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Abstract

In December 2022, Cristiano Ronaldo, five-time Ballon d'Or winner and the most-followed person on Instagram, signed a reported €200million contract to play football in the Kingdom of Saudi Arabia (KSA) for two and a half years. This marked one of several recent ground-shaking and expensive interventions by the KSA in global sports markets. We exploit the timing of this event, mid-way through a season of the Saudi Pro League, to estimate superstar effects. There are clear patterns showing that Ronaldo alone increased stadium attendance demand in the KSA, even before the influx of further stars in the summer of 2023. On average, Ronaldo helped to fill an additional 20% of the seats in his home team's stadium when he played, 15% of the seats in the stadiums he visited, and 3% of the seats where he did not even play. These effects may be the tip of the iceberg in terms of what policymakers will be hoping for. Regardless, they demonstrate that the astronomical sums being invested in sports markets by the Saudi state are not necessarily a total folly.

Keywords: Attendance; Demand; Externalities; Football; Spectator sports; Superstars

JEL codes: L39; L83; Z22

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1. Introduction

On December 30, 2022, only a few days after the conclusion of the Fédération Internationale de Football Association (FIFA) World Cup in Qatar, news broke that the Saudi football club (FC) Al-Nassr had signed Portugal's captain and five-time Ballon d'Or winner Cristiano Ronaldo (CR7; Reuters, 2022).² While not unprecedented, and, perhaps, hardly worth mentioning from a sporting perspective, signing one of the greatest male football players of all time (FourFourTwo, 2022), and the most followed person on Instagram,³ marked a pivotal moment for the Saudi Pro League (SPL). CR7's arrival aligns with other ground-shaking moves made by Saudi Arabia in other major sports markets, such as golf (CNBC, 2023a), motor racing (Sky Sports, 2023), and combat sports (AP News, 2023). This activity has been coined as sportswashing in the mainstream media (e.g., The Guardian, 2023) and is now being studied as a concept in the social science of sport (e.g., Davis et al., 2023; Fruh et al., 2023; Skey, 2023).⁴ In the case of football, the SPL executives' evident strategy reflects many past and present attempts elsewhere to exploit superstar externalities in growing and emerging leagues, both domestically and internationally.⁵

Assessing the merits of this Saudi strategy prompts us to ask whether domestic stadium attendance demand increased once CR7 joined Al-Nassr and the SPL, and, if so, whether this interest is likely to fade once the novelty wears off (e.g., see evidence from Major League Soccer (MLS), largely to this effect, in Jewell, 2017; Rewilak, 2023; Shapiro et al., 2017). Intriguingly, the public

² A salient example of CR7's global superstardom came in 2019 during his then Italian club's (Juventus FC) pre-season tour of South Korea. CR7 was left on the bench for the duration of a match, leading courts to order the local organiser to compensate fans, not only for the cost of the ticket but also for "mental anguish" (BBC Sport, 2020).

³ As of 20th August 2023, CR7 was the most followed person on Instagram with 601.41 million followers, 24% more than the next highest-followed person, Lionel Messi. After these two footballers, the next highest-followed sportsperson is the Indian cricketer Virat Kohli, with 256.84 million followers, and the next highest-followed footballer is Neymar, who has also just transferred to the SPL in August 2023 with 212.78 million followers.

⁴ See also i Newspaper (2023) for a recent account of how Saudi Arabia is growing its sportswashing empire.

⁵ For instance, David Beckham in 2007, Thierry Henry in 2010, Kaka in 2014, Frank Lampard and Steven Gerrard both in 2015, Wayne Rooney in 2018, and Lionel Messi in 2023, all moving to North American Major League Soccer (MLS); Brazilian internationals Ramires and Oscar to the Chinese Super League (CSL) in 2016-2017; Alessandro Del Piero moving to the Australian A-League in 2012; Alessandro Del Piero, Robert Pires and David Trezeguet to the Indian Super League in 2014; and Andres Iniesta to the Japanese J1 League in 2018 before playing in the United Arab Emirates in 2023. All these players have won the highest honours in football before making these moves, such as World Cups, European Championships, and the Champions League, and in their prime were regarded as the stars and cult heroes of the domestic leagues in Europe. Somewhat similarly, though significantly earlier, Pelé (in 1975) and Franz Beckenbauer (in 1977 and 1983) both moved to New York Cosmos, helping to grow "soccer" in the United States (c.f., ESPN, 2022).

discussion has so far focused mostly on whether and how the Saudi move has changed the global perception of the SPL, including its social media following (e.g., Axios, 2023), as well as the impacts on the global price of football talent (e.g., The Athletic, 2023).

Superstar externalities in sports, such as effects on league-wide stadium attendance demand (e.g., Humphreys & Johnson, 2020; Kaplan, 2022) or other sources of revenue and value added, are theoretically likely to emerge from an individual's special talent (Rosen, 1981), their popularity (Adler, 1985), or a combination of both. There is evidence that individual footballers have generated significant superstar effects in well-established markets. For instance, van Ours (2022) showed that Johan Cruyff, the greatest ever Dutch footballer and three-time Ballon d'Or winner, helped attract visitors to Feyenoord's home matches in the Dutch Eredivisie, after he moved there for his final professional season from arch-rivals AFC Ajax (a move which was unpopular with partisan fans of both clubs). Similar effects have been found in MLS (e.g., Scarfe et al., 2021), where marquee players, including David Beckham (e.g., Lawson et al., 2008), generated increased demand both at home and even more consistently on the road (Jewell, 2017). DeSchrive (2007) also found significantly stronger demand for MLS stadiums when they were visited by the Ghanaian-born American professional soccer player and wonderkid Fredua Koranteng (Freddy) Adu, who debuted at the age of fourteen and was once touted as the next Pelé (ESPN, 2011). Going beyond stadium attendance demand, there is evidence that the presence of superstar players significantly affects TV demand for the elite European football competitions (Bond & Addesa, 2019; Wills et al., 2022).

Although football is the world's most popular and commercially valuable sport, it is not unique in providing a testbed for superstar economics. For instance, arguably the most infamous evidence on superstar effects and externalities was generated by Michael Jordan's substantial influence within the National Basketball Association (NBA; e.g., Hausman & Leonard, 1997). In contrast with North America and Europe, the determinants of stadium attendance demand in the Middle East are hardly understood (c.f., Schreyer & Ansari, 2022), including whether domestic fans value the appearance of a global superstar such as CR7.

In this article, therefore, we consider the early signs on whether CR7 has affected stadium attendance demand in Saudi Arabia, prior to the later arrival of other superstars in the summer of 2023, who could end up saturating the League with stardust (e.g., Rewilak & Watanabe, 2022). In what follows, we first describe our dataset and the context of Cristiano of (in Saudi) Arabia. Second, we present our empirical strategy and stadium attendance model estimates. Third, we discuss our findings, their potential limitations, and some future research avenues.

2. Data set

Like many European football leagues, a season of the SPL, the highest tier of association football in the Saudi system, runs between August and May. It features promotion and relegation, and it is currently operating on a round-robin system, meaning that each of the clubs plays each of the others twice, once home and away. As such, our sample contains 240 matches played by sixteen different clubs during the 2022-23 season, three of which were just promoted: Al-Adalah, Al-Khaleej and Al-Wehda.⁶ CR7 debuted in the SPL on 22nd January, having been delayed after joining his new team by a two-match ban, issued by the English Football Association (FA) at the end of his time with Manchester United FC. He subsequently appeared in sixteen SPL matches, seven at home, and nine on the road, only missing his team's final match of the season reportedly due to a muscle strain.

In Table 1, we present summary statistics from our dataset, including the sources of the variables. In line with most previous research (c.f., Schreyer & Ansari, 2022), we proxy domestic stadium attendance demand by exploiting the publicly available information on the number of distributed tickets across home and away supporters, neither differentiating between matchday and season ticket holders, nor addressing any no-show behaviour (as this information is not publicly available as far as we are aware). On average, the clubs distributed 9,330 tickets per match during the 2022-23 SPL season, with a minimum reported attendance of 284 (Al-Wehda 0–1 Al-Fayha) and a maximum of

⁶ From the beginning of the season 2023-24, 18 teams will compete in the SPL, raising the number of matches played to 306.

59,892 (Al-Ittihad 2–0 Al-Tai), both in the final round of fixtures. The mean utilisation of stadium capacity during the season was 35% across all matches, with a minimum of 1% and a maximum of 99%. Table 1 also demonstrates some of the variance across matches in the numbers of foreign players appearing and the estimated transfer market values of the teams. In terms of the latter, the maximum was observed for Al-Nassr when CR7 was playing. Importantly, there was only limited activity in the SPL transfer window of the 2022-23 season apart from CR7.⁷ We do not have comprehensive price data for SPL matches, though CR7’s arrival midway through the season may suggest that pricing was largely unaffected.⁸

TABLE 1. Descriptive statistics for all 240 matches

	Mean	St. dev.	Min.	Med.	Max.
Attendance	9,330	10,492	284	5,663	59,892
Stadium capacity	26,018	13,059	3,646	25,000	68,752
Percentage of capacity	37	27	1	35	99
N. of home team foreign players	6	1	1	7	8
N. of away team foreign players	6	1	1	7	8
Transfermarkt value of home team (€millions)	16.02	13.91	0.95	9.24	72.63
Transfermarkt value of away team (€millions)	15.83	14.11	0.98	9.14	72.95

Notes: Author calculations. We collected attendance data and stadium capacities from the Entertainment and Sports Programming Network (ESPN) and crosschecked them with information from Weltfussball.de and, in a few cases, also Wikipedia in early August 2023. We also used these sources to extract match dates, timings, locations, and scorelines. Further, we collected the number of foreign players appearing in a match on each team, either starting or on the bench, and the cumulative transfer market value of those players from Transfermarkt.de.

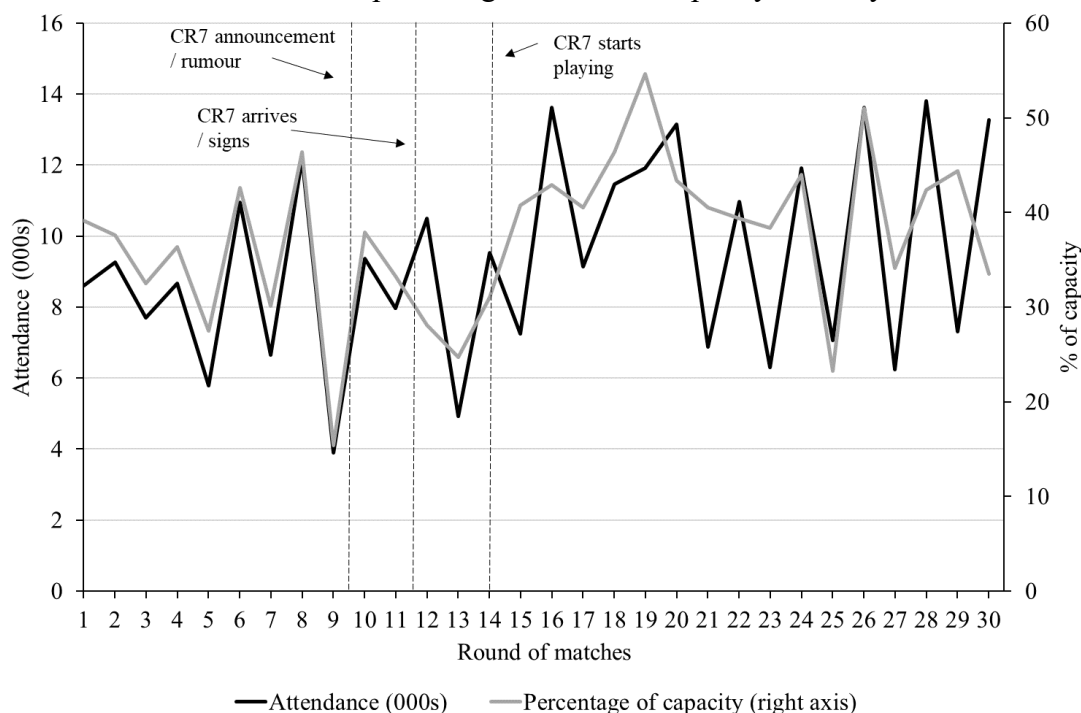
In Figure 1, we show the development of average stadium attendance demand over the eight matches within each of the thirty rounds of fixtures in the season 2022-23, expressed both in terms of the number of seats filled and capacity utilisation. The vertical dashed lines indicate when CR7’s move was first rumoured (e.g., The Guardian, 2022), when it was officially announced two rounds later, and when he started playing in round fourteen. Although these statistics are noisy from one round to the next, due to the generally alternating nature of teams playing home and away, there is

⁷ According to Transfermarkt.de, the next highest value player transferred in this period was Matheus Pereira (€7million), leaving the SPL. Ronaldo’s own Transfermarkt.de value at this time was €15million, despite his age of 37 and recent evidence at his previous club of performances declining sharply (Forbes, 2022).

⁸ Although there has been recent evidence of price-gouging (by as much as 1,700%) in MLS to attend matches where Lionel Messi is expected to play (CNBC, 2023b), we found that season ticket prices, to attend all of Al Nassr’s home matches, are currently priced at around a seemingly reasonable €170.

still a clear indication that average attendance demand in the SPL increased, particularly after CR7 started playing.

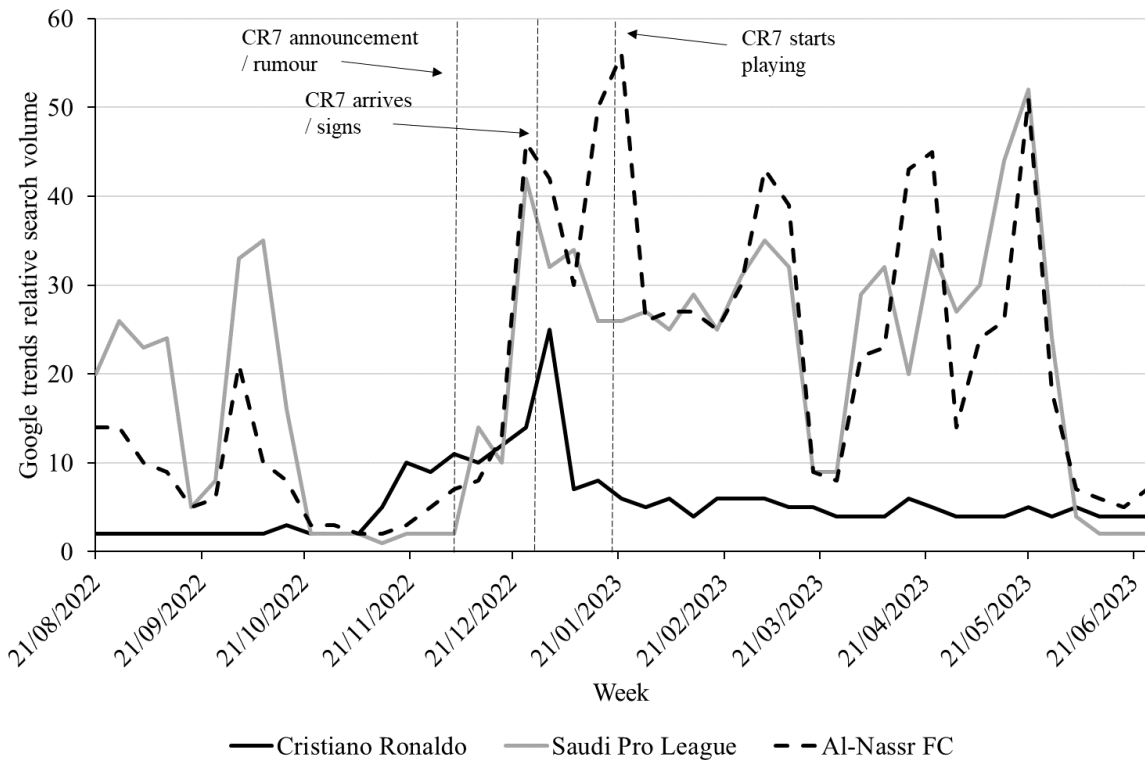
FIGURE 1. Mean attendance and percentage of stadium capacity filled by round of matches



Notes: Author calculations using data collected from ESPN, Weltfussball.de, and Wikipedia.

In Figure 2, we also document Google Trends within the Kingdom of Saudi Arabia (KSA) for three relevant search terms *Ronaldo*, *Saudi Pro League*, and *Al-Nassr FC*, for the whole duration of the season 2022-23. There appears to have been some additional interest in Al-Nassr FC and the SPL after the first rumours about CR7’s move and further details dripped out in the media during the World Cup, followed by an explosion of interest in the player, his new team, and the league when the signing was officially announced at the end of December. Interest in Al-Nassr FC then peaked when CR7 started playing. Relatively increased search volumes for all three terms were generally sustained over the second half of the season, before clearly waning after it ended.

FIGURE 2. Google Trends in Saudi Arabia (relative search volumes)

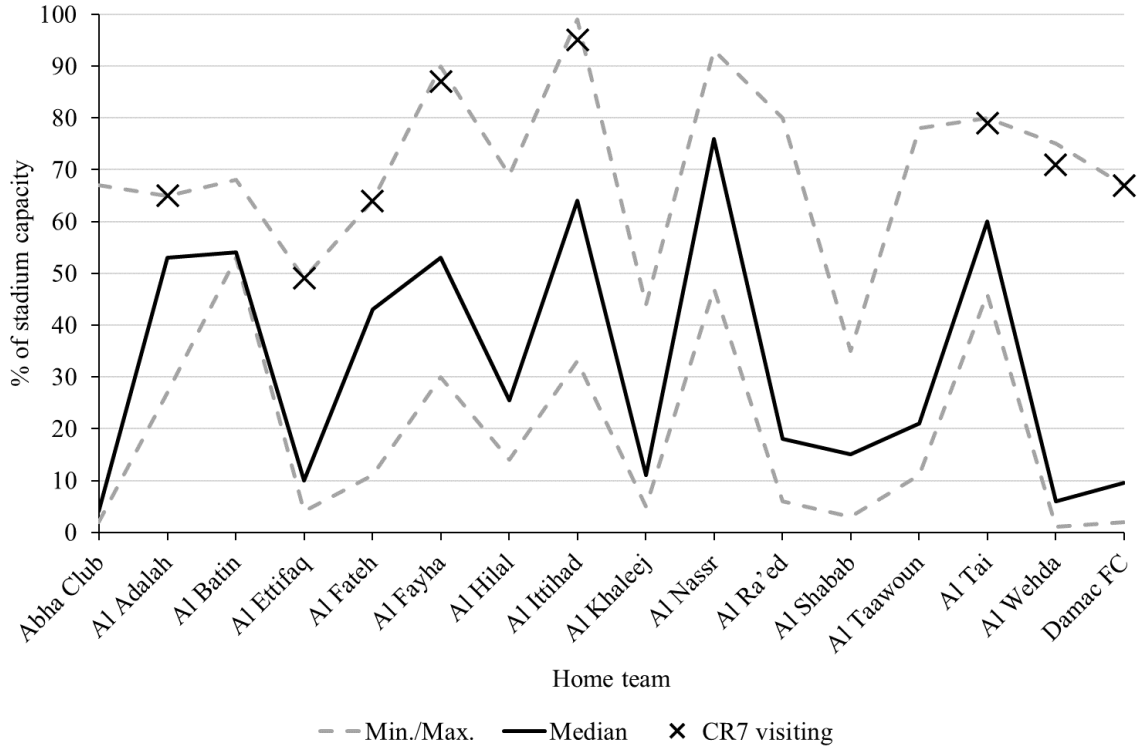


Notes: Author calculations using data extracted from Google Trends for the exact search terms, retrieved 17/8/2023.

To further put CR7’s arrival on the Arabian Peninsula in perspective, in Figure 3, we plot the minimum, median and maximum home percentage of capacity used for each team in the season 2022-23, at the stadium they played most of their matches. The teams generally experienced a big attendance range within their home stadiums during the season, such as Al-Ittihad, who both filled their stadium in one round but experienced it two-thirds empty in another. We have also indicated with crosses in Figure 3 the percentages of stadium capacity filled when CR7 visited. In all cases, these matches had either the maximum attendance for the team during the season or were very close to having so.

There is fairly clear descriptive evidence from the patterns in Figures 1-3 that CR7 likely increased the interest and attendance demand in the SPL, especially once he started playing. In the next section, we more formally estimate the potentially different average effects that CR7 had on stadium attendance demand at Al-Nassr when he played, at other stadiums when he visited, and on the league in general.

FIGURE 3. Percentage of stadium capacity filled by home stadium in SPL matches (2022-23)



Notes: Author calculations using data collected from ESPN, Weltfussball.de, and Wikipedia. 12 teams played all 15 of their home matches in a single stadium. For the others, only the stadiums they played in most of the time are considered: Al-Hilal (14 matches), Al-Khaleej (14 matches), Al-Tai (14 matches), Damac FC (12 matches).

3. Estimation and results

We estimate the following log-linear model for stadium attendance demand (e.g., Scelles et al., 2013; Reade & Singleton, 2021):

$$y_{ijm} = \theta + \beta_1 CR7Home_m + \beta_2 CR7Away_m + \beta_3 PostCR7_m + h_i + a_j + \varepsilon_{ijm}, \quad (1)$$

where y_{ijm} is either the log attendance or percentage of stadium capacity filled, in match m , between home team i and away team j . $CR7Home_m$ and $CR7Away_m$ are dummy variables indicating whether CR7 appeared at home or away in the match. $PostCR7_m$ is a dummy variable indicating the after-CR7 portion of the SPL season. We will consider three different versions of this variable when estimating the model, corresponding to the post-rumour, post-arrival, and post-playing periods (see Figure 1). h_i and a_j are fixed effects for the home and away teams, addressing the fact that some teams generate greater regular attendance demand than others and the unbalanced nature of the fixtures in SPL either side of the CR7 factors. We consider two variants of h_i , the first as an effect for each home

team, and the second for each home-stadium pair, given that some teams played their home matches at multiple stadiums.⁹ β_3 measures any general effect of Ronaldo being associated with the SPL, though we cannot rule out that other coincident factors could have increased demand, such as increased advertising and other investments made by the teams and the League. β_1 and β_2 measure any additional effects of CR7 appearing in a match on stadium attendance demand, home and away. θ is a constant and the remaining heterogeneity is in ε_{ijm} . We considered several other controls in the model, for scheduling effects (e.g., the day of the week, weekend fixtures, time of the day) and the numbers of foreign players, but they are statistically insignificant, and our findings are robust to their inclusion. For log attendance, we estimate Equation (1) using linear least squares. For the percentage of stadium capacity filled, we use tobit regression, censoring at 0% and 100%. Our preferred results will be from the latter set of models, given both the large variance in attendance within each stadium during the season (see, again, Figure 3) and the potential for β_1 , β_2 , and β_3 to be large. We estimate heteroskedasticity-robust standard errors for the coefficients, and we use the delta method to generate average partial effects on the censored percentage of stadium capacity filled.

In Table 2, we show our estimation results for the linear model of log attendance. Across all specifications, we find no evidence that on average, the post-CR7 period was associated with higher attendances. Further, although the estimated values of β_2 are large and positive, there is no significant evidence that CR7 visiting tended to increase attendances within a given stadium. However, the estimates suggest that CR7 increased attendances when Al-Nassr were playing at home by 0.44–0.52 log points (55–68%), including when we control for an insignificant quadratic trend over the matchdays (rounds of fixtures) of the SPL season (column (III), Table 2).

⁹ In practice, the second case leads to the estimation of sixteen home-stadium fixed effects instead of fifteen home team effects, and an estimation sample reduced to 237 matches as singletons are dropped (see notes to Figure 3).

TABLE 2. Linear regression estimates for log attendance in SPL matches (2022-23)

	(I)	(II)	(III)	(IV)	(V)	(VI)
CR7 home (β_1)	0.436** (0.192)	0.457** (0.192)	0.514*** (0.195)	0.504** (0.195)	0.520** (0.201)	0.435** (0.204)
CR7 away (β_2)	0.165 (0.424)	0.165 (0.424)	0.253 (0.462)	0.251 (0.451)	0.271 (0.455)	0.175 (0.462)
Matchday (round of SPL)			-0.015 (0.021)			
Matchday squared (x100)			0.039 (0.067)			
Post CR7 – rumour (β_3)				-0.074 (0.087)		
Post CR7 – arrival (β_3)					-0.081 (0.084)	
Post CR7 – playing (β_3)						0.024 (0.084)
Constant	8.594*** (0.044)	8.593*** (0.043)	8.701*** (0.130)	8.642*** (0.071)	8.640*** (0.064)	8.581*** (0.061)
Home team FEs	Yes	No	No	No	No	No
Home-Stadium FEs	No	Yes	Yes	Yes	Yes	Yes
Away team FEs	Yes	Yes	Yes	Yes	Yes	Yes
R ²	0.722	0.728	0.729	0.729	0.729	0.728
N. of matches	240	237	237	237	237	237

Notes: Least squares estimates of Equation (1). Columns (II)–(VI) drop singleton home-stadium matches from the estimation sample. ***, **, * indicate significance from zero at 1%, 5% and 10% levels, respectively, two-sided tests. Robust standard errors in parentheses.

In Table 3, we show our preferred estimation results for the censored models of percentage of stadium capacity filled. Column (I) shows results from a model with home-team fixed effects and no Post-CR7 dummy variables, giving average partial effects of CR7 playing at home of 19 percentage points of capacity, but no significant effect of him playing away. Column (II) uses instead home-stadium fixed effects, addressing the possibility that teams may have switched to a bigger stadium because they knew CR7 was coming to play. In this case, the estimated average effect of CR7 playing at home is 20 percentage points of capacity, and the average effect of him playing away is 15 percentage points, significantly different from zero at the 10% level (two-sided test). This is robust to adding a quadratic in the matchday (round of fixtures) into the model in column (III). These findings are qualitatively unchanged in columns (IV) and (V), when we respectively add the indicator variables for post-rumour and post-arrival to the model, both of which are insignificant. Column (VI)

suggests that the post-CR7-playing period of the season 2022-23 was associated with generally higher attendance demand across all matches, by 3 percentage points of stadium capacity, significantly different from zero at the 10% level (two-sided test), with a further significant 17 percentage point effect when he played at Al-Nassr's home. The additional average partial effect from CR7 appearing at an away stadium in this period was 12 log points, but we cannot reject a null hypothesis of no effect.

4. Conclusion

Since CR7's move to KSA, the media and public's attention has almost entirely been drawn to the potential externalities abroad (e.g., international audiences' perception of the country and the SPL's relative quality and market power). In this short article, we focus on whether externalities occurred within the Kingdom, specifically whether stadium attendance demand increased in the second half of the season 2022-23. Mirroring the results from previous research (e.g., Humphreys & Johnson, 2020; Jewell, 2017; Lawson et al., 2008), we find a considerable superstar effect, mainly for the signing club's home matches featuring CR7. This shows that, for both emerging sports clubs and their leagues, attracting extraordinary talent, even past its peak, can be an effective way of growing the domestic market, at least temporarily. It is not surprising then that this strategy has been employed - and currently is - in all parts of the world, including the United States.

While our results corroborate previous conclusions on superstar externalities, but in an as yet mostly ignored part of the world, providing initial evidence that an emerging (sports) market can rely on foreign talent to grow domestically, naturally, there are some notable limitations and caveats. We hope all of these can be addressed in future research. For instance, due to the relatively small sample size of matches in our study, we cannot robustly address whether the CR7 effects wane over time as the role any novelty factor wears off (e.g., Shapiro et al., 2017). Similarly, given the relatively modest sporting success associated with the player's move (Al-Nassr were leading the SPL when CR7 arrived, but finished the 2022-23 season in 2nd place), future research might centre around a more nuanced

TABLE 3. Censored regression estimates for percentage of stadium capacity filled [0,100] in SPL matches (2022-23)

	(I)	(II)	(III)	(IV)	(V)	(VI)
CR7 home (β_1)	20.149*** (6.771)	20.702*** (6.771)	20.489*** (7.132)	20.545*** (6.960)	20.424*** (7.012)	18.082** (7.064)
CR7 away (β_2)	9.744 (8.132)	14.996* (7.930)	14.363* 8.153	14.825* (7.986)	14.681* (8.141)	11.941 (8.129)
Matchday (round of SPL)			(0.062) (0.098)			
Matchday squared			0.010 (0.013)			
Post CR7 – rumour (β_3)				0.249 (1.786)		
Post CR7 – arrival (β_3)					0.354 (1.736)	
Post CR7 – playing (β_3)						2.884* (1.688)
Constant	11.050** (4.826)	12.059*** (4.590)	11.272** (4.661)	11.882** (4.788)	11.829** (4.785)	10.384** (4.744)
Home team FEs	Yes	No	No	No	No	No
Home-Stadium FEs	No	Yes	Yes	Yes	Yes	Yes
Away team FEs	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R ²	0.132	0.165	0.165	0.165	0.165	0.166
N. of matches	240	237	237	237	237	237
<i>Marginal Effects:</i>						
CR7 home	19.433*** (6.657)	20.084*** (6.785)	19.869*** (7.022)	19.925*** (6.859)	19.803*** (6.915)	17.441** (6.943)
CR7 away	9.471 (8.032)	14.551* (7.887)	13.918* (8.099)	14.381* (7.942)	14.239* (8.096)	11.523 (8.051)
Post CR7 ...				0.231 (1.653)	0.328 (1.606)	2.670* (1.559)

Notes: Maximum likelihood estimates of Equation (1) using censored tobit regression. Columns (3)–(5) drop singleton home-stadium matches from the estimation sample. ***, **, * indicate significance from zero at 1%, 5% and 10% levels, respectively, two-sided tests. Robust standard errors for coefficients in parentheses. Expected marginal effects, $E[dy^*/dx | y \in (0,100)]$, and their standard errors in parentheses, are estimated using the delta method. "CR7 played at home" average marginal effects are estimated at "CR played away" equal to zero and the home (stadium) team fixed effect at Al-Nassr (KSU Stadium). "CR7 played away" average marginal effects estimated at "CR played home" equal to zero and the away team fixed effect at Al-Nassr.

differentiation of the mechanisms at play, distinguishing between exceptional talent (Rosen, 1981) and popularity (Adler, 1985) – see Scarfe et al. (2021) for such an attempt regarding MLS production. Given the influx of talent to the SPL in the summer of 2023, a natural follow-up question is whether the League's perceived increase in attractiveness around the globe emerges from the abundance of

(super) stars or any consequential increase in the quality of football. Alternatively, future research might want to: (1) explore potential saturation effects from (too many) stars overshadowing (domestic) talent (e.g., see Jedelhauser et al. (2022) on the German Bundesliga); (2) differentiate between variations in the demand of different spectator groups (e.g., Allan & Roy (2008) on the Scottish Premier League); (3) add more control variables to the stadium attendance model (e.g., ticket price data); (4) test whether extreme salary inequality within the SPL and its clubs affects the production of football performances (e.g., Coates et al., 2016; Di Domizio et al., 2022; Franck & Nüesch, 2011; Levine, 1991); and (5) further test for extreme superstar effects in other markets, most obviously by exploring whether Lionel Messi's arrival in MLS attracted at least as big crowds to North American stadiums as his predecessors who moved across the Atlantic, including David Beckham (e.g., Jewell, 2017), and CR7 in KSA.

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