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Tabloid media influence Euroscepticism: Quasi-experimental evidence from England

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Are citizens' attitudes towards EU-integration shaped by the tabloid media? The question whether public opinion can be a consequence, rather than a cause of media reports is difficult to answer because citizens self-select into media consumption. We use a quasi-experiment, the boycott of the most important eurosceptic tabloid newspaper, the Sun, in Merseyside county as a consequence of the newspaper's reporting on the 1989 Hillsborough soccer disaster – to identify the effects of the Sun boycott on attitudes towards leaving the EU. Using a difference-in-differences design and British Social Attitudes data as well as official EU referndum results, we show that attitudes towards the EU got significantly more positive in Merseyside during the boycott. We estimate that this effect amounts to around 11 percentage-points. The results of this paper have important implications for our understanding of media effects on public opinion, and suggest that the tabloid media played a role in influencing attitudes towards leaving the EU.

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Introduction

The world's largest Customs Union – the European Union (EU) – not only faces a severe debt crisis but also an ever more unfolding disintegration crisis. Most prominently, the United King-

dom held a referendum asking its citizens whether or not to leave the European Union in 2016. After a heated and polarized campaign, 51.89 % of voters supported "Brexit". During and after the "Brexit" campaign, observers, pundits and journalists wondered about the influence eurosceptic slant in the print media had on the "Brexit" referendum (*1, 2*). However, researchers have so far mostly emphasized structural causes, focusing on left-behind and working class voters (*3*). At the same time exactly these voter groups have been been exposed to eurosceptic tabloid media campaigns since the mid 1980s.

The question if the media are able to shape public opinion is central to the social sciences (*4–8*). At least since the 17th century, democratic theorists assign a crucial role to the press, either in informing and enlightening citizens (for a summary of these arguments, see: (*9*)), or in manipulating them to support or oppose a specific issue (*6, 10*). While theorists hence believe that the media are powerful, empirical research has faced severe methodological challenges in causally identifying the persuasive effects of the media on citizens' attitudes beyond framing and priming (*11–14*).

Mass media not only set the agenda, but also follow the political agenda, and are responsive to public opinion (*reverse causation*). Thus, even if studies find strong correlations between media exposure and public attitudes, it remains unclear whether the media shape public opinion or the other way around. While exposure to media slant can be manipulated in the lab and even in the field (*14*), lab and field experiments only expose citizens to media articles for a short period of time. They therefore cannot account for the effects of *sustained exposure* to a media campaign over a significant period of time (*15*). While results from lab and survey experiments are mixed (*16*), when researchers have used quasi-experiments to identify the effect of media exposure on voting intentions in the United States (*17, 18*), they have recorded significant effects. Moreover, evidence from non-democracies (*19, 20*) also suggests that the consumption of a medium can have important persuasive effects. Our study uses the quasi-experimental ap-

proach to identify the effects of the sustained campaign of an important medium, the Sun, on an issue of paramount policy importance, Brexit.

Research design

To shed light on the question whether and how tabloid media affect public attitudes towards the EU in the United Kingdom, we turn to a quasi-experimental design. Our design rests on a specific historical event, the Hillsborough sporting disaster, a human crush at the Hillsborough soccer stadium in Sheffield (England), which led to the boycott of the Eurosceptic tabloid "The Sun" in Merseyside county (UK). On 15 April 1989 Liverpool F.C. was playing Nottingham Forest in the semi-finals of the British Football Association (FC) Cup at the Hillsborough stadium located in Sheffield (UK). Originally the match was scheduled to start at 3 pm. Yet, approximately at 2.30 pm large crowds - predominantly Liverpool F.C. supporters - started gathering in front of the stadium. Police officers then decided to open the exit gates in order to ensure that the masses could enter the stadium on time and enjoy the soccer match. This uncontrolled instreaming of ever more people led to a overcrowding of the stadium, specifically of the side pens (*21*). As a result of the action taken by the police ninety-six people lost their lives, hundreds were injured and thousands traumatized (*22–24*).

The Sun's coverage of this disaster was particularly one-sided and falsely claimed that "the truth" about the disaster was that Liverpool fans were responsible for the chaotic escalation, and ultimately, their own death (see supplementary materials (SM) S1.1). This version of the events was comprehensively contradicted by multiple reports released by the official Hillsborough Independent Panel (*25*). The sustained, misleading reporting by the "The Sun" led to an unprecedented backlash and boycott of the newspaper within Merseyside county, where the city of Liverpool is located. It was supported not only by Liverpool fans, but also by supporters of Premier League rival Everton F.C. who showed their solidarity with the "Hillsborough 96",

vouching never to buy the Sun again. The Guardian estimated that in the wake of the Hillsborough disaster, the Sun's circulation fell from 55'000 copies to just around 12'000 copies in Merseyside, although this figures cannot be independently verified because the Sun refuses to release circulation figures for Merseyside following Hillsborough (*26*). Despite the Sun's unreserved apology in 2012 which stated under the headline "Hillsborough: The real truth" that "the people of Liverpool may never forgive us for the injustice we did to them" (*27*), the boycott is still ongoing (*28*).

The occurrence of the Hillsborough disaster gives us the rare opportunity to identify the causal effect of tabloid non-readership on attitudes towards the EU. If the circulation of the most important eurosceptic tabloid would be significantly reduced, what would be the effect on attitudes towards leaving the EU? Importantly, the Sun is read mostly among working class voters, exactly those citizens who also voted for Brexit. However, as it was unambiguously caused by a sporting disaster, Merseyside's boycott of "The Sun" was exogenous to the Sun's strong anti-EU slant. The Hillsborough Disaster and its consequences are therefore plausibly exogenous to "The Sun's" opinion on the EU. Thus, our research design addresses the issues of *reverse causation* discussed above. Second, the case of the Sun boycott in Merseyside is a rare opportunity to study the effects of a sustained long-term campaign by an important medium on an issue of great policy importance.

Given the strong anti-EU campaign of the Sun over the past 25 years (SM S1.2), we expect that the boycott should deprive potential readers of their main source of Eurosceptic information and opinion over the long term. This is due to a shock to both demand and supply. While initially, the boycott was mostly driven by football supporters, their family and friends stopping to purchase the tabloid in protest to the Sun's coverage, soon the boycott was coordinated by the Hillsborough justice campaign, and most news agents stopped stocking the Sun (*29*). A clear norm of boycotting the Sun developed, which does not only extend to reading the paper, but

also to interviews by public figures such as Merseyside MPs and celebrities who are publicly sanctioned when breaking the norm (*30, 31*). It is important to emphasize that papers in the UK are not sold via subscription, but publicly via newsagents. Especially before the advent of the internet in the 2000s, norm violations were hence easy to police, and initial boycotts easier to enforce, leading to habit formation which likely lasted into the internet age.

It is important to emphasize that while "Brexit" and the EU in general today are amongst the most salient political issues in the UK, in the 1980s and 1990s, the EU issue was only emerging and reporting was overwhelmingly one-sided, dominated by Eurosceptic coverage. The absence of an effective counter frame leaves ample room for media effects to materialise (*32, 33*). The Sun's coverage during the period of the boycott ranged from well-known sensationalist stories about EU regulations on the shape of Bananas, to criticisms of the European commission, EU treaties, and EU leaders. Since most people do not read the Sun for its EU opinion, but for its sports and celebrity coverage, we also expect that readers should not substitute the Sun with the other large Eurosceptic paper in the UK, the Daily Mail. This is because both papers, while sharing a Eurosceptic outlook, cater to different social classes and cultural tastes. Empirically, while expecting an initial backlash against the Sun's coverage, effects should mostly materialise over the long-term as former readers break their habit of consuming Eurosceptic information on a daily basis. Specifically, we expect that after Hillsborough, euroscepticism in Merseyside will decrease compared to those counties that were unaffected by the boycott. Moreover, this decrease should be most pronounced among the most likely consumers of "the Sun", the working class.[1]

To test if the Sun boycott due to the Hillsborough disaster led to a decrease in Euroscepticism, we exploit the occurrence of the Hillsborough disaster in a difference-in-differences framework (DiD), where parliamentary constituencies located in Merseyside that directly ex-

[1] A detailed analyses of Sun readership prior to the Hillsborough disaster can be found in SM S8.

perienced "the Sun" boycott form the treatment group, and the remaining 217 English parliamentary constituencies which did not directly experience the boycott, form the control group (*34, 35*). The treatment is the date of the Hillsborough disaster, which divides our time series into two periods, before and after Hillsborough. Our attitudinal analyses are based on the long-running and high-quality British Social Attitudes (BSA) survey. We measure euroscepticism by relying on a question asking respondents if "Britain should continue its EC/EU membership". Our dependent variable Leaving EU is then coded '1' if respondents answered that Britain should withdraw from the EC/EU, and '0' otherwise. We cover the years from 1985 to 1996, the last year in which a question on leaving the European Union was included in the BSA.The Hillsborough disaster occured in 1989.[2] 491 of the 9375 BSA respondents live in one of the 15 parliamentary constituencies in Merseyside that directly experienced the Sun boycott. Details about our identification strategy, the sample, data, and statistical analysis can be found in the Materials and Methods section of the supplementary materials (SM S1.3).

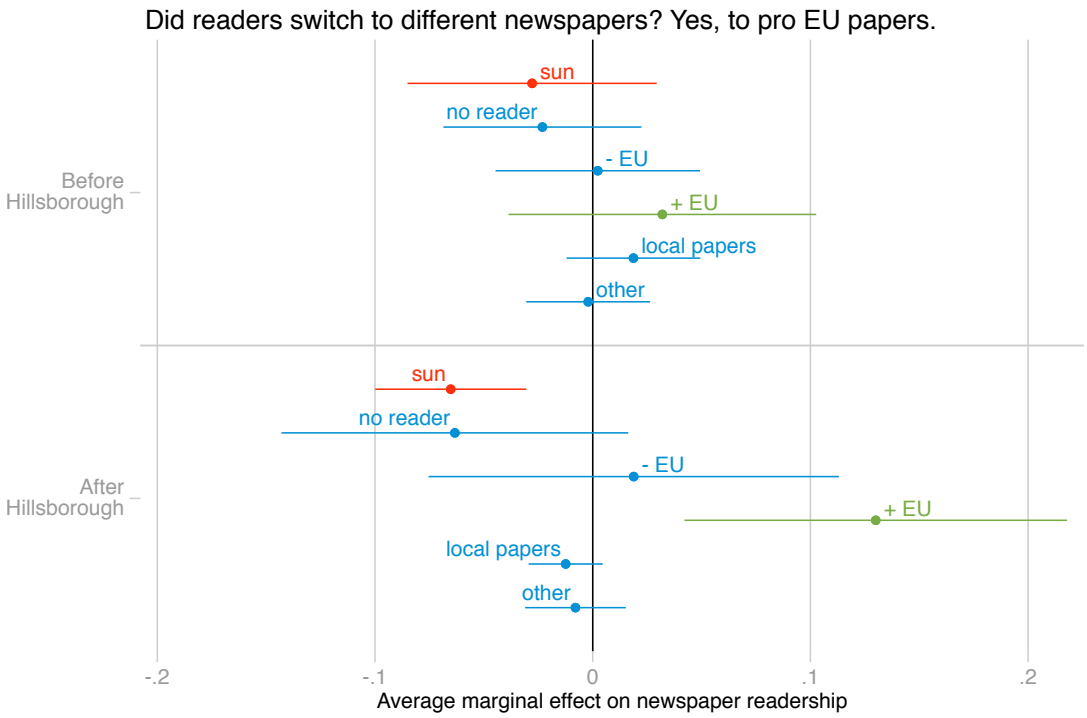
Results

First, to test the plausibility of our research design we (a) report the proportion of respondents in Merseyside county who reported to read "The Sun" before and after the Hillsborough Disaster and (b) investigate whether (Merseyside) plausibly would have followed the same trend as the untreated counties (remaining England) if it had never experienced the boycott (*parallel trends assumption*). Figure 1 reports results stemming from a DiD model using self-reported newspaper readership as the dependent variable. The Sun has consistently refused to release circulation data at the county level, and we are therefore unable to estimate the effects of the Hillsborough disaster on actual Sun readership. While self-reports can be a function of social desirability

[2]The BSA also contains data prior starting in 1983. Yet, since key covariates are not asked in the years before 1985 (e.g. education) the main findings are based on the years 1985-1996. Our findings remain robust to the inclusion of the entire time span (SM S2).

bias, in this case this would confirm the existence of a strong social norm against reading the Sun in Liverpool. We should hence treat this analysis as a manipulation check. We estimate

Figure 1: The decline and substitution effect of 'Sun' readership in Merseyside



Notice: Predictions of multinomial logistic diff-in-diffs surrounded by 95 % confidence intervals.

that, while before the Suns false reports about the disaster around 18 percent of Merseyside respondents reported reading the Sun on a daily basis, after the disaster the percentage declined to around 10 percent. Notice also that Figure 1 reports a substitution effect of Sun readership to pro-EU papers (mostly the Daily Mirror) instead of substitution to anti-EU newspapers (Daily Mail, Daily Telegraph, Daily Express). This is plausibly the case because many readers consume the Sun based on its cultural appeal and sports coverage which is most closely reflected by the Daily Mirror, not the Daily Mail. While we cannot empirically distinguish the effects of non-readership of Eurosceptic material and substitution with pro-EU material, during the

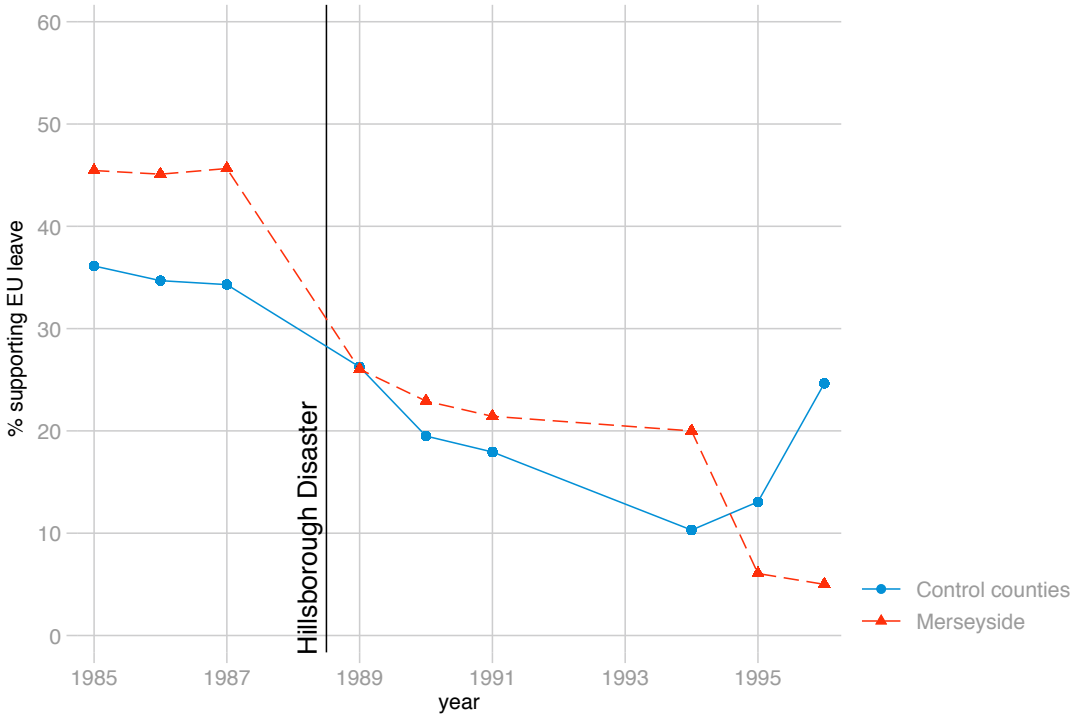
1990s, which is the period coveraged by the public opinion data, coverage of the EU issue was - with some exceptions - restricted to the Eurosceptic tabloid press. Nevertheless, we cannot rule out that substitution of a Eurosceptic newsmedia diet with a pro-EU diet plausibly contributes to the observed effects, especially in later years.

DiD designs only constitute a valid identification strategy if the parallel trends assumption is fulfilled. In the optimal scenario we would compare Merseyside after the Hillsborough disaster and the ensuing Sun boycott to a counterfactual Merseyside which would not have experienced Hillsborough and the Sun boycott. But obviously we can only observe Merseyside after having experienced the Hillsborough disaster. A comparison of Merseyside before and after the Hillsborough disaster does not alone provide a credible counterfactual because several time-varying confounders might have influenced EU attitudes across the enntire counntry. Therefore we create credible counterfactuals to Merseyside by relying on other counties in England. While we can never be certain that this assumption is truly fulfilled, observing parallel trends in the outcome variable prior to treatment suggests that the parallel trends assumption is unlikely to be violated. Figure 2 plots the percentage of respondents supporting leaving the EU for Merseyside and the control units across time.[3] The trends between Merseyside and the remainder of England are remarkably parallel before the Hillsborough disaster. In general we can conclude that the remaining counties in the BSA constitute a credible counterfactual for Merseyside.

After having outlined the credibility of our DiD design and the substantially large and statistically significant decrease of Sun readership in Merseyside, we now turn to the main findings of our analyses. Table 1 reports the main finding of our DiD models. Each model is based on the same identification strategy outlined in the appendix with the interaction between the Hillsborough disaster and Merseyside being the DiD estimand of interest. Each model uses a

[3]Notice that we cannot rely on the entire sample of English counties covered in the BSA since several counties are not included in each annual cross-section provided by the BSA. We cannot test the parallel trend assumptions for counties which we do not observe for the entire period. Thus, we only include counties in our analyses which are included for the entire period we analyze.

Figure 2: Testing the parallel trends assumption



different set of controls reported in the bottom part of the table. The first model does not use any controls, while models (2) - (7) sequentially introduce region fixed effects, time fixed effects, squared time trends and controls.

Table 1: Did Euroscepticism decrease after Hillsborough in Merseyside (1985-1996)? Yes.

	Leave EU					
	(1)	(2)	(3)	(4)	(5)	(6)
Hillsborough	-0.144	-0.0202	-0.0603	-0.140	-0.000420	-0.0547
	(0.0138)	(0.0283)	(0.0223)	(0.0127)	(0.0281)	(0.0209)
Merseyside	0.0952	0.0967	0.0940	0.0781	0.0814	0.0789
	(0.0505)	(0.0520)	(0.0530)	(0.0391)	(0.0402)	(0.0419)
DiD	**-0.119**	**-0.116**	**-0.118**	**-0.110**	**-0.106**	**-0.108**
	(0.0538)	**(0.0546)**	**(0.0521)**	**(0.0464)**	**(0.0470)**	**(0.0444)**
Constant	0.336	0.154	6674.7	0.277	0.325	6965.5
	(0.0106)	(0.0439)	(2332.7)	(0.0554)	(0.0639)	(2180.5)
Controls				✓	✓	✓
Regional FEs		✓	✓		✓	✓
Year FEs		✓			✓	
Year^2			✓			✓
R^2	0.0291	0.0369	0.0339	0.0711	0.0815	0.0775
N	7748	7748	7748	7701	7701	7701
$N_{constituencies}$	231	231	231	231	231	231

Clustered standard errors by constituency;
Controls (1985-1996): age, gender, education, religion, social class, party-ID;
region fixed effect & year fixed effects omitted from table.

Throughout all models we estimate a theoretically meaningful, large effect of Hillsborough on attitudes towards leaving the EEC/EU: After the Hillsborough disaster, Merseyside became less eurosceptic due to the absence of the Sun. Depending on the models we estimate, this effect ranges from 10 percentage-points to a 14 percentage-points decrease. Thus, we find a statisti-

cally significant and substantial drop of euroscepticism due to the Sun boycott in Merseyside. This effect is comparable in its size to previous studies on media effects (*14, 15*). Notice that this effect is also comparable in its size and significance ones we add regional, time fixed effects and controls.

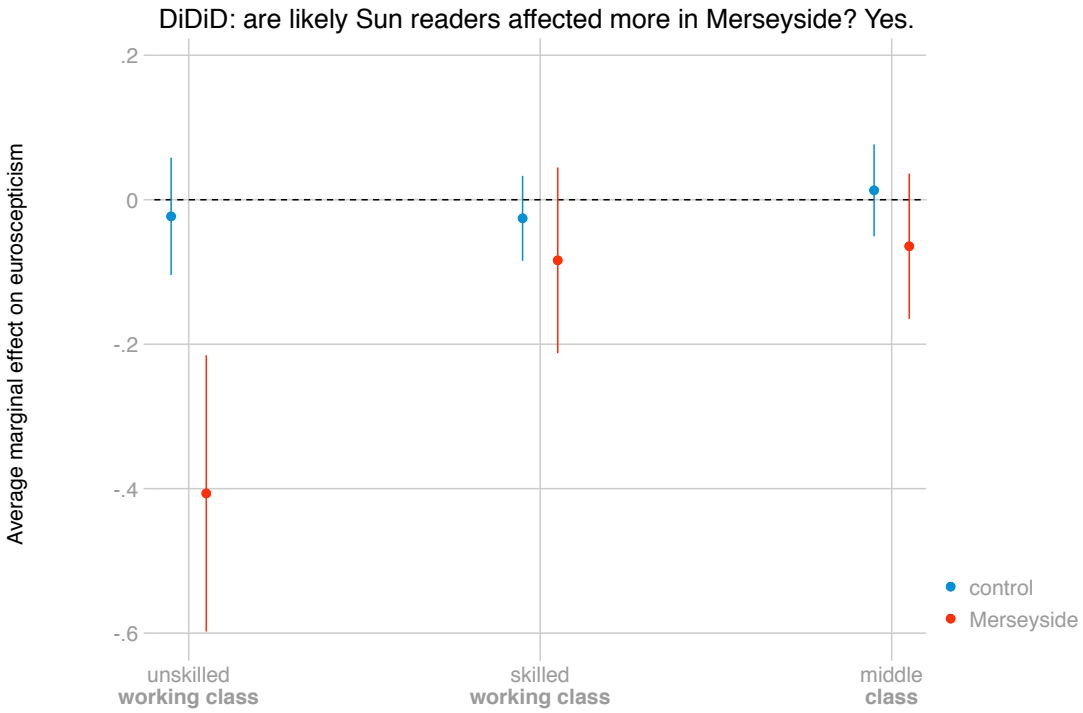
Although table 1 reports robust findings across all models, we conducted several robustness tests in the supplementary materials addressing further concerns. First, we restrict the analysis to Northern counties that are most comparable to Merseyside only. Re-estimating the DiD models for the Northern counties only does not change our findings (SM S3). Second, spillover effects into adjacent counties are possible. On the one hand this would mean that we underestimate the effect of reading the Sun on Euroscepticism since in the models reported in table 1 these constituencies are part of the control group. On the other hand we do not find a pattern of spillover effects into adjacent counties (SM S4). Third, the decrease of euroscepticism might not be unique to Merseyside but subject to a more general pattern across several counties. We randomly re-assigned the treatment into other constituencies in England using a (*permutation test*) and find that the drop of Euroscepticism in Merseyside remains statistically distinct from the sample of estimates we created (SM S5). Fourth, we used matching to address issues of comparability between treatment and control group across space and time. Again our findings remain robust (SM S6). Fifth, readers might be concerned about the violation of the exclusion restriction. For instance, the pattern of decreasing Euroscepticism might be caused by a differential change in support for the Labour Party or distaste for the Conservative Party during the 1990s. Again, robustness tests reveal that changes in party support in Merseyside reflected broader changes across England, and therefore cannot explain the sharp drop of Euroscepticism in Merseyside compared to other counties (SM S7).

Difference-in-Difference-in-Differences

We also report the results of a Difference-in-Difference-in-Differences design which utilizes differential subgroup propensities of reading the Sun pre-Hillsborough. Social class is the best predictor of whether a respondent reads the Sun. Hence, the effects of the succesful Sun boycott should be most pronounced among working class respondents, with middle class respondents who were unlikely to read the Sun in the first place acting as a control group within Merseyside.

We report our procedure in detail in the SM S8. We find that specifically unskilled working class respondents were much more likely to read the Sun than middle class respondents before the Hillsborough disaster. We should therefore expect that the effect of the Sun boycott should be most pronounced among working class respondents, and particularly among the unskilled working class. Figure 3 reports the marginal effects of the three-way interaction between the DiD estimand and social class. We do not find any significant effect of the Hillsborough disaster for working class respondents living outside of Merseyside (blue whiskers), again increasing the confidence in our results. In contrast, significant differences emerge within Merseyside following the disaster (red whiskers). The effects vary as expected along social class – with the most likely Sun readers being affected by the boycott. We observe significant decreases of euroscepticism for unskilled working class respondents while we estimate a null effect for respondents with middle class/white collar occupations that were very unlikely to read the Sun in the first place. Thus, the decrease of euroscepticism in Merseyside after the Hillsborough disaster reported in the first part of our analyses appears to be driven by working class respondents who should have been more likely to have read the Sun in the absence of the Hillsborough disaster.

Figure 3: Difference-in-Difference-in-Differences results for social classes

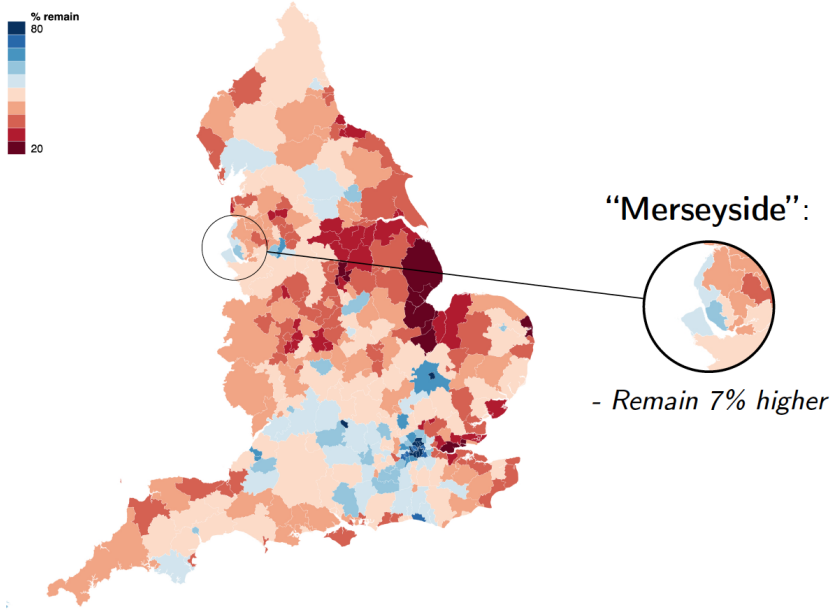


Note: Reported are the ATTs stemming from a difference-in-difference-in-differences model interacting the standard DiD estimand (Merseyside $\times$ Hillsborough) with self-reported social class (unskilled working class (baseline): *"never had job", unskilled*; skilled working class: *partly skilled, skilled*, middle: *intermediate, professionals*) of BSA respondents. Plotted are point estimates (scatter) surrounded by 95 % confidence intervals (whiskers).

2016 referendum

Finally, we look into differences between Merseyside and the remaining UK in the 2016 referendum vote. Figure 4 plots the remain votes for the "Brexit" referendum. Strikingly, Merseyside

Figure 4: Remain votes in the 2016 EU-referendum



voted significantly more "Remain" than the rest of England, by 7 percentage points. However, other regions – such as London, Oxfordshire or Cambridgeshire – also stand-out in their pro-European support. Yet, these regions are believed to be more pro-European than the remaining country for specific socio-economic (unemployment rate, median income) and political reasons (EU migration, EU regional funds). Thus, we need to account for similar alternative explanations that may have contributed to the outlying remain vote share in Merseyside. To do so, we again rely on the same DiD identification strategy used above and described in SM: S1. We use counting level data in the 2016 and 1975 EU referenda, controlling for alternative time-variant socio-economic and political explanations, and again estimate an OLS regression with regional fixed effects. All details about the sample, data, and statistical analysis can be found in the

Materials and Methods section of the supplementary materials (SM: S9). Controlling for population age, median hourly pay, unemployment rate, non-EU and EU migration and EU-funds per capita the results show that following the boycott counting areas located in Merseyside county were significantly less likely to vote for the eurosceptic option ("leave" in 2016 and "no" in 1975) in the 2016 Brexit referendum compared to 1975 than counting areas located within other English counties. Using this strategy, we estimate the effect of the boycott on the leave vote share to be around 10 percentage-points. This results is robust to adjusting for highly predictive covariates (R^2=.89).

Discussion

Robust evidence from a unique quasi-experiment shows that the boycott of the most important Eurosceptic newspaper - the Sun in Merseyside following Hillsborough - led to a decrease of euroscepticism in Merseyside, which we estimate to amount to around 8-12 percentage points. Moreover, our results suggest that non-readership of the Sun significantly decreased the leave vote share in Merseyside in the 2016 EU referendum. The estimated effects are non-trivial as the boycott could account for the difference between the actual result in Liverpool (41% leave) and a small, counterfactual majority for leave in this specific counting area. This study therefore shows that sustained media campaigns on emerging issues can have large, lasting, and ultimately, highly consequential effects on public opinion, public policy, and the stability of an organisation as large and important as the European Union.

The paper also shows that the decline of Euroscepticism in Merseyside following "the Sun" boycott was largely driven by a decrease in Euroscepticism among unskilled working class voters, who made up the largest share of Sun readers before the disaster. We therefore contribute to the debate about the role of the Northern working class in the Brexit vote, and highlight an important non-structural factor which likely contributed to the formation of Eurosceptic attitudes

among sections of the public during the 1990s and 2000s. We show that public opinion is partially endogeneous to media campaigns, which highlights the strategic failure of pro-EU elites to engage this debate early and provide an effective counter frame to the Eurosceptic campaign waged in the British tabloid media. As George Osborne, the former chancellor, and one of the key government figures in the Remain campaign wrote in 2018, "We were too late in the day trying to explain some of the benefits of European Union membership" (*36*).

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Supplementary materials

Materials and Methods (S1)

Supplementary Text

Figs. 5 to 10

Tables 2 to 6

References *(36-45)*

S1 Identification strategy

S1.1 Sun's coverage of Hillsborough

The Sun's coverage of the Hillsborough disaster was particularly one-sided and falsely claimed that "the truth" about the disaster was that the Liverpool fans were largely responsible for the chaotic escalation (see figure 5). Based partly on false information by a South Yorkshire police inspector, the Sun claimed that Liverpool fans had stolen from the dead as the disaster unfolded. According to the Sun's source one of the dead people had "numerous wallets" on him, and was likely "one of the Liverpool pickpockets".[4]

23 years after the incident, in the wake of the publication of the 2nd Hillsborough report by the Hillsborough Independent Panel established by Parliament, which concluded that Liverpool fans were in no way responsible for the disaster[5], the Sun admitted that their coverage was "false". The Sun apologized to the families of victims, and Liverpool supporters, and called their Hillsborough coverage "our gravest error", and the "blackest day in this newspaper's history". Their apology read "Today we unreservedly apologize to the Hillsborough victims, their families, Liverpool supporters, the city of Liverpool and all our readers for that misjudgment."

Despite what was clearly a commercial disaster for the paper, with sales in Merseyside

[4]The Guardian: How the Sun's 'truth' about Hillsborough unravelled: `https://www.theguardian.com/football/2016/apr/26/how-the-suns-truth-about-hillsborough-unravelled`.

[5]Hillsborough Independent Panel: `http://hillsborough.independent.gov.uk`.

Figure 5: The Sun's Hillsborough coverage

Source: The Sun on 13^{th} September 2012: We are sorry for our gravest error, `https://www.thesun.co.uk/archives/news/919113/we-are-sorry-for-our-gravest-error/`.

dropping from 524,000 to 320,000 overnight, in the days following the infamous front page, The Sun remained stubborn. This stubbornness led to a boycott of the Sun in the Merseyside area. The boycott was not only supported by supporters of Liverpool F.C., the most popular soccer club in the Merseyside region, but even supporters of Premier League rival Everton F.C. showed their solidarity with Liverpool supporters and the Hillsborough 96, and vouched never to buy the Sun again. Until today this boycott is ongoing. In 2017 after speaking to several victims of the Hillsborough disaster, the club owners, and the manager Jürgen Klopp decided to ban any Sun journalists from entering their stadium at Anfield road and their training ground.[6]

S1.2 Sun's coverage of EU

The Australian-born media mogul Rupert Murdoch bought the Sun in 1969. During the period

Figure 6: The Sun's anti-EEC coverage in the early 1990s

we study (1981-1996) the paper supported the Conservative party under Margaret Thatcher (PM from 1979-1990), and John Major (PM from 1990-1997). Since the beginning of the

[6]The Guardian: Liverpool ban Sun journalists over Hillsborough coverage:https://www.theguardian.com/football/2017/feb/10/liverpool-ban-the-sun-newspaper-over-hillsborough-coverage.

1980s, the Sun has printed strong anti-EU sentiments. For instance, on the frontpage in figure 6 it takes a strong stance against EU integration in November 1990. During the time period under investigation, there was hence no change in the Sun's stance on the EU. While the Sun supported New Labour under Tony Blair and Gordon Brown from 1997 until the 2010 General Election, it remained steadfast in its Eurosceptic slant and anti-EU coverage throughout UK Labour's last period in office (*15*).

S1.3 The difference-in-differences estimator

The unexpected occurrence of the Hillsborough disaster allows us to estimate the causal effect of a plausibly exogenous, sudden decline in Sun readership on attitudes towards leaving the EU. Given the strong anti-EU stance of the Sun, we assume that, after the Hillsborough disaster, euroscepticism should decrease in Merseyside, compared to the rest of the country. To test if the Hillsborough disaster firstly led to a decrease of Sun readership in Merseyside, and secondly, to a decrease in Euroscepticism, we exploit the occurrence of the Hillsborough disaster in a difference-in-differences design (*34, 37–40*). More specifically we use the Hillsborough Disaster to assign respondents into treatment (=Merseyside) and control groups (=remaining England):

$$\begin{aligned} leavingEU_{i,c,t,r} = \alpha + \gamma Merseyside_{i,c} + \lambda post\,Hillsborough_{i,t} + \\ \beta(Merseyside \times post\,Hillsborough_{i,c,t}) + \varsigma' X_{i,c} + \tau_t + \rho_r + \epsilon_{i,c,t} \end{aligned} \tag{1}$$

where *Leaving EU*$_{i,c,t,r}$ is respondent$_i$'s support to leave the EU in constituency$_c$ at year$_t$; ρ_r are regional fixed effects, τ_t year fixed effects, $\zeta_{i,c}$ a vector of individual level controls X outlined below and $\epsilon_{i,c,t}$ the error term. $\gamma_M \times \lambda_t$ is the treatment effect of interest based on the Hillsborough disaster which is an interaction term between a set of binary dummy variables being '1' for constituencies in Merseyside (γ_M) and a binary variable being '1' for all respondents surveyed after the Hillsborough disaster (λ_t). Since the sampling frame of the survey is stratified by constituency, we cluster our standard errors at the constituency level.

S1.4 The British Social Attitudes survey (BSA)

Our analyses is based on the long-running and high-quality British Social Attitudes (BSA) survey. We measure euroscepticism by relying on a question asking respondents if "Britain should continue its EC/EU membership". Respondents can then either answer "continue", "withdraw", or "don't know'.[7] Our dependent variable *Leaving EU* is then coded '1' if respondents answered that Britain should withdraw from the EC/EU, and 0 otherwise. We cover the years from 1983 to 1996, the last year in which a question on leaving the European Union was included in the BSA.[8] We control for respondents' gender, age, education, ethnicity, self-reported social class and party identification. Since the BSA reports the interview dates for each respondent, we can directly identify which respondents were interviewed before and after the 20^{th} of April 1989 – the day the Sun published its article on the Hillsborough Disaster.

S2 Including data from 1983 & 1984

Unfortunately the BSA does not report a major confounding variable prior to the 1985 data, namely *education*. Therefore, we decide to include only data from 1985 onwards in our main analysis. However table 2 below reports the same models as table 1 in the mainbody of the paper with including all available data from the BSA. The major drop in N is due to no information about education existing for a subset of respondents reported after 1985. Please notice that the major findings are robust to using the entire data. If anything the point estimate becomes stronger in size, suggesting an effect of about 14 percentage points.

[7] From 1993 onwards the BSA introduced six answer categories to the same question: "uk leave ec", "stay+reduce ec power", "leave as is", "stay+incr.ec power", "single ec govt", and "don't know". However, since this change in the measurement instrument does not coincide with the treatment, it should not bias our results. All results are robust to excluding the 1993-1996 period.

[8] Unfortunately, the question only re-appears in different wording in the 2015 wave of the BSA. We also include a range of control variables in our models.

Table 2: Did Euroscepticism decrease after Hillsborough in Merseyside (1985-1996)? Yes.

	Leave EU					
	(1)	(2)	(3)	(4)	(5)	(6)
Hillsborough	-0.182	-0.0186	-0.0520	-0.140	-0.000420	-0.0547
	(0.0139)	(0.0279)	(0.0206)	(0.0127)	(0.0281)	(0.0209)
Merseyside	0.121	0.104	0.102	0.0781	0.0814	0.0789
	(0.0507)	(0.0382)	(0.0396)	(0.0391)	(0.0402)	(0.0419)
Diff-in-diff	-0.144	-0.129	-0.132	-0.110	-0.106	-0.108
	(0.0524)	(0.0437)	(0.0416)	(0.0464)	(0.0470)	(0.0444)
Constant	0.374	0.168	8636.6	0.277	0.325	6965.5
	(0.0103)	(0.0425)	(1639.9)	(0.0554)	(0.0639)	(2180.5)
Controls				✓	✓	✓
Regional FEs		✓	✓		✓	✓
Year FEs		✓			✓	
Year^2			✓			✓
R^2	0.0413	0.0597	0.0546	0.0711	0.0815	0.0775
N	9375	9375	9375	7701	7701	7701
$N_{constituencies}$	232	232	232	231	231	231

Clustered standard errors by constituency;

Controls (1983-1996): age, gender, education, religion, social class, party-ID;

region fixed effect & year fixed effects omitted from table.

S3 Northern UK only

Below we report the same models as used in the mainbody of the text and described in S1 for the Northern regions of the UK only. The substantive meanings of our findings remain unaffected by this re-estimation on a different subsample.

Table 3: Did Euroscepticism decrease after Hillsborough in Merseyside (**The North only**)? Yes.

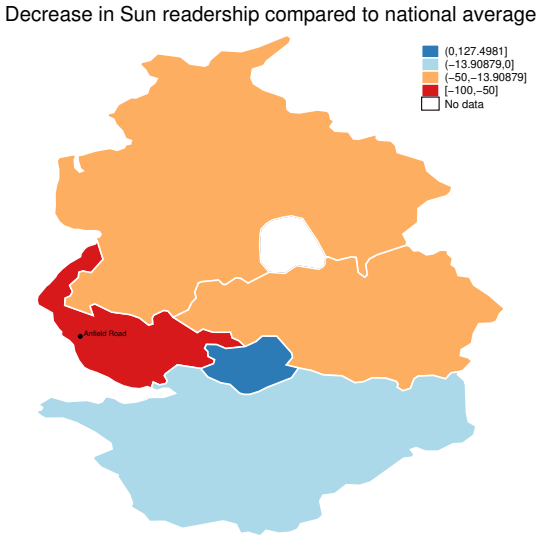
	Leave EU					
	(1)	(2)	(3)	(4)	(5)	(6)
Hillsborough	-0.134	-0.00898	-0.0388	-0.138	0.0106	-0.0357
	(0.0181)	(0.0342)	(0.0269)	(0.0162)	(0.0372)	(0.0249)
Merseyside	0.109	0.108	0.105	0.0923	0.0856	0.0827
	(0.0513)	(0.0525)	(0.0532)	(0.0380)	(0.0392)	(0.0405)
Diff-in-diff	-0.0945	-0.111	-0.110	-0.0783	-0.0963	-0.0971
	(0.0562)	(0.0565)	(0.0565)	(0.0462)	(0.0471)	(0.0463)
Constant	0.322	0.113	5384.6	0.272	0.00807	4115.4
	(0.0136)	(0.0439)	(2880.7)	(0.0655)	(0.0823)	(2573.2)
Controls				✓	✓	✓
Regional FEs		✓	✓		✓	✓
Year FEs		✓			✓	
Year^2			✓			✓
R^2	0.0269	0.0345	0.0323	0.0790	0.0890	0.0857
N	4692	4692	4692	4660	4660	4660
$N_{constituencies}$	183	183	183	183	183	183

Clustered standard errors by constituency;
Controls (1985-1996): age, gender, education, religion, social class, party-ID;
region fixed effect & year fixed effects omitted from table.

S4 Spillover

Below we look into the drop of Sun readership in counties which are adjacent to Merseyside. It becomes visible that the region of Merseyside stands out and the if any spillover effects exist

Figure 7: Are there spillover effects to adjacent counties? No.

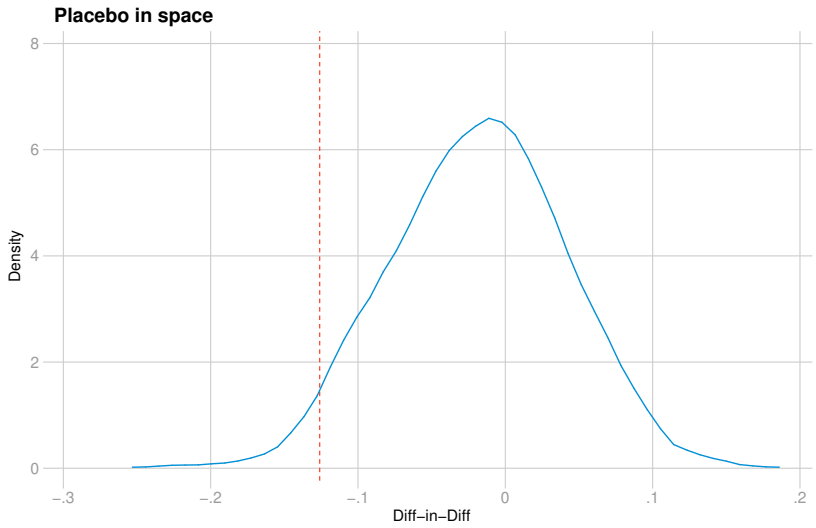


the are of very minor nature which are not detected in the macro patterns of the data.

S5 Permutation test

The decrease of euroscepticism might not be unique to Merseyside, but driven by a more general trend against euroscepticism in England in the 1990s. For instance, at least four regions (Greater Manchester, Lancashire, Cheshire) experienced a similar decrease in euroscepticism after the Hillsborough disaster. To address this concern we estimate a placebo test in space. More specifically, we randomly re-assigned the Hillsborough event into other constituencies in England. The upper panel in figure 8 reports the finding of this randomization test. The red vertical line reports the effect we found for Merseyside while the density plot reports the estimated effect for all 1000 permutations we estimated. It becomes strikingly evident that the Hillsbor-

Figure 8: Placebo tests: placebo in space



Note: Placebo in space based on 1'000 permutations, reports an ATT=-0.126 with SE(P)=0.006.

ough effect for Merseyside remains distinct and is statistically different from the distribution of placebo effects we estimated.

S6 Matching on observables

S6.1 Covariate balance statistics

Below we report the distributional differences between the treated (Merseyside after the Hillsborough disaster) and the control group. While there is no empirical evidence to support the use of any particular cut-off point on the standardized difference to define imbalance, Rubin (*41*) suggests that a standardized difference between treatment and control group of about 0.25 is strong evidence for imbalance. The last two columns of table 4 report the standardized difference and variance ratio (ratio of treated and control variances as a balance measure of the second moment, where balance is defined by values close to 1.0). As can be seen according to Rubin's 0.25 criterium, we only find imbalances between treatment and control for the Labour

vote variable — with a substantially higher share of respondents voting for the Conservatives in the control group. All other variables appear to be balanced between treatment and control groups.

Table 4: Covariate balance between treatment (Liverpool after Hillsborough) and control groups

	Treated			Control			**Balance**	
	mean	variance	skewness	mean	variance	skewness	**std. diff.**	**variance ratio**
age	46.23664	354.4566	.3787138	46.62632	323.7468	.3028696	**-.0211611**	**1.094857**
gender	1.559796	.247053	-.2409148	1.546512	.2478613	-.1868567	**.0267058**	**.996739**
university	.1882952	.15323	1.594611	.2043331	.1625973	1.466553	**-.0403589**	**.9423897**
religious	.6208651	.2359921	-.4982365	.6327768	.2323934	-.5508861	**-.0246142**	**1.015485**
social class	3.066158	1.102755	-.4100634	3.036474	1.037234	-.0526337	**.0286966**	**1.063169**
labour	.2798982	.2020694	.9805202	.2843371	.2035097	.9561684	**-.0098572**	**.9929224**
conservative	.2086514	.1655372	1.433997	.3411847	.2248	.6699553	**-.299999**	**.7363754**

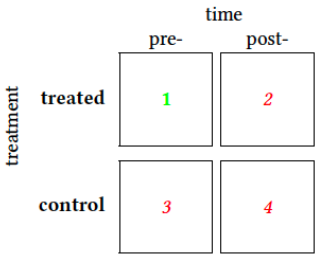
S6.2 Matching

Even though we only observe imbalance between treatment and control groups for the Conservative vote, we still decided to estimate matching models to be as rigorous as possible. Matching techniques help to address concerns of distributional in-balances between treatment and control groups for observational studies (*41–46*). Thereby matching mainly addresses issues of omitted variable bias in observational research. Yet, few studies use matching for difference-in-differences (DiD) models. Furthermore, until today there appears to be no consensus on how matching can be used in models, especially for DiD models based on repeated cross-sections such as our study.

The difficulty in applying matching methods in DiD designs are twofold. First, since balance between treatment and control groups is established based on covariates which credibly affect the outcome of interest, matching methods might introduce post-treatment biases for DiD studies based on repeated cross-sections. Given that there is no simple mathematical fix for this issue, researchers are advised to only match on variables which are plausibly not affected by an obvious issue of post-treatment bias.

Second, matching techniques usually match a *single* treated group on a *control* group. However, DiD models are essentially based on four groups. They are based on a treatment and control group, but these groups are again split by time – namely by pre- and post-treatment periods (see table 5).

Table 5: Relevant groups for DiD models



This means that for DiD estimands two potential selection biases should be addressed by matching techniques. First, selection biases across time. To use our case as an example, our DiD model assumes that the groups we compare do not change across time. But likely they will, for instance by people moving out or into Liverpool. Second, selection biases across the treatment status groups. This means that the groups are different to begin with. Again, applied to our case we showed in table 4 that there is a difference in the distribution of Labour voters between Liverpool and the control group. This second difference is not an issue for DiD studies, since constant difference across treatment and control groups do not violate the parallel trends assumption. However, if the first issue applies – differences across groups across time – the parallel trends assumption could be violated.

To address this concern we match each group onto group 1 (the pre-treated group). By doing so we ensure that the matching technique addresses both biases across groups, and more importantly across time:

1. We are interested in the effect of our treatment on group 1 in table 5 – namely the effect

of the treatment on the respondents living in Liverpool prior to the Hillsborough Disaster.

2. We then code a variable which reflects all four groups:

   - **Group 1:** if Hillsborough=0 & Liverpool=1
   - **Group 2:** if Hillsborough=1 & Liverpool=1
   - **Group 3:** if Hillsborough=0 & Liverpool=0
   - **Group 4:** if Hillsborough=1 & Liverpool=0

3. We then estimate a multinomial logit model with the group variable as our dependent variable and all covariates (X_i) included in our study (*age, gender, university, religious, social class, Conservative voter, Labour voter*) as predictors of group status. We use group 1 as our baseline category in the multinomial logit model.

4. We export the probabilities of belonging to each group based on a respondents covariate from the results of the multinomial logit model.

5. We estimate a respondent's probability of belonging to Group 1 based on the probability of the respondent belonging to her/his group. Thus, we define the probability of being in group 1 versus being in the other groups. More specifically, each respondent is assigned four probabilities, namely the probability of belonging to each of the four groups. We then use each of these four probabilities to weight them to be similar to group 1 (treatment group in pre-treatment period):

$$w_i = \frac{p_1(X_i)}{p_g(X_i)} \tag{2}$$

   where g is the subscript for a respondent i's status group. Therefore, respondents which are part of group 1 will have a weight of exactly 1. All remaining respondents receive a propensity weight which is relative to the probability of the group they are actually in.

6. Finally, we introduce this weights into the DiD models we estimated in our paper. Thus, we weight each respondent by their probability to be in the treatment group prior to treatment.

Table 6 reports the findings from our matching results. While the ATT decreases to about 8 % points the effect of the Hillsborough disaster remains statistically significant and substantive in its size. We omit questions on voting in the first model since they are plausibly affected by media exposure as (*15*) have shown especially for the British case. Yet our findings for matching is not affected by this decision as the results show.

Table 6: Did Euroscepticism decrease after Hillsborough in Merseyside (**Matching**)? Yes.

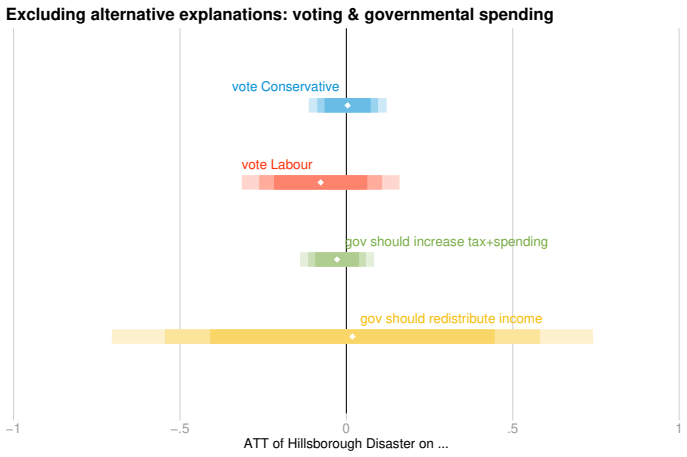
	(1)	(2)	(3)	(4)
	Leave EU	Leave EU	Leave EU	Leave EU
Merseyside	0.0625	0.0635	0.0653	0.0777
	(0.0399)	(0.0373)	(0.0424)	(0.0473)
After Hillsborough	-0.104	-0.103	-0.0753	-0.147
	(0.0137)	(0.0136)	(0.0404)	(0.0309)
Merseyside × After Hillsborough	-0.0808	-0.0832	-0.0813	-0.0775
	(0.0376)	(0.0364)	(0.0384)	(0.0369)
age *(continuous)*	0.00210	0.00248	0.00231	0.00238
	(0.000698)	(0.000732)	(0.000793)	(0.000789)
female *(Yes; No)*	-0.0337	-0.0289	-0.0308	-0.0299
	(0.0195)	(0.0193)	(0.0202)	(0.0192)
university *(Yes; No)*	-0.119	-0.116	-0.120	-0.118
	(0.0420)	(0.0400)	(0.0403)	(0.0407)
religious *(Yes; No)*	-0.0264	-0.0230	-0.0171	-0.0213
	(0.0342)	(0.0341)	(0.0342)	(0.0346)
never had job	0.0101	0.0220	0.0182	0.0262
	(0.115)	(0.102)	(0.102)	(0.104)
professional	-0.138	-0.0995	-0.111	-0.103
	(0.103)	(0.102)	(0.0990)	(0.103)
intermediate	-0.161	-0.137	-0.138	-0.139
	(0.0606)	(0.0562)	(0.0545)	(0.0583)
skilled	-0.0863	-0.0728	-0.0744	-0.0733
	(0.0332)	(0.0323)	(0.0334)	(0.0337)
partly skilled	-0.0451	-0.0439	-0.0448	-0.0435
	(0.0423)	(0.0411)	(0.0423)	(0.0411)
Conservative voter		-0.0860	-0.0962	-0.0906
		(0.0315)	(0.0316)	(0.0312)
Labour voter		-0.140	-0.143	-0.146
		(0.0297)	(0.0265)	(0.0297)
Constant	0.440	0.453	0.429	-7.312
	(0.0406)	(0.0439)	(0.0634)	(5.762)
Regional FEs			✓	✓
Year FEs			✓	
Year^2				✓
R^2	0.0639	0.0786	0.0917	0.0817
N	7701	7701	7701	7701
$N_{constituencies}$	231	231	231	231

Clustered standard errors by constituency;
Reference category: unskilled for class;
region fixed effect & year fixed effects omitted from table.

S7 Exclusion restriction

During the beginning and mid 1990s, the UK saw a decline in Conservative party support and a shift to the Labour Party, first lead by the late John Smith and after the former's death, from 1994 onwards, by Tony Blair. Thanks to its industrial heritage and radical political tradition,

Figure 9: Exclusion restriction



Merseyside has always been a strong bastion of the UK Labour Party. A steeper drop in support for the governing Conservative Party in Merseyside than elsewhere in the beginning and mid 1990s could hence invalidate our research design by violating the exclusion restriction. However, as Figure 9 above shows, the differential decline in support for the Conservatives is no more pronounced in Merseyside than in other UK regions. In fact, the difference-in-differences estimate is a tightly estimated null. We can therefore rule out that it is a more pronounced decline in Conservative party support that could explain the differential increase in the observed EU support in Merseyside post 1989 rather than a decline in Sun readership as a function of the Hillsborough soccer disaster.

S8 Who reads the Sun?

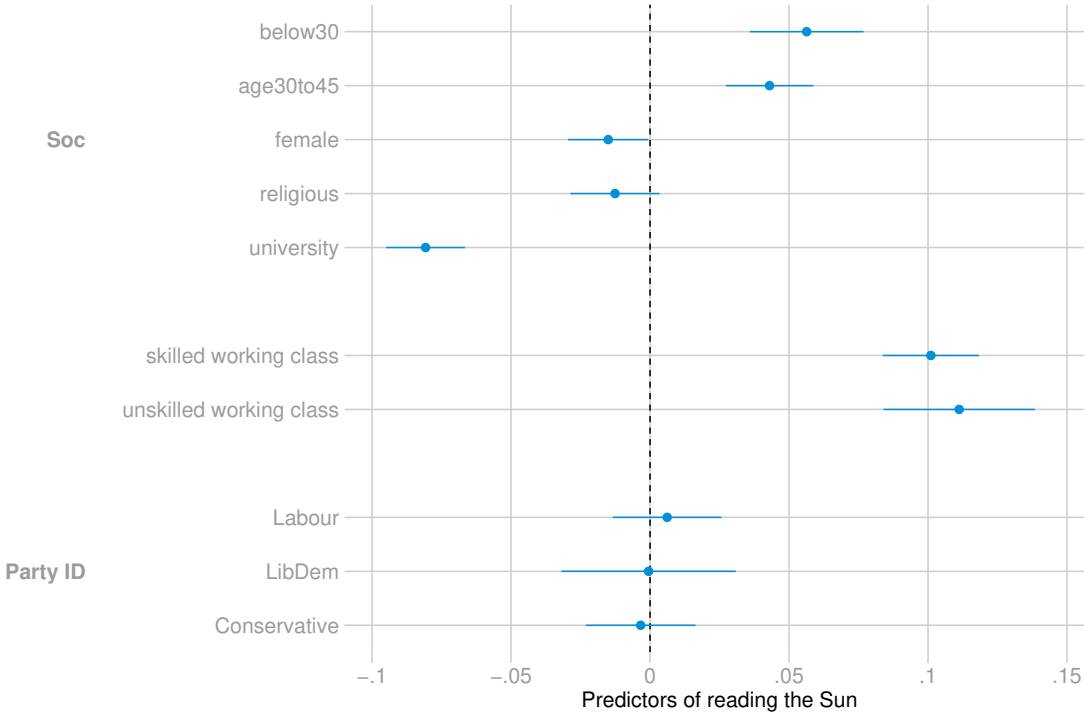
We estimated an OLS regression on which BSA respondents are most likely to read the Sun in the pre-Hillsborough data. We care about the Sun readership for at least two reasons.

First, the most immediate reaction to the Hillsborough Disaster came from the reactions of FC Liverpool supporters. FC Liverpool fans immediately selected out of reading the Sun. Thus, plausibly this group should be the one most affected by the Sun boycott. FC Liverpool fan largely correspond to the working class in Liverpool (partly unskilled and unskilled classes).

Second, the effect of the Hillsborough Disaster on euroscepticism should be strongest for people who are the plausible Sun readers after the Disaster. However, given that our analyses is based on repeated cross-sections we cannot plausibly know which persons would have read the Sun in Liverpool if the Hillsborough Disaster never had happened. We only observe people in Liverpool in the presence of the Disaster. Yet, we can approximate this group by relying on the strongest predictor(s) of Sun readership in the pre-Hillsborough data. Once we have identified this group we can run a difference-in-difference-in-differences (DiDiD) model as described in the main body of the text.

The OLS estimates are reported in figure 10. It becomes clearly visible that university education and social class are the strongest predictors for sun readership in the pre-Hillsborough data set. The higher a respondents' social class, the less likely s/he is to read the Sun. The unskilled working class is by far the most likely to read the Sun, followed by the skilled working class. Although we have no data on this question, it appears plausible that working class people are also more likely to be Liverpool F.C. supporters. To help with interpretation of our DiDiD estimates, and to have a large enough N in all cells we recoded the class variable into three categories, unskilled working class (*"never had job", unskilled working class*), skilled working class (*partly skilled, skilled working class*) and middle class (*intermediate, professionals*). We then use this recoded class variable to estimate the DiDiD model. We do this by using the exact

Figure 10: Who reads the Sun?



Note: Baseline category for class is "working class".

same identification strategy and models reported in S1. However, we interact the general DiD estimator (Merseyside $\times$ post Hillsborough) with the class variable discussed above.

$$\begin{aligned} leavingEU_{i,j,k,c,t,r} = \alpha + \gamma_1 Merseyside_{i,c} + \lambda_1 post\,Hillsborough_{i,t} \\ +\beta_1(Merseyside \times post\,Hillsborough_{i,c,t}) + \zeta class_j + \theta class_k + \\ \gamma_2(class \times Merseyside_{j,c}) + \lambda_2(class \times post\,Hillsborough_{k,t}) + \\ \beta_2(class \times Merseyside \times post\,Hillsborough_{j,c,t}) + \lambda_3(class \times post\,Hillsborough_{k,t}) + \\ \beta_3(class \times Merseyside \times post\,Hillsborough_{k,c,t}) + \varsigma' X_{i,j,k,c} + \tau_t + \rho_r + \epsilon_{i,j,k,c,t} \end{aligned} \tag{3}$$

where subscript $_i$ stands for unskilled working class respondent, subscript $_j$ for skilled working class respondent, and subscript $_k$ for middle class respondent.

S9 Referenda (2016, 1975) findings

In table 7 we report the findings of our 1975, 2016 refernda analysis. Again we use the same identification strategy as reported in S1. Yet, here we observe each referendum counting area twice (in 1975 & 2016). We then code 2016 as the post-Hillsborough event and again interact this variable with the Merseyside region. The findings report that Merseyside is about 10 percentage points less Eurosceptic in the 2016 EU referendum than the remaining UK compared to the 1975 referendum.

Table 7: DiD: Effect of Hillsborough on 2016 Leave vote share

	Leave vote share		
	(1)	(2)	(3)
Hillsborough	0.246	0.244	0.244
	(0.00592)	(0.00590)	(0.00570)
Merseyside	0.0313	0.0234	0.0234
	(0.00598)	(0.0145)	(0.0180)
Hillsborough × Merseyside	**-0.102**	**-0.100**	**-0.100**
	(0.0246)	**(0.0248)**	**(0.0279)**
econ. EU dependence		0.1000	0.1000
		(0.0668)	(0.0699)
share +60		0.0791	0.0791
		(0.0559)	(0.0610)
median pay		0.0999	0.0999
		(0.0136)	(0.0137)
share EU migrants		0.797	0.797
		(0.205)	(0.248)
share Non-EU migrants		-0.0919	-0.0919
		(0.0705)	(0.0769)
change of unqualified		0.117	0.117
		(0.0931)	(0.0999)
% unemployed		0.0111	0.0111
		(0.00715)	(0.00715)
EU funds per capita		-0.00000206	-0.00000206
		(0.0000560)	(0.0000684)
% Finance employment		-0.118	-0.118
		(0.0720)	(0.0760)
% manufacturer employment		0.0380	0.0380
		(0.0444)	(0.0460)
% unqualified		0.775	0.775
		(0.0665)	(0.0683)
Share of res. pop. qual 1		0.893	0.893
		(0.144)	(0.151)
” qual 2		0.533	0.533
		(0.150)	(0.162)
” qual 3		0.511	0.511
		(0.120)	(0.127)
constant	0.349	-0.405	-0.405
	(0.00772)	(0.0576)	(0.0613)
Regional FEs	✓	✓	✓
R^2	0.773	0.855	0.855
N	652	630	630