When Drains and Gains Coincide: Migration and International Football Performance

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1. Introduction

Effects of skilled migration on human capital in origin countries:

- Negative

  Direct loss of migrants' human capital

- Positive

  Possibility of migration increases returns to education

  Remittances relax credit constraints for investing in education and health

  Some migrants return with new skills and education acquired abroad

Net effect depends on circumstances ("brain drain" or "brain gain")

1. Introduction

- Particular case: sports migration and human capital
- Share of migrants in main sports leagues very large
- Specificity of sports migration: migrants still play for national teams
- Focus on football, where migration increased largely over the last decade (1995 Bosman ruling)

1. Introduction

- Dominant view in sports migration literature: “muscle drain” undermines sporting capacity of developing countries, leading to poor performances of developing countries in world sport events

- Ad hoc observations FIFA World Cup

  Cameroon 1990, Senegal 2002, Ghana 2010: quarter final

- Our aim: accurate assessment of the impact of football player migration on the performance of national teams

- Result: migration of football players significantly improves the performance of their home country national teams

2. Theoretical Framework

- Assumptions

  Two countries: home and foreign

  Players in each national football team: N

  Innate talent players home (foreign) national team: t_i (t_i^*)

  Players are ranked by increasing talent: $t_1 < t_2 < \cdots < t_N$ ($t_1^* < t_2^* < \cdots < t_N^*$)

  Total stock of talent home (foreign) national team:

$$t = \sum_{i=1}^{N} t_i \quad (t^* = \sum_{i=1}^{N} t_i^*)$$

2. Theoretical Framework

- Assumptions

  Football skills s_i determined by talent t_i and training level k_i :

  $$s_i = k_i t_i$$

  Players can play for a foreign club, but not for the foreign national team

  Market for football bigger in foreign country

  Training level higher in the foreign country clubs: $k^* > k$

  Players' wages γs_i an increasing function of skills ($\gamma > 0$)

⇒ Players from the home national team earn more if they play for a foreign club:

$$\gamma k t_i < \gamma k^* t_i$$

2. Theoretical Framework

- Migration decision

  Migrating abroad entails a cost c for the player

  Player i will migrate if:

$$\gamma k t_i < \gamma k^* t_i - c$$

$$t_i > t_{\bar{i}} \equiv c/\gamma(k^* - k)$$

- Football migration rate:

$$m \equiv \sum_{i=\bar{i}+1}^{N} t_i \Big/ \sum_{i=1}^{N} t_i$$

2. Theoretical Framework

- Performance of a team given by contest success function, in line with literature:

$$p = s/(s + s^*)$$

p is the probability that the home team wins a game against the foreign team

$s = \sum_{i=1}^{N} s_i$ ($s^* = \sum_{i=1}^{N} s_i^*$) is the stock of skills of the home (foreign) national team

2. Theoretical Framework

- As players $i > \bar{\imath}$ from the home national team migrate:

$$p = \left(k\sum_{i=1}^{\bar{\imath}} t_i + k^*\sum_{i=\bar{\imath}+1}^{N} t_i\right) \Big/ \left(k\sum_{i=1}^{\bar{\imath}} t_i + k^*\sum_{i=\bar{\imath}+1}^{N} t_i + k^*\sum_{i=1}^{N} t_i^*\right).$$

- Performance as a function of the migration rate:

$$p = [tm(k^* - k) + kt] / [tm(k^* - k) + kt + k^* t^*]$$

2. Theoretical Framework

- Effects of migration on national team performance:

$$\partial p/\partial m = t(k^* - k)k^*t^*/(tm(k^* - k) + kt + k^*t^*)^2 > 0$$

$$\partial^2 p/\partial m^2 = -2t^2(k^* - k)^2k^*t^*/(tm(k^* - k) + kt + k^*t^*)^3 < 0$$

- These effects depend on the assumption that migrating players obtain superior training

- Theoretical model predicts a positive (but diminishing) influence of football players' migration on national team performance

3. Empirical Framework

3.1 Variables and Data

3.2 Empirical Specification

3.3 Regression Results

3.4 Extensions and Robustness Checks

3.1 Variables and Data

- Dependent variable: national team performance: FIFA points
- Main independent variable: football migration rate
- The following migration index is attached to each national team:

$$Migr = \frac{1}{n}\sum_{i} r_i \sum_{d} \frac{1}{d} n_{id}$$

$$r_i = \left(n_{UEFA} + 1 - p_{rank,i}\right) / n_{UEFA}$$

- This index assigns a higher weight to players migrating to stronger leagues and higher divisions (higher skills spillover)
- Only national team players migrating to UEFA leagues in migration index

3.1 Variables and Data

- Control variables, in line with the literature:
  GDP per capita (and its squared form)
  Population size (and its squared form)
  Football history
  Temperature
  Historical performance

- Sample size:190 countries

3.1 Variables and Data

Variables	Mean	Max.	Min.	Std. Dev.
FIFA points	378.921	1568	0	320.993
Migration index	0.204	0.922	0	0.237
GDP per capita (in 1000$)	13.285	53.269	0.009	13.249
Population (in 1000000 inhabitants)	20.818	307.212	0.012	41.577
Football history	1939.326	2002	1873	27.294
Temperature	83.821	256	0	68.641
Historical performance	1.432	17	0	2.935

3.2 Empirical Specification

- We estimate the following equation:

$$Points_i = \beta_0 + \beta_1 Migr_i + \beta_2 Migr_i^2 + \beta_3 GDP_i + \beta_4 GDP_i^2 + \beta_5 Pop_i + \beta_6 Pop_i^2 + \beta_7 Temp_i + \beta_8 Hist_i + \beta_9 WCApp_i + u_i,$$

- We include both a linear and a quadratic form of the migration index in order to test for decreasing returns to migration

- This equation is estimated using ordinary least squares

3.3 Regression Results

Dependent variable	FIFA points					
Variables	(1)	(2)	(3)	(4)	(5)	(6)
Constant	159.855	91	-7.63	4296.92	3813.691	2358.646
	(0.000)	*(0.000)*	*(0.782)*	*(0.000)*	*(0.001)*	*(0.019)*
Migration	**1390.138**	**1323.701**	**1317.621**	**1155.419**	**1032.881**	**962.6**
	(0.000)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*
Migration²	**-660.940**	**-606.356**	**-663.132**	**-508.075**	-377.991	**-466.043**
	(0.069)	*(0.086)*	*(0.017)*	*(0.055)*	*(0.163)*	*(0.081)*
GDP per capita		10.875	14.267	10.599	9.749	6.55
		(0.008)	*(0.000)*	*(0.003)*	*(0.006)*	*(0.054)*
(GDP per capita)²		-0.192	-0.234	-0.181	-0.167	-0.111
		(0.046)	*(0.008)*	*(0.025)*	*(0.04)*	*(0.146)*
Population			5.185	4.573	4.284	3.437
			(0.000)	*(0.000)*	*(0.000)*	*(0.000)*
Population²			-0.015	-0.013	-0.012	-0.011
			(0.001)	*(0.002)*	*(0.003)*	*(0.005)*
Football history				-2.191	-1.905	-1.152
				(0.000)	*(0.001)*	*(0.026)*
Temperature					-0.566	-0.42
					(0.006)	*(0.028)*
Historical performance						29.399
						(0.000)
Observations	190	190	190	190	190	190
Adjusted R^2	0.51	0.528	0.627	0.652	0.662	0.7

3.3 Regression Results

- Unconditional specification (column (1))

  Statistically significant migration coefficients for both the linear and quadratic term

  Signs of the coefficients consistent with our hypothesis

- Conditional specifications (column (2)-(6))

  Signs and significance of the control variables in line with previous studies

  Signs of the migration coefficients still consistent with our hypothesis

3.4 Extensions and Robustness Checks

1. FIFA ranking as alternative dependent variable:

$$Ranking_i = \beta_0 + \beta_1 Migr_i + \beta_2 Migr_i^2 + \beta_3 GDP_i + \beta_4 GDP_i^2 + \beta_5 Pop_i + \beta_6 Pop_i^2 + \beta_7 Hist_i + \beta_8 Temp_i + \beta_9 WCApp_i + u_i$$

- The use of ranking leads to a loss of information
- Count variable: Poisson regression
- Likelihood Ratio testing: overdispersion
- This equation is estimated using negative binomial regression

3.4 Extensions and Robustness Checks

Dependent variable	FIFA ranking					
Variables	(1)	(2)	(3)	(4)	(5)	(6)
Constant	4.981	5.127	5.336	-3.889	-2.879	0.27
	(0.000)	*(0.000)*	*(0.000)*	*(0.098)*	*(0.244)*	*(0.901)*
Migration	**-2.568**	**-2.518**	**-2.529**	**-2.197**	**-1.956**	**-1.696**
	(0.000)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*
Migration²	0.788	0.756	0.803	0.495	0.261	0.398
	(0.371)	*(0.36)*	*(0.266)*	*(0.466)*	*(0.702)*	*(0.538)*
GDP per capita		-0.022	-0.032	-0.023	-0.021	-0.013
		(0.012)	*(0.000)*	*(0.004)*	*(0.008)*	*(0.081)*
(GDP per capita)²		0.000	0.001	0.000	0.000	0.000
		(0.075)	*(0.01)*	*(0.036)*	*(0.05)*	*(0.165)*
Population			-0.011	-0.009	-0.008	-0.007
			(0.000)	*(0.002)*	*(0.002)*	*(0.004)*
Population²			0.000	0.000	0.000	0.000
			(0.05)	*(0.09)*	*(0.026)*	*(0.102)*
Football history				0.005	0.004	0.002
				(0.000)	*(0.003)*	*(0.028)*
Temperature					0.001	0.001
					(0.005)	*(0.024)*
Historical performance						-0.081
						(0.000)
Observations	190	190	190	190	190	190
Adjusted R^2	0.509	0.502	0.563	0.612	0.624	0.682

3.4 Extensions and Robustness Checks

2. Results driven by countries with small football markets, in line with theory?

- Inclusion of interaction term between a dummy variable for UEFA countries and the migration index

3.4 Extensions and Robustness Checks

Variables	Dependent variable	FIFA points (1)	FIFA ranking (2)
Constant		3052.091	-1.583
		(0.003)	*(0.451)*
Migration		**1048.283**	**-1.963**
		(0.000)	*(0.000)*
Migration²		**-450.156**	0.369
		(0.076)	*(0.578)*
GDP per capita		8.421	-0.018
		(0.015)	*(0.014)*
(GDP per capita)²		-0.139	0.000
		(0.075)	*(0.062)*
Population		3.135	-0.006
		(0.001)	*(0.006)*
Population²		-0.01	0.000
		(0.004)	*(0.085)*
Football history		-1.508	0.003
		(0.004)	*(0.002)*
Temperature		-0.53	0.001
		(0.006)	*(0.003)*
Historical performance		28.467	-0.082
		(0.000)	*(0.000)*
*UEFA*migration*		**-222.176**	**0.669**
		(0.029)	*(0.008)*
Observations		190	190
Adjusted R^2		0.722	0.683

3.4 Extensions and Robustness Checks

2. Results driven by countries with small football markets, in line with theory?

- Exclusion of UEFA countries (144 obs.)

3.4 Extensions and Robustness Checks

Dependent variable	FIFA points	FIFA ranking
Variables	(1)	(2)
Constant	2789.128	-0.773
	(0.003)	*(0.689)*
Migration	**1010.928**	**-1.813**
	(0.000)	*(0.000)*
Migration²	-449.419	0.447
	(0.162)	*(0.601)*
GDP per capita	5.673	-0.01
	(0.081)	*(0.105)*
(GDP per capita)²	-0.077	0.000
	(0.285)	*(0.363)*
Population	2.166	-0.004
	(0.014)	*(0.034)*
Population²	-0.008	0.000
	(0.021)	*(0.102)*
Football history	-1.363	0.003
	(0.005)	*(0.003)*
Temperature	-0.504	0.001
	(0.007)	*(0.006)*
Historical performance	39.733	-0.136
	(0.000)	*(0.000)*
Observations	144	144
Adjusted R^2	0.741	0.686

3.4 Extensions and Robustness Checks

3. Results driven by countries with zero migration?

- Exclusion of countries without migration of national team players (91 obs.)

3.4 Extensions and Robustness Checks

Dependent variable	FIFA points	FIFA ranking
Variables	(1)	(2)
Constant	3077.582	-1.105
	(0.041)	*(0.711)*
Migration	**717.978**	**-1.319**
	(0.015)	*(0.039)*
Migration²	-111.474	-0.128
	(0.775)	*(0.897)*
GDP per capita	3.982	-0.007
	(0.558)	*(0.585)*
(GDP per capita)²	0.004	-0.000
	(0.984)	*(0.864)*
Population	1.971	-0.003
	(0.123)	*(0.197)*
Population²	-0.007	0.000
	(0.11)	*(0.265)*
Football history	-1.477	0.003
	(0.055)	*(0.043)*
Temperature	-0.652	0.001
	(0.022)	*(0.017)*
Historical performance	37.656	-0.13
	(0.000)	*(0.000)*
Observations	91	91
Adjusted R^2	0.678	0.6

3.4 Extensions and Robustness Checks

4. Players that once migrated to UEFA league (and thus acquired skills during this UEFA experience), but returned?

- Inclusion of earlier migration patterns in migration index

3.4 Extensions and Robustness Checks

Dependent variable	FIFA points	FIFA ranking
Variables	(1)	(2)
Constant	1920.257	1.148
	(0.056)	*(0.601)*
Migration	**1049.559**	**-1.944**
	(0.000)	*(0.000)*
Migration²	**-551.17**	-0.716
	(0.027)	*(0.266)*
GDP per capita	6.994	-0.014
	(0.028)	*(0.046)*
(GDP per capita)²	-0.133	0.000
	(0.06)	*(0.077)*
Population	3.337	-0.007
	(0.000)	*(0.003)*
Population²	-0.01	0.000
	(0.004)	*(0.106)*
Football history	-0.943	0.002
	(0.067)	*(0.072)*
Temperature	-0.298	0.001
	(0.107)	*(0.073)*
Historical performance	28.208	-0.076
	(0.000)	*(0.000)*
Observations	190	190
Adjusted R^2	0.72	0.701

3.4 Extensions and Robustness Checks

5. Endogeneity of migration index?

- Ability bias: countries with more talented players will have more migration and a better national team?

  Control for population size and football culture

  Experience effect

- IV?

3.4 Extensions and Robustness Checks

5. Endogeneity of migration index?

- Football federations promote both migration and good results for the national team?

- The following equation is estimated using ordinary least squares:

$$\Delta Ranking_{i,2010-1994} = \beta_0 + \beta_1 \Delta Migr_{i,2010-1994} + \beta_2 \Delta GDP_{i,2010-1994} + \beta_3 \Delta Pop_{i,2010-1994} + \beta_4 Hist_i + u_i.$$

3.4 Extensions and Robustness Checks

Dependent variable	Difference in FIFA ranking			
Variables	(1)	(2)	(3)	(4)
Constant	0.034	-0.018	-0.003	-1.963
	(0.362)	*(0.679)*	*(0.955)*	*(0.62)*
Difference in migration	**0.275**	**0.311**	**0.309**	**0.285**
	(0.079)	*(0.043)*	*(0.044)*	*(0.084)*
Difference in GDP per capita		0.015	0.014	0.012
		(0.013)	*(0.034)*	*(0.09)*
Difference in population			-0.002	-0.001
			(0.364)	*(0.577)*
Football history				0.001
				(0.622)
Observations	44	44	44	44
Adjusted R^2	0.038	0.09	0.074	0.055

4. Conclusion

- Theory

  Positive effect of migration on national football team performance

  Decreasing returns to migration on national football team performance

- Empirics

  Strong and robust support for the former

  Some support, but less robust, for the latter

⇒ While developing countries' football clubs may experience a "muscle drain", their national teams experience a "muscle gain" at the same time