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Ralf Dewenter

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Ralf Dewenter – Helmut Schmidt University Hamburg, Department of Economics, Germany

Uwe Dulleck – Queensland University of Technology, QUT Business School, Australia

Tobias Thomas – EcoAustria – Institute for Economic Research, Austria

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Am Heumarkt 10

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Austria

Tel: +43-(0)1-388 55 11

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The Political Coverage Index and its Application to Government Capture^a

Ralf Dewenter^b, Uwe Dulleck^c & Tobias Thomas^d

Abstract

With the upswing of populist, right-wing and EU-sceptic parties and politicians in Europe and the success of Donald Trump in the US presidential elections in 2016 media and their role with respect to the perception and decisions of individuals in the political context are (once again) in the focus of interest. This contribution introduces a new measure of political media bias by analyzing articles and newscasts with respect to the tonality on political parties and politicians. On this basis we develop a Political Coverage Index (PCI) sorting the outlets in the political left to right spectrum. We apply the PCI to 35 opinion-leading media in Germany, analysing 10,105,165 news items on political parties and politicians from 1998 to 2012. With this tonality-based approach we are able to achieve a more direct and reliable measure of media bias. In addition, we apply the PCI to investigate whether the media fulfil their role as the fourth estate, i.e. provide another level of control for government, or whether there is evidence of government capture. First results show that at least in Germany this seems to be not the case.

Keywords: Political Coverage Index, media bias, tonality, governmental capture

JEL: C43, D 72, L82

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^b Helmut Schmidt University Hamburg, Department of Economics, Germany.

^c Queensland University of Technology, QUT Business School, Australia.

^d EcoAustria – Institute for Economic Research, Am Heumarkt 10, Vienna, Austria, and Düsseldorf Institute for Competition Economics DICE.

1 Introduction

With the upswing of populist, right-wing and EU-sceptic parties and politicians in Europe and the success of Donald Trump in the US presidential elections in 2016 media and their role with respect to the perception and decisions of individuals in the political context are (once again) in the focus of interest. The at least temporarily success of Nigel Farage and his UK Independent Party (UKIP) in the United Kingdom, Geert Wilders' Partij voor de Vrijheid in the Netherlands, Marine Le Pen's Front Nationale in France, Giuseppe Piero „Beppe“ Grillo's Movimento 5 Stelle in Italy as well as the Alternative für Deutschland (AfD) has been connected with huge media interest.

The distribution of information through media channels is highly relevant, because media can never depict the complete reality, but only paint a partial picture. In addition, the portrayed reality is prone to several types of distortions which can be summarized under the so-called media bias. Media outlets are neither able nor expected to carry out comprehensive, completely neutral reporting. Consequently, individual's decisions based on information provided by the media might deviate from decisions based on a more unbiased and more comprehensive information basis. Hence, in the political context it is of interest if there exists a political media bias, i.e. if media outlets favour one or another side of the political spectrum. Beside political and communication science, this question is analysed in the public choice literature. With focus on the US two party system Groseclose and Milyo (2005) provide an index of media outlets by comparing the number of think tanks and interest groups cited by Democratic and Republican members of US congress with the same groups quoted by the media. The results show a strong liberal bias among all US news outlets examined, except Fox News' Special Report. In contrast, Gentzkow and Shapiro (2010) methodologically compare characteristic phrases frequently used in different media outlets.

Consequently, deviations in political media coverage can have an impact on the perception and behaviour of both voters and politicians. For instance, Prat (2014) shows that media organizations are able to induce voters to make electoral decisions they would not make if reporting were unbiased. The disturbing conclusion unfolds that it cannot be excluded that large media organizations can swing the outcome of US presidential elections. A closer look on the impact of media coverage on political action is provided by Snyder and Strömborg (2010). The authors find that voters living in regions with insufficient political media coverage are less able to recall or evaluate the representatives.

This has an effect on the work of the politicians: Less covered congressmen are less willing to serve as witness at congressional hearings or serve on committees and regions with lower press coverage of representatives receive less federal spending.

The reasons for the political bias of a media outlet can be diverse: For instance, the political positions of a media outlet can reflect the expectations of their recipients or their owners. For instance, Gentzkow and Shapiro (2010) find that the media's response to consumer preferences has a much higher explanatory power for media slant than the owner structure. Anderson & McLaren (2010) argue that media are owned by people with political and profit motives and they use their influence to change policy, for instance when it comes to tax policy, merger control or questions of intellectual property rights. Other authors argue that governments capture the media by policy decisions in their favour, or by access to the news stories to maintain "a "cozy" relationship with the media" (Besley & Prat, 2006, 720).¹ In particular the latter explanation of government capture would imply that media outlets tend to be less critical of the government, i.e. fail in their role as the fourth estate.² The former explanation would lead us to expect that such failure is at least for part of the media observable, namely for those media outlets that are owned or edited by people more aligned with the political party in power.

In this contribution we firstly introduce a new Political Coverage Index (PCI) based on the tonality of news reports on political parties and politicians with the aim to measure the political bias of different media outlets, sorting the outlets in the political left to right spectrum. By doing so, our work is connected to Groseclose and Milyo (2005), Gentzkow and Shapiro (2010) as well as Greenstein and Zhu (2012). However, in contrast to these contributions we do not utilize quotes or characteristic phrases but employ the tonality of news reports on political parties and politicians based on human coded media data. Secondly, we present an application of the PCI to study a government bias in news reporting. Therefore, our contribution is connected to the work of Anderson & McLaren (2010) and Besley & Prat (2006) as well.

Our contribution is structured as follows: Section 2 provides an overview over the related literature before the data and the Political Coverage Index (PCI) are introduced in section

¹ These contributions can be connected to the model of political agency or voter control (see Barro, 1973; Ferejohn, 1986).

² In 1787 Edmund Burke claimed in a famous parliamentary debate to provide members of the media access to the parliament. Burke's argument was that the media form the 'fourth estate' of government – beside the traditional three estates: The clerical and secular members of the House of Lords and the House of Commons.

3. Then, section 4 present our application of the PCI to study the government bias and the role of the media as the fourth estate. Finally, section 5 concludes.

2 Related Literature

Media play an important role in the perception and decisions of individuals in the economic and political context, as individuals often do not interact with each other through direct communication and informational exchange. Instead, information and communication are often exchanged in an indirect manner through media channels. This is highly relevant, because media can never depict the complete reality, but only paint a partial picture. In addition, the portrayed reality is prone to various types of distortions, so called media bias (Entman 2007).

From the various types of media bias the most prominent are: the advertising bias, when media change their news coverage in tone or volume in favour of their advertising clients (see Dewenter & Heimeshoff, 2014, 2015; Gambaro & Puglisi 2015 or Reuter & Zitzewitz 2006); newsworthiness bias, when news on certain issues crowd out coverage on other issues because they are seen as more newsworthy (see Durante & Zhuravskaya, 2015 or Eisensee & Strömberg, 2007); and the negativity bias, when media focus more on catastrophes, crime and threatening political and economic developments in comparison to more positive news (see Friebel and Heinz, 2014; Garz, 2013, 2014; Heinz and Swinnen, 2015; or Soroka, 2006).³ As a consequence, individual's decisions based on information provided by media might deviate from decisions based on a more unbiased information basis. For instance, Dewenter et al. (2016) find evidence that the number of car sales depends at least in parts on the media coverage on the automotive industry, Eisensee and Strömberg (2007) analyse the effects of media coverage of natural disasters on US disaster relief decisions, and Beckmann et al. (2017) show that media coverage on terror attacks causes further terroristic activities in terms of number of incidents as well as on the severity of terror acts.

Consequentially, a growing literature employs media data to explain perception and behaviour. In the economic context, Nadeau et al. (2000), Soroka (2006), and van Raaij

³ The most prominent types of media bias were already introduced in the introduction. In addition, in communication and media science exists a broad literature on the existence of media biases and their foundations. Some examples are Ball-Rokeach (1985) as well as Ball-Rokeach and DeFleur (1976) on the dependency of the media-system and Dunham (2013) on the measurement of media biases.

(1989) show that the assessment of the state of the economy and economic expectations depends at least in parts on media reports. Alsem et al. (2008), Goidel and Langley (1995) as well as Doms and Morin (2004) analyse the impact of media reporting on consumer climate. Garz (2012, 2013) investigates the impact of distorted media coverage on unemployment on job insecurity perceptions and Lamla and Maag (2012) analyze the role of media reporting for inflation forecasts of households and professional forecasters.

In the political context Bernhardt et al (2008), D'Alessio and Allen (2000), DellaVigna and Kaplan (2007), Druckman and Parkin (2005), Entman (2007), Gentzkow et al (2011), Morris (2007) as well as Snyder and Strömberg (2010) focus on the impact of media coverage on political attitudes, voter's decisions, and political accountability. The impact of media coverage on the outcome of elections is in the focus of Enikolopov et al. (2011). The authors analyse electoral outcomes of parliamentary elections in 1999 in Russian regions with different access to an independent national TV channel and find that access to independent TV leads to a decreased vote for the governing party and to an increased vote for major opposition parties. The results are comparable to those of DellaVigna and Kaplan (2007). Based on the successive rolling out of conservative broadcasting service Fox News Channel among the US states the authors find that republicans gained additional votes in Presidential elections between 1996 and 2000 in the cities that broadcast Fox News. In addition, as mentioned above, political media coverage has an impact on the behaviour of politicians as well (Snyder and Strömberg, 2010). The opposite causation, i.e. the impact of government parties on media coverage is analysed by Gentzkow et al (2015).

3 A New Measure of Political Media Bias

3.1 The Data

Media Set

Our contribution is based on the media content analysis by Media Tenor International. Our sample of media outlets consists of 35 different media outlets from Germany, such as private TV news shows (3), public service TV news shows (4), public service TV political magazines (11), daily newspapers (7), as well as weeklies and magazines (10) (see Table A1 in the appendix). The selection of the media set follows two criterions: First, the media set includes media which were quoted most by other media in the timeframe analysed

and hence can be seen as opinion-leading and second TV magazines with a special focus on political affairs. Reports were analyzed over the period February 1998 to December 2012. This time period is particularly interesting as it was characterized by governments lead by both major parties as well as a period with grand coalition. In addition, during the period 1998 and 2012 the German political system could still be largely classified as bipolar – with the two major parties, christian conservative CDU/CSU and social democratic SPD, representing the moderate right and the moderate left, and two smaller parties, the FDP and the Greens, by and large affiliated with the CDU/CSU and the SPD respectively.⁴ As media outlets were analyzed for different periods the panel is unbalanced.

Human Coding

The media outlets were analyzed based upon over 700 characteristics, which were defined in a binding coding manual – the so-called code-book. Each report was coded and categorized by media type (TV, print, general and specialized press, etc.), evaluated topic (such as unemployment, inflation, etc.), participating persons (such as politicians, entrepreneurs, managers, celebrities) and/or institutions (such as political parties, companies, football clubs), region of reference (such as Germany, USA, UK, world), time reference (future, present and past), and the source of information (such as journalist, politician, expert, etc.). Each report was analysed news item by news item, i.e. each time when a new topic, person, institution, region, time reference or source was mentioned, an additional news item was to be coded. In addition, the analysts captured if the relevant protagonists and/or institutions receive positive, negative or neutral coverage.

Overall 10,105,165 news items are included in the analysis. Skipping all items that were not on CDU/CSU or SPD resulted in a total of 7,203,351 items. The overwhelming majority of the reports did focus on the federal level in Germany, as the media set only includes opinion-leading national media and not regional media.⁵

The validity and reliability of the coding was checked by Media Tenor on an ongoing basis both with standard tests and random spot checks, based on the code-book. Only coders

⁴ The FDP in this period entered coalitions with both parties but the probability of a coalition with the CDU was the rule, and coalitions with the SPD the exception on state and federal level. The Greens during this period did not form coalitions with the CDU on state or federal level.

⁵ Most of the political TV magazines analyzed are provided by regional member broadcasting services of the ARD (in particular: Fakt, Kontraste, Monitor, Panorama, Plusminus, Report BR, Report SWR), which is a joint organization of Germany's regional public-service broadcasters. However, we did only include the political TV magazines which focus on national politics and were broadcasted on national ARD.

that achieved a minimum accuracy of 0.85 were cleared for coding. In comparison, computer linguistic approaches achieve accuracy not more than 0.60-0.70, especially when it comes to topical context and tonality. As a consequence, Grinner and Steward (2013, 1) conclude, that in political text analysis there is no substitute for human reading.

Tonality

Out of the set of all variables, for the development of the index we use in particular the name and type of media outlet, publication date, protagonist and tonality respectively. In communication science this sentiment or tone of coverage is called tonality (Haselmeyer and Jenny 2016). The tonality s of a media outlet i on a certain person or institution x can be defined as:

$$s_{i,t} = \frac{x_{i,t}^+ - x_{i,t}^-}{X_{i,t}},$$

whereas $x_{i,t}^+$ is the number of positive news in medium i in time t , $x_{i,t}^-$ is the number of negative news, and $X_{i,t}$ is the total number of positive, negative, and neutral news on a certain person or institution x in medium i in time t . The tonality $s_{i,t} \in (-1,0,1)$ ranges from -1 (all news about x are negative) to +1 (all news about x are positive).

On average, tonality of the media coverage is negative for all media (see Table A1). Also all media outlets show negative average scores for both parties, except Super Illu, an eastern German magazine, which has a slightly positive score for CDU/CSU. Media are therefore identified to be rather critical. This is hardly surprising and well known in communication science as negativity bias. However, comparing scores with respect to both parties political “preferences” of the outlets can be identified.

3.2 The Political Coverage Index (PCI)

Unweighted PCI

To derive an adequate index of media coverage we use media reporting on the two biggest German Parties, the so-called Union Parties (i.e. the CDU and its “sister party” CSU) as well as the SPD by simply measuring the difference in tonality of both parties by media outlet and time. Put differently, for each month and media outlet we measure the average

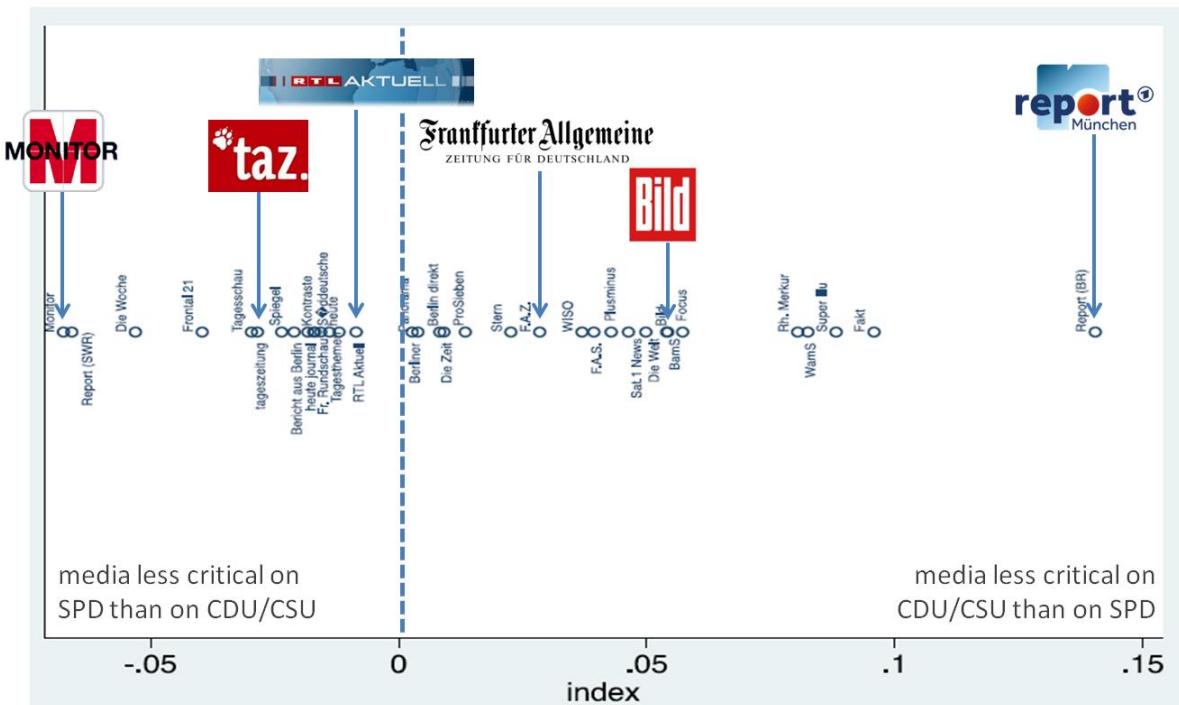
tonality of all articles on the two parties (CDU/CSU and SPD) and calculate the difference between the two values.

The unweighted PCI $S_{i,t}$ for media outlet i in month t is then defined as

$$S_{i,t} = \sum_{j=1}^n s_t^{\frac{CDU}{CSU}} - \sum_{k=1}^m s_t^{SPD},$$

where $\sum_{j=1}^n s_t^{\frac{CDU}{CSU}}$ is the average score of all the n reports in outlet i dealing with either the Christian Social Union of Bavaria (CSU) or the Christian Democratic Union of Germany (CDU) in month t , in any conceivable way. Similarly, $\sum_{k=1}^m s_t^{SPD}$ is the respective average score for the m reports dealing with Social Democrats, i.e. the Social Democratic Party (SPD). As $s \in (-1,0,1)$, reflecting a negative, neutral or positive tone, the range of the score is defined by $S = [-2,2]$. In case that a media outlet's coverage is always reporting negatively on SPD ($s = -1$) and at the same time reporting positively on CDU/CSU ($s = 1$), which yield the total score of $S_{i,t} = 1 - (-1) = 2$. In case that a media outlet shows always a negative reporting on CDU/CSU ($s = -1$) and at the same time reporting positively on SPD ($s = 1$) the total score would be $S_{i,t} = (-1) - 1 = -2$. In the first case one can argue that the respective media outlet is completely biased towards Christian Democrats. However, the latter case the outlet would show a complete bias towards the Social Democratic Party.

First, calculating the media coverage index over all observations from February 1998 to December 2012 leads to an overall distribution of the media outlets in our sample. As can be seen from Figure 1, media outlets cover values from about -0.07 to 0.14 indicating that some of the outlets reporting in favour of the CDU/CSU are more pronounced than those reporting for the SPD. Overall, the distribution is somewhat right-skewed. However, keeping in mind that the index is defined from -2 to 2 this seems to be a rather moderate skew. While the political TV magazine Monitor (WDR) which is produced as public broadcasting is the most leftish outlet, the Report BR, again a public broadcasting TV magazine, is the most conservative one.

Figure 1: Overall PCI 1998/2 to 2012/12 (unweighted PCI)

Note: An index value below 0 indicates the media outlet has a positive bias towards the SPD (left), a value above 0 indicates a bias towards the CDU (right).

On a first glance, the relative extreme positions of the two public broadcasting TV magazines might be irritating. The background of these political TV magazines sheds some light on potential explanation: Monitor (WDR) and Report BR are broadcasted on a national level by the ARD, which is a joint organization of Germany's regional public-service broadcasters. However, the magazines are produced by regional member broadcasting services WDR and BR. The WDR is based in the Federal State of North Rhine-Westphalia where from 1966-2017 the Social Democrats did form the government in 46 of 51 years. The Report BR is based in the Free State of Bavaria where since 1957-2017 the conservative CSU did form the governments in all 60 years. As the head or director of the regional broadcasting services is chosen by a council, mainly containing members of the regional parliaments and special interest groups, the extreme positions of TV magazine Monitor (WDR) and Report BR are not surprising at all.

Overall, the PCI varies moderately around zero, which can be interpreted as some kind of outer pluralism between the different media outlets, and is slightly right skewed.

Next, allowing the PCI to vary over outlets and over time, monthly, weekly and daily indexes can be derived (see Figure A1 for monthly values). Interestingly, the variation in the tonality of coverage is considerable large (see Table A2 for summary statistics of the

monthly index). The newspaper Die Welt for example, which can on average be described as conservative (mean PCI=0.05), varies in its PCI from a minimum of -0.10 to a maximum of 0.30. A more leftish newspaper, Tageszeitung (taz), varies from -.24 to 0.22 (mean PCI=-.030). Interestingly, public service broadcasting outlets can be placed over the whole political spectrum, which can be interpreted as some kind of inner pluralism ensured by a number of different programs. However, public service broadcasting also shows a relatively large variance of PCI. The latter indicates a different kind of inner pluralism, which is ensured by a certain degree of diversity of opinion that is given within a program.

Weighted PCI

As the unweighted PCI does not account for the number of items or reports, it may be biased in case that media either neglect to report on a specific party or show an unbalanced coverage in terms of the frequency of mentioning (independently of tonality). For this reason, we calculate a weighted PCI

$$S_{i,t}^w = w_{n,t} \sum_{j=1}^n s_t^{CDU/CSU} - w_{m,t} \sum_{k=1}^m s_t^{SPD},$$

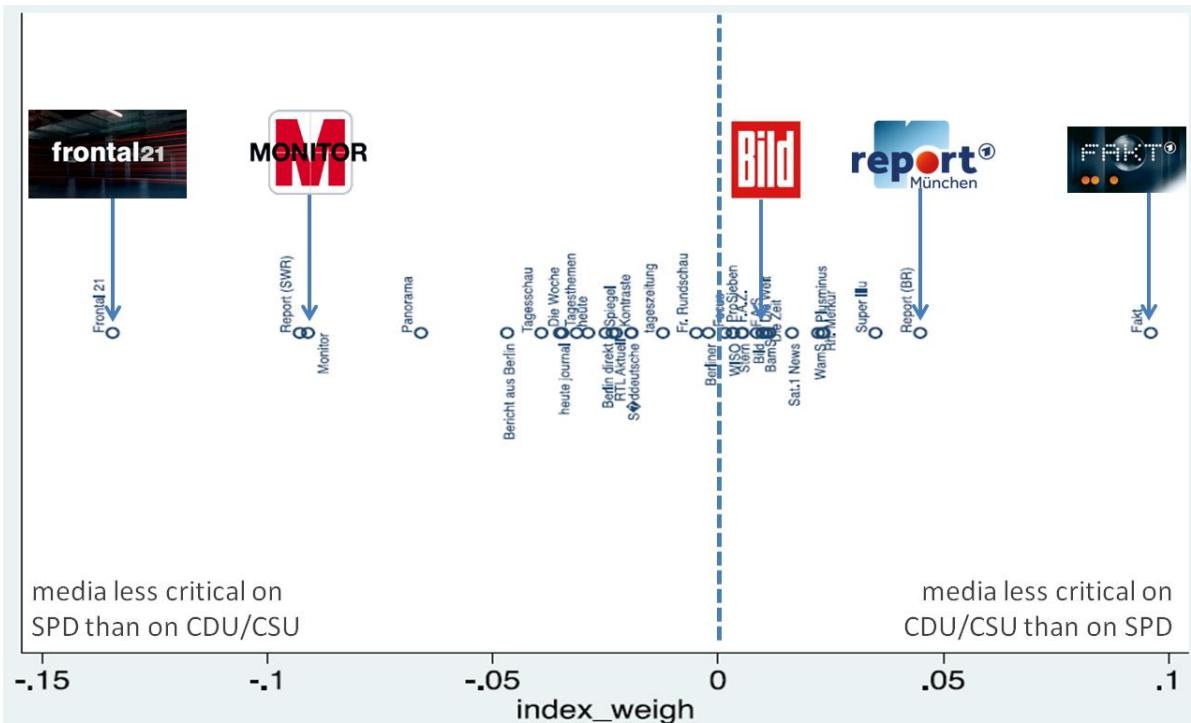
where w_n (w_m) is the share of the number of reports on CDU/CSU (SPD) within a period t . For a monthly version of the PCI, w_m is the share of reports on SPD in relation to all reports (on CDU/CSU and SPD) by month. Here, $S^w = [-1,1]$. In case that, e.g., coverage is only on SPD and entirely positive, S would be equal to -1. However, in case that coverage is more or less balanced $w_n = w_m \approx 0.5$, S^w should be smaller than S . By this means, the index also accounts for the extent to which a party is reported.

Again, calculating the media coverage index over all observations from February 1998 to December 2012 leads to the overall distribution of the media outlets (see Figure 2). Results are similar to the unweighted index, though the political spectrum of the media outlets shifted slightly to the left. While most numbers of PCI are now smaller in comparison to the unweighted index, some became bigger in absolute values. As the weights add up to one it is not surprising that the variance is lower in the weighted case.

Turning to a monthly index, again, weights are derived from the number of reports on a party. As can be seen from Table A3 in the appendix, the overall weights for CDU/CSU and SPD vary between media outlets. While most of the outlets show a more or less pronounced bigger share for CDU/CSU, few which are especially known as leftish media

products such as *taz* or *Die Zeit* have very slightly more reports on SPD. For this reason, a weighted index could be an adequate measure against a biased unweighted PCI.

Figure 2: Overall PCI 1998/2 to 2012/12 (weighted PCI)



Note: An index value below 0 indicates the media outlet has a positive bias towards the SPD (left), a value above 0 indicates a bias towards the CDU (right).

Properties of PCI

Taking a closer look at the distributions of the unweighted PCI over media and month reveals that almost every distribution is leptokurtic (see Table A2). Moreover, in 24 out of 35 cases distributions have at least a slightly positive skew. For 20 media outlets, means are positive indicating a conservative reporting.

The weighted index shows 20 instead of 15 negative means (i.e. a rather leftish coverage) and a higher Kurtosis for most of the outlets (see Table A3). The distribution of the weighted index is therefore steeper than the distribution of the unweighted PCI. 17 outlets show a negative skew instead of 11 in case of the unweighted index. And altogether, the weighted PCI is less skewed than the unweighted.

However, calculating Spearman's rank order coefficient leads to a value of 0.9351, indicating a high correlation between both indexes. The null of independence can be rejected. We therefore expect both indexes to be substitutable.

4 An Application: Government Bias in German Media

To test the PCI, we present a simple analysis of a possible government bias in German media. We therefore apply simple OLS and fixed effects regressions to determine the impact of different legislatures on a monthly PCI. Again, we use the whole sample of February 1998 to December 2012.

Graphical inspection of the data shows that the media coverage of different outlets varies over time (see Figures A2 to A5). The vertical lines represent the launch of a new coalition. At first appearance, a more conservative coalition seems to be accompanied with a rather leftish coverage and vice versa. However, a more accurate analysis can be conducted by a deeper inspection of the data.

4.1 Pooled Regressions

As a first step, we pool the indexes of all media and use simple least squares to analyse the relation of different coalitions with media reporting. The key explanatory variables are three dummies representing the individual government coalitions: CDU/FDP, CDU/SPD and SPD/GREEN. The coalitions of SPD and Greens lasted from 27 October 1998 and 22 October 2002 (SPD/GREEN I) and from 22 Oct 2002 to 18 Oct 2005 (SPD/GREEN II). The two CDU/CSU/FDP coalitions governed from 17 November 1994 to 26 October 1998 (CDU/FDP I) and between 28 October 2009 to 22 October 2013 (CDU/FDP II). The so called grand coalition (CDU/SPD) of CDU, CSU and SPD lasted between 22 November 2005 and 28 October 2009. The dummies are therefore equal to one in case that the respective coalition was in office and zero otherwise. In a second step, we split the SPD/GREEN dummy into two dummy variables, indicating the two terms of the so called “red-green coalition” in order to account for possible differences between the respective governments. Interestingly, in the second term of SPD and Greens (SPD/GREEN II) SPD-Chancellor Gerhard Schröder did pave the way for a couple of structural reforms in Germany. Facing a record number of 5.2 million unemployed workers, with the Agenda 2010 Schröder introduced a reform package which – with respect to the labour market – can be seen the most comprehensive social security reform since the World War II. However, despite the fact that up from 2005 the unemployment numbers decreases heavily, the revitalisation of the labour market came too late for Chancellor Schröder in terms of political success: accompanied with complains by other politicians and trade

unions, which saw the Agenda 2010, especially the Hartz IV legislation, as a huge cut into the German social security system, Schröder lost a confidence vote in the parliament. This necessitated an early general election in which the Social Democrats were defeated.

The regression equation can then be represented as:

$$PCI_{it} = \beta_1 d_t^{CDU/FDP} + \beta_2 d_t^{SPD/GREEN} + \beta_3 d_t^{CDU/SPD} + \varepsilon_{it},$$

where PCI is the monthly political coverage index, the d 's are the dummy variables indicating the respective coalitions, β 's are coefficients to be estimated and ε is an error term. As can be seen from regression OLS I in table 1, coefficients for both SPD/GREEN as well as for CDU/SPD coalitions are positive, while the coefficient for CDU/FDP is negative. The negative coefficient indicates a rather leftish reporting during the CDU/FDP coalition period and the positive coefficients speak more in favour of a more conservative reporting during a SPD/GREEN and a grand coalition. This result could be considered as some evidence for a critical reporting on government parties. Given that a negative (positive) PCI is connected with a rather leftish (conservative) reporting, the regression results suggest an (from the coalition's perspective) opposing media coverage. Moreover, it is noticeable the coefficient of the SPD/GREEN dummy is bigger than the CDU/SPD dummy, which is also in line with an anti-government bias. A coalition of Social Democrats and the Green Party is expectedly more to left than the grand coalition.

Splitting the coalition period of SPD and Green Party into period I and II (OLS II) leads to comparable results. However, while SPD/GREEN I is statistically significant and about 0.014, SPD/GREEN II is even larger (about 0.052). During the second legislative session, media reporting is even more "conservative" than during the first term. This result appears to be somewhat surprising, as during the second term of the SPD/GREEN coalition the so-called "Agenda 2010" has been implemented, a bunch of rather conservative structural reform measures to foster labour market flexibility. However, as the "Agenda 2010" was accompanied by strong protests by other politicians and trade unions, media did report on these protests connected to a stronger negativity on the Social Democrats, despite or due to the fact, that in those days they did run a rather conservative policy. Our PCI though is a measure of how media reporting is biased toward parties. Therefore, a larger PCI indicates a reporting in favour CDU/CSU and, in this case, against the government. Again, the coefficient for CDU/FDP is negative suggesting coverage, which is in favour of the social democrats during the conservative-liberal coalition.

Table 1: OLS and Fixed Effects Regressions of unweighted PCI

PCI	OLS I	OLS II	FE I	FE II	FE III
SPD/GREEN	0.0344 (0.00)	-	0.0905 (0.00)	0.0457 (0.00)	-
SPD/GREEN I	-	0.0143 (0.01)	-	-	0.0317 (0.00)
SPD/GREEN II	-	0.0523 (0.00)	-	-	0.0506 (0.00)
CDU/FDP	-0.0554 (0.00)	-0.0554 (0.00)	-	-	-
CDU/SPD	0.0209 (0.00)	0.0209 (0.00)	0.0702 (0.00)	0.0538 (0.00)	0.0555 (0.00)
Constant	-	-	-0.0539 (0.00)	0.1295 (0.24)	0.2773 (0.02)
Time Fixed Effects	No	No	YES	YES	YES
Media effects	No	No	YES	YES	YES
ifo business climate index	-	-	-	-0.0028 (0.00)	-0.0027 (0.00)
CPI	-	-	-	-0.0001 (0.00)	-0.0012 (0.00)
Unemployment Rate	-	-	-	0.0152 (0.00)	0.0104 (0.00)
R ²	0.05	0.06	0.04	0.06	0.08
Nobs	3716	3716	3716	3716	3716
Groups	-	-	35	35	35
F-Test	60.18 (0.00)	49.19 (0.00)	27.60 (0.00)	34.67 (0.00)	35.10 (0.00)

Note: Robust standard errors used to calculate p-values in parenthesis.

4.2 Fixed Effects Regressions

Next, in order to account for the panel structure of our data we used fixed effects regressions to analyse the effects of the composition of the government on media coverage. For this purpose, we introduced both media outlet fixed effects as well as time fixed effects. To account for possible macroeconomic effects, we also used the ifo business climate index (*ifo*), the unemployment rate (*unemploy*) as well as the consumer price index (*cpi*).

The regression equation then expands to

$$PCI_{it} = \alpha_i + T_t + \beta_1 d_t^{CDU/FDP} + \beta_2 d_t^{SPD/GREEN} + \beta_3 d_t^{CDU/SPD} + \gamma_1 ifo + \gamma_2 unemploy + \gamma_3 cpi + \varepsilon_{it},$$

where α and T indicate time-invariant individual effects as well as time fixed effects.

Overall, fixed effects regressions shows similar results as our pooled regression (see FE I-FE III in table 1). Note that because of the fixed effects approach and using the CDU/FDP coalition as the base case, the remaining coefficients of our coalition dummy variables describe the difference in coverage in comparison to the coverage during the conservative-liberal coalition. Referring FE I, again, reporting during the SPD/GREEN coalition is connected with a higher PCI in comparison during the grand coalition. Both coalitions are, however, associated with higher PCIs than base case, that is, the CDU/FDP coalition. Turning to FE II the results are partially reversed as accounting for macroeconomic factors such as CPI and unemployment rates the coefficient of CDU/SPD is now slightly higher than that of SPD/GREEN. Also, the coefficients change slightly in FE III when discriminating between SPD/GREEN I and II. However, the results stay more or less stable when using panel data techniques instead of pooled regressions. Again, SPD/GREEN II is associated with a bigger PCI, indicating that coverage is more conservative during this period.

While the analysis so far has not indicated any significant differences between the weighted and unweighted index, we now turn to the fixed effects regression of the weighted index. As can be seen from table 2, the results stay remarkable stable independently of different specifications. Using either simple fixed effects regressions with government coalitions or including also macroeconomic factors show very similar results. The dummy variables indicating different governments are statistically significant and are qualitatively comparable to former results. However, as the weighted index is smaller than the unweighted PCI regression also the coefficients are considerably smaller.

Consequently, there seems to be no obvious advantage of using the weighted instead of the unweighted index. This can be seen as a robustness check for the unweighted PCI as well.

Table 2: Fixed Effects Regressions of weighted PCI

PCI	FE I	FE II	FE III
SPD/GREEN	0.0058 (0.00)	0.0029 (0.00)	-
SPD/GREEN I	-	-	0.0017 (0.00)
SPD/GREEN II	-	-	0.0033 (0.00)
CDU/SPD	0.0045 (0.00)	0.0035 (0.00)	0.0036 (0.00)
Constant	-0.0072 (0.00)	0.0067 (0.39)	0.01937 (0.05)
Time Fixed Effects	YES	YES	YES
Media Fixed effects	YES	YES	YES
ifo business climate index	-	-0.00017 (0.00)	-0.0001 (0.00)
CPI	-	-0.00002 (0.66)	-0.0012 (0.10)
Unemployment Rate	-	0.0008 (0.00)	0.0004 (0.07)
R ²	0.04	0.05	0.05
Nobs	3716	3716	3716
Groups	35	35	35
F-Test	7.79 (0.00)	11.07 (0.00)	11.35 (0.00)

Note: Robust standard errors used to calculate p-values in parenthesis.

On the whole, in terms of our measure of media coverage, reporting is found to be rather critical and opposing against respective coalitions. We interpret this result carefully as some kind of an anti-government bias or, put in a more positive way, as an indication that the “fourth estate of democracy” is alive. More important, the PCI seems to be an adequate measure to illustrate the political reporting of media outlets, both in general and over time. In times of intense discussions about biased media and their role with respect to the upswing of populist, right-wing and EU-sceptic parties and politicians in Europe as well as the success of Donald Trump in the US presidential elections, this could be a suitable measure to analyse the behaviour of the media. However, the PCI can only be a relative measure of media coverage as, in general, a true and completely unbiased reporting is neither existent nor can it be developed. The PCI is therefore only suitable for an analysis between media outlets and for intertemporal matters.

4.3 Discussion

The analysis of political media coverage turned out that the average tonality in German leading media products differs between the outlets as well as over time. We also found that based on the analysis of different government coalitions the tonality is more negative for governing parties. While a conservative government is confronted with a more leftish reporting, the opposite holds for a government of Social Democrats and Greens. We interpret this result as some evidence for the existence of an anti-government bias. Put differently, we argue that the fourth estate actually delivers.

However, it should be noted that we are rarely able to identify the real effects of media coverage. First, although we control for macroeconomic factors we are not able to measure the overall performance of the government. We are therefore not able to classify the reports by the media. A more negative (in terms of a more leftish or more conservative) tonality does not necessarily equal a more critical news coverage.

Second, our analysis does not account for the German federalism. Though most of the news items included in our sample refer to the national rather to the state level, we cannot completely rule out that there are single reports that rather refer to single states, or that there might be spillovers from local and regional political issues.

Third, we also cannot rule out problems of endogeneity. A negative tonality towards the governing party (e.g.) might be a function of government popularity. When the

government is for some reason unpopular, voters like to hear negative stories (due to confirmation bias) and profit-maximizing media will satisfy this demand. In this case, the coefficients in our regressions would be biased.

However, the aim of the paper is not so much the exact identification of a shift in political reporting but to scrutinize the soundness of our Political Coverage Index. The development over time as well as the varying parameters for different coalitions suggest that the PCI is well able to reflect the behaviour of the media in a simple and suitable way. From our point of view the PCI can be used with different kinds of analyses as a measure of media coverage or as a proxy for political sentiment. Even though the index has some limitations, we consider it quite useful for analyses of several issues, such as media bias or public choice issues.

5 Conclusions

This contribution introduces a new direct measure of political media bias by analyzing articles and newscasts with respect to the tonality on political parties and politicians. On this basis we develop the Political Coverage Index (PCI) sorting the outlets in the political left to right spectrum. The PCI takes negative values in case that reporting is rather leftish and positive values in the opposite case. By these means, we are able to calculate a one-dimensional number reflecting the positioning of a media outlet in the political spectrum. In contrast to other contributions our index is based on the tonality and can be calculated for any frequency from daily to a yearly basis. The PCI is therefore easy to derive as well as extremely flexible.

We apply the PCI to opinion-leading media in Germany, analysing 10,105,165 news items, i.e. pieces of reports containing new information, between 1998 and 2012. Skipping all items that were not on the two major parties, the christian-conservative CDU/CSU or the social democratic SPD resulted in a total of 7,203,351 news items. The data are based on human coding media analysis which in comparison to computer linguistic approaches achieves a higher accuracy especially when it comes to topical context and tonality. The application shows robust results on the different political tendencies between the media outlets in Germany.

However, the results show as well that beside the general political orientation of the media outlet this orientation changes in time. First inspection of the data provides hints

on the tendency that all media analysed report bit more leftish if the government is more conservative and a bit more rightish if the government is social democratic. Hence, we apply simple OLS and fixed effects regressions to determine the effect of different legislatures. We observe that, while different media outlets definitely differ in their political orientation, there is evidence that all of them have a government malus, i.e. a party in government is more likely to be seen critical than a party outside of government. We see this result as a hint on some kind of anti-government bias or, put in a more positive way, as an indication that in Germany the “fourth estate of democracy” is alive. However, we do not see our empirical results as a prove of the “fourth estate”-hypothesis, as we are not able to control for governmental performance and spillovers effects from other federal levels and we cannot rule out problems of endogeneity.

However, the PCI could be a useful contribution to the scientific analysis of the impact of media coverage on the perception and behaviour in the (economic and) political context. Beside the question of a more in-depth empirical investigation on the “fourth estate”-hypothesis, future research could focus on a multidimensional index on the whole spectrum of political parties and different policy issues (foreign policy, domestic policy, economic policies etc). We also aim at applying our index approach to other, non-political themes.

Finally, current state of research on the impact of media coverage on the perception and behaviour in the political context already gives a strong hint on the special responsibility of media in democracies. We hope that the PCI can act as a helpful tool in analysing with which political tendencies media outlets report. The usage of the PCI and the consequences of its results lay – without doubt – in the hands of the media themselves.

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Appendix

Table A1: Analyzed set of reports by medium

Media	Observations (news items)	Mean score	Mean score CDU/CSU	Mean score SPD	Difference (overall PCI)
TV news shows (private)					
RTL aktuell	99,301	-.0688	-.0725	-.0639	-0.0086
Sat.1 News	61,587	-.0605	-.0386	-.0849	0.0463
ProSieben News	33,380	-.0741	-.0675	-.0810	0.0135
TV news shows (PSB)					
Tagesthemen (ARD)	274,998	-.0778	-.0845	-.0688	-0.0157
Tagesschau (ARD)	190,870	-.0723	-.0845	-.0548	-0.0297
Heute (ZDF)	176,707	-.0693	-.0743	-.0623	-0.012
heute journal (ZDF)	266,372	-.0739	-.0814	-.0630	-0.0184
TV magazines (PSB)					
Fakt (MDR/ARD)	3,535	-.1889	-.1346	-.2304	0.0958
Frontal 21 (ZDF)	18,537	-.2230	-.2371	-.1975	-0.0396
Kontraste (RBB/ARD)	4,086	-.2028	-.2112	-.1940	-0.0172
Monitor (WDR/ARD)	4,740	-.2371	-.2666	-.1991	-0.0675
Panorama (NDR/ARD)	6,656	-.2143	-.2127	-.2166	0.0039
Plusminus (rotating/ARD)	2,021	-.1331	-.1115	-.1543	0.0428
Report BR (BR/ARD)	6,366	-.1907	-.1250	-.2654	0.1404
Report SWR (SWR/ARD)	5,990	-.2085	-.2365	-.1705	-0.066
WISO (ZDF)	3,618	-.0815	-.0647	-.1017	0.037
Bericht aus Berlin (ARD)	48,970	-.0752	-.0829	-.0618	-0.0211
Berlin direkt (ZDF)	70,607	-.0626	-.0595	-.0677	0.0082
Daily newspaper					
Bild	270,945	-.0603	-.0372	-.0914	0.0542
Berliner Zeitung	305,272	-.0756	-.0742	-.0769	0.0027
Die Welt	1,021,579	-.0689	-.0465	-.0963	0.0498
Die Tageszeitung (taz)	323,432	-.1027	-.1171	-.0886	-0.0285
Frankfurter Allgemeine Zeitung (F.A.Z.)	977,975	-.0526	-.0395	-.0680	0.0285
Frankfurter Rundschau	670,668	-.0812	-.0898	-.0729	-0.0169
Süddeutsche Zeitung (SZ)	863,964	-.0797	-.0861	-.0722	-0.0139
Magazines and weeklies					
Bild am Sonntag (BamS)	104,073	-.0299	-.0096	-.0636	0.054
Die Zeit	150,302	-.0831	-.0783	-.0874	0.0091
Frankfurter Allgemeine Sonntagszeitung (FAS)	157,067	-.0519	-.0340	-.0733	0.0393
Focus	273,338	-.0729	-.0494	-.1066	0.0572
Spiegel	394,870	-.0718	-.0827	-.0591	-0.0236
Stern	86,524	-.0670	-.0562	-.0788	0.0226
Super Illu	25,497	-.0281	.0099	-.0781	0.088
Die Woche	50,272	-.0885	-.1138	-.0607	-0.0531
Rheinischer Merkur	112,389	-.0647	-.0294	-.1099	0.0805
Welt am Sonntag (WamS)	136,843	-.0715	-.0354	-.1179	0.0825

Note: The table includes the number of news items by medium, the average score of all reports (which are coded -1, 0, 1, respectively), the average score for reports on CDU/CSU, the average score for reports on SPD, and the difference between both scores.

Table A2: Summary statistics of monthly unweighted PCI

Outlet	Obs	Mean	Std. Dev.	Min	Max	Skewness	Kurtosis
Die Welt	115	.0522	.0692	-.1006	.3027	.5932	3.9126
FAZ	116	.0320	.0569	-.0769	.2213	.7769	3.5416
SZ	116	-.0122	.0649	-.1560	.2083	.7412	4.0863
Fr. Rundschau	106	-.0174	.0743	-.1744	.1769	-.0504	2.8514
taz	85	-.0302	.0893	-.2420	.2233	.3049	3.2327
Bild	172	.0387	.1188	-.3818	.3321	-.3477	3.8536
Berliner Zeitung	67	.0003	.0675	-.1065	.2351	.8166	3.9285
Tagesthemen (ARD)	178	-.0050	.1134	-.3426	.3021	-.0748	3.6200
heute journal (ZDF)	178	-.0080	.1132	-.3834	.3500	-.2991	4.5496
RTL aktuell	178	-.0092	.1623	-.5185	.6616	.0858	5.7067
Sat.1 News	124	.0521	.1871	-.6074	.7945	.7635	6.3142
Tagesschau (ARD)	178	-.0213	.1014	-.3256	.3478	-.0298	4.6922
Heute (ZDF)	178	-.0087	.1197	-.4003	.4420	.0948	5.1679
Pro Sieben Nachr.	108	.0199	.1912	-.4823	.5785	.0365	3.8845
Focus	176	.0532	.1029	-.2129	.3532	.5563	3.5150
Der Spiegel	176	-.0284	.0749	-.2798	.1836	-.2036	3.5080
Die Zeit	105	.0006	.1277	-.3451	.4127	.1286	3.8966
Die Woche	50	-.0532	.1428	-.4484	.2899	-.0261	3.2976
Rh. Merkur	106	.0784	.1220	-.2170	.3718	.0567	2.9997
Stern	83	-.0026	.1530	-.4664	.3153	-.2388	3.1314
FAS	73	.0354	.0731	-.1424	.2438	.0642	3.5598
WamS	71	.0886	.1113	-.1601	.4130	.3593	3.1343
BamS	117	.0533	.1047	-.2017	.4118	.4663	3.4404
Super Illu	60	.0877	.1190	-.2480	.3330	.0387	2.9516
Fakt (MDR/ARD)	57	.0966	.3860	-1	1.282	.1789	4.9478
Frontal 21 (ZDF)	100	-.027	.1589	-.3916	.6153	.4303	4.8652
Kontraste (RBB/ARD)	63	.0006	.3022	-.8	.7222	-.0856	3.2116
Monitor (WDR/ARD)	65	-.0733	.2931	-.8421	.5373	-.1909	2.9176
Panorama (NDR/ARD)	65	.0295	.3591	-.9571	1.045	.1453	4.5696
Plusminus (rotating/ARD)	58	.0236	.2803	-.75	1	.7856	6.1673
Report (BR/ARD)	62	.1161	.3965	-.1366	1.108	-.1600	5.6170
Report (SWR/ARD)	73	-.0323	.2699	-.8888	.7643	.1452	4.6905
WISO (ZDF)	63	.0167	.1863	-.4117	.75	.7645	6.1454
Bericht aus Berlin (ARD)	80	-.0060	.1509	-.3361	.6167	1.1892	6.0490
Berlin direkt (ZDF)	114	.0174	.1474	-.26888	.9423	2.5386	15.88

Note: The table includes the descriptive statistics on the monthly unweighted index. The number of observations equals the number of months for which reports from the single media outlets are available.

Table A3: Summary statistics of monthly weighted PCI

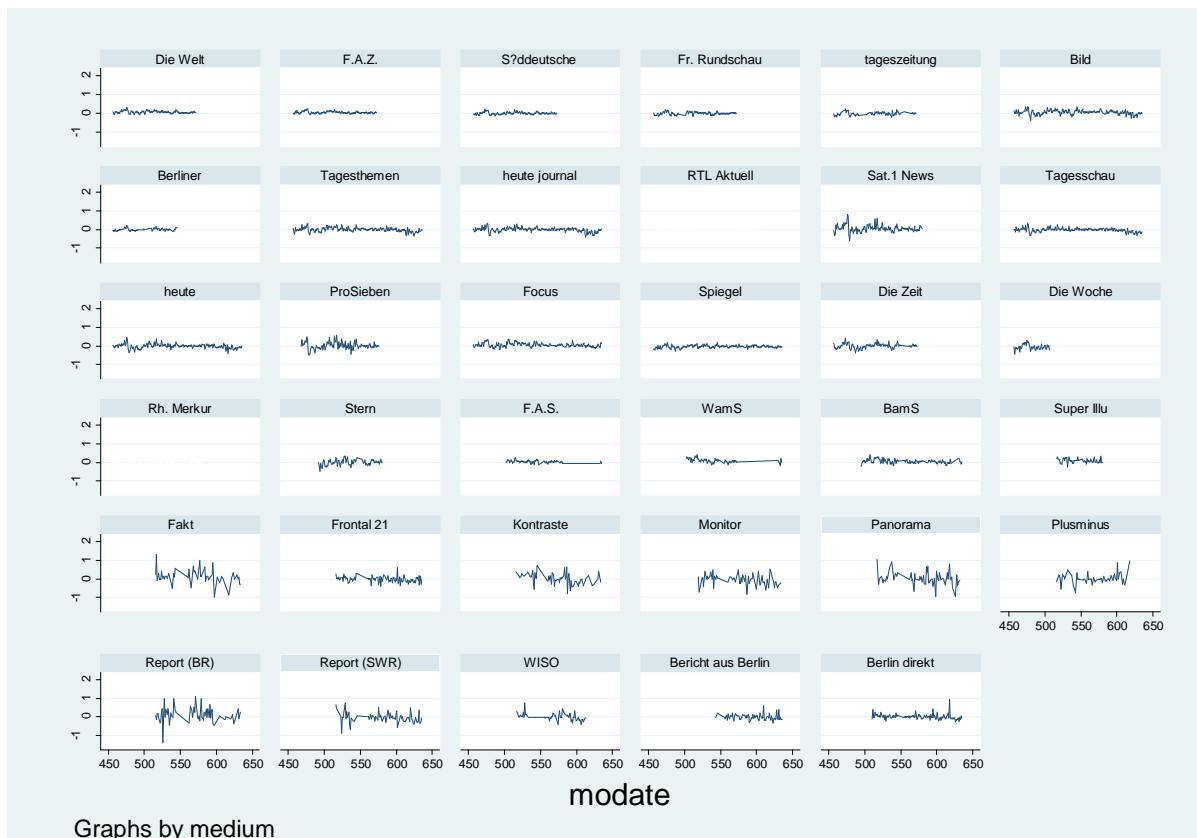
Outlet	Obs (months)	Mean	Std. Dev.	Min	Max	Skewness	Kurtosis
Die Welt	115	.0011	.0044	-.0087	.0158	.3291	3.5317
FAZ	116	.0005	.0032	-.0084	.0101	.2017	3.6399
SZ	116	-.0020	.0047	-.0206	.0088	-.6662	5.0715
Fr. Rundschau	106	-.0005	.0054	-.0179	.0122	-.4990	4.2502
taz	85	-.0021	.0100	-.0477	.0227	-1.420	8.7067
Bild	172	.0006	.0053	-.0217	.0249	-.1351	7.5297
Berliner Zeitung	67	-.0007	.0097	-.0404	.0252	-1.004	7.1063
Tagesthemen (ARD)	178	-.0021	.0058	-.0276	.0124	-.9951	5.654
heute journal (ZDF)	178	-.0024	.0060	-.0286	.0119	-1.599	6.984
RTL aktuell	178	-.0016	.0070	-.0356	.0186	-1.462	8.649
Sat.1 News	124	.0013	.0104	-.041282	.0378	-.0349	6.004
Tagesschau (ARD)	178	-.0026	.0048	-.0263	.0075	-1.469	6.7243
Heute (ZDF)	178	-.0019	.0050	-.0280	.0116	-.9883	7.185
Pro Sieben Nachr.	108	.0003	.0166	-.1009	.0528	-2.010	15.51
Focus	176	.0001	.0041	-.0164	.0129	.1138	5.1355
Der Spiegel	176	-.0015	.0032	-.0143	.0084	-.7671	5.0507
Die Zeit	105	.0008	.0112	-.0726	.0430	-2.250	20.930
Die Woche	50	-.0063	.0249	-.0750	.0642	.3515	4.2994
Rh. Merkur	106	.0027	.0073	-.0207	.0396	1.0393	8.7103
Stern	83	.0011	.0135	-.035	.0550	1.0283	6.7182
FAS	73	.0015	.0058	-.0116	.0178	.1752	2.9460
WamS	71	.0036	.0100	-.0291	.0300	-.0681	3.8513
BamS	117	.0010	.0049	-.0145	.0182	-.0200	4.5183
Super Illu	60	.0061	.0164	-.0221	.1032	3.3538	21.39
Fakt (MDR/ARD)	57	.0127	.0484	-.1542	.1518	.2037	5.6356
Frontal 21 (ZDF)	100	-.0152	.0257	-.1190	.0206	-1.7475	6.4920
Kontraste (RBB/ARD)	63	-.0019	.0497	-.1675	.2532	1.346	14.18
Monitor (WDR/ARD)	65	-.0103	.0451	-.1633	.1467	-.2497	6.2903
Panorama (NDR/ARD)	65	-.0063	.0479	-.1826	.2171	.9053	11.75
Plusminus (rotating/ARD)	58	.0022	.0343	-.1072	.1332	1.3049	9.2956
Report (BR/ARD)	62	.0128	.0470	-.0810	.2189	1.6180	8.1551
Report (SWR/ARD)	73	-.0126	.0316	-.1124	.0830	-.3607	4.490
WISO (ZDF)	63	.0014	.0202	-.0580	.0786	.7591	7.6130
Bericht aus Berlin (ARD)	80	-.0071	.0098	-.0345	.0221	-.3882	4.0980
Berlin direkt (ZDF)	114	-.0026	.0063	-.0289	.0207	-.4775	6.221

Note: The table includes the descriptive statistics on the monthly weighted index. The number of observations equals the number of months for which reports from the single media outlets are available.

Table A4: Average number of monthly reports on parties

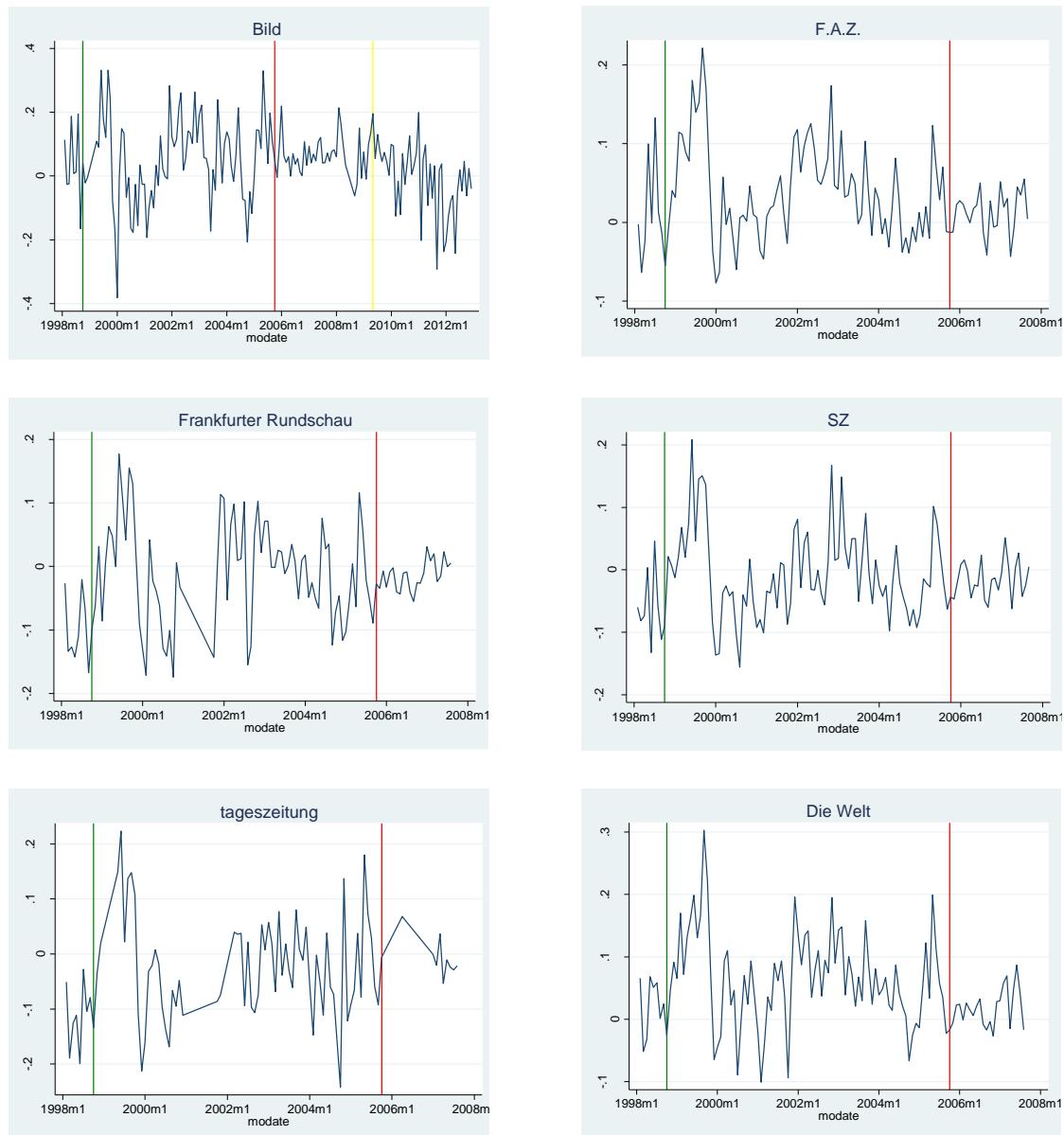
Outlet	CDU/CSU	SPD	% CDU/CSU	% SPD
Die Welt	46796.18	38372.29	0.55	0.45
FAZ	44036.00	37490.03	0.54	0.46
SZ	38749.51	33286.24	0.54	0.46
Fr. Rundschau	27253.99	28578.42	0.49	0.51
taz	13357.66	13798.39	0.49	0.51
Bild	12931.42	9671.86	0.57	0.43
Berliner Zeitung	13129.54	12619.10	0.51	0.49
Tagesthemen (ARD)	13258.74	9676.16	0.58	0.42
heute journal (ZDF)	13118.78	9094.78	0.59	0.41
RTL aktuell	4727.75	3555.30	0.57	0.43
Sat.1 News	2700.82	2438.05	0.53	0.47
Tagesschau (ARD)	9386.83	6522.14	0.59	0.41
Heute (ZDF)	8629.67	6107.74	0.59	0.41
Pro Sieben Nachr.	1422.67	1359.00	0.51	0.49
Focus	13458.64	9393.67	0.59	0.41
Der Spiegel	17722.40	15239.97	0.54	0.46
Die Zeit	6009.71	6560.73	0.48	0.52
Die Woche	2225.00	2006.86	0.53	0.47
Rh. Merkur	5291.06	4193.65	0.56	0.44
Stern	3805.57	3458.54	0.52	0.48
FAS	7198.92	6026.06	0.54	0.46
WamS	6443.85	5042.96	0.56	0.44
BamS	5411.90	3283.54	0.62	0.38
Super Illu	1215.23	937.33	0.56	0.44
Fakt (MDR/ARD)	150.62	170.36	0.47	0.53
Frontal 21 (ZDF)	1008.54	557.23	0.64	0.36
Kontraste (RBB/ARD)	176.18	173.01	0.50	0.50
Monitor (WDR/ARD)	226.06	192.96	0.54	0.46
Panorama (NDR/ARD)	351.08	253.84	0.58	0.42
Plusminus (rotating/ARD)	89.33	90.14	0.50	0.50
Report (BR/ARD)	302.75	255.21	0.54	0.46
Report (SWR/ARD)	292.82	216.66	0.57	0.43
WISO (ZDF)	154.00	132.14	0.54	0.46
Bericht aus Berlin (ARD)	2587.98	1493.06	0.63	0.37
Berlin direkt (ZDF)	3681.57	2230.44	0.62	0.38

Figure A1: Monthly unweighted PCI



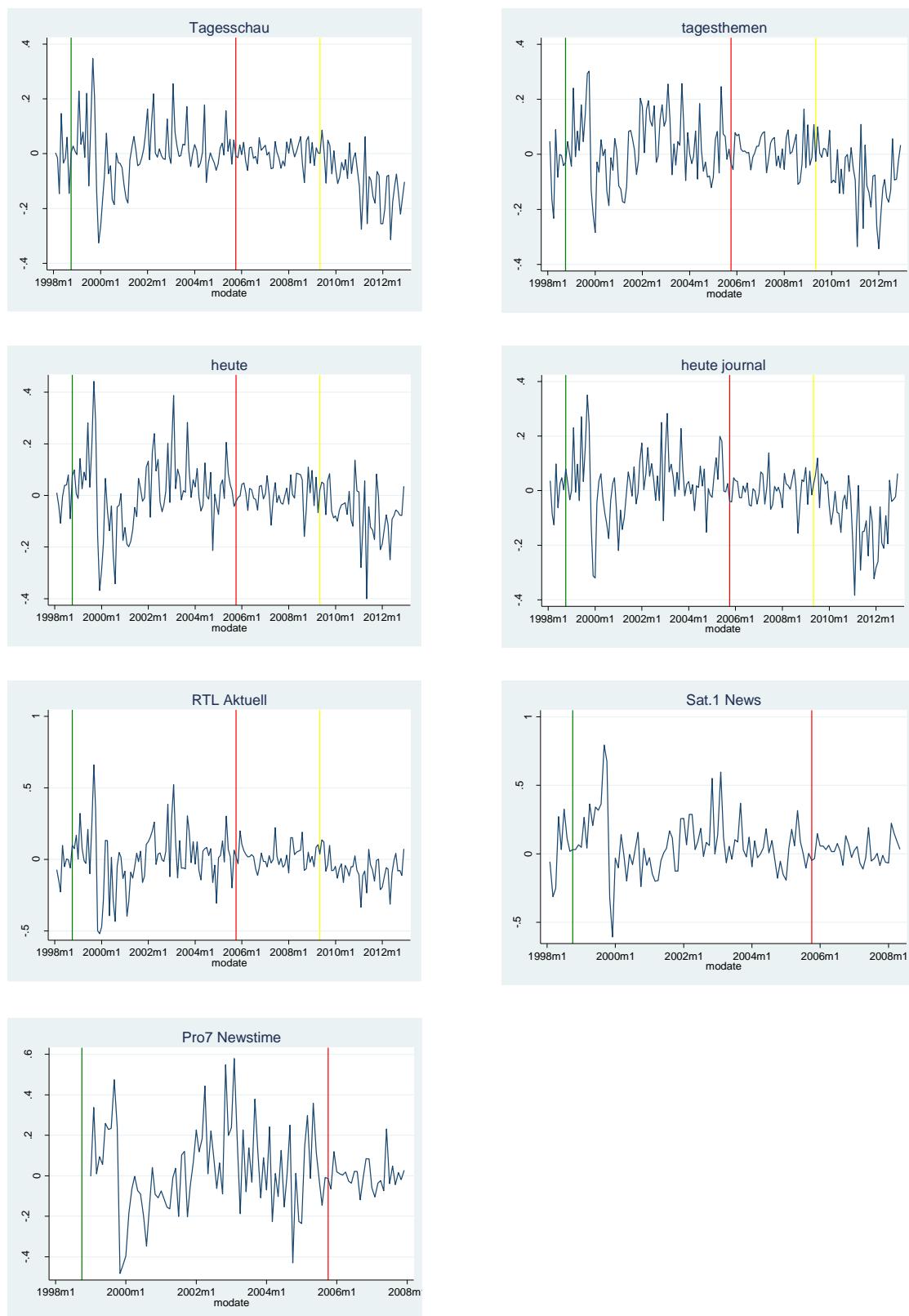
Graphs by medium

Note: Change of the political index over time. An index value below 0, in this figure on the y-axis, indicates the media outlet has a positive bias towards the SPD (left).

Figure A2: PCI of selected media outlets (newspapers)

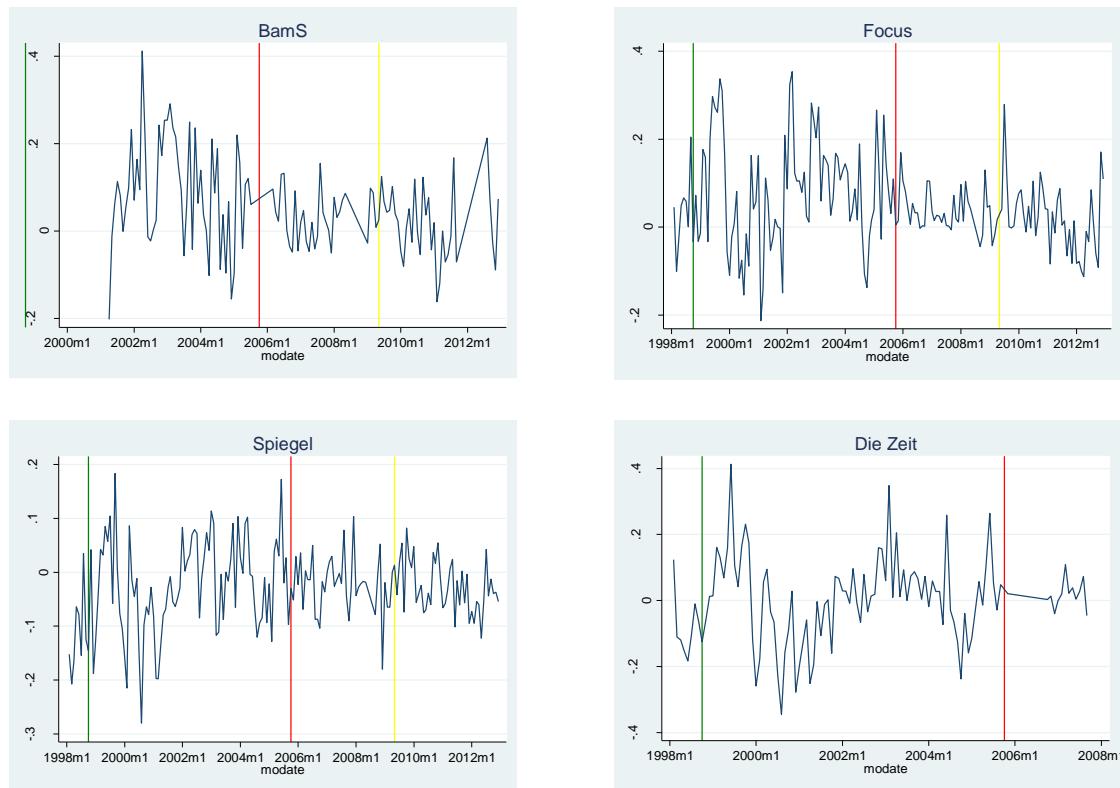
Note: Index value over time for different newspapers. An index value below 0 indicates the media outlet has a positive bias towards the SPD (left), a value above 0 indicates a bias towards the CDU (right). The index is shown on the y-axis.

Figure A3: PCI of selected media outlets (TV news programs)

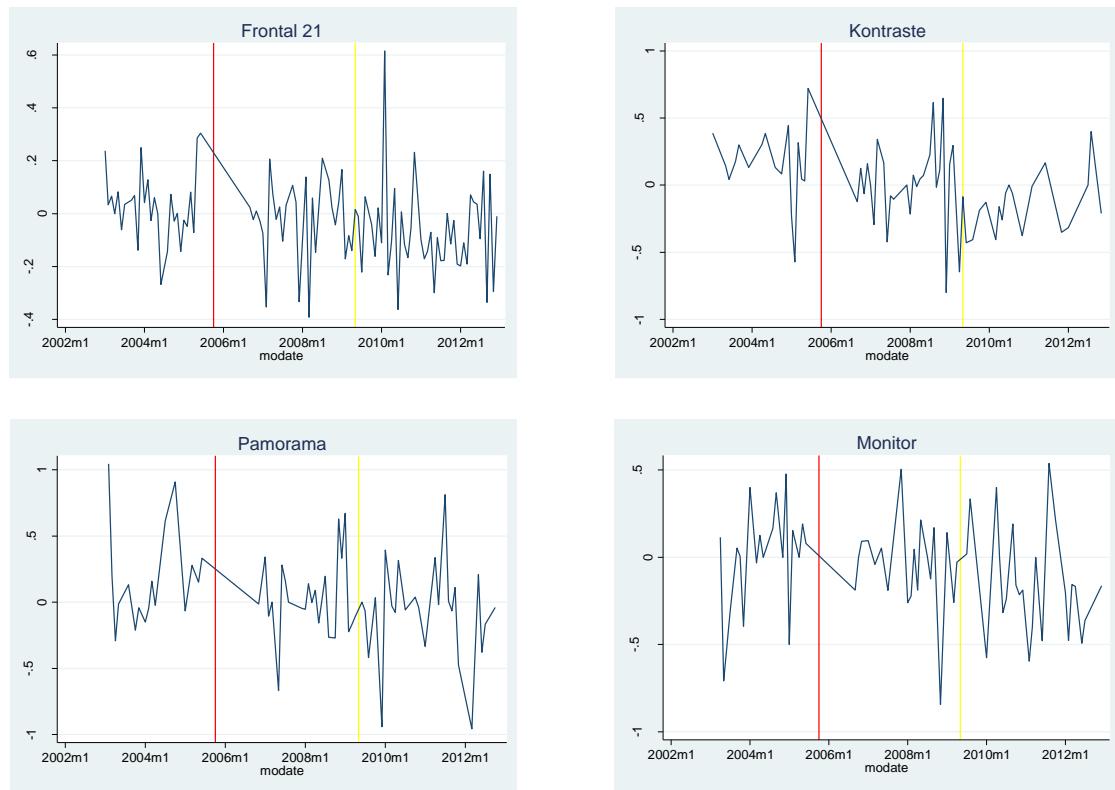


Note: Index value over time for different TV news programs. An index value below 0 indicates the media outlet has a positive bias towards the SPD (left), a value above 0 indicates a bias towards the CDU (right). The index is shown on the y-axis.

Figure A4: PCI of selected media outlets (weeklies)



Note: Index value over time for different weekly political and current affairs magazines. An index value below 0 indicates the media outlet has a positive bias towards the SPD (left), a value above 0 indicates a bias towards the CDU (right). The index is shown on the y-axis.

Figure A5: PCI of selected media outlets (TV programs)

Note: Index value over time for different current affairs TV programs. An index value below 0 indicates the media outlet has a positive bias towards the SPD (left), a value above 0 indicates a bias towards the CDU (right). The index is shown on the y-axis.