularly strong. By contrast, in the 'between' and random effects estimations, where the between variance of the variables plays a role, it can be seen that football performance is related to long-term development: higher levels of development and better FIFA rankings are observed simultaneously, even after controlling for different factors. We believe that this is evidence of a relationship between football and development, and particularly that football can be used as an indicator of long-term development at the international level. The endogeneity which produces larger values of the estimates indicates that football is related to non-observable factors that are associated with GDP per capita, thereby supporting our hypothesis that football is associated with development.

In order to explore that hypothesis in more detail our second alternative consists in analysing the GDP growth rate across all the considered years[16] so as to determine whether the FIFA ranking is indeed associated with long-term development. The model used is as follows:

$$\Delta gdp_{i,96-09} = \alpha + \beta_1\, football_{i,93-96} + \beta_2 \ln GDP_{i,96} + \beta_3 educ_{i,96} + \beta_4 life\_ex_{i,96} + \beta_5 inflation_{i,96} + \beta_6 inv\_ratio_{i,96} + \beta_7 openness_{i,96} + \beta_8\, pop\_growth_{i,96} + u_{i,t}$$

This equation studies the factor that is considered the most important in the economic literature: economic growth. In addition to the explanatory variables presented above, the model also includes another explanatory variable, namely the logarithm of GDP per capita in the initial year, as in the convergence literature (Barro and Sala-i-Martín, 1992). This variable

[16] The period analysed for the endogenous variable (GDP growth) covers the period from the base year of the other explanatory variables (1996) until the final year of our analysis (2009). The period analysed for the football variable uses the arithmetic mean between 1993 and 1996, since this is a variable with strong volatility in the short term. Thus we can ensure that the direction of causality runs from explanatory variables to endogenous variable, and not vice-versa.

is important because it corroborates empirically the models of neoclassical growth theory[17]. The results of the model estimation using OLS are shown in Table 6.

Table 6. Economic growth model estimation

	Model 1	Model 2	Model 3
Football	3.14e-05	-7.67e-05	-0.000867***
	(7.42e-05)	(7.10e-05)	(0.000274)
football * lnGDP			0.000104***
			(3.28e-05)
lnGDP		-0.0199***	-0.0267***
		(0.00298)	(0.00361)
Educ	-0.000121	9.10e-05	4.22e-05
	(0.000236)	(0.000240)	(0.000238)
life_exp	-0.000544	0.00202***	0.00187***
	(0.000584)	(0.000669)	(0.000661)
Inflation	2.76e-05***	3.29e-05***	3.38e-05***
	(3.81e-06)	(3.53e-06)	(3.25e-06)
inv_ratio	6.32e-05	-0.000155	-0.000110
	(0.000310)	(0.000276)	(0.000243)
openness	-8.62e-06	5.47e-05	-8.80e-06
	(6.23e-05)	(5.22e-05)	(4.84e-05)
pop_growth	-0.138	-0.0815	-0.0682
	(0.0915)	(0.0767)	(0.0783)
CONCAFAF	-0.00779	-0.0169*	-0.0226**
	(0.00952)	(0.00882)	(0.00931)
CONMEBOL	-0.0118	-0.0247**	-0.0325***
	(0.0111)	(0.00991)	(0.0103)
AFC	-0.00174	-0.00848	-0.0145
	(0.0122)	(0.0101)	(0.0104)
CAF	-0.0230*	-0.0193	-0.0286**
	(0.0135)	(0.0119)	(0.0131)
OFC	-0.0252*	-0.0234*	-0.0324**
	(0.0138)	(0.0139)	(0.0140)
Constant	0.116***	0.0909***	0.167***
	(0.0359)	(0.0303)	(0.0429)
Observations	140	140	140
R-squared	0.195	0.380	0.425

Table 6 shows the data for models 1 to 3. The first considers all the variables that were analysed in the previous panel specification, while model 2 includes the initial level of GDP in every country. Neither of these models yields a significant parameter for football, which

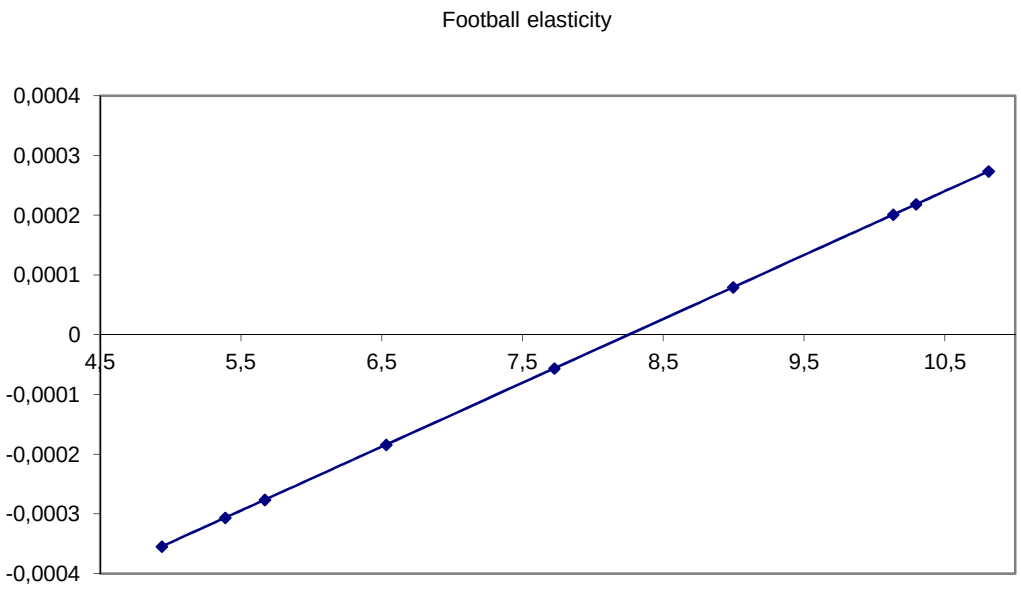
[17] It should be remembered that in neoclassical growth models, such as those of Ramsey (1928), Solow (1956), Cass (1965) and Koopmans (1965), it is argued that the per capita growth rate tends to be inversely related to the starting level of output or income per person

contradicts our previous hypothesis. However, in order to inspect the possibility of a kind of 'decreasing returns' effect for football performance on development, we included in model 3 an interaction between the FIFA ranking and the log GDP per capita. The result is a pair of significant parameters for both football and the interaction. To explore this result further, Table 7 shows the elasticity of football with respect to economic growth for different values of GDP per capita, while Figure 4 plots the results for the main percentiles of the distribution.

Table 7. Elasticity of football with respect to economic growth for different values of GDP per capita

1st quartile	Median	3rd quartile
-0.000184	-0.000056	0.000080

Figure 4. Elasticity of football with respect to economic growth for different values of GDP per capita



The results depicted in Table 7 and Figure 4 tell us that countries with low initial development but strong football performance experienced a greater growth in GDP, while countries with high initial development and strong football performance grew less than the rest. This result is consistent with the key assumption of convergence theory. Overall, running cross-sectional regressions confirms that football can be considered as an indicator of development, and that this may be particularly true for less developed countries.

V. CONCLUSIONS

This paper has examined whether football can be considered an indicator of development at the international level. It was seen that these two variables can be regarded as related and that there is literature supporting not only the influence of development on sporting success, but also that of sport on economic performance.

Considering a panel of 140 countries over the period 1993-2009 we estimated a model in which GDP per capita depends on the FIFA ranking, together with other traditional factors of development such as education, health, trade openness, inflation, population growth and the investment ratio. In the 'between' and random effects estimations football was shown to be a significant factor with the expected sign, while in the fixed effects estimation football was significant but with a much lower parameter value. This result is interpreted as demonstrating that a country's FIFA ranking is a good indicator of its long-term development, as it is significantly correlated with the permanent (i.e. non-time variant) position of each country.

In order to corroborate this conclusion we then estimated a growth equation in which GDP growth was regressed against all previously considered variables plus the initial level of GDP per capita. This showed that football is only significant through an interaction with the log of initial GDP per capita. We believe that this result confirms our initial hypothesis, but highlights that the relationship may be particularly true for less developed countries.

These findings should serve to complement our understanding of multidimensional development in those countries where the availability of information is not as good as researchers would like. The results also suggest that football can be used as an instrument in studies where development may be an endogenous variable (as in Biagi et al., 2011).

REFERENCES

Amabile, T.M., Barsade, S.G., Mueller, J.S. and Staw, B.M. (2005). "Affect and Creativity at Work," *Administrative Science Qaurterly*, 50, 367-403.

Amato, L., Gandar, J.M., Tucker, I.B. and Zuber, R.A. (1996). "Bowls Versus Playoffs: The impact on Football Player Graduation Rates in The National Collegiate Athletic Association," *Economics of Education Review*, 15(2), 187-195.

Anderson, D.J. (2001). "If You Let Me Play. The Effects of Participation in High School Athletics on Students' Educational and Labor Market Success," *Cornell University, Ph.D. Dissertation.*

Ashton, J.K, Gerrard, B. and Hudson, R. (2003). "Economic impact of national sporting success: evidence from the London stock exchange," *Applied Economics Letters,* 10, 783-785.

Baade, R.A. (1996). "Professional sports catalysts for metropolitan economic development," *Journal of Urban Affairs,*18(1), 1-17.

Baade, R.A., Baumann, R.W. and Matheson, V.A. (2006). "Selling the Big Game: Estimating the Economic Impact of Mega-Events through Taxable Sales," *International Association of Sports Economists, Working Paper Series,* 06-10.

Baade, R.A., Baumann, R.W. and Matheson, V.A. (2008). "Assessing the Economic Impact of College Football Games on Local Economies," *Journal of Sports Economics,* 9(5), 628-643.

Barclay, J. (2009). "Predicting the costs and benefits of mega-sporting events: misjudgement of Olympic proportions?" *Economic Affairs,* 29(2), 62-66.

Barro, R.J. (1991). "Economic Growth in a Cross Section of Countries," *Quarterly Journal of Economics,* 106(2), 407-443.

Barro, R.J. (1996). "Democracy and Growth," *Journal of Economic Growth,* 1, 1-27.

Barro, R.J. and Lee, J-W. (1994). "Sources of economic growth," *Carnegie-Rochester Conference Series on Public Policy,* 40, 1-46.

Barro, R.J. and Sala-i-Martin, X. (1992). "Convergence," *Journal of Political Economy,* 100(2), 223-251.

Baumann, R.W, Matheson, V.A. and Muroi, C. (2009). "Bowling in Hawaii: Examining the Effectiveness of Sports-Based Tourism Strategies," *Journal of Sports Economics,* 10(1), 107-123.

Berument, H. and Yucel, E.M. (2005). "Long live Fenerbahçe: The production boosting effects of football," *Journal of Economic Psychology,* 26, 842-861.

Biagi, B., Faggian, A. and McCann, P. (2011). "Long and short Distance Migration in Italy: The Role of Economic, Social and Environmental Characteristics," *Spatial Economic Analysis,* 6(1), 111-131.

Blair, S.N. and Brodney, S. (1999). "Effects of physical inactivity and obesity on morbidity and mortality: current evidence and research issues," *Med Sci Sports Exerc,* 31, 646-662.

Blair, S.N., kohl, H.W., Paffenbarger R.S. Jr., Clark, D.G., Cooper, K.H. and Gibbons L.W. (1989). "Physical fitness and all-cause mortality. A prospective study of healthy men and women," *Journal of the American Medical Association,* 262, 2395-2401.

Bohlmann, H.R. and van Heerden, J.H. "The Impact of Hosting a Major Sport Event on the South African Economy," *University of Pretoria, Working Paper:* 2005-29.

Borensztein, E., De Gregorio, J. and Lee, J-W. (1998). "How does foreign direct investment affect economic growth?," *Journal of International Economics,* 45, 115-135.

Bouchard, C. and Shephard, R.J. (1994). "Physical activity fitness and health: the model and key concepts," *Bouchard C, Shephard RJ, Stephens T, editors. Physical activity fitness and health: International proceedings and consensus statement. Champaign (IL): Human Kinetics;* 77-88.

Brown, G. and Hartzell, J.C. (2001). "Market reaction to public information: The atypical case of the Boston Celtics," Journal of Financial Economics, 60, 333-370.

Carlino, G. and Coulson, N.E. (2004). "Compensating differentials and the social benefits of the NFL," *Journal of Urban Economics,* 56, 25-50.

Cass, D. (1965). "Optimum Growth in an Aggregative Model of Capital Accumulation," *The Review of Economic Studies*, 32(3), 233-240.

Coates, D. and Humphreys, B.R. (2003). "The effect of professional sports on earnings and employment in the services and retail sectors in US cities," *Regional Science and Urban Economic*, 33, 175-198.

Coates, D. and Humphreys, B.R. (2008). "Do Economist Reach a Conclusion on Subsidies for Sports Franchises, Stadiums, and Mega-Events?," *Econ Journal Watch*, 5(3), 294-315.

Coates, D. and Humphreys, B.R. (1999). "The Growth Effects of Sport Franchises, Stadia, and Arenas," *Journal of Policy Analysis of Management*, 18(4), 601-624.

Compte, O. and Postlewaite, A. (2004). "Confidence-Enhanced Performance," *The American Economic Review*, 94(5), 1536-1557.

Condon, E., Golden, B.L. and Wasil, E.A. (1999). "Predicting the success of nations at the Summer Olympics using neutral networks," *Computers & Operations Research*, 26, 1243-1265.

Davis, M. C. and End, C. M. (2010)."A winning proposition: The economic impact of successful national football league franchises," *Economic Inquiry*, 48(1), 39-50.

Dimitrov, C., Helmenstein, C. Kleissner, A. Moser, B. and Schindler, J. (2006). "Die makroökonomischen Effekte des Sports in Europa," *Studie im Auftrag des Bundeskanzlermats, Sektion Sport, März.*

Domar, E, D. (1946). "Capital Expansion, Rate of Growth, and Employment," *Econometrica*, 14(2), 137-147.

Easterly, W. (2007). "Inequality does cause underdevelopment: Insights from a new instrument," *Journal of Development Economics*, 84, 755-776.

Edmans, A., García, D. and Norli, Ø. (2007). "Sports Sentiment and Stock Returns," *The Journal of Finance*, 62(4), 1967- 1998.

European Commission (2011). Sport satellite accounts. a European project: first results. http://ec.europa.eu/sport/library/documents/b1/madrid_forum_sport_satellite_account_leaflet.pdf. Accessed 3rd Juanuary 2012.

Feder, G. (1982). "On exports and economic growth," *Journal of Development Economics*, 12, 59-73.

Freng, X. amd Humphreys, B.R. (2008). "Assessing the Economic Impact of Sports Facilities on Residential Property Values: A Spatial Hedonic Approach," *IASE/NAASE Working Paper Series*, 08-12.

Frick, B. (2009). "Globalization and Factor Mobility: The impact of the Bosman-Rulling on Player Migration in Professional Soccer," *Journal Sports Economics*, 10(1), 88-106.

Gelan, A. (2003). "Local economic impacts: The British Open," *Annuals of Tourism Research*, 30(2), 406-425.

Grier, K. and Tullock, G. (1989). "An empirical analysis of cross-national economic growth, 1951-80," *Journal of Monetary Economics*, 24, 259-276.

Hagn, F. and Maennig, W. (2008). "Employment effects of the football World Cup 1974 in Germany," *Labour Economics*, 15, 1062-1075.

Hagn, F. and Maennig, W. (2009). "Large sports events and unemployment: the case of the 2006 soccer World Cup in Germany," *Applied Economics*, 41, 3295-3302.

Harrod, R.F. (1939). "An Essay in Dinamic Theory," *The Economic Journal*, 49(193), 14-33.

Hirtz, E., Zillmann, D., Erickson, G.A. and Kennedy, C. (1992). "Cost and Benefits of Allegiance: Changes in Fans' Self-Ascribed Competencies After Team Versus Defeat," *Journal of Personality and Social Psychology*, 63(5), 724-738.

Hoffman, R., Ging, L.C. and Ramasamy. B. (2002a). "Public policy and Olympic success," *Applied Economics Letters*, 9, 545-548.

Hoffman, R., Ging, L.C. and Ramasamy. B. (2002b). "The socio-economic determinants of the international soccer performance," *Journal of Applied Economics*, 5(2), 253-272.

Hotchkiss, J.L., Moore, R.E. and Zobay, S.M. (2002). "Impact of the 1996 summer Olympic Games on employment and wages in Georgia," *Southern Economic Journal*, 69(3), 691-704.

Houston, R.G. and Wilson, D. (2002). "Income, leisure and proficiency: an economic study of football performance," *Applied Economics Letters*, 9, 939-943.

Jasmand, S., Maennig, W. (2008) "Regional income and employment effects of the 1972 Munich summer olympic games", *Regional Studies*, 42 (7), 991-1002.

Jiang, M. and Xu, L.C. (2005). "Medals in transition: explaining medal performance and inequality of Chinese province," *Journal of Comparative Economics*, 33, 158-172.

Johnson. B.K, Groothius, P.A. and Whitehead, J.C. (2001). "The Value of Public Goods Generated by a Major League Sports Team," *Journal of Sports Economics*, 2,(1), 6-21.

Kavetsos, G. and Szymansky, S. (2010). "National well-being and international sports events," *Journal of Economic Psychology*, 31, 158-171.

Kavetsos, G. (2011). "National pride: war minus the shooting" *Social Indicators Research*, doi 10.1007/s11205-011-9801-1.

Koopmans, T. C. (1965). "On the Concept of Optimal Economic Growth", *In The Econometric Approach to Development Planning. Amsterdam: Nort-Holland, 1965.*

Kormendi, R. and Meguire, P. (1985). "Macroeconomic determinants of growth," *Journal of Monetary Economics*, 16, 141-163.

Glaeder, E.L., La Porta, R. and Shleifer, A. (2004). "Do Institutions Cause Growth?," *Journal of Economic Growth*, 9, 271-303.

Leeds, M.A. and Leeds, E.M. (2009). "International Soccer Success and National Institutions," *Journal of Sports Economics*, 10(4), 369-390.

Lentz, B. and Laband, D. (2009). "The Impact of Intercollegiate Athletic on Employment in the Restaurants and Accommodations Industries," *Journal of Sports Economics*, 10(4), 351-368.

Lertwachara, K. and Cochran, J.J. (2007). "An Event Study of the Economic Impact of Professional Sport Franchises on Local U.S. Economies," *Journal of Sports Economics*, 8(3), 244-254.

Levine, R. and Renelt, D. (1992). "A Sensitivity Analysis of Cross-Country Growth Regressions," *The American Economic Review*, 82(4), 942-963.

Li, H., Meng, L. and Wang, Q. (2009). "The government's role in China's Olympic glory," *Applied Economics*, 41, 3313-3318.

Lipscomb, S. (2007). "Secondary school extracurricular involvement and academic achievement: a fixed effects approach," *Economics of Education Review*, 26, 463-472.

Long, J.E. and Caudill, S.V. (1991). "The Impact of Participation in Intercollegiate Athletics on Income and Graduation," *The Review of Economics and Statistics*, 73(3), 525-531.

Lucas, R.E. (1988). "On the mechanics of economic development," *Journal of Monetary Economics*, 22, 3-42.

McAuley, E. (1994). "Physical activity and psychosocial outcomes," *Bouchard C, Shephard RJ, Stephens T, editors. Physical activity, fitness and health: the consensus knowledge. Champaign (IL): Human Kinetics*, 551-68.

McCormick, R.E. and Tinsley, M. (1987). "Athletics versus Academics? Evidence form SAT Scores," *Journal of Political Economy*, 95(5), 1106-1116.

Macmilan, T. and Smith, I. (2007). "Explaining International Soccer Rankings," Journal of Sports Economics, 8(2), 202-213.

Maennig, W. and du Plessis, S. (2007). "World Cup 2010: South African economic perspectives and policy challenges informed by the experience of Germany 2006," *Contemporary Economic Policy*, 25(4), 578-590.

Matheson, V.A. (2006). "Mega-Events: The effect of the world's biggest sporting events on local, regional, and national economies," *College of the Holy Cross, Department of Economics, Faculty research series, paper* 06-10.

Matheson, V.A. and Baade, R.A. (2004). "Mega-sporting events in developing nations: playing the way to prosperity," *The South African Journal of Economics*, 72(5), 1085-1096.

Matheson, V.A. and Baade, R.A. (2006). "Padding Required: Assessing the Economics Impact of the Super Bowl," *European Sport Management Quarterly*, 6(4), 353-374.

Mixon,F.G. and Treviño. L.J. (2005). "From kickoff to commencement: the positive role of intercollegiate athletics in higher education," *Economics of Education Review,* 24, 97-102.

Mondello, M.J. and Rishe, P. (2004). "Comparative Economic Impact Analyses: Differences Across Cities, Events, and Demographics," *Economic Development Quarterly*, 18(4), 331-342.

Monks, J. and Husch, J. (2009). "The Impact of Seeding, Home, Continent, and Hosting on FIFA World Cup Results," *Journal of Sports Economics*,10(4), 391-408.

Murray, B. (1996). "The Word´s Game: A History of Soccer", *Urbana: University of Illinois Press.*

Nicolau, J.L (2012). "The effect of winning the 2010 FIFA World Cup on the tourism market value: The Spanish case," *Omega*, 40(2), 137-148.

Oswald, J., Proto, E. and Sgroi, D. (2009). "Happiness and productivity," *IZA Discussion Paper* 4645.

Paffenbarger, R.S.Jr., Hyde, R.T., Hsieh, C.C. and Wing, A.L. (1986). "Physical activity, other life-style patterns, cardiovascular disease and longevity," *Acta Med Scand Suppl.* 711, 85-91.

Pfeifer, C. and Corneliβen, T. (2010). "The impact of participation in sports on educational attainment – New Evidence from Germany," *Economics of Education Review.* 29, 94-103.

Ram, R. (1986). "Government Size and Economic Growth: A New Framework and Some Evidence from Cross-Section and Time-series Data," *The American Economic Review*, 76(1), 191-203.

Ramsey, F.P. (1928). "A mathematical theory of saving". *Economic journal*, 38(152), 543-559.

Rappaport J. and Wilkerson, C. (2001). "What Are the Benefits of Hosting a Major League Sport Franchise?," *Economic Review*, 1, 55-86.

Rathke, A. and Woitek, U. (2008). "Economic and the Summer Olympics," *Journal of Sports Economics*, 9(5), 520-537.

Rebelo, S. (1991). "Long-Run Policy Analysis and Log-Run Growth," *Journal of Political Economy*, 99(3), 500-521.

Renneboog, L. and Vanbrabant, P. (2000). "Share price reactions to sporty performances of soccer club listed on the London Stock Exchange and the AIM," *Center for Economic Research*, 2000-19.

Robst, J. and Keil, J. (2000). "The relationship between athletic participation and academic performance: evidence from NCAA Division III," *Applied Economics*, 32, 547-558.

Rostow, W. W. (1959). "The stages of economic growth," *The Economic History Review*, 12, 1-16.

Sala-i-Martin, X. (1994). "Cross-sectional regressions and the empirics of economic growth," *European Economic Review*, 38, 739-747.

Sala-i-Martin, X. (1997). "I Just Ran Two Million Regressions," *The American Economic Review*, 87(2), 178-183.

Scholtens, B. and Peenstra, W. (2009). "Scoring on the stock exchange? The effect of football matches on stock market returns: an event study," *Applied Economics*, 41, 3231-3237.

Siegfried, J. and Zimbalist, A. (2006). "The Economic Impact of Sports Facilities, Teams and Mega-Events," *The Australian Economic Review*, 39(4), 420-7.

Smith, R. (2009). "College Football and Student Quality: An Advertising Effect or Culture and Tradition?," *American Journal of Economic and Sociology*, 68(2), 553-579.

Solow, R. M. (1956). "A contribution to the Theory of Economic Growth," *The Quarterly Journal of Economics*, 70(1), 65-94.

Stadtmann, G. (2006). "Frequent news and pure signals: The case of a public traded football club," *Scottish Journal of Political Economy*, 53(4), 485-504.

Stockman, A. C. (1981). "Anticipated inflation and the capital stock in a cash-in-advance economy," *Journal of Monetary Economics* 8, 387-393.

Süssmuth, B., Heyne, M. and Maennig, W. (2010). "Induced Civic Pride and Integration," *Oxford bulletin of economics and statistics*, 72(2), 202-220.

Torgler, B. (2004). "The Economics of the FIFA Football Worldcup," *KYKLOS*, 57(2), 287-300.

Tu. C.C. (2005). "How Does a New Sports Stadium Affect Housing Values? The Case of FedEx Field," *Land Economics*, 81(3), 379-395.

Tucker, I.B. (2004). "A reexamination of the effect of big-time football and basketball success on graduation rates and alumni giving rates," *Economics of Education Review*, 23, 655-661.

Tucker, I.B. and Amato, L. (1993). "Does Bib-time Success in Football or Basketball Affect SAT Scores?," *Economics of Review*, 12(2), 177-181.

Walton, H., Longo, A. and Dawson, P. (2008)."A Contingent Valuation of the 2012 London Olympic Games: A regional Perspective," *Journal of Sports Economics*, 9(3), 304-317.

Warburton, D.E., Gledhill, N., Quinney, A. (2001). "The effects of changes in musculoskeletal fitness on health," *Canadian Journal of Applied Physiology*, 26, 161-216.

Warburton, D.E., Gledhill, N. and Quinney, A. (2001). "Musculoskeletal fitness and health," *Canadian Journal of Applied Physiology*, 26, 217-237.

Warburton, D.E., Nicol, W. and Bredin, S.D. (2006). "Health benefits of physical activity: the evidence," *Canadian Medical Association Journal*, 174(6), 801-809.

Wright, T. and Staw, B.M. (1999). "Affect and favorable work outcomes: two longitudinal tests of the happy-productive worker thesis," *Journal of Organizational Behavior*, 29, 1-23.
Zack, P.J and Knack, S. (2001). "Trust and Growth," *The Economic Journal*, 111, 295-321.

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.- Albania	36.- Egypt, Arab Rep.	71.- Lesotho	106.- Senegal
2.- Algeria	37.- El Salvador	72.- Libya	107.- Seychelles
3.- Angola	38.- Estonia	73.- Lithuania	108.- Sierra Leone
4.- Antigua and Barbuda	39.- Ethiopia	74.- Luxembourg	109.- Singapore
5.- Argentina	40.- Fiji	75.- Macao SAR	110.- Slovenia
6.- Australia	41.- Finland	76.- Madagascar	111.- Solomon Islands
7.- Austria	42.- France	77.- Malawi	112.- South Africa
8.- Bahrain	43.- Gabon	78.- Malaysia	113.- Spain
9.- Bangladesh	44.- Gambia, The	79.- Maldives	114.- Sri Lanka
10.- Barbados	45.- Germany	80.- Mali	115.- St. Lucia
11.- Belgium	46.- Ghana	81.- Malta	116.- St. Vincent and the Grenadines
12.- Benin	47.- Greece	82.- Mauritania	117.- Sudan
13.- Bolivia	48.- Grenada	83.- Mauritius	118.- Suriname
14.- Botswana	49.- Guatemala	84.- Mexico	119.- Swaziland
15.- Brazil	50.- Guinea	85.- Morocco	120.- Sweden
16.- Brunei Darussalam	51.- Guinea-Bissau	86.- Mozambique	121.- Switzerland
17.- Bulgaria	52.- Guyana	87.- Namibia	122.- Syrian Arab Republic
18.- Burkina Faso	53.- Haiti	88.- Nepal	123.- Tanzania
19.- Burundi	54.- Honduras	89.- Netherlands	124.- Thailand
20.- Cameroon	55.- Hong Kong SAR	90.- New Zealand	125.- Togo
21.- Canada	56.- Hungary	91.- Nicaragua	126.- Trinidad and Tobago
22.- Cape Verde	57.- Iceland	92.- Niger	127.- Tunisia
23.- Central African Rep.	58.- India	93.- Nigeria	128.- Turkey
24.- Chad	59.- Indonesia	94.- Norway	129.- Uganda
25.- Chile	60.- Iran, Islamic Rep	95.- Oman	130.- Ukraine
26.- China	61.- Ireland	96.- Pakistan	131.- United Arab Emirates
27.- Colombia	62.- Israel	97.- Panama	132.- United Kingdom
28.- Congo, Rep.	63.- Italy	98.- Paraguay	133.- United States
29.- Costa Rica	64.- Jamaica	99.- Peru	134.- Uruguay
30.- Cote d'Ivoire	65.- Japan	100.- Philippines	135.- Vanuatu
31.- Croatia	66.- Jordan	101.- Poland	136.- Venezuela, RB
32.- Cyprus	67.- Kenya	102.- Portugal	137.- Vietnam
33.- Denmark	68.- Korea, Rep.	103.- Romania	138.- Yemen, Rep.
34.- Dominican Republic	69.- Latvia	104.- Russian Federation	139.- Zambia
35.- Ecuador	70.- Lebanon	105.- Saudi Arabia	140.- Zimbabwe