

Evaluating the Effect of Domestic Cup Participation on League Performance

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Introduction

Fixture congestion is a growing concern in football management.

Criticism from managers and players relates to **performance dips**, **fatigue** and **health** issues.

Prior Research focusses only on international tournaments and physical metrics.

Objective

Evaluate the impact of domestic cup fixtures on league performance in general.

- Does **participation** affect performance in the next league fixture?
- Does **winning** affect performance in next league fixture?

Other Questions:

- Are the effects **round-specific** (e.g., early vs. late stages)?
- Are the effects different for **team-characteristics** (e.g., size, market value)?
- What are the **practical insights** of the effects?

Empirical Strategy

Objective: Estimate effect of cup win/participation on league performance.

Complications

- **Selection Bias:** Stronger teams are more likely to win both cup and league matches.
- **Endogeneity:** Factors like i.e. team strength and travel distance affect both outcomes.

Why IV?

- **Randomness** of Cup Draws provides exogenous variation in opponent position.
- The instruments opponent position and division isolate causal effects by addressing endogeneity.

First Stage:

$$\text{Cup Win}_{i,r} = \pi_0 + \pi_1 \cdot \text{Opponent Position}_{i,r} + \pi_2 \cdot \text{Division}_{i,r} + \gamma \cdot X_{i,r}^{(m)} + \epsilon_{i,r} \quad (1)$$

Second Stage:

$$\text{League Performance}_{i,r} = \beta_0 + \beta_1 \cdot \widehat{\text{Cup Win}}_{i,r} + \delta \cdot X_{i,r}^{(m)} + \eta_{i,r} \quad (2)$$

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IV Assumptions (1/2)

Independence

The instrument is independent of unobserved confounders affecting league performance.

Validation:

- “The ties of each round of the competition shall be determined by means of a draw” (The Football Association, 2024).
- Chi-squared tests confirm independence between fixture assignment and opponent characteristics (See Appendix).

Exclusion

The instruments affect league performance only through cup participation or winning, with no direct effect on league outcomes.

Validation:

- Random opponent assignment ensures no direct pathway from opponent characteristics (position or division) to league performance.
- Verify stability of effects across (7) model specifications to confirm effect primarily through treatments.

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IV Assumptions (2/2)

Relevance

The instruments are strongly correlated with the likelihood of progressing or winning in cup competitions.

Validation:

- Higher-ranked teams statistically outperform lower-ranked teams.
- First-stage F statistics exceed 10, confirming strong predictive power of the instruments for cup progression/win.

Monotonicity

Higher-ranked teams are more likely to progress in cup rounds than lower-ranked teams, holding across expectations.

Validation:

- While upsets occur, higher-ranked teams generally advance further in cup competitions.
- This pattern supports the monotonicity assumption in expectation (e.g., rare upsets).

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Main Findings

Effect of **Winning** a Cup Fixture

- There is a **positive causal effect** of **winning** cup matches in early rounds (prior to the Quarter Finals) on performance in the next league fixture.
- Estimated effects between **0.53** and **1.02** in early rounds at **5%** and **10%** levels.
- First-stage **F-statistics** are strong (**11.40 to 48.02**), supporting instrument relevance.

Effect of **Participation** in a Cup Fixture

- Participation alone does not significantly impact league performance.
- While instruments are generally strong (**F-stat > 10**), estimated effects remain close to zero and statistically insignificant in early rounds.
- **Lower-market-value teams**: Positive and significant effects (**0.99 to 2.39**) in early rounds suggest stronger league performance following cup wins.
- **Larger team size**: Seem to be more resilient to fixture congestion, stronger and significant effects.
- **Caution**: Weak first-stage **F-stats** (**< 10**) reduce reliability of estimates. Directions of effects are clear.

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Discussion

Strengths:

- **IV Methodology:** Randomness of cup draws addresses endogeneity, robust causal interpretations in early rounds.
- **Heterogeneity Analysis:** Show directions of effects for team-level characteristics.
- **Practical Implications:** (Lower market-value) teams benefit from momentum boost of winning a cup fixture in league performance. Participation in a cup does not affect performance.

Shortcomings and Future Research:

- **Small sample sizes:** Limited power in later rounds ($n < 200$)
 - **Weak Instrument Heterogeneity Analysis:** Limited observations ($n < 100$)
 - **Exclusion:** Placebo test
- Expand datasets across seasons (FA Cup 1871) and countries (paid).
- Expand with UEFA/international match data to be valid.
- **Narrow scope:** Only round-specific effects
- Extend to cumulative effects, player well-being.

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Appendix

A. Descriptive Statistics of League Performance

	Participation		Cup Win	
	Yes	No	Win	No Win
Outcome Variable:				
Points in Next Fixture	1.57 (0.05)	1.20 (0.06)	1.53 (0.05)	1.34 (0.06)
Observations	620	497	609	429

B. Standardized Round Definitions

Round	Stage
1	Final
2	Semi-Finals
3	Quarter-Finals
4	Round of 16
5	Round of 32
6	Round of 64

C. Model Specifications

Model	$X_{i,r}^{(m)}$	Control Variables
1	-	-
2	Base Strength	Team Position
3	Distance	Distance
4	Recovery	Days till League Fixture
5	Intensity	Extra Time
6	Team Characteristics	Team Size, Total Market Value, Mean Age
7	Country	Country Code

Key Insight

Control variables, represented by the vector $X_{i,r}^{(m)}$, are added iteratively across seven model specifications to ensure robust estimates of the causal effect of cup wins on subsequent league performance.



D.1. Chi-Squared Test for Independence

Validating FA Cup Draw Randomness

Goal

Validate the randomness of FA Cup draws by testing independence between:

- **Fixture ID:** Categorical variable identifying matches within a round.
- **Binned Opponent Position:** Continuous positions divided into 5 bins.

Hypotheses

- H_0 : Fixture ID and Binned Opponent Position are independent.
- H_A : Fixture ID and Binned Opponent Position are not independent.

Test Methodology

- Perform Chi-squared test for independence using contingency tables for each round.
- Compare **observed frequencies** with **expected frequencies** under H_0 .

D.2. Chi-Squared Test for Independence

Example Data: Round 4 (Round of 16), FA Cup 2022

Observed Data:

- Round: 4th Round of FA Cup (2022).
- Variables: Fixture ID vs. Binned Opponent Position.
- Observations: Frequencies of opponent bins across fixtures.

Observed Contingency Table for Round 4 - England

Fixture ID	Bin 1	Bin 2	Bin 3	Bin 4	Bin 5
997624	0	0	1	1	0
997625	1	0	0	0	1
997626	0	2	0	0	0
997988	0	0	2	0	0
1004838	1	0	0	0	1
1004839	0	0	1	0	1
1004840	0	0	0	0	1
1004841	1	1	0	0	0

D.3. Chi-Squared Test for Independence

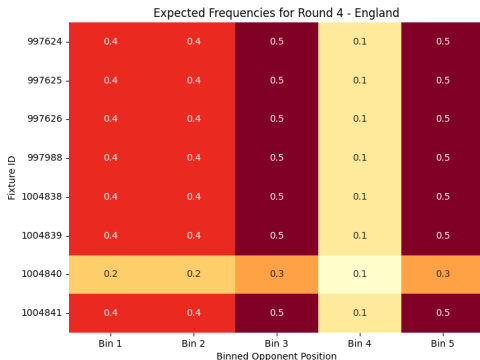
Statistical Results: Round 4 (Round of 16), FA Cup 2022

Chi-Squared Test Results:

- Chi-Squared Statistic: 33.1
- p -Value: 0.23
- Degrees of Freedom: 28

Conclusion:

- Fail to reject H_0 ($p > 0.05$). Indication for Randomness



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D.4. Chi-Squared Test for Independence

Summary Results for FA Cup 2022

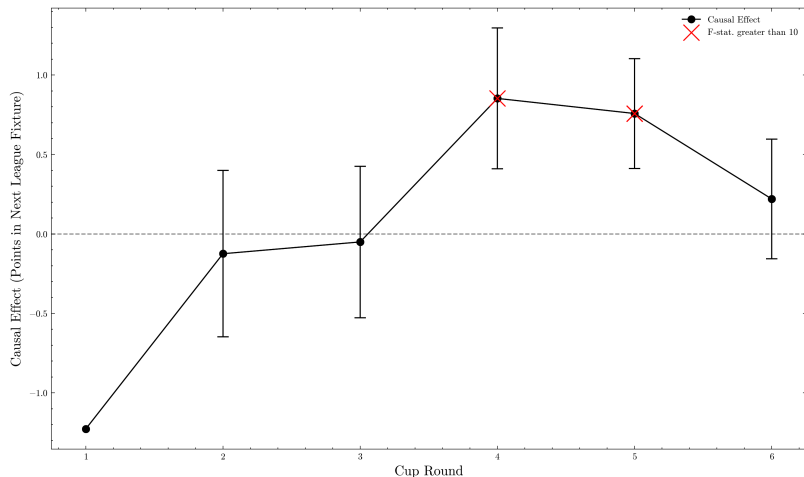
Chi-Squared Test Results for Randomness of Draws Across Rounds (FA Cup 2022).

Round	Chi-Squared Statistic	p -value	Degrees of Freedom
8	129.49	0.91	152
7	79.49	0.26	72
6	127.19	0.22	116
5	56.25	0.47	56
4	33.13	0.23	28
3	10.67	0.30	9
2	4.00	0.26	3
1	0.00	1.00	0

Key Insight

Failure to reject H_0 supports independence of fixture assignments, aligning with the random nature of FA Cup draws.

E.1. Summary Results Effect of Cup Win



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E.2. Winning a cup fixture in Round 5 improves performance

- Effects range from **0.53 to 0.55**, significant at the **5% level**.
- First-stage **F-statistics** are strong (**16.30 to 48.02**) - supports Relevance.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: First stage (dependent variable = win cup fixture)							
Opponent Position	0.01*** (0.003)	0.01*** (0.003)	0.01*** (0.003)	0.01*** (0.003)	0.01*** (0.003)	0.01*** (0.003)	0.01*** (0.003)
Opponent Division	0.17*** (0.02)	0.17*** (0.02)	0.17*** (0.02)	0.17*** (0.02)	0.17*** (0.02)	0.17*** (0.02)	0.18*** (0.02)
Panel B: IV estimates (dependent variable = next league performance)							
Win Cup Fixture	0.53* (0.28)	0.53* (0.28)	0.53* (0.28)	0.55** (0.28)	0.55** (0.28)	0.54** (0.28)	0.54** (0.28)
F-Statistic	48.02	38.00	28.52	22.90	19.07	16.45	16.30
R^2	0.12	0.14	0.14	0.14	0.14	0.18	0.19
Observations	705	705	705	705	705	705	705

Table 1: Estimates of the effect of winning a cup fixture in round 5 (round of 32) on league performance using random drawn opponent position and division as an IV.



F.1. Heterogeneity Analysis: Total Market Value and Squad Size

Market Value

- Low Value teams seem to benefit more from cup wins (e.g., **0.99**** [4], **2.39**** [5]).
- High Value teams have minimal and insignificant effects (e.g., **1.52** [4], **-0.41** [6]).

Squad Size

- Larger squads have stronger and significant effects (**3.10***** [4], **1.40*** [6]).
- Smaller squads have moderate and insignificant effects (**1.33**) [4], <0 in [5][6]).

Caution

F-statistics generally below 10, suggesting weak instruments. Small sample sizes (50-100) require careful interpretation.

F.2. Heterogeneity in Total Market Value: High vs. Low Teams

Cup Round	Total Market Value					
	Top 20%			Bottom 20%		
	4	5	6	4	5	6
Panel A: First Stage						
Division	0.05	0.17**	0.06	0.19**	0.26***	0.15***
Opponent Position	0.01	0.00	0.03***	0.03**	0.02*	0.02**
Panel B: IV estimates						
Cup Win	1.52	-0.29	-0.41	0.99**	2.39**	1.49**
F-Stat	1.46	2.93	2.64	1.08	4.01	3.10
Observations	82	93	69	50	49	98
Controls	Yes	Yes	Yes	Yes	Yes	Yes

- Minimal and weak effects for High Value teams.
- Larger and significant effects for Low Value teams.
- Weak instruments affect reliability, however direction of effects is clear.



G. Causal Effect of Cup Participation

- **Findings:**

- No significant causal effects of cup participation on league performance across all rounds.
- Example: IV estimates in Round 5 range from **-0.06 to 0.05**, none significant.
- F-statistics generally exceed 10, indicating strong instruments in most cases.
Round 3 and 4: **F = 9.22 to 24.30**.

Key Takeaways

Instruments are generally strong, but the causal effects of cup participation on league performance are close to zero and insignificant. Results suggest participation alone does not affect performance in next match.

H.1. Using Distance Traveled as an IV: Round 4

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: First Stage (dependent variable = cup win)							
Distance Traveled	-0.00024 (0.00020)	-0.00028* (0.00019)	-0.00035* (0.00018)	-0.00034* (0.00018)	-0.00034* (0.00018)	-0.00035** (0.00018)	-0.00034* (0.00018)
Panel B: IV Estimates (dependent variable = next league performance)							
Cup Win	0.60 (2.23)	0.70 (1.93)	0.70 (1.55)	0.58 (1.58)	0.63 (1.58)	0.40 (1.53)	0.42 (1.57)
F-Statistic	1.54	8.39**	16.72***	12.89***	10.28***	9.26***	8.63***
R^2	0.00	0.01	0.02	0.03	0.03	0.07	0.07
Observations	332	332	332	332	332	332	332

- Distance traveled shows weak first-stage effects with small coefficient estimates.
- IV estimates for cup wins are insignificant, with large standard errors across specifications.
- F-statistics indicate weak instruments in some specifications, particularly in column (1).
- Models with additional controls (columns 3-7) exhibit better instrument strength and slightly higher R^2 .



H.2. Using Distance Traveled as an IV: Round 5

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: First Stage (dependent variable = cup win)							
Distance Traveled	-0.00018** (0.00009)	-0.00018** (0.00008)	-0.00022*** (0.00008)	-0.00022*** (0.00008)	-0.00022*** (0.00008)	-0.00020*** (0.00008)	-0.00020*** (0.00008)
Panel B: IV Estimates (dependent variable = next league performance)							
Cup Win	-0.21 (1.22)	-0.22 (1.24)	0.05 (0.99)	-0.05 (0.99)	-0.07 (0.99)	-0.21 (1.09)	-0.22 (1.10)
F-Statistic	4.45**	8.24***	21.15***	15.83***	12.85***	9.45***	9.11***
R^2	0.01	0.04	0.13	0.13	0.14	0.16	0.17
Observations	414	414	414	414	414	414	414

- Distance traveled is a stronger instrument for Round 5 compared to Round 4, with highly significant first-stage coefficients.
- IV estimates for cup wins remain insignificant, with small and inconsistent point estimates.
- F-statistics in columns (3)-(7) suggest strong instruments, while lower F-statistics in columns (1)-(2) indicate weak instrument concerns.
- Models with additional controls (columns 5-7) exhibit better instrument strength and improved explanatory power (R^2).

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