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# Does deliberation contribute to decreasing the gender gap in knowledge?

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## Abstract

This article tests the role of deliberation in potentially reducing the gender gap in knowledge. It compares gender differences in knowledge of both participants and non-participants before and after the Europolis deliberative event took place by making use of the difference in difference estimation method. Findings show that deliberation increases the political knowledge of participants (especially women) suggesting that it contributes to reducing the gender gap in knowledge by providing participants not only with information and awareness about the topics discussed but also with confidence when answering factual knowledge questions. These results suggest the need to conduct further research about the way in which information-rich contexts might reduce other potential inequalities in sources of knowledge.

## Keywords

Comparative politics, deliberation, OLS regression, public opinion, quasi-experiment

## Introduction

Despite the importance of political knowledge for the functioning of democracy, there is plenty of evidence to suggest that this political resource is unequally distributed among citizens. Moreover, citizens with fewer resources (such as income or education) appear to be both less informed about politics and less politically active (Althaus, 2003; Delli Carpini and Keeter, 1996). The unequal distribution of political knowledge among the public is predominantly seen in the literature as a

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product of its resources, capabilities and motivation (Luskin, 1990). However, these factors cannot account for what is considered to be the most intriguing results in the literature: sex differences in knowledge.

Previous research has abundantly demonstrated that women tend to provide fewer correct answers and more 'don't know' (hereafter DK) answers than men in response to political knowledge questions (Burns et al., 2001; Delli Carpini and Keeter, 1996; 2000; Fraile, 2014; Frazer and Macdonald, 2003; Kenski and Jamieson, 2000; Lizotte and Sidman, 2009; Mondak and Anderson, 2004).

The uneven distribution of political knowledge between men and women raises a number of normative concerns. If women systematically have less knowledge than men, they may be less well represented in the democratic system. In short, gender constitutes a dimension of political under-representation both historically and currently, and this fact merits the attention of researchers.

The deliberative event can be considered a specific information environment where the opportunities for individuals to acquire political information increase substantially and the cost to acquire such information notably decreases. Participating in a deliberative event is then expected to raise significantly the general level of political knowledge. Yet, is this experience sufficient to reduce knowledge inequalities among citizens? This article analyses the role of deliberation in reducing gender differences in what people know and do not know about politics. More specifically, it examines change not only in the number of correct responses but also in the number of incorrect and DK responses to gain a better understanding of the influence deliberation has on the political knowledge of both men and women.

In doing so, this article makes a relevant contribution to the vibrant debate about gender differences in political knowledge. It draws on panel data where changes in political knowledge are recorded. Due to its quasi-experimental design, the Europolis data allow a comparison of respondents' political knowledge before and after deliberation takes place. This comparison can be further enriched by contrasting female and male participants with female and male non-participants. No previous research has used this kind of data to test whether the size of the gender gap in knowledge decreases under the special information-rich context that is created in a deliberative experience.

By using the difference in differences (DID) treatment effects estimation, this study demonstrates that deliberation increases the number of correct answers and decreases the number of both incorrect and DK answers provided by respondents to political knowledge questions. Moreover, these relevant changes appear to be of a greater magnitude for participating women in comparison to their male counterparts: the average treatment effect of deliberation is of a slightly greater magnitude for women than for men. Though the size of these gender differences is small, what emerges clearly from this study is that during the deliberative event people gain not only knowledge about a number of political issues (and so increase the number of correct answers and decrease the number of incorrect answers) but also the confidence to deal with such topics (thereby decreasing the number of DK answers).

These findings suggest the importance of information-rich contexts to reduce potential sources of knowledge inequalities (that is, not only gender but also race, education, social class, etc.).

## **Deliberation and the gender gap in knowledge**

There is extensive evidence to suggest that political knowledge is unequally distributed, with the highest levels of political knowledge being concentrated among the economically and socially advantaged (Althaus, 2003; Delli Carpini and Keeter, 1996). However, one of the most persistent and perplexing gaps is that between men and women. Whereas most differences in political knowledge can be explained as a function of ability, opportunity and motivation, these factors are insufficient to fully account for sex differences in knowledge (Delli Carpini and Keeter, 1996). In fact, after many attempts to account for gender differences in political knowledge, scholars are still struggling to understand this phenomenon (Burns et al., 2001; Delli Carpini and Keeter, 1996, 2000; Dolan, 2011; Fraile, 2014; Kenski and Jamieson, 2000; Mondak and Anderson, 2004).

Common explanations of the gender inequality in political knowledge point to traditional social norms (that identify women as being responsible for parenting and other caring activities) as well as to the socioeconomic disadvantages that women face. In other words, knowledge differences can be explained by greater levels of socioeconomic and cognitive resources for men than for women (Delli Carpini and Keeter, 1996, 2000; Verba et al., 1997).

Alternative explanations of the gender gap in knowledge are of a methodological character and focus on the way in which people's political knowledge is measured through surveys. According to this line of research, an important part of the gap is a consequence of the format of the items that are used in conventional surveys tapping political knowledge (Mondak and Anderson, 2004).

Factual political knowledge items included in survey questionnaires are normally presented in two kinds of formats: open ended and closed. Open-ended questions ask the respondent about a given political issue and she provides the response, which the interviewer codifies as correct or incorrect. Problems with this format are various: first, the high degree of ambiguity in the codification process (and consequently the difficulty in how to codify partially correct responses, see Gibson and Caldeira, 2009). Second, this format might produce conservative estimations of political knowledge, since the respondents might choose to use the DK option as soon as they have doubts about the correct response (see Luskin and Bullock, 2011). Moreover, a given respondent might not remember the exact name of a minister (for example) but could identify her if she sees her name or picture (Gibson and Caldeira, 2009). In contrast, the advantage of open-ended questions is that they minimize the risk of guessing to a great extent.

The second most frequently used format to measure political knowledge in surveys is that of closed-ended questions, where respondents have to choose the answer they believe is correct from a limited number of responses. The closed

format presents two main advantages: first, it stimulates correct responses and second, it reduces difficulties in the administration of the survey, since the codification process is easier. The main inconvenience of the closed format is that it might increase the inclination of respondents to guess (Luskin and Bullock, 2011). Several studies using closed-ended items have found that the gender differences in knowledge are a function of the different propensity of men and women to guess. Women are generally more risk-averse, and are less willing to guess, which creates an advantage in favour of men (Frazer and Macdonald, 2003; Kenski and Jamieson, 2000; Lizotte and Sidman, 2009; Mondak and Anderson, 2004). In contrast, men are more prone to guessing when choosing what they think is the correct answer (Lizotte and Sidman, 2009). However, the different predisposition of men and women to guess in answering survey questions might be a product not only of their different risk aversion but also of their degree of confidence in dealing with the topics that such surveys contain.

An alternative explanation of the gender gap in knowledge that also focuses on measurement questions argues that the quoted studies use gender-biased surveys when seeking to measure political knowledge. Therefore, the gender gap can be interpreted, at least in part, as a function of what is defined as knowledge (Dolan, 2011). Various studies have found that there are different dimensions of political knowledge, and that there seem to be specific domains of knowledge that are more relevant to women than to men (Delli Carpini and Keeter, 1996; Verba et al., 1997). Three other recent studies show that there are policy areas and practical political information (such as government benefits and services, or questions related to local politics) that are more directly relevant to women than to men. It is precisely when measuring these knowledge areas that differences between men and women disappear (Dolan, 2011; Shaker, 2012; Stolle and Gidengil, 2010).

All these studies fail to provide a complete explanation of the reasons for the gap, and the evidence they find is inconclusive. Therefore, it appears that the gap in knowledge between men and women is particularly complicated, and that scholars need to tackle it from multiple angles to understand its complexity (Dolan, 2011).

The present study takes a step further in the analysis of the gender gap in knowledge by making use of quasi-experimental data. In particular, it tests the extent to which the size of the gap decreases under the special information-rich context that is created in a deliberative experience. Nonetheless, why should participating in a deliberative event contribute to reducing the gender gap in knowledge? Critics argue that deliberative capacities are unequally distributed among participants (Sanders, 1997; Young, 2001). As a consequence, deliberation can potentially exacerbate existing inequalities by providing less voice to groups (such as women) with less authority in the political world (Karpowitz et al., 2012). The few previous studies analysing the content of group discussions among citizens during deliberation conclude that women tend to speak up less than men in deliberation, especially when women are in a minority within the discussion group, and when deliberation deals with discussions of controversial political issues. Since politics has long been considered to be 'a male game', it is men who are deemed to be more

competent and expert than women. When discussing politics with men, women tend to defer to the assumed expertise of men (Karpowitz et al., 2012). Moreover, women are found to deliberate differently (Delli Carpini et al., 2004; Norris, 1996) by relating personal stories or testimonies more than men, and in general developing a verbal interaction style that accentuates cooperation, intimacy and the inclusion of all participants (Mendelberg and Karpowitz, 2007; Smith-Lovin and Brody, 1989).

In the case of the pan-European deliberative poll on third-country migration and climate change (the case under analysis here, see Isernia and Fishkin, 2014), this question has already been studied. More specifically, Gerber (2012) explores the extent to which there is participation bias (such as gender, education, age) in the amount of contribution to the discussion participants make during the deliberative event. She does so by providing estimates for both determinants of the frequency of participation and the overall speaking time. Findings show that although women contributed slightly less to the discussion than men, there are no clear signs of a systematic exclusion of women from the discussions in the deliberative event analysed here (see Gerber, 2012). Moreover, a complementary study (see Gerber et al., 2012) performs a quantitative content analysis of the recorded discussion by constructing a Discourse Quality Index. This latter study shows that the majority of participants were able to reach a fairly demanding standard of deliberative quality (like, for example, empathy or reasoned justifications) with the sole exception of working class participants from Eastern and, to a lesser extent, from Southern Europe. In contrast, there is no evidence about significant differences in the quality of the arguments made by men versus women (Gerber et al., 2012).

However, independently of the volume of voice or the patterns of silence developed in the course of deliberation by men and women, what is important here is to identify the mechanism through which participants (and especially women) gain the confidence not only to acquire political information, but also to actively use it when responding to political knowledge questions in the survey after deliberation takes place. As mentioned above, the deliberative event can be considered a specific information environment where the opportunities for individuals to acquire information about politics increase significantly and the costs of acquiring such information significantly decrease. Participating in a deliberative event is therefore expected to increase the general level of political knowledge for all participants. Yet, there is more to this process than that. The greater degree of exposure to political information might not only increase the level of knowledge but also the level of ordinary citizens' confidence when dealing with political issues. It is well established in the literature that there are some gender stereotypes in individual characteristics. As such, men are considered to be more assertive, competitive and dominant in political conversations, whereas women are less competitive and more cooperative, and therefore less willing to intervene in a controversial political discussion. As previously mentioned, this is what normally happens in the course of deliberation or group discussion, although it

is less so in the particular case under study here (Gerber, 2012; Karpowitz et al., 2012; Smith-Lovin and Brody, 1989). However, participating in a deliberative event implies not only talking and intervening but also listening. Despite the fact that women tend to intervene less than men in a verbal exchange, they still listen to all the arguments made there. Thus, it might be possible to suggest that after deliberation, participants (and especially women) who have listened to all the arguments related to politics gain confidence and feel ready to deal with them when responding to the political knowledge questions in the survey.

If this is the case, then participating in the deliberative event might contribute to reducing one of the most interesting gaps in knowledge: the gender gap. This might happen through two connected empirical processes: a significant decrease in the percentage of both incorrect and DK answers provided by respondents at  $t_4$  in comparison to  $t_1$ , and a significant increase in the percentage of correct answers provided by respondents at  $t_4$  in comparison to  $t_1$ . Moreover, the expectation is that these relevant increases and decreases might be of a greater magnitude for women than for men.

## Data, variables and estimation techniques

To explore the extent to which deliberation contributes to a reduction in the gender gap in knowledge among participants, I use data from the Europolis project, a three-day deliberative poll experiment. Due to its quasi-experimental design, such data allow the knowledge of men and women to be compared both before and after deliberation takes place (and in comparison to the control group). Moreover, these data present a structure that is ideal to estimate the DID (in this case of deliberation). This estimation integrates the advances of the fixed effects estimators with the causal analysis when unobserved characteristics might confound causation (Angrist and Pischke, 2009: chapter 5).

The Europolis project opinion poll event focused on two issues – immigration and climate change – selected with the aim of studying the role of deliberation in controversial and highly salient political issues. The questionnaire contained items that measure (among other things) levels of respondents' knowledge about European politics, immigration and climate change. It also contains information about respondents' opinions on diverse political questions, as well as a variety of socio-demographic indicators. Details about the Europolis data can be found in the Introduction to this special issue (see Isernia and Fishkin, 2014).

As explained in the Introduction, the randomization of the two main groups compared here (participants and control groups) is far from perfect since only a sub-group of those initially randomly selected finally participated in the deliberative event. Nevertheless, an analysis of the socio-demographic profile of participants and control groups shows that there are no relevant differences between the two groups (at least not with respect to gender and age). These analyses show that the participant group presents higher percentages of highly educated (tertiary education) and subjectively defined upper class. Still the magnitude of this bias is not

big and there is enough variation in all the categories of education and social class in both groups.<sup>1</sup>

The analysis here is based on evidence provided by the first and last waves of the Deliberative Project (DP) of two groups of respondents: the participant and control group. To analyse the gender gap in political knowledge, the questions in the questionnaire about factual knowledge that were included in the first and fourth waves (see the online appendix for the exact wording of the questions) are employed. There are six questions: two about the functioning of the EU, two about immigration and two related to climate change. All six questions share the same closed-ended format: namely a question followed by four different options where the respondent has to indicate what she considers to be the correct answer (details are given below).

The empirical strategy to test the potential effect that participating in the deliberative event might have on the gender gap in knowledge is provided here. It is first demonstrated that there is a considerable increase in the percentage of correct answers provided by all participants in the deliberative event and for all six political knowledge questions analysed here. Parallel to this increase is a noteworthy decrease in the percentage of DK answers provided by all participants and for all six political knowledge items. The magnitude of these changes, however, is different depending on the item under analysis. There is also a significant decrease in the percentage of incorrect answers for all items but two. Nevertheless, these notable changes between  $t_1$  and  $t_4$  do not take place within the group of non-participants (the control group). Next, a rigorous test of the pattern of these differences is provided by way of the DID estimation showing that average knowledge gains between  $t_1$  and  $t_4$  are a consequence of participating in the deliberative event. Moreover, the informative effect of deliberation appears to be of a greater magnitude for women than for men. A final estimation calculates the difference in DID to provide reliable estimates of the gender difference in the effects of deliberation. The results indicate that deliberation can potentially contribute to reducing existing knowledge inequalities between males and females.

## Results

Table 1 shows net changes in the percentage of correct, incorrect and DK answers between  $t_1$  and  $t_4$  across all six different items and for both control and test groups, controlling by sex. Table 1 shows first that while there are relevant changes in the percentage of correct, incorrect and DK answers between  $t_1$  and  $t_4$  across all six different items for the participants in the deliberative event, the changes are absent for the non-participants.

Regarding the changes in the percentage of correct answers, they are not of the same magnitude across items. Moreover, the increase appears particularly high in magnitude for item 6 (about climate change) and item 3 (about immigration).

Additionally, from all six items, the increase appears higher for women than for men in three items (3, 4 and 6).

**Table 1.** Net changes between  $t_1$  and  $t_4$  in the percentages of correct, incorrect and DK answers for men and women by participation in the deliberative event across knowledge items

	Control men	Women	Test men	Women
Correct item 1	0.5	0.3	17.7	14.2
Incorrect item 1	-3.5	-6.4	-9.0	-0.6
DK item 1	3.0	6.1	-8.7	-13.6
Correct item 2	-2.3	-4.2	7.7	3.7
Incorrect item 2	-2.9	-5.8	-1.2	1.9
DK item 2	5.2	10.0	-6.5	-5.6
Correct item 3	0.2	-0.9	16.3	30.8
Incorrect item 3	3.5	1.5	18.7	9.9
DK 3	-3.7	-0.6	-35.0	-40.7
Correct 4	0.7	1.9	10.5	14.9
Incorrect 4	3.2	-3.2	2.9	-6.9
DK 4	-3.9	1.3	-13.4	-8.0
Correct 5	-4.4	2.5	12.9	8.0
Incorrect 5	5.1	-4.1	-2.3	12.3
DK 5	-0.7	1.6	-10.6	-20.3
Correct 6	3.4	-1.0	21.6	31.5
Incorrect 6	-2.9	0.9	-18.1	-25.3
DK 6	-0.5	0.1	-3.5	-6.1
<i>N</i>	315	414	171	162

Source: My elaboration on Europolis data (2010).

Entries are rounded percentages. (Note: See Table A.2 in the Online Appendix for the topics covered by each item.)

With respect to the changes in the percentage of DK answers between  $t_1$  and  $t_4$ , Table 1 shows a significant decrease for all items and for both men and women who participated in the deliberative event. Again, these changes are not of the same magnitude across all items. The decrease appears particularly high for item 3 (about immigration) and item 5 (about climate change). The decrease in the percentage moves from DK responses appears to be of a greater magnitude for women than for men on three items (1, 3 and 5). Finally, there is no clear trend with respect to the changes in the percentage of incorrect answers between  $t_1$  and  $t_4$ .

In sum, Table 1 reveals a pattern of significant increase in the percentage of correct answers between  $t_1$  and  $t_4$  among participants, and a significant decrease in the percentage of both DK and (to a lesser extent) incorrect answers. The size of these changes between  $t_1$  and  $t_4$  appear to be greater for women, although it seems to depend very much on the knowledge item under analysis.

Thus far, exploratory evidence has been presented, but a rigorous test of the pattern of the differences found in Table 1 is now required. Given the complexity of comparing between six different items across two different points in time and two different groups, and given the interest in analysing the influence of deliberation on the level of political knowledge of participants, it is not only important to consider the level of correct answers but also the influence of deliberation on incorrect and DK answers. As a result, three indexes (both for  $t_1$  and  $t_4$ ) have been created. They are related to what people declare they know or do not know about politics on the aforementioned six items. The first index represents the total number of correct responses across these six items.

The second index constitutes the total number of incorrect or wrong responses, and the third is the total number of DK responses. Each index has a possible theoretical range from 0 to 6.<sup>2</sup> Other scholars have previously employed this same empirical strategy (see for instance Ondercin et al., 2011)

The data here include two groups (i.e. the participant and control group) in two periods ( $t_1$  and  $t_4$ ). This is a typical situation in which the DID estimation can be effectively used to estimate the treatment effect (in this case, participating in the deliberative event) on a given dependent variable (here, participants' political knowledge). It is true that other possible methods could also be employed. However, the DID estimation has the advantage of controlling for unobserved characteristics and combining it with observed or complementary information (Villa, 2012)

The differences between the control and the treatment group (the participants) at  $t_4$  are estimated by taking into account both existing differences between the two groups at  $t_1$  and a general time trend. The identifying assumption is that whatever happened to the control group over time is what would have happened to the treatment group in the absence of deliberation. In order to achieve this, the data were reshaped into a long format<sup>3</sup> so that two dummy variables were created. The first identifies the time at which the observation was taken (*time*, with value 0 if the observation was taken at  $t_1$  and value 1 if the observation was taken at  $t_4$ ), and the second identifies whether the observation is in the treatment group or in the control group (*test*, with value 1 for participants and 0 for non-participants). For individual  $i$ , this initial setting performs the following linear regression equation<sup>4</sup>:

$$Y_{i,t} = \beta_0 + \beta_1 \times \text{Time}_{i,t} + \beta_2 \times \text{Test}_{i,t} + \beta_3(\text{Time}_{i,t} \times \text{Test}_{i,t}) + e_{i,t} \quad (1)$$

where the estimated coefficients have the following interpretation:  $\beta_0$  stands for the mean outcome for the control group at  $t_1$ ;  $\beta_0 + \beta_1$  refers to the mean outcome for the control group at  $t_4$ ;  $\beta_2$  is the single difference between participants and control group at  $t_1$ ;  $\beta_0 + \beta_2$  stands for the mean outcome for the participants at  $t_1$ ;  $\beta_0 + \beta_1 + \beta_2 + \beta_3$  is the mean outcome for the participants at  $t_4$ . Finally,  $\beta_3$  stands for the DID (our quantity of interest here).

Table 2 summarizes the results of these estimations for each of the dependent variables considered here (that is, the number of correct, incorrect and DK

**Table 2.** Difference in differences between participants and control group

	Correct	Incorrect	DK
Time (1: $t_4$ )	-0.020 (0.05)	0.83*** (0.05)	0.13 (0.08)
Test (1: participants)	0.13** (0.06)	-0.08 (0.06)	-0.36*** (0.11)
Test $\times$ Time	0.93*** (0.09)	-0.97*** (0.09)	-0.99*** (0.15)
Intercept	1.05*** (0.04)	2.14*** (0.03)	2.10*** (0.06)
N	2124	2124	2124
R <sup>2</sup>	0.13	0.18	0.08

Source: My elaboration on Europolis data (2010). Entries are OLS estimations and their correspondent standard errors in parentheses.

\*\*\* $p < .01$ ; \*\* $p < .001$  (two-tailed tests)

answers). It reveals a significant effect of deliberation for the participants and in comparison to the control group. Starting with the number of correct answers, the mean values for both the control group and the participants at  $t_1$  are 1.05 and 1.18, respectively. The difference in the number of correct answers between the two groups at  $t_1$  is small but statistically significant (0.13\*\*, see the coefficient corresponding to Test). In parallel, the mean values for both the control group and the participants at  $t_4$  are 1.03 and 2.09, respectively. Finally, the DID between the two groups, taking into account both existing differences between the two groups at  $t_1$  and general time trend, is statistically different from zero and in the expected direction (0.93\*\*\*, see the coefficient corresponding to Test  $\times$  Time). This amounts to a deliberation effect size of around one additional correct answer for participants out of the four political knowledge questions (the variation range of the number of correct answers was re-codified so that it goes from 0 to 4; see note 3).

The same conclusion can be reached if we look at the number of incorrect and DK answers. The DID between the two groups, taking into account both existing differences between the two groups at  $t_1$  and general time trend, is statistically different from zero and in the expected direction (-0.97\*\*\* and -0.99\*\*\* for the number of incorrect and DK answers, respectively, see the coefficient corresponding to Test  $\times$  Time for both equations). To put it another way, non-participants presented on average one additional incorrect/DK question.

Table 3 replicates the same analysis and throws up some interesting gender differences. First, men (both in the control and participating groups) provide a higher number of correct answers than women at  $t_1$ : 1.11 for the male control group and 1.32 for male participants, versus 1.00 for the female control group and 1.03 for female participants. The same applies at  $t_4$  but the gender differences

**Table 3.** Difference in differences between participants and control group by sex

	Correct male	Female	Incorrect male	Female	DK male	Female
Time	-0.01 (0.08)	-0.02 (0.07)	0.79*** (0.07)	0.86*** (0.06)	0.06 (0.12)	0.19 (0.12)
Test	0.21** (0.09)	0.03 (0.09)	-0.20** (0.09)	0.05 (0.08)	-0.43*** (0.14)	-0.23 (0.16)
Test×Time	0.83*** (0.13)	1.03*** (0.12)	-0.83*** (0.12)	-1.11*** (0.12)	-0.84*** (0.20)	-1.13*** (0.22)
Intercept	1.11*** (0.05)	1.00*** (0.05)	2.11*** (0.05)	2.15*** (0.04)	1.91*** (0.08)	2.24*** (0.08)
N	972	1152	972	1152	972	1152
R <sup>2</sup>	0.14	0.13	0.18	0.19	0.09	0.07

Source: My elaboration on Europolis data (2010). Entries are OLS estimations and their correspondent standard errors in parentheses.

\*\*\*p < .01; \*\*p < .001 (two-tailed tests)

are reduced to a certain extent for the participants (2.14 for male participants and 2.04 for female participants). Additionally, the average number of incorrect and DK responses is always smaller for men than for women. Second, and what appears to be more important for the purposes of the present study, the DID between the participants and the control group is statistically different from zero and in the expected direction for both men and women. Nevertheless, the magnitude of the effect appears to be slightly higher for females. For instance, the DID between participants and non-participants in their number of correct answers is equal to 0.83\*\*\* for men and 1.03\*\*\* for women. The same is true with respect to both the number of incorrect and DK answers. Moreover, male participants provide 0.83\*\*\* incorrect answers and 0.84\*\*\* DK answers less than male non-participants, whereas female participants provide 1.11\*\*\* incorrect answers and 1.13\*\*\* DK answers less than female non-participants (see the coefficients corresponding to Test×Time for each equation in Table 3).

Table 3 therefore shows that the informative effects of deliberation are reflected in two relevant changes: a significant increase in the number of correct answers and a significant decrease in the number of both incorrect and DK answers provided by participants (and in comparison with the control group). Table 3 further suggests that these informative effects appear to be of a greater magnitude for participating females in comparison to their male counterparts. Yet, what Table 3 does not provide is a test of the magnitude of these gender differences in the DID.

In order to achieve this, it is necessary to calculate the difference in DID. This implies estimating differences between participants and control group by gender at  $t_4$ , but taking into account both existing differences between the four groups (the combination of 2X2 groups: male participants, female participants, male non-participants and female non-participants) at  $t_1$  and the general time trend.

**Table 4.** Difference in differences in differences between female and male participants and female and male control group

	Correct	Incorrect	DK
Time	-0.02 (0.07)	0.86*** (0.06)	0.19* (0.11)
Test	0.03 (0.09)	0.05 (0.09)	-0.23 (0.15)
Test × Time	1.03*** (0.13)	-1.11*** (0.12)	-1.13*** (0.21)
Male	0.12 (0.07)	-0.04 (0.07)	-0.32*** (0.12)
Male × Time	0.00 (0.10)	-0.08 (0.10)	-0.12 (0.17)
Male × Test	0.18 (0.13)	-0.25** (0.12)	-0.20 (0.21)
Male × Time × Test <sup>a</sup>	-0.20 <sup>+</sup> (0.16)	0.28* (0.15)	0.29 <sup>+</sup> (0.21)
Intercept	1.00*** (0.05)	2.15*** (0.05)	2.24*** (0.08)
N	2124	2124	2124
R <sup>2</sup>	0.14	0.19	0.09

Source: My elaboration on Europolis data (2010). Entries are OLS estimations and their correspondent standard errors in parentheses.

<sup>+</sup> $p < .10$ ; \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$  (two-tailed tests).

<sup>a</sup>For the three-way interaction term the  $p$  associated to each estimator is calculated for a one-tailed test (since the null hypothesis tested is that the effect of deliberation is of a greater magnitude for women than for men).

This can be undertaken through a more demanding (and restrictive) estimation: difference in DID, summarized in equation (2)

$$\begin{aligned}
 Y_{i,t} = & \beta_0 + \beta_1 \times \text{Time}_{i,t} + \beta_2 \times \text{Test}_{i,t} + \beta_3(\text{Time}_{i,t} \times \text{Test}_{i,t}) + \beta_4 \times \text{Sex}_{i,t} \\
 & + \beta_5(\text{Sex}_{i,t} \times \text{Time}_{i,t}) + \beta_6(\text{Sex}_{i,t} \times \text{Test}_{i,t}) + \beta_7(\text{Sex}_{i,t} \times \text{Time}_{i,t} \times \text{Test}_{i,t}) + e_{i,t}
 \end{aligned}
 \tag{2}$$

Table 4 summarizes the results of such estimation for each of the dependent variables considered here, that is the number of correct, incorrect and DK answers. It confirms previous findings. The magnitude of the informative effects of deliberation is slightly higher for the case of women in comparison to men. Focusing first on the number of correct answers, the coefficient corresponding to the interaction term of Time and Test indicates the DID for female participants (category 0 of the

variable male) is statistically different from zero and of the expected sign ( $+1.03^{***}$ ), and amounts to a deliberation effect size of around one additional correct answer for female participants. This effect appears to be significantly smaller for the case of male participants (see the coefficient corresponding to the three-way interaction of Male, Time and Test):  $1.03 + (-0.20) = (+0.83^{***})$ . Although it is true that the magnitude of the sex differences in the deliberation effects is not high (in fact, the coefficient is significant only at the  $p$  value of 0.10 for a one-tailed test), it indicates a differential effect of deliberation on the number of correct answers for men and women. The same is true for the number of incorrect answers, although it is the other way around. The effect of deliberation for female participants is statistically different from zero and of the expected sign ( $-1.11^{***}$ ). This means a deliberation effect size of more than one incorrect answer less for female participants, in comparison to female non-participants. This effect appears to be significantly smaller in the case of male participants (see the coefficient corresponding to the three-way interaction of Male, Time and Test:  $-1.11 + (+0.28) = -0.83^{***}$ ). Finally, with respect to the number of DK answers, the effect of deliberation for female participants is again statistically different from zero and of the expected sign ( $-1.13^{***}$ ). This means a deliberation effect size of more than one DK answer less for female participants and in comparison to female non-participants. This effect is significantly smaller in the case of male participants (see the coefficient corresponding to the three-way interaction of Male, Time and Test:  $-1.13 + (+0.29) = -0.84^{***}$ ).

To reiterate, the findings show that deliberation has a relevant informative role on participants. This informative role is produced through three specific mechanisms: by increasing the number of correct answers provided by participants and by decreasing both the number of incorrect answers and the number of DK answers. The findings also show that these relevant increases and decreases are of a slightly higher magnitude for females than for males. This evidence suggests that deliberation might contribute to reducing the gender gap in knowledge by providing participants not only with more information and awareness about the topics discussed in the event but also by giving them more confidence when answering factual knowledge questions. The implications of these findings are discussed in the final section.

## Conclusion and discussion

This article tests the extent to which the size of the gender gap in knowledge decreases under the special information-rich context that is created in a deliberative experience. This is a specific information environment where the opportunities for individuals to acquire information about politics significantly increase and the costs of acquiring such information significantly decrease.

Previous literature has shown not only that information-rich contexts accentuate the abilities and willingness of citizens to pay the cost of becoming informed about

politics, but also that information-rich contexts contribute to a reduction of the inequalities in knowledge (Berggren, 2001; Fraile, 2013; Iyengar et al., 2010). More specifically, these studies show that the importance of abilities (Berggren, 2001), motivation (Iyengar et al., 2010) and socioeconomic status (Fraile, 2013) in explaining political knowledge varies across contexts, being less important in information-rich environments, but especially relevant in information-poor contexts.

By extending the same line of reasoning, this study tests the extent to which the special information-rich context that is created in a deliberative experience contributes to decreasing a specific knowledge gap: that relating to gender inequalities in levels of political knowledge. A previous study demonstrated that a specific information-rich setting (the 2000 American presidential campaign) fostered knowledge gain among citizens, but especially so among women, and thereby reduced the gender gap in knowledge previous to the electoral campaign (Ondercin et al., 2011).

This article analyses another specific information-rich context: participating in a deliberative event. Given the nature of the data (a quasi-experimental design with two points in time), the DID estimation is employed to provide reliable estimates of the effect of deliberation not only on the number of correct responses, but also on the number of both incorrect and DK responses provided by participants and the control group.

The findings show that participating in the deliberative event significantly increases the number of correct answers and decreases the number of both incorrect and DK answers provided by respondents to political knowledge questions. Moreover, these significant changes appear to be greater in the case of female participants: the average treatment effect of deliberation is of a higher magnitude for women than for men. This evidence indicates that deliberation enhances people's knowledge about a number of political issues (and so increases the number of correct answers and decreases the number of incorrect answers). In parallel, deliberation enhances people's confidence to deal with such topics (and so decreases the number of DK responses). Perhaps, the importance of deliberation is located not only in the opportunity for participants to intervene and discuss politics but also in the incentive to listen to others, as well as to gather and assimilate new information. This fosters both political learning and growing confidence in dealing with political and socioeconomic issues.

The findings also suggest the importance of information-rich settings to reduce potential sources of knowledge inequalities (not only gender but also race, education and social class). It highlights in addition the need to conduct further research on this topic to see if other specific information-rich environments (such as electoral campaigns, non-electoral experiences of participation, public debates about given topics in the street such as those promoted by protest movements, etc.) have the same differential effect on men and women.

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## Notes

1. For instance, while 37% of the control group stated that they had tertiary education, 47% of the participants declared the same. The difference is 10% (with a V Cramer = 0.14). The differences between the two groups in the percentage of upper class are about the same (that is, 40% for the participants versus 28% for the control group, with a V Cramer = 0.14).
2. However, for the sake of statistical efficiency, this original range was re-codified, given the very few number of observations with the highest values. Hence, the real range of variation of the indexes is as follows: from 0 to 4 for the number of both correct and incorrect answers; from 0 to 6 for the number of DK. See descriptive statistics of all these indexes in the online appendix, Table A.1.
3. This means that for each person interviewed there are two observations, so that the total number of observations in the original data set is duplicated (from 1062 to 2124). See  $N$  in Table 1 for the original data set, and  $N$  in Tables 2 to 4 for the reshaped data set.
4. There are two main approaches for estimating (and presenting) the DID results, namely tabular (that can be estimated through the `diff` command in Stata) and regression equation. As explained in Villa (2012: 2), they are strictly equivalent. In fact, the same estimations were replicated with the `diff` command and the tabular results show exactly the same findings as those presented in Tables 2 to 4 here.

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