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Voting on Embryonic Stem Cell Research: Citizens More Supportive than Politicians

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Abstract

As the public debate over stem cell research continues, the observable voting behaviour in Switzerland offers a unique opportunity to compare the voting behaviour of politicians with that of voters. In this paper, by analysing the outcomes of a referendum on a liberal new bill regulating such research, we reveal an almost 10 percentage point lower probability of the bill being accepted by politicians than by a representative sample of voters. Whereas the politicians' behaviour is driven almost entirely by party affiliation, citizen votes are driven not only by party attachment but also by church attendance. Seldom or never attending church increases the probability of bill acceptance by over 23 percentage points, while supporting the Christian Democratic Party makes supporting the bill less likely for voters, suggesting that religious observance is important. The observance of these tendencies in Switzerland – an environment that promotes discussion through direct democratic rights – strongly suggests that citizens see the benefits of stem cell research.

JEL Classification: D72, I10
Keywords: Representation, Stem Cells, Innovation

Although stem-cell research has experienced an explosion of activity since the 1998 isolation of human embryonic stem cells (Blow 2008), such research has been accompanied by a heated and bitter public debate around which the media have structured their coverage of the issue (Williams et al. 2003). A primary trigger for this ongoing controversy was U.S. President George W. Bush's 2001 national TV appearance announcing a new policy restricting stem cell research (Check 2004), which led to legal uncertainties that have affected its use in the U.S. (Check 2011). Nevertheless, the U.S. has been leading human embryonic stem cell research since 1998, with scientists performing well despite restrictive Bush policies (Moon and Cho 2014, Vakili et al. 2015). In fact, since 2005, U.S. research on derivations has rebounded in

spite of rapid progress by other countries like China, Israel, and Singapore (Moon and Cho 2014). Even the 2001 U.S. federal funding constraints have had no significant impact because the research has shifted geographically into states and countries with more favourable regimes and funding (Vakili et al. 2015). Nevertheless, stem cell research was hotly debated during the 2006 and 2008 U.S. elections and became a prominent campaign topic across politically strategic states (Nisbet and Markowitz 2014). In fact, several leading researchers have criticized the White House Domestic Policy Council report *Advancing Stem Cell Science Without Destroying Human Life* on the grounds that it misrepresented their work in an attempt to influence the cell debate in Congress (Holden 2007).

Overall, the debate has predominantly been framed as a moral matter. Opponents stress that embryos are human life and scientists should not be allowed to play God, while proponents emphasize the societal and therapeutic benefits of stem cell research (Nisbet and Markowitz 2014). Such benefits range from transplants to cell replacement therapies that treat such debilitating diseases as diabetes, Parkinson's, and Huntington's, research areas that have opened up a new terrain of basic biology (Lovell-Badge 2001). Nonetheless, scientists considering a career in embryonic stem cell biology have been warned that they will face uncertainty and sustainability issues within this touchy research field, in addition to the vigorous and extended public debate between supporters who sensationalize the research and opponents who demonize it (Borgelt et al. 2013).

The intense reporting of this debate has to date been more descriptive than empirical, with the political process revealing the field's ongoing vulnerability (Wadman 2011), which has prompted stem cell researchers to voice concerns about the difficulty of predicting where the political debate will go next (Holden and Vogel 2008). Some even expected the debate to disappear after the use of human embryos through direct cell reprogramming was declared safe for use in patients and new opportunities were created by the development of pluripotent (iPS)

cells from individual skin cells. However, the therapies for heart, neurological, and other diseases still pose huge challenges (Holden and Vogel 2008). Nevertheless, since the 2004 transplant of such cells into a woman with eye disease, hopes attached to the use of iPS cells to repair damaged or diseased tissues have been increasing (Cyranoski 2014). Today, such iPS cell usage is seen as a new route to research implementing human embryonic stem cells (Editorial 2013), and a recent survey of 26 hospital patients indicated a generally positive and supportive attitude towards donation of biological material for iPS research (Dasgupta et al. 2014).

Now, therefore, the field is well past the Bush era and in what its leading scientists refer to as a turning point or renaissance (Borgelt et al. 2013). Nevertheless, a new debate has recently emerged over embryo gene editing after some researchers expressed concern that it could be a slippery slope towards unethical or unsafe non-medical uses. Others counter-argued that its application to human embryos could answer basic scientific questions beyond clinical functions (Cyranoski and Reardon 2015), a claim that has raised new policy concerns (Kamenova and Caulfield 2015). Without doubt, the moral and ethical dimensions of the controversy suggest that it will not disappear any time soon, meaning that the actions and opinions of all parties involved should be investigated to better understand the debate. Yet the existing empirical literature still relies heavily on studying general public attitudes (Nisbet and Markowitz 2014) rather than the *actual behaviour* of individuals. For example, one common attitudinal question asks how much the respondent is in favour of or opposed to medical research that uses stem cells from human embryos (Nisbet and Markowitz 2014, p. 4).

One answer to this query was expressed in the U.S. state of California by a 2004 citizen vote to establish the California Institute for Regenerative Medicine (CIRM), which, with an endowment of $3 billion, is the largest funder of stem cell work in the world. After that vote, five other states set up stem-cell research agencies (Hayden 2014). In 2017, California voters

will again decide whether or not to support CIRM. Meanwhile, the European public's perception of stem cell research has been expressed in a series of citizens' initiatives that drew more than 1 million signatures and thus required a formal public hearing in the European Parliament. One petition signed by 1.7 million people requested a ban on financing any activity that required the destruction of human embryos (Editorial note 2014). Switzerland, particularly, offers an interesting opportunity to study how acceptable stem cell research is to voters and politicians not only because the policy issues decided by parliament are presented to citizens in referenda – whose outcomes are binding and lead to direct policy outcomes – but because parliamentary representatives' votes are publicly accessible. That is, all final roll calls in the National Council (comparable to the U.S. House of Representatives) are carried out through an electronic voting system, and the parliamentary services make public all individual votes registered by the system. Individual votes can thus be compared with citizen votes for or against the status quo on identical legislative proposals (Stadelmann et al. 2013). The Council of States (comparable to the U.S. Senate), in contrast, has no electronic voting system and did not even introduce camera recording until the winter of 2006.

In 2004, Switzerland held a referendum on whether to accept a liberal new bill regulating stem cell research, which was proposed by the Federal Council and a parliamentary majority. An opposing committee was against the new bill and in favour of a ban on embryonic stem cell research. We therefore compare the individual votes on the stem cell research legislation of 160 National Council members with the responses from a representative exit poll sample collected by Vox, which has collated post-survey data after each federal vote since 1977 (for more details, see http://forsdata.unil.ch/projects/voxit/). The overall voting outcome reveals substantial heterogeneity among the Swiss cantons even though all accepted the new liberal bill (Fig. 1).

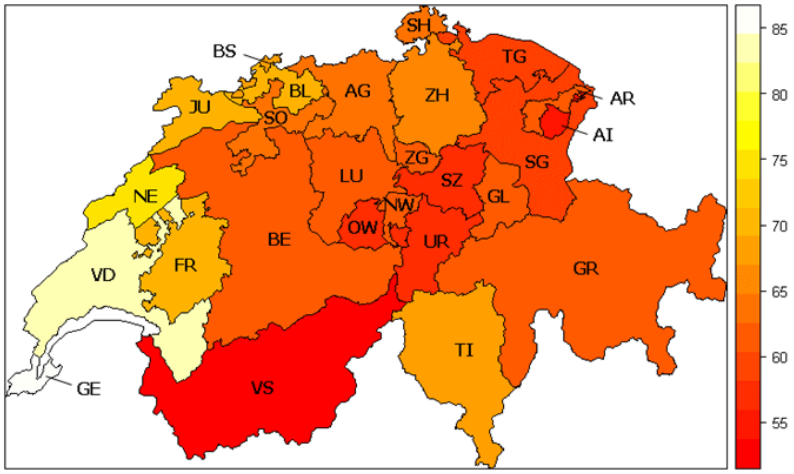

Fig. 1: Acceptance rate of the proposed law among all 26 Swiss cantons, showing a variation between 55.7% (Appenzell I. Rh., AI) and 84.6% (Genève, GE). Cantons in central Switzerland were less likely to approve the proposal, while the French and Italian speaking cantons were more likely to approve it. Source: Federal Statistical Office and Swissvotes Dataset.

Our dependent variable measures whether individuals (either the National Council members or the citizens polled) accepted the proposed legislation on stem cell research. Descriptive statistics and descriptions for all covariates are given in appendix Table A1. The analytical results, reported in Table 1, reveal that politicians were less likely than the citizens to accept the bill, indicating that the general population was far more open to embryonic stem cell research than its representatives. Specifically, being a member of the National Council reduced the probability of favouring the new law by 8.4 percentage points; however, the individual characteristics of age, marital status, education, and Roman Catholic faith were unimportant in the decisions of both politicians and voters, although women were more likely to be against the new bill. Nevertheless, when citizens and politicians were analysed separately (Table 2, columns 1–3 and 4–6, respectively) with additional factors controlled for, the gender effect was no longer statistically significant. For politicians, the number of years on the National Council did not matter, but party affiliation was of notable import, with conservative right-affiliated representatives or voters being more in favour of the liberal bill than social and

Christian democrats (with the Green Party and other smaller parties as the reference category). This result is in direct contrast to a U.S. study showing Republicans as less likely to favour embryonic stem cell research (Nisbet and Markowitz 2014). No other politician characteristics were statistically significant.

Table 1: Citizen and representative acceptance of stem cell research

DV: Accept research	Logit				OLS	
	(1)	(2)	(3)	(4)	(5)	(6)
Representative	-0.0840**	-0.0898***	-0.0700**	-0.1829***	-0.0801**	-0.1451***
	(0.0369)	(0.0313)	(0.0311)	(0.0404)	(0.0339)	(0.0309)
Female	-0.1254***	-0.1195***	-0.0846*	-0.0832**	-0.0956**	-0.0743**
	(0.0423)	(0.0435)	(0.0445)	(0.0411)	(0.0462)	(0.0370)
Age	0.0399	0.0674	0.0418	0.0466	0.0025	0.0022
	(0.1148)	(0.1272)	(0.1266)	(0.1571)	(0.0071)	(0.0066)
Age squared	-0.0065	-0.0326	-0.0244	-0.0161	-1.5e-05	-9.0e-06
	(0.1194)	(0.1263)	(0.1293)	(0.1661)	(7.1e-05)	(6.7e-05)
Married		-0.0035	-0.0142	0.0114	-0.0184	0.0106
		(0.0366)	(0.0315)	(0.0427)	(0.0411)	(0.0390)
Divorced		-0.0907	-0.0646	-0.0993	-0.0777	-0.0887
		(0.0743)	(0.0632)	(0.0840)	(0.0697)	(0.0743)
University education		0.0132	0.0313	0.0176	0.0402	0.0154
		(0.0224)	(0.0191)	(0.0291)	(0.0251)	(0.0263)
Catholic		-0.0159	-0.0280	-0.0235	-0.0347	-0.0211
		(0.0238)	(0.0266)	(0.0321)	(0.0302)	(0.0277)
Left party			-0.1850***		-0.2061***	
			(0.0536)		(0.0524)	
Right party			0.0118		0.0130	
			(0.0345)		(0.0405)	
Social democrats				0.0460		0.0460
				(0.0564)		(0.0626)
Christian democrats				-0.0721		-0.0893
				(0.0778)		(0.0831)
Liberals				0.2636***		0.3377***
				(0.0498)		(0.0495)
Right convservative				0.1744***		0.2102***
				(0.0422)		(0.0480)
R2	0.033	0.038	0.082	0.161	0.062	0.105
Brier	0.210	0.209	0.201	0.190		
n. Obs.	631	631	631	631	631	631

Notes: The dependent variable for all estimations is "Individual votes YES"; that is, acceptance of stem cell research. Estimated robust clustered (cantonal level) standard errors are reported throughout the table. Discrete effects, reported for the logit models, represent the estimated change in the probability of an individual voting yes from zero to one (for dummy variables) or from the first to the third quartile. Dummies: politician (with citizen as the reference group), female, married (or in partnership), divorced, university education, Roman Catholic, party affiliation or preference (with Center or other parties as the reference group). All estimates include an intercept. ***, **, and * indicate a mean significance level of below 1%, between 1 and 5%, and between 5 and 10%, respectively.

Table 2: Citizen and representative acceptance of stem cell research: Separate samples

DV: Accept research	Citizen acceptance only			Representative acceptance only		
	Logit		OLS	Logit		OLS
	(1)	(2)	(3)	(4)	(5)	(6)
Female	-0.0699*	-0.0773	-0.0589	-0.0225	-0.0143	-0.0639
	(0.0418)	(0.0621)	(0.0516)	(0.0471)	(0.0195)	(0.0958)
Age	0.0669	0.1594	0.0047	-0.0725	-0.0719	-0.0110
	(0.2087)	(0.2453)	(0.0078)	(0.1670)	(0.1080)	(0.0225)
Age squared	-0.0296	-0.1257	-3.7e-05	0.1039	0.0763	1.3e-04
	(0.2204)	(0.2652)	(7.6e-05)	(0.1798)	(0.1035)	(2.2e-04)
Married	0.0055	-0.0217	-0.0180	-0.0281	-0.0194	-0.0609
	(0.0639)	(0.0656)	(0.0522)	(0.0726)	(0.0391)	(0.0912)
Divorced	-0.0981	-0.1814	-0.1293	-0.0390	-0.0133	-0.1005
	(0.1017)	(0.1115)	(0.0890)	(0.0578)	(0.0240)	(0.1088)
University education	0.0365	0.0034	0.0057	0.0020	0.0043	0.0100
	(0.0547)	(0.0501)	(0.0395)	(0.0456)	(0.0153)	(0.0662)
Roman Catholic	0.0156	0.0017	-2.6e-04	-0.0098	-0.0238	-0.0670
	(0.0361)	(0.0387)	(0.0272)	(0.0481)	(0.0297)	(0.0477)
Social democrats	0.0561	0.0404	0.0354	0.2915***	0.2231**	0.2995***
	(0.0758)	(0.0973)	(0.0763)	(0.1069)	(0.1039)	(0.0936)
Christian democrats	-0.2206***	-0.2272***	-0.2055**	0.4369**	0.4112*	0.4478***
	(0.0856)	(0.0846)	(0.0808)	(0.1940)	(0.2317)	(0.1663)
Liberals	0.2717***	0.2761***	0.2170***	0.8786***	0.9246***	0.8449***
	(0.0688)	(0.0636)	(0.0473)	(0.0760)	(0.0510)	(0.0803)
Conservative right	-0.0481	-0.0562	-0.0320	0.8170***	0.8520***	0.8271***
	(0.0675)	(0.1047)	(0.0778)	(0.0798)	(0.0893)	(0.0852)
No church attendance		0.1881***	0.1635***			
		(0.0416)	(0.0369)			
Low income		-0.0197	-0.0194			
		(0.0614)	(0.0434)			
Impact country		0.2337***	0.0504***			
		(0.0479)	(0.0083)			
Number of interest groups					0.0082	0.0058
					(0.0130)	(0.0047)
Active years on National Council					0.0093	0.0023
					(0.0176)	(0.0077)
% Canton yes					0.0242	1.1251***
					(0.0166)	(0.2520)
R2	0.099	0.243	0.175	0.570	0.628	0.502
Brier	0.196	0.171		0.122	0.112	
n. Obs.	471	471	471	160	160	160

Notes: The dependent variable for all estimations is "Individual votes YES"; that is, acceptance of stem cell research. Estimated robust clustered (cantonal level) standard errors are reported throughout the table. Discrete effects, reported for logit models, represent the estimated change in the probability of an individual voting yes from zero to one (for dummy variables) or from the first to the third quartile. Dummies: politician (with citizen as the reference group), female, married (or in partnership), divorced, university education, Roman Catholic, party affiliation or preference (with Center or other parties as the reference group), no (infrequent) church attendance, and low income (lowest tercile). All estimates include an intercept. ***, **, and * indicate a mean significance level of below 1%, between 1 and 5%, and between 5 and 10%, respectively.

Among voters, church attendance was negatively linked to bill acceptance (Table 2, columns 2 and 3), which increased support by 18.8 percentage points for those who never or seldom attended church. Religious denomination, however (i.e., Roman Catholic or not), played no statistically significant role, suggesting that it is the church as an institution that is the producer of ideologies (Torgler 2006). Citizens supporting the Christian Democratic People's Party were also 22 percentage points less likely to vote in favour of the bill than the reference group (the political centre and other parties) in contrast to politicians affiliated to that

party who were around 43 percentage points more likely to vote in favour of the bill than politicians in the reference group. Declared supporters of the more liberal parties showed stronger support for the bill, while supporters of the conservative right (the Swiss People's Party) did not differ statistically from the reference group (the Green Party and other smaller parties, and citizens who indicated no specific party affiliation). We did observe a moderate match between National Council members' votes and their cantonal/district outcomes (%YES canton). Citizens who believed that stem cell research is important for Switzerland were also more likely to vote in favour of the bill (on a scale from 1 to 10). In fact, an increase from the first to the third quartile for this variable increased the probability of a yes vote by 23.3 percentage points. We found no difference, however, between low and high income voters, and all results remained qualitatively identical when we estimated a multilevel logistic model with random effects for cantons (Appendix Table A2).

Because of the high level of direct democracy in Switzerland, its citizens are generally well informed about upcoming referenda through intense public discourse and official booklets. These latter, which include the exact text of the legislative paragraphs to be modified or introduced into the law or constitution, provide objective information on the referendum issue. Counter-committees that have collected signatures may also provide outlines of their arguments, and parliament itself usually declares its position. Thus, citizens are provided a complete picture not only of the referendum content but also of the different perspectives. The opportunity to vote then encourages citizens to be informed about and discuss the entire issue. According to our findings, in this environment, citizens are more likely than politicians to favour embryonic stem cell research, suggesting that social discussion may help bring about agreement on shared principles, professional norms, and procedural conditions related to stem cell research.

Citizens care whether scientists are trustworthy, act transparently, and serve the public interest. Even scientists themselves have requested that journal editors and funding agencies adhere to the guidelines of the International Society for Stem Cell Research to encourage compliance (Daley et al. 2007). Meanwhile, however, the monitoring function is being taken over by institutional and ethics review boards or committees. Such bodies need to require evaluation of the scientists' rationale in proposals for embryo-creating research, especially as technical barriers continue to fall because of repeated embryo cloning and stem cell generation (Hyun 2014). Ultimately, however, research involving embryonic stem cells is likely to remain controversial and dependent on citizen values.

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Appendix Table A1: Data description and sources

Variable	*Description and sources*	*Mean*	*SD*
Accept research	Indicator variable: 1 if politcian/citizen voted "yes" for stem cell research. Swiss Parliamentary Services and FORS Vox Survey.	0.686	0.464
Politician	Indicator variable: 1 if politician. Own construction.	0.254	0.435
Female	Indicator variable: 1 if female. Swiss Parliamentary Services and FORS Vox Survey.	0.449	0.498
Age	Age of politican/citizen in years. Swiss Parliamentary Services and FORS Vox Survey.	51.360	14.490
Married	Indicator variable: 1 if married or partnership. Swiss Parliamentary Services and FORS Vox Survey.	0.650	0.477
Divorced	Indicator variable: 1 if divorced or separated. Swiss Parliamentary Services and FORS Vox Survey.	0.079	0.270
University education	Indicator variable: If university education. Swiss Parliamentary Services and FORS Vox Survey.	0.296	0.457
Catholic	Indicator variable: 1 if catholic for citizen or catholic majority in canton for politician. BFS - Federal Office for Statistics and FORS Vox Survey.	0.439	0.497
Left party	Indicator variable: 1 if political affiliation of citizen left leaning (center of no affilation is omitted category) or politician from left party. Swiss Parliamentary Services and FORS Vox Survey.	0.244	0.430
Right party	Indicator variable: 1 if political affiliation of citizen right leaning (center of no affilation is omitted category) or politician from right party. Swiss Parliamentary Services and FORS Vox Survey.	0.208	0.406
Social democrats	Indicator variable: 1 if political affiliation of citizen/politician equals Social democrats (SP). Swiss Parliamentary Services and FORS Vox Survey.	0.241	0.428
Christian democrats	Indicator variable: 1 if political affiliation of citizen/politician equals Christian Democrats (CVP). Swiss Parliamentary Services and FORS Vox Survey.	0.087	0.282
Liberals	Indicator variable: 1 if political affiliation of citizen/politician equals Liberals (FDP). Swiss Parliamentary Services and FORS Vox Survey.	0.160	0.367
Conservative right	Indicator variable: 1 if political affiliation of citizen/politician equals Conservative right (SVP). Swiss Parliamentary Services and FORS Vox Survey.	0.136	0.343
No church attendance	Indicator variable: 1 if citizen reports no or low church attendance (not available for politicians). FORS Vox Survey.	0.452	0.498
Low income	Indicator variable: 1 if citizen is in low income tercile (not available for politicians). FORS Vox Survey.	0.329	0.470
Impact country	Citizens evaluate referendum to have high (10) or low (1) impact on country (not available for politicians). FORS Vox Survey.	7.391	2.581
Number of interest groups	Number of interes group affiliations of politician (not available for citizens). Swiss Parliamentary Services.	4.275	5.614
Active years on National Council	Number of years in parliament at day of referendum (not available for citizens). Swiss Parliamentary Services.	4.881	4.513
% Canton yes	Yes share at referendum in electzoral district/canton (not relevant for citizens). Swissvotes Database.	0.663	0.080

Notes: Unweighted descriptive statistics. Data sources indicated next to variable descriptions.

Appendix Table A2: Citizen and representative acceptance of stem cell research - Random Effects Models

DV: Accept research	Citizens and representatives			Citizens	Politcians
	(1)	(2)	(3)	(4)	(5)
Representative	-0.478**	-0.399*	-0.834***		
	(0.221)	(0.230)	(0.256)		
Female	-0.623***	-0.475**	-0.0778	-0.355	-0.652
	(0.188)	(0.195)		(0.236)	(0.634)
Age	0.019	0.012	0.011	0.027	-0.206
	(0.030)	(0.031)	(0.032)	(0.034)	(0.193)
Age squared	-0.0001	-0.0001	-0.0001	-0.0002	0.002
	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.002)
Married	-0.044	-0.116	0.027	-0.078	-0.514
	(0.215)	(0.221)	(0.226)	(0.289)	(0.633)
Divorced	-0.521	-0.422	-0.497	-0.749*	-0.589
	(0.355)	(0.367)	(0.374)	(0.446)	(1.156)
University education	0.050	0.176	0.038	-0.015	0.156
	(0.207)	(0.215)	(0.224)	(0.284)	(0.583)
Catholic	-0.114	-0.197	-0.153	0.036	-0.604
	(0.181)	(0.186)	(0.191)	(0.251)	(0.577)
Left party		-0.963***			
		(0.219)			
Right party		0.094			
		(0.254)			
Social democrats			0.303	0.205	2.383**
			(0.233)	(0.280)	(1.024)
Christian democrats			-0.231	-0.913**	3.228***
			(0.330)	(0.434)	(1.126)
Liberals			2.533***	1.724***	6.518***
			(0.463)	(0.509)	(1.442)
Conservative right			1.239***	-0.214	5.478***
			(0.343)	(0.412)	(1.134)
No church attendance				0.956***	
				(0.248)	
Low income				-0.036	
				(0.283)	
Impact country				0.251***	
				(0.045)	
Number of interest groups					0.045
					(0.058)
Active years on National Council					0.039
					(0.065)
% Canton yes					11.377***
					(3.866)
n. Obs.	631.000	631.000	631.000	471.000	160.000
Log Likelihood	-382.262	-371.153	-351.736	-242.802	-55.320
AIC	784.525	766.307	731.472	517.605	142.640
BIC	828.998	819.674	793.734	584.082	191.843

Notes: The dependent variable for all estimations is "Individual votes YES", i.e. acceptance of stem cell research. Multi-level logistic model with random effects for cantons is estimated. All estimates include an intercept. ***, **, and * indicate a mean significance level of below 1%, between 1 and 5%, and between 5 and 10%, respectively.