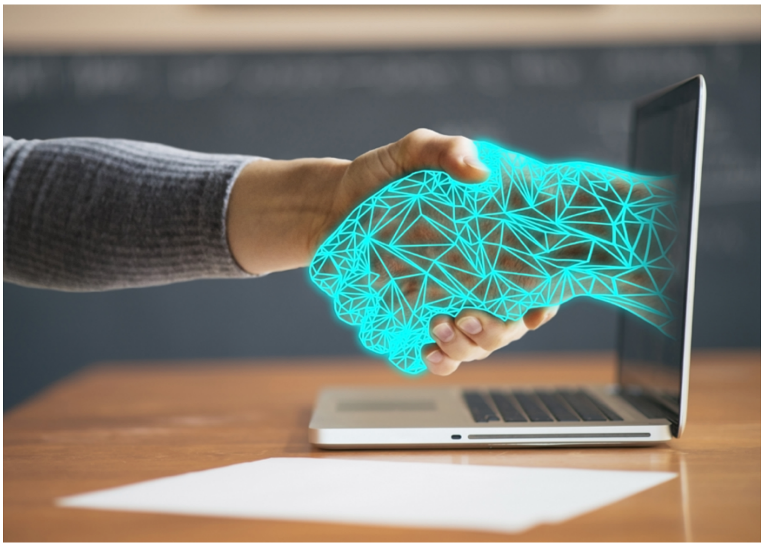
Building Back Better, Data-Driven Innovation and the Scottish Football Industry[1]



Micro Briefing: Geo-Spatial Analysis – Where are the fans?

Project Lead: Professor Grant Jarvie[2]

Research Team:

Jake Barrett, Ellen Frank Delgado, Professor Grant Jarvie, Neil McGillivray, Dr Mason Robbins, Professor Michael Rovatsos, John Scott, Dr Paul Widdop, Dr Yujun Xu.

[1] We are grateful for the support and co-operation given to this study from the four football clubs that participated in the study (Aberdeen, Heart of Midlothian, Hibernian, and Motherwell) and Scottish Football Association.

[2] Contact: Professor Grant Jarvie, University of Edinburgh, Grant.Jarvie@ed.ac.uk

Introduction[3]

1. Football is Scotland's most popular sport. It delivers in communities and connects with those on the margins of society on a scale that other sports fail to match. Football clubs are anchor institutions within Scottish communities. They do not exist in isolation from the broader forces that affect the people, communities, and countries in which they are situated- including the Covid-19 pandemic.

2. This series of micro briefings on the Scottish Football Industry have resulted from a Scottish Funding Council funded Data-Driven Innovation Initiative as part of the 'Building Back Better' open funding call, helping to transform the City region into the data capital of Europe. The Scottish Funding Council has provided £75m funding to boost the Scottish university research, to contribute to the mitigation of effects of Covid-19 pandemic. The University of Edinburgh received £23.2m of these funds.

3. The data-driven approach to Covid-19 recovery and job retention in the Scottish football industry project was led by the University of Edinburgh's Academy of Sport[4] in partnership with the Bayes Centre[5].

4. The project was designed to (i) produce unique data sets that could help the Scottish football industry build back better from Covid-19; and (ii) demonstrate the potential of the University of Edinburgh's capability to inform and support both the football industry and the broader sports industry.

5. The project consisted of three sets of data-driven activities: (i) an analysis of Scottish football sentiment and networks, generated through online communications; (ii) a spatial and demographic analysis of supporters and non-supporters; and (iii) a cataloguing of a Scottish football data set.

6. This micro briefing - ***Geo-Spatial Analysis- Where are the fans*****?** limits itself to a Geo-Spatial Analysis of season ticket holders that provides a unique degree of granular detail on where the season ticket holders from the four clubs are located. *This report is supported by a series of data rich micro-briefings including (i) Scottish Women's Football; (ii) International Engagement through Scottish Football Clubs; (iii) International Engagement and the European 2020/21 Football Championships; (iii) Scottish Football Building Back Better ; (iv) 4 bespoke briefing papers for each of the partner football clubs Aberdeen, Heart of Midlothian, Hibernian and Motherwell; and (v) Fans, Influencers and Key Brokers: A Sentiment Analysis of Scottish Football.*

The Four Cases – Aberdeen, Heart of Midlothian, Hibernian and Motherwell

7. The geographic distribution of paying supporters is essential data for football clubs. Football clubs need to know where season ticket holders come from for a number of reasons. First, it is important to understand the neighbourhoods that supporters are drawn from as they attach meaning to place through daily interactions, with football clubs being central to the making of meaning. Second, from an economic perspective

[3] Project Team: Jake Barrett, Ellen Frank Delgado, Grant Jarvie, Neil Mason, Neil McGillivray, Mason Robbins, Michael Rovatsos, John Scott, Paul Widdop, Yujun Xu.
[4] University of Edinburgh Academy of Sport
[5] University of Edinburgh Bayes Centre

it allows clubs to better understand their support base and improve marketing campaigns and more bespoke tailored fan engagement. Third, by understanding the demographic composition of the population in areas where support for the club is high clubs are better informed to deliver outreach programmes, identify areas of inequality, and support governing bodies in improving the life chances of the population. Finally, knowing what types of areas supporters are drawn will inform and help to support both Scotland as a nation and the football clubs battle build back from Covid-19.

8. Covid-19 whilst not discriminating on who it infects is nevertheless spatially polarised, with incidents disproportionally cited in areas of poverty and deprivation, the same types of areas where the effects of the furlough scheme and rising pandemic related unemployment might be felt. Age-standardised death rates for COVID-19 have been twice as high for people living in the 20% most-deprived areas compared to the 20% least deprived areas[6].

9. People are more likely to experience poorer mental and physical wellbeing, lower life satisfaction, and feelings of loneliness, all of which either have already been impacted by COVID or are likely to be impacted by an economic downturn and increased poverty. Therefore, knowing where supporters are drawn takes on even more consequences as they economically, may be at risk of reducing their spend on leisure and socially. Clubs have worked with the Scottish Government and other governmental bodies to contribute to reversing the most harmful aspects of Covid-19.

10. Overall Scotland has a population of approximately 5.47million people. The population is dispersed across rural and urban locations with 70% of the population residing in the central belt, which incorporates Scotland's largest urban conurbations Glasgow and Edinburgh. Three of the clubs in this study namely, Hearts of Midlothian FC, Hibernian FC, and Motherwell FC, reside in this area. The final club in this study, Aberdeen FC, are in the Northeast coast of Scotland, whilst the city of Aberdeen itself is relatively dense in population terms, the areas surrounding are rural and sparsely populated.

11. Scotland can be broken down into several different spatial scales for administration purposes. There are 32 local authorities across Scotland in which all residents of the country reside, furthermore at lower levels of geography Scotland has 345 electoral wards and approximately 46,351 output areas across Scotland. Scotland can also be divided up into 16 large postcode areas with each postcode area divided up into numerous smaller districts.

12. In this study we have used as a base for our analysis of the geography of football supporters one of these smaller districts, Postcode District. In our data we have 456 unique Postcode Districts which provides for a comprehensive geography of where season ticket holders reside. The first four digits (anonymous) from the purchase of club season tickets has been mapped against these postcodes.

13. The data provided in this micro-briefing paper is presented (i) on a club-by-club basis (ii) by areas of multiple deprivation according to the Scottish index of multiple deprivation and (iii) by income deprivation.

---

[6] See The Impacts Of Covid-19 On Equality In Scotland

Aberdeen Football Club

Figure 1 Summary: Aberdeen Football Club Season Ticket Holders

14. The Aberdeen season ticket sales data for 2019/20 identified around 9,000 ticket sales. 90.94% of these sales were drawn from Aberdeen area postcodes, which is the largest proportion across the four clubs. This is due to both the large catchment area of AB postcodes and Aberdeen's geographical isolation. Top sales areas on the fringes of Central Aberdeen (AB15, AB12, AB21), however, the postcode containing Pittodrie is not among the top postcode areas in terms of either sales or sales per capita, largely due to Aberdeen's status as a single-club city at SPL-level. Matchday ticket purchasers are significantly more likely to reside outside the AB postal district than season ticket purchasers, due to the large travel demands of an Aberdeen season ticket. The most popular per-capita sales areas (AB22 and AB23) are in North-East Aberdeen, with over 3% of residents buying season tickets.

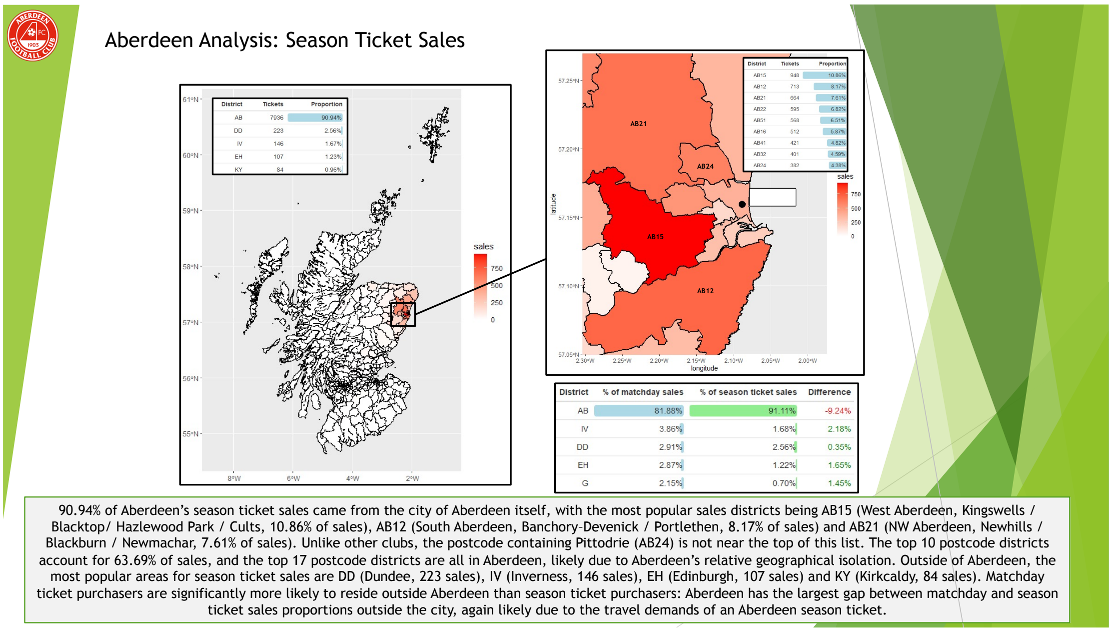


Figure 2 Aberdeen Football Club Season Ticket Sales

15. 90.94% of Aberdeen's season ticket sales came from the city of Aberdeen itself, with the most popular sales districts being AB15 (West Aberdeen, Kingswells / Blacktop/ Hazlewood Park / Cults, 10.86% of sales), AB12 (South Aberdeen, Banchory–Devenick / Portlethen, 8.17% of sales) and AB21 (NW Aberdeen, Newhills / Blackburn / Newmachar, 7.61% of sales). Unlike other clubs, the postcode containing Pittodrie (AB24). The location of Aberdeen's Stadium is not near the top of this list. The top 10 postcode districts account for 63.69% of sales, and the top 17 postcode districts are all in Aberdeen, likely due to Aberdeen's relative geographical isolation. Outside of Aberdeen, the most popular areas for season ticket sales are DD (Dundee, 223 sales), IV (Inverness, 146 sales), EH (Edinburgh, 107 sales) and KY (Kirkcaldy, 84 sales). Matchday ticket purchasers are significantly more likely to reside outside Aberdeen than season ticket purchasers: Aberdeen has the largest gap between matchday and season ticket sales proportions outside the city, again likely due to the travel demands of an Aberdeen season ticket.

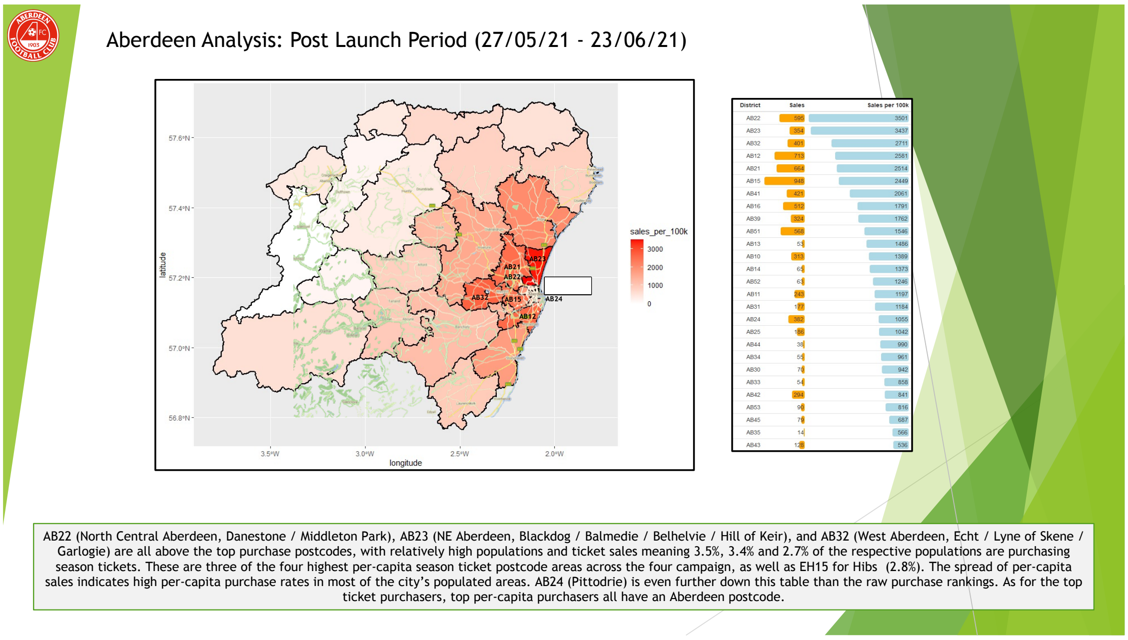


Figure 3 Aberdeen Football Club Post Season Ticket Campaign Launch

16. The Postcode Districts AB22 (North Central Aberdeen, Danestone / Middleton Park), AB23 (NE Aberdeen, Blackdog / Balmedie / Belhelvie / Hill of Keir), and AB32 (West Aberdeen, Echt / Lyne of Skene / Garlogie) are all above the top purchase postcodes, with relatively high populations and ticket sales meaning 3.5%, 3.4% and 2.7% of the respective populations are purchasing season tickets. These are three of the four highest per-capita season ticket postcode areas across the four campaign, as well as EH15 for Hibs (2.8%). The spread of per-capita sales indicates high per-capita purchase rates in most of the city's populated areas. AB24 (Pittodrie) is even further down this table than the raw purchase rankings. As for the top ticket purchasers, top per-capita purchasers all have an Aberdeen postcode.

Heart of Midlothian Football Club

Figure 4 Summary: Heart of Midlothian Football Club Season Ticket Holders

17. The data for Hearts season ticket holders shows that over 11,000 ticket sales were sold during 2019/20 season. 83.84% of these sales stem from Edinburgh area postcodes, with the top sales areas being clustered in West Edinburgh: EH14, EH12, EH11 (including Tynecastle) and EH4. In general, matchday sales are more likely to come from areas outside Edinburgh, consistent with the travel commitments of a season ticket. The most popular total sales areas (EH14 and EH12) are also the most popular per-capita sales areas, with over 2% of people buying season tickets.

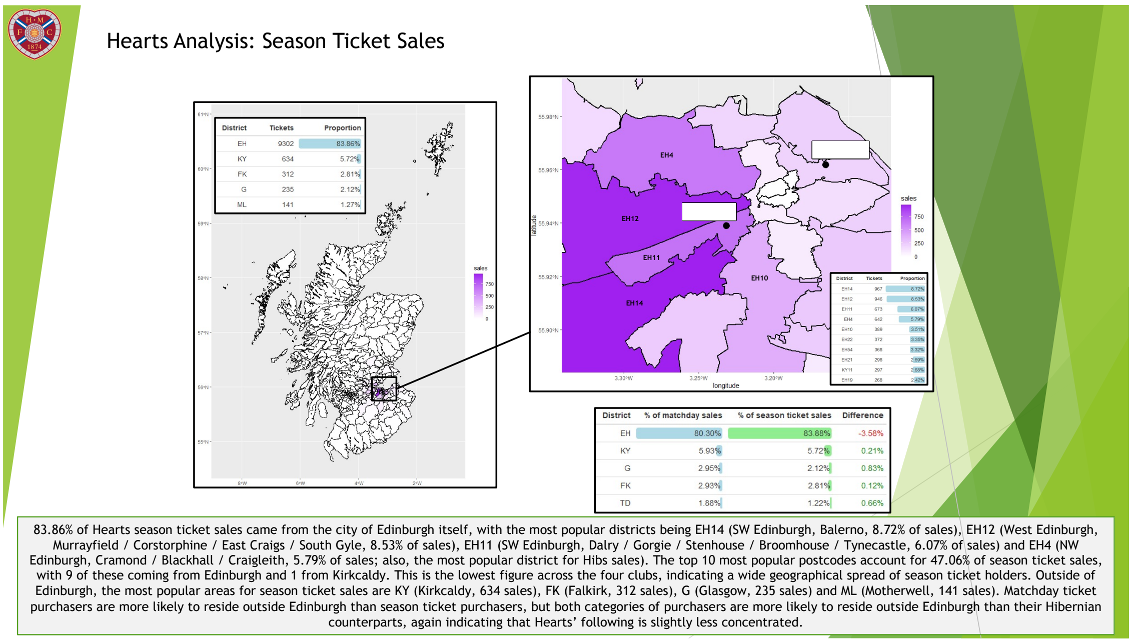


Figure 5 Heart of Midlothian Football Club Season Ticket Sales

18. 83.86% of Hearts season ticket sales came from the city of Edinburgh itself, with the most popular districts being EH14 (SW Edinburgh, Balerno, 8.72% of sales), EH12 (West Edinburgh, Murrayfield / Corstorphine / East Craigs / South Gyle, 8.53% of sales), EH11 (SW Edinburgh, Dalry / Gorgie / Stenhouse / Broomhouse / Tynecastle, 6.07% of sales) and EH4 (NW Edinburgh, Cramond / Blackhall / Craigleith, 5.79% of sales; also, the most popular district for Hibs sales). The top 10 most popular postcodes account for 47.06% of season ticket sales, with 9 of these coming from Edinburgh and 1 from Kirkcaldy. This is the lowest figure across the four clubs, indicating a wide geographical spread of season ticket holders. Outside Edinburgh, the most popular areas for season ticket sales are KY (Kirkcaldy, 634 sales), FK (Falkirk, 312 sales), G (Glasgow, 235 sales) and ML (Motherwell, 141 sales). Matchday ticket purchasers are more likely to reside outside Edinburgh than season ticket purchasers, but both categories of purchasers are more likely to reside outside Edinburgh than their Hibernian counterparts, indicating that Hearts' following is slightly less concentrated.

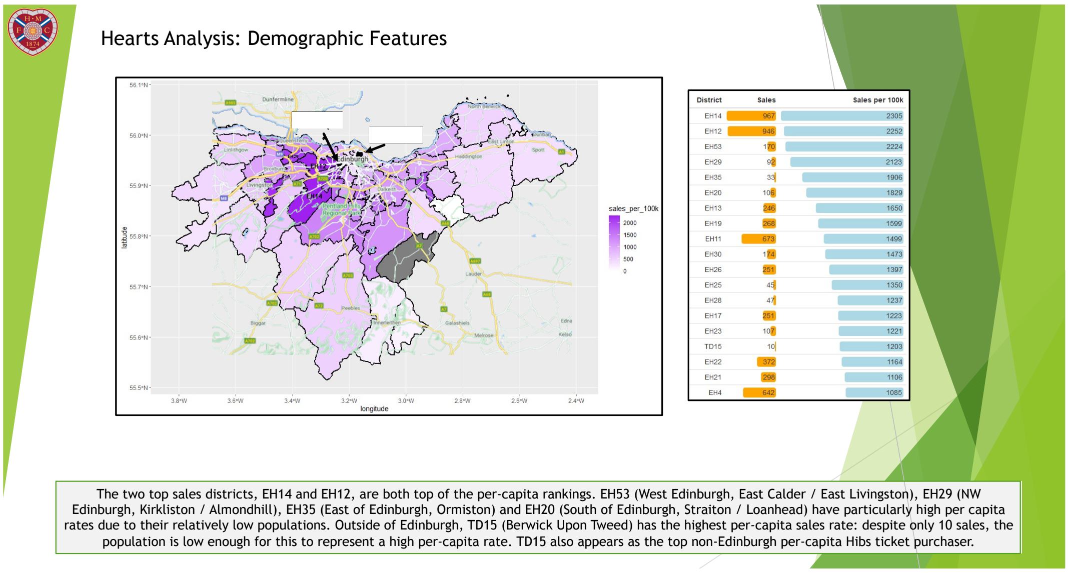


Figure 6 Heart of Midlothian Football Club Season Ticket Sales

Hibernian Football Club

Figure 7 Summary: Hibernian Football Club Season Ticket Holders

19. The Hibernian season ticket sales of 2019/20 saw approximately 12,300 ticket sales. Indeed, 88.51% of these sales stem from the City of Edinburgh area postcodes, with the top sales areas clustered in North and East Edinburgh: EH4, EH6, and EH7 (the Easter Road postcode and Hibernian's home stadium). In general, matchday sales are more likely to come from areas outside Edinburgh, consistent with the travel commitments of a season ticket. Per capita, different areas emerge as the most significant buyers: particularly in NE Edinburgh, EH15, EH21, and EH7 all have more than 2% of their populations buying season tickets.

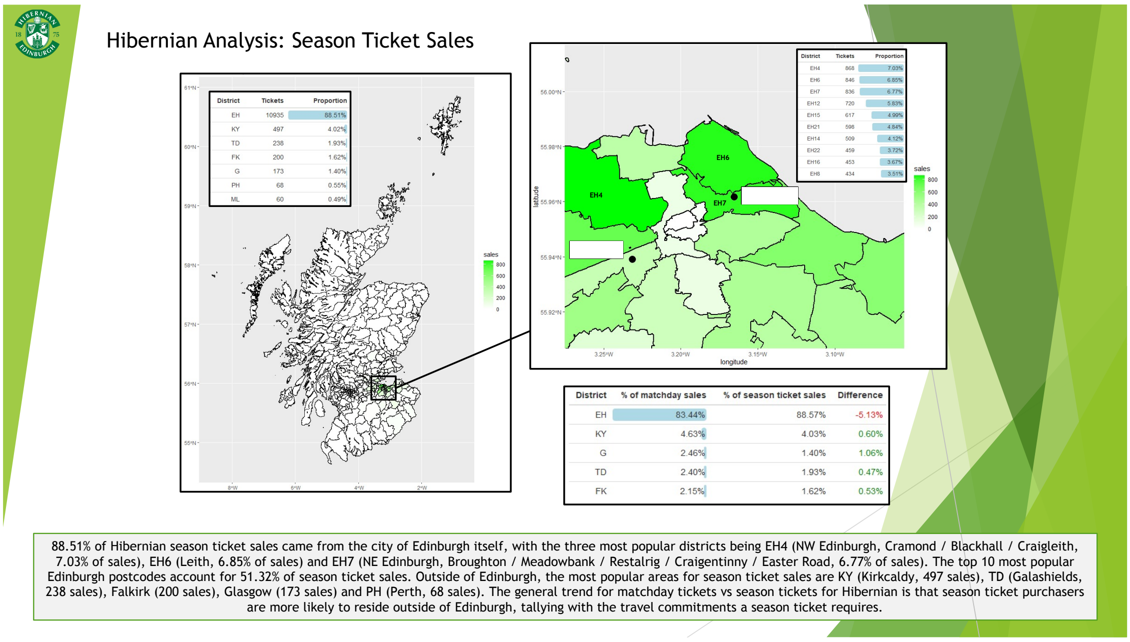


Figure 8 Summary: Hibernian Football Club Season Ticket Sales

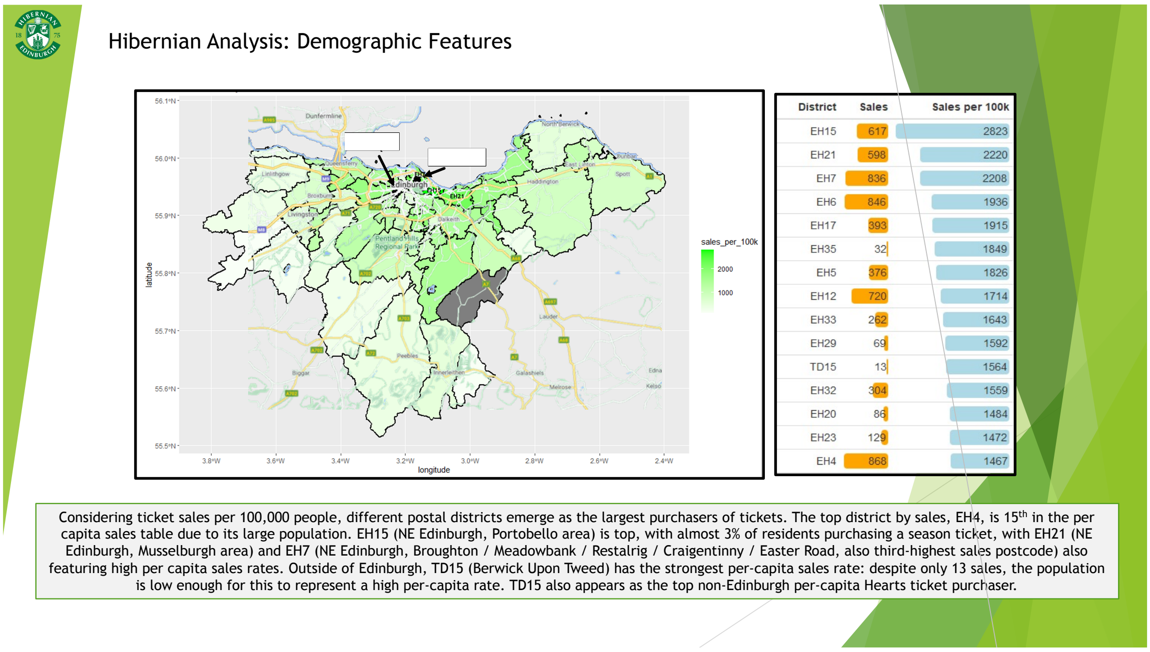


Figure 9 Summary: Hibernian Football Club Season Ticket Holder Demographics

20. Of the 88.51% of Hibernian season ticket sales from the City of Edinburgh, the three most popular districts being EH4 (NW Edinburgh, Cramond / Blackhall / Craigleith,

7.03% of sales), EH6 (Leith, 6.85% of sales) and EH7 (NE Edinburgh, Broughton / Meadowbank / Restalrig / Craigentinny / Easter Road, 6.77% of sales). The top 10 most popular Edinburgh postcodes account for 51.32% of season ticket sales. Outside of Edinburgh, the most popular areas for season ticket sales are KY (Kirkcaldy, 497 sales), TD (Galashields, 238 sales), Falkirk (200 sales), Glasgow (173 sales) and PH (Perth, 68 sales). The general trend for matchday tickets vs season tickets for Hibernian is that season ticket purchasers are more likely to reside outside of Edinburgh, tallying with the travel commitments a season ticket requires.

21. Considering ticket sales per 100,000 people, different postal districts emerge as the largest purchasers of tickets. The top district by sales, EH4, is 15th in the per capita sales table due to its large population. EH15 (NE Edinburgh, Portobello area) is top, with almost 3% of residents purchasing a season ticket, with EH21 (NE Edinburgh, Musselburgh area) and EH7 (NE Edinburgh, Broughton / Meadowbank / Restalrig / Craigentinny / Easter Road, also third-highest sales postcode) also featuring high per capita sales rates. Outside of Edinburgh, TD15 (Berwick Upon Tweed) has the strongest per-capita sales rate: despite only 13 sales, the population is low enough for this to represent a high per-capita rate. TD15 also appears as the top non-Edinburgh per-capita Hearts ticket purchaser.

Motherwell Football Club

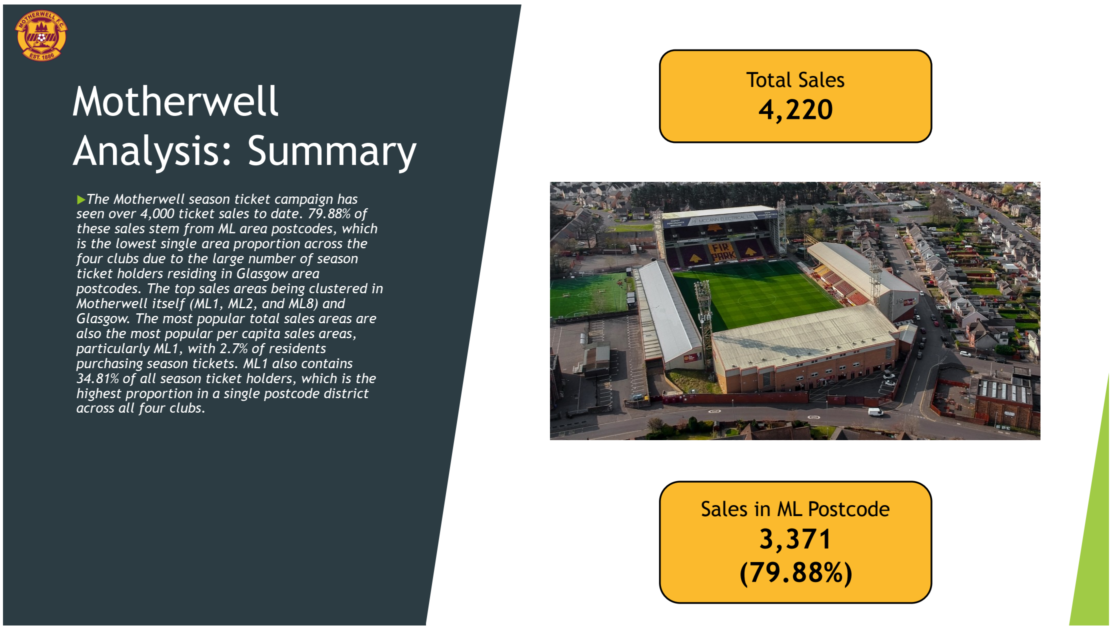


Figure 9 Summary: Motherwell Football Club Season Ticket Holders

22. Sales of Motherwell season tickets for the season 2019/20 reached over 4,200 ticket sales. Of these, 79.88% of these sales stem from ML area postcodes, which is the lowest single-area proportion across the four clubs due to the large number of season ticket holders residing in Glasgow area postcodes. The top sales areas being clustered in Motherwell itself (ML1, ML2, and ML8) and Glasgow. The most popular total sales areas are also the most popular per-capita sales areas, particularly ML1, with 2.7% of residents purchasing season tickets. ML1 also contains 34.81% of all season ticket holders, which is the highest proportion in a single postcode district across all four clubs.

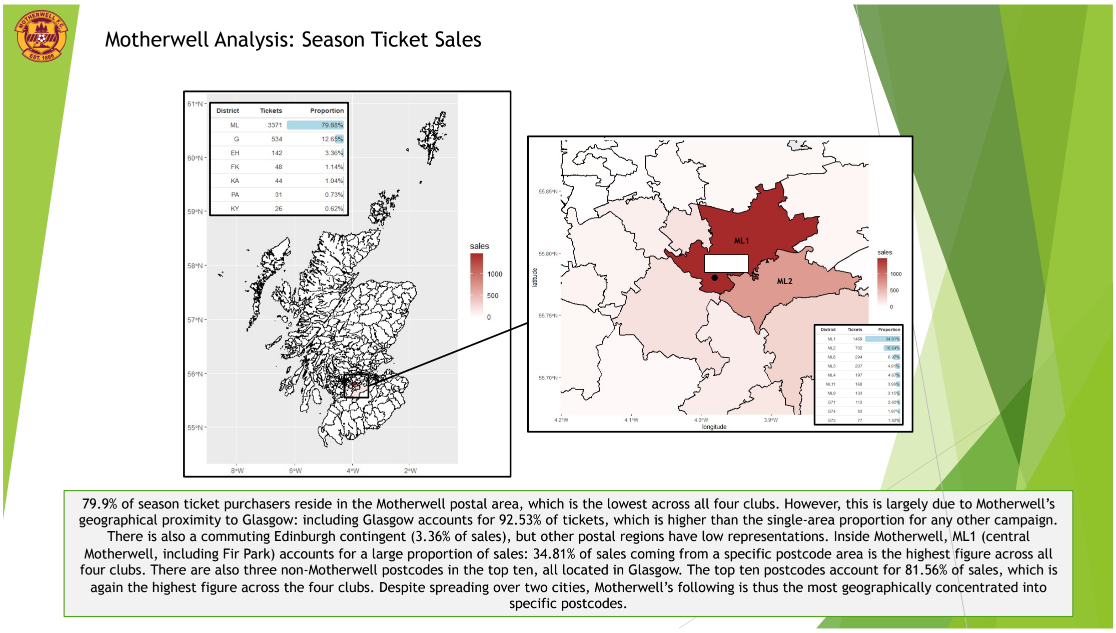


Figure 10 Summary: Motherwell Football Club Season Ticket Sales

23. 79.9% of season ticket purchasers reside in the Motherwell postal area, which is the lowest across all four clubs. This is largely due to Motherwell's geographical proximity to Glasgow: including Glasgow accounts for 92.53% of tickets, which is higher than the single-area proportion for any other season ticket sales. There is also a commuting Edinburgh contingent (3.36% of sales), but other postal regions have low representations. Inside Motherwell, ML1 (central Motherwell, including Fir Park) accounts for a large proportion of sales: 34.81% of sales coming from a specific postcode area is the highest figure across all four clubs. There are also three non-Motherwell postcodes in the top ten, all located in Glasgow. The top ten postcodes account for 81.56% of sales, which is again the highest figure across the four clubs. Despite spreading over two cities, Motherwell's following is thus the most geographically concentrated into specific postcodes.

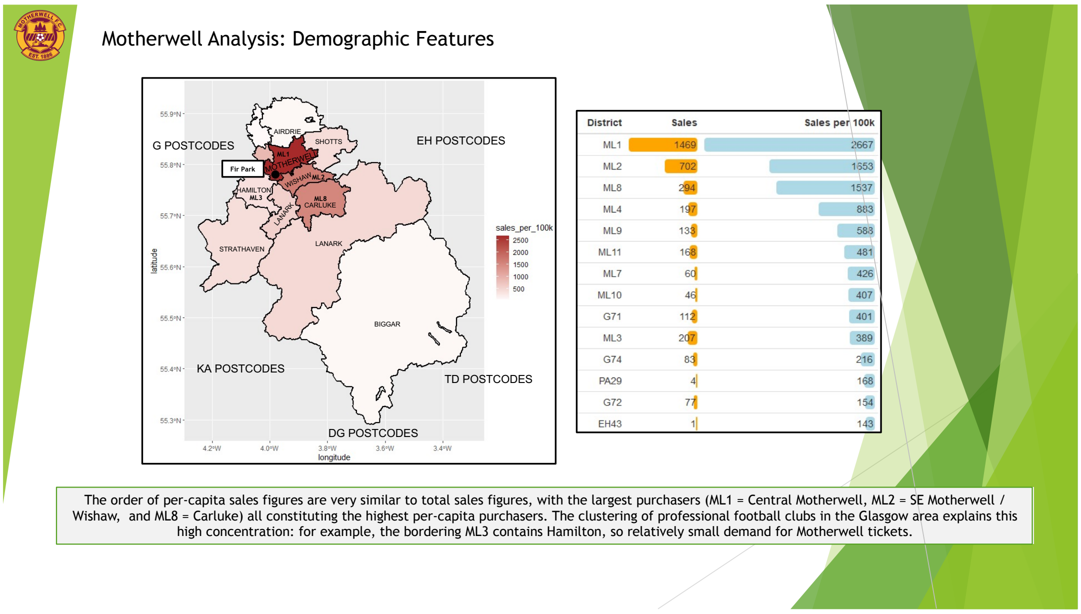


Figure 11 Summary: Motherwell Football Club Season Ticket Demographics

24. The order of per-capita sales figures is very similar to total sales figures, with the largest purchasers (ML1 = Central Motherwell, ML2 = SE Motherwell / Wishaw, and ML8 = Carluke) all constituting the highest per-capita purchasers. The clustering of professional football clubs in the Glasgow area explains this high concentration: for example, the bordering ML3 contains Hamilton, so relatively small demand for Motherwell tickets.

Key Findings from the Data Analysis

25. Clubs and Scottish football must take account of geography in its understanding of supporters. As identified here, although much greater work is needed, Scottish football season ticket holders are spatially polarised and much more likely to be drawn from the more affluent areas. Supporters are still drawn from areas where others are also supporters, that is there are core geographies and there may be contagion mechanisms operating in these areas.

26. Scottish football especially in wealthy areas has a high proportion and significant section of the population who are season ticket holders. If we add data from other clubs to the four we have here, we could potentially show a very significant proportion of the population who are season ticket holders. This is very positive in sense that, those in the more affluent parts of Scotland will perhaps be less affected by Covid implications and therefore more likely to have disposable income that will see repeat purchase of season tickets. However, it is also precarious as it highlights the reliance clubs have on live attendance.

27. Spatial distribution helps us understand where core supporters are located, this has implications for policy makers and football club strategies. For example, relocation of stadiums and changing demographics of areas (migration in and out) has huge implications to areas where core supporters are drawn. As noted by the breakdown by clubs there remains a clear geography (one based on history) of supporters for each club.

28. Football must address the growing spatial inequalities in the game, which becomes imperative as we recover from covid.

Poverty, Deprivation and Income

29. This study captured data on several key indicators at the postcode district level which will support our understanding of areas in which season ticket holders are drawn. First to explore index of deprivation, an index used to measure the deprivation within a district. The results are presented in Figure 12. We find that 16% of season ticket holders across the four clubs reside in the top 20% most deprived postcode districts in Scotland, and a further 20% in the second most deprived postcode districts.

30. 36% of season tickets holders are located in these areas most deprived in Scotland. The highest percentage of season ticket holders (based upon these 4 clubs only) reside in the most affluent areas of Scotland. 37% of all sales recoded are drawn from postcodes in the top 20% most affluent. This supports evidence that, whilst the game has a significant number of working-class consumers (season ticket holders), it is the affluent in society who are much more likely to claim to be regular match goers. This is also

supported when we control for population in these areas, in fact it becomes much more apparent that if such results were repeated for Scottish football, then Scottish football might have an issue with season ticket equity. 1.3% of the population of the most affluent 20% of postcodes districts have a season ticket **at one of the four clubs in** this study. If we contrast that with the most deprived areas, we can observe that 0.35% of the population are season ticket holders.

Scotland Index of Deprivation Average Rank	Population	Ticket Sales	% of all ticket sales	% of population buying tickets
Lowest 20% Rank (most Deprived)	1,683,128	5,894	16%	0.35%
Second lowest 20% Rank	1,153,257	7,236	20%	0.63%
Middle 20% Rank	772,014	3,961	11%	0.51%
High Middle 20% Rank	806,167	5,705	16%	0.71%
Higher 20% Rank (least Deprived)	1,048,734	13,597	37%	1.30%

Figure 12 – Season ticket sales by population and ranked average postcode district deprivation

31. Another measure of deprivation and its association with season ticket sales that we can observe is illustrated in Figure 12, which shows the index deprivation quintile of percentage of people who are income deprived (i.e., the percentage of the working age population (men aged 16-64 and women aged 16-60) in receipt of Income Support, Employment and Support Allowance, Job Seekers Allowance, Guaranteed Pension Credits, and Child and Working Tax Credits). These figures presented in Figure 12 support the findings of the previous table, and further indicates the unequal nature of football based upon the data from just these four clubs. 31% of season ticket holders reside in areas that have low levels of income deprivation. 36% of season ticket holders are located in districts that whilst not the most income deprived (bottom 20%), are in higher worse of group compared to Scotland as a whole.

32. This suggests that there may be contextual effects operating at a lower area of geography that we can't capture with the data aggregated to the district level. If we control for population size in these districts, we find that those in the least income deprived areas are more likely to be season ticket holders. Those districts that are the worst off in terms of income deprivation have a 0.3% of the population buying season tickets, contrasted against the least deprived, 0.97%.

Index Deprivation Quintile	Population	Ticket Sales	Number of Postcodes	% of all ticket sales	% of population buying tickets
Lowest 20% (0-4% inc dev, affluent)	215,814	2,103	92	6%	0.97%
Second 20% (4-7% inc dev, moderately affluent)	840,840	9,025	91	25%	1.07%
Mid 20% (7-9.5% inc dev, mid income)	927,445	5,717	94	16%	0.62%
Higher 20% (9.5-13.8% inc dev, worse off)	1,553,398	13,217	88	36%	0.85%
Higher 20% (13.8% - 35.4% inc dev, worst off)	1, 925803	6331	91	17%	0.33%

Figure 12 – Season ticket sales by population and income postcode district deprivation quintile.

33. To explore poverty and its relationship with season ticket holders further we highlighted that household income may perhaps be a significant factor, especially when disposable income is correlated with greater volumes of leisure. Whilst we don't have actual household income for each season ticket holder we can use a proxy measure of median household income, derived from data zone data using the most recently available file, from 2018[7]. The results are presented in Figure 13 and whilst the largest proportion of season ticket holders reside in districts where the median household income is mid ranging, this is perhaps slightly misleading. Indeed, when we control for population in these districts, we observe that the areas where median household income is highest have a higher proportion of the population as season ticket holders, contrasts with those areas where the median household population is lowest.

Household Income**	No. of Season Tickets	% of Season tickets	Population Size	% of population buying tickets
15-25K	1500	4.1	692,180	0.22
25-30K	6814	18.7	1,759,095	0.39
30-35K	18070	49.6	2,157,824	0.84
35-40K	6797	18.7	565,462	1.20
40K+	3172	8.7	267,426	1.19

Figure 13 Percentage of season ticket holders residing in postcode districts with a median household income range

**46 Postcode Districts removed as no data on Household Income.

[7] See https://www.gov.scot/publications/banded-income-statistics-2018/

Recommendations, Observations and Concluding Remarks

34. There is a clear relationship poverty, deprivation, and income on season ticket consumption. This has implications as people start to emerge from lockdowns and life slowly returns to normal.

35. From our data we can show that fans are disproportionally drawn from areas with low levels of deprivation and poverty. There is inequality here based on season ticket data with the most deprived the least likely to attend. As laid out by the Covid Recovery Commission, mortality rates from Covid-19 are highest in the most deprived neighbourhoods in the UK. Even after controlling for a range of other factors, in the 20% most deprived neighbourhoods there has been an average of 21 more Covid-19 deaths per 100,000 population compared to the least deprived neighbourhoods. This has huge implications for Scotland as a society and how football clubs can re-engage these communities.

36. There are further implications for clubs, especially in hard-to-reach communities. There are still significant proportions of season tickets that are drawn from deprived areas and these fans are in danger of being lost from football. Indeed, in these areas it might not be as simple as repeat purchasing of season tickets as we recover from Covid. Whilst football supporters are well known for their loyalty, that should not be taken for granted. This impact is clearly economical, but there is also a social dimension. Football clubs are cultural institutions and important in the meaning making of places, a sense of place pride and a focal point for the community, this is perhaps showcased in the relatively distance decay of season ticket purchases the further you move away from the football stadium. Any disconnect between a football club and its community will have huge social implications around social capital, wellbeing, and happiness.

Micro Briefings: Building Back Better, Data Driven Innovation and the Scottish Football Industry.

The Academy of Sport in partnership with the Bayes Centre have developed a series of micro briefings written in collaboration with partners from the Scottish Football Industry. They are intended to inform and contribute to enhancing the capability of Scottish football to learn from the Covid-19 pandemic and embrace the possibilities of how data-driven decision-making, innovation and sharing can support, for example, business data analysis and off-field data analysis.

It is envisaged that other micro briefings on Scottish football would include international engagement through football; social and demographic analysis of football season ticket holders; bespoke briefings for individual football clubs supporting the project; Scottish football building back better from Covid-19 and more.

Contact: Professor Grant Jarvie, University of Edinburgh, Grant.Jarvie@ed.ac.uk

Project Team: Jake Barrett, Ellen Frank Delgado, Grant Jarvie, Neil McGillivray, Mason Robbins, Michael Rovatsos, John Scott, Paul Widdop, Yujun Xu.

THE UNIVERSITY *of* EDINBURGH
Academy of Sport

FUNDED BY

THE UNIVERSITY *of* EDINBURGH | Data-Driven Innovation