Effect of Linguistic Heterogeneity on Technology Transfer: An Economic Study of FIFA Football Rankings

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Abstract

This paper used Fédération Internationale de Football Association (FIFA) world ranking points data to examine how linguistic heterogeneity has an impact on technology transfer from the most developed countries. The major findings were that the learning effect from the most developed countries on team performance is larger for developing countries than for developed ones, and that linguistic heterogeneity has a detrimental effect on technology transfer for developed but not developing countries. The results presented here are interpreted to imply that the importance of common and proper comprehension of team strategy among members, which improves team performance but is hampered by linguistic heterogeneity, depends on the stage of development.

Keywords: FIFA raking, Technology transfer, Linguistic heterogeneity
JEL classification: L83, O19, Z13

Introduction

It is generally acknowledged that football is the most popular and widely played sport in the world. This is reflected by the fact that in 2008, 208 countries are the members of The Fédération Internationale de Football Association (FIFA)[1]. Recently, in the field of Economics, a growing body of research has been conducted into football in terms of an international perspective. Torgler (2004) assessed how referees influenced the game results in the 2002 World Cup. Coupé (2007) focused on bonus schemes for the 2006 World Cup. Some works have been concerned with the determinants of FIFA World Ranking (e.g., Hoffmann et al., 2002, Houston and Wilson 2002, Yamamura 2009). Among the FIFA members, many countries can be regarded as being less developed ones as measured by economic indicators. There are wide variations not only in economic conditions such as GDP and the unemployment ratio, but also in respect to social and cultural features. Inevitably, a country's football performance is thought to be affected by such socio-economic environments.

As the professional football leagues in Europe have developed, the modern football game has become sophisticated and hence game strategy is systematically planned. Necessarily, a higher level of technology might be required to raise the likelihood that a team gains better results than before. Yamamura (2009) found that developing countries catch up with developed ones thanks to the technology transfer and local information spillover, but developed ones hardly enjoy such learning effects[2]. This is presumably because the higher the marginal cost of technology improvement becomes, the higher the existing technology level is. This finding is consistent with the classical argument about the process of economic development that latecomers borrow advanced technology from their predecessors, which results in a convergence of productivity among countries (Gerschenkron 1962). Further empirical research has made it evident that social learning of new technology from neighbors plays a crucial role in information spill over (e.g., Foster and Rosenzweig, 1995; Goolsbee and Klenow, 2002). Yamamura (2008) found that a social network that is strengthened by social

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[1] See FIFA HP (http://www.fifa.com/aboutfifa/federation/index.html).

[2] In this paper, the degree of development is measured by the FIFA World Ranking, instead of per capital GDP, since in developing countries in the field of football this is relevant to the results of football match, rather GDP.

capital and cohesiveness enhances social learning. If this is the case, social structure and characteristics can be considered to have an influence on technology diffusion and thus on team performance.

On the other hand, social science researchers draw attention to social heterogeneity such as ethnic diversity, which has been found to be closely related to economic outcomes (Easterly and Levine 1997, Alesina et al. 2003, Alesina and La Ferra 2005). Racial fragmentation is found to impede economic growth, especially in less developed countries such as those in Africa (Easterly and Levine 1997). Collier and Jan Gunning (1999) demonstrated that ethno-linguistic fractionalization is negatively associated with the accumulation of productive public goods, resulting in an impediment to economic growth. Information flows decrease in a homogeneous population, preventing individuals from learning from others (Munshi 2004). Linguistic heterogeneity thus appears to affect the interpersonal network for social learning.

Assuming, that the more important communication among team member becomes, the more sophisticated the team strategy is, heterogeneity can be considered to have an influence on football team performance through technology diffusion. Nevertheless, little is known about such socio-economic effects on sports team performance. The aim of this paper is to assess how and the extent to which heterogeneity affects technology transfer from more developed countries. An empirical examination of FIFA's world ranking points, considered to reflect countries' performances, was conducted using panel data to control for unobserved countries' specific effects (Baltagi 2005). The major finding of that research was that linguistic heterogeneity has a detrimental effect on technology diffusion for developed countries' teams but not for developing countries' ones, which implies that the heterogeneity effect depends on a country's existing technology level.

Review of changes in FIFA world ranking points.

Though the "super stars" of international football belong to prestigious European club teams and enormous salaries, many of them play as members of non-European national teams in the World Cup. According to Maguire and Pearton (2000), European football clubs employed over 60 % of the players in the 1998 World Cup. On the other hand, Andreff (2004) noted that only 21 % of players of the five participating African countries were employed in their domestic leagues. This tells me that a number of players frequently move between their home country and Europe. Such labor mobility is thought to partly result in transporting advanced technology from the European leagues to other countries, leading to the improvement of developing countries' performances and therefore to an increase in the competitive balance among FIFA member countries over time (Yamamura 2009)[3]. This is reflected in the surprising and unpredicted results of World Cup 2002 in which Turkey and Korea, both considered developing countries in the football world, took third and forth places. "Euro 2004" where Greece[4] became the champion and "Euro 2008" where Turkey reached the semi-finals also mirror the increase in the international competitive balance[5].

I compare the changes of FIFA World Ranking Points as well as their distribution among the most developed, developed, and developing countries. For this, I have defined the most developed countries group as consisting of Italy, England, Germany, and Spain as these countries have the most prominent professional football leagues[6]. As shown in *Table A1*, I define developed countries as the rest of the European countries and those in central-south American since these national teams usually have a good World Cup records. The rest of the countries are defined as developing countries.

Figure 1 shows the normal distributions and the distributions of world ranking points by a kernel density estimate for both 1993 and 1998. Panel A demonstrates the kernel densities of all FIFA member countries. Splitting the members into developed and developing country groups; Panels B and C illustrate the kernel densities of the developed and developing groups, respectively. Comparing the distribution in 1993 with that in 1998 in Panel A, it can be seen to skew to the left in 1993, because the low point countries' gained points in the following years, in 1998 the deviation of the distribution of points has decreased. I see from Panel B that twin peaks are observed in 1993 but

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[3] an increase in competitive balance is also observed within Major League Baseball (e.g., Schmidt, 2001; Schmidt and Berry, 2005).

[4] Greece is a European country but is not generally regarded as a most developed one in football.

[5] It must be noted that striking result of World Cup 2002 held in Japan-Korea was significantly the result of a home advantage (Torgler 2004). Nevertheless, Euro2004 and 2008 were held in Portugal and Austria-Switzerland, respectively, leading me to assume that a home for Greece and Turkey..

[6] Italy's Serie A, England's Premiership, Germany's Bundesliga, and Spain's Primera Division. Although Wilson and Ying (2003) added France's Le Championnat to these other leagues, the records of teams belonging to Le Chamionnat are inferior to those from the other leagues in the UEFA Champions League that determines the champion club among European professional leagues. Therefore in this study I omitted France from the group of the most developed football countries.

disappear and skew to the right in 1998. This implies that the developed countries can be further divided into inferior and superior sub-groups in 1993, a number of lower performing teams increase their points climb out of inferior status by 1998. As for Panel C, consistent with Panel A, the skew to the left in 1993 is hardly observed in 1998. Overall, these indicate that developing countries have a tendency to catch up with developed ones, thereby increasing the competitive balance[7].

For a closer examination, I look at the changes in the competitive balance over time. In this paper, the coefficient of the variations of world ranking points is taken as a measure of the degree of competitive balance[8]. Those of the most-developed, developed, and developing countries separately appear in Figure 2. A cursory examination of Figure 2 shows that the level of the developing countries continues to take the largest values, while that of the developed ones is found between the most developed and the developing countries. This tells me that the gap between the national teams among each group is obviously associated with their average performance. The higher the average performance level of a group is, the smaller the gap becomes. As for trends, developed and developing countries decline consistently over time, whereas the value of most developed ones is stable. This implies that the competitive balance among countries increases, which is consistent with Figure 1. That is, the gaps among national team performances among countries have narrowed over time. Turning to Figure 3, the difference of the average raking points between the most-developed and the developed countries is larger than that between the developed and developing ones. In addition, the difference between the most developed countries and others slightly diminished over time. This implies that the records of the most development countries overwhelmingly dominated. This dominance, however, tends to decline gradually.

How is it that developing countries can catch up with developed ones? This question is a central issue in development economics. Technology transfer between developed and developing countries and information spillover are considered to be crucial factors for achieving the catch-up observed in FIFA World Cup Rankings (Yamamura 2009). On the

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[7] In Major League Baseball, the expansion of teams in the league led to an increased competitive balance (Schmidt, 2002). The members of FIFA increased from 167 in1993 to 208 in 2008. Therefore, the effects of expansion on competitive balance appearing in international football are in line with those seen in the MLB.

[8] There are alternative indexes for competitive balance, such as the Gini coefficient (Schmidt 2002).

other hand, it is increasingly acknowledged that social heterogeneity, for instance at racial, linguistic and income levels, hampers economic development (Easterly and Levine 1997, Alesina et al. 2003, Alesina and La Ferra 2005). Turning to football, heterogeneity is thought to have a detrimental effect on technology transfer, though individual skill and physical improvement through experience in prestigious club teams is not affected by heterogeneity [9]. This is because football technology contains not only individual player skills but also team strategy. Abundant resources such as a number of players with high skill levels might result in a small output if the resources are not efficiently allocated or the division of labor is hampered. Efficient resource allocation and division of labor within a team is realized when all members comprehend their own role as well as those of the other members. A member is required to understand the team strategy and game plan as a whole to harmonize with other member's playing. Furthermore, players are required to communicate with each other as a response to changes in conditions. For instance, the appropriate game plan changes depending on whether the team is behind or not. It is thus necessary for team members to use a common language. In this case, linguistic heterogeneity leads to preventing a team from functioning well, since the transaction cost to coordinate the resource allocation and division of labor becomes very high.

Methodological approach and model

Following Houston and Wilson (2002) and Yamamura (2009), I take the FIFA world ranking points as a proxy for the proficiency of a nation in international football. I estimate its determinants and use panel data from FIFA member countries for the years 1993-1998[10] to control the unobserved countries' specific effects.

As argued, the estimated function takes the following form:

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[9] Information spillover and social learning from others is weaker in a heterogeneous population (Munshi 2004).

[10] In August 1993, the FIFA introduced a ranking system for senior national teams. Current rankings are calculated by performances in the current year. The method of calculation of world ranking points changed at the beginning of 1999. From that point, current rankings are calculated by performances over the last 8 years. Further, from 2005, the basic calculation criteria changed again, with rankings calculated by performances over the last 4 years. Hence, rankings after 1999 suffer from serial correlations that result in estimation bias. Thus this paper focuses on rankings prior to 1999. We focus on the period 1993 to 1998. Variables such as population and real GDP used for the estimation were collected from the Penn world table (http://pwt.econ.upenn.edu/php_site/pwt61_form.php).

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\begin{aligned}
ln\ PTS = {} & \alpha_1\, ln\ RPTS_{i,\,t\text{-}1,\,j} + \alpha_2\, ln\ YFIFA_{it} + \alpha_3\, WCAPER_{it} \\
& + \alpha_4\, ln\ GDP_{it} + \alpha_5\, ln\ POP_{it} + \alpha_6 ln\ UNEMP_{it} + \alpha_7\, OPEN_{it} \\
& + \alpha_8 ln\ TOPTS_t + \alpha_9 ln\ OPEN_{it} * TOPTS_t + \alpha_{10}\, lnOPEN_{it} * NOFFLAG_{it} \\
& + \alpha_{11}\, lnOPEN_{it} * LINGFRA_{it} + \alpha_{12}\, lnOPEN_{it} * TOPTS_t * NOFFLAG_{it} \\
& + \alpha_{13}\, lnOPEN_{it} * TOPTS_t * LINGFRA_{it} + \varepsilon_i + \omega_{it},
\end{aligned}
$$

where *ln PTS*, a dependent variable, represents the logarithm of FIFA world ranking points of nation *i* for year *t*.. *j* denotes the locality of the country, and α represents the regression parameter. ε_i and ω_{it} represent the unobservable specific effects of the individual effects of *i* 's country (a fixed effect nation vector) and the error term in the *t* th year ,respectively. The structure of the data set used in this study is a panel; ε_i holds the time invariant feature, which we control by means of fixed effects estimation. Since the dependent variable is in log form, the coefficients of log form independent variables can be interpreted as the elasticity.

Table 1 compares mean values of dependent and independent variables in the regression function, which also includes variable definitions[11]. As for raking points which are dependent variables, the values of the developed countries are significantly, 13 points, larger than for the developing ones, which is consistent with Figures 1 and 3 as discussed earlier.

To capture the social learning effect from neighbors that seems to also have a critical role in international information spill over (e.g., Foster and Rosenzweig, 1995; Goolsbee and Klenow, 2002), I thus incorporate *ln RPTS* denoting the existing local technology level[12]. The local spillover in technology appears to come from neighbors with more advanced technology and results in a country's technological progress; thus, the coefficient sign of *ln RPTS* is expected to be positive (Yamamura 2009). Furthermore,

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[11] *ln YFIFA* and *WCAPER* are available at http://www.fifa.com/en/mens/statistics/rank/procedures/0,2540,3,00.html. *lnGDP* and *lnPOP* are collected from Penn & World Table (http://pwt.econ.upenn.edu/php_site/pwt_index.php). *NOFFLAG* and *ETHFRA* are used in Collier and Gunning (1999) and Taylor and Hudson (1972), respectively. Data sets for *NOFFLAG* and *ETHFRA* are available from the World Bank HP(http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTRESEARCH/EXTPROGRAMS/EXTMACROECO/0,,contentMDK:20392406~menuPK:836389~pagePK:64168182~piPK:64168060~theSitePK:477872,00.html). *OPEN* and *UNEMP* are collected from the World Bank (2006).

[12] I use the index as below as a proxy for the level of local technology, which is also used by Yamamura(2008a). Total ranking points in the locality minus own raking are calculated and then divided by the number of FIFA members in the locality minus 1.

instead of a non-lagged *ln RPTS*, a lagged one represented as *ln RPTS_1* is used to control for simultaneous endogenous bias.

A logarithm of the years a nation has been a FIFA member (*ln YFIFA*), the total number of World Cup appearances (*WCAPER*), real GDP (*ln GDP*), population (*ln POP*), and unemployment ratio (*UNEMP*) are control variables, which are defined similarly to those used in previous studies that have tested their effects on FIFA World Ranking Points (Houston and Wilson 2002, Yamamura 2009). The football experience seems to lead to an accumulation of information about technique and the strategy required for improvement of performance. Consistent with it, as demonstrated in Table 1, the effect of the experience of FIFA and World Cup appearances by developed countries are about twice and 8 times larger than those of developing ones, respectively. Therefore, the difference between developed and developing countries of these experiences appears to be reflected in their point differences. As a consequence, the coefficients of *ln YFIFA* and *WCAPER* are predicted to be positive. From Table 1, per capita GDP of developed counties is about twice as large as that for developing ones, which seems to make a contribution to an increase in FIFA points. This is in line with the argument that economic resources provide opportunities for improving team performance (Bernard and Busse 2004). The anticipated signs of *lnGDP* and *lnPOP* are thus positive.

To capture the effects of technology transfer from the most developed countries in the improvement of performance, the average world ranking points for Italy, England, Germany, and Spain (*ln TOPTS*) is incorporated as an independent variable in the function. These countries have the most prominent professional football leagues, which employ many talented players from less developed countries (Wilson and Ying, 2003). It might be appropriate that *ln TOPTS* is considered as a proxy for the most advanced technology level. The talented foreign players are thought to learn techniques and strategies by playing in these most advanced leagues and then transfer them to their domestic national team when they play for their country. If this holds true, technology transfer through international player mobilization leads to less developed countries catching up with the more advanced ones. Hence, the sign of *ln TOPTS* is expected to be positive. The international channel though which football skill and strategy are transferred is accelerated and reinforced by smooth labor mobility. The degree of labor mobility might be in proportion to the extent of the expansion of trade. I attempt to capture such an effect by including the *ln TOPTS* interacted with *OPEN* representing the trade share. If enhancement of labor mobility leads to an increase in advanced skills and strategy from the most developed countries, *OPEN*lnTOPTS* takes the positive sign.

I incorporate *NOFFLAG* and *LINGFRA*, which stand for the percent of the population not speaking the official language and the ethno-linguistic fractionalization score[13] respectively, as a proxy for linguistic heterogeneity. I see from Table 1 that both values of developed countries are significantly smaller than those of developing ones, suggesting advanced technology transfer is smoother for a developed country than for a developing one thanks to relative linguistic homogeneity. To examine how linguistic fractionalization impedes the technology transfer and then decreases FIFA points, various interaction terms such as *OPEN*NOFFLAG*, *OPEN*LINGFRA*, *OPEN*lnTOPTS*NOFFLAG* and *OPEN*ln TOPTS*LINGFRA* are included. *OPEN*NOFFLAG* and *OPEN*LINGFRA* capture an effect of linguistic heterogeneity on technology transfer, especially that from foreign countries. To more precisely assess the influence of linguistic heterogeneity, *OPEN*ln TOPTS*NOFFLAG* and *OPEN*ln TOPTS*LINGFRA* are used to examine how linguistic heterogeneity impedes technology transfer from the most developed countries. I expect that their coefficients take negative signs.

Empirical results

Estimation results using the whole sample are set out in Table 2. For a closer examination, I split samples into developed countries covering Europe and Latin America and developing countries covering the other areas. I then conducted an estimation utilizing the same specification as in Table 2. Developed and developing country results appear in Tables 3 and 4, respectively. Information derived from them is seen to be of great use for investigating the difference of linguistic heterogeneity effect on technological transfer between developed and developing areas. I begin by discussing the results of Table 2. As anticipated, *ln RPTS_1* takes the positive signs in all estimations although four of six are not statistically significant. This suggests that learning from neighbor countries makes a contribution to increase in FIFA points. The

[13] A ethno-linguistic fractionalization score is used in Taylor and Hudson (1972).

coefficient signs of *Ln YFIFA* are as expected positively statistically significant at the 1 % level in all estimation whereas those of *WCAPER* are unpredicted negative signs. I interpret this as follows. Most countries have been eliminated from the regional preliminary games that select counties to take part in the World Cup[14]. This is why, compared with *Ln YFIFA*, *WCAPER* cannot sufficiently capture the experience of football.

With respect to the macro economic condition, as expected, all coefficients of *ln GDP* and *ln POP* take positive signs. Results of *ln POP* show statistical significance in all estimations. Furthermore, the magnitude of the coefficients of *ln POP* are between 2.17 to 3.63, meaning that a 1 % increase in population leads to a rise in FIFA points of between 2.17 and 3.63 %, showing that population size has a tremendous impact on a rise in points. On the other hand, I see negative signs of *UNEMP* in all estimations.

The significantly positive sign of *OPEN*TOP* tells me that the smooth mobility of talented players to the club teams of the most developed countries makes a contribution to improving team performance through technology transfer. I now turn to various cross terms that assess the effect of linguistic heterogeneity on technology transfer. *OPEN*NFFLAG* and *OPEN*LINGFRA* yield negative coefficient signs although *OPEN*LINGFRA* is not statistically significant; implying that the lack of a common language decreases FIFA points because it hampers technology transfer. *OPEN*ln TOPTS*NOFFLAG* and *OPEN*ln TOPTS*LINGFRA* produce negative signs, suggesting that linguistic heterogeneity impedes technology transfer, in particular from the most developed countries. As a whole, these results lead me to argue that linguistic heterogeneity prevents countries from transferring technology.

I now switch to the results using the developed countries samples set out in Table 3 and focus on the effect of linguistic heterogeneity on technology transfer. It follows from the unstable signs of *OPEN*TOP* that player mobility between developed and the most developed countries hardly makes any contribution to improving team performances. It is interesting to observed that the coefficients of *OPEN*NFFLAG* and *OPEN*LINGFR* take significant negative signs and their magnitudes are -0.02 and -0.07, respectively, which are about three times larger than those in Table 2. Similar results are obtained for *OPEN*ln TOPTS*NOFFLAG* and *OPEN*ln TOPTS*LINGFRA*. From this, I derive

[14] In 1998, 140 of 205 FIFA members had no experience of an appearance in the World Cup.

the argument that linguistic heterogeneity has little detrimental effect on technology transfer, even if labor mobility is smooth. Such a negative effect of linguistic heterogeneity seems to in part result in talented player mobility having little effect on raising FIFA points.

Table 4, presenting the results of developing countries, is compared with those of Table 3. *OPEN*TOP* consistently yields positive signs, despite being statistically insignificant in columns (4) and (6). This tells me that player mobility between developing and most developed countries has an important role in raising FIFA points. Further, from the results of *OPEN*NFFLAG, OPEN*LINGFR, OPEN*ln TOPTS*NOFFLAG* and *OPEN*ln TOPTS*LINGFRA,* I find it very interesting that the signs of variables interacting with heterogeneity are not stable. This implies that the effect of linguistic heterogeneity is not negatively associated with technology transfer. Considering Tables 3 and 4 together, the negative effect of heterogeneity is found when samples are limited to developed countries, but is not found when samples of developing countries are used. Furthermore, based on the results of the Chow test in Table 4, I reject the null hypothesis that the coefficient vectors shown in Table 3 are the same as those in Table 4. This implies that estimation results for developing countries are structurally different from those for developed ones. As mentioned before, Table 1 shows that the linguistic heterogeneity of developing countries is significantly larger than that of developed ones. The combined results of Tables 1, 3, and 4 make for an interesting puzzle. The smaller heterogeneity is, the more obvious the detrimental effect of heterogeneity on technology transfer becomes.

My conjecture is that the required technology for each group, developed and developing countries, might provide the answer to solving the puzzle. When a developing stage country aims to raise its FIFA points, it seems necessary for its players to improve individual skills and to develop physical strength. This is something that is not connected with communications or intellectual ability. This can be why linguistic heterogeneity has no influence on technology transfer in the estimation of developing countries. The prerequisite for transferring sophisticated strategy might be that individual skills and physical fitness are upgraded in order to acquire it. Next, after entering the developed stage where individual skills and physical strength are equivalent to the most developed country's players, the extent to which members comprehend the team strategy and improve their team-work becomes relatively important in further ameliorating team performance. In fact, it seems that most national team members of developed countries usually play for a prestigious club team in the most developed countries. Developed countries have well-organized team strategies to improve performance since the members of developed countries have already acquired these playing skills. This is why linguistic heterogeneity becomes a major impediment for transferring strategy, even if the degree of heterogeneity is small.

Conclusion

Football has the greatest worldwide penetration of any popular sport and therefore is played in most of the countries of Europe, South America, Africa, and Asia. Notwithstanding such the world wide characteristic of football, few researchers have attempted to assess improvements of national team performances from a view point of economic development. Technology transfer from developed countries to developing ones is considered to be the crucial determinant of economic development. It is interesting to examine how such a mechanism is applicable to football. This paper used FIFA World Ranking points data to assess how linguistic heterogeneity has an impact on technology transfer from the most developed countries. The major findings were:

(1) The effect on team performance of learning from the most developed countries is larger for developing countries than for developed ones.

(2) Linguistic heterogeneity has a detrimental effect on technology transfer for developed countries but not for developing ones.

To resolve this puzzle, I derived an argument as follows: It is clearly easier for a developing country to improve performance through learning from the most developed countries than it is for developed countries. Improvements of individual skills and the physical characteristics of team members through experience in club teams of the most developed countries are more important than communication among team members when a team is in the developing stage where insufficient skills and physical condition cause a team to choose just a simple and basic strategy. On the other hand, a well-organized team strategy, which is achieved by intensive communication, plays a crucial role in improving the team performance when the team enters the development stage where there is not sophisticated strategy available although their individual skills and physical condition are equivalent to those of the most developed countries. This leads me to conclude that linguistic heterogeneity becomes a more serious impediment for improving performances at the developed stage than at the developing stage, since the common and proper comprehension of systematic team strategy by members might be required to better the performance of developed countries.

The evidence presented above is based on country level data. For a closer examination and to reconsider and scrutinize the results presented here, it will be advantageous to use individual player level data. This is an issue remaining to be addressed in future research.

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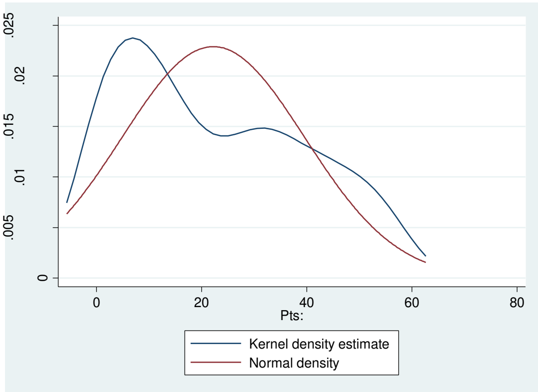
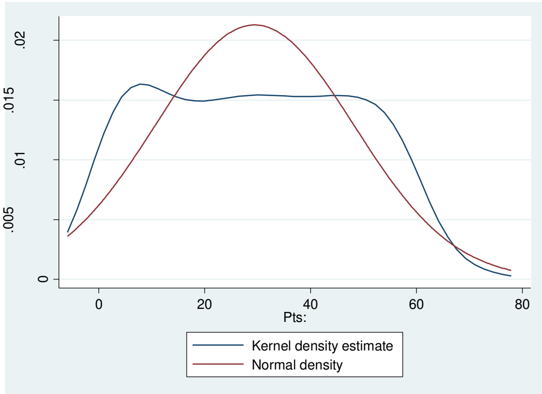
FIGURE 1

Kernel distributions of FIFA world ranking points.

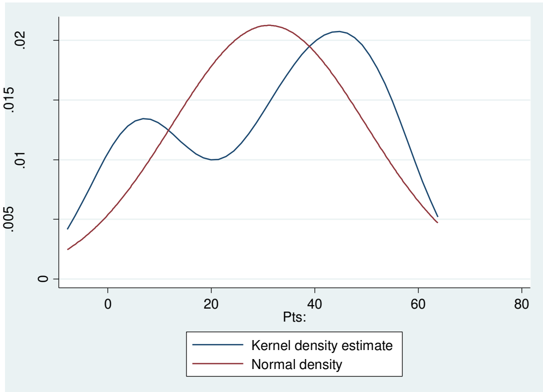
Panel A. All countries.

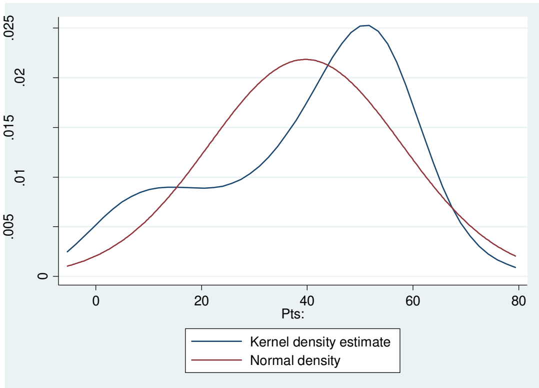




1993 1998

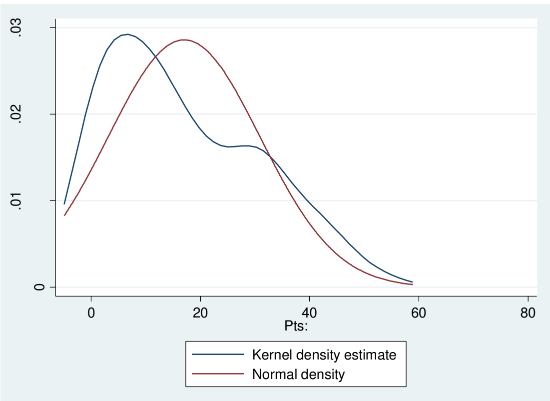
Panel B. Developed countries

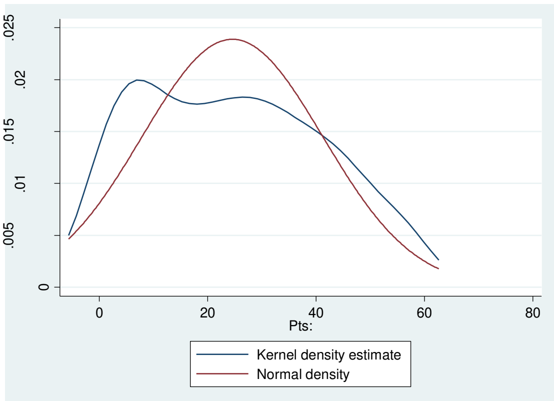




1993 1998

Panel C. Developing countries





1993 1998

Note: We use the kernel function to draw distributions.

FIGURE 2

Coefficient of variation of FIFA world ranking points.

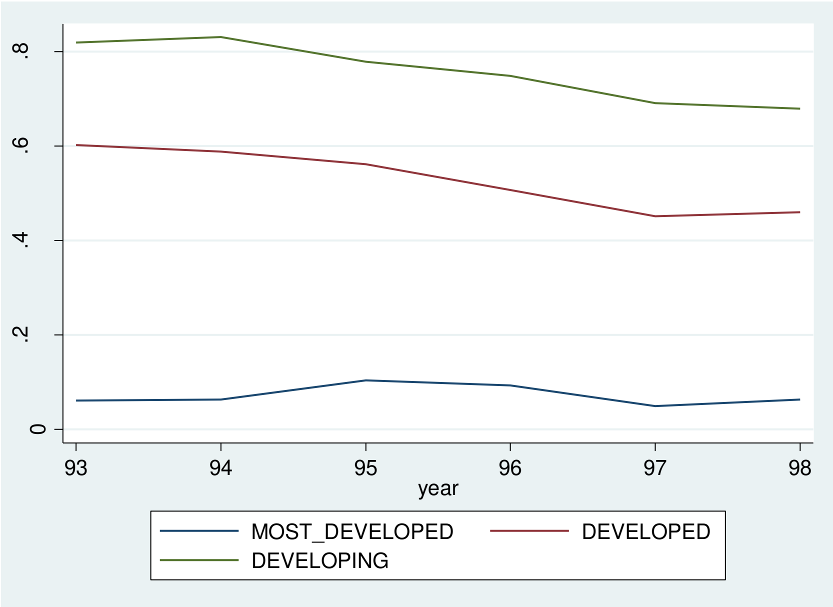


FIGURE 3

Mean values of FIFA world ranking points.

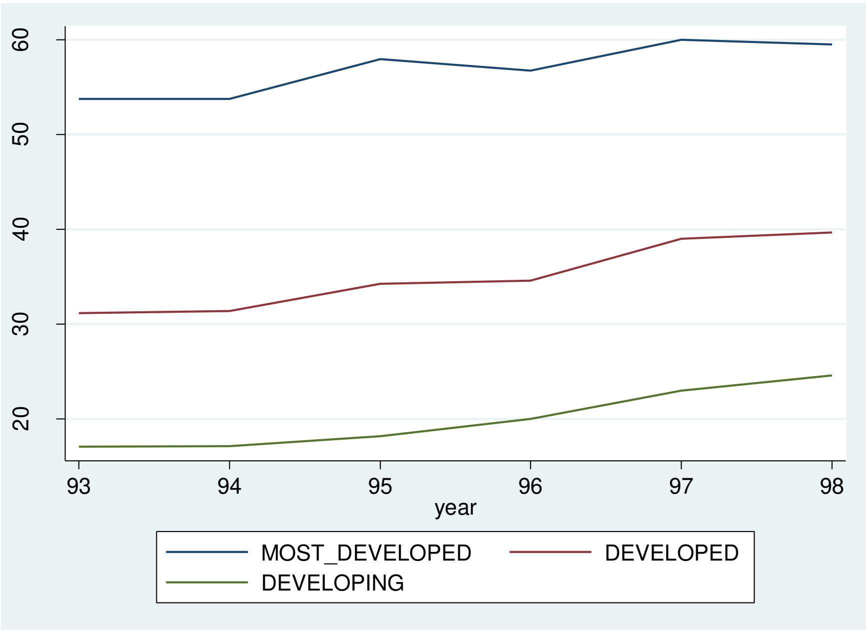


TABLE 1

Variable definitions, means and standard deviations.

Variables	Definition	Developed countries	Developing countries	t-statistics
PTS	Ranking points.	35.1	20.1	13.1**
YFIFA	Years a nation has been a FIFA member	64.3	32.8	19.3**
WCAPER	Total number of World Cup appearances	3.25	0.42	18.7**
GDP	Real GDP per capita (Thousands dollars).	10.5	5.7	9.35**
POP	Population (Millions).	15.8	45.5	3.12**
UNEMP	Unemployment ratio (%)	8.99	9.82	1.65*
OPEN (%)	Trade/ GDP (%)	82.0	82.4	0.65
NOFFLAG	Percent of population not speaking the official language (%)	13.1	47.9	12.6**
LINGFRA	Ethno-linguistic fractionalization score	0.21	0.53	15.7**

Notes: Values are simple averages of yearly values over the period 1993-1998. t-statistics are absolute values. * and ** indicate significance at 5 and 1 per cent levels respectively. *ln YFIFA* and *WCAPER* are available from http://www.fifa.com/en/mens/statistics/rank/procedures/0,2540,3,00.html. *lnGDP* and *lnPOP* are taken from the Penn & World Table (http://pwt.econ.upenn.edu/php_site/pwt_index.php). *NOFFLAG* and *ETHFRA* are used as in Collier and Gunning (1999) and Taylor and Hudson (1972), respectively. Data set of *NOFFLAG* and *ETHFRA* are available at the World Bank HP(http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTRESEARCH/EXTPROGRAMS/EXTMACROECO/0,,contentMDK:20392406~menuPK:836389~pagePK:64168182~piPK:64168060~theSitePK:477872,00.html). *OPEN* and *UNEMP* are taken from the World Bank (2006).

TABLE 2

Regression Results on FIFA World Ranking Points (TOTAL)

Variables	(1)	(2)	(3)	(4)	(5)	(6)
ln RPTS_1	0.48*	0.47*	0.10	0.27	0.10	0.27
	(2.04)	(2.03)	(0.38)	(1.04)	(0.38)	(1.04)
ln YFIFA	1.06**	0.97**	1.45**	1.18**	1.45**	1.18**
	(5.58)	(5.20)	(5.28)	(4.04)	(5.27)	(4.02)
WCAPER	-0.11	-0.10	-0.07	-0.08	-0.08	-0.08
	(-1.63)	(-1.55)	(-1.13)	(-1.23)	(-1.14)	(-1.25)
ln GDP	0.42	0.25	0.17	0.03	0.16	0.04
	(1.36)	(0.85)	(0.53)	(0.11)	(0.49)	(0.13)
ln POP	2.55*	2.17*	3.58**	3.58**	3.63**	3.57**
	(2.24)	(2.05)	(2.55)	(2.67)	(2.57)	(2.67)
UNEMP	-0.01	-0.01	-0.01	-0.01	-0.10	-0.009
	(-1.30)	(-0.99)	(-1.41)	(-0.81)	(-1.38)	(-0.79)
OPEN	$-0.05*10^{-3}$	-0.07**	-0.05*	-0.06*	-0.05*	-0.07**
	(-0.23)	(-3.25)	(-2.06)	(-2.26)	(-2.20)	(-2.40)
Ln TOPTS	0.64					
	(1.14)					
*OPEN *LnTOPTS*		0.01**	0.01*	0.01**	0.01*	0.01**
		(3.27)	(2.16)	(2.43)	(2.27)	(2.52)
OPEN NOFFLAG*			-0.01*			
			(-1.92)			
OPEN LINGFRA*				-0.02		
				(-1.51)		
OPEN LnTOPTS*NOFFLAG*					-0.003*	
					(-1.67)	
OPEN LnTOPTS* LINGFRA*						-0.004
						(-1.46)
Sample	319	319	281	257	281	257
Groups	90	90	78	67	78	67

Note: Numbers in parentheses are t-statistics. * and ** indicate significance at 5 and 1 per cent levels, respectively (one-sided tests). Numbers are the elasticity, which is evaluated in the sample mean values of the variables. In all columns, ln *TOP* which represents the average world ranking points for Italy, England, Germany, and Spain is incorporated; therefore, these nations are excluded from the sample to remove endogenous bias.

TABLE 3

Regression Results on FIFA World Ranking Points (Developed countries)

Variables	(1)	(2)	(3)	(4)	(5)	(6)
ln RPTS_1	-0.21	-0.15	-1.14**	-0.97*	-1.14**	-0.93*
	(-0.54)	(-0.39)	(-2.48)	(-2.17)	(-2.48)	(-2.08)
ln YFIFA	1.02**	0.94**	8.84**	9.02**	8.71**	8.72**
	(3.39)	(3.10)	(4.22)	(4.00)	(4.16)	(3.84)
WCAPER	-0.03	-0.04	-0.03	-0.02	-0.03	-0.03
	(-0.42)	(-0.53)	(-0.47)	(-0.35)	(-0.46)	(-0.43)
ln GDP	0.55	0.43	0.18	-0.22	0.16	-0.17
	(1.36)	(1.07)	(0.45)	(-0.56)	(0.42)	(-0.45)
ln POP	7.60**	6.79**	4.84**	4.33**	4.99**	4.39**
	(4.08)	(3.73)	(2.67)	(2.48)	(2.76)	(2.50)
UNEMP	-0.01	-0.01	-0.01	-0.01	-0.01	-0.003
	(-1.10)	(-0.99)	(-0.64)	(-0.81)	(-0.66)	(-0.22)
OPEN	-0.001	-0.01	0.05	0.02	0.04	0.008
	(-0.49)	(-0.58)	(1.36)	(0.66)	(1.23)	(0.21)
Ln TOPTS	-0.34					
	(-0.45)					
*OPEN *LnTOPTS*		0.004	-0.01	-0.001	-0.01	0.0001
		(0.54)	(-1.34)	(-0.39)	(-1.20)	(0.01)
OPEN NOFFLAG*			-0.03*			
			(-1.77)			
OPEN LINGFRA*				-0.07**		
				(-3.55)		
OPEN LnTOPTS*NOFFLAG*					-0.008*	
					(-1.74)	
OPEN LnTOPTS*LINGFRA*						-0.01**
						(-3.25)
Sample	190	190	178	168	179	168
Groups	42	42	39	36	39	36

Note: Numbers in parentheses are t-statistics. * and ** indicate significance at 5 and 1 per cent levels, respectively (one-sided tests). Numbers are the elasticity, which is evaluated in the sample mean values of the variables. In all columns, ln*TOP*, which represents the average world ranking points for Italy, England, Germany, and Spain is incorporated; therefore, these nations are excluded from the sample to remove endogenous bias.

TABLE 4

Regression Results on FIFA World Ranking Points (Developing countries)

Variables	(1)	(2)	(3)	(4)	(5)	(6)
ln RPTS_1	0.50*	0.43*	0.54*	0.57*	0.56*	0.57*
	(1.83)	(1.72)	(1.66)	(2.12)	(1.70)	(2.12)
ln YFIFA	1.42**	1.34**	1.51**	1.19**	1.52**	1.19**
	(6.14)	(6.24)	(6.24)	(4.87)	(6.24)	(4.84)
WCAPER	-0.17	-0.09	-0.10	-0.08	-0.11	-0.08
	(-1.22)	(-0.79)	(-0.80)	(-0.69)	(-0.81)	(-0.69)
ln GDP	0.74	0.39	0.15	0.22	0.11	0.22
	(1.55)	(0.89)	(0.27)	(0.40)	(0.20)	(0.41)
ln POP	-1.97	-1.75	-2.12	-1.36	-2.21	-1.36
	(-1.48)	(-1.50)	(-1.06)	(-0.70)	(-1.10)	(-0.70)
UNEMP	-0.02*	-0.02*	-0.02	-0.02*	-0.02	-0.02*
	(-1.81)	(-2.04)	(-1.56)	(-1.92)	(-1.54)	(-1.97)
OPEN	0.007*	-0.10**	-0.11**	-0.06	-0.12**	-0.05
	(1.75)	(-3.43)	(-2.90)	(-1.22)	(-3.00)	(-1.13)
Ln TOPTS	1.31					
	(1.65)					
*OPEN *LnTOPTS*		0.02**	0.03**	0.01	0.03**	0.01
		(3.75)	(3.25)	(1.33)	(3.25)	(1.13)
OPEN NOFFLAG*			-0.01			
			(-1.40)			
OPEN LINGFRA*				0.01		
				(0.65)		
OPEN LnTOPTS*NOFFLAG*					-0.002	
					(-1.12)	
OPEN LnTOPTS* LINGFRA*						0.004
						(0.69)
Sample	129	129	103	89	103	89
Groups	48	48	39	31	39	31
Chow test	7.48	7.49	8.33	10.15	7.43	9.88
[probability>F] Table 3 vs Table 4	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]

Note: Numbers in parentheses are t-statistics. * and ** indicate significance at 5 and 1 per cent levels respectively (one-sided tests). Numbers are the elasticity, which is evaluated in the sample mean values of the variables. In all columns, ln*TOP*, which represents the average world ranking points for Italy, England, Germany, and Spain is incorporated; therefore, these nations are excluded from the sample to remove endogenous bias. The null hypothesis of the Chow test is that the coefficient vectors shown in Table 3 are the same as those in Table 4. Numbers in square brackets for the Chow test are p values.