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A League of Their Own

Female Soccer, Male Legacy and Women's
Empowerment

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A League of Their Own

Female Soccer, Male Legacy and Women's Empowerment

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Abstract: This paper investigates whether male soccer tradition can predict the success of female soccer. Different from the existing literature, this paper utilizes panel data covering 175 countries during the 1991-2011 period, capturing country heterogeneity effects and time trends. An instrumental variable approach is further employed in order to identify causal relation. My findings do not support the widespread perception that male tradition determines female soccer attainments. On the other hand, my results indicate that women's empowerment can be a driving force for the success of female soccer.

Keywords: female and male soccer, women's empowerment, panel analysis

JEL: C33, J16, Z10

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1. Introduction

Soccer is long perceived to be a male-dominant sport. However, female soccer is gaining popularity and the markets for female soccer are growing rapidly (Hoffman et al. 2006; Matheson and Congdon-Hohman 2011). The International Federation of Soccer Associations (FIFA)¹ established the Women's World Cup in 1991 as a counterpart to the longstanding men's World Cup, one of the most privileged sports events in the world. Since 2003, FIFA has evaluated the performance of female national soccer teams in international matches in the same way as they do men's soccer. Witnessing such development, several recent papers investigated the determinants of female soccer (Hoffman et al. 2006; Kein 2004; Matheson and Congdon-Hohman 2011; Torgler 2008). Their results suggest that male soccer tradition is a robust factor of female performance. However, female soccer has developed its own history and winners of international female soccer matches are not necessarily the same as its male counterparts (see figure 1).

In this paper, I tackle the issue of male legacy on female soccer performance and empirically investigate the determinants of female soccer. To do so, I use cross-country longitude data covering up to 175 countries for the 1991-2011 period. The utilization of panel data provides an advantage controlling for country heterogeneity and time trends that may affect the performance of female soccer at the country level. In fact, the existing literature does not take into account country and time fixed effects; thus these studies are subject to omitted

¹ FIFA stands for "Fédération Internationale de Football Association," or in English, the "International Federation of Association Football". I use the term "soccer" throughout this paper in order to prevent confusion between it and the multitude of other sports that also go by the name football.

variable biases. In addition, I employ an instrumental variable approach to further identify causality running from male towards female soccer.

My findings suggest that there is limited evidence of the influence of male soccer on female performance, different from the previous literature. My baseline analysis shows that male soccer affects female performance only in countries where soccer tradition (proxied by male FIFA ranking) is not strong. In countries with strong soccer tradition, male soccer does not influence female soccer.² In other words, strong male soccer legacy does not lead to the success of female soccer. The results of the instrumental variable analysis further support the limited role of male soccer. Controlling for reverse causality and time varying unobserved effects, male soccer does not have any significant impact on female soccer performance.

On the other hand, women's empowerment, proxied by female labor force participation, positively and significantly impacts female soccer performance. As Klein (2004) predicts, women's labor participation can reflect the enhancement of women's attainments and opportunities in sports. This especially seems to be the case for soccer, which was male-dominated for many years.

2. Data and Research Design

To measure the performance of male and female soccer, I employ two different indicators: FIFA World Ranking scores; and the qualification for the World Cup. The FIFA scores are used

² See also appendix A on the top 30 countries for male and female FIFA rankings.

as the baseline measurement as this variable reflects the accumulated performance level of national soccer teams in international matches. The scores are determined based on seven criteria: (i) matches (all international A-level); (ii) results; (iii) the importance of matches; (iv) the opponent strength; (v) confederation strength; (vi) period assessed; and (vii) the number of matches considered per year (FIFA 2011). The alternative measurement for soccer performance is World Cup qualification, which indicates whether a country qualified to play in World Cup games. This indicator reflects how a national team is successful in important international matches.

The baseline model for empirical analysis takes the following form. In order to control for country-specific heterogeneity and time trends, I use time-series cross-country data.

$$\text{Female Soccer}_{it} = \alpha_1 + \beta_2 \text{Male Soccer}_{it} + \phi_4 X_{it} + \eta_i + v_t + u_{it} \quad (1)$$

As discussed above, the model has two dependent variables: female FIFA scores and the qualification for women’s World Cup. The subscript *i* refers to country *i* covering up to 175 countries. The subscript *t* refers to time period of: (i) 2003 – 2011 for FIFA scores; and (ii) 1991 – 2011 for the World Cup.³ The independent variable of principle interest is Male Soccer_{it}, denoting male FIFA scores and the qualification for men’s World Cup, respectively. I estimate the model with the contemporary values of male FIFA scores first and then lagged values up to three years to identify lagged effects of male soccer (i.e. t-1, t-2, t-3), if any.

³ Female FIFA scores are available from 2003, while the first Women’s World Cup was held in 1991. As the World Cup takes place every four years, the panel analysis using the World Cup variable covers 1991, 1995, 1999, 2003, 2007 and 2011.

Concerning the World Cup variable, I take the results of men's World Cup held directly before the Women's World Cup, as men's World Cup takes place in a different year.

The vector X_{it} contains socioeconomic control variables. Literature suggests that country's income level and population sizes are robust factors explaining the level of sports performance (Hoffmann et al. 2002, 2006; Klein 2004). Income is important because economic development affects not only the quality of sports infrastructures but also leisure time used for sports. Population size indicates the pool of talent for soccer. As this paper concerns female soccer performance, the logarithm of female population is controlled for as a proxy to the pool of female talent. Additionally, women's empowerment is arguably positively correlated to female success in sports (Hoffman et al. 2006; Klein 2004; Matheson and Congdon-Hohman 2011) and thus I include female labor force participation rate as a proxy to women's status. The income, population and labor force data are taken from the World Development Indicator (World Bank 2012). The summary statistics are provided in appendix B. Additionally, η_i denotes country specific effects controlling for time-invariant heterogeneity of a country. v_t refers to time effects and u_{it} is the idiosyncratic error term.

With female FIFA scores as the dependent variable, a maximum likelihood analysis of the nonnegative binomial regression with two-way fixed effects is employed in order to address the nature of the count variable consisting of nonnegative integer scores. For the qualification for the World Cup (dummy variable), I estimate the model with a probit regression with random and time fixed effects. Robust standard errors are applied.

The model is estimated with the full sample of countries first and then with sub-samples grouped by the level of soccer tradition in a country. Soccer tradition is proxied by male soccer ranking given by FIFA, arguably because male soccer attainments reflect long term endowments of soccer in a country (Torgler 2008). The sub-group estimations are conducted as male legacy may have different effects on female performance depending on the strength of male soccer tradition.

3. Results

3.1. Baseline Analysis

Table 1 shows the results of the baseline analysis. Employing FIFA scores, the results suggest that male performance positively affects female soccer (column 1). However, this result is mainly driven by countries that do not have strong soccer tradition – i.e. male FIFA rankings below 100 (column 2-5). Furthermore results of the World Cup qualification support the insignificant role of male soccer in female performance (column 6).

Turning to the control variables, a higher income level leads to higher performance of female soccer in general, however, the positive effect is pronounced in countries with FIFA rankings below 100. On the other hand, larger female populations improve women's soccer performance in all groups of countries, supporting the argument of the pool of female talent. Interestingly, women's empowerment, proxied by female labor force participation rates, has positive effects in countries with both strong and weak soccer traditions – FIFA ranking top 30 and below 100. The positive effects of income, female talent and women's empowerment are also found in the model employing the World Cup indicator.

To enhance the robustness of the findings, the model is further tested by employing lagged values of the main independent variable – male FIFA scores. In fact, the relation between male soccer tradition and female performance may not be contemporary. Taking contemporary values still makes sense as FIFA scores are accumulated and thus contemporary scores reflect soccer tradition over time. However, the scores may not fully reflect lagged effects, if it takes longer time for male tradition to have an impact on women's performance. To capture such lagged effects, I estimate the model with values of male FIFA scores lagged up to three years ($t-1$, $t-2$ and $t-3$). Table 2 summarizes the results. With one and two years of lag, male soccer affects female performance positively but the effect is found only in countries that are between 50 and 100 in FIFA rankings. With a three-year lagged value, however, male soccer does not turn out to have any significant effect. It seems that lagged male tradition (up to two years) affect female performance in middle-group countries, while contemporary legacy has positive effects in countries with weak tradition. On the other hand, the positive effect of female labor force participation is found in low-performing countries (ranking below 100), employing a one-year lag.

3.2. Causality

The results of the baseline analysis suggest that male soccer has positive effects on female performance only in countries with weak and/or middle levels of soccer tradition. However, the distribution of male FIFA scores could be correlated with the error term for several reasons. First, there could be reverse/double causality running effects from female soccer to male performance, although such a problem may not be very significant in this case as male soccer has a much longer history than its female counterpart. Second and more importantly,

the selected control variables may have neglected some time-varying unobserved determinants of female soccer, causing omitted variable biases which are not minimized by controlling for country fixed effects. Thus, in this section, I employ a two-stage IV estimation method (2SLS) in order to identify causal effects of male soccer on female performance.

Obviously, male and female soccer share a great deal of common determinants, making it difficult to find an instrument meeting with the requirement of exclusion restriction. One possible candidate as an instrument is the size of male population. Literature empirically shows that population size is a robust factor explaining a country's sports performance, as population reflects the pool of talent (Bernard and Busse 2004; Klein 2004; Leeds and Leeds 2009). With this in mind, male population can be a proxy for the pool of male talent directly explaining male soccer, while female population represents that of female talent correlated to female soccer. Table 3 shows the results of the first-stage regression. The coefficient of male population is large⁴ but the statistical significance is at the modest level of 10%. In fact, male population may not be a perfect instrument, as it shares a great deal of features with female population. Thus, I conduct several further checks for the validity of the instrument. As seen in table 3, the Anderson canonical LM test rejects the under-identification of the first-stage equation and F-statistics also indicate a strong instrument significant at 1% level. Additionally, the Sargan test of overidentifying restrictions fails to reject the null hypothesis of independent identically distributed errors. Given the results, this chosen variable seems to be a fairly suited instrument and therefore used to address the causality.

⁴ The large magnitude of the coefficient is partially driven by the linear assumption of the model, despite the fact that the dependent variable is a count variable. 2SLS estimation is employed as there is no practical method to conduct nonnegative binomial IV regression.

The results of the 2SLS estimations (table 3) show that there is no significant effect running from male soccer to female performance in any group of countries, regardless of the number of lags. In other words, the positive association between male and female soccer in countries of modest/weak levels of soccer tradition does not hold after controlling for causality. On the other hand, female labor still holds positive effects at least in countries with strong tradition (top 50 by the male FIFA ranking). Quantitatively, for this group of countries, a 10% increase in female labor participation rates increases the female FIFA scores by 161-points – the approximate difference Canada and Russia in 2011 (FIFA ranking 9 and 20, respectively). The results of the 2SLS estimation, however, should be interpreted with a caution because the linear assumption may not produce best fit for the model with a count variable and, possibly because of that, the standard errors of the control variables are a lot noisier than those of the nonnegative binomial regressions. But such less precision does not seem to be caused by the choice of instruments as OLS regressions produce similar results to those of 2SLS.

4. Conclusion

This paper empirically tests for the widespread perception of male influence on female performance in soccer. My analysis shows that the presumed impact of male soccer legacy may be misleading due to unobserved heterogeneity and zeitgeist. Controlling for omitted variables and time trends, I do not find causal evidence between male and female soccer. On the other hand, my findings indicate that women's empowerment promotes the success of female soccer, particularly in countries with strong soccer tradition. My study suggests that

female soccer is not a byproduct of male soccer, rather it has developed its own path alongside with overall women's advancement.

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Figure 1

Male and Female FIFA Scores (140 countries, 2011)

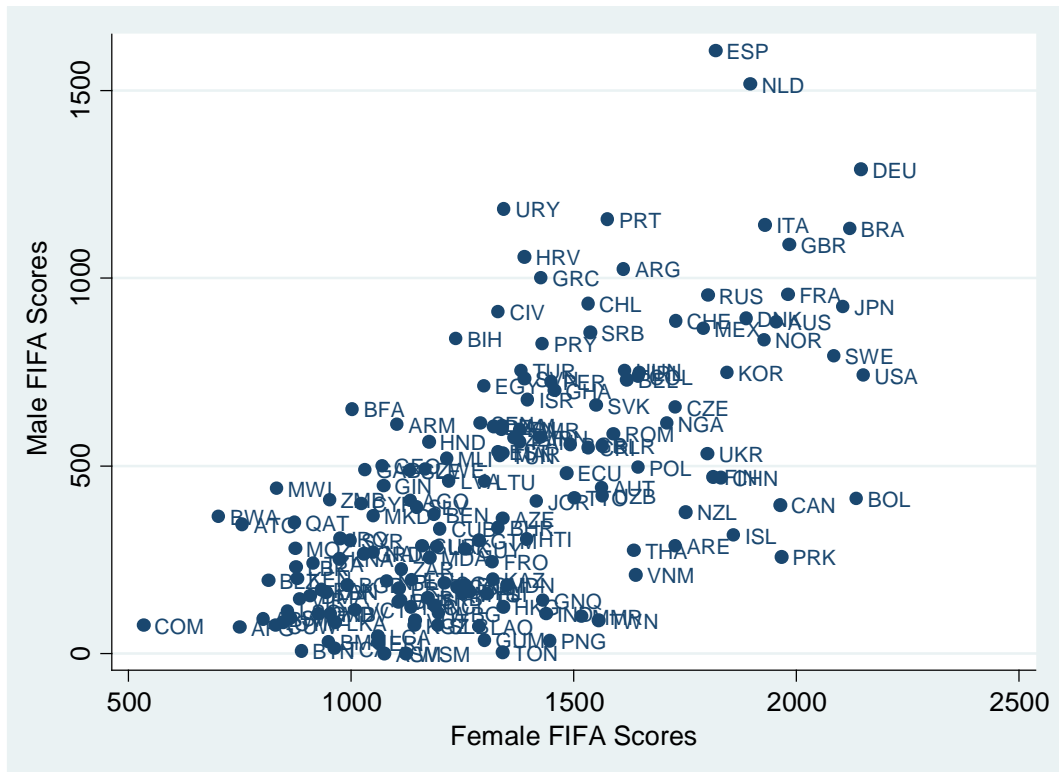


Table 1

Baseline Analysis, Female and Male Soccer Performance (1991-2011)

DV	Nonnegative binomial estimation (column 1-5)					Probit
	Female FIFA scores (column 1-5)					World Cup
	(1)	(2)	(3)	(4)	(5)	(6)
	Full sample	Top 30	Top 50	50-100	Below 100	Full sample
Male FIFA scores	0.00002 (2.11)**	1.20e-06 (0.09)	5.40e-06 (0.45)	-0.00003 (-0.63)	0.0002 (2.66)***	
Male World Cup						0.14 (0.40)
Income	0.13 (5.56)***	0.29 (0.75)	-0.10 (-2.80)**	-0.003 (-0.07)	0.40 (7.23)***	0.92 (4.44)***
Female Population	0.25 (6.41)***	0.52 (4.48)***	0.36 (5.20)***	0.16 (0.05)**	-0.02 (-0.29)	1.14 (4.43)***
Female Labor	0.005 (3.93)***	0.003 (1.73)*	0.002 (1.08)	-0.0003 (-0.09)	0.02 (4.38)***	0.07 (3.35)***
Country FE	Yes	Yes	Yes	Yes	Yes	RE
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Log(pseudo)likelihood	-5,372.53	-1,023.62	-1,757.13	-1,278.60	-1,749.43	-102.99
No. observations	1,090	244	398	300	365	1,014
No. countries	140	39	60	64	66	175
Period	2003-2011	2003-2011	2003-2011	2003-2011	2003-2011	1991-2011

Note: Parentheses are z-statistics. */**/** indicates significance at 10/5/1% level. Sub-groups are categorized by male FIFA ranking.

Table 2
Lagged Effects, Female and Male Soccer Performance (2003-2011)

DV	Nonnegative binomial estimation (column 1-10)									
	Female FIFA scores (column 1-10)									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Full sample	Top 30	Top 50	50-100	Below 100	Full sample	Top 30	50-100	Below 100	Full sample
L. Male FIFA	0.00002 (1.95)*	-3.47e-06 (-0.28)	-1.63e-06 (-0.14)	0.0002 (2.69)***	0.00001 (1.59)					
L2. Male FIFA						0.01 (2.56)**	-4.94e-06 (0.35)	0.0003 (2.26)**	0.0001 (1.45)	
L3. Male FIFA										7.97e-06 (0.84)
Income	0.17 (6.39)***	0.05 (1.11)	-0.11 (-2.75)***	0.04 (0.73)	0.42 (7.23)***	0.06 (2.61)***	0.05 (1.00)	0.15 (2.22)**	0.16 (3.91)***	0.09 (3.35)***
Female Population	0.28 (6.50)***	0.55 (3.75)***	0.35 (4.18)***	0.13 (1.25)	0.02 (0.26)	0.23 (5.30)***	0.68 (3.80)***	0.27 (2.39)**	0.13 (1.58)	0.19 (3.83)***
Female Labor	0.01 (4.19)***	0.002 (1.15)	0.002 (1.43)	0.001 (0.22)	0.03 (5.35)***	-0.001 (-0.62)	0.002 (0.92)	0.0005 (0.11)	-0.0004 (-0.18)	-0.0004 (-0.31)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Log likelihood	-4,800.21	-874.48	-1,519.57	-767.61	-1,576.36	-3,846.42	-733.82	-582.67	-1,169.93	-3,224.33
No. observations	989	216	355	190	333	883	187	139	298	772
No. countries	140	39	60	49	64	140	38	33	62	140

Note: Parentheses are z-statistics. */**/** indicates significance at 10/5/1% level. Sub-groups are categorized by male FIFA ranking.

Table 3

Instrumental Variable Approach, Female and Male Soccer Performance (2003 – 2011)

DV	2SLS (column 1-5)				
	Female FIFA scores (column 1-5)				
	(1)	(2)	(3)	(4)	(5)
	Full	Top 50	50-100	Below 100	Full
Male FIFA scores	-0.11 (-1.21)	-0.20 (-1.51)	0.37 (0.60)	2.10 (-0.53)	
L. Male FIFA scores					-0.02 (-0.23)
Income	-30.86 (-0.92)	-38.72 (-0.52)	-92.83 (-0.57)	-47.38 (-0.13)	-14.01 (-0.37)
Female Population	91.42 (0.79)	-8.67 (-0.03)	473.11 (1.51)	543.60 (0.64)	178.02 (1.43)
Female Labor	4.60 (1.99)**	16.11 (2.53)**	-0.74 (-0.12)	17.10 (0.69)	3.72 (1.66)*
Country FE	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes
R ²	0.16	0.04	0.02	0.07	0.18
No. observations	1,090	328	204	338	994
No. countries	140	59	63	71	145
	First-stage regression				
Male Population			3,506.79 (1.86)*		
L. Male Population			1,692.63 (1.34)		
F-stat.			13.24***		
Anderson LM			26.11***		
Sargan-stat			2.47		
(p-value)			(0.12)		

Note: Parentheses are z-statistics. */**/** indicates significance at 10/5/1% level. Sub-groups are categorized by male FIFA ranking. Instruments: (log) male population (t and t-1); Instrumented: male FIFA scores.

Appendix A

List of Top 30 Countries by FIFA Ranking (male and female, Sept. 2011)

Ranking	Country, female	Female Scores	Ranking	Country, male	Male Scores
1	USA	2,151	1	Spain	1,605
2	Germany	2,146	2	Netherland	1,571
3	Brazil	2,121	3	Germany	1,290
4	Japan	2,106	4	Uruguay	1,184
5	Sweden	2,085	5	Portugal	1,158
6	England	1,985	6	Italy	1,142
7	France	1,982	7	Brazil	1,132
8	North Korea	1,967	8	England	1,089
9	Canada	1,964	9	Croatia	1,057
10	Australia	1,956	10	Argentina	1,024
11	Italy	1,930	11	Greece	1,000
12	Norway	1,928	12	France	956
13	Netherlands	1,897	13	Russia	954
14	Denmark	1,888	14	Chile	932
15	Iceland	1,860	15	Japan	924
16	South Korea	1,845	16	Côte d'Ivoire	910
17	China	1,831	17	Denmark	893
18	Spain	1,819	18	Switzerland	886
19	Finland	1,813	19	Australia	882
20	Russia	1,802	20	Mexico	866
21	Ukraine	1,801	21	Serbia	855
22	Mexico	1,792	22	Bosnia- Herzegovina	839
23	Scotland	1,772	23	Norway	835
24	New Zealand	1,752	24	Paraguay	825
25	Switzerland	1,730	25	Sweden	792
26	Czech Republic	1,729	26	Montenegro	777
27	Nigeria	1,710	27	Hungary	754
28	Ireland	1,648	27	Turkey	754
29	Poland	1,645	29	Ireland	749
29	Colombia	1,645	29	South Korea	749

Appendix B

Summary Statistics

	Observations	Mean	Std. Dev.	Minimum	Maximum
Female FIFA scores	1,090	1,405.79	331.43	113	2,233
Male FIFA scores	1,090	506.99	312.86	0	1,883
Qualification for World Cup, female	1,014	0.08	0.27	0	1
Qualification for World Cup, male	1,014	0.16	0.37	0	1
Female labor force participation rates	1,090	59.39	14.17	13.7	90.5
Female population, log	1,090	15.37	1.82	10.81	20.29
Male population, log	1,090	15.36	1.81	10.82	20.36
Income, log	1,090	8.07	1.51	4.48	10.94