

# The interdependence of domestic and international success: the case of the UEFA Champions League

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## Introduction

- In 1955, the so-called European Champion Clubs' Cup was launched.
- It was a yearly competition played by the national league champions of the strongest UEFA national associations.
- The competition took on its current name (the UEFA Champions League) in 1992, adding a group stage to the competition and allowing multiple entrants from certain countries.
- It is one of the most prestigious tournaments in the world and the most prestigious club competition in European football.

## Introduction

- In its present format, the UEFA Champions League begins with four knockout qualifying rounds and a play-off round.
- The surviving teams enter the group stage, joining teams qualified in advance.
- Overall, 32 teams are drawn into eight groups of four teams and play each other in a double round-robin system.
- The eight group winners and eight runners-up proceed to the knockout phase that culminates with the final match.
- The eight third-place holders join the UEFA Europa League.
- The eight fourth-place holders leave both Champions and Europa League.

## Introduction

- Real Madrid is the most successful club in the competition's history, having won the tournament 13 times
- Spanish clubs have accumulated the highest number of victories (18), followed by England and Italy (12).
- The last 10 Champions League competitions witnessed a very strong domination of Spanish clubs:
  - Real Madrid won 4 competitions and Barcelona 3.
  - Atletico de Madrid was a runner-up in 2 editions.
  - The UEFA Europa League, also witnessed a similar domination of Spanish clubs who won it 6 times in the last decade, Atletico Madrid and Sevilla - 3 times each.
  - What could possibly be the reasons for such a streak?

## Introduction

- One hypothesis is that Spain enjoyed during the last decade two of the most dominating players in history (Lionel Messi and Cristiano Ronaldo) who received the so-called Ballon d'Or (the most prestigious annual football award, awarded since 1956) five times each for the period from 2008 to 2017.
- Actually, for those 10 years there was only one runner-up not named Ronaldo or Messi (Andres Inesta in 2010).
- Here, we consider a different hypothesis referring to the interdependence of domestic and international competitions.

## Introduction

- During the last decade, the Spanish domestic competition was indeed characterized by the rivalry between the two powerhouses (Barcelona and Real Madrid), each having one of those two dominant players. But this involved a great amount of effort (and stress) to win domestically (especially during the Guardiola-Mourinho era).
- In general, none of this two teams won easily the domestic competition as opposed, for instance, to Germany and Italy, where Bayern Munich and Juventus exhibited an overwhelmingly domination in the last years.
- On the other hand, with the occasional exception of Atletico de Madrid (an important actor in the UEFA CL too), they faced little competition from other teams in La Liga, as opposed, for instance, to England, which witnessed 4 different champions in the last 7 seasons of the EPL.

## A simple model

Let  $N$  be the set of domestic (national) competitions. For each competition  $i \in N$ , we denote by

- $\lambda_i$  - the country coefficient associated to it (a strength of the domestic league determined by UEFA)
- $b_i$  - competitive balance associated to it
- $p_i$  - the probability that a team from competition  $i$  wins the international tournament.
- the competitive balance can be represented either by HHI, the ratio of the Hirschman-Herfindahl index to that of the perfectly balanced league
- the concentration ratio - the share of points of the top 5 teams as compared to that share of the perfectly balanced league
- the standard deviation of the league points.

## A simple model

$$p_i = \frac{f_i(G_i)}{\sum_{j=1}^n f_j(G_j)},$$

We assume:

- $f_i \leq f_j$  for each pair  $i, j \in N$ , such that  $\lambda_i \leq \lambda_j$ .
- $G_i = G_i(b_i)$ , for each  $i \in N$

We then suggest:

$$G_i(b_i) = (M - b_i)b_i^{\alpha_i},$$

where  $M$  denotes the upper bound of  $b_i$ , and  $\alpha > 0$  denotes the rate of substitution of competitive balance and performance dispersion for the determination of effort.

Note that  $\frac{\alpha_i}{1+\alpha_i}M = \arg \max_{[0,M]} G_i(b_i)$ .



## A simple model

Consequently,

$$p_i = \frac{\lambda_i(M - b_i)b_i^{\alpha_i}}{\sum_{j=1}^n \lambda_j(M - b_j)b_j^{\alpha_j}},$$

which could be simplified assuming  $\alpha_i = \alpha$ , for each  $i \in N$ .

LIGA	17-18 (RM-LIV)				16-17 (RM-JUV)				15-16 (RM-AM)			
	PREMIER CALCIO		BUNDESLIGA		PREMIER CALCIO		BUNDESLIGA		PREMIER CALCIO		BUNDES	
93	100	95	84	93	93	91	82	91	81	91	88	
79	81	91	63	90	86	87	67	90	71	82	78	
76	77	77	55	78	78	86	64	88	70	80	60	
73	75	72	55	72	76	72	62	64	66	67	55	
61	70	72	55	67	75	70	49	62	66	64	52	
60	63	64	53	64	69	63	49	60	63	61	50	
58	54	60	51	63	61	62	48	52	62	57	50	
55	49	57	49	56	46	60	45	48	60	54	50	
51	47	54	47	55	46	53	45	48	51	50	45	
51	44	54	43	54	45	49	43	45	50	46	43	
49	44	43	42	46	45	48	42	44	47	46	41	
49	44	41	41	46	44	47	41	44	47	45	40	
49	42	40	39	45	44	45	38	43	45	45	38	
47	41	40	36	39	41	43	38	43	43	42	38	
46	40	39	36	39	41	41	37	42	42	40	37	
43	37	39	33	36	40	36	37	39	42	39	36	
43	36	38	31	35	40	34	32	39	39	39	33	
29	33	35	22	31	34	32	25	38	37	38	25	
22	33	25		22	28	26		36	34	31		
20	31	21		20	24	15		32	17	28		

SUMA

1054	1041	1057	835	1051	1056	1060	844	1048	1033	1045	859
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RANGO NORM

1,9211	1,81579	1,94737	1,82353	1,921053	1,815789	2	1,67647	1,55263	1,68421	1,65789	1,8529
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RANGO PERMANENCIA NORM

1,3158	1,68421	1,5	1,41176	1,526316	1,394737	1,5	1,32353	1,36842	1,10526	1,36842	1,5
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RANGO CHAMPIONS NORMALIZADO

0,8421	0,78947	0,60526	0,85294	0,684211	0,473684	0,55263	0,97059	0,76316	0,39474	0,71053	1,0588
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RANGO CAMP-SUBC NORM

0,3684	0,5	0,10526	0,61765	0,078947	0,184211	0,10526	0,44118	0,02632	0,26316	0,23684	0,2941
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DESV.EST

18,227	19,1709	20,551	13,988	20,62567	19,85102	20,7973	13,9406	18,1032	15,4384	17,247	15,503
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CV

0,3459	0,36832	0,38886	0,30154	0,392496	0,375966	0,3924	0,29731	0,34548	0,2989	0,33009	0,3249
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VARIANZA

332,22	367,524	422,345	195,663	425,4184	394,0632	432,526	194,34	327,726	238,345	297,461	240,33
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GINI

0,1845	0,19207	0,21112	0,15788	0,216603	0,199716	0,21623	0,15416	0,17319	0,16297	0,17641	0,1646
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RANGO CAMP-4 NORM

0,5263	0,65789	0,60526	0,85294	0,552632	0,447368	0,5	0,58824	0,71053	0,39474	0,63158	0,9706
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CAMP+SUBC-NORM

0,1632	0,17387	0,17597	0,17605	0,17412	0,169508	0,16792	0,17654	0,17271	0,14714	0,16555	0,1932
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CAMP+SUBC+3-NORM

0,2353	0,24784	0,24882	0,24192	0,248335	0,243371	0,24906	0,25237	0,25668	0,21491	0,24211	0,2631
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IQR-NORM

0,7	1,15	1,25	1,05556	1,25	1,4	1,1	0,61111	0,9	1,05	1,05	0,7778
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TBQ-NORM

11,25	11,65	12,45	7,5	12,8	12,1	13,15	8	10,55	9,25	10,45	8,3333
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MEDIA

52,7	52,05	52,85	46,3889	52,55	52,8	53	46,8889	52,4	51,65	52,25	47,722
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C25-NORM

0,3624	0,38713	0,38505	0,30778	0,38059	0,386364	0,38302	0,32583	0,37691	0,34269	0,36746	0,3271
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C50-NORM

0,6233	0,63401	0,65847	0,61317	0,658421	0,639205	0,65377	0,60545	0,61832	0,61955	0,62392	0,6147
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HHI

0,0557	0,05644	0,05718	0,06033	0,057318	0,056714	0,05731	0,06019	0,05567	0,05424	0,05518	0,0611
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HHI-NORM

0,006	0,00678	0,00756	0,00505	0,007703	0,007068	0,0077	0,00491	0,00597	0,00447	0,00545	0,0059
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18,227			13,988								
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LIGA	14-15 (BAR-JUV)			BUNDESLIG LIGA	13-14 (RM-AM)		
	PREMIER	CALCIO			PREMIER	CALCIO	BUNDESLIG
94	87	87	79	90	86	102	90
92	79	70	69	87	84	85	71
78	75	69	66	87	82	78	64
77	70	64	61	70	79	65	61
76	64	63	49	63	72	60	60
60	62	59	48	59	69	58	55
55	60	56	46	59	64	57	53
51	56	55	44	49	56	57	52
50	54	54	43	49	50	56	44
49	48	52	43	48	49	54	42
49	47	49	40	45	45	50	41
46	47	49	40	43	42	45	39
41	44	46	37	42	40	44	36
37	41	43	36	42	38	44	36
35	39	42	35	41	38	39	32
35	38	41	35	40	37	36	27
35	38	37	34	40	36	34	26
35	35	34	31	39	33	32	25
29	33	24		36	32	29	
20	30	19		25	30	25	

SUMA

1044	1047	1013	836	1054	1062	1050	854
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RANGO NORM

1,94736842	1,5	1,78947368	1,41176471	1,71052632	1,47368421	2,02631579	1,91176471
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RANGO PERMANENCIA NORM

1,55263158	1,28947368	1,31578947	1,29411765	1,31578947	1,31578947	1,78947368	1,70588235
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RANGO CHAMPIONS NORMALIZADO

0,47368421	0,60526316	0,63157895	0,88235294	0,71052632	0,36842105	1,10526316	0,88235294
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RANGO CAMP-SUBC NORM

0,05263158	0,21052632	0,44736842	0,29411765	0,07894737	0,05263158	0,44736842	0,55882353
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DESV.EST

21,0603144	16,3490705	16,0960113	13,5872874	18,2874705	19,2733795	19,4489886	17,365355
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CV

0,4034543	0,31230316	0,31778897	0,29254925	0,34701083	0,36296383	0,37045693	0,36601451
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VARIANZA

443,536842	267,292105	259,081579	184,614379	334,431579	371,463158	378,263158	301,555556
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GINI

0,21704981	0,17139446	0,17270484	0,1505848	0,18036053	0,19755179	0,19695238	0,19737184
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RANGO CAMP-4 NORM

0,44736842	0,44736842	0,60526316	0,52941176	0,52631579	0,18421053	0,97368421	0,85294118
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CAMP+SUBC-NORM

0,17816092	0,15854823	0,15498519	0,17703349	0,16793169	0,16007533	0,17809524	0,18852459
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CAMP+SUBC+3-NORM

0,25287356	0,23018147	0,2230997	0,25598086	0,25047438	0,23728814	0,25238095	0,26346604
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IQR-NORM

1,25	1,15	0,85	0,72222222	0,9	1,55	0,95	1,33333333
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TBQ-NORM

13,15	10,05	9,9	7,77777778	10,85	11,75	11,7	9,77777778
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MEDIA

52,2	52,35	50,65	46,44444444	52,7	53,1	52,5	47,44444444
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C25-NORM

0,39942529	0,35816619	0,34846989	0,32894737	0,37666034	0,37947269	0,37142857	0,33489461
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C50-NORM

0,6532567	0,62559694	0,62092794	0,60406699	0,62713472	0,65065913	0,64	0,6440281
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HHI

0,05773183	0,05463283	0,05479702	0,06004613	0,05571978	0,05625778	0,05651882	0,06258467
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HHI-NORM

0,00813877	0,00487666	0,00504949	0,00475473	0,00602083	0,00658714	0,00686192	0,00744259
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## HICB

111,363956	112,887464	114,364837	108,587328
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HICB ranks

2	3	4	1
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HICB-average

112,848236	111,316935	112,39509	109,527517
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**HICB-rank-average**

<b>3</b>	<b>2</b>	<b>3,4</b>	<b>1,6</b>
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## C5ICB

144,971537	154,851105	154,020814	134,51497
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C5ICB ranks

2	3	4	1
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C5ICB-average

151,681023	148,305718	148,434678	139,529596
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**C5ICB-rank-average**

<b>3</b>	<b>2,8</b>	<b>2,8</b>	<b>1,4</b>
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## SDLP

18,2269321	19,1709072	20,5510276	13,9879734
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SDLP ranks

2	3	4	1
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SDLP-average

19,2607207	18,0165598	18,8280677	14,8767564
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**SDLP-rank-average**

<b>3</b>	<b>2,4</b>	<b>3,4</b>	<b>1,2</b>
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