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India Elections 2014: Time-Lagged Correlation between Media Bias and Facebook Trend

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India Elections 2014: Time-Lagged Correlation between Media Bias and Facebook Trend

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Abstract After establishing print media bias and Facebook trend as reliable predictors of election outcome, the study analyses the relationship between the two before and during the 2014 Indian Lok Sabha election. Time-lagged correlation is used to study the immediate effect of newspaper reports on the political behaviour of Facebook. Further, a correlation was found to exist between the long-term political trends in the print media and Facebook. That is, the number of positive and negative news reports published on a party in the newspapers affected the number of 'likes' recorded on the Facebook fan page of the party or its candidate.

I. INTRODUCTION

Media effect on the masses is an intensely-studied area of communications research, but the relationship that exists between different media platforms and the way they interact and influence each other have been barely explored. Print media remains to be a main source of political information in India and it also influences voter decisions (Chiang and Knight, 2011). On the other hand, the online social media has become a tool for free expression of political opinion—its content being user generated (Woolley, et al., 2010). Hence, it can be consciously and cautiously assumed that print media behaviour could affect the political trend observed on online social media. To test this theory in the context of the 2014 Indian Parliamentary election, four leading English newspapers and Facebook were chosen.

Perhaps, India's 2014 general election was the world's largest democratic exercise—with about 814.5 million eligible voters—conducted in nine phases from April 7 till May 12, 2014. The Indian National Congress (INC or just the Congress), Bharatiya Janata Party (BJP) and the Aam Aadmi Party (AAP) were the dominant parties contesting the election. Arvind Kejriwal led the AAP, while Rahul Gandhi, son of former Prime Minister Rajiv Gandhi and Congress President Sonia Gandhi, was portrayed as the face of INC. BJP nominated Narendra Damodardas Modi as its prime ministerial candidate, who led his party to a thumping victory.

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While the Congress party secured 106,935,311 (19.3%) votes, the BJP amassed 171,637,684 (31%). AAP managed a meagre 11,325,635.

Both the mainstream print and the online social media played decisive roles during the election period, spreading political news and moulding public opinion (Pansare, 2014; and Swamy, 2014). In India, newspapers are witnessing steady growth in circulation numbers bucking the global trend (Hooke, 2012). India is home to the world's largest English-language newspaper readership (Hayden, 2012) and the fastest growing newspaper market (The Economist, 2011, and All About Newspapers, 2010). This apart, India recorded the fastest Facebook growth in 2014 (PTI, 2014). Facebook announced on March 31, 2014, that its Indian user base had just crossed the 100-million milestone (Singh, 2014).

As the circulation of newspapers and the number of Facebook users increase, their influence on the electorate is only amplified. Hence, it becomes important to study their political behaviour during elections. Accordingly, the aim of the present study is stated to be:

To identify the political trends that prevailed in the print media and Facebook during the period of study—January 24 to May 12, 2014.

To validate those political trends by correlating them with the election results.

To associate the political trends by correlating them with each other.

For the present study, the top four English newspapers published from India—readership wise—were chosen. By content analysing the newspapers, the political trend that prevailed during the study period can be estimated using time-series analysis.

Similarly, the top national parties chosen for the study were the Congress, BJP and AAP, as the prospects of others claiming a majority at the Centre were bleak.

Political influence of print media: Bartels (1993) analysed the persuasive effects of media exposure and concluded that new information absorbed via media exposure must be about three times as distinctive as has generally been supposed in order to account for observed patterns of opinion change. Rhee (1997) found that news frames in election coverage affected individuals' interpretation of campaigns. Druckman and

Parkin (2005) investigated how editorial slant—defined as the quantity and tone of a newspaper's candidate coverage as influenced by its editorial position—shaped candidate evaluations and vote choice. Combining comprehensive content analyses of the papers with an Election Day exit poll, the researchers assessed the slant of campaign coverage and its effects on voters. The researchers claimed to have found compelling evidence that editorial slant affected electoral decisions. Exposure to newspapers affects political behaviour and opinion (Gerber, et al., 2006). Kuypers (2002) charted the potential effects that the press has upon the messages of political and social leaders when they discuss controversial issues. Endersby (2011) observed that news consumers who read papers are more likely to modify their perceptions of party ideology in the direction of press bias. Furthermore, media consumption correlated with ideological preferences and perceptions of political parties. Reviewing the past studies, it can be cautiously assumed that the print media could exhibit bias in their election coverage—and thereby, influence the voters.

Political communication on Facebook: Williams and Gulati (2007) investigated the extent of Facebook profile use in 2006, and analyzed which Congressional candidates were more likely to use them, with what impact on their vote shares. As part of a 2006 election feature, Facebook created entries for all U.S. congressional and gubernatorial candidates. Candidates or their campaign staff then could personalise the profile with everything from photographs to qualifications for office. Facebook members could view these entries and register their support for specific candidates. They also received notification every time one of their Facebook friends registered support for a candidate. Facebook displayed the number of supporters for each candidate and calculated the percentage of —votes that candidate had in his or her race. The study found that the number of Facebook supporters was an indicator of a campaign resource that did matter, and was independent of the impact of other variables in their predictive model. This theory is applied in the present study as well, however, instead of the profile pages that were created for the US Congressional candidates, the Indian politicians have verified fan pages functioning on the social network. Kushin and Kitchener (2009) studied the emergence of Facebook as a platform for political discourse and raised new questions for study of online political discussion as it occurred in the emergent Internet technologies of social network sites.

Vitak (2011) observed that in the 2008 US presidential election, social network sites such as Facebook allowed users to share their political beliefs, support specific candidates and interact with others on political issues. The researchers also found evidence

that political activities on Facebook affected political participation among young voters.

Reviewing the past studies, it can be inferred that various aspects of Facebook and political communication happening on the social network has been studied and the online social network is recognised as a crucial tool for propaganda and political deliberation. However, using the number of 'likes' recorded on Facebook fan pages and predicting election outcomes have not been studied, at least, in the studies reviewed. Facebook, like a few other online platforms, offers users the power to freely express their political opinion. The present study uses the count of 'likes' recorded on the Facebook fan pages of 'Narendra Modi', 'Arvind Kejriwal' and 'Indian National Congress' during the study period to trace the political trend of Facebook.

Furthermore, time—that is an important aspect of communication—has been ignored in the past studies. But the present study employs reliable methodologies to study the political trends in the print media and on Facebook, and track their shift over time. On Facebook, the number of 'likes' recorded on the fan pages of the politicians can help estimate the political trend prevailing on the social network. But for the newspapers, the political polarity of each of the political news items published on the three parties—that is, whether it is favourable, unfavourable or neutral—and their position in the papers—that is, on which page, the news items were published—have to be considered to track the political trend.

a) *Research questions*

At this stage, to bring in some focus to the study, the following research questions are asked:

- RQ1. Do the newspapers show a particular partisan political orientation?
- RQ2. Is the political trend in the papers associated with the election results?
- RQ3. Which political party is popular on Facebook and to what extent?
- RQ4. Is Facebook popularity associated with the election results?
- RQ5. Is the press trend associated with the Facebook popularity?

b) *Hypotheses for the newspapers*

Press popularity can be defined in many ways. Even the number of mentions of a party name could be used to estimate popularity. But the present study is focussed on studying latent content rather than manifest content as the former is considered more meaningful. Since, the study considers the political polarities of political news items and their respective positions in the paper, the following hypothesis is proposed for the newspapers:

More number of strategically-positioned positive reports on a party in the newspapers means more votes for that party in the election.

This hypothesis takes into account only the positive reports published on a particular party. Newspapers publish both positive and negative reports and hence, another hypothesis is proposed to take into account the negative reports as well:

More number of strategically-positioned positive reports and comparatively lesser number of strategically-positioned negative reports on a party in the newspapers means more votes for that party in the election. This hypothesis could be simplified by introducing a term 'positivity' which will stand for 'strategically-positioned positive reports and comparatively lesser strategically-positioned negative reports' as: *More positivity for a party in the newspapers means more votes for that party in the election.* Testing this hypothesis will answer RQ1 and RQ2.

c) Hypotheses for Facebook

On Facebook, leaders of two of the three chosen parties had verified fan pages. However, for the other party, the fan page of the party was taken into account for analysis. The number of 'likes' recorded on the fan pages of the representative of the parties were more than that of the party, which means, the leaders were more popular than their respective parties on social media.

Hence, the hypothesis for Facebook would be:

More number of 'likes' recorded on the fan page of a party or the representative of the party means more votes for that party in the election.

Likes are termed positive. However, the number of 'likes' keeps adding up. At the start of the study, the parties had different number of 'likes' and hence, calculations based on them could be erratic. Hence, to track the actual political trend on Facebook, the number of new 'likes' recorded every day was taken into account. For that analysis, the hypothesis is as follows:

More number of new 'likes' recorded on the fan page of a party or the representative of the party means more votes for that party in the election.

Testing this hypothesis will answer RQ 3 and RQ 4.

d) Hypotheses for print media-Facebook association

The above-mentioned hypotheses identify the political trends that prevailed in the print media and Facebook during the period of study and validate them. But the present study also seeks to analyse short- and long-term effects of the print media on the people and Facebook by comparing the content of newspapers with that of the online social network. People are the connection between mass media and the online social media. So, if the trends and shocks observed in the press is reflected and felt on the online social media then the amount of influence that these media exert on

the people and vice-versa can be deduced. Hence, the following hypothesis is proposed to infer and check the effects of the print media:

More positivity for a party in the newspapers means more number of new 'likes' recorded on the fan page of a party or the representative of the party.

After the hypotheses are proposed, the next step would be to choose appropriate methods of research. The method of research chosen is explained in the following chapter.

II. METHOD OF RESEARCH

a) Newspapers

Based on readership figures, the following broadsheet dailies were selected for the study: *The Times of India* (ToI), *Hindustan Times* (HT), *The Hindu* (TH) and *The Telegraph* (TT). Political news items published in the chosen four newspapers were collected on a daily-basis from January 24 to May 12, 2014—the period of study. In this study, 'news item' refers to news stories, editorials, op-ed pieces, columns, standalone pictures, info-graphics and opinion pieces published in the newspapers. The unit of analysis is a news item. Of the news items published, the ones that were related to the chosen parties—the Congress, BJP and AAP—were segregated.

Each of the items was analysed and classified as positive, neutral or negative for a party based on its content. A common formula was applied to each of the news item in this comparative study to mitigate any inherent bias in the data analysis.

Scoring guidelines for polarity: Nine categories were chosen for categorisation of political polarity—Congress positive, Congress negative and Congress neutral; BJP positive, BJP negative and BJP neutral; AAP positive, AAP negative and AAP neutral. While reporting an issue or controversy, if a news item presented the view or statement of a party or the views that favour that party, then the news item was classified as positive for that party.

In the case of multiple views, the dominant view was considered.

If a news item had the mention of a party and was found to be damaging the image of that party, it was rated as negative. If a news item was based on the political campaign of a party, then it was classified as positive for that party. Positive and negative statements were tracked in news reports to decide their polarity. If a news item mentions more than one party, then the party that is dominantly discussed in the news report is considered.

A news item that did not exhibit a perceivable political polarity was categorised as neutral. Only the news items that exhibited a political polarity—that is, either positive or negative—were considered for further analysis of political orientation of the newspapers.

Scoring guidelines for position: Based on the position of the news item in the paper—that is on which page it appeared—weightage was assigned to it. Front page news item - 5; editorial - 4; news item on editorial or op-ed page - 3 and news item on nation page - 2.

Independent variables in this study are newspaper, party and 'time', while the dependent variables are political polarity and the position of news items in the paper, which were measured in ratio points. Political orientation of a newspaper was calculated based on the two dependent variables. Calculation was done daily to track the trend over time as the four papers analysed are daily broadsheets. For the independent variable time, the unit of measurement was one day.

Reliability: An 'a priori' coding scheme describing all the measures was created and the scoring guidelines were served to the coders, who were trained with samples before the study period. Since a human coding method was employed, the meaning and content of the news items were better analysed to estimate the political orientation of the chosen four newspapers.

Inter-coder reliability was tested. Cohen's κ was run to determine if there was agreement between two coders using a sample of 50 news items and the guidelines proposed. There was almost perfect agreement between the coders' judgments, $\kappa = .856$ (Std. error .055), $p < .0005$.

b) Facebook

For the content analysis of Facebook, the official verified fan pages of Narendra Modi and Arvind Kejriwal were chosen to represent their respective parties—BJP and AAP. Rahul Gandhi did not have a verified fan page on Facebook. However, during the middle of the study, through promotional campaigns and adverts, the Indian National Congress party publicised its website and official Facebook fan page. After that, the Indian National Congress official fan page was chosen to represent the Congress party on Facebook. The number of 'likes' recorded on these fan pages were recorded on a daily-basis during the study period—January 24 to May 12, 2014.

The unit of analysis is a 'like'. The number of 'likes' for a day was randomly recorded at different times during the day. However, the number of 'likes' on each of the fan pages was recorded at the same time during a day to mitigate bias and inter-subjectivity. Since a 'like' carries a positive character and there was not a negative equivalent to it on Facebook, the number of 'likes' was only used to understand the political trend on Facebook. Independent variables are party and 'time', while the dependent variable is 'like', which were measured in ratio points. Political trend that prevailed on Facebook was deduced using the counts of 'likes' that were recorded on each of the chosen fan pages. It was recorded daily to track the trend over time. For the

independent variable time, the unit of measurement was one day. Political trends were calculated for the whole study period to conclude which party was favoured and to what extent on Facebook. The political trend of Facebook was determined using the number of actual 'likes' and the number of new 'likes' recorded on the fan pages.

The data were collected and analysed using Microsoft Excel spreadsheet and a portable version of the SPSS statistics software. For the time-series analyses, linear and quadratic regression models and SPSS Expert Modeler were employed.

III. FINDINGS AND DISCUSSION

RQ1. Do the newspapers show a particular partisan political orientation?

Political news published in the four chosen newspapers—*The Times of India*, *Hindustan Times*, *The Hindu* and *The Telegraph*—were reviewed on a daily basis during the period of study—January 24 to May 12, 2014. Of them, the political news items published on the front page, editorial page, Op-ed page and nation pages on the three national parties selected for the study were rated as positive and negative for a party. That was identified as the political polarity of a news item. Based on the news item's position in the paper—that is, on which page it was published—each news item was assigned a weightage. Daily scores for the papers were calculated by summing up the weightages of the positive and negative news items. The first part of the analysis deals with finding out the political orientations of the four newspapers—that is, which newspaper supported which political party and to what extent.

a) One-way Anova: Party vs Positivity

To determine the political orientation of the newspapers, the political polarities identified in its reports with the position weightage attributed to each of the polarity were summed up for the whole study period. Then the negative scores were subtracted from the positive scores to get the positivity scores, which were used to define the political orientation of the newspapers.

One-way Anova was performed to find out if there were statistically significant differences among the three chosen parties with regard to the positivity scores that each of them earned in the daily newspapers during the study period and the results are presented in Table 1.

Table 1 : One-way Anova results: Party vs. Positivity

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	12284.642	2	6142.321	19.907	.000
Within Groups	99972.275	324	308.556		
Total	112256.917	326			

There was a statistically significant difference among the parties with regard to their average positivity scores as determined by one-way Anova ($p < .0005$). A Tukey post-hoc test revealed the political orientations of the newspapers (BJP-21.44; Congress-15.66 and AAP-

6.55) were in favour of the BJP, see Table 2. The Aam Aadmi Party drew the least amount of support from the newspapers—that is, it saw the least number of favourable news reports.

Table 2 : Table of means

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Congress	109	15.6606	19.24800	1.84362	12.0062	19.3149	-18.00	84.00
BJP	109	21.4404	21.09697	2.02072	17.4349	25.4458	-39.00	70.00
AAP	109	6.5505	10.49293	1.00504	4.5583	8.5426	-21.00	34.00
Total	327	14.5505	18.55657	1.02618	12.5317	16.5692	-39.00	84.00

RQ2. Is the political trend in the papers associated with the election results?

The daily positivity scores are summed up for the whole study period and these scores are used to

find an association between press trends and election results. The sum of the overall positivity scores for the three chosen parties and the election results are tabled in Table 3.

Table 3 : Political orientation of the papers vs. election results

	Congress	BJP	AAP
Press trend	1707	2337	714
Popular vote share	106760001	171459286	11325635
Press trend %	35.88	49.12	15.01
Popular vote share%	36.87	59.22	3.91

To measure the strength and direction of association that exists between press trends and elections results, Spearman's rank-order correlation coefficient was calculated and the test results are presented in Table 4. The coefficient will provide a

nonparametric measure of association between the political trends in newspapers (media bias) and poll results, and will be used to test the hypothesis that press trends are positively associated with election results.

Table 4 : Spearman's correlation results: newspapers vs. election results

		Press trend	Popular vote share
Spearman's rho	Press trend	Correlation Coefficient	1.000
		Sig. (1-tailed)	.
	Popular vote share	Correlation Coefficient	1.000**
		Sig. (1-tailed)	.

** . Correlation is significant at the 0.01 level (1-tailed).

A Spearman's rank-order correlation was run to determine the relationship between the political trend on the newspapers and election results. There was a strong, positive correlation between them, which was statistically significant ($r_s = 1.000, p < .01$).

Hence, the hypothesis that more positivity for a party in the newspapers means more votes for that party in the election is tenable.

RQ3. Which political leader is popular on Facebook and to what extent?

BJP's prime ministerial candidate Narendra Modi and AAP's Arvind Kejriwal had verified 'Fan pages' in their respective names on Facebook. But Congress's Rahul Gandhi did not have one. Hence, for the study, the Facebook fan pages of 'Narendra Modi', 'Arvind Kejriwal' and 'Indian National Congress' were

considered and the varying number of 'Likes' on each of those pages were recorded on a daily-basis for analysis. Each of these fan pages will represent one of the chosen parties—the Congress, BJP and Aam Aadmi Party.

To estimate the political trend on Facebook—that is, how popular the party and politicians chosen for

the study are on Facebook—a one-way Anova test was conducted which would identify statistically significant differences among them with regard to the number of new 'likes' recorded on their respective Facebook fan pages during the period of study.

The results are presented in Table 5.

Table 5 : One-way Anova results: Party vs. New likes

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	75052301982.529	2	37526150991.265	63.409	.000
Within Groups	156830582914.706	265	591813520.433		
Total	231882884897.235	267			

There is a statistically significant difference among the three chosen parties with regard to the average number of new 'likes' that they secured each day during the period of study as determined by the one-way Anova ($F(2,267) = 63.409, p < .0005$), refer Table 6. A Tukey post-hoc test revealed that Narendra Modi (49589.44 ± 36178.298 likes, $p < .0005$) was

more popular than the Indian National Congress (21720.38 ± 14957.793 likes) and Arvind Kejriwal (13307.04 ± 7084.970 likes) on Facebook. There was no statistically significant difference between the average numbers of new 'likes' recorded by INC and Kejriwal ($p = .103$).

Table 6 : Table of means

	N	Mean	Std. Deviation	Std. Error
MODI	108	49589.44	36178.298	3481.258
INC	52	21720.38	14957.793	2074.273
KEJRIWAL	108	13307.04	7084.970	681.752
Total	268	29560.74	29469.904	1800.161

RQ4. Is Facebook popularity associated with the election results?

The average number of new 'likes' recorded during the period of study is used to find an association

between Facebook political trends and election results, see Table 7.

Table 7 : Political trend on Facebook vs. election results

	BJP	INC	AAP
Average number of new likes recorded during the study period	49589.44	21720.38	13307.04
Percentage	58.60	25.67	15.73
Popular vote share – election outcome	17,16,37,684	10,69,35,311	1,13,25,635
Percentage	59.21	36.89	3.91

To measure the strength and direction of association that exists between Facebook's trends and elections results, Spearman's rank-order correlation coefficient was calculated and the test results are presented in Table 8. The coefficient will provide a

nonparametric measure of association between the political trends on Facebook and poll results, and will be used to test the hypothesis that Facebook popularity is positively associated with election results.

Table 8 : Spearman's correlation results: Facebook trend vs. election results

		ANL	VOTES
Spearman's rho	ANL	Correlation Coefficient	1.000
		Sig. (1-tailed)	.
	VOTES	Correlation Coefficient	1.000**
		Sig. (1-tailed)	.

ANL— Average number of new likes recorded during the study period;
VOTES— Popular vote share – election outcome.

A Spearman's rank-order correlation was run to determine the relationship between the political trends on Facebook and election results. There was a strong, positive correlation between them, which was statistically significant ($r_s = 1.000, p < .01$).

There is a strong correlation between the average number of new likes recorded during the study period and the election results.

Hence, the hypothesis that more number of new 'likes' recorded on the fan page of a party or the representative of the party means more votes for that party in the election is tenable.

RQ5. Is the press trend associated with the Facebook popularity?

Based on the polarity and position of political items published in the newspapers, daily scores were

assigned to the parties under six categories—Congress positive, Congress negative, BJP positive, BJP negative, AAP positive and AAP negative. These daily scores for the parties in the four newspapers combined were used to understand the underlying political trends in the newspapers. Similarly, the Facebook fan pages of 'Narendra Modi', 'Arvind Kejriwal' and 'Indian National Congress' were considered and the varying number of 'Likes' on each of those pages were recorded on a daily-basis for analysis. To measure the effect of press trends on Facebook, the daily positivity scores for the three parties chosen in the newspapers and the number of new 'likes' recorded on each day of the study period have to be correlated. The daily scores for the parties in the papers and Facebook are presented in Table 9.

Table 9 : Daily scores for the parties in the newspapers and Facebook

Date	PCONG	PBJP	PAAP	FBJP	FCONG	FAAP
24-Jan-2014	6	13	5			
25-Jan-2014	-6	18	0	78796		11994
26-Jan-2014	5	5	15	117183		18221
27-Jan-2014	4	4	16	45075		12368
28-Jan-2014	44	9	4	149679		24993
29-Jan-2014	-7	7	-5	110274		28889
30-Jan-2014	7	8	27	21920		8643
31-Jan-2014	26	14	8	67892		24926
01-Feb-2014	23	22	28	35194		13398
02-Feb-2014	3	0	-2	21056		7799
03-Feb-2014	6	27	-15	32844		10752
04-Feb-2014	23	-5	28	99996		17483
05-Feb-2014	-2	9	4	103576		13194
06-Feb-2014	-11	37	12	135441		10794
07-Feb-2014	18	9	4	65647		18512
08-Feb-2014	16	19	26	237202		12219
09-Feb-2014	-14	25	26	70981		12424
10-Feb-2014	5	37	25	162104		26964
11-Feb-2014	18	9	-9	7455		42333
12-Feb-2014	41	31	29	79816		29396
13-Feb-2014	9	21	34	19115		19291
14-Feb-2014	7	36	1	14545		14701
15-Feb-2014	-16	-2	3	17240		16022
16-Feb-2014	8	-20	-2	16288		13959
17-Feb-2014	15	-15	21	12279		6691
18-Feb-2014	23	7	15	25315		14915
19-Feb-2014	-3	13	-7	3269		2472
20-Feb-2014	22	14	6	21843		11578
21-Feb-2014	31	4	12	29402		26056
22-Feb-2014	15	4	13	39720		14376
23-Feb-2014	4	14	2	24583		13528
24-Feb-2014	12	-9	28	25927		13384
25-Feb-2014	4	19	8	23784		13802
26-Feb-2014	18	23	-6	7287		4559
27-Feb-2014	-9	35	6	24601		12860
28-Feb-2014	23	19	23	29823		14364
01-Mar-2014	5	18	5	39675		11853
02-Mar-2014	4	21	12	12952		15338
03-Mar-2014	9	26	14	24660		12914
04-Mar-2014	2	9	8	4660		10914
05-Mar-2014	10	16	8	44661		14915

06-Mar-2014	13	-7	10	24660		5914
07-Mar-2014	0	14	-13	104661		19914
08-Mar-2014	6	3	17	14660		1726
09-Mar-2014	7	0	-21	54661		2000
10-Mar-2014	4	42	17	74566		1892
11-Mar-2014	-1	17	-8	39882		4938
12-Mar-2014	21	14	-4	39941		12469
13-Mar-2014	-9	-2	7	89941		10469
14-Mar-2014	-8	13	6	9880		16941
15-Mar-2014	0	39	3	59883		14934
16-Mar-2014	-8	70	27	41021		5336
17-Mar-2014	62	38	8	30842		10111
18-Mar-2014	17	4	12	47899		14430
19-Mar-2014	21	22	2	43147		10121
20-Mar-2014	35	6	5	39733		7671
21-Mar-2014	45	50	4	36884		12082
22-Mar-2014	16	-23	2	54126	11497	11061
23-Mar-2014	7	-39	13	12254	12519	16215
24-Mar-2014	4	23	8	44912	26680	17697
25-Mar-2014	3	8	15	20220	8890	9327
26-Mar-2014	19	23	18	54229	29537	23098
27-Mar-2014	84	48	-2	41211	31118	16183
28-Mar-2014	-13	7	0	53761	49881	18984
29-Mar-2014	3	30	-4	36813	36586	14524
30-Mar-2014	23	-19	10	43428	56581	14515
31-Mar-2014	8	29	8	73429	16599	14423
01-Apr-2014	32	63	-5	13428	36571	14619
02-Apr-2014	13	51	19	74428	56585	14521
03-Apr-2014	75	45	10	12429	16584	14518
04-Apr-2014	-18	16	-4	43427	36582	14522
05-Apr-2014	37	19	-7	12115	36585	14520
06-Apr-2014	46	7	14	111711	43621	19261
07-Apr-2014	66	35	4	63711	37621	19161
08-Apr-2014	18	3	4	7971	10701	990
09-Apr-2014	32	35	-1	63956	42144	34430
10-Apr-2014	26	41	10	60837	34605	25881
11-Apr-2014	44	38	15	12670	7644	5824
12-Apr-2014	41	9	17	55382	27276	20233
13-Apr-2014	1	2	-14	64361	27968	19611
14-Apr-2014	0	20	7	90695	31533	22180
15-Apr-2014	38	39	8	93594	37139	23903
16-Apr-2014	25	52	-1	27244	12242	7161
17-Apr-2014	39	63	2	90331	44006	21011
18-Apr-2014	10	6	3	25975	11779	6501
19-Apr-2014	16	67	3	78275	24728	17344
20-Apr-2014	31	18	0	29507	14331	6365
21-Apr-2014	5	34	2	29509	4339	6356
22-Apr-2014	8	-35	-1	60002	37435	12958
23-Apr-2014	33	20	-9	66264	30903	13541
24-Apr-2014	-1	15	12	54703	21471	9981
25-Apr-2014	40	49	0	45987	5193	9845
26-Apr-2014	15	31	10	48903	5092	10640
27-Apr-2014	64	45	0	44002	3994	10314
28-Apr-2014	17	45	2	40717	4320	9345
29-Apr-2014	29	20	-2	54011	8061	11562
30-Apr-2014	14	13	8	52588	8786	9504
01-May-2014	2	16	11	59385	6994	9178
02-May-2014	23	36	10	53328	8303	8164
03-May-2014	30	41	4	23152	3296	3700
04-May-2014	28	32	-4	60652	16772	8876
05-May-2014	5	56	2	60652	8771	8776
06-May-2014	-4	57	2	39433	19008	5634
07-May-2014	32	45	2	50503	15360	7201

08-May-2014	13	49	6	45934	16345	7421
09-May-2014	0	56	2	30463	10110	3967
10-May-2014	0	41	12	39357	12776	6316
11-May-2014	31	38	4	40223	11766	5718
12-May-2014	-6	43	-13	33440	232	4838

PCONG – Daily positivity score for the Congress in the newspapers
PBJP – Daily positivity score for the BJP in the newspapers
PAAP – Daily positivity score for the AAP in the newspapers
FCONG – Increase in the number of ‘Likes’ for ‘INC’ over the previous day’s score
FBJP – Increase in the number of ‘Likes’ for ‘Narendra Modi’ over previous day’s score
FAAP – Increase in the number of ‘Likes’ for ‘Arvind Kejriwal’ over the previous day’s score

These positivity scores for the Congress, BJP and AAP, calculated daily, were used for further analysis. In time-series analysis, the first step would be to plot the data, to acquire a basic understanding of the

nature of the time-series and which models and type of analysis would best suit them. The scores of the three parties—Congress, BJP and AAP—are plotted in Fig. 1.

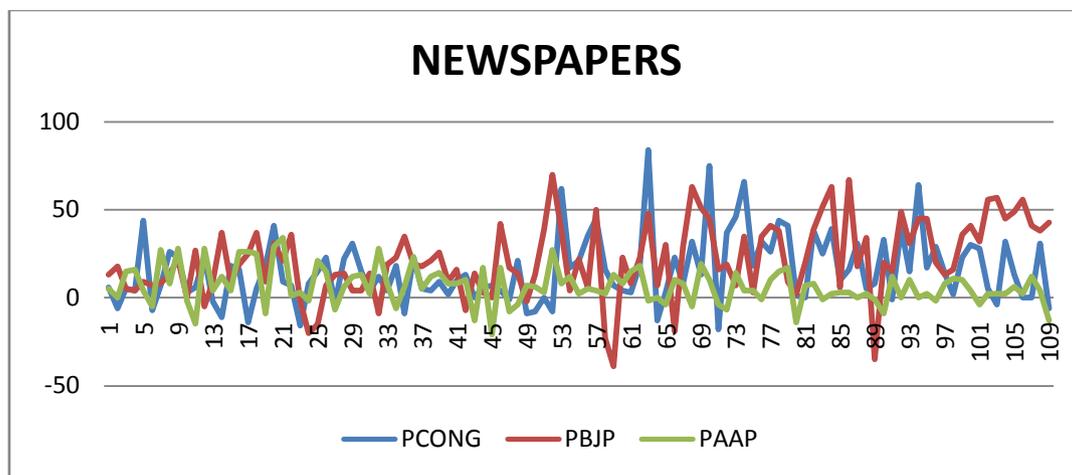


Figure 1 : Time-series plot for positivity scores

Similarly, the daily increase in the number of ‘likes’ is plotted in Fig. 2.

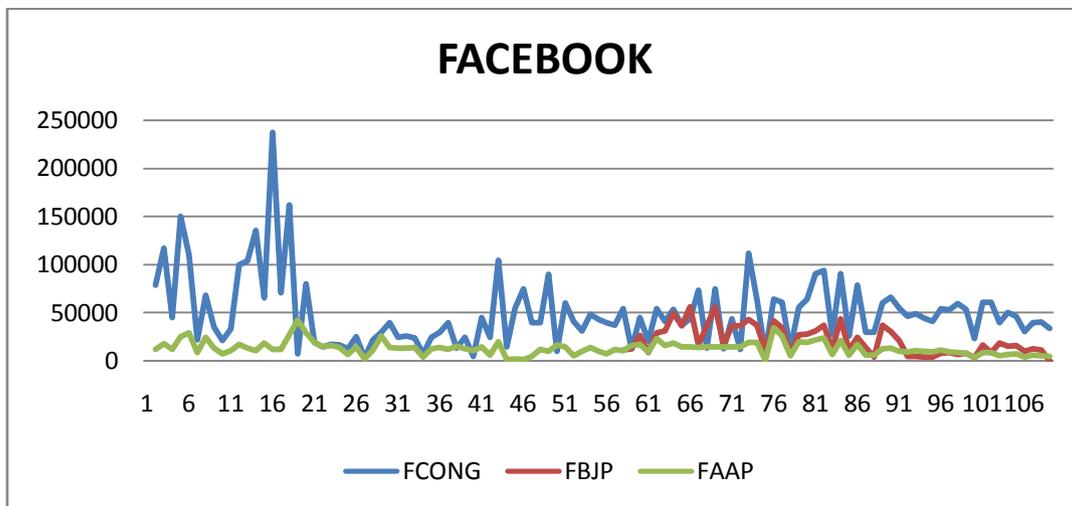


Figure 2 : Time-series plot for daily increase in the number of Fan page ‘likes’

Analysing Fig.1 and 2, it is observed that the curves exhibit seasonal fluctuations hiding the underlying trend. It is also observed that the curves sport a trend and not stationary. A series is stationary if

its mean and variance stay about the same over the length of the series.

To estimate the immediate effect of the print media on Facebook using cross-correlation, the time-



series need to be stationary. Hence, using the first order of difference of the time-series, the original curves are converted into stationary curves. Then the time-series for

Congress party in the newspapers and Facebook were cross-correlated and the results are presented in Table 10.

Table 10 : Cross-correlations: Series pair PCONG with FCONG

Lag	Cross Correlation	Std. Error ^a
-7	-.148	.100
-6	.104	.100
-5	-.043	.099
-4	-.019	.099
-3	.065	.098
-2	.002	.098
-1	-.070	.097
0	.024	.097
1	.103	.097
2	-.179	.098
3	.072	.098
4	.062	.099
5	-.072	.099
6	-.048	.100
7	.105	.100

a. Based on the assumption that the series are not cross correlated and that one of the series is white noise.

The analysis shows that the press trend (positivity scores) for the Congress party is a leading indicator for the number of likes that the fan page of Indian National Congress secures. As shown in the plot (Fig. 3), most of the correlations are small. There is a fairly large negative correlation of -0.179 at lag 2. A

positive lag indicates that the first series leads the second series. It can be concluded that the leading indicator press trend of Congress really is a leading indicator and that it works best at predicting the value of new Facebook 'likes' two periods later.

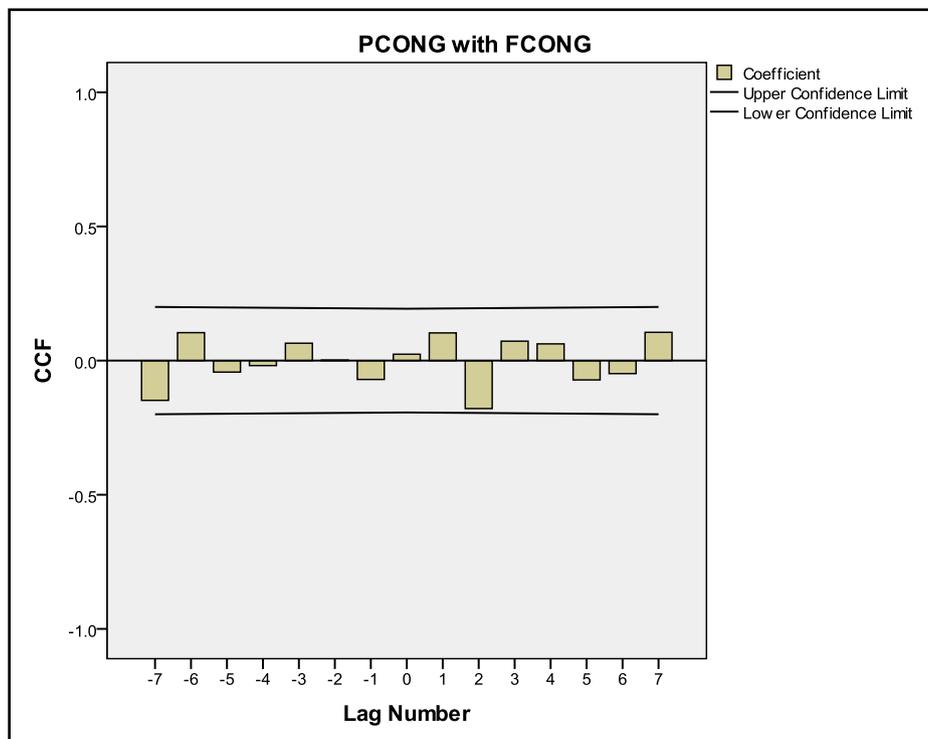


Figure 3 : Cross-correlations: Congress

Similarly, the time-series for BJP in the newspapers and Facebook were cross-correlated and the results are presented in Fig. 4. In the case of BJP,

too, the press trend (positivity scores) was found to be a leading indicator for the number of likes that the fan page of Narendra Modi secured. As shown in the plot

(Fig. 4), most of the correlations are small. There is a fairly large positive correlation of 0.226 at lag 6 and a fairly large negative correlation of -0.239 at lag 7. The

leading indicator works best at predicting the value of Facebook 'likes' seven days later.

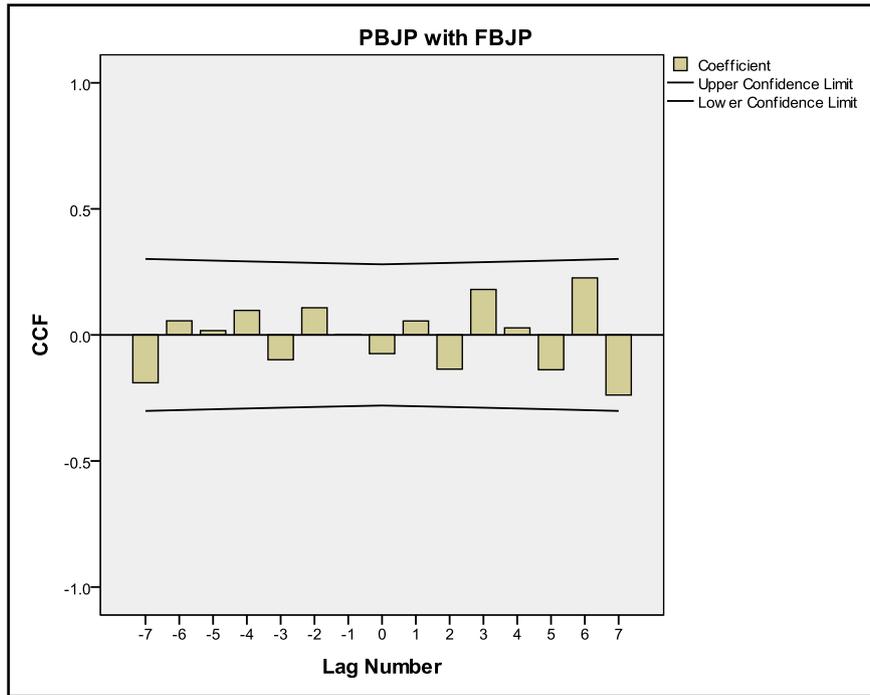


Figure 4 : Cross-correlations: BJP

Similarly, the time-series for AAP in the newspapers and Facebook were cross-correlated and the results are presented in Fig. 5. In the case of AAP, too, the press trend (positivity scores) was found to be a leading indicator for the number of likes that the fan page of Arvind Kejriwal secured. As shown in the plot

(Fig. 5), most of the correlations are small. There is a fairly large negative correlation of -0.174 at lag 0 and a fairly large positive correlation of 0.214 at lag 3. The leading indicator works best at predicting the value of Facebook 'likes' three days later.

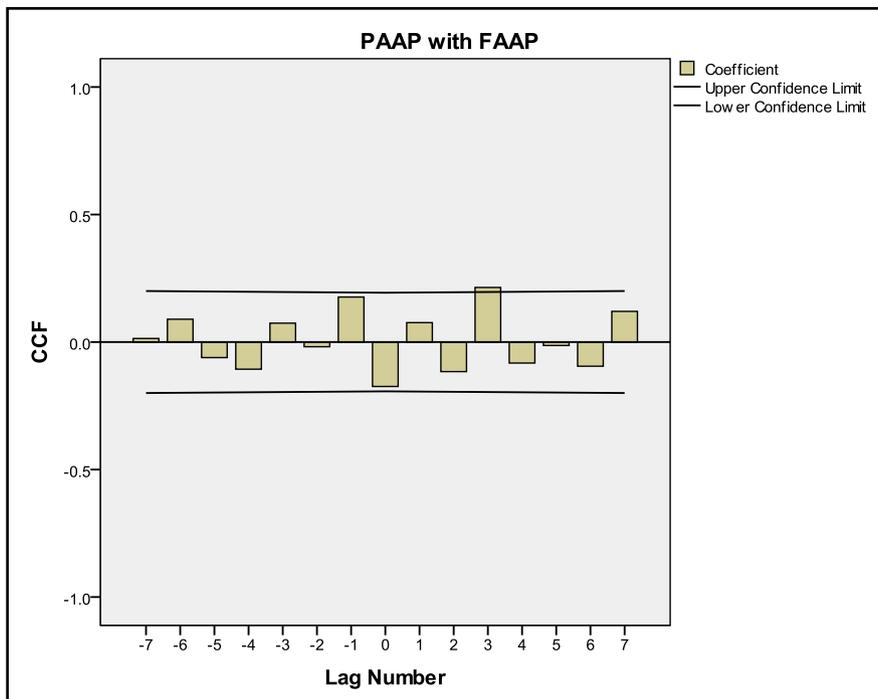


Figure 5 : Cross-correlations: AAP

Though the time-lagged correlation coefficients found an association between the press and Facebook trends at several lags, those are about seasonal fluctuations. The study aims at establishing a correlation between the long term political trends of Facebook and the print media. Since the original curves are highly distorted by seasonal fluctuations, the curves are

decomposed to extract the seasonal component by calculating the moving averages for seven periods—since data were collected on all the seven days of a week. After the seasonal component is removed from the original curves, the residual data is subjected to correlation analysis and the results of the analysis are presented in Table 11.

Table 11 : Correlation results: Press trends vs. Facebook trends

		FB	FC	FA
PC	Pearson Correlation	-.073	.304	.177
	Sig. (1-tailed)	.232	.015	.038
	N	102	51	102
PB	Pearson Correlation	.177	-.141	-.212
	Sig. (1-tailed)	.038	.163	.016
	N	102	51	102
PA	Pearson Correlation	.235	.081	.576
	Sig. (1-tailed)	.009	.286	.000
	N	102	51	102

PA — Deseasonalised newspaper scores for AAP; PB — Deseasonalised newspaper scores for BJP;
 PC — Deseasonalised newspaper scores for Congress; FA — Deseasonalised Facebook scores for AAP;
 FB — Deseasonalised Facebook scores for BJP; FC — Deseasonalised Facebook scores for Congress

A Pearson product-moment correlation was run to determine the relationship between the deseasonalised daily positivity scores that the Congress earned in the newspapers and the number of new 'likes' recorded on the Facebook fan page of the Indian National Congress during the study period. The data showed no violation of normality, linearity or homoscedasticity. There was a strong, positive correlation between the press and Facebook trends, which was statistically significant ($r = .304$, $n = 51$, $p = .015$). Similarly, there was a significant correlation between the deseasonalised daily positivity scores that the BJP earned in the newspapers and the number of new 'likes' recorded on the Facebook fan page of Narendra Modi during the study period ($r = .177$, $n = 102$, $p = .038$). The deseasonalised daily positivity scores that the AAP earned in the newspapers was also positively correlated with the number of new 'likes' recorded on the Facebook fan page of Arvind Kejriwal during the study period ($r = .576$, $n = 102$, $p < .0005$).

IV. CONCLUSION

As the results of the empirical analyses show, both the political trends in the print media and on Facebook were reliable predictors of the outcome of the 2014 Lok Sabha elections. Press trend or media bias (Congress – 35.88%; BJP – 49.12% and AAP – 15.01%) was highly in favour of the BJP party and correlated with the popular vote share of the parties in the polls that the BJP won. Similarly, the political trend on Facebook (Congress – 25.67%; BJP – 58.6% and AAP – 15.73%) that was tracked using the number of 'likes' recorded on the fan pages of the parties and their popular candidates was highly in favour of the BJP and

correlated with the election results (Congress – 36.89%; BJP – 59.21% and AAP – 3.91%). That is, analysing the bias in the press reports published during the election, the probable winner of the elections can be predicted. In simple terms, more positive news and comparatively lesser amount of negative news published in the newspapers means more votes for the party in the elections. Similarly, the number of 'likes' recorded on the Facebook fan page of a party or its candidate can be used to estimate how popular the party or candidate is among the people. The study results have shown that the political trend on Facebook can also be used to predict the probable winner.

The thread that connects the print media and Facebook are the people. People who read news reports published in the papers are influenced by it and when they lend their support to their favourite parties on Facebook, that influence is felt. This theory was found to be tenable through statistical tests. A correlation was found to exist between press and Facebook trends. That is, the effect of political news published in the papers during the election period was felt on Facebook with variations in the number of 'likes' recorded on the fan pages of the parties.

The present study investigated both short- and long-term effects. Cross-correlation analyses were performed to estimate the immediate effects. It was found that in all three cases—the Congress, BJP and AAP—the press trend was a leading indicator. That is, the press trend can be used as a predictor for the Facebook trend. In other words, analysing the number of positive and negative reports published in the newspapers, the probable increase or decrease in the number of 'likes' recorded on the Facebook fan pages

can be predicted. However, the strongest amount of correlation between press and Facebook trends was found to be several lags away. That is, the effect of media reports on Facebook was not immediately felt, but several periods—in the present case, several days—later. The study was more interested in finding a correlation between the long-term political trends of the newspapers and Facebook.

Positive correlations were reported indicating that the newspapers had an effect on Facebook—which in turn, shows that the newspapers had an effect on the people.

Since media bias, Facebook trend and the election results correlated, the present study concludes that just by studying the content of a mass media that people avidly use, the outcome of the election—or any other future behaviour of the people—can be predicted.

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