Mass Media and Concerns about Immigration in Germany in the 21ˢᵗ century: Individual-level Evidence over 15 Years

Online Appendix

What does our outcome measure?

In line with usual findings from the literature on attitudes towards immigration and immigrants, our measure is highly associated with education, party preference, and political ideology as Table O1 shows. This favours the argument that SOEP respondents interpret this item similar to other items on attitudes towards immigration and relate the question to negative consequences of immigration.

Table O1: Mean values of various correlates of migration attitudes for original three valued ordinal item and the dichotomous operationalization

Correlates of migration attitudes	Mean Migration concerns ordinal	Mean Migration concerns dichotomous
School degree		
Elementary	2.188	0.360
Secondary I	2.090	0.317
Secondary II (FHR)	1.856	0.204
Secondary II (Abitur)	1.683	0.142
Other degree/no degree	2.089	0.342
In school	1.788	0.199
Total	2.031	0.292
Party preference		
No party preference	2.077	0.310
CDU/CSU (Christian Democrats)	2.126	0.329
SPD (Social Democrats)	1.943	0.24
Die Grünen (The Greens)	1.456	0.07
Die Linke (The Left)	1.928	0.267
FDP (Free Democrats)	1.916	0.259
Others and mixed	1.952	0.288
Radical right	2.786	0.824
Total	2.031	0.292

Political left-right self-placement

[0] 0 very left	1.949	0.288
[1] 1	1.843	0.232
[2] 2	1.803	0.205
[3] 3	1.821	0.202
[4] 4	1.887	0.224
[5] 5	2.120	0.334
[6] 6	2.117	0.332
[7] 7	2.263	0.433
[8] 8	2.424	0.523
[9] 9	2.573	0.637
[10] 10 very right	2.572	0.650
Total	2.058	0.313

Is the Effect of Media Salience Causal? Considerations on Reverse Causality and Unmeasured Confounding

Our design assumes no effects of aggregate concerns in the population on media salience and that the effects of external events are mediated through mass media. If we do not allow for these assumptions, however, causal inference is complicated by two interrelated issues: feedback between aggregate concerns and media salience and unmeasured period effects.

Feedback mechanisms are present if the media increases aggregate public concerns, which, in turn, fuels interest in migration related topics, which then prompts journalists to write even more about the topic. Aggregate concerns sometimes even may precede media reports. If aggregate concerns also affect individual concerns, e. g. through social networks, they may confound our relationship of interest. In other words, it is hard to separate the effects of media salience and the aggregate mood in the population on individual concerns if these factors themselves correlate. To adjust for potential feedback mechanisms, we include a variable measuring the lagged mean concerns of respondents, covering the period of 42 to 22 days before each interview in Model 1 in Table O1. The coefficient of the LPM is clearly reduced but still substantial at 0.02.

As an additional analysis, we restrict the sample to years with no large fluctuations in media salience. The assumption behind this analysis is that feedback mechanisms between public opinion and media reports are mainly present in those debates which result in peaks in

salience. In those years where there were no peaks in media salience we assume that there were no major reinforcing mechanisms of public opinion on media salience, or at least they were quite small. In addition, this restriction ensures that we compare years which are more similar in terms of media salience. The results are shown in Table O3. We find that such restrictions do not change our overall conclusions.

The second causal issue is that external events are assumed to have no direct additional influence on individual concerns given media salience and conditional on the variables in our model. We think this assumption is reasonable because most of the topics discussed among the public do not fall out of thin air due to some event which is not visible in media reports. Rather the issues are present in people's minds because the media reported about them in the first place.

These period events might, however, confound the relationship if their effects on individual concerns are not primarily channelled through media reports but for example through private communication or social networks. To account for periodic idiosyncrasies of certain years, we completely net out all variance between years by including year fixed-effects (Model 2) or include a restricted cubic spline specification of the date variable (Model 3). In both models, the effect of media salience remains statistically significant, but the effect size is substantively reduced when year fixed effects are included in Model 2. Year dummies are commonly employed to adjust for unmeasured macro-level trends. By definition, netting out all variance between years adjusts for everything that could possibly confound the relationship between media salience and individual concerns that is related to each year. However, an alternative interpretation of such modelling is that the year dummies capture similarities between individuals within each year which are *caused* by media salience in this year. In that case, the inclusion of year fixed-effects leads to over-control bias, which results in an underestimation of the "true" effect of media salience because variation that is actually caused by media salience is partialled out.

Generally, identifying the correct model for the media effect over a range of temporal contexts depends on the assumptions about the theoretical emergence of the media effect: is it the effect of merely the media itself or does it also include the public discussion surrounding it? What exactly one assumes to be part of such a media effect influences the strength of the association between media salience and individual concerns. While we opted for the most general (and arguably easiest to interpret) media effect for our main analyses, we offer some additional, more conservative, specifications in the models presented here. In the end, we

believe that what matters is that even under strict conditions, the media salience effect remains statistically and substantively significant.

Table O2: Possible adjustment strategies for feedback mechanisms and unmeasured confounding through period effects. Dependent variable: concerns about migration. Main independent variable: linear specification of media salience factor (Welt, TAZ, Spiegel, Stern)

	(1) Aggregate concerns[1]	(2) Year dummies	(3) Date splines
Media salience, past 21 days	0.02*** (0.00)	0.01*** (0.00)	0.02*** (0.00)
Party preference (ref.: no preference)			
CDU/CSU (Christian Democrats)	0.03*** (0.00)	0.03*** (0.00)	0.03*** (0.00)
SPD (Social Democrats)	-0.01+ (0.00)	-0.01 (0.00)	-0.01 (0.00)
Die Grünen (The Greens)	-0.01 (0.01)	-0.01 (0.01)	-0.01 (0.01)
Die Linke (The Left)	0.00 (0.01)	-0.00 (0.01)	-0.00 (0.01)
FDP (Free Democrats)	0.02* (0.01)	0.03** (0.01)	0.02* (0.01)

Others and mixed	0.02	0.02[+]	0.02[+]
	(0.01)	(0.01)	(0.01)
Radical right	0.15***	0.14***	0.14***
	(0.01)	(0.01)	(0.01)
Interest in politics (ref.: very strong)			
Strong	-0.02***	-0.02***	-0.02***
	(0.01)	(0.00)	(0.00)
Not so strong	-0.03***	-0.03***	-0.03***
	(0.01)	(0.01)	(0.01)
Not at all	-0.03***	-0.03***	-0.03***
	(0.01)	(0.01)	(0.01)
Income satisfaction (ref.: low)			
1	-0.00	-0.01[+]	-0.01[+]
	(0.01)	(0.01)	(0.01)
2	-0.01	-0.01*	-0.01*
	(0.01)	(0.01)	(0.01)
3	-0.01*	-0.02**	-0.02**
	(0.01)	(0.01)	(0.01)
high	-0.01*	-0.02**	-0.02**
	(0.01)	(0.01)	(0.01)

Concerns about German economy (ref.: not concerned)			
Somewhat concerned	0.03***	0.04***	0.04***
	(0.00)	(0.00)	(0.00)
Very concerned	0.11***	0.12***	0.11***
	(0.00)	(0.00)	(0.00)
Concerns about own economic situation (ref.: not concerned)			
Somewhat concerned	0.02***	0.02***	0.02***
	(0.00)	(0.00)	(0.00)
Very concerned	0.06***	0.06***	0.06***
	(0.00)	(0.00)	(0.00)
Age categories (ref.: <25)			
25-34	0.00	0.00	0.00
	(0.01)	(0.01)	(0.01)
35-49	0.00	-0.01	-0.01
	(0.01)	(0.01)	(0.01)
50-64	0.01	-0.01	-0.01
	(0.01)	(0.01)	(0.01)
>65	0.01	-0.01	-0.01
	(0.01)	(0.01)	(0.01)

Employment status
(ref.: not working)

In training/apprentice	-0.01	-0.01	-0.01
	(0.01)	(0.01)	(0.01)
Registered	-0.01	-0.01	-0.01
unemployed	(0.01)	(0.01)	(0.01)
Pensioner	0.00	-0.01	-0.01
	(0.01)	(0.01)	(0.01)
Working	0.00	0.00	0.00
	(0.01)	(0.01)	(0.01)

Month of interview
(ref.: January)

Feb.	0.02*	-0.00	0.00
	(0.01)	(0.00)	(0.00)
Mar.	0.02**	0.00	0.00
	(0.01)	(0.00)	(0.00)
Apr.	0.03***	0.01^{+}	0.00
	(0.01)	(0.00)	(0.00)
May	0.05***	0.01**	0.01^{+}
	(0.01)	(0.01)	(0.01)
Jun.	0.05***	0.01	-0.00
	(0.01)	(0.01)	(0.01)

Jul.	0.04***	-0.00	-0.01+
	(0.01)	(0.01)	(0.01)
Aug.	0.06***	0.01	0.00
	(0.01)	(0.01)	(0.01)
Sep./Oct./Nov.	0.05***	0.01	-0.01
	(0.01)	(0.01)	(0.01)
Monthly in-migration/1000 (imputed before 2006)	0.00***	0.00**	0.00***
	(0.00)	(0.00)	(0.00)
Aggregate concerns	0.57***		
	(0.02)		
Survey year (ref.: 2001)			
2002		0.04***	
		(0.01)	
2003		0.00	
		(0.01)	
2004		0.06***	
		(0.01)	
2005		0.13***	
		(0.01)	
2006		0.08***	
		(0.01)	

2007	0.08***	
	(0.01)	
2008	0.04***	
	(0.01)	
2009	-0.01+	
	(0.01)	
2010	-0.01	
	(0.01)	
2011	0.03***	
	(0.01)	
2012	-0.02**	
	(0.01)	
2013	0.01	
	(0.01)	
2014	0.06***	
	(0.01)	
2015	0.09***	
	(0.01)	
dateSPL_1		-0.00***
		(0.00)
dateSPL_2		0.00***
		(0.00)

dateSPL_3			-0.01***
			(0.00)
dateSPL_4			0.02***
			(0.00)
dateSPL_5			-0.01***
			(0.00)
dateSPL_6			-0.00*
			(0.00)
dateSPL_7			-0.00
			(0.00)
Constant	0.00	0.18***	0.99***
	(0.02)	(0.02)	(0.21)
No. person-years	149945	190049	190049
No. persons	24747	25073	25073

Standard errors in parentheses

Data: SOEP v32.1. April 2001 to 2015.

[1] Calculated as mean concerns in period 42 days to 21 days before interview with at least 15 observations (hence the reduced sample size).

+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table O3: Restricting the analysis to subsets of years does not change the results. Dependent variable: concerns about migration. Main independent variable: linear specification of media salience factor (Welt, TAZ, Spiegel, Stern)

	(1) Without refugee crisis year 2015	(2) Excluding most salient debates (2004, 06, 10, 15)	(3) Excluding relatively salient debates (04 to 06, 10, 14, 15)	(4) Low salience years only (2003, 11, 12, 13)	(5) Restrict to years with 6 quantiles of media salience
Media salience, past 21 days	0.05***	0.06***	0.04***	0.05***	0.04***
	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)
Party preference (ref.: no preference)					
CDU/CSU (Christian Democrats)	0.03***	0.03***	0.02***	0.02+	0.03***
	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
SPD (Social Democrats)	-0.01+	-0.01+	-0.01	-0.00	-0.02**
	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Die Grünen (The Greens)	-0.01	-0.01	-0.01	-0.01	-0.02
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)

Die Linke (The Left)	-0.01	0.01	0.01	0.02	-0.03[*]
	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)
FDP (Free Democrats)	0.02[+]	0.02[*]	0.02	-0.02	0.01
	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)
Others and mixed	0.02	0.02	0.02[+]	0.01	0.02
	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)
Radical right	0.14[***]	0.13[***]	0.15[***]	0.14[***]	0.16[***]
	(0.01)	(0.02)	(0.02)	(0.04)	(0.02)
Interest in politics (ref.: very strong)					
Strong	-0.02[***]	-0.02[***]	-0.03[***]	-0.03[**]	-0.01[+]
	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)
Not so strong	-0.02[***]	-0.03[***]	-0.04[***]	-0.03[**]	-0.02[*]
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Not at all	-0.02[***]	-0.03[***]	-0.04[***]	-0.05[***]	-0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)

Income satisfaction (ref.: low)					
1	-0.01*	-0.02*	-0.01+	-0.02	-0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
2	-0.02**	-0.02*	-0.01+	-0.02	-0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
3	-0.02***	-0.02**	-0.02*	-0.04*	-0.02+
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
high	-0.02***	-0.02**	-0.02*	-0.03*	-0.02+
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Concerns about German economy (ref.: not concerned)					
Somewhat concerned	0.04***	0.04***	0.03***	0.04***	0.04***
	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)
Very concerned	0.12***	0.12***	0.10***	0.11***	0.14***
	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)

Concerns about own economic situation (ref.: not concerned)

Somewhat concerned	0.02***	0.02***	0.02***	0.01*	0.02***
	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)
Very concerned	0.06***	0.06***	0.06***	0.06***	0.07***
	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)

Age categories (ref.: <25)

25-34	-0.00	0.01	-0.01	-0.01	0.01
	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)
35-49	-0.01	0.00	-0.02+	-0.02	0.01
	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)
50-64	-0.01	0.01	-0.02	-0.01	0.01
	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)
>65	-0.01	0.02	-0.01	0.01	0.02
	(0.01)	(0.01)	(0.01)	(0.03)	(0.02)

Employment status (ref.: not working)					
In training/apprentice	-0.01	-0.01	-0.01	-0.01	-0.02
	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)
Registered unemployed	-0.01	-0.01	-0.00	-0.02	-0.01
	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)
Pensioner	-0.01[+]	-0.01	-0.01	-0.02	-0.00
	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)
Working	0.00	0.00	0.01	-0.01	0.00
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Month of interview (ref.: January)					
Feb.	0.01***	0.03***	-0.00	0.02[+]	0.01**
	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Mar.	0.02***	0.03***	0.01	0.03***	0.01*
	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)

Apr.	0.02***	0.03***	0.01	0.04***	0.02**
	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)
May	0.02**	0.03***	0.01	0.05***	0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Jun.	0.01	0.02**	-0.00	0.03*	0.00
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Jul.	-0.00	0.01	-0.01	0.04**	-0.01
	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)
Aug.	0.02*	0.03**	0.01	0.05**	0.02
	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)
Sep./Oct./Nov.	-0.01	-0.00	-0.00	0.01	0.01
	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)
Monthly in-migration/1000 (imputed before 2006)	0.00***	0.00***	-0.00***	-0.00+	0.00***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)

Constant	0.20***	0.19***	0.29***	0.29***	0.19***
	(0.01)	(0.02)	(0.02)	(0.03)	(0.02)
No. person-years	179138	138896	113388	51790	100363
No. persons	25073	25060	24650	22537	24110

Standard errors in parentheses

Data: SOEP v32.1. April 2001 to 2015.

$^+$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table O4: Regression models of concerns about immigration. Dependent variable: concerns about migration. Main independent variable: linear specification of media salience factor (Welt, TAZ, Spiegel, Stern)

	(1) FE linear probability model	(2) FE ordered logit[1]	(3) RE ordered logit
Media salience, past 21 days	0.050*** (0.002)	0.428*** (0.009)	0.432*** (0.009)
Party preference (ref.: no preference)			
CDU/CSU (Christian Democrats)	0.027*** (0.005)	0.236*** (0.029)	0.294*** (0.025)
SPD (Social Democrats)	-0.007 (0.004)	0.006 (0.028)	-0.136*** (0.025)
Die Grünen (The Greens)	-0.012* (0.006)	-0.205*** (0.054)	-0.919*** (0.048)
Die Linke (The Left)	-0.005 (0.009)	-0.013 (0.057)	-0.211*** (0.056)
FDP (Free Democrats)	0.019* (0.009)	0.145* (0.066)	0.043 (0.063)
Others and mixed	0.015 (0.010)	0.072 (0.072)	-0.052 (0.069)
Radical right	0.144*** (0.015)	1.075*** (0.128)	1.861*** (0.128)

Interest in politics (ref.: very strong)			
Strong	-0.020***	-0.099**	-0.018
	(0.005)	(0.034)	(0.031)
Not so strong	-0.026***	-0.110**	0.120***
	(0.006)	(0.038)	(0.034)
Not at all	-0.025***	-0.152***	0.153***
	(0.007)	(0.045)	(0.041)
Income satisfaction (ref.: low)			
1	-0.012+	-0.050	-0.096*
	(0.007)	(0.043)	(0.044)
2	-0.015*	-0.049	-0.099*
	(0.007)	(0.044)	(0.044)
3	-0.021**	-0.091*	-0.184***
	(0.007)	(0.045)	(0.046)
high	-0.020**	-0.077+	-0.215***
	(0.008)	(0.046)	(0.047)
Concerns about German economy (ref.: not concerned)			
Somewhat concerned	0.037***	0.612***	0.819***
	(0.003)	(0.026)	(0.027)
Very concerned	0.120***	1.091***	1.437***
	(0.004)	(0.029)	(0.032)

Concerns about own economic situation (ref.: not concerned)			
Somewhat concerned	0.019***	0.270***	0.368***
	(0.003)	(0.019)	(0.018)
Very concerned	0.062***	0.508***	0.700***
	(0.004)	(0.027)	(0.026)
Age categories (ref.: <25)			
25-34	-0.001	-0.155**	-0.063
	(0.008)	(0.052)	(0.045)
35-49	-0.009	-0.323***	0.040
	(0.010)	(0.067)	(0.047)
50-64	-0.014	-0.425***	0.179***
	(0.011)	(0.076)	(0.049)
>65	-0.014	-0.487***	0.250***
	(0.013)	(0.086)	(0.057)
Employment status (ref.: not working)			
In training/apprentice	-0.010	-0.027	-0.252***
	(0.008)	(0.057)	(0.051)
Registered unemployed	-0.009	-0.022	0.007
	(0.007)	(0.048)	(0.044)

Pensioner	-0.009	-0.027	0.139**
	(0.008)	(0.052)	(0.043)
Working	0.001	0.046	-0.021
	(0.006)	(0.039)	(0.033)

Month of interview
(ref.: January)

Feb.	0.016***	0.063*	0.012
	(0.005)	(0.026)	(0.028)
Mar.	0.017***	0.083**	-0.006
	(0.005)	(0.027)	(0.029)
Apr.	0.019***	0.090**	-0.008
	(0.005)	(0.030)	(0.031)
May	0.022***	0.100**	-0.001
	(0.006)	(0.035)	(0.036)
Jun.	0.015*	0.006	-0.091*
	(0.007)	(0.040)	(0.041)
Jul.	0.002	-0.049	-0.152**
	(0.007)	(0.046)	(0.046)
Aug.	0.022*	0.144*	0.010
	(0.009)	(0.057)	(0.056)
Sep./Oct./Nov.	-0.005	-0.035	-0.224**
	(0.011)	(0.080)	(0.073)

Monthly in-migration/1000 (imputed before 2006)	0.001*** (0.000)	0.007*** (0.000)	0.006*** (0.000)
Constant	0.191*** (0.015)		
cut1			
Constant			-0.123 (0.090)
cut2			
Constant			3.251*** (0.090)
sigma2_u			
Constant			3.872*** (0.067)
No. person-years	190049	209509	190049
No. persons	25073		25073
Min. no. person-years per person	2		2
Max. no. person-years per person	15		15

Standard errors in parentheses

Data: SOEP v32.1. April 2001 to 2015.

[1]Panel Fixed-Effects ordered logit model (BUC estimator) according to Baetschmann et al. (2015).

[+] $p < 0.10$, [*] $p < 0.05$, [**] $p < 0.01$, [***] $p < 0.001$

Reference, fixed-effects ordered logistic regression:

Baetschmann, G., Staub, K. E., & Winkelmann, R. (2015). Consistent estimation of the fixed effects ordered logit model. Journal of the Royal Statistical Society: Series A (Statistics in Society), 178(3), 685-703.

Results for different periods of measuring media salience before date of interview

We assessed whether changing the number of days before the individual interviews took place changes our results. The results showed to be very similar for periods of 7 days, 14 days, 21 days and 28 days before the interview.

Results for different period of measurement of media salience. FE LPM.
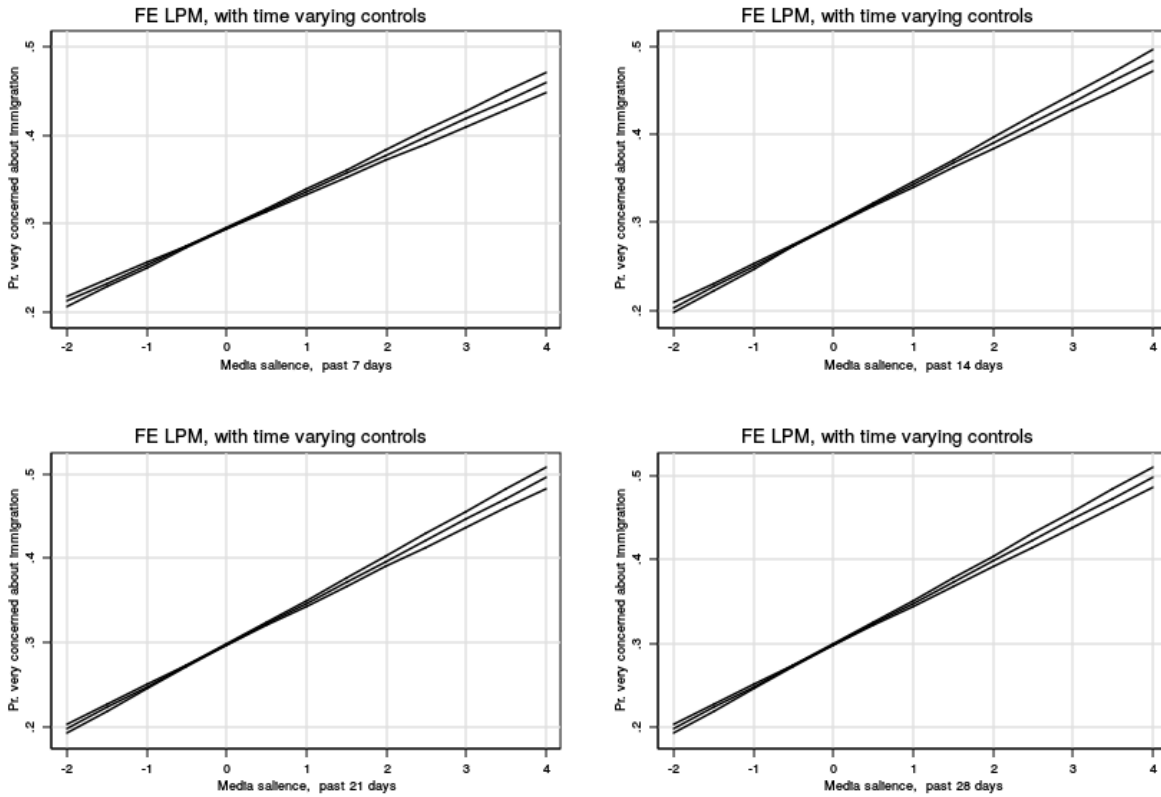
Using counts of articles as treatment variable (weighted by days of weekly publication frequency)

Linear effect of media salience w/ count variable