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Media Freedom and the Institutional Underpinnings of Political Knowledge*

MARTIJN SCHOONVELDE

Recent empirical workin the study of political sophistication finds that citizens' knowledge of politics is not only a function of their individual characteristics but also depends on the supply of information from their environment (the 'information environment'). Yet this literature does not address the question of how the information environment may be shaped by institutional factors. This article aims to fill this void. It first argues that the relationship between a government and the media affects the information that is available to individual citizens. Using cross-national data, it then finds that less government interference with the media (1) positively affects political learning and (2) moderates the individual-level effect of education on learning.

Recent empirical work in the study of political sophistication has found that voters' knowledge of politics is not just a function of their individual characteristics; it also depends on the supply of information from their environment (the 'information environment') (Prior 2005; Jerit, Barabas and Bolsen 2006; Jerit 2009; Barabas and Jerit 2009; Hutchings 2003). A key finding from this literature is that different groups of citizens learn at different rates about politics, depending on the information that is available to them from the media. Yet this literature does not address the question of how the information environment may be shaped by institutional factors. This article aims to fill this void. It first explains why characteristics of media systems—in particular freedom from government interference—comprise an important ingredient of the information environment. It then analyzes whether variation in government interference in the media sector impacts the political sophistication of electorates as a whole and/or particular groups of voters. To this end, it examines citizen knowledge across 23 elections in 20 countries using the first wave of the Comparative Study of Electoral Systems (CSES) dataset and national-level data on the media from Freedom House. It finds that media freedom has a positive effect on political sophistication for electorates as a whole. Using cross-level interactions analysis, it also finds that this effect is larger for better-educated individuals than for individuals with less education.

The article proceeds as follows. In the following section I briefly survey the literature on political knowledge in both political science and economics. I then present my hypotheses and discuss the data and results. I finish with some concluding remarks.

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THEORETICAL BACKGROUND

The study of citizens' political knowledge has long been a prominent branch of the public opinion literature in political science. This makes sense, since it is only through knowledge of the workings of politics that electorates can hold their representatives accountable (Snyder and Strömberg 2010). But then what exactly explains an individual's political knowledge? Answers to this seemingly straightforward question vary considerably over time. Early work emphasizes voters' individual characteristics, such as their education, income and political interest. These studies tend to be rather pessimistic about the average voter's potential to learn about politics. For example, *The American Voter* (Campbell *et al*., 1960) argues that a majority of voters hold 'non-attitudes' that are unconstrained by ideological content. Most of their voters do not care about issues—their vote is informed only by identification with the party they have been exposed to by their families. Recent behavioral research is more optimistic about voters' potential knowledgeability, which is supported by a range of arguments. Achen (1975), for example, argues that the measures used in *The American Voter* are flawed, and systematically underestimate voters' cognitive capacities and information levels. Page and Shapiro (1992) find that, even though individual citizens may not be very politically knowledgeable, the public at large is still capable of rationally responding to policy since individual-level noise tends to be cancelled out in the aggregate.[1] And a sizable literature on 'low-information rationality' (Lupia 1994) argues that voters may not need very much information to vote *as if* they were well informed.

The advent of more sophisticated multilevel modeling techniques in political science has inspired a *neo-institutional* approach that models political knowledge as a function of both individual characteristics and institutional factors. Most prominently, Jerit and colleagues (Jerit, Barabas and Bolsen 2006; Jerit 2009; Barabas and Jerit 2009) find that the volume (and type) of newspaper reporting moderates the (widely established) impact of socio-economic status in explaining political information: an increase in the volume of newspaper reporting yields an increase in information differences between highly and poorly educated voters. Their approach opens the door to understanding political sophistication not just as a capability or cognitive trait (as in the earlier behavioral studies) but also as a *choice*. This point of view echoes that of Gordon and Segura (1997), who conceive of some configurations of political institutions as intrinsically more conducive to political learning because they make high-quality political information cheaper to obtain. In their study of the effect of party systems, electoral systems and legislative institutions on voter information, these authors reason that "if the party system, the electoral system, and legislative institutions of a polity affect the availability, clarity and usefulness of political information, they will also account for some of the cross-national variance in any individual-level measure of sophistication" (1997, 126). In a comparison of the 12 pre-1995 countries of the European Union, Gordon and Segura find that factors such as the competitiveness of electoral systems and the effective number of parties that make up party systems have significant positive effects on average mass sophistication.

Following this line of reasoning, variation in mass media institutions should also have an effect on political learning. After all, many citizens learn about politics through the mass media. Yet despite the media's importance to voter sophistication for representative

[1] For an opposing view, see the heuristics and biases literature (Kahneman, Slovic and Tversky 1982).

democracies, much public opinion research in political science—both theoretical and empirical—has not *systematically* studied the mass media. Almost by assumption, the mass media are treated as "a conveyor belt that passively transports elite views—particularly the views of the most powerful elites—to the public" (Baum and Potter 2008, 40). This contrasts with the more systematic study of the mass media within the field of 'media economics' (Prat and Strömberg 2011). With respect to political knowledge, this literature has produced some interesting results. Leeson (2008) studies media freedom from government control and political knowledge in 13 Central and Eastern European countries. He finds that "falling from the highest level of media freedom in the sample to the lowest is associated with a 42 percent increase in political ignorance" (160). Prat and Strömberg (2005) find that the introduction of commercial television in Sweden increased the average political knowledge of the electorate as a whole. In addition, voter knowledge is found to have positive downstream policy effects. For example, Snyder and Strömberg (2010) find that politicians are more responsive to the wishes of knowledgeable voters. Djankov *et al.* (2003) find that private media ownership (in contrast to state-owned media) is associated with improved social outcomes (citizens' health, wealth and life span).

HYPOTHESES

In line with the institutional approach to voter learning in the aforementioned studies, the main argument of this article is that the institutional characteristics of media systems can be conducive to voter learning. A seminal paper in media economics (Besley and Prat 2006) finds that as the number of independent media outlets increases, government *capture* of the media is less likely to occur. That is, if a media market is becoming more diverse, it becomes more difficult for political elites to constrain the supply of political information to voters. From this perspective, it makes sense to think of media freedom (as well as increased competition among media outlets) as conducive to voter information, simply because the 'information environment' is more heterogeneous and less constrained. Thus the first main hypothesis is:

MEDIA FREEDOM HYPOTHESIS: Individuals who live in media systems that are more free from government interference are, on average, more knowledgeable about politics than individuals in media systems that are less free.

The Media Freedom Hypothesis is in line with the findings in Leeson (2008). The current article improves on that study in at least three different ways. It first expands the sample of countries from 13 Central and Eastern European countries to over 20 countries on five different continents.[2] Secondly, it uses a more satisfying measure of voter knowledge (which is discussed in the next section). Thirdly, my multilevel modeling approach allows me to test cross-level interactions among types of voters and their institutional surroundings. The estimated multilevel models in this article include individual-level variables that have been named "the usual suspects" (Prior 2005; Jerit, Barabas and Bolsen 2006; Jerit 2009; Barabas and Jerit 2009) of behavioral models of voter knowledge: education, income, etc. As noted, Jerit and colleagues find that the

[2] See Table 1 in the Appendix for the list of countries studied.

information environment has a moderating effect on these factors' impact on knowledge. Extending their findings to a cross-national context, I expect that education and media freedom interact in their effect on political knowledge: increased media freedom corresponds to greater choice among media outlets, but individuals with more education are in a better position than voters with less education to learn from this increasingly diverse information environment. This leads me to the second main hypothesis:

EDUCATION HYPOTHESIS: In a comparison of countries and citizens, the marginal effect of education level on political knowledge is larger in free media systems than it is in media systems that are less free.

DATA AND MEASUREMENT

Data

Data for this research come from a number of sources. Individual- and country-level political data are from the first module of the CSES, a cross-national research program of over 50 national election studies. Its first module contains data on elections during the period 1996–2001. Information on media freedom in those countries is from Freedom House, a US-based nongovernmental organization that conducts and publishes annual reports on democracy, political freedom and human rights. Political and media control variables are from UNESCO's Institute for Statistics, the World Bank,[3] Golder (2005) and Baek (2009).

Dependent Variable: Voter Knowledge

Voter knowledge can be thought of and measured in many different ways, ranging from the abstract to the more concrete. Each measure comes with its own strengths and weaknesses. For example, a more concrete measure would simply tally voters' ability to correctly answer a set of political knowledge questions. Yet this type of measure is difficult to compare across countries. That is, what is considered concrete political information in Country A is often different from concrete political information in Country B.

To be able to compare voter information across countries, a more abstract measure is required that (1) applies to all countries involved and (2) is of central importance to voters in the electoral process. Gordon and Segura (1997) have developed a measure with both of these qualities; they conceptualize voter information as voters' ability to correctly locate parties' ideological preferences. After all, in order for voters to keep their representatives accountable, they must know the politicians' policy preferences. And the better they are at this, the more information they must have. More concretely, Gordon and Segura measure voter knowledge as the average sum of the absolute distances between a respondent's placement of a polity's political parties on a one-dimensional ideological scale and their mean placements by all other respondents.[4]

[3] UNESCO Institute for Statistics: http://www.uis.unesco.org/Pages/default.aspx; World Bank: http://data.worldbank.org/.

[4] An important caveat is that his measure assumes that the mean of the distribution of perceived party locations is, in fact, that party's correct location. Gordon and Segura find that voters' mean assessment is strongly correlated with expert assessments by researchers in the field as well as the assessment of party members (Gordon and Segura 1997).

This article uses a similar approach, measuring knowledge as the absolute distance between an individual's perception of the largest party's ideological location and the mean perception of the electorate at large. That is, political knowledge is measured as $|L_{ij} - \bar{L}_j|$, where L_{ij} is individual i's perception of the ideological location L of party j and $\bar{L}_j$ is the electorate's perception of the ideological position L of party j on a 10-point ideological scale.[5] This measure is constructed using CSES data (Sapiro and Shively 2003). To make the results more intuitive, the knowledge variable is inverted so that larger scores correspond to higher levels of knowledge. The variable is logged and recoded so that it fits a normal distribution and varies between 0 and 1.[6]

Independent Variables

The main independent variable in this article is Freedom House's annual media freedom measure, which is a substantive and continuous measure that scores countries based on government interference in their media sectors. It is scaled from 0 (most free) to 100 (least free) and is constructed from 23 items that are subdivided into three equally weighted subcategories: legal environment, political environment and economic environment.

The legal environment subcategory encompasses "an examination of both the laws and regulations that could influence media content and the government's inclination to use these laws and legal institutions to restrict the media's ability to operate."[7] In principle, this subcategory assesses the extent to which a country's legal framework guarantees freedom of expression, and the independence of the judiciary and media regulatory bodies. It consists of eight individual items on which countries are scored from 0 to 30.

The political environment subcategory denotes the degree of political control over the content of the media (seven items, scored between 0 and 40 points). This subcategory assesses "the editorial independence of both state-owned and privately owned media; access to information and sources; official censorship and self-censorship; the vibrancy of the media and the diversity of news available within each country; the ability of both foreign and local reporters to cover the news freely and without harassment; and the intimidation of journalists by the state or other actors."[8]

The economic environment subcategory (eight items, 0 to 30 points) includes "the structure of media ownership; transparency and concentration of ownership; the costs of establishing media as well as of production and distribution; the selective withholding of advertising or subsidies by the state or other actors; the impact of corruption and bribery on content; and the extent to which the economic situation in a country impacts the development and sustainability of the media."[9] In other words, it measures the economic cost of establishing a media outlet in a country.

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[5] To increase comparability across as many countries as possible, I only focus on voters' ability to locate the largest parties in their polity.

[6] In addition to these absolute values, I have also explored average distances from the median citizen in each country to investigate whether individuals were more likely to be wrong in one direction or another (i.e., to the left or right of the country median). When aggregated across all elections, the mean of this variable is 0.08. A simple t-test found this variable to be not significantly different from zero, suggesting that no directional bias exists.

[7] http://www.freedomhouse.org/report/freedom-press-2012/methodology, accessed May 2013.

[8] Ibid.

[9] Ibid.

The scores on this *Media Freedom* variable have been inverted and re-scaled so that a 0 denotes the country in the sample with the most media interference (Belarus in 2001) and 1 denotes the country with the least media interference (Norway in 1997).[10] For each country I used the media freedom score for the year in which the election took place.

Furthermore, I control for a number of media system variables. The *Herfindahl Index* measures media market competitiveness (Hirschman 1964). Theoretically, a Herfindahl index ranges from 0 to 1, where 0 denotes a perfectly competitive industry and 1 denotes a monopoly. The index H is calculated as follows: $H = \sum_{i=1}^{N} s_i^2$, where s_i is the market share of firm i in the market, and N is the number of firms. The models in this article include indices for both the television and newspaper industries. Both indices were calculated using data from Djankov *et al*. (2003) on countries' five largest newspapers and television channels in terms of market share. *Public Broadcasting Percentage* measures the audience share of public broadcasting channels as the percentage of total audience size of the five largest television stations (Baek 2009). *Newspaper Demand* is the number of daily newspaper subscribers per capita in the population, with daily newspapers referring to publications that appear at least four times a week. This variable is from UNESCO's Institute for Statistics. To control for economic conditions, I also include *GDP Per Capita* as measured by the World Bank.[11]

In addition to these media system variables, the models in this article also include a number of political control variables as well as individual-level variables. Their measurement is discussed in the Appendix.

ANALYSIS AND RESULTS

The statistical models I estimate in this article require much from the data. In order to extend the robustness of the statistical results to as many elections as possible, I estimated both a completely specified model (with controls for political, economic and media factors) on 28,450 individuals in 23 elections and nested models (with political and economic controls alone) on 37,077 individuals in 31 elections. Table 1 lists the elections that are under study in all of the estimated models. The difference in the number of observations at the country level stems from the availability of country-level media variables. With media data missing for eight elections, the number of individual observations changes as well.

Descriptive Statistics

Figure 1 depicts the raw, linear relationship between voter knowledge and media freedom, averaged across countries. It clearly displays the positive correlation between both

[10] I thus transform the media freedom measure as follows: I first invert the scores so that 0 denotes least free and 100 denotes most free; I then recode these scores so that 1 denotes the most free country in the dataset (which happens to be Norway in 1997) and 0 denotes the least free country in the dataset (which happens to be Belarus in 2001).

[11] As stated on the World Bank website (http://data.worldbank.org), "GDP per capita is gross domestic product divided by midyear population. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in current US dollars."

TABLE 1 *Elections Under Study*

Country	Year	Models 1 & 2	Models 3 & 4	Model 5
Australia	1996	✓	✓	✓
Belgium-Flanders	1999	✓	✓	✓
Belgium-Wallonia	1999	✓	✓	✓
Belarus	2001		✓	✓
Canada	1997	✓	✓	✓
Czech Republic	1996	✓	✓	✓
Denmark	1998	✓	✓	✓
Germany	1998	✓	✓	✓
Great Britain	1997	✓	✓	✓
Hungary	1998	✓	✓	✓
Iceland	1999		✓	✓
Israel	1996		✓	✓
Korea	2000		✓	✓
Mexico	1997	✓	✓	✓
Mexico	2000	✓	✓	✓
Netherlands	1998	✓	✓	✓
New Zealand	1996	✓	✓	✓
Norway	1997	✓	✓	✓
Peru	2000		✓	✓
Peru	2001		✓	✓
Poland	1997	✓	✓	✓
Portugal	2002		✓	✓
Romania	1996	✓	✓	✓
Russia	1999	✓	✓	✓
Slovenia	1996	✓	✓	✓
Spain	1996	✓	✓	✓
Spain	2000	✓	✓	✓
Sweden	1998	✓	✓	✓
Switzerland	1999	✓	✓	✓
Taiwan	1996		✓	✓
Ukraine	1998	✓	✓	✓

variables: on average, voters tend to be more knowledgeable about politics as a country's media system becomes more free.[12]

Tables 2 and 3 display the summary statistics for all variables in the model. Table 2 demonstrates that the Herfindahl index for the newspaper market does not vary all that much. That is, almost all countries in the dataset are characterized by highly competitive newspaper markets. This may obscure a potential effect of market competitiveness on voter knowledge. Bivariate correlations among all variables are listed in Table 2. The correlation between *Media Freedom* and *Newspaper Circulation Per Capita* is positive and high ($r=0.50$). Thus an increase in media freedom is associated with a higher number of daily newspaper subscribers per capita. Furthermore, I should note that both

[12] A graphical diagnostics analysis of both variables indicated the Mexico 1997 and 2000 and the Czech Republic surveys had comparably large error terms. However, excluding these elections did not substantively alter the pooled ordinary least squares (OLS) relationship between nationally averaged voter knowledge and media freedom. Interestingly enough, *Media Freedom* does appear to have a negative effect on the national level of political knowledge when *Media Freedom* is above 0.80. This negative relationship for high levels of media freedom can partly be attributed to correlating *Media Freedom* with other country-level variables. For example, Australia and Belgium both have compulsory voting, which—as the models demonstrate—negatively affects voter knowledge. The unexplained part of this variation is picked up by the random components of the random intercepts in the estimated models.

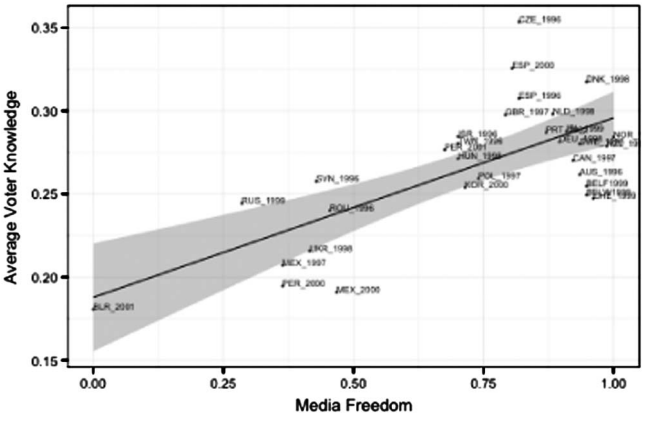

Fig. 1. Media Freedom *and voter knowledge (averaged across countries)*

TABLE 2 *Summary Statistics*

Variable	Mean	Std. Dev.	Min.	Max.	N
Political Knowledge	0.27	0.15	0	1	43,635
Income	0.49	0.34	0	1	54,103
Education	0.56	0.25	0	1	61,546
Union Membership	0.26	0.44	0	1	52,151
Age	0.35	0.19	0	1	59,877
Parliamentary Dummy	0.46	0.5	0	1	62,409
Compulsory Voting Dummy	0.28	0.45	0	1	62,409
Party List Dummy	0.49	0.5	0	1	62,409
Majoritarian Dummy	0.24	0.43	0	1	60,735
Effective Number of Electoral Parties	4.44	2.07	2.12	9.73	57,001
Media Freedom	0.75	0.24	0	1	60,735
Newspaper Market Competitiveness	0.08	0.06	0	0.23	59,104
Television Market Competitiveness	0.22	0.1	0.03	0.41	56,801
Newspaper Circulation Per Capita	0.21	0.13	0.02	0.59	59,018
Public Broadcasting Pct.	0.47	0.27	0	0.96	58,104
GDP Per Capita	17002	11752	835	38291	62,409

Media Freedom (r=0.75) and *Newspaper Circulation Per Capita* (r=0.81) correlate very strongly with a country's income as measured by *GDP Per Capita*. To account for this correlation in the analysis that follows, I will present model results with and without *GDP Per Capita* included as an independent variable. If *Media Freedom* is to have an effect on voter knowledge that is independent of a country's income, the size and significance of its regression estimates should be unaffected by including the latter variable in the models.

Diagnostics

A citizen's political knowledge can be modeled as a function of both individual- and country-level covariates using many types of statistical models, each of which makes its own assumptions about the data-generating process. For example, a pooled ordinary least square (OLS) model takes all (individual-level) observations to be drawn from the same general population. That is, an OLS model implicitly assumes that there is no country-level component to individual-level errors. Yet when I estimate the country-level

TABLE 3 *Correlations*

	VK	IN	ED	UN	Age	PD	CV	PL	MD	ENP	F	NC	TC	NN	PP
VK															
IN	0.08														
ED	0.08	0.37													
UN	−0.01	0.13	0.12												
Age	−0.01	−0.22	−0.26	−0.08											
PD	0.14	−0.01	0.00	0.04	0.02										
CV	−0.11	−0.03	0.00	0.00	−0.06	−0.14									
PL	0.07	0.00	−0.07	0.05	−0.01	0.15	0.15								
MD	0.02	0.04	0.13	−0.02	0.08	0.08	−0.20	−0.53							
EMP	−0.05	0.02	0.11	0.12	0.03	−0.16	0.21	0.22	−0.36						
F	0.15	0.03	0.01	−0.01	0.05	0.34	0.02	0.25	0.21	−0.20					
NC	0.03	−0.01	0.00	0.03	−0.02	0.18	−0.20	0.18	−0.08	0.11	−0.01				
TC	−0.02	−0.01	−0.08	0.00	−0.05	−0.24	−0.06	−0.05	−0.25	−0.06	−0.40	0.00			
NN	0.09	0.00	0.01	0.12	0.04	0.43	−0.21	0.12	0.20	−0.15	0.50	0.04	−0.13		
PP	0.09	0.00	0.00	0.00	0.09	0.01	−0.34	0.03	−0.04	0.22	0.12	0.12	0.27	0.30	
GDP	0.09	0.01	0.04	0.07	0.05	0.37	0.03	0.29	0.24	−0.05	0.75	0.07	−0.36	0.81	0.22

Note: VK = Voter Knowledge; IN = Income; ED = Education; UN = Union Membership; PD = Parliamentary Dummy; CV = Compulsory Voting Dummy; PL = Party List Dummy; MD = Majoritarian Dummy; ENP = Effective Number of Legislative Parties; F = Freedom of the Press Score; NC = Newspaper Market Competitiveness; TC = Television Market Competitiveness; NN = Newspaper Circulation; PP = Public Broadcasting Pct.; GDP = GDP per capita.

intraclass correlation coefficient (ρ=0.065), significant and considerable unobserved heterogeneity is revealed, which strongly indicates that the individual observations are clustered within countries.[13] This finding implies that a random intercept model is to be preferred over a pooled OLS regression model, since there is significant variation across countries; under such conditions, complete pooling leads to biased standard errors and incorrect hypothesis tests (Rabe-Hesketh and Skrondal 2008). More substantively, these diagnostics also indicate that there is interesting cross-national variation in voter knowledge to explore.

RESULTS

The Media Freedom Hypothesis holds that individuals who live in media systems that are more free from government interference are, on average, more knowledgeable about politics than individuals in media systems that are less free.

The random-intercept model for the *Political Knowledge* of voter i in country j that is employed to address this hypothesis is:

$$\text{Voter Knowledge}_{ij} = \beta_{0j} + \beta_{1j} \times \text{Education}_{ij} + \sum \beta \times \text{Controls (Individual-Level)} + \varepsilon_{ij}$$

$$\beta_{0j} = \gamma 00 + \gamma_{01} \times \text{Media Freedom}_{j} + \sum \gamma \times \text{Controls (Country-Level)} + \zeta_{0j}$$

[13] The intraclass correlation coefficient ρ is calculated as follows: $\rho = \frac{\psi}{\psi + \theta}$, where ψ equals the country-level error variance and Θ the individual-level error variance. It can be thought of in two ways: the degree of country-level unobserved heterogeneity or the degree of within-country dependence. It is the proportion of the total variance in voter knowledge that can be attributed to between-cluster variance or unobserved heterogeneity. A likelihood ratio test compared a random intercept model to a pooled model ($H_0 : \psi = 0$; $H_A : \psi > 0$). The highly significant test statistic ($\chi^2(df = 1) = 2417.89$, $p = 0.000$) indicates the presence of significant unobserved heterogeneity.

TABLE 4 *Voter Knowledge: Random Intercept Models*

	Model 1 Coef./Std. err.	Model 2 Coef./Std. err.	Model 3 Coef./Std. err.	Model 4 Coef./Std. err.
Individual-level variables				
Income	0.02***	0.02***	0.02***	0.02***
	0.0	0.00	0.0	0.0
Education	0.04***	0.04***	0.04***	0.04***
	0.00	0.00	0.00	0.00
Union Membership	−0.01***	−0.01***		
	0.00	0.00		
Age	−0.01*	−0.01*		
	0.01	0.01		
Country-level variables				
Media Freedom	0.11***	0.14***	0.09***	0.13***
	0.04	0.04	0.02	0.03
Parliamentary System	0.04***	0.04***	0.02***	0.02***
	0.01	0.01	0.01	0.01
Compulsory Voting	−0.03**	−0.01	−0.03***	−0.03***
	0.01	0.02	0.01	0.01
Party List	0.01	0.01	0.01	0.01
	0.01	0.01	0.01	0.01
Majoritarian System	−0.01	−0.01	−0.01	−0.01
	0.02	0.02	0.01	0.01
Effective Number of Parties	−0.00	−0.01		
	0.00	0.00		
Newspaper Competitiveness	−0.03	−0.00		
	0.08	0.08		
Television Competitiveness	0.11*	0.09		
	0.07	0.07		
Newspaper Circulation	−0.00*	−0.00		
	0.00	0.00		
Public Broadcasting Pct.	0.02	0.05*		
	0.02	0.03		
GDP Per Capita		−0.07		−0.04**
		0.05		0.02
Constant	0.13***	0.11***	0.16***	0.15***
	0.03	0.04	0.01	0.01
$\sqrt{\psi}$	0.02	0.02	0.02	0.02
	0.00	0.00	0.00	0.00
$\sqrt{\theta}$	0.14	0.14	0.14	0.14
	0.00	0.00	0.00	0.00
ρ	0.01	0.02	0.02	0.02
	-	-	-	-
R^2 Individual	0.05	0.05	0.01	0.01
R^2 Election	0.84	0.87	0.75	0.79
AIC	−31,801.80	−31,797.76	−40,289.23	−40,285.58
n/N	23/28,450	23/28,450	31/37,077	31/37,077

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$ (two sided).

Thus the intercept β_{0j} is allowed to vary across countries as a function of country-level covariates. Technically, random-effects estimators are the weighted average of between- and within-country estimates (and thus incorporate information from both). To test the Media Freedom Hypothesis, I have estimated four random intercept models (see Table 4).

Models 1 and 2 are fully specified models (with political and media controls and political, media and economic controls, respectively) on individuals in 23 elections, whereas Models 3 and 4 are nested models (with only political and economic controls) of

individuals in 31 elections. The estimated effect of *Media Freedom* is significant, in the hypothesized direction, and of similar size in all models: all else equal, voters are about 10 percentage points ($\gamma_{01} = 0.11$ in Model 1, $\gamma_{01} = 0.14$ in Model 2, $\gamma_{01} = 0.09$ in Model 3 and $\gamma_{01} = 0.13$ in Model 4) more knowledgeable when media are most free (Norway in 1997) than when media are least free (Belarus in 2001). This difference thus varies between one-half and one complete standard deviation in aggregate political knowledge. I should also note that the effect of *Media Freedom* on average voter knowledge is independent of economic conditions as measured by *GDP Per Capita*, despite the strong correlation between both variables: including *GDP Per Capita* in Models 2 and 4 does not alter the size or significance of the regression estimates for *Media Freedom*.[14]

At the individual level, both income and education positively affect *Political Knowledge*: better-educated individuals with a larger income tend to be more knowledgeable about politics than their lower-earning, less-educated counterparts ($\beta = 0.02$ and $\beta = 0.04$, respectively). This expected effect of the 'usual suspects' of behavioral studies supports the validity of the voter knowledge measure employed in this study. Furthermore, union members are slightly less knowledgeable about politics than non-members ($\beta = -0.01$), whereas the oldest senior citizens are slightly less well informed than those who just turned 18 ($\beta = -0.01$).

With regards to political institutions, the model demonstrates that citizens in parliamentary democracies tend to be better informed than citizens in mixed or presidential democracies. This finding is possibly explained by the important role of parties in parliamentary democracies. After all, in such democracies the executive needs majority support from the legislature to remain in power. Compulsory voting laws seem to negatively impact voter sophistication ($\gamma = -0.03$), although this effect seems sensitive to model specification and is not very robust. Furthermore, as television markets become more competitive, this has a positive and sizable effect on *Political Knowledge* ($\gamma = 0.11$), but this marginally significant effect disappears with the inclusion of *GDP Per Capita*. In contrast, the competitiveness of newspaper markets does not seem to have any effect on voter knowledge, but this is possibly explained by the lack of variability in newspaper markets in the dataset (see Table 2).

All in all, the results from the random-intercept model strongly support the Media Freedom Hypothesis: *Media Freedom* and *Political Knowledge* are positively related. Yet aggregating across electorates may obscure interesting variations. For example, political and media institutions may differentially affect knowledge across different groups of individuals. This idea is in line with the work of Jerit and colleagues (Jerit, Barabas and Bolsen 2006; Jerit 2009; Barabas and Jerit 2009), who find that the volume and type of newspaper reporting moderates the (widely established) impact of socio-economic status in explaining political information: an increase in the volume of newspaper reporting coincides with an increase in information between highly and poorly educated citizens.

An extension of these findings to a cross-national setting is summarized in the Education Hypothesis, which posits that in a comparison of countries and citizens, the marginal effect of education level on political knowledge is larger in media systems that are more free from government interference. To investigate evidence for the Education

[14] To exclude the possibility that it is just the level of democracy that matters, I also ran models that included a measure of level of democracy, as measured by the Polity IV data project (Marshall, Jaggers and Gurr 2002). Inclusion of this variable in Models 1 through 4 did not alter *Media Freedom*'s estimated effect on voter knowledge, either in terms of size or significance level.

Hypothesis, I have estimated a random coefficient model in which the slope parameter for the within-country variation of the *Education* variable[15] is modeled as a function of *Media Freedom* (Gelman and Hill 2007; Rabe-Hesketh and Skrondal 2008).[16] The random intercept, random coefficient model for *Political Knowledge* of individual i in country j that is employed to test this hypothesis is:

$$\text{Voter Knowledge}_{ij} = \beta_{0j} + \beta_{1j} \times \text{Education}_{ij} + \sum \beta \times \text{Level} - 1 \text{ Controls} + \in_{ij}$$
$$\beta_{0j} = \gamma 00 + \gamma_{01} \text{Media Freedom}_{j} + \sum \gamma \times \text{Controls} + \zeta_{0j}$$
$$\beta_{1j} = \gamma 10 + \gamma 11 \times \text{Media Freedom}_{j} + \zeta_{1j}$$

This model allows both the intercept β_{0j} and the slope for *Education* β_{1j} to vary across countries as a function of country-level covariates and *Media Freedom*, respectively. The model results are presented in Table 5. The first thing to notice is that *Income* ($\beta = 0.02$), *Compulsory Voting* ($\gamma = -0.04$) and *Parliamentary Dummies* ($\gamma = 0.02$) are similar to their estimates in the random intercept model, and that the majoritarian dummy ($\gamma = -0.02$) now is marginally significant. Yet in contrast to the random intercept model, the estimate for the effect of *Education* on *Political Knowledge* ($\gamma_{10} = 0.01$), rather than denoting a marginal effect, now denotes a specific conditional effect of education. More precisely, it denotes the effect of *Education* on *Political Knowledge* for individuals living in Belarus. Across all countries j, the conditional effects of *Education* on *Political Knowledge* (β_{1j}) are estimated as the sum of fixed components (the fixed effects of *Education* and *Media Freedom*) as well as the estimated random effect of *Education*. More generally, and in contrast to random intercept models or pooled OLS models, the varying coefficient for *Education* denotes conditional effects rather than a marginal effect.

Figure 2 displays the estimated conditional effects (and their 95 percent confidence intervals) for all countries, sorted from lowest (Belarus in 2001) to highest (Norway in 2007) *Media Freedom*. Although the conditional effects do not neatly line up in order, they do follow a clear pattern: as *Media Freedom* increases, so does the effect of *Education* on *Political Knowledge*. Further evidence of this comes from the displayed least squares regression line ($\beta = 0.07$, se$=0.02$, p<0.00) of the conditional effects of *Education* on *Media Freedom*. The plot paints an interesting picture of varying conditional effects, in which *Education* ranges from having no effect on political knowledge (for example, in Belarus, Russia, Mexico and Taiwan) to having significant positive effects. To illustrate, in New Zealand a university-educated individual is about 11 percentage points more knowledgeable about politics than a counterpart with only a secondary school education. And in Norway and Switzerland, education alone moves an individual about half a standard deviation up the political knowledge distribution.

To further visualize the interactive Education Hypothesis, I have separately estimated the conditional effect of *Education* on voter knowledge in less free media systems (*Media Freedom* ≤ 0.5) and more free media systems (*Media Freedom* > 0.5). The results of these estimations are displayed in Figure 3. This figure first shows that voters in countries with unrestricted media are predicted to be more politically knowledgeable than their counterparts in countries in which the media are less free, regardless of their

[15] To purge the *Education* variable from between-election variation, I simply subtracted election means from individual education scores.

[16] A likelihood ratio test ($\chi^2(df = 3) = 106.39$, $p = 0.000$) comparing the random intercept model to the random coefficient model found that the latter provides a significantly better fit.

TABLE 5 *Random Intercept, Random Coefficient Model With Cross-Level Interactions*

	Model 5 Coef./Std. err.
Individual-level variables	
Income	0.02*** 0.00
Education	0.01 0.03
Country-level variables	
Media Freedom	0.10*** 0.03
Parliamentary Dummy	0.02** 0.01
Compulsory Voting Dummy	−0.04*** 0.01
Party List Dummy	0.01 0.01
Majoritarian Dummy	−0.02* 0.01
GDP Per Capita	−.03* 0.02
Cross-level interaction terms	
Education x *Media Freedom*	0.04 0.03
Constant	0.17*** 0.01
$\sqrt{\theta}$	0.14 0.00
$\sqrt{\psi}_{\text{int } ercept}$	0.02 0.00
$\sqrt{\psi}_{slope}$	0.04 0.01
$Cov(\zeta_{0j}, \zeta_{1j})$	−0.70 0.13
AIC	−40446
n/N	31/37077

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$ (two sided).

education level.[17] In addition, it demonstrates that the marginal effect of *Education* on voter sophistication is larger for voters in free media systems than for their counterparts in less free media systems. That is, the predicted marginal effect of *Education* is much larger for voters in free media systems than it is for voters in relatively unfree media systems, as evidenced by the steeper slope for these voters. This finding lends strong

[17] To distinguish between the types of countries, I created a dummy variable that was coded 1 if the country scored higher than the mean on *Media Freedom*, and 0 otherwise.

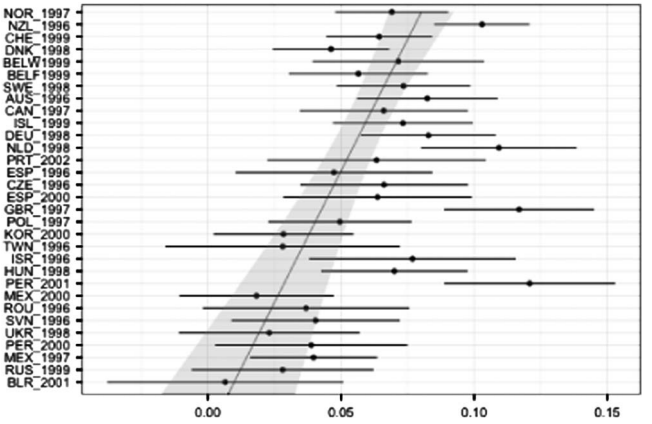

Fig. 2. Conditional effects of Education *across elections and countries*
Note: each dot represents the estimated conditional effect of education on individual countries (the black lines represent their 95 percent confidence intervals). The countries are sorted from lowest (Belarus 2001) to highest (Norway 1997) *Media Freedom*. The red line denotes the least squares regression line of the conditional effects on the *Media Freedom* variable (its 95 percent confidence interval is shown in gray). The figure shows that, all else equal, as mass media becomes more free from government interference, *Education* has a stronger effect on *Political Knowledge*.

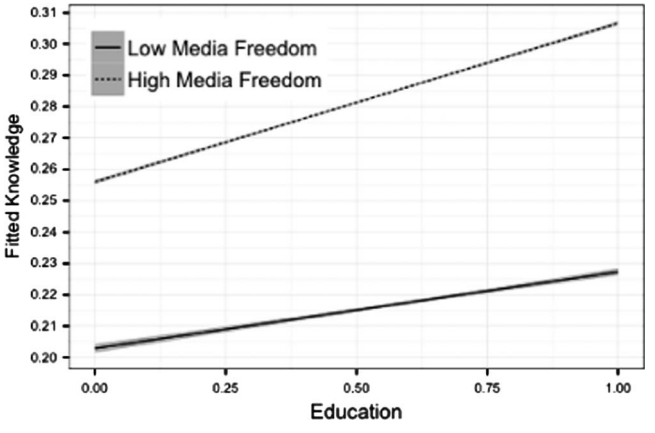

Fig. 3. Education *and* Voter Knowledge *in countries that are low and high in* Media Freedom
Note: the lines denote fitted *Political Knowledge* for individual voters with different levels of education within countries that are high (> 0.5) and low (≤ 0.5) in *Media Freedom*. The shading denotes 95 percent confidence intervals around those predicted values (these are small because they are estimated at the individual level).

support to the Education Hypothesis: all else equal, education is a better predictor of political knowledge when media are more free than when media are less free.

CONCLUSION

The statistical models estimated in this article find evidence for the Media Freedom Hypothesis and the Education Hypothesis: voters who live in media systems that are more

free from government interference are, on average, more knowledgeable about politics than voters in media systems that are less free, and the conditional effect of education is more pronounced in free media systems than in less free media systems. These findings are likely the result of the increased supply of political information in free media systems, as evidenced by the strong positive correlation between *Media Freedom* and *Newspaper Circulation Per Capita* (see Table 3). In free media systems, individual outlets are less likely to be ''captured'' by the government, which leads to a more heterogenuous and less constrained information environment, which in turn positively affects the political knowledge of the electorate as a whole, and of well-educated individuals in particular. These media effects are independent of a country's economic state and level of democracy.

These findings illustrate that voter knowledge is not just a function of individual characteristics; it also depends on the institutional environment. That is, individual characteristics such as education, income and political interest interact with the institutional environment to explain voter knowledge. In the American context, these types of (media) contingencies have been studied extensively by Jerit and Barabas and colleagues (Jerit, Barabas and Bolsen 2006; Jerit, 2009; Barabas and Jerit, 2009), and this article has shown that this finding also applies to a cross-national setting.

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APPENDIX

Country-Level Political Variables and Individual-Level Variables

Gordon and Segura (1997) find that party systems, electoral systems and legislative institutions positively affect voter information if they make high-quality political information cheaper to obtain. To account for their findings, this article includes the following control variables:

Country-level political variables.

- *Parliamentary System* is a dummy variable coded as 1 if a country had a parliamentary system in 2000, and 0 otherwise (i.e., presidential or mixed). This variable is taken from Golder (2005).
- *Compulsory Voting* is a dummy variable coded as 1 if a country has compulsory voting laws, and 0 otherwise. This variable is taken from CSES (2003), and its inclusion is intended to capture the possibility that if a country has mandatory voting, this may affect voters' willingness to learn about parties.
- *Party List* is a dummy variable coded as 1 if a country has party lists, and 0 otherwise. This variable is taken from CSES (2003), and it is included in order to capture party strength. In electoral systems in which parties are strong, individuals are expected to be more knowledgeable about parties' ideologies.

Individual-level variables.

- *Education* is measured on a scale from 1 (no education) to 8 (university undergraduate degree completed). To facilitate interpretation, the variable has been recoded to range from 0 to 1.
- *Income* is measured on a scale from 1 (lowest household income quintile) to 5 (highest household income quintile) and has been recoded to range from 0 to 1.
- *Age* (measured in years) has been recoded to range from 0 to 1.
- *Union Membership* is a dummy variable coded as 1 if a respondent is a member of a union, and 0 otherwise.