Football and economy relations at the international level

Roberto Gásquez Mendoza

ERSITAT DE
CELONA

2017

PhD in Economics | **Roberto Gásquez Mendoza**

UNIVERSITAT DE
BARCELONA

PhD in Economics

Football and economy relations at the international level

Roberto Gásquez Mendoza

LIBERTAS PERFVNDET
OMNIA LVCE

UNIVE
BARC

PhD in Economics

Thesis title:

Football and economy relations at the international level

PhD student:
Roberto Gásquez Mendoza

Advisors:
Vicente Royuela Mora
Patricia García-Durán Huet

Date:
June 2017

UNIVERSITAT DE BARCELONA

"We are all one. Everything is energy"

Alejandro Gásquez

Preface and acknowledgements:

This PhD thesis is the result of years of research and dedication. I am very proud to choose this doctorate research. Quite young, I focused my energy on becoming a professional tennis player. I will always be grateful to my brother Alejandro for helping me understand (when I was 17) that I had to prioritize my studies over a professional career in tennis. *Gracias Fabio.*

I also want to thank my wife, Meri. We have been together since we were 18 and she has instilled in me the value of excellence while providing unconditional support and love.

Likewise, I am indebted to my parents for always giving me all the facilities and support to study. In particular, I would like to thank my father Thutam for asking me every day how the doctorate was going.

Thanks to my grandmother Sebastiana, who taught me that effort always brings a reward.

On a more professional note, I am grateful to the University of Barcelona for granting me an APIF grant for 4 years to facilitate my doctorate studies. Furthermore, I show appreciation to the members of the doctoral commission and their work in the monitoring of my PhD thesis.

The subject of analysis of this PhD thesis is the result of my passion for football, embodied in my irrational fanaticism for RCD Espanyol, and above all of Doctor Francesc Granell's imagination. During one of the many meals we had at the faculty's eating hall, he said to me: "You are always talking about football, and you have been teaching Economic Development and International Economy. Why don't you join the two topics that you are most passionate about and study them?" I was incredulous. Was he seriously proposing that I did an economic thesis about football? As I realized over time, he was very serious and so was the topic of research he proposed.

I started to work on Dr. Granell's idea and asked Dr. Vicente Royuela, an exceptional economist and specialist in econometric methods, to direct my PhD thesis. I have learned a lot from Dr. Royuela, who has always treated me

with respect and dedication. His monitoring of my efforts has been exhaustive (without him, I would not have finished my PhD thesis, because when one has another full-time job, it is very easy to leave research aside).

My gratitude also to Dra. Patricia García-Durán, who co-directed my PhD thesis and whose support has been fundamental. I would also like to emphasize all the help given to me by the rest of the members of the University of Barcelona Chair of International Economic Organization, a real family for me, particularly Doctor Granell, Dra. Montserrat Millet and Maria Luisa Justo.

I am also obliged to Dr. Peter Macmillan for his advice and dedication during my visiting research at the University of Saint Andrews (Scotland).

Thank you with all my heart to all those mentioned, and many more, since without you it would have been unimaginable to carry out this PhD thesis or to already have two publications in journals of international reach.

Finally, I want to double thank both my brother and wife. Without my brother, I would neither have reached a doctorate, nor met my wife. Meri's love has provided me with the calm and understanding necessary in the difficult moments of my investigation. Finally, I would also like to show my gratitude to my daughter Nausica. Her arrival gave me the last necessary incentive to finish my PhD thesis.

A mi primo Toni

Contents:

List of Tables

Chapter 1:

Chapter 2:

Chapter 3:

Chapter 4:

List of Figures:

Chapter 1:

Chapter 4:

Methodological appendix:

Tables:

Figures:

Chapter 1: Introduction

The sport industry is nowadays a sector with important economic influence. Dimitrov et al. (2006), cited in the White Paper on Sport of the European Commission, estimated the size of European Union's sports industry at 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 European countries (European Commission, 2011).

This PhD thesis studies the most popular and widespread sport in the world: football[1]. One of the best examples of the phenomenon of globalization, the effect of this sport has grown exponentially in the 21st century, generating excitement and frustration, and for many becoming a kind of religion. According to FIFA, the 2014 World Cup in Brazil reached 3.2 billion people, and one billion watched the final. In terms of participation, football is one of the few sports played all over the world (Murray, 1996). According to FIFA estimates, there are currently around two hundred and sixty-five million active football players[2].

The focus of this research is to analyse the relationship between football and economy at the international level. This relationship is investigated from different perspectives, leading to three related chapters that together offer new evidence on the importance of football in today's globalized world. The high development of the football industry in practically all countries of the planet allows chapter two to demonstrate that football can be considered an indicator of development at international level. On these grounds, chapter three then turns to proposing a model for identifying and measuring the factors that determine a national football team's performance. Chapter four finally extends the analysis to the local level (clubs) and examines whether the proportion of foreign players is related to the success of football clubs at national and global

[1] Or soccer, depending on the culture and language in use.
[2] Accesible at
http://www.fifa.com/mm/document/fifafacts/bcoffsurv/bigcount.statspackage_7024.pdf

level, considering the classical channels of knowledge-spillovers, matching or sharing effects. In other words, chapter four considers whether the international migration of footballers should be considered a determiner of football clubs' success.

This introduction follows a conventional structure. In its first section, it justifies the study of football's relationship with the economy at the international level from different perspectives. Then it presents the objectives, hypotheses and methodology followed in the research and concludes with a summary of its main findings.

1.1. Justifying the research

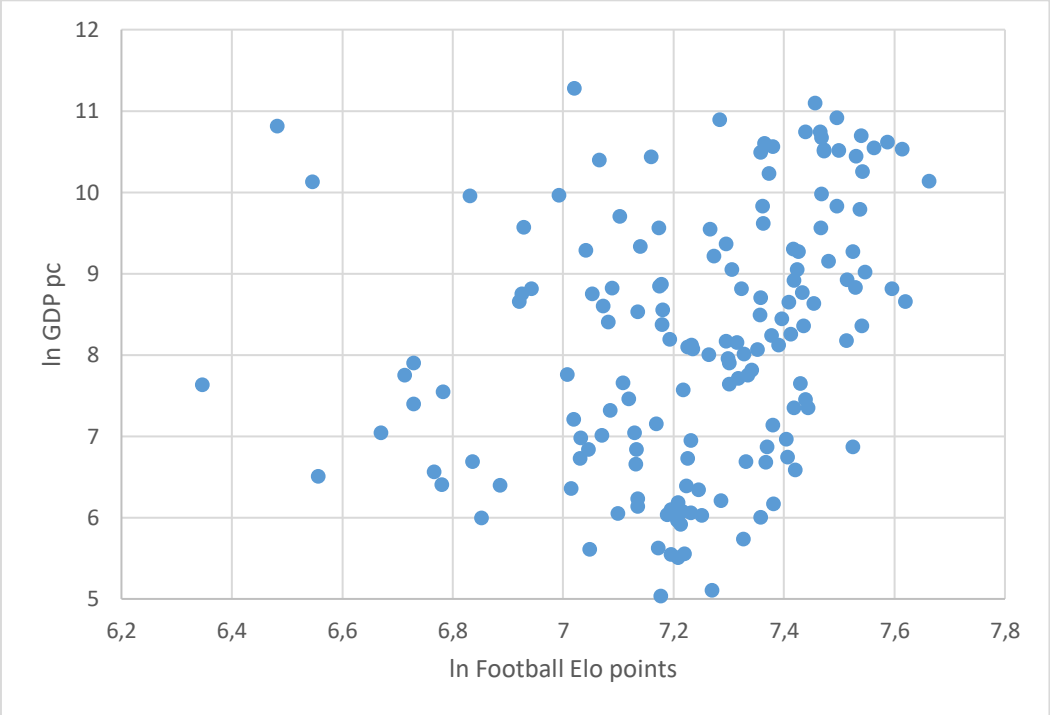
The objective of this research is to establish whether there is relationship between football and the economy at the international level. This approach answers a direct call from the mother of international organizations - the United Nations (UN). The UN General Assembly itself, in resolution A/61/373 of 22 September 2006, called on the academic world and the different institutions of the world of research to position sport on the one hand as an important tool for development and peace, by providing a common framework for assessing the impact of sport on economic and social development; and on the other hand, to promote recognition of the contribution of sport to economic and social development.

Since the beginning of the century, the UN has had a specific office dedicated to sport, the United Nations Office for Sport for Development and Peace (UNOSDP), and considers sport as a means to promote education, health, development and peace. The UN encourages the use of sport as a way to promote the development and strengthening of education for children and young people; prevent disease and promote health, including prevention of drug abuse; empower girls and women; promote the inclusion and well-being of persons with disabilities and facilitate social inclusion, conflict prevention and peace-building. (Resolution of the UN General Assembly 65/4 of 18 October 2010) In fact, the empowerment of sport is included as means to achieve both the UN development Millennium Goals (MDGs) [3] and their successors in 2016,

[3] UNOSDP justification for how sport favors compliance with the eight MDGs is set out in annex 1.

the Sustainable Development Goals.[4] As Figure 1.1 shows, this association is reasonably clear, as one can expect: more developed countries (higher GDP per capita) display better positions at the football ranking position. Sports success can be seen, then, as an output but also as an input of economic and human development.

Figure 1.1. Association between economics and football development. 2012



From an academic perspective, while sport's economic and even social impact had been demonstrated through various studies, there is little evidence of what the UN was asking for. Chapter two of this thesis therefore focuses on whether football can be considered an indicator of development (even if exclusively for the poorest countries). The theoretical framework proposed draws both on the endogenous and neoclassical economic growth model and looks at several drivers of economic growth. Once these factors are taken into consideration, can association between social and economic development still

[4] UNOSDP justification for how sport favors compliance with the seventeen Sustainable Development Goals is available at the following link: https://www.un.org/sport/content/why-sport/sport-and-sustainable-development-goals

exist? If so, football success may well be seen an indicator of development due to the influence of sport on health, education, happiness and its role in global social issues.

If football can be considered an indicator of development, then it is important to understand how to promote its success. As can be expected, sport performance is fundamentally driven by the economic and social development of nations. The efforts made up to now report robust evidence of several determiners of football performance, including economics, demographics, weather and institutions. There is a wide academic literature on this topic, although the analysis for football is not as large as one could expect. While most studies of the determiners of the success of national football teams are based on the analysis of the FIFA classification and its resulting ranking, a list of problems linked to the applied studies was founded. In this regard, these studies failed to give sufficient consideration to a theoretical framework, most of the analyses used cross-sections of countries and finally the FIFA classification was the only alternative rating employed. To resolve these limitations, the third chapter of this thesis proposes a list of innovations on the analysis of the factors promoting the success of national football teams. Firstly, and most importantly, the use of an alternative indicator to the FIFA ranking: the Elo rating, what allows us to substantially expand the time series under analysis and consequently to use a panel framework for our empirical exercise. Also, the theoretical model developed by Bernard and Busse (2004), originally designed to study the determiners of success in the Olympics Games, is adapted determiner to analyse the determiners of success of national football teams.

On the basis of this adapted model, chapter four considers the effects of globalization on football success. From the start, football was a universal game. In addition to being easy to learn and play, it did not require the use of a specific national language or a recognized diploma, and its standards were widely adopted around the world. On the other hand, for many, football was a product of transnational connections and the ideology of free trade (Lanfranchi and Taylor 2001). The example of football illustrates the desirable type of globalization: eliminating the limits of labor mobility, increasing global production through interaction between people, taking advantage of increased performance of skills (Milanovic, 2005).

Nowadays international migration is a very important phenomenon, and football is not alien to this reality. Football clubs try to hire the best players, no

matter where they come from, while football players aim to join the best teams to enjoy better salaries and professional prospects. In a globalized sport such as football, talent can be anywhere, which results in an international dimension that is probably more significant than in any other profession. Europe and South America have monopolized football successes for decades, but the arrival of globalization and the growth of emerging countries in different continents threaten to discuss, in the not too distant future, the government of this duopoly. China, the United States, India, and some countries in the Middle East are trying to acquire the most prestigious international stars.[5]

The migration of footballers is therefore a relevant and topical debate. Important currents of opinion have argued against an excess of foreigners in their leagues. Even UEFA and FIFA have tried to limit, and in fact have partially limited, the number of foreigners in order to preserve the national identity of clubs. Critics argue that excessive mobility threatens the configuration of local identities and worsens national football team performance. Since most papers analysing the impact of foreign football players are addressed at the national team level, chapter four's contribution expands current knowledge by considering a comprehensive data set of international clubs all over the world that allows for conducting both national comparisons and a detailed analysis at the club level.

1.2 Research hypotheses and methodology

This thesis has tested three hypotheses through different econometric models.

- Hypothesis 1: *The performance of a country's national team can be considered a good indicator of development at the international level.*

The objective is not to establish causality but rather whether there is a relationship between a country's national team and development. In other words, the objective is to observe whether the country's FIFA ranking continues to have an explanatory value when the classical factors of development are discounted.

[5] Carlos Tevez, currently, is the best paid player in the world. His club, Shenhua Shenhua, pays $ 80,000,000 for 2 years. (La Nacion, 2016).

To test the hypothesis, chapter two considers a panel of 135 countries over the period 1993 to 2010 to estimate a list of models in which both GDP per capita and the Human Development Index depend on the more traditional factors of development, including trade openness, inflation, population growth, government consumption and the investment ratio, and finally on the country's FIFA ranking. The econometric tests used are: Ordinary Least Squares (OLS), Between Panel Estimation, Random Effects (RE) and Fixed Effects (FE), which allows for controlling for non-observed fixed factors.

- Hypothesis 2a: *The best predictor of football success at the national level is economic development*
- Hypothesis 2b: *The Elo rating can be used as an alternative indicator to FIFA ranking to measure the performance of national teams.*

These two hypotheses are tested by using as a starting point a theoretical framework which is adapted to football. In our empirical model, a list of explanatory factors of sports success is regressed, including population and economic factors as well as football institutions. Chapter 3 considers a wide panel of countries over a 33-year period, and consequently we widely expand previous empirical analysis. This is done by considering an alternative rating for international football performance: the Elo rating system. In order to test if our proposal plays a better role than the FIFA ranking, we run a list of alternative regressions testing our proposal.

Methodologically, chapter three goes a step further chapter two, and because it estimates panel models (between, random and fixed effects estimates) together with a list of additions, including a time-to-build approach by means of a dynamic panel model using Blundell and Bond's (1998) system-generalized method of moments (GMM) estimator. Also, our hypothesis by means of ranking rather than points ratings is tested. For that purpose, negative binomial panel models (fixed and random effect) are used.

- Hypothesis 3: *Having a greater proportion of foreign players can have an impact on the success of football clubs.*

The last hypothesis of the thesis tests whether having more foreign players may influence the performance of football teams. It does so by comparing a cross section of close to one thousand football clubs all over the world. Using an empirical econometric model, the effect of the share of foreign

players on the points and ranking of the clubs measured by the classification developed by Footballdatabase.com (Elo rating methodology) is analysed.

Methodologically, this chapter goes a step further and introduces identification techniques to guarantee the causality of the relationship. The estimation strategy tries to avoid endogeneity problems because of a possible causal link between the percentage of foreigners and the performance of football clubs. Since such variables may have some time series persistence, and consequently some reverse causality can exist in the model, together with the omitted variables problem, an instrumental variable approach based on a two-step procedure following Brückner (2012, 2013) and Castells-Quintana (2016) is incorporated. Moreover, an instrumental variable estimator in negative binomial regressions is used.

1.3 Structure and main findings

This PhD thesis is structured in three main chapters, in addition to the introduction and conclusions. Each of these chapters corresponds to an article. The first two are published in international peer reviewed journals. The third work is currently being reviewed in an international journal.

This research, through the analysis of the relationship between football and economy at the international level, supports the UN claim that sport may help in the development of a country and improves our knowledge on how to promote sport by looking at the determiners of football success at international level. Chapter two results suggest that FIFA rankings of national teams can be used to complement our understanding of multidimensional development, particularly in those countries where the availability of information is not as good as researchers would like.

Chapter three's analysis of the determiners of football success at the international level indicates that economics, demographics, weather, geography, and football institutions are drivers of success. Besides, the analysis also shows that the Elo rating is a good alternative indicator compared to FIFA ranking, particularly when the researcher aims to analyse long time panels. Thereby, the Elo rating may be used in academic studies that wish to analyse football success over a long period of time.

Lastly, chapter four's study of the impact of the proportion of foreign players in the success of football clubs at national and global level reveals that

the international migration of footballers has an impact on success. On average, teams in leagues with more foreign players display better results in the world classification. Nevertheless, having more foreign players has no effect in any league where all teams have the same regulations, and once we control for economic variables. We conclude that when all teams have the same possibilities to import better players from abroad, what matters is the financial power to choose the better players.

References chapter 1

Bernard, A.B. and Busse, M.R. (2004). "Who wins the Olympic Games: economic resources and medal total." *The Review of Economic and Statistics*, 86(1), 413-417.

Blundell, R. and S. Bond. (1998). "Initial Conditions and Moment Restrictions in Dynamic Panel Data Models." *Journal of Econometrics,* 87, 115-143.

Brückner, M. (2012). "Economic growth, size of the agricultural sector, and urbanization in Africa." *Journal of Urban Economics*, 71, 26-36.

Brückner, M. (2013). "On the simultaneity problem in the aid and growth debate." *Journal of Applied Econometrics,* 28, 126-150.

Castells-Quintana, D. (2016) "Malthus living in a slum: Urban concentration, infrastructure and economic growth." *Journal of Urban Economics*, 92, 31-47.

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

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.

La Nacion (2016). "Tevez se va a China para ganar lo mismo que Messi y Cristiano juntos." Available at http://www.lanacion.com.ar/1971542-tevez-se-va-a-china-para-ganar-lo-mismo-que-messi-y-cristiano-juntos

Lanfranchi, P. and Taylor, M. (2001). *Moving with the Ball: The Migration of Professional Footballers*. Oxford: Berg.

Milanovic, B. (2005). "Globalization and goals: does soccer show the way?" *Review of International Political Economy*, 12(5), 829-850.

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

Annex Chapter 1:

Table A.1. Contribution of sport to the millennium development goals

1. Eradicate extreme poverty and hunger
➢ Participants, volunteers and coaches acquire transferable life skills which increase their employability
➢ Vulnerable individuals are connected to community services and supports through sport-based outreach programs
➢ Sport programs and sport equipment production provide jobs and skills development
➢ Sport can help prevent diseases that impede people from working and impose health care costs on individuals and communities
➢ Sport can help reduce stigma and increase self-esteem, self-confidence and social skills, leading to increased employability
2. Achieve universal primary education
➢ School sport programs motivate children to enroll in and attend school and can help improve academic achievement
➢ Sport-based community education programs provide alternative education opportunities for children who cannot attend school
➢ Sport can help erode stigma preventing children with disabilities from attending school
3. Promote gender equality and empower women
➢ Sport helps improve female physical and mental health and offers opportunities for social interaction and friendship
➢ Sport participation leads to increased self-esteem, self-confidence, and enhanced sense of control over one's body
➢ Girls and women access leadership opportunities and experience
➢ Sport can cause positive shifts in gender norms that afford girls and women greater safety and control over their lives
➢ Women and girls with disabilities are empowered by sport-based opportunities to acquire health information, skills, social networks, and leadership experience
4. Reduce child mortality

➢ Sport can be used to educate and deliver health information to young mothers, resulting in healthier children
➢ Increased physical fitness improves children's resistance to some diseases
➢ Sport can help reduce the rate of higher-risk adolescent pregnancies
➢ Sport-based vaccination and prevention campaigns help reduce child deaths and disability from measles, malaria and polio
➢ Inclusive sport programs help lower the likelihood of infanticide by promoting greater acceptance of children with disabilities
5. Improve maternal health
➢ Sport for health programs offer girls and women greater access to reproductive health information and services
➢ Increased fitness levels help speed post-natal recovery
6. Combat HIV and AIDS, malaria, and other diseases
➢ Sport programs can be used to reduce stigma and increase social and economic integration of people living with HIV and AIDS
➢ Sport programs are associated with lower rates of health risk behaviour that contributes to HIV infection
➢ Programs providing HIV prevention education and empowerment can further reduce HIV infection rates
➢ Sport can be used to increase measles, polio and other vaccination rates
➢ Involvement of celebrity athletes and use of mass sport events can increase reach and impact of malaria, tuberculosis and other education and prevention campaigns
7. Ensure environmental sustainability
➢ Sport-based public education campaigns can raise awareness of importance of environmental protection and sustainability
➢ Sport-based social mobilization initiatives can enhance participation in community action to improve local environment
8. Develop a global partnership for development
➢ Sport for Development and Peace efforts catalyze global partnerships and increase networking among governments, donors, NGOs and sport organizations worldwide

Chapter 2: Is football an indicator of development at the international level?[6]

2.1 Introduction

As we have seen in the introduction of this thesis, 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. Besides, football is considered the most popular sport in the world.

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 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

[6] The analysis of this chapter is published in Social Indicators Research. July 2014, Volume 117, Issue 3, pages 827–848.

question: Can a national football team's performance be used as an indicator of development at the international level? In this line, is it possible that the performance of the national football team might be useful as an additional indicator particularly in those countries where the availability of information is not as good as researchers might like?

The chapter addresses this question through five further sections. Section 2.2 reviews the literature on the topic. Section 2.3 introduces the theoretical analytical framework used in this research. Section 2.4 presents the data sources. Section 2.5 sets out the empirical model and presents the estimation results. Finally, section 2.6 offers some conclusions.

2.2 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.

2.2.1 Development influencing sporting success

Economists have already shown that GDP[7] 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 GDP may indeed have an influence on sporting success, and argue that richer 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

[7] 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).

pitch. 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.

2.2.2 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 about 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. Interestingly, few papers consider explicitly a developing country: Bohlmann and Van Heerden (2005) analyse the impact of a sport event on the South African economy, while Hoffman et al (2002b) and Houston and Wilson (2002) include development non-linearly in the sport performance equation.

The aim of this chapter 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. Additionally, we devote an explicit analysis for developing countries. 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.

2.3 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.[8] 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), 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 Cornelißen, 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),

[8] 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).

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[9], 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).

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

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 due to the mobility of workers and the remittances it might generate, which are beneficial for the growth of the least developed countries. Even though there are several reasons to believe that there are differences in the remitting patterns of highly skilled and less-skilled emigrants, it is not clear in which direction is the difference Bollard et al., 2011, Ramos and Mattano, 2013), even though Horton (2012) argues that "One of the main purposes of migrating or working overseas is to be able to help to support the family financially as well as to help the wider community at home", and that that may be particularly true for Pacific Islanders rugby players. What is out of doubt is the fact that the migration of football players from developing countries to competitive leagues, usually placed in developed countries, results in a significant improvement of such player and also in their national football team (Berlinschi et al., 2013). As stressed by the World Development Report (World Bank, 2009): "an important insight of the agglomeration literature – that human capital earns higher returns where it is plentiful – has been ignored by the literature of labour migration".

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.

2.4 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, to test both interpretations of development, we consider both GDP per capita and the Human Development Index (HDI).[10] As a measure of development, Sagar and Najam (1998) note that the HDI has become a relevant alternative to the traditional one-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

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

and enrolment rates. Arguably, the HDI is a good index as it considers 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.[11] 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 in methodological appendix 1.

The period for which both variables will be analysed as controls (specified below) covers the years from 1993 to 2010[12]. The analysis includes a total of 135 countries[13].

---

[11] 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

[12] This period is chosen because FIFA rankings commenced in 1993 and the Hybrid HDI ends in 2010.

[13] This is the number of countries available in the Hybrid HDI. The full list of countries analysed can be consulted in annex (table A.2.1)

Having defined the key variables in our analysis we need to consider whether, *a priori*, there is any relationship between them. Table 2.1 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 we control for country effects (-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 2.1: 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.

- *Openness.*[14] 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

[14] Openness data come from the Penn World Table (PWT) 7.1.

advantage, and hence they reduce aggregate output. If this were true, countries that reduced trade restrictions over time should experience higher economic growth.

- *Population.*[15] 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).*[16] 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.*[17] 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).*[18] Grier and Tullock (1989) found a significantly negative relation between the growth of real GDP and the growth of the government share of GDP.

- *Regional dummies:* regional dummy variables are included to complete a regional analysis. CONCACAF, CONMEBOL, AFC, CAF, and OFC are the regional football confederations. UEFA is the omitted confederation. By including international confederations, we control for the potential bias that may result from the FIFA ranking calculation, as winning a match in a strong confederation or against a strong team (more likely to be in strong confederation) reports more FIFA points and consequently a higher ranking.

[15] Annual population data come from the PWT 7.1.
[16] Data on investment relative to GDP come from the PWT 7.1.
[17] Inflation data come from the World Development Indicators.
[18] Government Consumption data come from the PWT 7.1.

The descriptive statistics for all the variables used in the present study are summarized in Table 2.2, and the correlations between all the variables are shown in Tables 2.3 and 2.4. It can be seen that football is correlated with GDP per capita, the HDI, government consumption and trade openness; however, these correlations disappear when country and time effects are taken into account (this being the case for all other correlations).

2.5 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[19] per capita according to a list of variables that can be considered determinants of development.

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.

$$\ln GDP_{i,t} = \alpha + \beta_1 fifa_{r_{i,t}} + \beta_2 kg_{i,t} + \beta_3 ki_{i,t} + \beta_4 openk_{i,t} + \beta_5 infl\_GDPd_{i,t} + \beta_6 POP_{i,t} + u_{i,t} \quad (2.1)$$

The estimations were performed using different procedures (see Table 2.5). All estimates, even the fixed effects estimate, gave a negative and significant result for the FIFA variable. The Hausman test 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.

[19] Following Easterly (2007), the current level of GDP is the result of consecutive years of economic growth.

Table 2.2: 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 2.3: 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 2.4: 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

Table 2.5: 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)
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

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%.

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

$$HDI_{i,t} = \alpha + \beta_1 fifa\_r_{i,t} + \beta_2 kg_{i,t} + \beta_3 ki_{i,t} + \beta_4 openk_{i,t} + \beta_5 \text{infl}\_GDPp_{i,t} + \beta_6 POP_{i,t} + u_{i,t} \quad (2.2)$$

The results displayed in Table 2.6 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.

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.

Table 2.6: 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

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 A.2.2. and A.2.3 in annex 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).

Finally, in order to see if the FIFA ranking is a good indicator particularly in developing countries, we have run a list of fixed effects regressions and considered separately different groups of countries depending on their level of development.[20] The estimated parameters referred to the FIFA ranking variable are displayed at table 2.7. The outcomes of the regressions show always the expected negative results, although they are not significant in several cases. FIFA ranking is not significant for developing countries in the economic development (GDP per capita) models, but displays a significant parameter for multidimensional development (HDI). Less developed and developed countries display always a significant result. Interestingly, the parameter for the developed countries at the GDP model is significant at 5% but not at 1%, and overall statistical significance is always larger for less developed countries and for the HDI models.

Table 2.7: Fixed effects estimation results for different development levels

	Developing Countries			
	Less Developed Countries N=27	Developing Countries without LDCs N=61	All Developing Countries N=88	Developed Countries N=47
log (GDP)	-0.0009781***	-2.06E-06	-0.0002508	-0.0003584**
	(0.0003246)	-0.0000277	(0.0001779)	(0.0001527)
HDI	-0.0002135***	-0.0003133	-0.0000592**	-0.0000599***
	(0.000058)	-0.000208	(0.0000266)	(0.0000202)

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

Overall, we believe that these results confirm our initial guess about the suitability of the FIFA ranking as indicator of development and stress that it is a closer indicator to multidimensional development and for less developed countries, precisely where the lack of good quality statistical information may be larger.

[20] We have followed the Development Assistance Committee of the OECD list of official development assistance countries (ODA). It consists of all low- and middle-income countries based on gross national income (GNI) per capita as published by the World Bank. The list also includes all of the Least Developed Countries (LDCs) as defined by the United Nations (UN). This OECD list can be accessed at: http://www.oecd.org/dac/stats/49483614.pdf

2.6 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 trade openness, inflation, population growth, goverment consumption 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. These results are particularly robust for less developed countries and are more significant for multidimensional development (measured by the HDI).

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 and that football performance may be mirroring national institutions want, at the end, strongly affects development (Castells-Quintana and Royuela, 2012).

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 (less developed countries), 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).

References chapter 2

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

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.

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.

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.

Berlinschi R., Schokkaert, J. and Swinnen, J. (2013). "When Drains and Gains Coincide: Migration and International Football Performance." *Labour Economics,* 21(1), 1-14.

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." *Medicine and Science in Sports and Exercise,* 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. (2005). The Impact of Hosting a Major Sport Event on the South African Economy. University of Pretoria, Working Paper: 2005-29.

Bollard, A., McKenzie, D., Morten, M. and Rapoport. H. (2011). "Remittances and the Brain Drain Revisited: The Microdata Show That More Educated Migrants Remit More." *World Bank Economic Review,* 25 (1), 132-156.

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.

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.

Castells-Quintana, D. and Royuela, V. (2012) "Unemployment and long-run economic growth: The role of income inequality and urbanization." *Investigaciones Regionales,* 24, 153-173.

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.

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.

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 neural networks." *Computers and 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.

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

Downie, M. and Koestner, R. (2008). "Why Faster, Higher, Stronger isn't Necessarily Better - The Relations of Paralympic and Women's Soccer Teams' Performance to National Well-being." *Social Indicators Research,* 88, 273-280.

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

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

Feng, X. and 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.

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

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.

Horton, P. (2012). "Pacific Islanders in Global Rugby: The Changing Currents of Sports Migration." *The International Journal of the History of Sport*, 29(17), 2388-2404

Hotchkiss, J.L., Moore, R.E. and Zobay, S.M. (2003). "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., and Whitehead, J.C. (2000). "Value of public goods from sports stadiums: The CVM approach." *Contemporary Economic Policy*, 18(1), 48-58.

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

Johnson, B.K., Mondello, M. and Whitehead, J.C. (2001b). "The Value of Public Goods Generated by a National Football League Team." *Journal of Sport Management*, 21(1), 123-136.

Kang, Y.S. and Purdue, R. (1994). *Long-term impact of a mega-event on international tourism to the host country: A conceptual model and the case of the 1988 Seoul Olympics*. Global tourist behavior, 205-225. New York: International Business Press.

Kavetsos, G. (2012). "National pride: war minus the shooting." *Social Indicators Research*, 106, 173-185.

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

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.

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. (1988). "On the Mechanics of Economic Development." *Journal of Monetary Economics,* 22, 3-42.

Macmillan, 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.

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.

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.

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.

Ramos, R. and Matano, A. (2013) Remittances, education and return migration. WP3/11 SEARCH working paper. Available at http://www.ub.edu/searchproject/results/working-paper-collection/

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 Long-Run Growth." *Journal of Political Economy,* 99(3), 500-521.

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

Romer, P.M. (1986). "Increasing Returns and Long Run Growth." *Journal of Political Economy*, 94, 1002-37.

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

Royuela, V. and J. Suriñach (2013) "Quality of Work and aggregate productivity." *Social Indicators Research*, 113(1), 37-66.

Sagar, A. and Najam, A. (1998). "The human development index: a critical review." *Ecological Economics,* 25, 249-264.

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

Sen, A. (1999). *Development as Freedom*. New York: Anchor Books.

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.

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.

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.

UNDP (1990). *Human Development Report 1990*. Oxford, New York.

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. and Quinney, A. (2001a). "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. (2001b). "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.

World Bank (2009). *World Development Report 2009: Reshaping economic geography*. Washington D.C: World Bank.

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 Chapter 2:

Table A.2.1: Countries considered

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	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.	Cen. 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)	101.	Philippines	135.	Zimbabwe
34.	Cyprus	68.	Kuwait	102.	Poland		

Table A.2.2: 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 A.2.3: 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

Chapter 3: The determinants of international football success: A panel data analysis of the Elo rating[21]

3.1 Introduction

As we have seen in chapter 2, the importance of football is so great that it can even be used as a development indicator. Given the importance of football in society today and its impact on the economy, efforts have been made to study the determinants of football success at the international level. This chapter improves previous works and contributes to the literature in three ways:

a. We apply to football a theoretical framework, which is based on the work of Bernard and Busse (2004) developed originally for determining country success at the Olympic Games.

b. In addition, we expand the traditional cross-section analyses reported in the literature by considering a panel of 180 countries for the period 1980-2012.[22]

c. We use as our world-wide indicator of football performance the Elo rating, an alternative indicator (and less problematic) to FIFA's more traditional classification.

The chapter addresses these tasks in the following six sections. Section 3.2 reviews the literature on the topic. Section 3.3 introduces the theoretical analytical framework used in this research. Section 3.4 presents the data sources. Section 3.5 sets out the empirical model and presents the estimation results, several additions to the model and a sensitivity analysis and robustness checks. Finally, section 3.6 offers some conclusions.

[21] The analysis of this chapter is published in Social Science Quarterly. June 2016, Volume 97, Issue 2, pages 125–141.
[22] The full list of countries analysed can be consulted in table A.3.1 of the annex.

3.2 Literature review

The study of the determinants of the success of national football teams (based on analyses of the FIFA classification and its resulting ranking) is a relatively modern field, but a number of findings have already been reported. Below we review chronologically the papers published to date that analyse the determinants of the football performance of national football teams.[23]

- Hoffman et al. (2002) is considered the pioneering study of the determinants of international football performance. Drawing on studies of the determinants of success at the Olympic Games, the authors apply an empirical methodology to the analysis of the explanatory variables showing a significant relation to FIFA's world ranking points. To do so, they estimate a cross-section for 76 countries for the year 2000. The explanatory variables are: GNP per capita, GNP per capita squared, temperature, share of world population, host dummy (if the World Cup has been held previously in a given country), and a Latin dummy variable (it is noted that the largest countries in terms of population - China, India, Indonesia - are not the most successful at football, and so the authors include an interaction term between Latin cultural origin and population size). Their findings indicate that economic, demographic, cultural and climate variables are important. They also identify an inverted U-shape relationship for temperature and per capita wealth. Finally, the authors find that the interaction between population size and Latin culture is significant, while separately these variables are insignificant.

- Houston and Wilson (2002) analyse FIFA's ranking points as a proxy of the proficiency of leisure. The estimation was conducted using a cross-section of 179 countries for 1999. Interestingly, the authors incorporate control variables hitherto not considered, including, the number of years as a member of FIFA (a proxy of football institutions). The findings show that leisure proficiency on an aggregate level (FIFA points ranking) is positively associated with income and increases at a decreasing rate. As such, their results are consistent with Hoffman et al. (2002).

[23] In addition, Mourão (2010) analyses the football performance at the European level through analysing the performance of the professional clubs with an original ranking system for European soccer teams. These rankings measure the success of the professional clubs in the European Champions League.

- In three separate studies Benno Torgler analyses the determinants of football performance. Torgler (2004a) examines the determinants of the success of national teams in the 2002 FIFA World Cup. The study uses a dummy variable as the dependent variable (winning a match=1 vs. not winning a match=0) and FIFA's points ranking as an explanatory variable, together with related variables of game performance: shots on goal, possession, sending-offs, corner kicks, etc. (determinants of success during a game). The author reports a cross-section probit estimate for 126 observations[24] and finds that FIFA's points ranking is not a good predictor for determining which team will win a match.

- Torgler (2004b) examines the determinants of the FIFA women's world ranking and also the FIFA classification. The estimation is made for a cross-section of 99 countries in 2009. The explanatory variables are similar to those selected in previous studies: GDP, tradition, population and temperature. In addition, he uses the success of national football teams over time as a proxy of football tradition among women. The main contribution of the study is the author's attempt to control for geography using football regions (confederations). In line with Hoffman et al. (2002), the author finds that economy, demography and tradition are important. However, he fails to find the same inverted U-shape relationship with per capita wealth. Moreover, Torgler finds regional differences (geography) to be relatively small.

- Finally, Torgler (2004c) constructs a model where previous World Cup final tournament performance (1930 to 2002) is the dependent variablefor studying the determinants of success in such tournaments.[25] Although he analyses the success of national football teams over time, he considers average values. In the case of his economic and demographic explanatory variables he uses averages for 1960 to 2001. He thus estimates a cross-sectional model applied to 60 countries.[26] Once more, wealth is positively associated with a national team's performance, population size only affects

[24] These 126 observations consider the performances of each team in the 63 games played in the 2002 World Cup, excluding the match for third place (63 games).
[25] The author claims that this is the only way to capture the temporal dimension, given that the FIFA ranking only began to be calculated in 1993 and, moreover, it underwent a change in methodology in 1999.
[26] The countries that participated in the World Cup final up to and including 2002, with the exception of Cuba, North Korea, Iraq and East Indies, for which the author does not find data for the explanatory variables.

countries of Latin origin and there is strong evidence of the importance of football tradition.[27] By contrast, temperature does not affect football performance.

- Hoffman et al. (2006) adopt a very similar approach to Torgler (2004b). They use a cross-section regression for 88 countries in 2002 for women's international football performance and compare it with that of their male counterparts. In so doing, they also incorporate political[28] and gender inequality variables. They find that while economic and demographic factors have the same impact on the men's and women's game, the political and cultural factors differ. Specifically, climate and Latin cultural origin only affect men's football performance, while the political system and gender inequality account for performance in the women's game. Thus, the authors find a differentiated set of determinants of football success for men and women.

- Macmillan and Smith (2007) identify serious statistical problems in the pioneering work of Hoffman et al. (2002), including sample selection bias and abnormal errors. To overcome these problems, the authors add 100 countries to the sample and estimate a cross-section for the year 2000. As well as considering the same explanatory variables as in Hoffman et al. (2002), they take into account Houston and Wilson's (2002) study and introduce the importance of football tradition as a variable. Additionally, in line with Torgler (2004c), they also include football confederations as control variables.[29] The findings confirm that Hoffman et al. (2002) suffers from serious statistical problems. In line with earlier studies, a country's football tradition is a significant variable. However, they conclude that the size of the population is significant without the need to relate it directly to whether a country is of Latin origin or not. Indeed, these findings lead them to propose the use of an alternative indicator of population: a variable related to the number of football players, rather than the simple use of population. Finally, they consider that the FIFA ranking may not be a good indicator of the true level of competitiveness, as its calculation includes friendly matches in which national teams do not have the same incentives as in competitive

[27] The proxies used are having hosted the competition and the number of years as a member of FIFA.
[28] Specifically, whether the country has ever operated a communist or socialist political system.
[29] Subsequently, football confederations will also be used in Leeds and Leeds (2009) and Berlinschi et al. (2013).

matches. As a consequence, in addition to the FIFA ranking, they use an alternative indicator: the so-called Elephant ranking,[30] and obtain similar results.

- Gelade and Dobson (2007) estimate a cross-section for 201 countries for FIFA ratings between 2000 and 2005. Most interestingly they introduce new explanatory variables: the number of men who regularly play football (in line with Macmillan and Smith's suggestion) and the percentage of expatriate players in the national team. They find that the inclusion of these two variables (both significant) improves the explanation of the determinants of national football success - the models' overall explanatory power being 70%. They conclude that the determinants of football success are highly inflexible, limiting the ability of policymakers to intervene; however, they believe policymakers can make a difference by encouraging more people to play football and by increasing the number of expatriate footballers from the most competitive leagues in the national team.

- Leeds and Leeds (2009) claim that success in football can be measured in one of two ways: by measuring the success of a national team over time (temporal), or by accounting for the number of FIFA points held by a nation at a particular point in time. They estimate a cross-section for 178 countries for 2006. In line with Torgler (2004b), the authors consider an alternative dependent variable, the FIFA classification (as opposed to FIFA points). The paper contributes to the literature by analysing the role of institutions in determining the success of national football teams. Thus, they analyse the impact of a nation's political regime, colonial heritage and political freedom (but find no significant relationships), as well as its football institutions: number of years as a member of FIFA (as in Houston and Wilson, 2002) and the international success of the country's club teams. The authors conclude that the stronger the country's domestic leagues are (measured by success in international club tournaments) the stronger the national team will be. Thus, investing in the domestic league is one way to improve a national team's performance.

- Yamamura (2009) examines whether the mechanism of technology transfer from developed to developing countries can be applied to football. He observes that only 21% of players in the African national teams at the 1998

[30] Note that as this indicator was somewhat rudimentary, the website at which it could be consulted (www.elerankings.com) is no longer operational.

World Cup played in their corresponding domestic leagues. Consequently, he claims, the gap in competitive football between developed and developing countries should be closed quite quickly thanks to the importation of more advanced techniques. Indeed, he finds that the coefficient of variation of FIFA's ranking points system fell between 1993 and 1998. To test his reasoning, the author regresses the log of FIFA points for 156 countries over the period 1993-1998, making the first study to use panel data. He justifies the use of this short period of time on the grounds of the methodological changes made in the computation of FIFA classification in 1999 and 2006. He concludes that the improved proficiencies of developing countries can be attributed to technology transfer and local information spillover. In a similar vein, Yamamura (2012) uses FIFA world ranking points to examine how linguistic heterogeneity impacts technology transfers from the most developed countries, finding that it has a detrimental effect in the case of developed countries but not in that of developing countries.

- Binder and Findlay (2012) analyse the effects of the Bosman ruling on national and club teams in Europe. To our knowledge, this is the first paper that uses the Elo rating to measure the national team strength. The authors show how the Elo rating is a better predictor of success in recent World Cups compared to the FIFA rating, although they do not discuss in depth the methodological advantages of such alternative. The application is devoted to fourteen European countries and finds that the Bosman ruling had, if any, a fairly small effect on national teams' performance.

- Berlinschi et al. (2013) carry out a cross-sectional estimation for 202 countries for the year 2010, considering both FIFA points and the FIFA ranking (using a negative binomial regression). The authors study the impact of the migration of professional footballers on their countries of origin. They find that the migration of international football players improves performance, especially for countries with domestic leagues of lower quality. The authors conclude, in line with Gelade and Dobson (2007), that the migration of players to competitive leagues is one of the determinants of football success, especially for developing countries, in keeping with Yamamura's results on knowledge transfer by migration.

- Allan and Moffat (2014) make a cross-sectional estimation for 179 countries for the year 2010, 2011 and 2012, considering FIFA points. The authors

study the impact of the emigration of professional footballers and the manager immigration on the national football team. They find that player emigration has a positive impact on the performance of the national football team. Nevertheless, the manager immigration variable has a negative impact to the national football team. The author concludes that the national football sides should employ domestic managers.

- Jacobs (2014) studies the determinants of women´s international football performance, such as Torgler (2004b) and Hoffman et al. (2006). This work emphasizes how four programme-level factors – governance, training, youth development and early initiation into football – are associated with a country's international performance. This study uses 2006 programme-level data from 139 FIFA member nations. The contemporaneous and longer-term associations between programme-level factors and FIFA ranking points are explored using ordinary least squares regressions. Controls for economic, gender equity, talent pool, temperature, men's soccer legacy, political and cultural factors are included. The author shows that dedicated governance staff and training are key correlates of successful football nations.

This literature review shows that there is robust evidence of several determinants of football performance, including, economics, demographics, weather and institutions. However, there are several gaps in the literature.

First, these studies fail to give sufficient consideration to a theoretical framework that would ensure theoretical consistency in their empirical estimations. Next section is devoted to adopting the theoretical developed by Bernard and Busse (2004), which is originally designed to study the determinants of success in the Olympics Games. Given that field of study is very similar to ours (sport success), in next section we adapt their theoretical model to analyse the determinants of success of national football teams.

Second, most of the analyses use cross-sections of countries. One of the main reasons for this is the methodological changes made to the computation of the FIFA classification in 1999 and 2006. Third, concerns regarding the FIFA classification, with the sole exception of Macmillan and Smith (2007), it is the only alternative employed.

To resolve these limitations, we considered an alternative indicator to the FIFA ranking: the Elo rating. With this indicator, we can run a panel analysis,

because we have a longer time horizon (Elo rating don't have methodological changes over time). Besides, Elo rating has a several advantages, that we analyse later, compared to FIFA ranking.

3.3 Theoretical framework

Bernard and Busse (2004) model the determinants of success at the Olympic Games. Their model assumes that the talent of athletes is randomly distributed around the world. Thus, assuming that countries are arbitrary divisions of the world population, adapting this model to football, we would expect success to be proportional to the population of each country.

$$E(football\ success\ share_{i,t}) = \frac{football\ success_{i,t}}{\sum_j football\ success_{j,t}} = \frac{population_{i,t}}{\sum_j population_{j,t}} = pop\ share_{i,t} \quad (3.1)$$

However, there are several reasons why this equation might not hold. First, there are technical reasons that apply specifically to the game of football. For instance, the national football team of each country comprises the same number of players (the eleven sent out on to the pitch) irrespective of the size of the country's population. In addition, there are specific criteria as to how football performance is measured. For instance, playing the final stages of the major football tournaments, such as the FIFA World Cup (for which not all countries can qualify), gives a team more points and so a better FIFA ranking.

Yet, clearly, as football includes a range of technical features other than natural talent, it is sensible to consider that aside from population, there must be other factors that account for the success of national football teams. Indeed, boosting good players would appear to require a considerable outlay in terms of commodities and personnel. In this regard, wealthy countries are more likely to have public and/or private organizations willing to make this investment. Further, there is a stronger likelihood that more developed countries offer sport as part of the school curriculum, and dispose of more free time to dedicate to sport. This means that socioeconomic factors related to development need to be included in the model.

Additionally, regardless of the size of the population of a country and its resources, the literature shows that mean temperature is a key variable for the practice of football and, at a subsequent stage, for success in the sport. Hoffman et al. (2002) claim that the optimal mean annual temperature for sporting

performance is 14 ºC and that deviations from this temperature can hamper success.

Furthermore, institutions would seem to play a significant role. The previous literature (for example, Leeds and Leeds, 2009) points to a non-significant influence of political institutions. On the contrary, football institutions (including the national football association and private or public football clubs and their resources) may be connected with football performance. Consequently, we only consider the inclusion of the latter in our model.

Thus, the production function of talent ($T_{i,t}$) of the football teams in country i in year t requires a population ($N_{i,t}$), economic resources ($Y_{i,t}$), a warm temperature ($W_{i,t}$), a number of football-related institutions ($I_{i,t}$) and some organizational skills ($A_{i,t}$):

$$T_{i,t} = f(N_{i,t}, Y_{i,t}, W_{i,t}, I_{i,t}, A_{i,t}) \tag{3.2}$$

The relative football success, $S^*_{i,t}$, obtained by the country is a function of the talent in that particular country:

$$E\left(\frac{football\ success_{i,t}}{\sum_j football\ success_{j,t}}\right) = S^*_{i,t} = g(T_{i,t}) \tag{3.3}$$

A Cobb-Douglas talent production function is assumed:

$$T_{i,t} = A_{i,t} N_{i,t}^{\gamma} Y_{i,t}^{\theta} W_{i,t}^{\varphi} I_{i,t}^{\xi} \tag{3.4}$$

This characterization leads to the following specification for a country's relative success at football:

$$S^*_{i,t} = \ln \frac{T_{i,t}}{\sum_j T_{j,t}}$$

$$S_{i,t} = ln\, A_{i,t} + \gamma\, ln\, N_{i,t} + \theta\, ln\, Y_{i,t} + \varphi\, ln\, W_{i,t} + \xi\, ln\, I_{i,t} - ln \sum_j T_{j,t} \tag{3.5}$$

As the socioeconomic variable, can be expressed as the product of population and per capita income, the specification to be estimated is:

$$S_{i,t} = \beta_0 + \beta_1\, ln\, N_{i,t} + \beta_2\, ln\left(\frac{Y}{N}\right)_{i,t} + \beta_3\, ln\, W_{i,t} + \beta_4\, ln\, I_{i,t} + d_t + v_i + \epsilon_{i,t} \tag{3.6}$$

where d_t is a time *dummy* included to capture the changes in the talent panel, v_i is a country effect, and $\epsilon_{i,t}$ the error term that is distributed normally.

3.4 Data

As seen in section 2 above, the previous literature has primarily drawn on FIFA data, either using the Association's classification points or rankings. One of the main contributions of the study reported here, therefore, is its alternative use of the Elo rating (www.eloratings.net), a rating system that has been rarely exploited in the academic literature and, to our knowledge, only once in the football literature, although in a small sample of European countries (Binder and Findlay, 2012).[31] A detailed analysis of the methodology for calculating both the Elo and the FIFA ratings is shown in methodological appendix 1 and 2. Stefani and Pollard (2007) show that the Elo system has a series of advantages over the FIFA system. Since being introduced in 1993, the FIFA World Ranking has been the subject of much debate, especially with regard to its calculation and the resulting disparity between the perceived quality and the world ranking of certain teams. Thus, for example, Norway was surprisingly ranked second in October 1993 and again between July and August 1995, while the United States climbed to fourth in 2006, much to the surprise even of their own players. This criticism of the ranking has continued even after the implementation of a new formula in 2006. Leeds and Leeds (2009) identify major methodological problems with the FIFA. The methodical problems are:

a. The authors claim that national teams can obtain better rankings by switching to a different confederation.

b. They highlight the volatility among the rank position of the top ten teams.

c. Additionally, the FIFA ranking only takes into consideration if the team wins, loses or draws the match.

These methodological problems are solved when using the Elo rating, since it uses a low volatility index (is an index that has more memory present) and problems attributable to geography are avoided, as the rating does not depend on the confederation to which a national team belongs. Regarding to the result of the match, the Elo rating incorporates more information because it considers expected and goal difference in the game, and not only if the team wins, loses or draws the match. Even though the more recent FIFA ranking has

[31] Created by the physicist Arpad Elo to establish a system for rating chess players, the Elo rating has only been used in the academic literature on a few occasions to measure the degree of efficiency of predictions in sports betting markets (Hvattum and Arntzen, 2010; Leitner et al. 2010; Ryall and Bedford, 2010)

improved the previous rating systems (methodological change in 2006) by taking into account strength of opponents and game importance, all losses are treated as equal, regardless of the opponents, and home advantage is ignored.

In addition, FIFA ranking is not an internal ratings-based system source (IRB system). The IRB system employs a predictor/corrector adjustment in which defeating a weak team provides less gain than defeating a strong team, while losing to a weak team elicits a much larger negative adjustment than losing to a strong team, arguably a fair and efficient methods for rating competitors. As can be seen in methodological appendix 1 and 2, Elo based system, employing many of features of the IRB system, and so appears to have advantages over the FIFA system.

A further advantage of using the Elo rating is the wider horizon can be analysed: while FIFA ranking suffers methodological changes in 1999 and 2006, the Elo rating allows for comparative analysis in longer periods. Although the Elo rating can in fact be computed since 1872, we opt here to consider the period from 1980 to 2012, as the panel can be largely balanced with information for the explanatory variables.[32]

In another vein, as usual, the UK is not included as a single country, since FIFA recognizes England, Scotland, Northern Ireland and Wales individually as independent teams with the right to play in international competitions. Following Hoffman et al. (2002), we therefore opt to include England, as the largest of the home countries, to represent the UK.

Regarding to the socioeconomic factors, it would be appropriate to use facilities such as the number of youth training camps, sport education, etc. However, the difficulty of obtaining data on these variables at the country level requires us to use GDP per capita as a proxy for such socioeconomic explanatory variables.[33] An alternative to GDP per capita could be the use of the Human Development Index, developed by the Human Development Report. We make correlations between Elo rating and GDP per capita and HDI.[34]

---

[32] We select the rating and the position of each country when playing their last match in the year.

[33] GDP per capita (constant 2005 international $) data come from World Development Indicators.

[34] To make a homogeneous comparison between the 2 variables, we use 135 countries. This is the number of countries available in the Hybrid HDI, accessible at http://hdr.undp.org/en/data/trends/hybrid/.

Contrary to what one might think a priori, GDP per capita is a better explanatory variable to explain football performance (the overall correlation between Elo rating is higher for logarithm of GDP per capita: 0.4217, compared to HDI: 0.3994.) Thus, we use GDP per capita as a socioeconomic indicator.

Population data come from the World Development Indicators. Although we wanted to include the number of people playing football regularly, in line with Gelade and Dobson's (2007) recommendation, this variable is only available for 2006 and, so, we had to rule out its use in our panel specification. The weather variable is computed as $(TEMP - 14)_i^2$, where *TEMP* refers to the average annual temperature between 1961 and 1999 (in degrees Celsius). As this variable is very stable, we take this valour as a representative of the whole period.[35]

In the case of the football institutions variable, as we do not have access to the budgets of all the associations and clubs over the considered period, and as we do not dispose of a variable that measures the quality of these institutions, a proxy is required. In line with Leeds and Leeds (2009), we consider the best proxy of football institutions to be the number of years a country's football association has belonged to FIFA in 2012. This is the most convenient variable for capturing the maturity of football institutions.[36] Additional proxies of football institutions include the *Host* variable (a dummy for those countries that have hosted a World Cup finals tournament[37]) and a list of dummies of the regional football confederations.[38] The description of all variables is in table A.3.2 of the annex.

[35] This variable is available at http://data.worldbank.org/data-catalog/cckp_historical_data.
[36] Leeds and Leeds (2009) use other proxies: namely, the international success of the country's club teams. This variable considers how many teams from each country dispute the main competition organised in their region, such as the Euro Champions League or the Copa Libertadores. However, one caveat for working with this variable is the fact that the rules for playing in such competitions have strongly changed over time: the European Champions League now included several clubs from each country, while in the 80s only one club per country was included.
[37] Argentina, Brazil, Chile, England, France, Germany, Italy, Japan, Korea, Mexico, South Africa, Spain, Sweden, Switzerland, United States of America and Uruguay.
[38] UEFA, CONCACAF, CONMEBOL, AFC, CAF and OFC. Methodological appendix 3 provides details of the countries in each confederation.

3.5 Results

3.5.1 Basic model

We follow the empirical strategy of Bernard and Busse (2004) who use a parsimonious model specification, starting from the estimation of equation 3.1 by means of a panel OLS (column 1 of Table 3.1). Column 2 reports the estimation using the log of population rather than the share, reporting a much larger R^2. At this stage, the preferred model (the highest R^2 value) is the one that considers the log of population, what supports the basic framework of the Bernard and Busse's (2004) model. Column 3 shows the estimates using both the log of population and the log of GDP per capita.

Table 3.1: Panel estimation

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Elo points	Elo points	Elo points	Elo points	Elo points	Elo points	Elo points
VARIABLES	OLS	OLS	OLS	OLS	Between	Fixed	Random
Popshare	1,037***						
	(164.8)						
LPOP		67.49***	81.77***	56.80***	50.35***	18.31**	34.46***
		(1.766)	(1.641)	(2.001)	(10.64)	(8.696)	(6.263)
LGDP			76.06***	51.37***	42.02***	12.07**	21.11***
			(1.836)	(2.235)	(12.66)	(5.175)	(4.699)
LWeather				-28.12***	-32.87***		-31.67***
				(2.324)	(12.11)		(10.90)
LYearsFIFA				125.0***	173.3***		165.5***
				(7.246)	(42.75)		(28.03)
Constant	1,393***	370.8***	-443.9***	-254.4***	-2,383***	1,020***	187.6
	(22.18)	(32.18)	(33.94)	(38.73)	(848.9)	(146.4)	(133.6)
Observations	5,667	5,667	5,344	5,344	5,344	5,344	5,344
Countries					180	180	180
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R2 or Pseudo R2	0.006	0.227	0.404	0.453	0.563	0.376	0.435

Column 4 considers equation 3.6, which includes population, GDP per capita, weather and institutions, expressed as log values. When jointly included, all the variables remain significant and present the expected sign in accordance with the literature. This points to the importance of a moderate temperature and the number of years a country's football association has been affiliated to FIFA for success in international football.

Next, we estimate the panel specification of equation 3.6. Following Baltagi and Griffin (1984) and Pirotte (1999), the panel between estimates would capture the long run effect of a model where the explanatory variables would impact the endogenous variable by means of a distributed lag structure. On the contrary, the fixed effects specification would report the short run effects. Finally, the OLS and random effects models would report estimates averaging the long and short run specifications.

Our panel specifications use GDP per capita as a proxy of socioeconomic factors related to development which in turn impact the available resources (facilities such as the number of youth training camps, sport education, etc.) to train and *produce* football players. We interpret then our model as a sort of reduced form specification where the variables will capture all other omitted variables directly related with football performance. This effect will be particularly strong in the between specification, as the fixed effects structure will capture the permanent differences between countries in such socioeconomic and related factors other than just GDP per capita.

Columns 5 to 7 present the between, fixed and random effects estimations. All models report significant parameters for all variables, although the fixed effects results display lower values for population and GDP per capita. The interpretation is in line of the above comments: the between estimates captures long run effects of a reduced form model where GDP per capita proxies socioeconomic factors. Thus, a *level* of GDP per capita 1% higher implies 42 Elo points higher. The fixed effects model, on the contrary, presents a parameter value much lower. On the other hand, the Hausman test between the Random and Fixed effects specifications reject 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. Population, weather and years in FIFA maintain the same behaviour all over specifications.

3.5.2 Additions to the model

The empirical specification of equation (3.6) leaves some specific information relating to each country in the error term. This section incorporates various factors (derived from our study of the literature) that we consider important for improving the analysis of the determinants of the sporting success

of national football teams.[39] Specifically, we include the square of the socioeconomic variable (to confirm whether there is an inverted U-shape relationship in the impact), the *Host* dummy[40] and the dummy of the regional football confederations[41] (so we can control the potential effects of belonging to a particular geographical region).

$$S_{i,t} = \beta_0 + \beta_1 \ln N_{i,t} + \beta_2 \ln\left(\frac{Y}{N}\right)_{i,t} + \beta_3 \ln\left(\frac{Y}{N}\right)^2_{i,t} + \beta_4 \ln W_{i,t} + \beta_5 \ln I_{i,t} + \beta_6 Host_{i,t} + + \sum_{j=1}^{5} \theta_j Conf_j + d_t + v_i + \epsilon_{i,t} \quad (3.7)$$

The results are presented in columns 1 to 4 of Table 3.2. All variables are significant and present the expected sign in accordance with the literature.

In line with Hoffman et al. (2002) and Houston and Wilson (2002) we observe 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, once a certain wealth threshold is reached, any subsequent increase in per capita wealth does not lead to greater sporting success. Consequently, we might expect to find that the relationship between sporting success and GDP per capita is more relevant in developing countries. The results point to a decreasing relationship in these first two estimations. The fixed and random effects results point to a linear relationship at sample values.[42] Countries with strong football institutions (proxied by having hosted a World Cup and the number of years affiliated to FIFA) display better outcomes in the Elo rating. We also find geographical differences, so that while CONMEBOL (South America) countries display better results than UEFA (Europe) countries, the other confederations present significantly negative values for this parameter.

[39] Following Macmillan and Smith (2007), we do not incorporate the interaction between people and the *Latin* dummy variable, as they conclude that the size of the population is significant without the need to relate it directly to whether a country is of Latin origin or not.
[40] This dummy variable is not permanent. The variable takes the value 0 until the World Cup takes place in the country, and from that year is equal to 1.
[41] UEFA is the confederation omitted.
[42] The difference in sign recorded for GDP and GDP squared in fixed and random effects is, in fact, not relevant. For real GDP values the relationship is almost linear. If we do not include GDP squared, the relationship between GDP per capita and football success becomes positive.

Table 3.2: Estimating additions to the model

	(1) Elo points OLS	(2) Elo points Between	(3) Elo points Fixed	(4) Elo points Random	(5) Elo points Sys GMM	(6) Elo ranking Neg Binomial	(7) Elo ranking Neg Bin Fixed	(8) Elo ranking Neg Bin Random
$ELOpoints_{t-1}$					0.775***			
					(0.033)			
LPOP	71.42***	70.23***	29.77***	51.01***	16.47***	-0.164***	-0.231***	-0.168***
	(1.908)	(10.54)	(9.195)	(6.176)	(3.092)	(0.00579)	(0.00964)	(0.0108)
LGDP	184.8***	190.5*	-45.91**	-49.28**	46.74**	-0.522***	0.132**	0.0788
	(17.10)	(100.5)	(22.13)	(21.23)	(18.20)	(0.0431)	(0.0540)	(0.0496)
$LGDP^2$	-7.698***	-8.184	3.886***	4.707***	-2.001*	0.0236***	-0.0189***	-0.0114***
	(1.074)	(6.177)	(1.463)	(1.383)	(1.117)	(0.00278)	(0.00357)	(0.00328)
LWeather	-13.18***	-20.69*		-12.88	-2.631	0.0506***		0.0661***
	(1.881)	(10.89)		(9.934)	(1.936)	(0.00562)		(0.0200)
LYearsFIFA	56.69***	80.69**		84.66***	13.81*	-0.120***		-0.608***
	(6.721)	(39.43)		(25.76)	(7.785)	(0.0173)		(0.0648)
Host	80.60***	84.09	89.64***	94.39***	17.06*	-0.894***	-0.725***	-0.480***
	(8.470)	(60.70)	(17.28)	(16.56)	(8.899)	(0.0438)	(0.0778)	(0.0603)
CONCACAF	-123.2***	-115.5**		-144.0***	-27.06**	0.450***		0.610***
	(10.26)	(52.57)		(42.20)	(12.77)	(0.0301)		(0.0859)
CONMEBOL	52.81***	62.03		53.34	13.84	-0.0995**		-0.365***
	(10.59)	(68.07)		(58.93)	(11.07)	(0.0439)		(0.107)
AFC	-298.1***	-297.7***		-305.0***	-69.08***	0.742***		0.854***
	(8.752)	(49.99)		(37.28)	(13.64)	(0.0219)		(0.0789)
CAF	-14.30*	13.33		-98.71**	-2.566	0.163***		0.443***
	(8.111)	(54.97)		(38.64)	(8.697)	(0.0234)		(0.0794)
OFC	-79.91***	-78.03		-91.92	-17.96	0.231***		0.779***
	(12.98)	(78.11)		(64.69)	(14.93)	(0.0280)		(0.149)
Constant	-744.2***	-2,895***	1,045***	534.5***	-209.7**	9.556***	7.179***	7.917***
	(78.86)	(765.9)	(149.3)	(138.7)	(83.24)	(0.188)	(0.253)	(0.333)
Observations	5,344	5,344	5,344	5,344	5,187	5,344	5,343	5,344
		180	180	180	180		180	180
R2 or Pseudo R2	0.625	0.712	0.400	0.596	0.966	0.559	0.416	0.541

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

3.5.3 Time to build

Up to this juncture, we have assumed that the achievement of sporting success is a process in which the capabilities of each country are potentially persistent. However, it seems logical that investment in the achievement of sporting success at the national level should increase the chances of success in subsequent years. To test this, we firstly lag the socioeconomic variable for a time period of up to ten years. Table A.3.3 in the annex reports the fixed effects estimations.[43] The better model adjustment is found when GDP per capita is lagged nine years; that is, on average, economic improvements record their maximum outcome in terms of football performance after nine years. A second option for accounting persistence is the addition of a one-year lag of the endogenous variable to the model:

$$S_{i,t} = \beta_0 + (1-\delta)S_{i,t-1} + \beta_1 \ln N_{i,t} + \beta_2 \ln\left(\frac{Y}{N}\right)_{i,t} + \beta_3 \ln\left(\frac{Y}{N}\right)^2_{i,t} + \beta_4 \ln W_{i,} \quad (3.8)$$
$$\beta_5 \ln I_{i,t} + +\beta_6 Host_{i,t} + +\sum_{j=1}^{5} \theta_j Conf_j + d_t + v_i + \epsilon_{i,t}$$

This dynamic panel model is estimated using Blundell and Bond's (1998) System-generalised method of moments (GMM) estimator. The results are presented in column 5 of Table 3.2, where the inclusion of the lagged endogenous variable is shown to improve the model fit. Clearly, the best determinant of a team's football success is to consider its football success in the recent past. In this case, if we include the lagged dependent variable, our model fit increases to 96.6% of the determinants of success in international football. The estimates pass the Arellano andBond´s (1991) tests and, therefore, the instruments are valid.

As expected, the introduction of the lagged endogenous variable in the dynamic model captures most of the fixed information that was controlled by variables such as the weather or the regional dummies. Nevertheless, several other variables, including population and GDP per capita, remain significant. Interestingly, two confederations, CONCACAF and AFC, are still significant.

[43] The Hausman test between the Random and Fixed effects specifications reject the null hypothesis of equal vectors of parameters, and so the fixed effects estimation is preferable to the random effects estimation.

3.5.4. Sensitivity analysis and robustness checks

To check the robustness of our results, we estimate equation (3.7) by replacing the dependent variable with the Elo ranking (as opposed to Elo points). Following Leeds and Leeds (2009) and Berlinschi et al. (2013), we use a negative binomial regression, as the data display excess dispersion in the rank variable, with the conditional variance exceeding the conditional mean.[44] The results (column 6 to 8 of Table 3.2) are similar to previous estimates (the parameters present the reverse sign, as the lower the position occupied in the ranking, the better the performance). The difference in sign recorded for GDP and GDP squared is, in fact, not relevant, as the relationship is almost linear (if we do not include GDP squared, the relationship between GDP per capita and football success becomes positive).

A second robustness check is to use the FIFA ranking[45] for the period 1993-2012[46] and to compare the results with the Elo ranking for the same period. The results of the negative binomial panel specifications (Table 3.3) are similar for both indicators of football performance. Here again the difference in sign of GDP and GDP squared is due to the fact that the relationship is practically linear in the two estimations.

Table 3.3 shows that the results based on the Elo ranking and FIFA ranking are extremely similar. Thus, one of the main contributions of our work is to provide empirical evidence that the Elo ranking (and therefore, surely, the Elo rating) is a good alternative indicator to the FIFA ranking/rating. Thus, in subsequent academic works on this field, the Elo rating may be used as an alternative to the FIFA rating for these works that wish to analyse a long period of time.

All in all, the results obtained are highly robust to the football performance indicator, the period of analysis and the model specification.

---

[44] The excess dispersion means the negative binomial model is preferred, while the Poisson is inappropriate.

[45] We cannot use the points, because FIFA ranking suffers a methodological change in 1999 and 2006.

[46] The period for which the FIFA ranking exists.

Table 3.3: Elo ranking versus FIFA ranking (1993-2012)

	(1) ELO ranking Neg Bin	(2) FIFA ranking Neg Bin	(3) ELO ranking Neg Bin Fixed	(4) FIFA ranking Neg Bin Fixed	(5) ELO ranking Neg Bin Rand	(6) FIFA ranking Neg Bin Rand
LPOP	-0.181***	-0.169***	-0.340***	-0.310***	-0.225***	-0.237***
	(0.00650)	(0.00638)	(0.0198)	(0.0181)	(0.0180)	(0.0171)
LGDP	-0.470***	-0.534***	0.154**	-0.136	0.0980	-0.188**
	(0.0536)	(0.0512)	(0.0738)	(0.0919)	(0.0690)	(0.0859)
LGDP2	0.0194***	0.0235***	-0.0203***	-0.00525	-0.0143***	-0.000787
	(0.00342)	(0.00318)			(0.00448)	(0.00549)
LWeather	0.0549***	0.0526***			0.0662***	0.0285
	(0.00708)	(0.00758)			(0.0240)	(0.0196)
LYearsFIFA	-0.103***	-0.133***			-0.335***	-0.155***
	(0.0201)	(0.0218)	(0.00481)	(0.00592)	(0.0702)	(0.0581)
Host	-0.915***	-0.860***	-0.327***	-0.407***	-0.267***	-0.273***
	(0.0521)	(0.0564)	(0.0899)	(0.101)	(0.0658)	(0.0776)
CONCACAF	0.393***	0.388***			0.603***	0.483***
	(0.0325)	(0.0316)			(0.111)	(0.0910)
CONMEBOL	-0.151**	0.0341			-0.676***	-0.456***
	(0.0588)	(0.0575)			(0.131)	(0.117)
AFC	0.757***	0.700***			1.049***	1.050***
	(0.0262)	(0.0265)			(0.0996)	(0.0797)
CAF	0.188***	0.145***			0.350***	0.166**
	(0.0265)	(0.0288)			(0.0960)	(0.0825)
OFC	0.232***	0.393***			0.730***	0.947***
	(0.0327)	(0.0346)			(0.175)	(0.147)
Constant	9.638***	9.747***	9.185***	8.968***	8.161***	8.158***
	(0.232)	(0.229)	(0.405)	(0.439)	(0.406)	(0.427)
Observations	3,473	3,348	3,472	3,347	3,473	3,348
Countries individual effects			179	178	180	179
R2 or Pseudo R2	0.559	0.554	0.397	0.4286	0.571	0.582

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

3.6 Conclusions

In this chapter, we have analysed the determinants of success in international football. Thanks to the demonstrated adequacy of Bernard and Busse's (2004) theoretical framework, our empirical estimation is guaranteed theoretical consistency. This means the choice of variables is clear, as is the way in which they should be considered.

The GDP per capita is a better socioeconomic variable to explain football performance, regarding the HDI.

The use of the Elo rating as our football performance indicator has a series of advantages over the use of the FIFA classification. In particular it has enabled us to conduct a list of panel regression estimates over a 33-year period and so to provide stronger empirical evidence of the determinants of success in international football. In this way, Elo ranking is a better alternative indicator to the FIFA ranking. Thus, in subsequent academic works on this field, the Elo rating may be used as an alternative to FIFA rating for these works that wish to analyse a long period of time, as in Binder and Findlay (2012).

The results show that the economics, demographics, weather, football institutions and geography are all determinants of performance at the international level. We make different specifications and the explicative variables the same behaviour remain.

The economic performance of a country influences positively its performance in international football, this influence reaching a maximum point after a ten-year lag. In addition, the model's persistence can be taken into account by including the lagged dependent variable, making it a dynamic panel model. In this way, the model fit increases to 96.6%.

Future research needs to take into consideration additional factors, including the influence of migrating football players on a nation's football performance (like Gelade et al., 2007, and Berlinschi et al., 2013). However, these studies cited are cross-section due to the enormous work involved in building a proper indicator of migration for various years. The work that would build a migration index for over 30 and the exhaustive analysis of this variable is hard. Nevertheless, it is our firm belief that constructing a measurement of migration (e.g., the percentage of players in the national team playing for clubs in foreign leagues) for a wide panel of countries over a long period of time would greatly enrich the analysis.

Another novel option would be analysed the influence of foreign players on the success of football clubs (instead national football team). Indeed, this is the scope of analysis of Chapter 4. This analysis is done by crossection, since to make a panel seems to be excessively laborious.

References chapter 3

Allan, G.J. and Moffat, J. (2014). "Muscle drain versus brain gain in association football: technology transfer trough player emigration and manager immigration." *Applied Economics Letters*, 21(7), 490-493.

Arellano, M. and Bond, S. (1991). "Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations." *The review of economic studies,* 58(2), 277-297.

Baltagi, B.H., and Griffin J.M. (1984). "Short and Long Run Effects in Pooled Models." *International Economic Review,* 25(3), 631-645.

Berlinschi, R., Schokkaert, J. and Swinnen, J. (2013). "When drains and grains coincide: Migration and international football performance." *Labour Economics,* 21, 1-14.

Bernard, A.B. and Busse, M.R. (2004). "Who wins the Olympic Games: economic resources and medal total." *The Review of Economic and Statistics,* 86(1), 413-417.

Binder J.J. and Findlay, M. (2012). "The Effects of the Bosman Ruling on National and Club Teams in Europe." *Journal of Sports Economics*, 13(2), 107-129.

Blundell, R. and S. Bond. (1998). "Initial Conditions and Moment Restrictions in Dynamic Panel Data Models." *Journal of Econometrics,* 87, 115-143.

Gelade, G. A. and Dobson, P. (2007). "Predicting the Comparative Strengths of National Football Teams." *Social Science Quarterly,* 88(1), 244-258.

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

Hoffman, R., Ging, L.C., Matheson, V. and Ramasamy. B. (2006). "International women's football and gender inequality." *Applied Economic Letters,* 13, 999-1001.

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

Hvattum, L. M. and Arntzen, H. (2010). "Using Elo ratings for match results prediction in association football." *International Journal of Forecasting,* 26, 460-470.

Jacobs, J. (2014). "Programme-level determinants of women's international football performance." *European Sport Management Quarterly*, 14(5), 521-537.

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

Leitner, C., Zeileis, A. and Hornik, K. (2010). "Forecasting sports tournaments by ratings of (prob)alities: A comparison for the EURO 2008." *International Journal of Forecasting,* 26, 471-481.

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

Mourão, P. R. (2010). "Regional Determinants of Competitiveness: The Case of European Soccer Teams." *International Journal of Sport Finance,* 5(3), 222-234.

Pirotte, A. (1999). "Convergence of the static estimation toward the long run effects of dynamic panel data models." *Economics Letters,* 63, 151-158.

Ryall, R. and Bedford, A. (2010). "An optimized ratings-based model for forecasting Australian Rules football." *International Journal of Forecasting,* 26, 511-517.

Stefani, R. and Pollard R. (2007). "Football Rating Systems for Top-Level Competition: A Critical Survey." *Journal of Quantitative Analysis in Sport,* 3(3), 1-22.

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

Torgler B. (2004b). The determinants of women's international soccer performances. Center for Research in Economics, Managements and Arts, working paper no. 2004-19.

Torgler B. (2004c). Historical Excellence in football world cup tournaments: empirical evidence with data from 1930 to 2002. Center for Research in Economics, Managements and Arts, working paper no. 2004-18.

Yamamura, E. (2009). "Technology transfer and convergence of performance: an economic study of FIFA football ranking." *Applied Economic Letters,* 16, 261-266.

Yamamura, E. (2012). "Effect of Linguistic Heterogeneity on Technology transfer: An Economic Study of FIFA Football Rankings." *Atlantic Economic Journal,* 40(1), 85-99.

Annex Chapter 3:

Table A.3.1: Countries considered

1. Afghanistan	46. Czech Rep	91. Latvia	136. Samoa
2. Albania	47. Denmark	92. Lebanon	137. San Marino
3. Algeria	48. Djibouti	93. Lesotho	138. Saudi Arabia
4. Andorra	49. Dominica	94. Liberia	139. Senegal
5. Angola	50. Dominican Republic	95. Libya	140. Serbia
6. Antigua and Barbuda	51. Ecuador	96. Liechtenstein	141. Seychelles
7. Argentina	52. Egypt	97. Lithuania	142. Sierra Leone
8. Armenia	53. El Salvador	98. Luxembourg	143. Singapore
9. Australia	54. Ecuatorial Guinea	99. Macao	144. Slovakia
10. Austria	55. Estonia	100. Macedonia	145. Slovenia
11. Azerbaijan	56. Ethiopia	101. Madagascar	146. Solomon Islands
12. Bahamas	57. Fiji	102. Malawi	147. South Africa
13. Bahrain	58. Finland	103. Malaysia	148. Spain
14. Bangladesh	59. France	104. Mali	149. Sri Lanka
15. Barbados	60. French Polynesia	105. Malta	150. St. Kitts and Nevis
16. Belarus	61. Gabon	106. Mauritania	151. St. Lucia
17. Belgium	62. Gambia	107. Mauritius	152. St. Vincent & Grenadines
18. Belize	63. Georgia	108. Mexico	153. Sudan
19. Benin	64. Germany	109. Moldova	154. Surinam
20. Bermuda	65. Ghana	110. Mongolia	155. Swaziland
21. Bhutan	66. Greece	111. Morocco	156. Sweden
22. Bolivia	67. Grenada	112. Mozambique	157. Switzerland
23. Botswana	68. Guatemala	113. Namibia	158. Syria
24. Brazil	69. Guinea	114. Nepal	159. Tajikistan
25. Brunei	70. Guinea-Bissau	115. Netherlands	160. Tanzania
26. Bulgaria	71. Guayana	116. New Caledonia	161. Thailand
27. Burkina Faso	72. Honduras	117. New Zealand	162. Togo
28. Burundi	73. Hong Kong	118. Nicaragua	163. Tonga
29. Cambodia	74. Hungary	119. Niger	164. Trinidad and Tobago
30. Cameroon	75. Iceland	120. Nigeria	165. Tunisia
31. Canada	76. India	121. Norway	166. Turkey
32. Cape Verde	77. Indonesia	122. Oman	167. Turkmenistan
33. Central African Republic	78. Iran	123. Pakistan	168. Uganda
34. Chad	79. Ireland	124. Panama	169. Ukraine
35. Chile	80. Israel	125. Papua New Guinea	170. United Arab Emirates
36. China	81. Italy	126. Paraguay	171. UK
37. Colombia	82. Jamaica	127. Peru	172. United States
38. Comoros	83. Japan	128. Philippines	173. Uruguay
39. Congo Dem Rep	84. Jordan	129. Poland	174. Uzbekistan
40. Congo Rep	85. Kazakhstan	130. Portugal	175. Vanuatu
41. Costa Rica	86. Kenya	131. Puerto Rico	176. Venezuela
42. Cote d'Ivori	87. Korea Rep	132. Qatar	177. Vietnam
43. Croatia	88. Kuwait	133. Romania	178. Yemen
44. Cuba	89. Kyrgyzstan	134. Russia	179. Zambia
45. Cyprus	90. Laos	135. Rwanda	180. Zimbabwe

Table A.3.2: Variables used

Variable	Description	Source
ELO_points	World Football Elo Ratings	http://www.eloratings.net/
ELO_ranking	World Football Elo Ranking	http://www.eloratings.net/
FIFA_ranking	FIFA/Coca-Cola World Ranking	FIFA
Popshare	Share of Population (% of World)	World Development Indicators
LPOP	Population (in log).	World Development Indicators
LGDP	GDP per capita (in log). Constant 2005 international $	World Development Indicators
LGDP2	GDP per capita squared (in log). Constant 2005 international $	World Development Indicators
LWeather	(TEMP-14) squared, where TEMP refers to the average annual temperature between 1961 and 1999 (in degrees Celsius)	Climate Data API (World Bank website)
LYearsFIFA	Years affiliated to FIFA (in log)	FIFA
Host	A dummy for those countries that have hosted a World Cup finals tournament	FIFA
CONCAFAF	Confederation of North, Central American and Caribbean Association Football	CONCAFAF
CONMEBOL	South American Football Confederation	CONMEBOL
AFC	Asian Football Confederation	AFC
CAF	Confederation of African Football	CAF
OFC	Oceania Football Confederation	OFC
UEFA	European Union of Association Football	UEFA

Table A.3.3: Estimating lag the socioeconomic variable

	(1) Elo points Fixed	(2) Elo points Fixed	(3) Elo points Fixed	(4) Elo points Fixed	(5) Elo points Fixed	(6) Elo points Fixed	(7) Elo points Fixed	(8) Elo points Fixed	(9) Elo points Fixed	(10) Elo points Fixed
LPOP	28.84***	27.55***	25.74***	23.84**	22.27**	20.41**	20.21**	19.81*	20.26*	32.35**
	(9.210)	(9.275)	(9.376)	(9.494)	(9.641)	(9.821)	(10.05)	(10.22)	(10.41)	(15.12)
Host	86.85***	84.97***	82.09***	77.70***	72.37***	70.09***	67.11***	63.81***	60.43***	58.99***
	(17.60)	(17.98)	(17.90)	(17.86)	(17.89)	(17.96)	(18.11)	(18.15)	(18.26)	(18.40)
$LGDP_{t-1}$	-25.25									
	(22.41)									
$LGDP2_{t-1}$	2.886*									
	(1.480)									
$LGDP_{t-2}$		-7.359								
		(22.70)								
$LGDP2_{t-2}$		2.081								
		(1.499)								
$LGDP_{t-3}$			8.102							
			(22.98)							
$LGDP2_{t-3}$			1.200							
			(1.517)							
$LGDP_{t-4}$				23.12						
				(23.30)						
$LGDP2_{t-4}$				0.319						
				(1.538)						
$LGDP_{t-5}$					39.18					
					(23.91)					
$LGDP2_{t-5}$					-0.749					
					(1.582)					
$LGDP_{t-6}$						53.49**				
						(24.68)				
$LGDP2_{t-6}$						-1.719				
						(1.637)				
$LGDP_{t-7}$							68.18***			
							(25.52)			
$LGDP2_{t-7}$							-2.732			
							(1.697)			
$LGDP_{t-8}$								81.59***		
								(26.19)		
$LGDP2_{t-8}$								-3.604**		
								(1.748)		
$LGDP_{t-9}$									103.2***	
									(26.96)	
$LGDP2_{t-9}$									-5.109***	
									(1.806)	
$LGDP_{t-10}$										121.7***
										(27.78)
$LGDP2_{t-10}$										-6.304***
										(1.873)
Observations	5,206	5,058	4,903	4,742	4,579	4,414	4,248	4,080	3,911	3,740
Pseudo R2	0.4185	0.4276	0.4305	0.4309	0.4348	0.4365	0.4448	0.4483	0.4571	0.4531

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Chapter 4: Does having more foreign players influence the success of football clubs?[47]

4.1. Introduction

Football is the most globalized sport in the world,[48] and it is an important part of the global economy.

Nowadays international migration is a very important phenomenon, and football is not alien to this reality. Football clubs try to hire best players, no matter where they come from, while football players aim at joining the best team to enjoy better salaries and professional prospects. In a globalized sport such as football, talent can be anywhere and what results in an international dimension, probably larger than in any other profession.

This chapter analyses the impact of such migration flows on firm performance, i.e. if having a larger proportion of foreign football players influences significantly the success of football clubs. Most papers analysing the impact of foreign football players are addressed at the national team level. Our contribution expands current knowledge by considering a comprehensive data set of international clubs all over the world that allows for conducting both national comparisons and a detailed analysis at the club level.

Our results confirm that having more foreign football players favor the performance of clubs at the international level, although such influence vanishes within every national league, where every club faces the same level of restrictions to hire foreign talent. Having more foreign players only has a positive effect for teams in confederations where a learning process can finally benefit home teams. On the contrary, in those better-ranked leagues we do not observe any benefit once we account for local football norms, as all teams have the same possibilities for hiring better players what, in the end, is a financial issue.

---

[47] The analysis of this chapter is currently under review in Journal of Sports Economics.

[48] As we have seen in chapter 1, according to FIFA, 2014 Brazil's World Cup reached 3.2 billion people, and one billion watched the final.

Next, section 4.2 reviews several facts and the existing literature on the topic. Section 4.3 introduces the theoretical analytical framework used in this research. Section 4.4 presents the data sources. Section 4.5 sets out the empirical model and presents the estimation results, several additions to the model and a sensitivity analysis and robustness checks. Finally, section 4.6 offers some conclusions.

4.2. Literature review and stylised facts

Several works have studied the phenomenon of migration in football. Specifically, they have focused on analysing the effect of migration of footballers on the performance of national teams.

A few recent studies (Baur and Lehman, 2007; Gelage and Dobson, 2007; Berlinschi et al., 2013; Yamamura, 2009; Allan and Moffat, 2014) have investigated the benefits of having national association football players playing in clubs outside their domestic league. Competing in higher quality leagues allow them to access to better training and tactical methods, players who play abroad improve the performance of the national team. As opposed to these authors and contrary to conventional economic wisdom, Frick (2009) finds that the migration of players to the financially rewarding leagues in Western Europe does not improve national team performance.

Baur and Lehman (2007) examine the effect of having a large share of foreign players on the performance of the national team. Contrary to public opinion, they defend that having more foreigners in your league may be related to the sporting success of your national team. These authors conclude that imports in a football league improve the performance of the national team, because players benefit from knowledge-spillovers. Imported players have some skills or qualities from which other players can learn and benefit. They suggest as future research agenda extending the study of the effect of imported players on football clubs, a research that, up to our knowledge, had not been addressed yet.

In the same line, Alvarez et al. (2011) look at whether there is an impact on the performance of a national basketball team from having non-domestic players within those national leagues. When skilled labor is imported, skill levels of local workers may be raised by contact with new techniques and practices.

With the study of the European basketball, the authors demonstrate that an increase in the number of foreigners in a domestic league tends to generate an improvement in the performance of the national team.

Migration, labor mobility, is the human side of the agglomeration story. Consequently, we can see the positive effects of these flows in terms of the three sources of agglomeration economies reported by Duranton and Puga (2004). Among them, one can expect that the *matching* effect dominates: stronger and more successful clubs, usually with higher financial resources, are the ones expected to hire best players, no matter their origin. Still, as reported in many of the papers studying the impact on national teams' performance, the *learning* effect can be substantial, through knowledge-spillovers, which can take place both at the club level and at the national level. Finally, *sharing* common legal and administrative frameworks within a national league or international environments (such as UEFA's Champions League) can help to exploit fully the market potential of foreign players, by having a larger global audience worldwide or by improving club's merchandising sales.

Agglomeration economies has also several other consequences, such as distributional ones (Behrens and Robert-Nicoud, 2014). In this line, Milanovic (2005) focuses on the impact of football players' international migration on inequality between teams. He develops a theoretical model predicting that opening of football markets reduces inequality between national teams due to skills spillover between players. Binder and Findlay (2012) study the effects on competitive balance of the Bosman Ruling on National and Club Teams in Europe.[49] According to their results, the competitive balance in the domestic leagues has not decreased over time. That is, imported players have gone to a variety of clubs, not just the top teams. In another area of research, Kleven et al. (2013) analyse the effects of tax in international migration. The authors found evidence that football migration is conditioned by taxes.

[49] The Bosman ruling established freedom of movement football players, as workers, within the European Union. In December 1995, the European Court of Justice ruled that the provision, whereby out-of-contract players could only move between two clubs in different European (EU) countries if a transfer fee was agreed between the clubs, was incompatible with Article 48 of the "Treaty of Rome" which relates to freedom of movement of labor. Moreover, Article 48 was also ruled as incompatible with restrictions on the number of foreign players permitted in a team.
The Bosman jurisprudence was later extended to citizens of European countries that were not European Union member states by the Malaja, Kolpak and Simutenkov cases and to citizens of African, Caribbean and Pacific countries by the 2000 Cotonou agreement.

In fact, legal barriers and conditionings for migration are one of the key aspects to be considered. According to data from the Football Observatory, since the Bosman the percentage of foreign players recruited by clubs in the "Big Five" European football leagues[50] increased from around 19% in the 1995/1996, to around 46% in the 2014/2015. In recent years, we see that some teams have more than 90% of international migrant's players (e.g. Swansea F.C. in the Premier League).

This reality has turned into a debate in the media. Attitudes towards migration of footballers raise several issues related to the political economy of high-level sport, but also raise broader questions about national identity, citizenship, freedom of work and the inclusion or exclusion of foreigners in local labor markets (Taylor, 2006).

Both UEFA and FIFA have tried to limit, and in fact have partially achieved, the number of foreigners to preserve the national identity of clubs. Critics argue that excessive mobility threatens the configuration of local identities and worsens national football team performance: former FIFA president, Joseph Blatter, defended that having more foreigners is neither good for the development of football, nor for the education of young players, and supported FIFA to open the door to foreign players but not so much that this identity is lost. Other examples of this attitude can be found in the words of the former Italian prime minister and AC Milan president, Silvio Berlusconi, who said he dreamed of seeing his team without foreigners. In this line, Giulianotti and Robertson (2004) note that this process of globalization in football has as its counterpart a growing sense of dispossession among fans, and stress the importance to maintain the balance between globalization and identity.

Another line of critique is the negative impact for national teams of excessive volumes of foreign players: despite the Premier League is considered one of the best leagues in the world, and English teams are among the strongest in Europe, the English team does not achieve similar success. Several voices blame the massification of foreign players in the Premier League teams for such weak outcomes of the National team. In this context, several football federations restrict the entry of foreign players, aiming at ensuring the success of national football teams. With the intention to restrict the number of foreign players, in 2000, FIFA and UEFA sought support from the European

[50] The "Big Five" are England, Spain, Germany, Italy and France.

Parliament to amend the Amsterdam Treaty, and grant football as a cultural activity, to stop the effects of the Bosman ruling.[51]

In 2008, FIFA approved the application of the "6 + 5 rule" to force clubs to field six players eligible for the country team to protect the identity of national teams. However, the European Commissioner for Employment, Valdmiri Špidla, knocked such idea because "players are workers and the principles of free movement must be respected. The rule of '6 + 5' constitute direct discrimination"[52] and that the European Commission would take legal action against any country that approved the controversial proposal by FIFA to limit the number of foreigners in football clubs.

Finally, a different rule was created for the "protection of young players": since 2008/09, clubs in the UEFA Champions League and UEFA Europa League required a minimum of eight homegrown players of the country in a team limited to 25 players.[53] UEFA defines "homegrown players in a country" as those who, regardless of their nationality, have been trained by such club or by another club in the same national association for at least three years, when the player was between 15 and 21 years. UEFA regulations has no conditions of nationality, since those conditions would be illegal in the European Union (the Bosman for ruling).

In line with this European policy, many countries have restrictions on foreign players, varying extensively within the same area. As for Latin America, Argentina allows only four foreigners in the team, whereas in Brazil the number is three, in Chile seven, five for Mexico and six for Peruvian teams. European countries face have a huge diversity of rules for players from EU-countries and non-EU countries: no quota for non-EU-players (Austria, Belgium, England[54], Germany, Poland, Portugal, Scotland, Serbia, Wales, The Netherlands), no quota for non-EU-players but only a certain amount can be brought to the

[51] As established by the EU treaties, the principle of free movement may not apply to cultural activities, since culture is one of the areas, along with the defense, which are not subject to these rules, considering them outside the economic space and responsibility of each State. For this reason, some governments of EU countries have requested the declaration of sport as a cultural activity, with the aim of maintaining this area outside the regulations imposed by the court.

[52] Statement of Commissioner Vladimir Špidla regarding FIFA's "6+5" rule, accessible at http://ec.europa.eu/social/main.jsp?langId=en&catId=89&newsId=424&furtherNews=yes

[53] Clubs have no obligation to play a certain number of homegrown players in a match in the national league.

[54] England only allows the entry of foreign players if they play regularly in some of the best 70 national football teams of the world.

games (Czech Republic, Croatia, Denmark, Finland, Hungary, Iceland, Russia, Sweden, Slovakia) and a limited amount of foreigners/non EU players (Belarus, Bulgaria, France, Greece, Israel, Italy, Norway, Romania, Spain, Turkey). For example, Spain only allows for three non-EU players. The differences between EU and non-EU players have turned into the search of EU passport for players as a way to avoid restrictions and so to be part of the more competitive leagues in the world.[55]

As reported above, most academic literature addressing this phenomenon is concentrated on analysing the impact of foreign players on national team's performance. To the best of our knowledge, to date only Karaka (2008) is focused on the study of the impact of international migration on club performance in a small data set and with no information at the club level. Our work expands current knowledge by considering a comprehensive and wide database at the international level of about one thousand clubs worldwide.

4.3. From theory to empirics

Bernard and Busse (2004) develop a theoretical framework to analyse the determinants of success in sport, concretely at the Olympic Games. On the other hand, many other works have studied the determinants of the success of national football teams.[56] Chapter 3 considers the model developed by Bernard and Busse (2004) on national football team's performance. We follow such theoretical framework, where the empirical expression is as follows:[57]

$$S_i = \beta_0 + \beta_1 \ln N_i + \beta_2 \ln W_i + \beta_3 \ln Y_i + \beta_4 \ln I_i + u_i \quad (4.1)$$

[55] Some of the most striking cases of forgery of passports to get dual citizenship are: the Argentinian Veron, convicted of falsifying his Italian passport for alleged great grandfather, the Brazilian Dida and Uruguayan Alvaro Recoba who received penalties for passport fraud. Many other players have found a way to enjoy a double nationality. For instance, Spain allows for citizenship after several years of legal and continuous residence (just two years for nationals of Latin American countries, Andorra, Philippines, Equatorial Guinea, Portugal or persons of Sephardic origin).

[56] Hoffman et al. (2002), Houston and Wilson (2002), Torgler (2004a), Torgler (2004b), Torgler (2004c), Hoffman et al. (2006), Macmillan and Smith (2007), Gelade and Dobson (2007), Leeds and Leeds (2009), Yamamura (2009), Binder and Findlay (2012), Berlinschi et al. (2013), Allan and Moffat (2014) and Jacobs (2014) has studied the determinants of the success of national football teams.

[57] See 3.3 Theoretical framework of chapter 3 for model development.

Where S_i refers to football success, N_i to population, Y_i to economic resources, W_i to warm temperature, I_i to football-related institutions at country level, and u_i is error term. These variables are suitable for studies at national team level, but they may not be enough for analysing performance of clubs, as they do not capture differences within national leagues. Consequently, we adapt these variables to analyse the determinants of performance at the club level. Castellanos et al. (2007) analyse the determinants of success taking cities instead of countries as units of analysis. They consider that success at club level is a function of the size and wealth of its city.[58] They consider these factors using population and local GDP per capita. These authors end their work by arguing that future studies should address the importance of inherently non-economic factors of the city/club, such as culture, weather conditions, institutions or historical excellence (tradition) in the context of football performance.

In addition to consider GDP per capita as a proxy of socioeconomic conditions, we believe prefer to consider the economic 'power' of every team, proxying the capacity to hire more and better (foreign) players. Szymanski (2003) and Dell'Osso and Szymanski (1991) reports a positive relationship between expenditure on player's wages and transfers and position for twelve English Clubs. Likewise, Fløtnes (2011) argues that the more important factors for clubs success are player's wages and financial resources through operating income. When competing in the elite division or at international levels, access to financial resources partly determines how successful a football club can be. The Economist (2014) illustrates a strong link between the amount spent on wages and the points won by 34 English clubs that played in the top division between 1996 and 2014.[59]

For these reasons, we focus the explanatory variables of the equation (4.1) in our study at the club level by considering the economics resources of the club as an indicator of Y_i, and we consider population size, N_i, to the one of the city where every club is located, W_i an index that takes into account the average temperature of every city, and I_i, an indicator of local football institutions, that we proxy with confederations and county dummies.

[58] Walker (1986), Burger and Walters (2003), Troelsen (2005) and Fløtnes (2011) argue that most populous cities offer a greater internal potential market for their football teams.

[59] As anecdotic evidence, Sam Allardyce, former manager of West Ham United and English football manager, came up with a straightforward explanation for footballing performance: "Where you finish in the league depends on the money you've spent. It's a statistical fact, that."

In addition to these variables, we consider the proportion of foreign football players, M_i, what allows us to capture the impact of migration on football's clubs success. We cannot distinguish with our approach between learning, sharing and matching. Rather, we just account for a global impact of this variable. We finally add some more controls by considering the social engagement of clubs through the capacity of the Stadium, Cap_i, as a proxy of attendance.

Finally, then, our equation becomes:

$$S_i = \beta_0 + \beta_1 M_i + \beta_2 \ln N_i + \beta_3 W_i + \beta_4 \ln Y_i + \beta_5 \ln I_i + \beta_6 \ln Cap_i + u_i \qquad (4.2)$$

4.4. Data

Our empirical strategy relies on the use of a worldwide dataset. It is difficult, though, to find official comparable statistics for capturing success of football clubs is an international environment. Other works in the football literature have worked with points in domestic leagues, rankings at the European level, etc., what makes difficult to make worldwide comparisons. Our final database considers 971 teams, from the First Division of 71 Leagues.[60] We finally rely on the Elo rating score published by www.footballdatabase.com. The data set is referred to February 2016. This ranking follows the methodology Elo Rating, also followed in chapter 3, where its advantages over official scores, such as FIFA ranking.[61] Top ten clubs according to this ranking in February 2016 are displayed in table 4.1, while Figure 4.1 shows the boxplot of the teams according to every football confederation[62].

The explanatory variables refer to 2015. To find the proportion of foreign players, we used information at www.transfermarkt.es. Table 4.2 displays the top ten clubs and top ten leagues by share of foreign football players, while Figure 4.2 displays the box-plot of this variable by confederation. On average, the confederation with the larger share of foreign-born football players is UEFA (35%), followed by CONCACAF (34%), AFC and OFC (19%), CONMEBOL (12%) and CAF (11%). It is important to compare these

[60] Table A.4.1 in the annex lists the considered football leagues.
[61] A detailed analysis of the methodology for calculating the Elo rating is shown in Methodological appendix 2.
[62] UEFA, CONCACAF, CONMEBOL, AFC, CAF, and OFC. Supporting Information Methodological appendix 3 provides details of the countries in each confederation.

figures against global ones: about 200 million people in the world, around 3% of total world population, live outside their country of birth. As happens in football, international immigrants are more important in developed countries: they represent more than 12 per cent of the total population in OECD countries.

Table 4.1. World top 10 teams according to Elo Ratig score. February 2016.

League	Club	Ranking	Elo Points
Spain	FC Barcelona	1	2082
Germany	Bayern Munich	2	1989
Spain	Real Madrid	3	1967
France	Paris Saint-Germain	4	1958
Italy	Juventus FC	5	1942
Spain	Atlético Madrid	6	1908
Italy	SSC Napoli	7	1855
England	Arsenal FC	8	1822
England	Tottenham Hotspur	9	1818
Germany	Borussia Dortmund	10	1810

Figure 4.1. Box plot of Elo rating score by Football Confederation

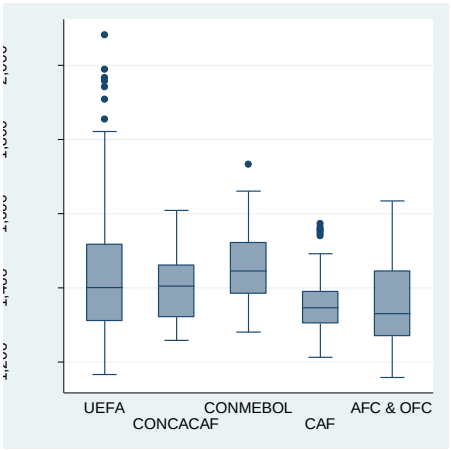
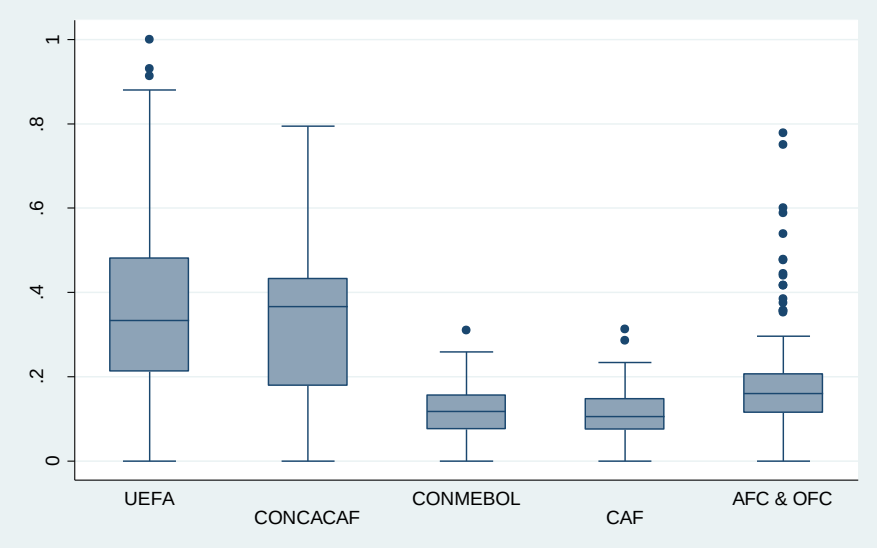


Table 4.2. Top clubs and national leagues by share of foreign players

Club (National League)	(%) Foreign players
AS Monaco (France)	100%
Watford FC (England)	93.10%
Swansea City (England)	91.30%
Inverness Caledonian Thistle FC (Scotland)	88.00%
NK Zavrc (Slovenia)	85.19%
FC Vaduz (Switzerland)	84.62%
Chelsea FC (England)	84.00%
Stoke City (England)	84.00%
Manchester City (England)	83.33%
Inter Milan (Italy)	82.61%

National League	(%) Foreign players
Canada	77,98%
England	69,34%
Cyprus	58,31%
Belgium	56,36%
Portugal	55,65%
Italy	55,48%
Luxembourg	55,43%
Switzerland	52,41%
Germany	49,54%
France	49,30%

Figure 4.2. Box plot of the share of foreign players, by Football Confederation



The proxy we consider of the economic power of football clubs is the market value published by www.transfermarkt.es. This variable is highly correlated with the budget of clubs and consequently can be used to proxy the total wage bill.[63] To know of which city is the football club, we use www.soccerway.com information. Population cities data come from the Wikipedia, and refers to the administrative definition of the city rather than the corresponding to the metropolitan of functional urban area. We follow Hoffman et al. (2002) and consider as weather indicator an index considering the deviation from the optimal mean annual temperature for sporting performance, which is settled at 14º C. Thus, our weather variables, as in chaper 3, is computed as $W_i = (Temperature - 14)^2$. The Average city temperature is extracted from http://www.weatherbase.com. We will consider a list of country (league) dummies to capture differentiated football-related institutions. The capacity of the stadium is obtained mostly from www.soccerway.com, being complented using Wikipedia. The same sources are used to get the year of foundation of the club, a variable that we will used later for identification issues, together with the average age of the players of every team, also obtained from www.transfermarkt.es. Table A.4.2 in the annex summarizes the description and sources of all considered variables, and Table 4.3 reports the descriptive statistics of the considered variables.

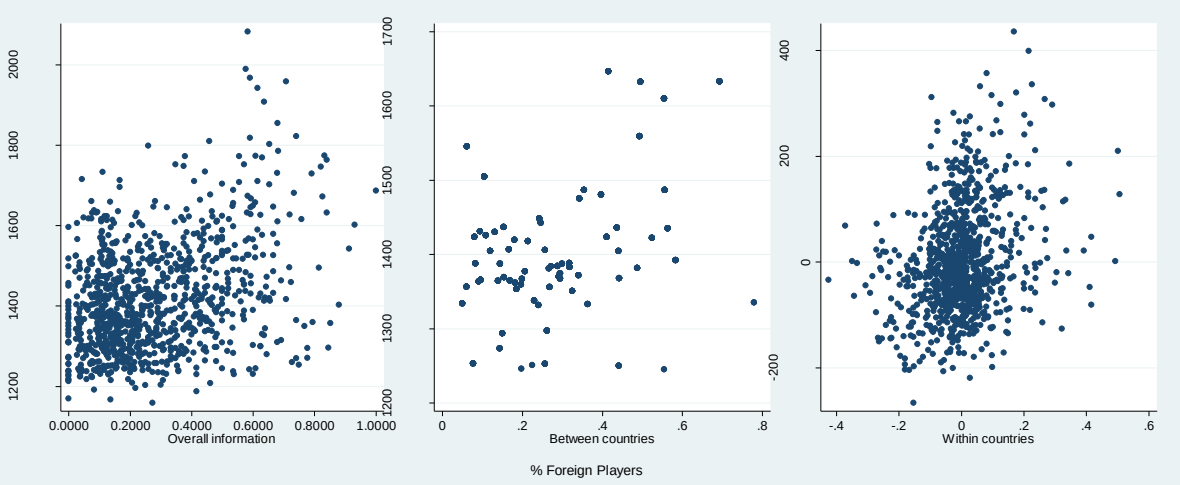
[63] Methodological appendix 4 displays the correlation between market value and to see why the market value of the Squad is a good Proxy of the budget of the clubs.

At this stage, we look at the correlation between the Elo ranking score and the share of foreign players. Figure 4.3 displays the scatter plot between these two variables for the 971 considered teams. The left panel considers all information, the central panel the average for every national league, and the right panel plots the information of all teams once removed national averages (within transformation). In the first case the correlation is 0.36, which increases to 0.44 between countries and shrinks to 0.28 when national averages are discounted (correlations for the log of the Elo rating are very similar). Consequently, we have a first insight of a positive relationship between these two variables, which is much stronger at the national level than within every national league. The next step will try to find out if this correlation holds once other factors are controlled for.

Table 4.3. Descriptive statistics

Variable	Obs.	Mean	Std. Dev.	Min.	Max.	Corr(Xi, ln Points)	Corr(Xi, % For. Pl.)
Elo Points	971	1414.9	133.77	1159	2082		
ln Elo Points	971	7.251	0.091	7.055	7.641		
% Foreign Players	971	0.277	0.196	0	1	0.359	
Market Value	971	26.14	63.01	0.025	704.8	0.623	0.434
Population	970	1,396,643	2,965,882	25,333	24,152,700	0.125	-0.079
Weather	971	33,59	43,42	.0001	289,00	-0.125	-0.139
Capacity Stadium	971	22,714.7	18,805.9	368	105,064	0.538	0.134
Year Foundation	968	1,943	36.6	1,863	2,014	-0.378	-0.171
Age	971	25.6	1.66	18.5	33.6	0.082	0.191

Figure 4.3. Scatter plots between Elo ranking score and the Share of Foreign Players



4.5. Results

The estimation strategy tries to avoid endogeneity problems because of possible causal link between the percentage of foreigners and performance of football clubs. We have obtained the data of foreign players participating in a team since September 2015 and the classification of the club in February 2016.[64] Thus, the causality is from the variable number of foreign players to success in football clubs, and not vice versa. Nevertheless, we admit that such variables may have some time series persistence, and consequently some reverse causality can exist in the data, together with the omitted variables problem. In order to solve, at least partially, these problems we incorporate an instrumental variable approach based on a two-steps procedure following Brückner (2012, 2013) and Castells-Quintana (2016). We use the year of foundation of every club to build instruments for football success in an equation explaining the share of football international migrants. Later we use the residual of this equation as an instrument for the share of football migrants in our main equation, together with the average age of players in every team. We explain this identification strategy in methodological appendix 5.

Table 4.4 display the results of the main model where we use the variables in logs. We introduce variables sequentially and columns 1 to 6 display OLS estimates. We can see how in a first stage the share of foreign players is positively associated with team's success, even if external components are controlled for (columns 1 and 2). Nevertheless, when financial and market potential variables are introduced (columns 3 and 4), model adjustment improves dramatically and the parameter for the share of foreign players turns significant and negative, what we interpret as a clear sign of the strength of financial aspects in sport success. When we introduce institutions in columns 5 (confederations dummies) and 6 (country dummies), the share of foreign players becomes not significant. One can interpret this result in terms of the importance of financial variables and national regulations as main drivers on international football rankings. When national regulations are controlled, competition for foreign players is balanced within every country and this factor becomes negligible. Teams' performance basically depends on their financial health. To be clear: while those leagues with higher shares of foreign players have better

[64] This indicator considers the results of recent months. For example, on 14.02.2016 (date of obtaining the data of this ranking) Leicester City was Leader of the Premier League and consequently was ranked 15th, while the same week of the previous year it ranked 416th.

ratings than leagues with less imported players, within every league, as all teams face the same type of restrictions to hire foreign players, and finally this factor becomes negligible.

Nevertheless, at this stage we have not accounted for reverse causality. Columns 7 to 10 report Instrumental Variable estimates (IV) using as instruments the residual of the two-steps procedure based on instrumenting the 2010 Elo rating when explaining the September 2015 share of foreign players. This generated instrument is used together with the average age of all football players in every team (and its square) in columns 8 to 10 to report the over identification statistics. This set of regressions report again a non-significant parameter, what we understand as a sort of robustness check of the previous results. Still, we perform other sensitivity analysis and additional checks.

Table 4.4. Estimation results

	(1) OLS	(2) OLS	(3) OLS	(4) OLS	(5) OLS	(6) OLS	(7) IV	(8) IV	(9) IV	(10) IV
% Foreign players	0.1658***	0.1780***	-0.0127	-0.0435**	-0.0159	0.0174	-0.0120	-0.0120	-0.0122	-0.0122
	(0.039)	(0.034)	(0.030)	(0.022)	(0.019)	(0.015)	(0.014)	(0.013)	(0.013)	(0.013)
ln Population		0.0152***	0.0002	-0.0000	0.0004	0.0014	0.0012	0.0012	0.0012	0.0012
		(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Weather Index		-0.0002*	0.0001	0.0001	0.0001	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ln Market value			0.0510***	0.0212***	0.0196**	0.0563***	0.0577***	0.0577***	0.0577***	0.0577***
			(0.008)	(0.008)	(0.008)	(0.009)	(0.008)	(0.006)	(0.006)	(0.006)
ln Market value^2				0.0068***	0.0067***	0.0047***	0.0048***	0.0048***	0.0048***	0.0048***
				(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
ln Capacity Stadium			0.0097**	0.0092**	0.0092***	0.0099***	0.0098***	0.0098***	0.0098***	0.0098***
			(0.004)	(0.004)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)
Confederation Dummies	NO	NO	NO	NO	YES	NO	NO	NO	NO	NO
Country Dummies	NO	NO	NO	NO	NO	YES	YES	YES	YES	YES
Kleibergen-Paap rk LM statistic									170.8 (0.000)	170.9 (0.000)
Hansen J-Statistic (p-val)									1.797 (0.180)	1.878 (0.171)
Observations	971	970	970	970	970	970	970	970	970	970
R-squared	0.126	0.246	0.604	0.658	0.680	0.807	0.806	0.806	0.806	0.806

Note: Robust standard errors clustered by country in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Equations (8) to (10) report not-clustered robust standard errors to get the over-identification statistics. Columns (7) and (8) use the generated residual resulting from the two-steps Brückner strategy. Columns (9) and (10) add the average age of players and its square respectively, what allows for computing the over-identification statistic. KP refers to the under-identification Kleibergen-Paap LM statistic, while the J statistic corresponds to the over-identification Hansen J-Statistic.

Table 4.5. Estimation results by confederation.

	(1) UEFA	(2) CONMEBOL	(3) CONCACAF	(4) CAF	(5) AFC - OFC	(6) UEFA	(7) CONMEBOL	(8) CONCACAF	(9) CAF	(10) AFC - OFC
	OLS	OLS	OLS	OLS	OLS	IV	IV	IV	IV	IV
% Foreign players	0.00643	0.00138	0.0852	0.169*	0.0189	-0.0120	-0.0003	0.0465	0.0232	-0.0631
	(0.0153)	(0.0886)	(0.0630)	(0.0869)	(0.0393)	(0.015)	(0.089)	(0.060)	(0.083)	(0.046)
ln Population	0.00201	0.00104	0.00370	-0.000964	0.00318	0.0018	0.0010	0.0038	-0.0008	0.0019
	(0.00135)	(0.00221)	(0.00568)	(0.00209)	(0.00362)	(0.001)	(0.002)	(0.005)	(0.002)	(0.003)
Weather Index	4.13e-05	3.67e-05	-0.000275	7.29e-05	-1.10e-05	0.0000	0.0000	-0.0003*	0.0000	-0.0000
	(9.65e-05)	(0.000109)	(0.000164)	(0.000159)	(0.000140)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ln Market value	0.0727***	0.0910***	0.0348	0.0518***	-0.00958	0.0742***	0.0910***	0.0409	0.0535***	-0.0038
	(0.00812)	(0.0292)	(0.0760)	(0.00558)	(0.0136)	(0.008)	(0.028)	(0.069)	(0.006)	(0.014)
ln Market value^2	0.00298***	-0.00781	0.00313	0.0134***	0.0295***	0.0030***	-0.0078	0.0025	0.0138***	0.0285***
	(0.00109)	(0.00510)	(0.0148)	(0.00120)	(0.00463)	(0.001)	(0.005)	(0.013)	(0.001)	(0.005)
ln Capacity Stadium	0.00565*	0.0196***	0.0171	0.000219	0.00907	0.0057*	0.0196***	0.0169	0.0007	0.0087
	(0.00321)	(0.00682)	(0.0124)	(0.00401)	(0.00915)	(0.003)	(0.006)	(0.011)	(0.004)	(0.009)
KP statistic (p-val)						131.2 (0.000)	36.56 (0.000)	9.800 (0.020)	30.72 (0.000)	13.52 (0.004)
J-Statistic (p-val)						5.517 (0.063)	3.242 (0.198)	0.427 (0.808)	2.680 (0.262)	1.639 (0.441)
Country dummies	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	571	129	50	94	124	571	129	50	95	125
R-squared	0.715	0.603	0.427	0.596	0.556	0.858	0.630	0.589	0.706	0.688

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All models use the generated residual resulting from the two-steps Brückner strategy together with the average Age (and its square) of players in every team. KP refers to the under-identification Kleibergen-Paap LM statistic, while the J statistic corresponds to the overidentification Hansen J-Statistic.

We investigate next if our result is a global outcome or if it is specific to some World regions or Football confederations. We perform additional regressions separated by Football confederations. Both OLS and IV estimates are presented in table 4.5, including in all cases national dummies. We see there that, in general, the share of international football players is not significantly associated with teams' success. This is an additional proof of the small impact of this variable compared with the economic ones, including the market value and the capacity of the stadium.

We finally check for robustness by using the rank of teams rather than Elo points. We also use the Elo rating rather than the log of the index. The results (not reported here for brevity reasons but displayed in table A.4.3 of the annex) basically replicate former results, with the exception of the marginally significant parameter for the CONCACAF subsample for the model using the rank rather than the Elo points. Overall, then, the benefits of having a larger share of foreign players does not exist neither the global sample nor in any confederation.

4.6. Conclusions

This chapter analyses the socio-economic determinants of sporting success of football clubs in a wide world cross section sample, and especially inspects the effect of the share of foreign players, when other factors are controlled for. We use the Elo rating as indicator for the world classification of close to a thousand teams in 71 leagues. We use a two-steps procedure as an identification strategy: in a regression explaining the share of foreign football players in 2015 we instrument the Elo rating in 2010 by means of the year of foundation of every club together with the local conditions to play football. The residual of this equation is later used as an instrument of the share of foreign players in a regression explaining the Elo rating in 2016.

We observe that, on average, leagues with higher shares of foreign players are the ones with better positioned teams. On the contrary, within every league, having more foreign players has a negligible impact of team's performance.

As expected, we find that the fundamental explicative variable of the success teams is money. Our key finding is that having more foreign football

players favor the performance of clubs at the international level: national regulations allowing more foreign players will result in better performance of these teams in an international framework. Nevertheless, such influence vanishes within every national league, where every club faces the same level of restrictions to hire foreign talent. In the end having better players will be the result of financial constraints.

References chapter 4

Allan, G.J. and Moffat, J. (2014). "Muscle drain versus gain in association football: technology transfer through player migrations and manager immigration." *Applied Economic Letters,* 21(7), 490-493.

Alvarez, J., Forrest, D. and Sanz, I. (2011). "Impact of importing foreign talent on performance levels of local co-workers." *Labour Economics*, 18, 287-96.

Baur, D.G. and Lehmann, S. (2007). Does the mobility of football players influence the success of the national team? IIIS Discussion Paper No. 217, Institute for International Integration Studies, Dublin.

Behrens, K., and Robert-Nicoud, F. (2014). "Survival of the fittest in cities: Urbanisation and inequality." *The Economic Journal,* 124(581), 1371-1400.

Berlinschi, R., Schokkaert, J. and Swinnen, J. (2013). "When drains and gains coincide: migration and international football performance." *Labour Economics*, 21, 1-14.

Bernard, A.B. and Busse, M.R. (2004). "Who wins the Olympic Games: economic resources and medal total." *The Review of Economic and Statistics*, 86(1), 413-417.

Binder, J.J. and Findlay, M. (2012). "The effects of the Bosman ruling on national and club teams in Europe." *Journal of Sports Economics*, 13(2), 107-29.

Brückner, M. (2012). "Economic growth, size of the agricultural sector, and urbanization in Africa." *Journal of Urban Economics*, 71, 26-36.

Brückner, M. (2013). "On the simultaneity problem in the aid and growth debate." *Journal of Applied Econometrics,* 28, 126-150.

Burger, D. and Walters, S. (2003). "Market Size, Pay, and Performance." *Journal of Sport Economics*, 4(2), 108-125.

Castellanos, P., Dopico, J. and Sánchez, J.M. (2007). "The Economic Geography of football success: empirical evidence from European Cities." *Rivista di Diritto et Economia dello Sport*, 3(2), 67-88.

Castells-Quintana, D. (2016) "Malthus living in a slum: Urban concentration, infrastructure and economic growth." *Journal of Urban Economics*, 92, 31-47.

Dell'Osso, F. and Szymanski, S. (1991). "Who are the Champions? (An analysis of football and architecture)." *Business Strategy Review Summer,* 113-130.

Duranton, G. and Puga, D. (2004). *Micro-Foundations of Urban Agglomeration Economies*. Handbook of Urban and Regional Economics, Edition 1, Vol. 4: 2063-2117, J.V. Henderson and J.F. Thisse (eds.)

Fløtnes, T. (2011). Factors of success for Norwegian top football clubs - And why profit making is difficult for European football clubs. Copenhagen Business School. M. Sc. Applied Economics and Finance.

Frick, B. (2009). "Globalization and factor mobility: the impact of the 'Bosman-Ruling' on player migration in professional soccer." *Journal of Sports Economics*, 10, 88-106.

Gelade, G.A. and Dobson, P. (2007). "Predicting the comparative strengths of national football teams." *Social Science Quarterly*, 88, 244-58.

Giulianotti, R. and Robertson R. (2004). "The globalization of football: a study in the glocalization of the 'serious life'." *The British Journal of Sociology,* 55(4), 545-68.

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

Hoffman, R., Ging, L.C., Matheson, V. and Ramasamy. B. (2006). "International women's football and gender inequality." *Applied Economic Letters,* 13, 999-1001.

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

Jacobs, J. (2014). "Programme-level determinants of women's international football performance." *European Sport Management Quarterly*, 14(5), 521-537.

Karaca, O. (2008). "The impact of foreign players on international football performance." *Munich Personal RePEc Archive*, MPRA Paper No. 11064. Online at http://mpra.ub.uni-muenchen.de/11064/

Kleven, H.J., Landais. C. and Saez, E. (2013). "Taxation and International Migration of Superstars: Evidence from the European Football Market." *American Economic Review,* 103(5), 1892-1924.

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

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

Milanovic, B. (2005). "Globalization and goals: does soccer show the way?" *Review of International Political Economy*, 12(5), 829-850.

Szymanski, S. (2003). "The Economic Design of Sporting Contest." *Journal of Economic Literature*, 41 (4), 1137-1187.

Taylor, M. (2006). "Global Players? Football, Migration and Globalization, c. 1930-2000." *Historical Social Research,* 31(1), 7-30.

The Economist. (2014) "Everything to play for. Good managers matter, but not as much as money does." Available at http://www.economist.com/news/britain/21601873-good-managers-matter-not-much-money-does-everything-play.

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

Torgler, B. (2004b). The determinants of women's international soccer performances. Center for Research in Economics, Managements and Arts, working paper no. 2004-19.

Torgler, B. (2004c). Historical Excellence in football world cup tournaments: empirical evidence with data from 1930 to 2002. Center for Research in Economics, Managements and Arts, working paper no. 2004-18.

Troelsen, T. (2005). "Centralisering af dansk fodbold: En statistisk analyse med bud på årsagsforklaringer. Kommunal støtte til professionel fodbold." I J. Magnussen, & R. K. Storm (red.), *Professionel fodbold.* Klim, Århus, s. 69-86.

Walker, B. (1986). "The demand for professional league football and the success of football league teams: some city size effects." *Urban Studies*, 23(3), 209-219.

Yamamura, E. (2009). "Technology transfer and convergence of performance: an economic study of FIFA football ranking." *Applied Economics Letters*, 16, 261-6.

Annex Chapter 4:

Table A.4.1: Included football leagues

1. Albania	25. Finland	49. Norway
2. Algeria	26. France	50. Peru
3. Argentina	27. Georgia	51. Poland
4. Australia	28. Germany	52. Portugal
5. Austria	29. Ghana	53. Qatar
6. Azerbaijan	30. Greece	54. Qatar
7. Belarus	31. Hungary	55. Romania
8. Belgium	32. Iceland	56. Russia
9. Bosnia-Herzegovina	33. India	57. Saudi Arabia
10. Brazil	34. Iran	58. Scotland
11. Bulgaria	35. Israel	59. Serbia
12. Canada	36. Italy	60. Slovakia
13. Chile	37. Japan	61. Slovenia
14. China	38. Kazakhstan	62. South Africa
15. Colombia	39. Korea, South	63. Spain
16. Costa Rica	40. Lebanon	64. Sweden
17. Croatia	41. Luxembourg	65. Switzerland
18. Cyprus	42. Macedonia	66. Tunisia
19. Czech Republic	43. Mexico	67. Turkey
20. Denmark	44. Moldova	68. Ukraine
21. Ecuador	45. Montenegro	69. United States
22. Egypt	46. Morocco	70. Uruguay
23. England	47. Netherlands	71. Wales
24. Estonia	48. New Zealand	

Table A.4.2: Variables: definition and sources

Variable	Description	Source
Points	Elo rating points of World Football Club classification	http://footballdatabase.com/
Ranking	Worls ranking based on Elo rating points of World Football Club classification	http://footballdatabase.com/
Pop	Population of the city where every club is located	Wikipedia
Market value	Market value of total players of the Team	http://www.transfermarkt.com/
Share Foreign players	Share of foreign players of each team (%)	http://www.transfermarkt.com/
Age	Average age of players of each team	http://www.transfermarkt.com/
Weather Index	(TEMP-14) squared, where TEMP refers the weather of the city (in log)	http://www.weatherbase.com/
Foundation	Years of Foundation of the team	www.soccerway.com complemented with Wikipedia
Capacity_Stadium	Capacity of the Stadium	www.soccerway.com complemented with Wikipedia
CONCAFAF	Confederation of North, Central American and Caribbean Association Football	CONCAFAF
CONMEBOL	South American Football Confederation	CONMEBOL
AFC	Asian Football Confederation	AFC
CAF	Confederation of African Football	CAF
OFC	Oceania Football Confederation	OFC
UEFA	European Union of Association Football	UEFA

Table A.4.3: Robustness checks

Table A.4.3.1. Using the rank of teams rather than Elo points. IV-Negative binomial regressions of World Ranking

	(1) World IV Neg Bin	(2) World IV Neg Bin	(3) World IV Neg Bin	(4) World IV Neg Bin	(5) UEFA IV Neg Bin	(6) CONMEBOL IV Neg Bin	(7) CONCACAF IV Neg Bin	(8) CAF IV Neg Bin	(9) AFC – OFC IV Neg Bin
% Foreign players	0.728***	-0.149	0.813***	0.198	0.261	0.302	-0.776*	-1.057	0.293
	(0.225)	(0.169)	(0.210)	(0.152)	(0.168)	(1.232)	(0.401)	(0.784)	(0.370)
ln Population	0.00926	-0.00782	0.0108	-0.00381	-0.0144	-0.000909	-0.0523	0.0191	-0.0192
	(0.0198)	(0.0126)	(0.0179)	(0.0109)	(0.0133)	(0.0335)	(0.0605)	(0.0189)	(0.0310)
Weather Index	-0.000299	0.000772	-0.000384	0.000665	0.000151	0.000146	0.00188	-0.00142	0.000170
	(0.000601)	(0.000693)	(0.000634)	(0.000630)	(0.000831)	(0.000980)	(0.00182)	(0.00193)	(0.000413)
ln Market value	-0.140***	-0.493***	-0.156***	-0.520***	-0.612***	-0.868**	-0.260	-0.566***	-0.0445
	(0.0395)	(0.0545)	(0.0461)	(0.0406)	(0.0682)	(0.409)	(1.451)	(0.0183)	(0.0989)
ln Market value^2	-0.108***	-0.105***	-0.105***	-0.103***	-0.0989***	0.0443	-0.101	-0.111***	-0.252***
	(0.00905)	(0.00908)	(0.00987)	(0.00662)	(0.00886)	(0.0742)	(0.256)	(0.0119)	(0.0282)
ln Capacity Stadium	-0.0962**	-0.0891***	-0.0987***	-0.0959***	-0.0524	-0.213**	-0.135***	-0.0663***	-0.133*
	(0.0382)	(0.0296)	(0.0375)	(0.0250)	(0.0363)	(0.105)	(0.0462)	(0.0249)	(0.0748)
SFP_res			54.24***	60.76***	52.26***	-3.413	73.25	93.12***	76.66***
			(8.340)	(7.463)	(9.273)	(26.76)	(50.18)	(13.44)	(11.79)
Constant	8.037***	9.653***	8.106***	9.700***	9.568***	9.749***	11.35***	8.453***	9.695***
	(0.275)	(0.266)	(0.299)	(0.224)	(0.318)	(0.998)	(2.797)	(0.110)	(0.518)
Country Dummies	NO	YES	NO	YES	YES	YES	YES	YES	YES
ln alpha	-1.107***	-1.589***	-1.181***	-1.729***	-1.768***	-1.358***	-1.893***	-2.946***	-1.950***
	(0.0815)	(0.0860)	(0.0856)	(0.101)	(0.123)	(0.139)	(0.165)	(0.198)	(0.209)
Observations	970	970	968	968	571	129	50	94	124

Note: Robust standard errors clustered by country in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Models including as regressor SFP_res are controlling for endogeneity by means of the Control Function Approach, as we include the generated residual of an equation where the Share of Foreign Players depend on all control variables plus a list of excluding instruments, namely the generated instrument reported in methodological appendix 5 plus the average age of players in every team.

Table A.4.3.2: Using the Elo rating rather than the log of the index.

	(1) World IV	(2) UEFA IV	(3) CONMEBOL IV	(4) CONCACAF IV	(5) CAF IV	(6) AFC – OFC IV
% Foreign players	-18.0137	-18.5044	-0.8221	67.0160	31.4755	-90.2161
	(18.526)	(21.141)	(130.435)	(84.807)	(114.631)	(63.521)
ln Population	1.3537	2.1962	1.4402	5.5291	-1.4372	2.5610
	(1.466)	(1.837)	(3.024)	(7.157)	(3.179)	(4.552)
Weather Index	-0.0268	0.0635	0.0533	-0.3807*	0.0550	-0.0342
	(0.086)	(0.129)	(0.149)	(0.197)	(0.225)	(0.181)
ln Market value	76.2571***	97.1647***	126.0772***	44.9985	74.1756***	-6.7516
	(7.772)	(10.320)	(40.356)	(97.329)	(7.622)	(18.640)
ln Market value^2	9.1983***	7.2045***	-9.6598	6.4672	19.3227***	40.0886***
	(1.182)	(1.427)	(7.135)	(18.929)	(1.765)	(6.347)
ln Capacity Stadium	13.3003***	7.0710	27.9330***	24.2508	1.6509	12.5905
	(3.366)	(4.429)	(9.311)	(15.219)	(5.385)	(11.719)
Country Dummies	YES	YES	YES	YES	YES	YES
KP statistic (p-val)	171.1 (0.000)	131.2 (0.000)	36.56 (0.000)	9.800 (0.020)	30.72 (0.000)	13.52 (0.004)
J-Statistic (p-val)	2.524 (0.283)	6.454 (0.039)	3.224 (0.200)	0.429 (0.807)	2.669 (0.263)	1.638 (0.441)
Observations	970	571	129	50	95	125
R-squared	0.818	0.867	0.632	0.597	0.713	0.689

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All models use the generated residual resulting from the two-steps Brückner strategy together with the average Age (and its square) of players in every team. KP refers to the under-identification Kleibergen-Paap LM statistic, while the J statistic corresponds to the over-identification Hansen J-Statistic.

Chapter 5: Conclusions: Main Findings, Implications for Policy Makers and Future Research

Summary and main findings

This research has focused on the relationship between football and the economy at the international level. This relationship has been analysed from several innovative perspectives.

The research successfully demonstrates that football can be considered an indicator of development at international level. That is, football can be used to complement our broader understanding of multidimensional development. Additionally, in those countries where the availability of information is not as good as researchers might like (less developed countries), the performance of the national football team might usefully serve as an additional indicator. Therefore, 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.

In addition, by analysing the factors that determine international football success, the research has shown that the Elo rating has a series of advantages over the FIFA classification. The main benefit is that the Elo rating considers a longer period of time. Thus, in subsequent academic works in this field, the Elo rating may be used as an alternative to FIFA rating for these works that wish to analyse a longer period of time.

Finally, the research has examined whether the proportion of foreign players is related to the success of football clubs at national and global level. It shows that while in every national league having more foreign players has a negligible impact of team's performance, on average, leagues with a higher proportion of foreign players are the ones with better positioned teams. The key finding of this part of the research is therefore that having more foreign football players favours the performance of clubs at the international level. Nevertheless, such influence vanishes in any national league where all clubs face the same level of restrictions on hiring foreign talent. In any case, having better players will be the result of financial constraints.

Implications for Policy Makers

The conclusions of the works that make up this PhD thesis, besides having a marked academic component, try to contribute to the political debate.

Firstly, by demonstrating that football can be seen as a mirror of the development of countries, especially in less developed countries, arguments are provided to defend the suitability of the integral promotion of sport in general and football in particular in every society. For academics, football ratings can be used as an additional instrument, among the many that exist, to determine whether a country is developed or not.

Secondly, by indicating that the Elo rating is a better indicator of country performance than the FIFA ranking, this research offers football professionals and the media another rating to take into consideration when analysing football or, at least, that FIFA considers these kinds of techniques to build historical data into football ratings.

Thirdly, given the strong dichotomy between the interest of football clubs to have the biggest market possible to hire players and the protectionist attempt of the national federations to limit the number of foreigners to preserve the national identity of clubs, the results of this study regarding international football migration may be of use at a political level. Since this research has shown that having higher proportion of foreign players makes teams more competitive internationally but not within their leagues, national regulations allowing more foreign players will result in better performance of these teams in an international framework.

Future research

As a result of this PhD thesis, different areas of investigation are opened for future research.

The field of research of national determiners of football success needs to take into consideration additional factors, including the influence of migrating football players on a nation's football performance. Constructing a measurement of migration (e.g., the percentage of players in the national team playing for clubs in foreign leagues) for a wide panel of countries over a long period of time would probably enrich the analysis.

Further research should also be done on the influence of foreign players on football teams' success. This research investigation has only covered countries' first divisions. It would be enlightening to also analyse other professional divisions. One should not discard the analysis of the youth categories of football clubs. All such analyses would be enhanced by considering the long-term horizon.

Finally, another future area of research would be to use gravitational models to analyse flows of footballer migrations between countries. One could compare the flows of migrations in football with migrations in general, and find different behaviours as well as investigate which are the different channels of migrations that predominate.

Methodological appendix 1: Method for calculating the current FIFA rankings (methodology since 2006)

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

Methodological appendix 2: The World Football Elo Rating System

The World Football Elo Ratings are based on the Elo rating system, developed by Dr. Arpad Elo. This system is used by FIDE, the international chess federation, to rate chess players. In 1997 Bob Runyan adapted the Elo rating system to international football and posted the results on the Internet. He was also the first maintainer of the World Football Elo Ratings web site. The system was adapted to football by adding a weighting for the kind of match, an adjustment for the home team advantage, and an adjustment for goal difference in the match result.

These ratings take into account all international matches for which results could be found. Ratings tend to converge on a team's true strength relative to its competitors after about 30 matches. Ratings for teams with fewer than 30 matches should be considered provisional. Match data are primarily from International Football 1872 - Present.

The ratings are based on the following formulas:

$$\mathbf{R_n = R_o + K \times (W - W_e)}$$

$\mathbf{R_n}$ is the new rating; $\mathbf{R_o}$ is the old (pre-match) rating.

K is the weight constant for the tournament played:

- **60** for World Cup finals;
- **50** for continental championship finals and major intercontinental tournaments;
- **40** for World Cup and continental qualifiers and major tournaments;
- **30** for all other tournaments;
- **20** for friendly matches.

K is then adjusted for the goal difference in the game. It is increased by **half** if a game is won by two goals, by **3/4** if a game is won by three goals, and by **3/4 + (N-3)/8** if the game is won by four or more goals, where **N** is the goal difference.

W is the result of the game (**1** for a win, **0.5** for a draw, and **0** for a loss).

$\mathbf{W_e}$ is the expected result (win expectancy), either from the chart or the following formula:

$$\mathbf{W_e = 1 / (10^{(-dr/400)} + 1)}$$

dr equals the difference in ratings plus **100** points for a team playing at home.

Sample Winning Expectancies

Difference in	Higher	Lower related
0	0.500	0.500000
10	0.514	0.486
20	0.529	0.471
30	0.543	0.457
40	0.557	0.443
50	0.571	0.429
60	0.585	0.415
70	0.599	0.401
80	0.613	0.387
90	0.627	0.373
100	0.640	0.360
110	0.653	0.347
120	0.666	0.334
130	0.679	0.321
140	0.691	0.309
150	0.703	0.297
160	0.715	0.285
170	0.727	0.273
180	0.738	0.262
190	0.749	0.251
200	0.760	0.240
210	0.770	0.230
220	0.780	0.220
230	0.790	0.210
240	0.799	0.201
250	0.808	0.192
260	0.817	0.183
270	0.826	0.174
280	0.834	0.166
290	0.841	0.159
300	0.849	0.151
325	0.867	0.133
350	0.882	0.118
375	0.896	0.104
400	0.909	0.091
425	0.920	0.080
450	0.930	0.070
475	0.939	0.061
500	0.947	0.053
525	0.954	0.046
550	0.960	0.040
575	0.965	0.035
600	0.969	0.031
625	0.973	0.027
650	0.977	0.023
675	0.980	0.020
700	0.983	0.017
725	0.985	0.015
750	0.987	0.013
775	0.989	0.011
800	0.990	0.010

Methodological appendix 3: Details of the countries in each confederation

The Asian Football Confederation (AFC) is the governing body of association football in Asia. It has 47 member countries, located in the main on the Asian continent. All the transcontinental countries with territory straddling both Europe and Asia are members of UEFA (Azerbaijan, Armenia, Georgia, Kazakhstan, Russia and Turkey). Israel, although it lies entirely in Asia, is also a UEFA member. Australia, formerly in the OFC, has been in the AFC since 2006, and the Oceanian island of Guam, a territory of the United States, is also a member of the AFC.

a. The Confederation of African Football (CAF) represents the national football associations of Africa.

b. The Confederation of North, Central American and Caribbean Association Football (CONCACAF) is the continental governing body for association football in North America, Central America and the Caribbean.

c. The South American Football Confederation (CONMEBOL) is the continental governing body for association football in South America.

d. The Oceania Football Confederation (OFC) is one of the six continental confederations of international association football, consisting of New Zealand and island nations such as Tonga, Fiji and other Pacific Island countries. In 2006, the OFC's largest and most successful nation, Australia, left to join the Asian Football Confederation.

e. The Union of European Football Associations (UEFA) is the administrative body for association football in Europe and, partially, Asia. UEFA membership coincides with sovereign countries in Europe, although some UEFA members are transcontinental states (e.g. Turkey). Several Asian countries have also been admitted to the European football association: Azerbaijan, Armenia, Georgia, Kazakhstan, Israel, Russia and Turkey, which had previously been members of the Asian football association.

Methodological appendix 4: Using market value as a proxy for budget for salaries

The top ten clubs with higher Market Value are displayed in table M.A.4.1.

Table M.A.4.1. World top ten clubs by Market Value (M €)

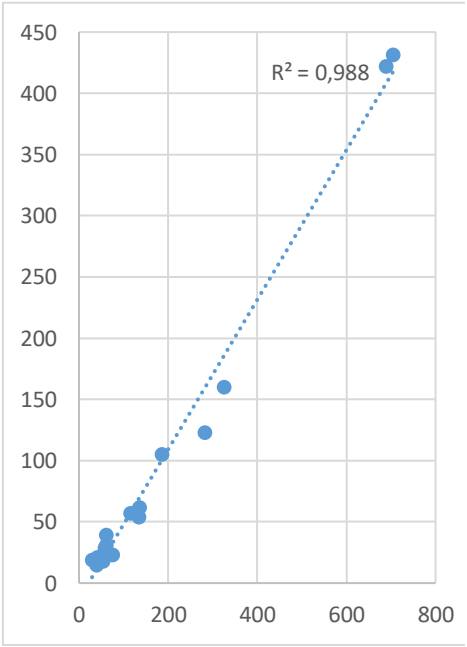
League	Club	Market value
Spain	Real Madrid	704.8
Spain	FC Barcelona	689.5
Germany	Bayern Munich	578.55
England	Manchester City	501.75
England	Chelsea FC	490
England	Arsenal FC	431
France	Paris Saint-Germain	423.75
England	Manchester United	411.25
Italy	Juventus FC	379.8
England	Liverpool FC	367.1

In order to exemplify how Market Value is a good proxy of the Budget of the Club, we use data of the Spanish League, for which we record the Budget linked to the maximum amount that can be devoted to wages by every club, according to the rules dictated by the Professional Football League. Table M.A.4.2 and Figure M.A.4.1 report this data, and shows a strong correlation, close to 99%.

Table M.A.4.2. Market Value – Budget devoted to salaries. Spanish League 2015-06.

Club(s)	Market Value	Budget
Athletic Bilbao	134	53.6
Atlético Madrid	325	159.6
Celta de Vigo	75.7	22.6
Deportivo de La Coruña	53.95	17.8
FC Barcelona	689.5	421.7
Getafe CF	51.1	20.7
Granada CF	61.9	25.2
Levante UD	58.75	25.9
Málaga CF	57.9	28.7
Rayo Vallecano	41.45	20.9
RCD Espanyol	60.6	30.6
Real Betis Balompié	61	39.1
Real Madrid	704.8	431.3
Real Sociedad	115.4	56.6
SD Eibar	40.8	19.11
Sevilla FC	186.2	105.13
Sporting Gijón	39.05	14.6
UD Las Palmas	29.25	18.4
Valencia CF	282	122.8
Villarreal CF	135.8	61.5

Figure M.A.4.1. Scatter plot Market Value – Budget devoted to salaries



Methodological appendix 5. Identification strategy to incorporate IV.

As it is hard to find an instrument for the share of foreign players in every football team, we follow a two-step procedure following Brückner (2012, 2013) and Castells-Quintana (2016) to adjust for simultaneity bias. By using an instrument for the Elo ranking in 2010 we are able to build a valid instrument for the share of foreign players in our substantive estimation. The starting point is a simultaneous equation model where football success (S_i) and the share of foreign football players (M_i) are mutually related:

$$S_i = \alpha(M_i) + u_i \quad \text{(A1)}$$

$$M_i = \theta(S_i) + e_i \quad \text{(A2)}$$

We are interested in estimating parameter α, but if θ is not zero, OLS estimates in A1 will be biased and inconsistent. To overcome this problem, we propose using instrumental variables for football migrants. If we can consistently estimate θ in A2, we can build an instrument to be used in A1 by capturing the residual: $\hat{e}_t = res(M_i) = M_i - \hat{\theta}S_i$. Using this generated variable as instrument, the IV estimate of A1 will be free of simultaneity bias:

$$\hat{\alpha}_{IV} = \frac{COV(res(M_i),S_i)}{COV(res(M_i),M_i)} = \alpha + \frac{COV(res(M_i),u_i)}{COV(res(M_i),M_i)} = \alpha + \frac{COV(e_i,u_i)}{COV(res(M_i),M_i)} \quad \text{(A3)}$$

Still, as far as $COV(e_i, u_i) \neq 0$ the omitted variable bias will exist. In order to avoid that bias, we include in our estimate country fixed effects in A2 together with the population size of every city.

In this strategy, timing is an important aspect. Thus, our first step consists on explaining the share of foreign football players as a function of *past* football success: we regress the share of foreign footballers in September 2015 against the Elo ranking dated in January 2010. We include then a set of country dummies (I_i) that proxy national institutions, such as legal barriers.

$$M_i^{2015} = \theta S_i^{2010} + \mathbf{\Theta} I_i + e_i \quad \text{(A4)}$$

As an instrument for the Elo ranking in 2010 (S_i^{2010}), we use information based on the history of every club. In particular we account for the year of foundation of the club and we compute its seniority (Old_i). With this variable, we build the following set of instruments: the rank of seniority within every league (1), and its square (2), plus the rank of the ratio between the capacity of the stadium and the seniority of every team (3), and its square (4). Finally, we add the weather indicator differentiated by country. These instruments are expected to be correlated at some stage with the success of every team, but not to affect the share of foreign players. The first stage of equation A4 becomes:

$$S_i^{2010} = \rho_1 Rank\_Old_i + \rho_2 Rank\_Old_i^2 + \rho_3 Rank\_Cap/Old_i + \rho_4 Rank\_Cap/Old_i^2 + \Xi WeatherIndex_i + \mathbf{\Omega} I_i + \omega_i$$

Table A7.1 displays the results of the first (A5) and second stage (A4) regressions. We find that our instruments are correlated with the classification of every team within its league (remember that we include league's dummies) and that in the second stage we find a non-significant Sargan statistic for over identification, what is a signal of the good performance of our instruments. Still, we have also performed additional checks for the exclusion restriction. First, we have computed the correlation between the residuals of equations A4 and A4, to check if $COV(e_i, u_i) = 0$. We obtain a correlation coefficient of -0.0378, which is not significant even at 10% (p-val = 0.24). Figure M.A.5.1 displays the scatterplot between both residuals. Finally, figure M.A.5.2 shows the scatterplots of the generated residuals of equation A4, which are correlated with the share of migrants but not with the Elo points.

Table M.A.5.1. Identification strategy

	ln Elo Points 2010 OLS (1st stage)	% Foreign Players 2SLS
Rank Old	-0.0044***	
	(0.001)	
Rank Old ²	0.000036	
	(0.000061)	
Rank (Capacity/Old)	-0.0077***	
	(0.001)	
Rank (Capacity/Old) ²	0.0001**	
	(0.000)	
ln Elo points 2010		0.4218***
		(0.112)
Interaction Weather -Index # Country Dummies	YES	
Country Dummies	YES	YES
Observations	968	968
R-squared	0.587	0.712
Anderson canon. corr. LM statistic for Underidentification	Chi-sq(73)=232	P-val=0.000
Sanderson-Windmeijer multivariate F test of excluded instruments:	F(73, 825) = 3.56	P-val= 0.0000
Sargan Statistic test for Overidentification	Chi-sq(72)	P-val = 0.159

Figure M.A.5.1. Scatter plots – generated residuals eq. A4 and A5

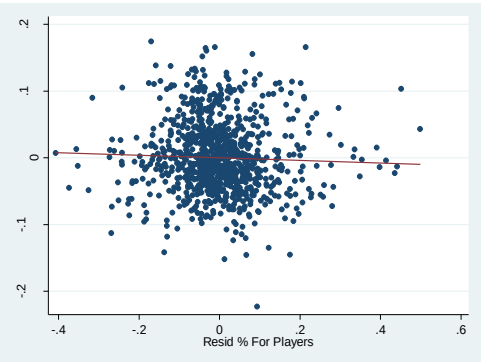
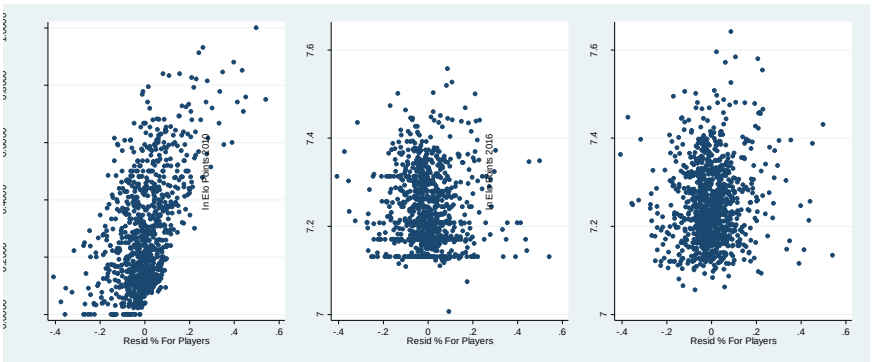


Figure M.A.5.2. Scatter plots for the generated residuals



Resumen en español

Capítulo 1:

La industria deportiva es hoy en día un sector con una importante influencia económica. Dimitrov et al. (2006), citado en el Libro Blanco sobre el Deporte de la Comisión Europea, estimó el tamaño de la industria deportiva de la Unión Europea en torno al 3,7% del PIB y el 5,4% del empleo. Más recientemente, las Cuentas Satelitales Deportivas Europeas de 2011 sugirieron que el deporte representa entre el 3 y el 3,7% del gasto de consumo, entre el 2,2 y el 4,0% del valor añadido bruto y entre el 2,0 y el 5,8% del empleo en los países europeos (Comisión Europea, 2011).

Esta tesis doctoral estudia el deporte más popular y difundido en el mundo: el fútbol, uno de los mejores ejemplos del fenómeno de la globalización. El efecto de este deporte ha crecido exponencialmente en el siglo XXI, generando emoción y frustración, y para muchos convirtiéndose en una especie de religión. Según la FIFA, la Copa Mundial de Brasil 2014 llegó a 3,2 mil millones de personas, y unos mil millones vieron la final. En términos de participación, el fútbol es uno de los pocos deportes que se practica en todo el mundo (Murray, 1996). Según las estimaciones de la FIFA, actualmente hay alrededor de doscientos sesenta y cinco millones de futbolistas activos.

El objetivo de esta investigación es analizar la relación entre el fútbol y la economía a nivel internacional. Esta relación se investiga desde diferentes perspectivas, mediante tres capítulos relacionados que, juntos, ofrecen nuevas pruebas sobre la importancia del fútbol en el mundo globalizado actual. El alto desarrollo de la industria del fútbol en prácticamente todos los países del planeta permite al capítulo dos demostrar que este deporte puede ser considerado un indicador del desarrollo a nivel internacional. Por estos motivos, el capítulo tres propone un modelo para identificar y medir los factores que determinan el desempeño de un equipo nacional de fútbol. El capítulo cuatro extiende finalmente el análisis al nivel local (clubes) y examina si la proporción de jugadores extranjeros está relacionada con el éxito de los clubes de fútbol a nivel nacional y mundial, considerando los canales clásicos de conocimiento, coincidencia y efectos compartidos. En otras palabras, el capítulo cuatro

considera si la migración internacional de futbolistas debe considerarse un factor determinante del éxito de los clubes de fútbol.

Capítulo 2:

El objetivo del capítulo 2 es examinar si el fútbol puede considerarse un indicador de desarrollo a nivel internacional. Se diseña un modelo econométrico para analizar el desarrollo tanto en términos del PIB per cápita como en términos del Índice de Desarrollo Humano. Se utiliza información transversal y de series temporales. Los resultados sugieren que el ranking FIFA de los equipos nacionales puede utilizarse para complementar nuestra comprensión del desarrollo multidimensional, en particular, en aquellos países donde la disponibilidad de información no es tan buena como los investigadores desean.

Capítulo 3:

En el capítulo 3 se investigan los determinantes del éxito del fútbol a nivel internacional. Se presentan tres innovaciones: (a) se aplica el modelo desarrollado por Bernard y Busse (2004) al fútbol, (b) se considera un amplio panel de países durante un período de 33 años, y (c) se complementa el ranking de la FIFA con el sistema de clasificación Elo. Se estima un modelo de panel dinámico utilizando el estimador de los momentos (GMM) de Blundell y Bond (1998). Los resultados son robustos a varios análisis de sensibilidad, ya que muestran que la economía, la demografía, el tiempo, la geografía y las instituciones de fútbol son buenos indicadores del éxito del fútbol a nivel internacional. Además, la calificación Elo es un indicador alternativo mejor que el ranking de la FIFA. Por lo tanto, la calificación Elo puede ser utilizada en los trabajos académicos que desean analizar el éxito del fútbol durante un largo período de tiempo.

Capítulo 4:

En el capítulo 4 se estudia la migración internacional de los futbolistas. La mayoría de los equipos de fútbol tienen como objetivo poseer los mejores jugadores, independientemente de su nacionalidad. Sin embargo, muchas federaciones de fútbol imponen restricciones a la libre movilidad en este mercado. De hecho, si todos los equipos de una liga se enfrentan a las mismas

restricciones, no está claro que tal afluencia de extranjeros tenga algún impacto. El objetivo de este trabajo es analizar si tener más futbolisats extranjeros puede influir en el rendimiento de los equipos. Este propósito se lleva a cabo comparando cerca de mil clubes de fútbol de todo el mundo. A través de un modelo econométrico, se analiza el efecto de la proporción de futbolistas extranjeros en la puntuación y el ranking de los clubes proporcionados por la clasificación desarrollada por Footballdatabase.com. En promedio, los equipos en las ligas con más jugadores extranjeros muestran mejores resultados en la clasificación mundial. Sin embargo, dentro de cada liga, donde todos los equipos tienen las mismas regulaciones, y una vez que se controlan las variables económicas, contar con más jugadores extranjeros no tiene un efecto significativo. Al final, cuando todos los equipos tienen las mismas posibilidades de importar mejores jugadores del extranjero, lo que importa es el poder financiero para elegir a los mejores futbolistas.

Capítulo 5:

Las conclusiones de esta tesis de doctorado, además de tener un marcado componente académico, tratan de contribuir al debate político.

En primer lugar, al demostrar que el fútbol puede ser visto como un espejo del desarrollo de los países, especialmente en aquellos menos desarrollados, se exponen argumentos para defender la idoneidad de la promoción integral del deporte en general y del fútbol en particular en todas las sociedades. Para los académicos, las calificaciones del fútbol se pueden utilizar como un instrumento adicional, entre los muchos que existen, para determinar si un país está desarrollado o no.

En segundo lugar, al indicar que la calificación de Elo es un mejor indicador del desempeño de los países que el ranking de la FIFA, esta investigación ofrece a los profesionales del fútbol y a los medios de comunicación otra calificación relevante que debe tenerse en cuenta en el análisis del fútbol o, al menos, en la construcción de datos históricos referentes a las calificaciones del fútbol.

En tercer y último lugar, dada la fuerte dicotomía entre el interés de los clubes de fútbol por tener el mayor mercado posible para contratar jugadores y el intento proteccionista de las federaciones nacionales de limitar el número de extranjeros con el fin de preservar la identidad nacional de los clubes, el estudio

aplicado de esta tesis doctoral puede ser útil a nivel político. Puesto que esta investigación ha demostrado que la mayor proporción de jugadores extranjeros hace que los equipos sean más competitivos internacionalmente pero no dentro de sus ligas, las regulaciones nacionales que permitan más jugadores extranjeros obtendrán un mejor rendimiento de sus equipos en un marco internacional.

Full list of references

Allan, G.J. and Moffat, J. (2014). "Muscle drain versus gain in association football: technology transfer through player migrations and manager immigration." *Applied Economic Letters,* 21(7), 490-493.

Alvarez, J., Forrest, D. and Sanz, I. (2011). "Impact of importing foreign talent on performance levels of local co-workers." *Labour Economics*, 18, 287-96.

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

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.

Arellano, M. and Bond, S. (1991). "Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations." *The review of economic studies,* 58(2), 277-297.

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.

Baltagi, B.H., and Griffin J.M. (1984). "Short and Long Run Effects in Pooled Models." *International Economic Review,* 25(3), 631-645.

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.

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.

Baur, D.G. and Lehmann, S. (2007). Does the mobility of football players influence the success of the national team? IIIS Discussion Paper No. 217, Institute for International Integration Studies, Dublin.

Behrens, K., and Robert-Nicoud, F. (2014). "Survival of the fittest in cities: Urbanisation and inequality." *The Economic Journal,* 124(581), 1371-1400.

Berlinschi, R., Schokkaert, J. and Swinnen, J. (2013). "When drains and grains coincide: Migration and international football performance." *Labour Economics,* 21, 1-14.

Bernard, A.B. and Busse, M.R. (2004). "Who wins the Olympic Games: economic resources and medal total." *The Review of Economic and Statistics*, 86(1), 413-417.

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.

Binder J.J. and Findlay, M. (2012). "The Effects of the Bosman Ruling on National and Club Teams in Europe." *Journal of Sports Economics*, 13(2), 107-129.

Blair, S.N. and Brodney, S. (1999). "Effects of physical inactivity and obesity on morbidity and mortality: current evidence and research issues." *Medicine and Science in Sports and Exercise,* 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.

Blundell, R. and S. Bond. (1998). "Initial Conditions and Moment Restrictions in Dynamic Panel Data Models." *Journal of Econometrics,* 87, 115-143.

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

Bollard, A., McKenzie, D., Morten, M. and Rapoport. H. (2011). "Remittances and the Brain Drain Revisited: The Microdata Show That More Educated Migrants Remit More." *World Bank Economic Review,* 25 (1), 132-156.

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.

Brückner, M. (2012). "Economic growth, size of the agricultural sector, and urbanization in Africa." *Journal of Urban Economics*, 71, 26–36.

Brückner, M. (2013). "On the simultaneity problem in the aid and growth debate." *Journal of Applied Econometrics,* 28, 126-150.

Burger, D. and Walters, S. (2003). "Market Size, Pay, and Performance." *Journal of Sport Economics*, 4(2), 108-125.

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.

Castellanos, P., Dopico, J. and Sánchez, J.M. (2007). "The Economic Geography of football success: empirical evidence from European Cities." *Rivista di Diritto et Economia dello Sport*, 3(2), 67-88.

Castells-Quintana, D. (2016) "Malthus living in a slum: Urban concentration, infrastructure and economic growth." *Journal of Urban Economics*, 92, 31-47.

Castells-Quintana, D. and Royuela, V. (2012) "Unemployment and long-run economic growth: The role of income inequality and urbanization." *Investigaciones Regionales,* 24, 153-173.

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.

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.

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 neural networks." *Computers and 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.

Dell'Osso, F. and Szymanski, S. (1991). "Who are the Champions? (An analysis of football and architecture)." *Business Strategy Review Summer,* 113-130.

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

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

Downie, M. and Koestner, R. (2008). "Why Faster, Higher, Stronger isn't Necessarily Better - The Relations of Paralympic and Women's Soccer Teams' Performance to National Well-being." *Social Indicators Research,* 88, 273-280.

Duranton, G. and Puga, D. (2004). *Micro-Foundations of Urban Agglomeration Economies.* Handbook of Urban and Regional Economics, Edition 1, Vol. 4, 2063-2117, J.V. Henderson and J.F. Thisse (eds.)

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

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.

Feng, X. and 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.

Fløtnes, T. (2011). Factors of success for Norwegian top football clubs - And why profit making is difficult for European football clubs. Copenhagen Business School. M. Sc. Applied Economics and Finance.

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.

Gelade, G. A. and Dobson, P. (2007). "Predicting the Comparative Strengths of National Football Teams." *Social Science Quarterly,* 88(1), 244-258.

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

Giulianotti, R. and Robertson R. (2004). "The globalization of football: a study in the glocalization of the 'serious life'." *The British Journal of Sociology,* 55(4), 545-68.

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

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. (2002). "The socio-economic determinants of the international soccer performance." *Journal of Applied Economics*, 5(2), 253-272.

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.

Hoffman, R., Ging, L.C., Matheson, V. and Ramasamy. B. (2006). "International women's football and gender inequality." *Applied Economic Letters,* 13, 999-1001.

Horton, P. (2012). "Pacific Islanders in Global Rugby: The Changing Currents of Sports Migration." *The International Journal of the History of Sport*, 29(17), 2388-2404

Hotchkiss, J.L., Moore, R.E. and Zobay, S.M. (2003). "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.

Hvattum, L. M. and Arntzen, H. (2010). "Using Elo ratings for match results prediction in association football." *International Journal of Forecasting,* 26, 460-470.

Jacobs, J. (2014). "Programme-level determinants of women's international football performance." *European Sport Management Quarterly*, 14(5), 521-537.

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., and Whitehead, J.C. (2000). "Value of public goods from sports stadiums: The CVM approach." *Contemporary Economic Policy*, 18(1), 48-58.

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

Johnson, B.K., Mondello, M. and Whitehead, J.C. (2001b). "The Value of Public Goods Generated by a National Football League Team." *Journal of Sport Management*, 21(1), 123-136.

Kang, Y.S. and Purdue, R. (1994). *Long-term impact of a mega-event on international tourism to the host country: A conceptual model and the case of the 1988 Seoul Olympics*. Global tourist behavior, 205-225. New York: International Business Press.

Karaca, O. (2008). "The impact of foreign players on international football performance." *Munich Personal RePEc Archive*, MPRA Paper No. 11064. Online at http://mpra.ub.uni-muenchen.de/11064/

Kavetsos, G. (2012). "National pride: war minus the shooting." *Social Indicators Research*, 106, 173-185.

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

Kleven, H.J., Landais. C. and Saez, E. (2013). "Taxation and International Migration of Superstars: Evidence from the European Football Market." *American Economic Review,* 103(5), 1892-1924.

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.

La Nacion (2016). "Tevez se va a China para ganar lo mismo que Messi y Cristiano juntos." Available at http://www.lanacion.com.ar/1971542-tevez-se-va-a-china-para-ganar-lo-mismo-que-messi-y-cristiano-juntos

Lanfranchi, P. and Taylor, M. (2001). *Moving with the Ball: The Migration of Professional Footballers.* Oxford: Berg.

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

Leitner, C., Zeileis, A. and Hornik, K. (2010). "Forecasting sports tournaments by ratings of (prob)alities: A comparison for the EURO 2008." *International Journal of Forecasting,* 26, 471-481.

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. (1988). "On the Mechanics of Economic Development." *Journal of Monetary Economics,* 22, 3-42.

Macmillan, 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.

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.

Milanovic, B. (2005). "Globalization and goals: does soccer show the way?" *Review of International Political Economy*, 12(5), 829-850.

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.

Mourão, P. R. (2010). "Regional Determinants of Competitiveness: The Case of European Soccer Teams." *International Journal of Sport Finance,* 5(3), 222-234.

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.

Pirotte, A. (1999). "Convergence of the static estimation toward the long run effects of dynamic panel data models." *Economics Letters,* 63, 151-158.

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.

Ramos, R. and Matano, A. (2013) Remittances, education and return migration. WP3/11 SEARCH working paper. Available at http://www.ub.edu/searchproject/results/working-paper-collection/

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 Long-Run Growth." *Journal of Political Economy,* 99(3), 500-521.

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

Romer, P.M. (1986). "Increasing Returns and Long Run Growth." *Journal of Political Economy*, 94, 1002–37.

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

Royuela, V. and J. Suriñach (2013) "Quality of Work and aggregate productivity." *Social Indicators Research*, 113(1), 37-66.

Ryall, R. and Bedford, A. (2010). "An optimized ratings-based model for forecasting Australian Rules football." *International Journal of Forecasting,* 26, 511-517.

Sagar, A. and Najam, A. (1998). "The human development index: a critical review." *Ecological Economics,* 25, 249-264.

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

Sen, A. (1999). *Development as Freedom*. New York: Anchor Books.

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.

Stefani, R. and Pollard R. (2007). "Football Rating Systems for Top-Level Competition: A Critical Survey." *Journal of Quantitative Analysis in Sport,* 3(3), 1-22.

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.

Szymanski, S. (2003). "The Economic Design of Sporting Contest." *Journal of Economic Literature*, 41 (4), 1137-1187.

Taylor, M. (2006). "Global Players? Football, Migration and Globalization, c. 1930-2000." *Historical Social Research,* 31(1), 7-30.

The Economist. (2014) "Everything to play for. Good managers matter, but not as much as money does." Available at http://www.economist.com/news/britain/21601873-good-managers-matter-not-much-money-does-everything-play.

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

Torgler B. (2004b). The determinants of women's international soccer performances. Center for Research in Economics, Managements and Arts, working paper no. 2004-19.

Torgler B. (2004c). Historical Excellence in football world cup tournaments: empirical evidence with data from 1930 to 2002. Center for Research in Economics, Managements and Arts, working paper no. 2004-18.

Troelsen, T. (2005). "Centralisering af dansk fodbold: En statistisk analyse med bud på årsagsforklaringer. Kommunal støtte til professionel fodbold." I J. Magnussen, & R. K. Storm (red.), *Professionel fodbold.* Klim, Århus, s. 69-86.

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.

UNDP (1990). *Human Development Report 1990*. Oxford, New York.

Walker, B. (1986). "The demand for professional league football and the success of football league teams: some city size effects." *Urban Studies*, 23(3), 209-219.

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. and Quinney, A. (2001a). "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. (2001b). "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.

World Bank (2009). *World Development Report 2009: Reshaping economic geography*. Washington D.C: World Bank.

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.

Yamamura, E. (2009). "Technology transfer and convergence of performance: an economic study of FIFA football ranking." *Applied Economic Letters,* 16, 261-266.

Yamamura, E. (2012). "Effect of Linguistic Heterogeneity on Technology transfer: An Economic Study of FIFA Football Rankings." *Atlantic Economic Journal,* 40(1), 85-99.

Zack, P.J and Knack, S. (2001). "Trust and Growth." *The Economic Journal,* 111, 295-321.