# The Impact of Market Value Inequality and Team Composition on Premier League Team Performance 2013/14 - 2017/18



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## Executive Summary

This study examines whether internal squad structure and team composition are associated with performance outcomes in the English Premier League, beyond differences in overall financial strength. Using an original unbalanced panel dataset of 100 club-season observations covering the 2013/14 to 2017/18 seasons, the analysis focuses on market value inequality within squads, nationality concentration, and the share of native players. Performance is measured using points per match.

The empirical approach employs a fixed-effects framework with club and season fixed effects and standard errors clustered at the club level. This specification controls for unobserved, time-invariant club characteristics and league-wide seasonal influences, allowing identification from within-club changes in squad structure over time. Both linear and non-linear specifications are estimated to assess whether structural characteristics exert systematic effects on performance.

The results show that relative financial strength is the most robust determinant of performance. A higher share of total league market value is consistently associated with increased points per match. Market value inequality, nationality concentration, and the share of native players do not exhibit statistically significant associations with performance once financial strength and fixed effects are controlled for. Allowing for non-linear effects does not alter these conclusions.

Overall, the findings suggest that while financial scale plays a central role in shaping competitive outcomes, short-run changes in internal squad structure and composition do not independently explain performance differences in the Premier League over the period considered.

## Introduction

Performance in professional football is shaped by financial, structural and compositional factors that determine how teams convert resources into sporting outcomes over a season (Gerhards and Mutz 2017). From an economic perspective, football clubs can be conceptualised within the framework of a sporting production function, where inputs such as financial resources, player ability and organisational structure are transformed into outputs measured by league performance. This framework emphasises that clubs operate under budgetary and institutional constraints and must allocate resources efficiently in order to maximise competitive outcomes. The English Premier League provides a particularly appropriate empirical setting for examining these relationships, as it exhibits substantial disparities in financial resources across clubs (Gerhards and Mutz 2017). These disparities motivate empirical investigation into the extent to which financial strength explains performance and whether internal structural and compositional characteristics contribute to observed differences in outcomes. Yang (2025) highlights that financial resources shape organisational decision-making in professional football, reinforcing the relevance of analysing how financial and structural factors jointly relate to performance.

A consistent finding in the empirical literature is that team market value is strongly associated with sporting success. Gerhards and Mutz (2017) show that average market value explains a substantial share of variation in league results across the top five European leagues. They argue that market value captures the technical, physical and tactical attributes embodied within a squad, making it a meaningful proxy for team strength. Kalemba and Campa (2017) report that financial investment in human capital is associated with improved organisational outcomes in football contexts. Together, these studies establish market value as a key financial input in the sporting production process and provide a baseline against which additional structural characteristics can be evaluated.

Studies document systematic relationships between observable player characteristics and market valuation in professional football. Prayoga et al. (2023) show that individual performance indicators are statistically associated with changes in player market value in top European leagues. Khalife et al. (2025) further demonstrate that age, playing position and projected career trajectory are key determinants of player valuation. Together, these findings indicate that market value reflects observable player attributes and performance-related characteristics, reinforcing its use as an empirically grounded measure for player quality in team-level performance analysis.

Beyond total market value, teams differ in how financial resources are distributed internally across players. Gerhards and Mutz (2017) identify market value dispersion as a structural characteristic of squads, although they find that its independent association with performance is weaker than that of total market value. Evidence from related sports contexts provides further insight. Vasilescu (2007) demonstrates that wage inequality in Major League Baseball exhibits a non-linear relationship with team performance, indicating that both excessive concentration and excessive equality may be inefficient. Franck and Nüesch (2009) emphasise that team production depends on complementarities among players, implying that the distribution of talent within a squad may affect overall output. Consistent with this literature, the present study incorporates the Gini coefficient of player market values to examine whether internal inequality is systematically related to performance once differences in overall market value are considered. In the dataset analysed, market value inequality varies substantially, ranging from a Gini coefficient of 0.3429 for Stoke City in 2013/14 to 0.5943 for Everton FC in 2014/15.

Team composition represents an additional structural dimension that may influence performance. Ingersoll et al. (2017) analyse cultural heterogeneity in the Premier League and find that nationality diversity is associated with variation in team outcomes. Their results indicate that the performance implications of diversity depend on league context and organisational structure. Measures of nationality concentration, such as the Herfindahl-Hirschman Index, therefore provide a systematic way to capture this aspect of team composition. In the present dataset, nationality concentration varies markedly across clubs and seasons, with values ranging from 0.0505 for Watford FC in 2015/16 to 0.3827 for AFC Bournemouth in 2017/18.

Beyond demographic characteristics, psychological and behavioural alignment has also been associated with team functioning. Parks-Leduc et al. (2024) show that alignment in achievement related values within teams corresponds with improved outcomes, suggesting that shared values support coordination and effective role allocation. Although the current study does not directly measure psychological alignment, these insights support the rationale for investigating compositional variables that reflect potential cohesion effects, such as the share of native players. This measure varies across the sample, with values ranging from 0.0909 for Watford FC in 2015/16 to 0.6071 for AFC Bournemouth in 2017/18.

Taken together, the literature identifies a series of measurable characteristics that are associated with performance in professional football. These include financial indicators, internal value distribution, team composition and contextual influences. However, prior studies often examine these characteristics separately, and there is limited work that evaluates market value dispersion and compositional characteristics jointly within a multi-season Premier League context. The five season dataset developed for this study exhibits substantial variation in these structural characteristics, which provides a strong empirical basis for assessing their relationships with performance.

The present study investigates how market value dispersion and team composition correspond with team performance outcomes in the Premier League. It incorporates the Gini coefficient of market value as a measure of internal inequality, the Herfindahl Hirschman Index of nationalities as a measure of nationality concentration, and the share of native players as an indicator of contextual familiarity. Using points per match as the performance measure, the analysis evaluates whether these structural characteristics are associated with variation in outcomes beyond differences in total market value.

This investigation contributes to the literature by providing empirical evidence on within-team value inequality in the Premier League, evaluating nationality concentration and native-player share within a unified framework, and constructing a five-season dataset covering 2013/14 to 2017/18 to support club-level analysis of financial and structural characteristics. By integrating financial, structural, and compositional measures, the study provides a detailed empirical assessment of the variables associated with team performance and contributes to ongoing academic discussion in sports economics and team analysis.

## Data and Methodology

The analysis uses an unbalanced panel dataset of 100 club-season observations from the English Premier League covering the 2013/14 to 2017/18 seasons. All variables were constructed from Transfermarkt, which provides player-level market values, nationality information and club-level squad attributes. Promotion and relegation generate the unbalanced structure of the sample. The dependent variable, points per match, was calculated as total league points divided by 38, the fixed number of fixtures played by each club in every season.

The main explanatory variables capture structural characteristics of squads. Market value inequality was measured using the Gini coefficient, computed from the distribution of individual player market values within each club by ordering valuations, calculating cumulative value shares and deriving the corresponding area under the Lorenz curve for each club-season. Nationality concentration was measured using the Herfindahl-Hirschman Index (HHI), based on nationality shares within the Premier League-registered squads. The share of native players was defined as the proportion of players eligible to represent England within each Premier League squad. Additional control variables include Premier League squad size, Premier League squad average age and the share of total league market value held by each club.

Table 1 presents descriptive statistics for variables used within the analysis.

Table 1: Summary statistics

| Variable | Mean | Standard Deviation | Observations | Minimum | Maximum |
|---|---|---|---|---|---|
| Points Per Match | 1.3787 | 0.4669 | 100 | 0.4474 | 2.6316 |
| Market Value Gini | 0.4747 | 0.0558 | 100 | 0.3429 | 0.5943 |
| Nationality HHI | 0.1693 | 0.0621 | 100 | 0.0505 | 0.3827 |
| Native Share | 0.3413 | 0.1024 | 100 | 0.0909 | 0.6071 |
| Squad Size | 31.84 | 3.7274 | 100 | 24 | 44 |
| Average Age | 26.768 | 1.0554 | 100 | 24.2 | 28.9 |
| Market Value Share | 0.0500 | 0.0345 | 100 | 0.0125 | 0.1446 |

All variables are defined in Appendix A.1.

To illustrate key empirical patterns, two preliminary scatterplots present the associations between points per match and the Gini coefficient, and between points per match and nationality HHI.

Figure 1: Scatterplot of market value dispersion (Gini coefficient) and points per match, Premier League 2013/14 - 2017/18

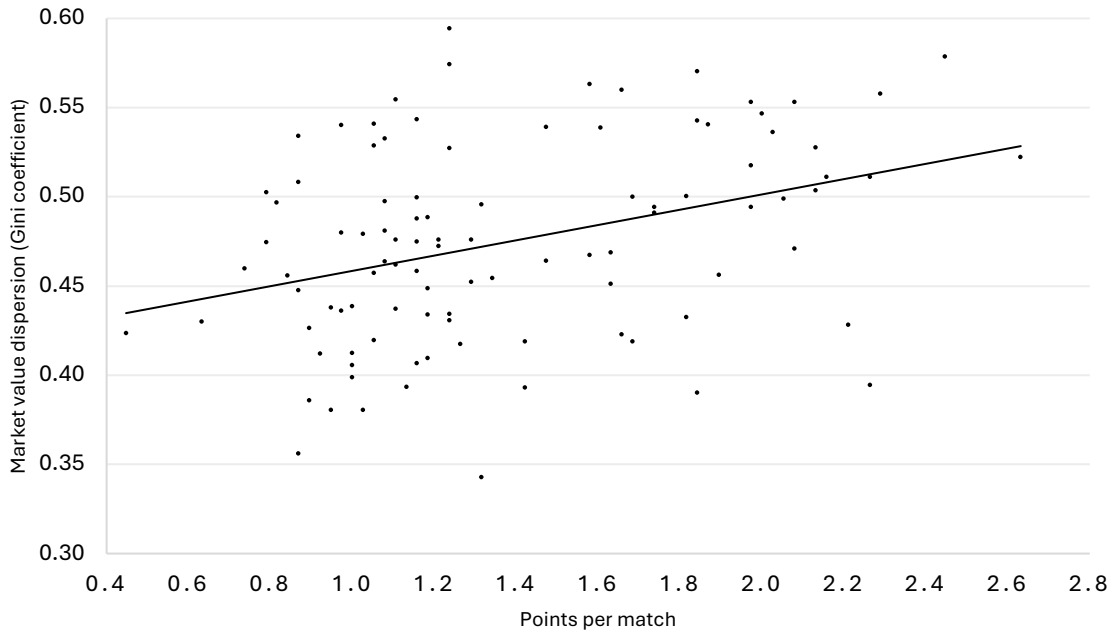
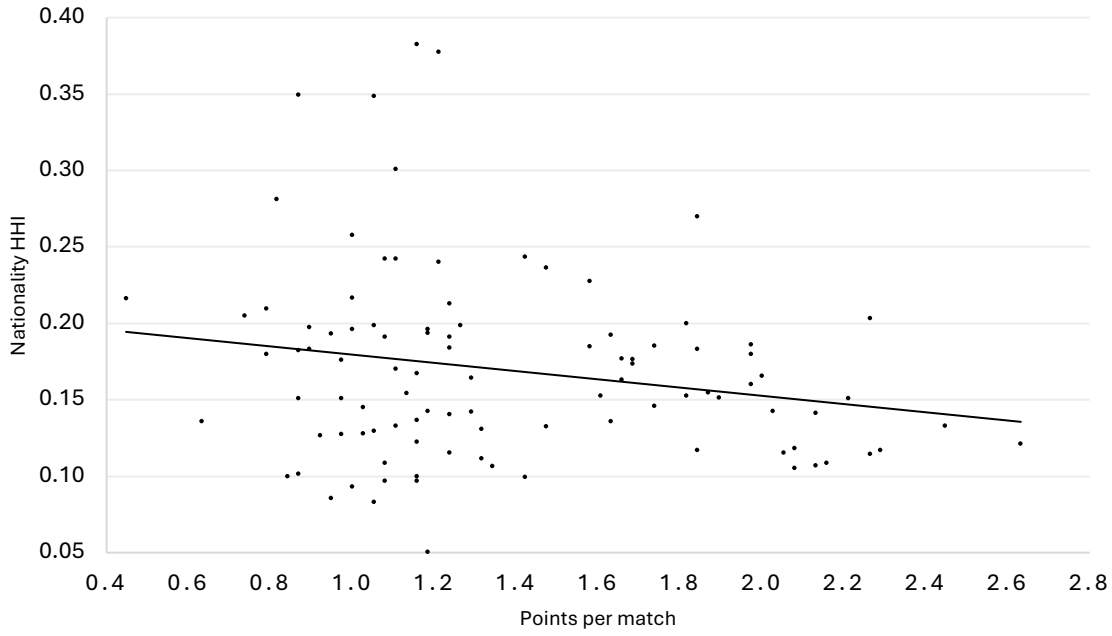



Figure 2: Scatterplot of nationality concentration (HHI) and points per match, Premier League 2013/14 - 2017/18



The empirical analysis estimates the following linear fixed-effects model:

$$PPM_{it} = \beta_1 Market\ Value\ Gini_{it} + \beta_2 Nationality\ HHI_{it} + \beta_3 Native\ Share_{it} + \beta_4 Squad\ Size_{it} + \beta_5 Average\ Age_{it} + \beta_6 Market\ Value\ Share_{it} + \alpha_i + \lambda_t + \varepsilon_{it},$$

where $\mathrm{PPM}_{it}$ denotes points per match for club $i$ in season $t$. The term $\alpha_i$ represents club fixed effects, $\lambda_t$ captures season fixed effects, and $\varepsilon_{it}$ is the idiosyncratic error term.

Club fixed effects are included to control for all time-invariant characteristics of clubs that may influence performance, while season fixed effects account for factors common to all clubs within a given season. Standard errors are clustered at the club level to allow for within-club serial correlation and heteroskedasticity.

In addition to the baseline linear specification, an extended model includes squared terms for the Gini coefficient and nationality HHI. This allows the data to test for potential non-linear relationships between internal inequality, nationality concentration, and performance, consistent with the discussion in Gerhards and Mutz (2017) that structural characteristics may exhibit diminishing or increasing marginal effects. No log transformations are applied, as all key explanatory variables are indices or proportions bounded within the unit interval.

The analysis evaluates the following hypotheses concerning the relationship between squad structure and performance outcomes:

*Hypothesis 1:* Higher market value inequality, measured by the Gini coefficient, is associated with lower points per match.

*Hypothesis 2:* Higher nationality concentration, measured by the Herfindahl-Hirschman Index, is associated with lower points per match.

*Hypothesis 3:* A higher share of native players is associated with higher points per match.

## Results

Regression results are reported in Table 2 for the baseline fixed-effects specification and in Table 3 for an extended specification that allows for potential non-linear effects. All models include club and season fixed effects, with standard errors clustered at the club level.

### Linear fixed-effects regression

Table 2. Fixed effects estimates of points per match

| Variable | Coefficient |
|---|---|
| | |
| Market value Gini | 0.0425 |
| | (0.672) |
| | |
| Nationality HHI | $-1.105$ |
| | (1.187) |
| | |
| Native players share | 0.186 |
| | (0.624) |
| | |
| Squad size | $-0.0394^{***}$ |
| | (0.00813) |
| | |
| Squad average age | $-0.0661^{*}$ |
| | (0.0337) |
| | |
| Market value share | $13.44^{***}$ |
| | (2.248) |
| | |
| Club fixed effects | Included |
| Season fixed effects | Included |
| Observations | 100 |
| Number of clubs | 41 |
| Within $R^2$ | 0.466 |

Robust standard errors clustered at the club level are reported in parentheses.
$^{*}$ $p < 0.1$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$.

Table 2 presents estimates from the baseline linear fixed-effects model. The specification yields a within $R^2$ of 0.466, indicating that changes in squad structure and composition explain 46.6 percent of the within-club variation in points per match.

The coefficient on the market value Gini coefficient is positive but statistically insignificant. After controlling for total market value and other covariates, there is no evidence that internal inequality in player market values is systematically associated with team performance. Hypothesis 1, which proposed a negative relationship between market value inequality and points per match, is therefore not supported. This finding is consistent with Gerhards and Mutz (2017), who show that internal value dispersion plays a secondary role relative to overall market value in explaining team success.

Nationality concentration, measured by the Herfindahl-Hirschman Index, also displays a negative but statistically insignificant coefficient. This indicates that within-club changes in nationality concentration are not associated with statistically significant changes in performance. Consequently, Hypothesis 2 is not supported. This result aligns with Ingersoll et al. (2017), who emphasise that the performance implications of nationality composition in the Premier League are highly context-dependent and not uniformly positive or negative.

The share of native players exhibits a positive coefficient but does not display a statistically significant relationship with points per match. The analysis therefore provides no evidence in support of Hypothesis 3, indicating that changes in the proportion of English-qualified players within a squad are not systematically associated with performance once club-specific effects and financial controls are considered.

Several control variables exhibit strong and statistically significant associations with performance. Squad size is negatively related to points per match and is statistically significant at the 1 percent level. The estimated coefficient implies that an increase of one additional squad member is associated with a reduction of approximately 0.04 points per match, ceteris paribus. Squad average age is also negatively associated with performance and is statistically significant at the 10 percent level. This indicates that within-club increases in average squad age correspond with lower performance outcomes.

The share of total league market value held by a club exhibits a positive and statistically significant coefficient at the 1 percent level. This finding confirms that relative financial strength remains a central determinant of performance, even within a fixed-effects framework that controls for unobserved club characteristics. This result is fully consistent with the central findings of Gerhards and Mutz (2017), who identify market value as the dominant predictor of success in European football leagues.

**Non-linear fixed-effects specification**

Table 3. Fixed effects estimates of points per match with quadratic terms

| Variable | Coefficient |
|---|---|
| | |
| Market value Gini | 4.222 |
| | (8.696) |
| | |
| Market value Gini squared | $-4.389$ |
| | (9.155) |
| | |
| Nationality HHI | 1.291 |
| | (3.944) |
| | |
| Nationality HHI squared | $-6.339$ |
| | (9.001) |
| | |
| Native players share | 0.108 |
| | (0.742) |
| | |
| Squad size | $-0.0400^{***}$ |
| | (0.00826) |
| | |
| Squad average age | $-0.0703^{**}$ |
| | (0.0325) |
| | |
| Market value share | $13.70^{***}$ |
| | (2.312) |
| | |
| Club fixed effects | Included |
| Season fixed effects | Included |
| Observations | 100 |
| Number of clubs | 41 |
| Within $R^2$ | 0.472 |

Robust standard errors clustered at the club level are reported in parentheses.
$^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table 3 reports estimates from an extended specification that includes squared terms for the market value Gini coefficient and nationality HHI to allow for potential non-linear effects.

The estimated coefficients on both the linear and squared terms for market value inequality are statistically insignificant. Similarly, neither the linear nor squared terms for nationality concentration are statistically significant. These results indicate no evidence of non-linear relationships between internal value dispersion or nationality concentration and performance within the observed range of data. Accordingly, the extended specification does not alter the conclusions drawn from the baseline model regarding Hypotheses 1 and 2.

The coefficients on the control variables remain stable across the two specifications. Squad size and squad average age continue to display negative associations with points per match and remain statistically significant, while the share of total market value retains a positive and statistically significant coefficient. The within $R^2$ increases to 0.472 in the non-linear specification, indicating an improvement in explanatory power.

**Relation to existing literature**

The results reinforce existing evidence that overall financial strength remains the primary determinant of performance in professional football. Consistent with Gerhards and Mutz (2017), the share of total league market value exhibits a strong and statistically significant association with points per match, while internal distributional characteristics play a more limited role once financial scale is considered.

The absence of statistically significant effects for nationality concentration and native-player share aligns with the findings of Ingersoll et al. (2017), who emphasise that the performance implications of squad diversity in the Premier League are context-dependent and not uniformly positive or negative. The fixed-effects framework employed here suggests that persistent club-level characteristics, rather than short-run changes in squad composition, account for much of the observed variation in performance outcomes.

Overall, the evidence indicates that while internal structural features vary across clubs and seasons, their independent association with performance is limited once financial resources and unobserved club heterogeneity are controlled for.

## Conclusion

This study examined whether market value dispersion and team composition are associated with performance outcomes in the English Premier League over the 2013/14 to 2017/18 seasons. Using an original unbalanced panel dataset and a fixed-effects framework, the analysis assessed whether internal market value inequality, nationality concentration, and the share of native players explain variation in points per match beyond differences in overall financial strength.

The results show that relative financial strength, measured by a club's share of total league market value, is the most robust and consistent determinant of performance. Neither market value inequality nor nationality concentration exhibits a statistically significant association with performance once club and season fixed effects are included. The share of native players also shows no independent relationship with points per match. These results suggest that short-run within-club changes in internal squad structure do not systematically translate into performance outcomes.

Several limitations should be acknowledged. The analysis relies on market value data from Transfermarkt, which represents an estimated measure for player quality rather than an observed market transaction. The sample is restricted to five Premier League seasons, which may limit the generalisability of the findings to other leagues or longer time horizons. Although the fixed-effects framework controls for time-invariant club characteristics, the estimated relationships should be interpreted as associations rather than causal effects, as time-varying unobserved factors may remain correlated with explanatory variables (Moon and Weidner, 2014).

Future research could extend this framework by incorporating managerial characteristics, tactical indicators, or longer time periods, as well as applying comparable methods across multiple leagues to assess external validity.

## Technical Appendix

### A.1 Variable definitions

Appendix A.1 presents the definitions of all variables used in the empirical analysis.

| Variables | Label |
|---|---|
| Points per match | Total Premier League points earned by a club in a season divided by 38 fixtures |
| Market value Gini | Gini coefficient of individual player market values within a club-season |
| Market value Gini squared | Gini coefficient of individual player market values within a club-season squared |
| Nationality HHI | Herfindahl-Hirschman Index of player nationalities within a club's Premier League squad |
| Nationality HHI squared | Herfindahl-Hirschman Index of player nationalities within a club's Premier League squad squared |
| Native Share | Proportion of Premier League squad players eligible to represent England |
| Squad Size | Number of players registered in a club's Premier League squad for a given season |
| Average Age | Mean age of players registered in a club's Premier League squad |
| Market Value Share | Share of total Premier League market value held by a club in a given season |

All variables are constructed using data from Transfermarkt.

### A.2 Baseline linear fixed-effects regression full output

Appendix A.2 reports the full Stata output corresponding to the baseline linear fixed-effects results presented in Table 2.

**Fixed effects regression estimates for points per match**

Standard errors adjusted for 41 clusters in Club

| Variable | Coefficient | Robust Standard Error | t-statistic | p-value | 95% confidence interval | |
|---|---|---|---|---|---|---|
| Market value Gini | 0.0425 | 0.6717 | 0.06 | 0.950 | −1.3152, | 1.4001 |
| Nationality HHI | −1.1052 | 1.1865 | −0.93 | 0.357 | −3.5032, | 1.2929 |
| Native players share | 0.1859 | 0.6245 | 0.30 | 0.767 | −1.0762, | 1.4480 |
| Squad size | −0.0394 | 0.0081 | −4.85 | 0.000 | −0.0558, | −0.0230 |
| Squad average age | −0.0661 | 0.0337 | −1.96 | 0.057 | −0.1343, | 0.0020 |
| Market value share | 13.4386 | 2.2478 | 5.98 | 0.000 | 8.8956, | 17.9816 |
| Season 2014/15 | 0.0289 | 0.0758 | 0.38 | 0.706 | −0.1244, | 0.1821 |
| Season 2015/16 | 0.0060 | 0.0830 | 0.07 | 0.943 | −0.1618, | 0.1738 |
| Season 2016/17 | 0.0051 | 0.0558 | 0.09 | 0.927 | −0.1076, | 0.1179 |
| Season 2017/18 | −0.1419 | 0.0876 | −1.62 | 0.113 | −0.3190, | 0.0351 |
| Constant | 3.8551 | 0.8311 | 4.64 | 0.000 | 2.1753, | 5.5348 |

**Model statistics**

| Statistic | Value |
|---|---|
| Observations | 100 |
| Number of clubs | 41 |
| Within $R^2$ | 0.466 |
| Between $R^2$ | 0.785 |
| Overall $R^2$ | 0.772 |
| F-statistic | 19.39 |
| Prob > F | 0.000 |
| Standard deviation of club fixed effects | 0.2473 |
| Standard deviation of idiosyncratic error | 0.1992 |
| Fraction of variance attributable to club fixed effects | 0.6065 |
| Correlation between club fixed effects and regressors | −0.5889 |

### A.3 Non-linear fixed-effects regression full output

Appendix A.3 reports the full Stata output corresponding to the non-linear fixed-effects results presented in Table 3.

**Fixed effects regression estimates for points per match**

Standard errors adjusted for 41 clusters in Club

| Variable | Coefficient | Robust Standard Error | t-statistic | p-value | 95% confidence interval | |
|---|---|---|---|---|---|---|
| Market value Gini | 4.2224 | 8.6955 | 0.49 | 0.630 | −13.3519, | 21.7968 |
| Market value Gini squared | −4.3886 | 9.1552 | −0.48 | 0.634 | −22.8919, | 14.1148 |
| Nationality HHI | 1.2911 | 3.9441 | 0.33 | 0.745 | −6.6803, | 9.2624 |
| Nationality HHI squared | −6.3389 | 9.0013 | −0.70 | 0.485 | −24.5312, | 11.8535 |
| Native players share | 0.1085 | 0.7423 | 0.15 | 0.885 | −1.3917, | 1.6086 |
| Squad size | −0.0400 | 0.00826 | −4.84 | 0.000 | −0.0567, | −0.0233 |
| Squad average age | −0.0703 | 0.0325 | −2.16 | 0.037 | −0.1360, | −0.0046 |
| Market value share | 13.7022 | 2.3117 | 5.93 | 0.000 | 9.0301, | 18.3742 |
| Season 2014/15 | 0.0270 | 0.0791 | 0.34 | 0.735 | −0.1330, | 0.1870 |
| Season 2015/16 | 0.0054 | 0.0830 | 0.06 | 0.949 | −0.1625, | 0.1732 |
| Season 2016/17 | −0.0049 | 0.0666 | −0.07 | 0.942 | −0.1394, | 0.1296 |
| Season 2017/18 | −0.1452 | 0.0982 | −1.48 | 0.147 | −0.3437, | 0.0534 |
| Constant | 2.8203 | 2.2935 | 1.23 | 0.226 | −1.8151, | 7.4556 |

**Model statistics**

| Statistic | Value |
|---|---|
| Observations | 100 |
| Number of clubs | 41 |
| Within $R^2$ | 0.472 |
| Between $R^2$ | 0.767 |
| Overall $R^2$ | 0.761 |
| F-statistic | 17.33 |
| Prob > F | 0.000 |
| Standard deviation of club fixed effects | 0.2710 |
| Standard deviation of idiosyncratic error | 0.2023 |
| Fraction of variance attributable to club fixed effects | 0.6422 |
| Correlation between club fixed effects and regressors | −0.6431 |

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