



Media effects on sustainable food consumption. How newspaper coverage relates to supermarket expenditures

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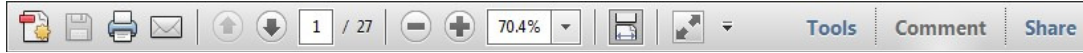
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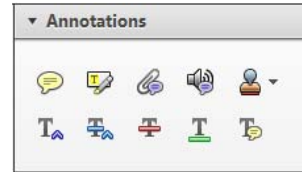
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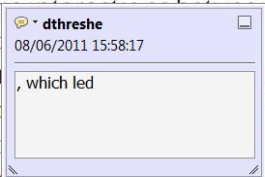


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How to use it

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standard framework for the analysis of microeconomic activity. Nevertheless, it also led to the development of a new paradigm of strategic behavior. The number of competitors in the industry is that the structure of the main components of the model, at the level, are exogenous. An important work on this by Shirone (M henceforth)¹ we open the 'black b



2. [Strikethrough \(Del\)](#) Tool – for deleting text.



Strikes a red line through text that is to be deleted.

How to use it

- Highlight a word or sentence.
- Click on the [Strikethrough \(Del\)](#) icon in the Annotations section.

there is no room for extra profits as mark ups are zero and the number of firms (net) values are not determined by market clearing. Blanchard ~~and Kiyotaki~~ (1987), in a perfect competition in general equilibrium, the effects of aggregate demand and supply shocks in a classical framework assuming monopoly competition between an exogenous number of firms

3. [Add note to text](#) Tool – for highlighting a section of text to be changed to bold or italic.



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- Highlight the relevant section of text.
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dynamic responses of mark ups consistent with the VAR evidence

sation by Markov and Bell. The number of competitors and the impact on the structure of the sector is that the demand-



4. [Add sticky note](#) Tool – for making notes at specific points in the text.

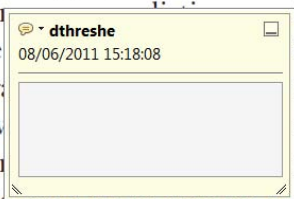


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How to use it

- Click on the [Add sticky note](#) icon in the Annotations section.
- Click at the point in the proof where the comment should be inserted.
- Type the comment into the yellow box that appears.

and supply shocks. Most of the literature on this topic is based on a standard framework. The number of competitors and the impact on the structure of the sector is that the demand-



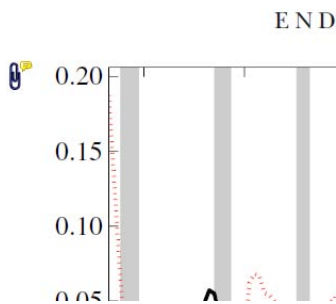
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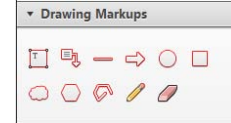
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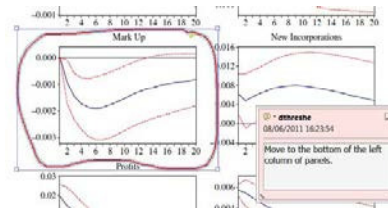


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- Double click on the shape and type any text in the red box that appears.



1 Media effects on sustainable food consumption. How 2 newspaper coverage relates to supermarket expenditures

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AQ6

18 Keywords

Consumer expenditures, media readership, scanner data, sustainable consumption, food, mixed methods.

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14 Introduction

16 An increasing body of literature addresses the role of media on
17 public opinion, attitudes and behaviors in relation to climate
18 change, and particularly to sustainable consumption. This interest
19 arises because media are considered an important setting for
20 the reconstruction of environmental discourses (Corbett and
21 Durfee, 2004), which is also highly influential on people's per-
22 ception of environmental problems (Sampei and Aoyagi-Usui,
23 2009). Because of the impact on people's opinion and attitudes
24 about the environment, media sources are also generally be-
25 lieved to have some effects in directing consumer choices and
26 behavior (Buenstorf and Cordes, 2008; Vigar *et al.*, 2011). This
27 belief is at the basis of most policy interventions aiming at tar-
28 geting consumption, which are framed around what Shove
29 (2010, 1274) polemically calls the ABC models: in order to
30 influence consumers' choices (C), which are outcomes of spec-
31 ific behaviours (B), policy needs to modify individuals' atti-
32 tudes (A). Under this paradigm, if media are effective in
33 influencing how people explicitly feel about the environment
34 (their explicit attitudes, or consumer's stated intentions) we
35 should expect some variation in people's choices and
36 behaviours.

37 The acknowledged limit of this approach consists in the
38 observed inability of pro-environmental attitudes to translate
39 into environmentally friendly choices and sustainable be-
40 haviours. This problem is known as 'attitude-behaviour gap'
41 (LaPiere, 1934; Blake, 1999; DEFRA, 2008; de Barcellos
42 *et al.*, 2011) and has often been studied by evaluating the con-
43 straints of contextual factors on people's choices. The problem
44 with the identification of external and contextual factors imped-

ing people's choices, according to Shove, consists in the fact
that any attempt of cataloguing them has resulted in highly
variable, long, arbitrary and ultimately inefficient lists (Shove
2010, 1275). A whole direction of research has thus shifted the
attention from attitudes to practices (Warde, 2005): here the
focus is not on what people think, believe, or value, but on
what people do, or declare they do, in their everyday life and
the consequences that the outcomes of habits and routines (no
matter if intentional or unintentional) have for the environment.

Despite the indication that we should focus on practices
rather than attitudes, the ABC approach still inspires policy-
makers targeting behavioural change in environmental con-
sumption (DEFRA, 2008). In what seems to be the mainstream
approach (for some notable exceptions see Southerton *et al.*,
2011), consumers are surveyed on a large scale, segmented
according to their explicit attitudes and reported behaviours on
specific issues (Barr and Gilg, 2006; Frame and Newton, 2007;
Verain *et al.*, 2012; Kang *et al.*, 2013) and targeted appropri-
ately using different strategies, for instance eco-labelling
(Aprile *et al.*, 2012; Sirieix *et al.*, 2013), information cam-
paigns, and media coverage. This is the case, for example, in
relation to food consumption, where information has focused
especially on the kind of products which have more or less
environmental impact. By informing consumers on the greenest
available choices, assuming the positive attitudinal disposition
towards sustainable consumption, public interventions aim at
modifying the patterns of consumers' purchases and conse-
quently reducing the environmental impact of overall food
consumption.

The limits of such interventions are essentially that firstly
they focus on reported rather than observed behaviours, as

76 already noticed within the practice theoretical framework¹;
 77 and secondly that they fail to provide a robust consensus on
 78 how information is perceived by consumers. On this second
 79 issue, some work has been recently done: Hanss and Bohm
 80 (2012), for example, focus the attention on how consumers
 81 understand the concept of sustainability and how this is
 82 related to consumption decisions. Furthermore, it has been
 83 noticed that consumers may not hold the required knowledge
 84 to critically evaluate competing options of sustainable food
 85 (Vecchio and Annunziata, 2012). In this article, we aim to
 86 test the effects of information provision on consumers’
 87 observed food expenditures, and to understand the way in
 88 which the content and the framing of information may affect
 89 this effectiveness.

90 After this introduction, the detailed aim of this work is pre-
 91 sented in ‘Aims of the study: moving beyond attitudes’ section.
 92 This is followed by a review of studies that have observed and
 93 tested the relation between the media debate on climate change
 94 and the public opinion on environmental issues. Building on
 95 these studies, we present and discuss our analytical strategies
 96 that adopt a mixed method explanatory sequential design (Cres-
 97 well *et al.*, 2008). ‘The data: media sources, searching strings,
 98 grocery categories, customers’ sample’ section describes the
 99 data used in the analysis, where we connect the number of
 100 articles dedicated to environmentally friendly food categories
 101 with corresponding monthly grocery expenditure data from
 102 Tesco, the largest UK retailer (DEFRA, 2011). ‘Results’ sec-
 103 tion presents the results of the quantitative analysis, followed
 104 by results of the content analysis. In ‘Discussion: the complex-
 105 ities of media debate over sustainable food’ section, we discuss
 106 the implications of our results. ‘Conclusion’ section concludes
 107 the article by summarizing the main results and indicating
 108 future directions of research.

109 **Aims of the study: moving beyond**
 110 **attitudes**

111 The effectiveness of information over public opinion and
 112 explicit attitudes towards environmental issues has been
 113 observed in several studies (Mazur and Lee, 1993; Nisbet and
 114 Myers, 2007; Sampei and Aoyagi-Usui, 2009; Scruggs and
 115 Benegal, 2012). However, as we have previously mentioned,
 116 attitudes often fails to translate into consequent behaviours.
 117 Here we want to skip the passage through attitudes and opin-
 118 ions altogether and see if information on the sustainability of
 119 food consumption directly correlates with observed purchases
 120 of food categories, by virtue of being consciously or uncon-
 121 sciously internalised by consumers. It could be that consumers
 122 better perceive information framed in specific ways, for exam-
 123 ple by insisting on health benefits of food categories rather
 124 than their lower impact on the environment. Or it could be that
 125 by repeating the same message over and over, consumers
 126 unconsciously internalise the message and modify their behav-
 127 iours without changing the overall opinions about sustainable

¹The practice theoretical framework also shows that the environmental impact of food consumption does not depend only on consumers’ purchases, but it has much more to do with the system of distribution, provisioning, usage and waste of food (Warde and Southerton, 2012).

128 food consumption. We test the hypothesis of the effects of
 129 information over food purchases using regression analysis
 130 (specified in the ‘Aims of the study: moving beyond attitudes’
 131 section), to observe how the coverage of news targeting sus-
 132 tainable food consumption in printed UK media (broadsheet
 133 and tabloids²) relates to food expenditures in Tesco supermar-
 134 kets (UK) over a 2-year period. If we find no dependency
 135 between information and purchases, results give strength to the
 136 critiques of the ABC models that aim at modifying consumers’
 137 purchases by simply informing them on the sustainability of
 138 products.

139 If we find some dependency, the second goal of the paper is
 140 to understand under which conditions information may be use-
 141 ful for changing expenditures patterns. We expect that different
 142 audiences perceive and decode information in different ways,
 143 as extensively shown by the cultural studies’ tradition of
 144 research (Hall, 1980; Liebes and Katz, 1990). This is because
 145 the content of the news is believed to have an impact on how
 146 people decode the message (Hall, 1980; Kolandai-Matchett,
 147 2009; Scruggs and Bengal, 2012). Therefore we should expect
 148 that discourses on different topics impact audiences differently:
 149 are there some topics that prove to be more effective in influ-
 150 encing food purchases over time? And if so, how are they
 151 framed compared to unsuccessful topics? In order to address
 152 these questions content analysis (De Sola Pool, 1959; Neuen-
 153 dorf, 2002) is subsequently used on a subsample of the data,
 154 selected for its significance, to identify recurrent frames and
 155 produce a set of interpretative hypothesis that can be used to
 156 illustrate some of the quantitative results.

157 **Analytical strategies: modeling the relation**
 158 **between media coverage and scanner data**

159 The academic literature on the provision of environmental
 160 news and its influence over public opinion is vast, and it gener-
 161 ally concentrates on broad environmental issues. Discourse
 162 analysis has been the primary tool for the qualitative identifica-
 163 tion of dominant patterns of discussion framing the environ-
 164 mental debate in the news (Doulton and Brown, 2009; Gavin
 165 and Marshall, 2011), and for the analysis of the underlying
 166 political, economic, cultural, and infrastructural content (Son-
 167 nett *et al.*, 2006; Uusi-Rauva and Tienari, 2010; Gavin and
 168 Marshall, 2011). In some cases quantitative techniques have
 169 been used to test the influence of information on opinion polls.
 170 Scholars have found a strong relationship between the amount
 171 of media coverage of climate change and shifts in public opin-
 172 ion (Nisbet and Myers, 2007), although with a short-lasting
 173 influence mainly due to the competition of other issues in the
 174 media arena (Sampei and Aoyagi-Usui, 2009). Some authors
 175 found that public opinion can be negatively influenced by con-
 176 tradictory media coverage (Weber and Stern, 2011), while other

²In this article, we use the distinction between broadsheet and tabloids when discussing our media samples. We are aware that the distinction is more about the quality of the newspaper rather than the format, and nowadays titles like the Independent and the Times publish in tabloid format. When discussing about printed media more generally, we will sometimes use the term ‘newspaper’ to retain consistency with the previous literature, but we expressively refer to the wider category of printed news.

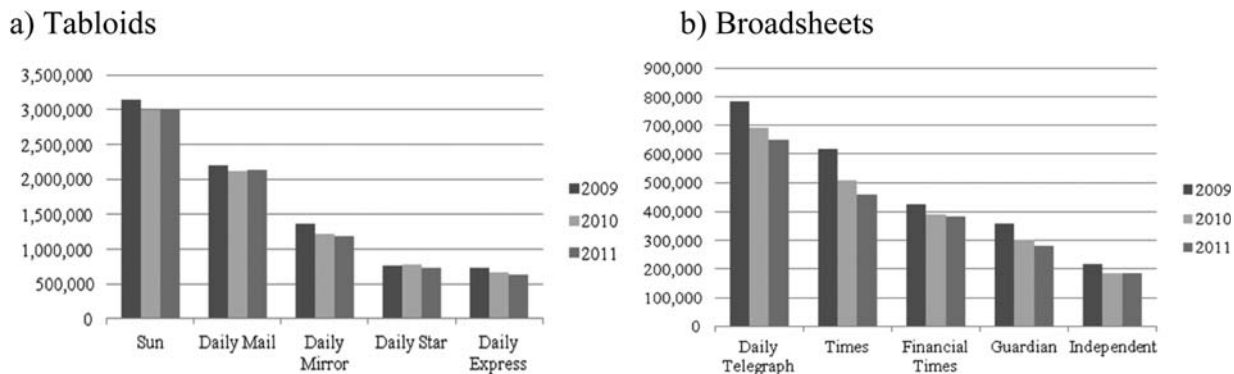


Figure 1 Circulation of main daily UK press from 2009 to 2011 (a) Tabloids, (b) Broadsheets.

Source: Audit Bureau of Circulations.

Note: The same ranking is substantially reflected in the Sunday broadsheets and tabloids. Note also that the Sun launched a Sunday edition only in February 2012.

177 research have revealed that the skeptic coverage of climate
 178 change, if not negatively influencing public opinion, at least
 179 confuses it (Dunlap and McCright, 2010; Gavin and Marshall,
 180 2011). In other studies instead the content of the news seemed
 181 to have less effect on public awareness of environmental prob-
 182 lems than the mere number of published articles (Mazur and
 183 Lee, 1993). In other words, the more consumers are exposed to
 184 an environmental problem, no matter how contradictory the
 185 debate is, the more they declare to be aware.

186 The study of media coverage and public opinion has thus
 187 benefit from both qualitative and quantitative approaches, the
 188 first being able to disentangle the way in which news are
 189 framed, information perceived, and opinions informed; the sec-
 190 ond generalizing the qualitative observation on a large scale
 191 and assessing the impact numerically. In this article, we want
 192 to merge the two approaches and their peculiar strengths. In the
 193 first step of our analytical strategy we want to extend the exist-
 194 ing literature by testing the conditional dependence between
 195 media coverage of food-related environmental issues against
 196 observed food expenditures, rather than against reported atti-
 197 tudes or public opinions.³ Following previous results based on
 198 public opinion studies, we explore whether a positive correla-
 199 tion between the number of published articles on a specific
 200 topic and the corresponding expenditures exists, and how long
 201 the relation might last (or might take to be observed). To test
 202 for the conditional dependence of food expenditures on media
 203 articles we regress the total expenditure (*sales*) on a specific
 204 food category⁴ at time *t* against the number of articles (*media*)
 205 that discuss the environmental implication of such food cate-
 206 gory (Varian, 1992) as:

$$\ln(\text{sales}_t) = \beta_0 + \beta_1 \cdot \ln(p_t) + \beta_2 \cdot \ln(\text{foodexp})_t + \sum_{k=0}^4 \delta_k \cdot \text{media}_{t-k} + e_t \quad (1)$$

Equation (1) adjusts for total food expenditures (*foodexp*),
 and average price (*p_t*), and residuals are assumed to be tempo-
 rally autocorrelated,⁵ where $e_t = (\rho \cdot e_{t-1} + v_t)$. This is because
 rather than assuming only a contemporaneous relation between
 information and consumer expenditures, Eq. (1) allows for a
 slow assimilation process. Four monthly lags correspond to the
 duration of the impact of advertising on sales (Clarke, 1976)
 and to 1 week above the duration of the effect of promotions
 on sales (Pauwels *et al.*, 2002). While advertising differs from
 media as a less impartial source of knowledge (Huh *et al.*,
 2004; Micu and Thorson, 2008), it can still be considered as a
 form of information supply (Nelson, 1974; Griffin and
 Dunwoody, 1995), and Clarke's estimates (1976) represent the
 best option in the absence of equivalent parameters for media.

Quantitative estimates from Eq. (1) assesses the first research
 question by looking at the overall relation between media and
 expenditures, if any, paying attention to specific topics of dis-
 cussion and their corresponding expenditure categories. This is
 consistent with research highlighting that public awareness on
 environmental issues relies primarily on quantitative coverage
 (number of articles) rather than qualitative (its content) (Mazur
 and Lee, 1993), but it cannot illustrate differences in response
 patterns. Consequently, the second step of our analytical strat-
 egy consists in investigating how the framing of the food-
 related environmental message might influences consumers. We
 want to observe if the political standing of the media and their
 respective readers, and the specific framing of the news, relate
 not much to public opinions and attitudes, as observed in
 Carvalho (2005, 2007), rather to consumers' expenditures. This
 second research question is studied performing content analysis

³Previous studies have made use of scanner data to observe variations and patterns in food expenditures, see for example the work of Anders and Moeser (2008) on the consumption of organic meat in Canada.

⁴We calculate the total amount of food expenditure in the various categories as the average of purchases of all Tesco customers in a given month for all expenditures on food (total expenditures on food), and for each specific food category (e.g.: total expenditures on red meat). We also calculate the same averages for each category for customers who buy specific printed media, as explained further on in the paper.

⁵The autocorrelation correction removes the influence of elements that span across time periods, which are unobservable because they are not available in the data set.

Table 1 Voting by regular readers, by tabloid or broadsheet title (2010 elections)

Journal Type	Readership	Conservative	Labour	Liberal Democrat	Others
Total	All GB Adults	37%	30%	24%	10%
Tabloids	The Sun	43%	28%	18%	11%
	Daily Mail	59%	16%	16%	9%
	Daily Mirror	16%	59%	17%	8%
	Daily Star	22%	35%	20%	23%
	Daily Express	53%	19%	18%	10%
Broadsheet	Daily Telegraph	70%	7%	18%	5%
	The Times	49%	22%	24%	5%
	Financial Times	n.a.	n.a.	n.a.	n.a.
	The Guardian	9%	46%	37%	8%
	The Independent	14%	32%	44%	10%

Source: Ipsos Mori, see the research and publication archive at <http://www.ipsos-mori.com/>.

Table 2 SUSTAIN’s principles of sustainable food and the corresponding search strings

SUSTAIN’s ‘7 Principles of Sustainable Food’	Search Strings
0 General	<ul style="list-style-type: none"> • Food and sustainability or carbon or ‘climate change’
1 Specify food from farming systems that minimise harm to the environment, such as certified organic produce.	<ul style="list-style-type: none"> • Food and organic or OGM or ‘genetically modified’ or pesticides
2 Limit foods of animal origin (meat, dairy products and eggs) served, as livestock farming is one of the most significant contributors to climate change, and promote meals rich in fruit, vegetables, pulses, wholegrains and nuts. Ensure that meat, dairy products and eggs are produced to high environmental and animal welfare standards.	<ul style="list-style-type: none"> • Food and ‘animal welfare’ or ‘animal cruelty’ • Food and vegetarian or vegan • Food and ‘animal origin’ and meat or dairy or eggs • Food and ‘free range’ or ‘battery farmed’
3 Exclude fish species identified as most ‘at risk’ by the Marine Conservation Society, and choose fish only from sustainable sources- such as those accredited by the Marine Stewardship Council.	<ul style="list-style-type: none"> • Food and ‘Marine Conservation Society’ or ‘Marine Stewardship Council’ • Food and ‘farmed fish’ • Food and ‘sustainable sources’ and fish
4 Choose Fairtrade-certified products for foods and drinks imported from poorer countries, to ensure a fair deal for disadvantaged producers.	<ul style="list-style-type: none"> • Food and ‘Fair-trade’
5 Promote health and well-being by cooking with generous portions of vegetables, fruit and starchy staples like wholegrains, cutting down on salt, fats and oils, and cutting out artificial additives.	<ul style="list-style-type: none"> • Food and sustainability and health or ‘well being’ or ‘artificial additives’ or wholegrain

Note: SUSTAIN’s principles also include the categories ‘Use local, seasonally available ingredients’ and ‘Avoid bottled water’. We did not include local food because we could not isolate products according to this criterion. We also excluded bottled water because we had very few articles on this issue, most of them unrelated to sustainability.

237 of a subsample of those articles included in the quantitative
238 analysis.

239 **The data: media sources, searching**
240 **strings, grocery categories, customers’**
241 **sample**

242 In our empirical analysis, we use supermarket data representing
243 actual purchasing behaviors in specific categories of food con-
244 sumption. The data refers to expenditures recorded in Tesco

Clubcard data set,⁶ a databank containing information on 245
around 16.5 million UK cardholders. The data set allows us to 246
observe a varied range of expenditure classes (of newspapers 247
and food), which can be connected to determine a high- 248

⁶The data set has been collected for the research project ‘Modelling consumer behaviours’, funded by the Sustainable Consumption Institute, University of Manchester. For more information on the data set, see Panzone *et al.* (2013) and Panzone (2013).

Table 3 Food categories selected from Tesco's Clubcard data set

Category	Expenditure Category
0: General	<ul style="list-style-type: none"> • Total food and drinks expenditures
1: Organic	<ul style="list-style-type: none"> • Expenditures on foods with organic labels • Expenditures on organic Fruit and Vegetables (F&V)
2: Animal Origin	<ul style="list-style-type: none"> • Expenditures on meat products • Expenditures on red meat products • Expenditures on dairy products • Expenditures on eggs • Expenditures of F&V • Expenditures of free range meat • Expenditures of free range eggs
3: Fish	<ul style="list-style-type: none"> • Expenditures on fish
4: Fair-trade	<ul style="list-style-type: none"> • Expenditures on foods with fair-trade labels
5: Health and well-being	<ul style="list-style-type: none"> • Expenditures on low-salt products • Expenditures on low-fat products • Expenditures on wholegrain rice • Expenditures on wholegrain pasta • Expenditures on wholegrain bread

249 resolution image of consumers over time. We focus our obser-
 250 vations on purchases of specific food categories for registered
 251 loyalty-cardholders who have been selected according to the
 252 type of broadsheets and tabloids they buy during their weekly
 253 food shopping. In this way we can associate the expenditures
 254 for news with expenditures of other goods.

255 **Media sources**

256 We selected media sources focusing on four criteria. First,
 257 readership includes the two most popular broadsheets and tab-
 F1 258 loids in the UK (Figs. 1a and b). Second, we limit our attention
 259 to national press. Third, we exclude printed media with no Sun-
 260 day edition (as discussed below). Finally, the analysis limits its
 261 focus on one liberal and one conservative broadsheet, as well
 262 as one liberal and one conservative tabloid, deriving the politi-
 263 cal stance from the 'Voting by Newspaper Readership 2010'
 T1 264 survey (Table 1). These criteria identified *The Daily Mail* (con-
 265 servative) and *The Daily Mirror* (liberal) as tabloids; and *The*
 266 *Daily Telegraph* (conservative) and *The Guardian* (liberal) as
 267 broadsheets.⁷

⁷A caveat of the data is that it only analyzes a specific source of infor-
 mation (broadsheets and tabloids), with no information on other impor-
 tant sources like television, internet, or marketing campaigns (Nerlich
 and Koteyko, 2009; Gavin and Marshall, 2011). However, previous
 studies have shown that printed media are still considered the most
 credible source of information (Chyi and Lasorsa, 2002; Kang *et al.*,
 2011). Also, our data do not account for multiple readerships: while a
 non-significant effect could be caused by readership of different media
 with conflicting messages, we still capture the average impact of
 articles from a newspaper on the expenditures of their readers. Cer-
 tainly, purchasing a newspaper does not necessarily imply reading it,
 and an insignificant coefficient could indicate that consumers buying
 that printed media have simply skipped the environmental information.
 While it is a limitation that our data does not observe actual readership,

Searching strings

268

The criteria for the selection of food categories are based on 269
 SUSTAIN's⁸ principles of sustainable food (<http://www.sustain-> 270
[web.org/sustainablefood/](http://www.sustainablefood/)).⁹ Through these principles we devel- 271
 oped a series of keywords and text strings (Table 2) and 272 T2
 searched the four selected media (both their daily and Sunday 273
 editions) for the number of articles containing them, using the 274
 Lexisnexis library (<http://www.lexisnexis.com>). The keywords 275 AQ4
 are intentionally left broad enough to include any kind of arti- 276
 cle that may influence expenditures in the corresponding food 277
 category, despite its direct reference to the environment. For 278
 example, if SUSTAIN says 'Limit foods of animal origin 279
 (meat, dairy products and eggs) served, as livestock farming is 280
 one of the most significant contributors to climate change', our 281
 analysis is intended to see if articles related to food of animal 282
 origin (whatever they discuss, if they relate to the sustainability 283
 of production and consumption, or to the lack of cruelty in pro- 284
 duction) can have an effect in modifying expenditures on meat 285
 in general, of red meat in particular, of food of animal origin 286
 (dairy, eggs), and of free range products. We also included a 287
 general category covering 'sustainable food' to capture articles 288
 on sustainability that do not contain any other searched 289
 terms. We covered the period February 2009 to May 2011.¹⁰ 290

Grocery categories

291

Subsequently, we identified 17 grocery categories that could be 292
 viewed as targets of the articles containing the searched strings, 293
 specifically 16 food categories together with the total food and 294
 drinks (F&D) expenditures (Table 3). Dunnhumby Ltd (the data 295 T3
 manager) provided monthly food expenditures for each of these 296
 categories (total sales in GBP) from the Tesco Clubcard data set, 297
 from May 2009 to May 2011. Data also includes an average 298
 price.¹¹ We could not observe some food categories of interest to 299
 the analysis, particularly British labels or sustainable fish. While 300
 no proxy for local food was available, we used general fish 301

it removes a news selectivity bias in the results, implying that the vari-
 able representing the number of published article is statistically inde-
 pendent from unobservable consumers' preferences for specific news.

⁸Sustain is a registered UK charity and a company limited by guarantee
 which advocates food and agriculture policies and practices that
 enhance the health and welfare of people and animals, improve the
 working and living environment, enrich society and culture and pro-
 mote equity. It was launched at the UNED-UK hosted Healthy Planet
 Forum on 17 June 1999. It was formed by merging The National Food
 Alliance and the Sustainable Agriculture Food and Environment
 (SAFE) Alliance, both of which had been established for over 10 years.

⁹Academic research presents unclear results on whether some categories
 (e.g. fair trade or organic products) are effectively environmentally sus-
 tainable or not: we adopt the definitions provided from SUSTAIN as a
 proxy for what passes as shared cultural representation on sustainable
 in UK, without questioning if these definitions are right or wrong, a
 matter which is not of concern of a social science study.

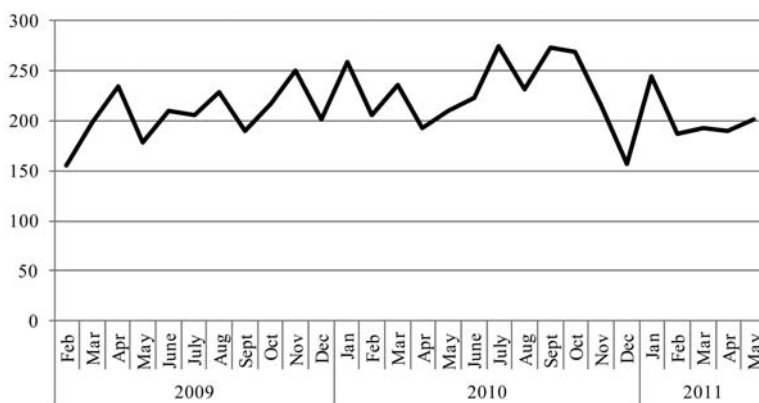
¹⁰While expenditures on food categories have been observed from May
 2009 to May 2011 as explained below, articles have been selected from
 February 2009 to allow 4 months lag period in which we can observe
 if they had an impact on the corresponding purchases.

¹¹Prices refers to the average price of a unit transacted (e.g. the ratio
 total sales/total units sold), as unit prices (e.g. £/kilos) were not
 available.

Table 4 Number of articles for media categories for the four sources

Media Cat.	All Sources		The Guardian		The Telegraph		The Mirror		The Mail	
	N	%	N	%	N	%	N	%	N	%
0: General	2,084	29%	1,060	33%	673	28%	108	19%	243	24%
1: Organic	2,826	39%	1,176	36%	1,068	45%	201	35%	381	37%
2: Animal Origin	1,998	28%	852	26%	533	23%	251	43%	362	35%
3: Fish	93	1%	40	1%	32	1%	4	1%	17	2%
4: Fair-trade	118	2%	57	2%	29	1%	14	2%	18	2%
5: Health and well-being	82	1%	46	1%	28	1%	1	0%	7	1%
Total	7,201	100%	3,231	100%	2,363	100%	579	100%	1,028	100%

a) Total sample



b) By source

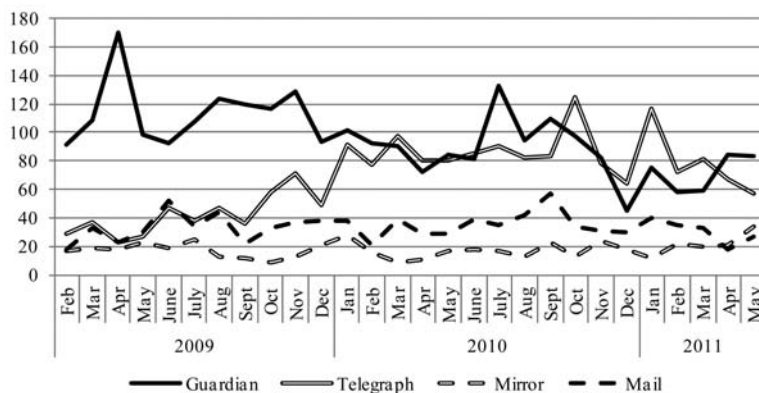


Figure 2 Monthly trends of published articles (a) Total sample, (b) By source.

302 expenditures to represent expenditures patterns in the market for
 303 fish. The total food and drinks (F&D) expenditures have been
 304 regressed against the total number of articles belonging to the
 305 general category of ‘sustainable food’ in each source, to see if
 306 the overall debate over food consumption and sustainability may
 307 have an effect in reducing purchases altogether.

308 **Customers’ sample**

309 For each broadsheet and tabloid, expenditure data refers to
 310 readers who regularly buy them. The baseline population of a

311 newspaper includes whoever has purchased the corresponding
 312 Sunday edition (the Observer, The Sunday Telegraph, the Mail
 313 on Sunday, and the Sunday Mirror) in the month considered. A
 314 customer is then regarded as regular buyer of the specific
 315 broadsheet/tabloid only if she spends on it more than the 2-
 316 year median of the population of readers of each specific
 317 broadsheet/tabloid (i.e. the top 50% of the population only).
 318 The focus on Sunday editions is crucial: the Tesco Clubcard
 319 data reveals that daily newspapers are not regularly bought in
 320 specific supermarkets, while Sunday editions are commonly

Table 5 Relation between media coverage and expenditures on selected products – Guardian

Guardian	Media (t)	Media (t-1)	Media (t-2)	Media (t-3)	Media (t-4)
In (Total Food)	-0.0054***	0.0055***	-0.0005	0.0005	-0.0022***
SE	0.0016	0.0018	0.0008	0.0008	0.0007
In (Exp Organic Food)	0.0026***	0.0006	0.0006	0.0000	0.0001
SE	0.0008	0.0008	0.0007	0.0007	0.0008
In (Exp Organic F&V)	0.0009	0.0000	-0.0012	-0.0012	-0.0025
SE	0.0014	0.0014	0.0012	0.0014	0.0016
In (Exp Meat Products)	-0.0001	-0.0007	-0.0003	-0.0001	-0.0008
SE	0.0006	0.0006	0.0006	0.0006	0.0006
In (Exp Red Meat Products)	0.0002	-0.0002	0.0002	0.0002	-0.0008
SE	0.0005	0.0005	0.0005	0.0005	0.0006
In (Exp Free-Range Meat Products)	0.0002	-0.0007	0.0002	-0.0002	-0.0003
SE	0.0017	0.0019	0.0019	0.0019	0.0017
In (Exp Free-Range Eggs)	0.0005	-0.0004	-0.0002	-0.0017	-0.0005
SE	0.0009	0.0009	0.0009	0.0009	0.0010
In (Exp F&V)	0.0007	-0.0010	-0.0014	-0.0019	-0.0008
SE	0.0009	0.0011	0.0012	0.0011	0.0009
In (Exp Dairy Products)	0.0006	0.0006	0.0004	-0.0003	-0.0003
SE	0.0003	0.0005	0.0004	0.0004	0.0003
In (Exp Eggs)	0.0003	0.0000	0.0002	-0.0004	0.0000
SE	0.0008	0.0009	0.0008	0.0008	0.0008
In (Exp Fish)	-0.0056	0.0031	0.0010	-0.0034	0.0022
SE	0.0046	0.0056	0.0051	0.0051	0.0045
In (Exp Fair-Trade Foods)	0.0187	-0.0062	0.0013	-0.0001	0.0139
SE	0.0105	0.0106	0.0122	0.0110	0.0095
In (Exp Low-Salt Foods)	0.0030	-0.0034	0.0072	0.0167	0.0210
SE	0.0160	0.0186	0.0223	0.0201	0.0156
In (Exp Low-Fat Foods)	-0.0019	0.0054	-0.0103	0.0023	-0.0055
SE	0.0078	0.0074	0.0094	0.0091	0.0095
In (Exp Wholegrain Bread)	-0.0118	0.0020	0.0195	0.0106	-0.0364
SE	0.0188	0.0167	0.0201	0.0172	0.0185
In (Exp Wholegrain Rice)	-0.0342	0.0288	-0.0364	-0.0047	-0.0114
SE	0.0233	0.0264	0.0304	0.0275	0.0243
In (Exp Wholegrain Pasta)	-0.0160	0.0001	-0.0246	0.0177	-0.0165
SE	0.0217	0.0204	0.0232	0.0210	0.0221

N= 24. Regression results are adjusted by total food expenditures and average price. Intercept included. Results are corrected for temporal autocorrelation. Significance if as follows: *** = 0.01 level of significance (two-tailed); ** = 0.05 level of significance (two-tailed).

321 purchased during the weekly shopping trip. The starting sample
 322 includes in the analysis only regular Tesco shoppers to avoid a
 323 sample bias. Each expenditure class is collected for four differ-
 324 ent samples: 65,870 readers of the Mail; 50,910 readers of the
 325 Mirror; 18,914 readers of the Telegraph; and 29,760 readers of
 326 the Guardian.¹² For these customers we observe the monthly

¹²We use the purchases of the Sunday editions as a proxy for identifying readers of the four sources, assuming that they are likely to buy the same newspaper and tabloid also during the week. While the quantitative analysis refers to a large number of consumers, Tesco Clubcards owners are not necessarily representative of the UK population. Tesco stores are spread across the whole UK with stores located in each post-code of the country, providing a rich data set with a diversified sample of consumers. However, socio-economic characteristics are only provided when consumers sign up for a Clubcard and are not frequently updated, therefore we cannot compare them with national statistics. Also, the data set does not account for provision of food from different retailers: data only describes expenditures of Tesco Clubcard holders in

expenditures on each of the 17 grocery categories to see if at
 any increase or decrease of articles in the printed media they
 regularly buy we can observe any variation in the expenditures
 for the corresponding grocery category.¹³

Results

Before discussing results of the quantitative analysis, it is worth
 exploring the distribution of articles in each thematic area in
 the four sources of information. From February 2009 to May
 2011 (included) the four media published 7,201 articles related
 to at least one principle of sustainable food. Of these, 29% dis-
 cuss sustainable food in general; 39% organic products; while
 28% are dedicated to the sustainability of food from animal

Tesco shops, without providing any information on items purchased elsewhere (e.g. farmers markets).

¹³A caveat of this strategy is that for customers who never buy some categories (e.g.: vegetarians who never buy meat) we do not observe any variation in the expenditures.

Table 6 Relation between media coverage and expenditures on selected products – Mail

Mail	Media (<i>t</i>)	Media (<i>t</i> -1)	Media (<i>t</i> -2)	Media (<i>t</i> -3)	Media (<i>t</i> -4)
In (Total Food)	0.0042	-0.0076	-0.0037	-0.0004	-0.0035
SE	0.0044	0.0046	0.0046	0.0044	0.0043
In (Exp Organic Food)	0.0035**	0.0020	0.0023	0.0021	0.0025
SE	0.0016	0.0018	0.0019	0.0018	0.0013
In (Exp Organic F&V)	0.0013	0.0010	-0.0008	0.0014	0.0007
SE	0.0029	0.0034	0.0034	0.0032	0.0023
In (Exp Meat Products)	0.0000	0.0008	0.0004	0.0015	0.0011
SE	0.0017	0.0015	0.0016	0.0017	0.0017
In (Exp Red Meat Products)	0.0001	0.0006	0.0001	0.0009	-0.0003
SE	0.0014	0.0014	0.0015	0.0015	0.0014
In (Exp Free-Range Meat Products)	-0.0016	-0.0037	0.0018	0.0001	-0.0012
SE	0.0042	0.0042	0.0044	0.0045	0.0041
In (Exp Free-Range Eggs)	-0.0023	0.0026	0.0038	-0.0032	0.0017
SE	0.0027	0.0024	0.0026	0.0027	0.0028
In (Exp F&V)	-0.0021	-0.0069**	-0.0052	-0.0052	-0.0015
SE	0.0025	0.0029	0.0030	0.0029	0.0025
In (Exp Dairy Products)	0.0007	-0.0010	-0.0008	-0.0017	-0.0011
SE	0.0011	0.0011	0.0012	0.0012	0.0010
In (Exp Eggs)	-0.0005	-0.0011	0.0001	-0.0015	-0.0003
SE	0.0021	0.0018	0.0019	0.0020	0.0022
In (Exp Fish)	0.0183**	0.0208**	0.0142	0.0142	0.0150**
SE	0.0080	0.0083	0.0081	0.0078	0.0064
In (Exp Fair-Trade Foods)	-0.0128	-0.0008	-0.0123	0.0379	0.0183
SE	0.0243	0.0224	0.0238	0.0240	0.0267
In (Exp Low-Salt Foods)	0.0239	0.0690**	0.0460	0.0218	0.0035
SE	0.0264	0.0262	0.0257	0.0251	0.0253
In (Exp Low-Fat Foods)	-0.0115	-0.0265	0.0034	0.0074	0.0065
SE	0.0136	0.0145	0.0143	0.0136	0.0116
In (Exp Wholegrain Bread)	0.0433	0.0570	0.0414	0.0473	0.0492
SE	0.0440	0.0491	0.0516	0.0524	0.0356
In (Exp Wholegrain Rice)	0.0024	-0.0110	0.0253	-0.0273	0.0686**
SE	0.0300	0.0301	0.0297	0.0288	0.0302
In (Exp Wholegrain Pasta)	-0.0150	-0.0355	-0.0163	-0.0066	0.0473
SE	0.0401	0.0439	0.0449	0.0402	0.0330

N = 24. Regression results are adjusted by total food expenditures and average price. Intercept included. Results are corrected for temporal autocorrelation. Significance if as follows: *** = 0.01 level of significance (two-tailed); ** = 0.05 level of significance (two-tailed).

T4 339 origin (Table 4). All remaining categories (fair-trade, sustain- 358
 340 able fish and health) take the remaining 4% of the media space. 359
 341 The Guardian (the leading source of food-related environmental 360
 342 articles), and the Daily Telegraph are the most prolific suppliers 361
 343 of articles within each topic. 362

344 While the overall monthly trend of articles covering food-
 345 related environmental issues is stable in the period analysed
 F2 346 (Fig. 2a), broadsheets and tabloids seem to have fluctuating 363
 347 trends in dealing with sustainable food topics. Fluctuations are 364
 348 sharper in 2010 and 2011 compared to 2009. Dips in December 365
 349 suggest that the number of articles on food-related environmen- 366
 350 tal topics is relatively low before Christmas and New Year,
 351 increasing noticeably in January. Individual broadsheets and
 352 tabloids behave differently (Fig. 2b): attention to sustainable
 353 food has declined in the Guardian and increased in the Tele-
 354 graph. Similarly, articles in the Mail show a mild downward
 355 trend, while those in the Mirror increased slightly.

356 Overall, the distribution of articles suggests that broadsheets
 357 engage with food related environmental concerns more than

tabloids; that the Telegraph has gradually replaced the Guard- 358
 359 ian as the leading source of information; and that there are 360
 361 some periods during the year (like Christmas and the summer) 362
 362 where the attention to sustainable food declines, but this is 363
 363 compensated in subsequent months. 364

Quantitative analysis 363

In this section, we observe how the number of articles discuss- 364
 365 ing food-related topics links with corresponding consumers' 366
 366 expenditures.¹⁴ The marginal effect of an article on the

¹⁴It is worth mentioning that the analysis simply shows conditional dependence and matching trends between two variables. In other words, the analysis does not necessarily identify a causal effect of the number of media articles on expenditures, but only a co-movement whereby large numbers of articles appear with high expenditure (a positive coefficient) or low expenditures (a negative coefficient). Results should be interpreted accordingly.

Table 7 Relation between media coverage and expenditures on selected products – Mirror

Mirror	Media (t)	Media (t-1)	Media (t-2)	Media (t-3)	Media (t-4)
ln (Total Food)	-0.0032	-0.0044	0.0010	0.0005	-0.0130
SE	0.0056	0.0055	0.0055	0.0059	0.0078
ln (Exp Organic Food)	-0.0013	0.0017	0.0004	0.0051	0.0028
SE	0.0032	0.0042	0.0044	0.0043	0.0038
ln (Exp Organic F&V)	0.0037	0.0049	0.0076	0.0008	0.0032
SE	0.0050	0.0066	0.0069	0.0066	0.0060
ln (Exp Meat Products)	-0.0003	0.0034	-0.0007	-0.0026	0.0028
SE	0.0019	0.0020	0.0019	0.0020	0.0021
ln (Exp Red Meat Products)	-0.0011	0.0033	-0.0005	-0.0020	0.0022
SE	0.0016	0.0017	0.0017	0.0017	0.0017
ln (Exp Free-Range Meat Products)	-0.0018	0.0001	0.0027	0.0030	-0.0005
SE	0.0055	0.0061	0.0062	0.0064	0.0059
ln (Exp Free-Range Eggs)	-0.0016	0.0044	0.0038	-0.0028	0.0068
SE	0.0038	0.0039	0.0039	0.0041	0.0041
ln (Exp F&V)	0.0033	0.0068**	-0.0005	-0.0036	0.0046
SE	0.0031	0.0032	0.0031	0.0036	0.0037
ln (Exp Dairy Products)	0.0016	0.0025	0.0011	0.0009	0.0026**
SE	0.0011	0.0012	0.0011	0.0013	0.0012
ln (Exp Eggs)	-0.0032	0.0014	-0.0007	-0.0037	0.0012
SE	0.0024	0.0025	0.0024	0.0026	0.0025
ln (Exp Fish)	0.0339	-0.0023	-0.0035	-0.0034	-0.0500
SE	0.0330	0.0352	0.0302	0.0318	0.0280
ln (Exp Fair-Trade Foods)	0.0102	-0.0113	0.0201	0.0428	0.0062
SE	0.0419	0.0430	0.0418	0.0322	0.0259
ln (Exp Low-Salt Foods)	0.0869	0.2372***	-0.0283	-0.1341	-0.0173
SE	0.0707	0.0711	0.0711	0.0815	0.0743
ln (Exp Low-Fat Foods)	0.0160	-0.0454	0.0151	-0.0098	-0.0342
SE	0.0470	0.0507	0.0506	0.0514	0.0523
ln (Exp Wholegrain Bread)	-0.1643	-0.2335	-0.2826	-0.3435**	-0.3555**
SE	0.1322	0.1400	0.1386	0.1423	0.1437
ln (Exp Wholegrain Rice)	0.1251	0.1045	0.0859	0.0917	0.0410
SE	0.0902	0.0965	0.0924	0.0882	0.0898
ln (Exp Wholegrain Pasta)	0.0091	0.0335	0.1775	0.0472	0.0821
SE	0.0947	0.0992	0.0949	0.0937	0.0973

N= 24. Regression results are adjusted by total food expenditures and average price. Intercept included. Results are corrected for temporal autocorrelation. Significance if as follows: *** = 0.01 level of significance (two-tailed); ** = 0.05 level of significance (two-tailed).

367 logarithm of consumer expenditures (in GBP) is presented by
T5 368 broadsheets and tabloids in Tables (5–8). All regressions
T6 369 adjusted by total food expenditures and average price (both in
T7 370 logarithmic form), and included an intercept (these coefficients
T8 371 are not reported and are available from the authors). All regres-
372 sions (24 time periods) correct for temporal autocorrelation
373 using a Prais–Winsten estimator. Results present a fairly hetero-
374 geneous picture of relation to articles in the media.

375 Despite being the broadsheet that has dedicated most atten-
376 tion to sustainable food consumption over time (Table 4), the
377 *Guardian* is the newspaper with the least observed influence on
378 expenditures (Table 5). General articles on sustainability inver-
379 sely correlate with the total expenditures on food and drinks in
380 the immediate time, although the effect is counterbalanced the
381 following month, to reappear again after 4 months. Apart from
382 this general effect, articles only have an immediate effect on
383 consumers' expenditures on organic products.

384 Readers of the *Mail* seem to better tune their expenditures
385 with media messages (Table 6). Specifically, the increase in the

number of articles on organic food and sustainable fishing, as
386 well as in those with possible implication on health, appears to
387 have a positive effect on consumers' expenditures, as observed
388 in the corresponding increase in expenditures on organic prod-
389 ucts, fish, low-salt food, and whole grain rice. The correlation
390 seems to last for a fairly long time in the case of fish. Con-
391 versely, total purchase of F&V is negatively correlated to the
392 increase in the number of articles. Overall, readers of the *Mail*
393 appear to change their expenditures for categories when more
394 environmentally friendly or healthier options (e.g. organic prod-
395 ucts, fish, low salt, and whole grain) are available, while they
396 do not modify expenditure patterns when articles target entire
397 categories (e.g. meat or dairies).
398

Articles on the selected food-related environmental topics
399 correlate more ambiguously with expenditures of the readers of
400 the *Mirror* (Table 7). In particular, an increase in media cover-
401 age has a positive correlation with expenditures on F&V, dairy,
402 and low-salt foods. In contrast, information correlates persist-
403 ently and negatively with expenditures on wholegrain bread.
404

Table 8 Relation between media coverage and expenditures on selected products – Telegraph

Telegraph	Media (t)	Media (t-1)	Media (t-2)	Media (t-3)	Media (t-4)
In (Total Food)	-0.0026	0.0000	0.0030	0.0002	-0.0010
SE	0.0021	0.0021	0.0020	0.0020	0.0019
In (Exp Organic Food)	-0.0001	-0.0008	-0.0004	-0.0003	-0.0009
SE	0.0007	0.0008	0.0008	0.0008	0.0007
In (Exp Organic F&V)	-0.0020	-0.0008	-0.0004	0.0019	-0.0002
SE	0.0012	0.0014	0.0013	0.0016	0.0013
In (Exp Meat Products)	0.0010	-0.0020**	0.0017	0.0012	0.0000
SE	0.0008	0.0008	0.0009	0.0008	0.0006
In (Exp Red Meat Products)	0.0013	-0.0027***	0.0019*	0.0004	-0.0001
SE	0.0009	0.0009	0.0010	0.0009	0.0007
In (Exp Free-Range Meat Products)	0.0011	-0.0008	0.0041	0.0064**	-0.0059**
SE	0.0026	0.0026	0.0029	0.0024	0.0022
In (Exp Free-Range Eggs)	-0.0009	-0.0015	0.0016	0.0005	-0.0010
SE	0.0021	0.0020	0.0023	0.0020	0.0017
In (Exp F&V)	-0.0023	-0.0019	0.0018	0.0012	0.0002
SE	0.0019	0.0019	0.0020	0.0019	0.0018
In (Exp Dairy Products)	-0.0008	-0.0010	0.0006	-0.0003	-0.0006
SE	0.0007	0.0008	0.0008	0.0008	0.0007
In (Exp Eggs)	-0.0002	-0.0022	0.0017	-0.0004	-0.0013
SE	0.0013	0.0012	0.0014	0.0012	0.0011
In (Exp Fish)	-0.0107	-0.0177**	-0.0146**	-0.0049	-0.0054
SE	0.0059	0.0063	0.0068	0.0064	0.0064
In (Exp Fair-Trade Foods)	0.0140	0.0075	-0.0105	0.0048	-0.0122
SE	0.0178	0.0154	0.0169	0.0178	0.0159
In (Exp Low-Salt Foods)	0.0035	-0.0174	-0.0041	0.0123	0.0113
SE	0.0252	0.0283	0.0276	0.0255	0.0243
In (Exp Low-Fat Foods)	0.0101	0.0077	-0.0008	-0.0053	-0.0074
SE	0.0125	0.0144	0.0150	0.0143	0.0122
In (Exp Wholegrain Bread)	-0.0157	-0.0155	-0.0379	-0.0496	-0.0448
SE	0.0263	0.0392	0.0462	0.0424	0.0284
In (Exp Wholegrain Rice)	-0.0034	-0.0059	-0.0018	0.0001	0.0230
SE	0.0368	0.0374	0.0354	0.0344	0.0346
In (Exp Wholegrain Pasta)	0.0303	0.0050	-0.1286	-0.1381**	-0.1066***
SE	0.0353	0.0542	0.0628	0.0564	0.0360

N = 24. Regression results are adjusted by total food expenditures and average price. Intercept included. Results are corrected for temporal autocorrelation. Significance if as follows: *** = 0.01 level of significance (two-tailed); ** = 0.05 level of significance (two-tailed).

405 Overall, articles in the Mirror appear to have sparse and incon- 423
 406 sistent effects on observed expenditures, where the only posi- 424
 407 tive note comes from an increase in F&V expenditures. 425
 408 Customers translate new information into expenditures mainly 426
 409 in 1 or 4 months. 427

410 Finally, readers of the *Telegraph* (Table 8) present a fairly 428
 411 varied type of response to articles discussing the environmental 429
 412 impact of food. While the overall consumption of meat and red 430
 413 meat decreases in one month, articles on free-range meat tend 431
 414 to have a fluctuating influence, with an increase in expenditure 432
 415 after 3 months counterbalanced by a subsequent decrease in the 433
 416 following month. The flow of articles correlates negatively with 434
 417 expenditures on fish and wholegrain pasta, and the effects 435
 418 appear long-lasting. Readers of the Telegraph do not seem 436
 419 prone to change expenditures on generic food categories 437
 420 according to information provided, which increases expendi- 438
 421 tures on meat and decreases expenditures on fish. However,
 422 consumers seem to shift towards substitute products with lower

environmental impact (e.g. free-range meat) although the effect 423
 does not last. Finally, the case of fish is worthy of note: despite 424
 their similar political stance, the correlation between number of 425
 articles and expenditures on fish is persistently negative for 426
 Telegraph readers and persistently positive for Mail readers. 427

Qualitative case study: the debate over organic food 428
 429

Quantitative results indicate that media can have both positive 430
 and negative correlation with expenditures on environmentally 431
 friendly purchases, depending on the products being targeted. 432
 However, results do not offer a systematic explanation of dif- 433
 ferences across broadsheets and tabloids. Given the diversity in 434
 the political stances of the newspapers considered, it is likely 435
 that the same topic will be framed differently. To explore this 436
 issue in detail, we analyze a subsample of articles included in 437
 the quantitative study through a content analysis. To make the 438

Table 9 Number of articles discussing specific topics related to 'Organic' in each media source

Media Source	Opinion	Main Theme			Issues Related to 'Organic'				Association 'Organic' and:		
		Organic	GM	Pesticides	Free Range	Food Crises	Fair Trade	Health	Role Models	Products/Recipes	Restaurants/Tourism
Observer	Pro	10	12	1			4		11	1	26
	Against	4		3		9		4	1		2
	Controversial	1	2		1						
	No Opinion									16	
Sunday Telegraph	Pro	5					1		10		
	Against			2							
	Controversial		2								
Mail on Sunday	No Opinion									11	16
	Pro	3	2	1			1	1	2	1	
	Against	3				1		1			
	Controversial	2	1						3		
Sunday Mirror	No Opinion									7	6
	Pro								2		5
	Against										
	Controversial										
Sunday Mirror	No Opinion										

Note: Because an article might cover more than one topic, the sum of articles from all topics differs from the number of sampled articles. Empty cells imply no articles on a specific topic.

439 task manageable, we only focus on organic food (Principle 1 in
 440 Table 2) as a selected case study to understand the relation
 441 between news framing and food expenditures. The debate over
 442 organic food covers a large proportion of food-related environ-
 443 mental news in all four sources, accounting for 34% of total
 444 articles published. Significantly, the quantitative analysis shows
 445 that customers respond differently to articles on this subject
 446 across broadsheets and tabloids: coverage positively relates to
 447 expenditures on organic food in both Guardian and Mail read-
 448 ers, while showing no relation for readers of the Telegraph and
 449 the Mirror. Furthermore the increase in expenditures is slightly
 450 higher for the readers of the Mail (each article published by the
 451 Mail increases the monthly expenditures on organic food of
 452 £1.0035) than for the readers of the Guardian (where each arti-
 453 cle increases the expenditures of £1.0026).

454 Because of the size of the task (2,826 articles), we limit out
 455 attention to articles published in the Sunday edition of each
 456 journal on the first Sunday of each month over the 2-years
 457 period considered.¹⁵ The final sample covers 99 articles from
 458 the Guardian, 33 from the Mail, 47 from the Telegraph, and 7
 459 from the Mirror. The objective of the content analysis is to
 460 determine if 'Organic': (a) is the main theme of an article; (b)
 461 is connected or opposed to other topics (e.g. genetically modi-
 462 fied food, or the use of pesticides); (c) relates to other products
 463 or secondary issues (e.g. fair trade, or health); (d) is simply
 464 mentioned or critically debated. The distribution of articles in
 465 the first three categories, combined with the last one, is

¹⁵In the regression analysis the number of articles includes all the titles published monthly by each source for each topic, regardless of the day of the week in which they appear. The qualitative sample instead only extracts articles published in the Sunday edition of each title.

reported in Table 9, while the next four subsections examine 466 T9
 the results. 467

Topic 1: 'Organic' and competing practices 468

469 Despite a relevant coverage of the topic, the Guardian and the
 470 Mail have contrasting opinions regarding the role of 'Organic'
 471 and its competing practices (GM and pesticides). The *Observer*
 472 (the Guardian's Sunday edition) tends to frame the 'Organic'
 473 debate more critically. On one hand it discusses the positive
 474 role of organic farming, especially in countries where food pro-
 475 duction is dominated by monoculture plantations. Here small-
 476 scale and organic farmers are encouraged not so much for the
 477 better quality of organic products (which is reportedly scientifi-
 478 cally controversial), but for the hidden social and environmen-
 479 tal costs of intensive food production which uses large
 480 quantities of pesticides and destroys rainforests. Conversely,
 481 'Organic' is viewed as a problem that restrains from tackling
 482 global issues such as the global food crisis, fair international
 483 trade, and malnutrition. On this last topic, organic movements
 484 are accused to be dogmatic in their refusal of GM production.
 485 Readers are often alerted on the impelling needs of changing
 486 not so much customers' choices of products, but the entire sys-
 487 tem of British food production, offering detailed accounts of
 488 the advantages of using GM-altered food on a large scale to
 489 reduce carbon dioxide emissions.

490 In contrast, the *Mail on Sunday* dedicates little attention to
 491 the debate over GM food and pesticides as the antithesis of
 492 organic food. Instead, food production techniques are discussed
 493 in terms of costs of production (high for organic food), and on
 494 the malfunctioning of the current system of food provision. The
 495 debate is reduced on one hand to the individual responsibility
 496 of eating locally and seasonally, which is judged expensive and
 497 ultimately inefficient to tackle the global food crisis; on the

498 other hand to the political and economic responsibilities for a
 499 better organization of soil allocation and distribution system.
 500 *We already grow enough food to nourish nine billion people*
 501 *(...) Much of the global harvest feeds livestock an inefficient*
 502 *route for delivering our nutrition, since it takes eight*
 503 *calories of grain to produce one calorie of meat. Plenty*
 504 *more is diverted to make biofuels. [Also] we throw about 25*
 505 *per cent our food away, uneaten. (The Mail on Sunday, 6/2/*
 506 *11)*
 507 Finally, while the *Sunday Mirror* does not report any article
 508 specifically focused on organic, GM or pesticides, the *Sunday*
 509 *Telegraph* covers very briefly the debate over GM food, but
 510 not as an alternative to ‘Organic’. In particular, the Telegraph
 511 does not seem to take any position, reporting news about scien-
 512 tific advances on GM research with equal attention given to
 513 both supporters and critics. Importantly, the *Sunday Telegraph*
 514 does not associate the concept of organic with global environ-
 515 mental or social issues, but with the promotion of local produc-
 516 tion, particularly British farming, and the conservation of the
 517 countryside, where health and climate change are only second-
 518 ary topics:
 519 *The Prince of Wales has long been a champion of organic*
 520 *farming [...] “I think organic is the most genuinely*
 521 *sustainable form of farming” he said “Does this matter? It*
 522 *does for all of us who love the British countryside, its*
 523 *landscapes and its villages; and for those of us who mind*
 524 *about food security and the impact of climate change. (The*
 525 *Sunday Telegraph, 4/7/10)*

526 **Topic 2: ‘Organic’ role models**

527 The involvement of celebrities in media coverage of climate
 528 change has been deeply analyzed in Boykoff and Goodman
 529 (2009). In their work, the authors interpret the role of celebri-
 530 ties in ambivalent terms, as newly authorized speakers who can
 531 liaise between policy, science and public sphere, but also as
 532 promoters of individualistic ‘heroic’ solutions. All four newspa-
 533 pers in this study promote role models as champions of
 534 organic, although with substantial dissimilarities which might
 535 influence the differences in the impact of each source over
 536 expenditures. ‘Organic’ in the *Observer* is uncritically pre-
 537 sented as a key component of a coherent environmentally
 538 friendly lifestyle of writers and famous environmentalists. In
 539 the *Mail on Sunday* role models are more often actors and
 540 famous chefs who claim to use organic, seasonal and local
 541 ingredients in their daily cooking because of their freshness
 542 rather than their ethical implications. The cliché of ‘Organic’
 543 belonging to celebrities’ lifestyle appears also in the *Sunday*
 544 *Telegraph*. However, as in the *Mail on Sunday* role models
 545 are generic celebrities (actors, TV broadcasters, restaurateurs,
 546 the Royal Family), rather than known environmentalists. More-
 547 over, ‘Organic’ is valued for its local origin rather than *per se*.
 548 *[Monty Don] We don’t believe in the food we eat. People*
 549 *are looking for surety, they’re looking for things they can*
 550 *make and know are good, rather than things they can buy or*
 551 *that other people sold to them. My commitment to farming is*
 552 *just as strong. I’m the president of the Soil Association, and*
 553 *I’m very involved in organic farming and food production.*
 554 *(The Sunday Telegraph, 7/2/10)*

Interestingly, the *Observer* also labels ‘Organic’ as a preten- 555
 tious and pricey symbol of social distinctiveness (i.e. rich vs. 556
 poor), effectively challenging the benefits of organic products. 557
 This argument is briefly mentioned in the *Mail on Sunday*, 558
 while absent in the other two sources. 559

Topic 3: ‘Organic’ products and recipes 560

Apart from the *Sunday Mirror*, all other newspapers include 561
 organic products in recipes and advertising. In these occasions, 562
 ‘Organic’ is simply and uncritically mentioned as a culturally 563
 accepted healthy choice in daily cooking. In the *Observer*, for 564
 example, articles indicate organic gardening products and wine 565
 as the culturally accepted standard for these categories. The 566
Mail on Sunday, advertises ‘Organic’ as a component of a 567
 healthy lifestyle, particularly in relation to dietary and beauty 568
 products. The *Sunday Telegraph* only focuses on ‘Organic’ to 569
 indicate local and fresh food products. 570

Topic 4: ‘Organic’ restaurants and tourist destinations 571

Finally, all media discuss ‘Organic’ in reviews of restaurants 572
 and tourist destinations, always as a sign of quality and luxury. 573
 For instance, for the *Observer* it represents a culturally 574
 accepted measure of quality, often associated with locally pro- 575
 duced food, although in some cases reviews are critical and 576
 controversial, like in the case of the organic restaurants with 577
 high carbon foot print (The Observer, 7/3/2010). In the *Sunday* 578
Telegraph, the *Mail on Sunday*, and the *Sunday Mirror* desti- 579
 nation and restaurants with organic food on their menus are 580
 always uncritically seen as quality/luxury places supporting 581
 local production, rediscovery of culinary traditions, and healthy 582
 lifestyle (as a note, the *Sunday Telegraph* mostly reviews UK 583
 locations). 584

Discussion: the complexities of media 585
debate over sustainable food 586

The combination of qualitative and quantitative results pre- 587
 sented in the previous section derives a novel, detailed picture 588
 of the effects of the provision of printed media messages, 589
 which we summarise and discuss in this section. First, even if 590
 the number of articles is mostly unrelated to food expenditures, 591
 readers of different media titles seem to respond differently to 592
 the debate over sustainable food presented by the press. In par- 593
 ticular, it seems that an increase in information on specific 594
 food categories (e.g. organic, free range, sustainably sourced 595
 fish) induces a shift of expenditures towards these products 596
 from their generic alternatives.¹⁶ These results indicate that 597
 despite a general lack of effectiveness of information in modi- 598
 fying customers’ expenditures, media are slightly more success- 599
 ful in suggesting people to switch from general products to 600
 substitutes with a social, environmental or health benefit. 601

The quantitative analysis falls short of a complete explana- 602
 tion of these results because it only takes into account the num- 603
 ber of articles published on topics related to sustainable food 604

¹⁶In the case of fish we can only observe an overall increase or decrease of expenditures in the whole fish category, without being able to distinguish the trends for the sustainably sourced products.

605 purchases, with no information on the content of the message.
 606 The content analysis of articles on organic food suggests that
 607 differences in response might be attributed to the way food-
 608 related environmental messages are framed. In particular, media
 609 articles seem more effective when information is consistent and
 610 presented uncritically (Weber and Stern, 2011), for example by
 611 incorporating the concept of organic in tourist destinations or
 612 products description as a form of advertising. This is the case
 613 of the Mail, where messages are rarely contradictory, and gen-
 614 erally do not discuss any wider social and economic implica-
 615 tion of organic food choices. As readers consistently receive
 616 information on the benefits of organic products, they might find
 617 easier to modify their expenditures by simply preferring them
 618 over non organic products. This point is consistent with previ-
 619 ous research, where the amount of media coverage influences
 620 public opinion more than its content (Mazur and Lee, 1993).
 621 Further qualitative research, for examples interviewing a sub-
 622 sample of the customers, would be useful to illustrate how
 623 readers perceive the specific content of news, and how they
 624 think it may influence their purchases.

625 In the Guardian, articles criticise the high price of organic
 626 food and the resistances in the adoption of GM food. The
 627 broadsheet engages its readers in complex discussions of prob-
 628 lems such as resource overexploitation, waste production, the
 629 food crisis, and social responsibility for international develop-
 630 ment. Moreover, the Guardian promotes the complex idea that
 631 a ‘green attitude’ is an ethical and political position related to a
 632 series of principles and ideals that should embrace the whole
 633 life of consumers. Consequently, readers may relate their prefer-
 634 ence for ‘Organic’ to a wider set of pro-environmental atti-
 635 tudes. This complex message is proposed through interviews
 636 with environmental activists, where ‘Organic’ fits within a big-
 637 ger effort to reduce the carbon footprint of personal lifestyle.
 638 The same broadsheet also promotes organic products for luxury
 639 dining and sustainable farming. We can make the hypothesis
 640 that although the Guardian dedicates a lot of attention to the
 641 concept of organic, by linking it to broader attitudes in favour
 642 of the environment and social justice its impact over expendi-
 643 tures is less strong than in the Mail, as observed in the coeffi-
 644 cients’ values. Considering that the Mail reaches more than
 645 twice as many Tesco’s customers as the Guardian (65.870 com-
 646 pared to 29.760) with only a third of the articles (381 articles
 647 compared to 1176), and that the coefficient for the Mail is
 648 slightly larger than the one for the Guardian, we can conclude
 649 that the impact over purchases of each article published by the
 650 Mail is much stronger than the impact of the Guardian. This
 651 provides some indications that uncritical and coherent informa-
 652 tion is more effective (Weber and Stern, 2011) and that target-
 653 ing attitudes does not necessarily imply a robust shift in
 654 consumers’ choices.

655 The conservative Telegraph appears more concerned about
 656 the role of organic production in the provision of quality food,
 657 and associates the concept with local production to support
 658 British labels. Consequently, the quantitative analysis observes
 659 no relation between information provision and expenditures on
 660 organic products. There could possibly be an increase in expen-
 661 ditures on British products, but the data could not identify
 662 products with a ‘British’ label. Finally, the considerably low

number of articles dedicated by the Mirror to organic food 663
 explains the lack of association between the two variables. 664

665 In light of these results, it is worth reflecting upon the effec-
 666 tiveness of the existing debate in the press in inducing more
 667 sustainable food purchases. General debate around food, sus-
 668 tainability and climate change, represented by articles included
 669 in the first searching string, does not show any effect on the
 670 overall food basket, apart from a weak and fluctuating effect
 671 for the readers of the Guardian. This result is partially
 672 expected: the aggregate level of the overall monthly purchases
 673 is probably too general to be used as a valid indicator of sus-
 674 tainable choices, and reducing consumption altogether is a radi-
 675 cal choice that requires high commitment from individual
 676 consumers. Similarly, when the target is a broader food cate-
 677 gory (e.g. meat, F&V, dairy products, eggs), we see no effect
 678 of media coverage on expenditures.¹⁷ Overall, results indicate
 679 that a substantial reduction in the expenditures of food of ani-
 680 mal origin in diets cannot be addressed by simply informing
 681 customers about the environmental implication of food produc-
 682 tion and consumption. Although the discussion of environmen-
 683 tal implications of food of animal origin represents 28% of the
 684 total number of articles in the four newspapers, it fails to
 685 reduce consumers’ expenditures, giving strength to the hypothe-
 686 sis advanced in practice theoretical frameworks that see diets
 687 and eating habits as embedded in daily routines and therefore
 688 more difficult to be changed by simply informing consumers.

689 The task of modifying expenditure patterns seems to work
 690 better when information suggest the adoption of specific sus-
 691 tainable products as substitutes for their less sustainable coun-
 692 terparts. If consumers are advised to switch from non-organic
 693 to organic, they may decide to buy the second option, possibly
 694 because switching between products does not require any read-
 695 justment of habitual diets. Although sometimes more expen-
 696 sive, when sustainable products are presented uncritically in the
 697 news, like necessary ingredients for successful recipes or qual-
 698 ity signatures in restaurants, customers tend to prefer them
 699 regardless the price. This is consistent across broadsheets and
 700 tabloids, and for different labels (organic, free range, whole-
 701 grain, and low salt). In this case, media can play an important
 702 role by inducing customers to prefer sustainable options, and
 703 they can use different narratives to frame the task: social and
 704 environmental issues for the readers of the Guardian; local and
 705 British products for the readers of the Telegraph, and health
 706 and genuine options for the readers of the Mail.

707 Conclusion

708 The task of understanding consumers’ purchases and how they
 709 can be influenced by the availability of information is

¹⁷Inevitably, a weakness of the data is that general categories include both sustainable and unsustainable options (for instance, meat includes white and red meat, free-range and intensive farming, organic and chemical intensive) and a drop in overall expenditures might indicate unobservable variances in all those subcategories. While we can control for some of them, because together with the whole meat category we also measure variations in specific subcategories (red meat, organic, free range), some other variations are lost, like in the case of fish whose category does not distinguish between sustainably sourced options.

undoubtedly complex. This article discusses the relation between media coverage of issues related to sustainable food consumption and corresponding food expenditures. Overall, results indicate that the simple provision of information does not have a significant influence on expenditures: this result suggests that dominant policy approaches that aim at modifying individual choices by providing information and activating pro-environmental attitudes (i.e. the ABC models) may succeed in changing people opinions (Mazur and Lee, 1993; Nisbet and Myers, 2007; Sampei and Aoyagi-Usui, 2009; Scruggs and Benegal, 2012), but are ineffective in modifying purchases. In particular, the simple amount of media coverage does not strongly relates to modifications in expenditures patterns, like it does for changes in public opinion (Nisbet and Myers, 2007): if this was the case, the Guardian and the Telegraph should show the highest influence over consumers' expenditures, while this is not the case.

However, the paper also addresses the importance of differentiating between information sources, in line with previous research (Carvalho 2005, 2007) and between several expenditures' categories. Some preliminary indications are drawn from our results, suggesting that information may be more effective in shifting purchases across products, given the uncritical frame of the message, but fails in reducing expenditures in general categories like food of animal origin. Our hypothesis is that shifting expenditures to organic, free range and healthier version of a product is more effective because it does not require any change in habits and routines, while reducing whole food categories or the overall amount of expenditures has an impact on diets and eating habits and therefore requires a better understanding of how those habits are daily organized. This hypothesis is in line with recent finding of research adopting a practice theoretical framework (Southerton *et al.*, 2004; Warde, 2005; Shove, 2010; Southerton *et al.*, 2011; Warde and Southerton, 2012), but cannot be confirmed by our analysis and requires further investigation.

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