ONLINE SUPPLEMENT

The Relative Effects of a Scandal on Member Engagement in Rites of Integration and Rites of Passage: Evidence from a Child Abuse Scandal in the Catholic Archdiocese of Philadelphia

Figure A.1: Cumulative number of treated parishes

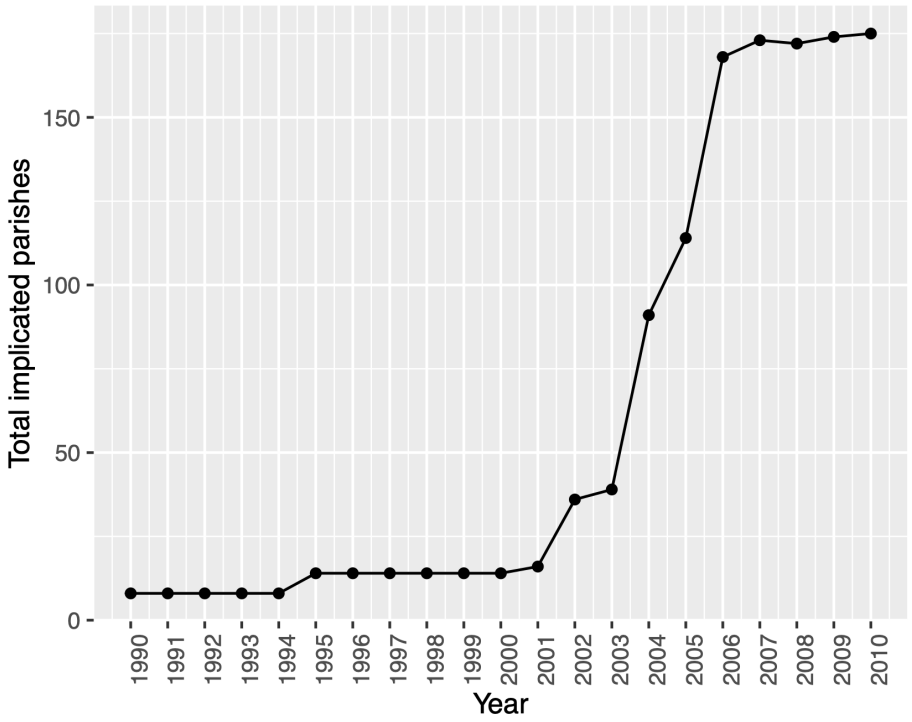


Table A.1: Mean comparison tests

	Mean values in 2003		
Variable	**Control parishes** (n = 63), not treated by 2007	**Treated parishes** (n = 134), treated between 2004-2007	**p-value of difference**
Rites of passage	105.8571	133.3955	0.0206
Rites of integration	1163.6030	1430.3410	0.0951
Organizational age	0.4127	0.5373	0.1038
Organizational size (# members), '00s	43.6886	50.0205	0.2163
Scandal pervasiveness	0.1938	0.1457	0.0869
Local population, '00s	44.5161	42.0739	0.2589
Religious adherents (county), %	0.6802	0.6706	0.4779
Income per capita (county), '000s	41.0212	39.3512	0.2654
White population (county), %	0.7318	0.6975	0.2605

The sample is limited to parishes that in 2003 had not yet been associated with an accused priest (197 parishes). By 2007 134 of these parishes were implicated in scandal (“treated” parishes), and 63 remained unimplicated (“control” parishes).

Table A.2: Robustness test using the 2005 Grand Jury report as an exogenous shock

	Model 1			Model 2		
Variable	**Rites of passage**	**Rites of integration**	**Chi-squared test (H1)**	**Rites of passage**	**Rites of integration**	**Chi-squared test (H2)**
Implication in scandal	-0.0658 ***	0.0068	7.8286 **	-0.0403	0.0568	
	0.0003	0.7332	0.0026	0.2403	0.1323	
Implication in scandal ×				-0.0441	-0.0834	0.2756
Scandal pervasiveness				0.3958	0.1443	0.2998
Implication in scandal ×						
Organizational age						
Implication in scandal ×						
Organizational size, '00s						
Scandal pervasiveness	0.0062 ***	0.0209 ***		0.0061 ***	0.0207 ***	
	0.0000	0.0000		0.0000	0.0000	
Organizational size (# members), '00s				-0.0011	-0.0448	
				0.9798	0.3392	
Local population, '00s	0.0341 ***	0.0164 **		0.0340 ***	0.0159 *	
	0.0000	0.0095		0.0000	0.0118	
Religious adherents (county), %	-6.0007 ***	-2.6152 †		-6.1080 ***	-2.9169 *	
	0.0000	0.0583		0.0000	0.0350	
Income per capita (county), '000s	0.0025	0.0064		0.0023	0.0058	
	0.6984	0.3720		0.7274	0.4189	
White population (county), %	7.9110 **	0.4127		7.8490 **	0.1034	
	0.0011	0.8767		0.0012	0.9690	
Constant	-0.9366	0.4450		-0.8346	0.7990	
	0.3529	0.6887		0.4130	0.4759	
Parish fixed effects	Yes	Yes		Yes	Yes	
Year fixed effects	Yes	Yes		Yes	Yes	
R^2	0.9680	0.9708		0.9680	0.9710	
N	984	984		984	984	

Note: $^{\dagger}p < 0.10$; $*p < 0.05$; $**p < 0.01$; $***p < 0.001$; p-values reported below coefficients

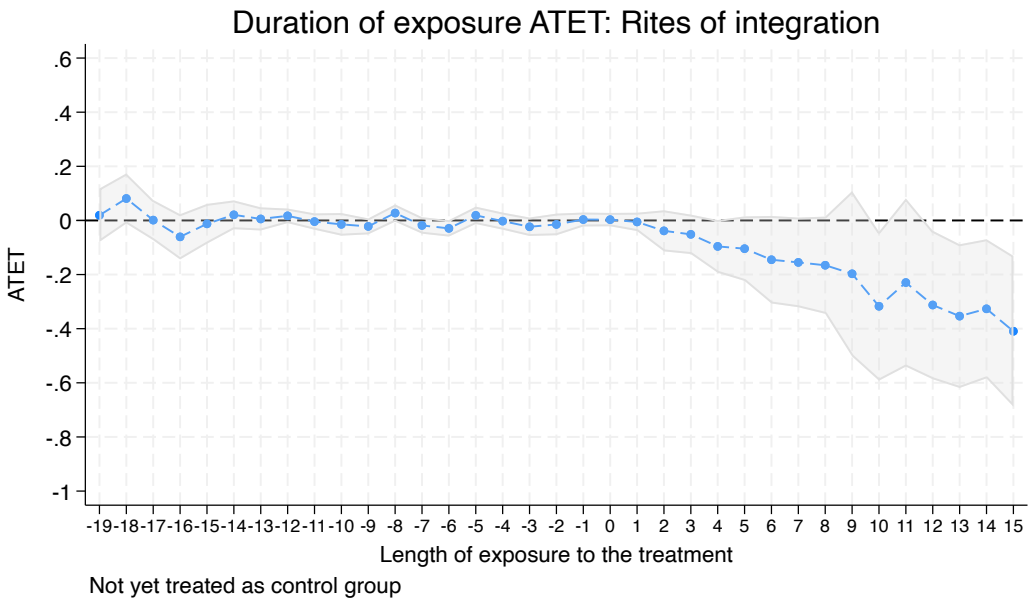
Sample of parish-years (2003-2007) using publication of the Grand Jury report as exogenous shock. Mirrors full sample analysis report in the paper. See Table R5 above for comparison of “treated” and “control” parishes in 2003 before any were treated.

Table A.2 (continued): Robustness test using the 2005 Grand Jury report as an exogenous shock

	Model 3					Model 4				
Variable	**Rites of passage**		**Rites of integration**		**Chi-squared test (H3)**	**Rites of passage**		**Rites of integration**		**Chi-squared test (H4)**
Implication in scandal	-0.0955	***	-0.0327			0.0702	**	0.0392		
	0.0000		0.1901			0.0068		0.1806		
Implication in scandal × Scandal pervasiveness										
Implication in scandal × Organizational age	0.0567	*	0.0753	**	0.2376					
	0.0318		0.0096		0.3130					
Implication in scandal × Organizational size, '00s						-0.0027	***	-0.0007		13.7166 ***
						0.0000		0.1320		0.0001
Scandal pervasiveness	0.0059	***	0.0205	***		0.0067	***	0.0210	***	
	0.0000		0.0000			0.0000		0.0000		
Organizational size (# members), '00s										
Local population, '00s	0.0339	***	0.0162	*		0.0282	***	0.0150	*	
	0.0000		0.0103			0.0000		0.0188		
Religious adherents (county), %	-5.8778	***	-2.4521	†		-4.2749	***	-2.2038		
	0.0000		0.0751			0.0006		0.1171		
Income per capita (county), '000s	0.0023		0.0061			0.0029		0.0065		
	0.7285		0.3976			0.6535		0.3657		
White population (county), %	7.6519	**	0.0687			6.7446	**	0.1347		
	0.0015		0.9793			0.0043		0.9597		
Constant	-0.8854		0.5129			-1.2598		0.3679		
	0.3788		0.6432			0.2005		0.7404		
Parish fixed effects	Yes		Yes			Yes		Yes		
Year fixed effects	Yes		Yes			Yes		Yes		
R^2	0.9681		0.9710			0.9696		0.9709		
N	984		984			984		984		

Note: †$p < 0.10$; *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$; p-values reported below coefficients

Figure A.2: Dynamic treatment effect plots for each of the two dependent variables.



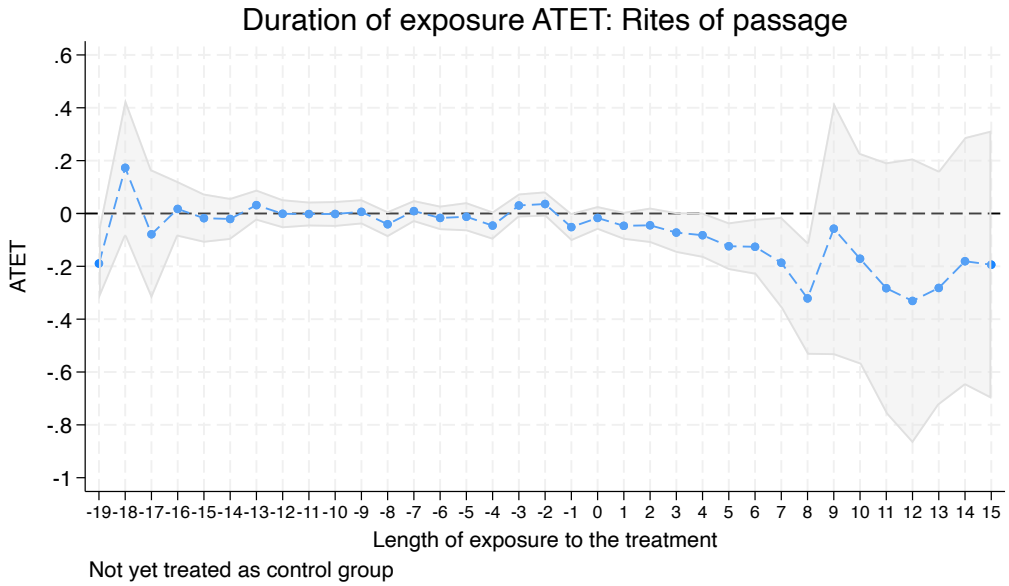


Table A.3: ATETs for two independent heterogenous treatment difference-in-difference models

		Rites of passage		Rites of integration	
Exposure	ATET difference	ATET	P>z	ATET	P>z
-19	-0.209	-0.189	0.006	0.019	0.703
-18	0.094	0.175	0.192	0.081	0.087
-17	-0.083	-0.084	0.496	-0.001	0.986
-16	0.076	0.015	0.779	-0.060	0.161
-15	-0.002	-0.022	0.654	-0.020	0.594
-14	-0.039	-0.015	0.704	0.024	0.410
-13	0.035	0.036	0.248	0.001	0.970
-12	-0.039	-0.007	0.807	0.032	0.056
-11	0.011	0.012	0.661	0.001	0.961
-10	0.004	0.001	0.970	-0.003	0.884
-9	0.020	0.007	0.782	-0.013	0.397
-8	-0.044	-0.028	0.260	0.015	0.322
-7	0.008	-0.006	0.803	-0.014	0.393
-6	0.012	-0.016	0.522	-0.028	0.089
-5	-0.035	-0.017	0.567	0.018	0.307
-4	-0.049	-0.055	0.043	-0.006	0.725
-3	0.044	0.024	0.365	-0.019	0.262
-2	0.038	0.017	0.507	-0.021	0.313
-1	-0.033	-0.033	0.205	0.000	0.994
0	-0.020	-0.024	0.331	-0.004	0.843
1	-0.037	-0.052	0.045	-0.015	0.527
2	0.006	-0.040	0.250	-0.045	0.270
3	-0.023	-0.078	0.047	-0.056	0.149
4	0.016	-0.083	0.060	-0.099	0.053
5	-0.019	-0.131	0.006	-0.111	0.067
6	0.018	-0.132	0.016	-0.150	0.065
7	-0.054	-0.216	0.020	-0.162	0.051
8	-0.167	-0.342	0.003	-0.175	0.051
9	0.065	-0.133	0.631	-0.198	0.222
10	-0.011	-0.317	0.182	-0.306	0.030
11	-0.088	-0.312	0.214	-0.224	0.181
12	-0.020	-0.355	0.199	-0.335	0.023
13	0.088	-0.296	0.189	-0.384	0.008
14	0.129	-0.226	0.350	-0.355	0.008
15	0.216	-0.194	0.454	-0.409	0.004

Note that only 3% of parishes are observed 15 time periods after treatment.

R Code for Section: Simulations Based on Individual- and Organizational-Level Assumptions

```
# Simulation code for:
# "The Relative Effects of a Scandal on Member Engagement in Rites of Integration and
Rites of Passage: Evidence from a Child Abuse Scandal in the Catholic Archdiocese of
Philadelphia"

library(data.table)
library(ggplot2)
library(scales)
library(gridExtra)

# Input:
# number of core and number of peripheral members at org (ratio)
# core members' likelihood to engage in rites of passage pre-scandal
# core members' likelihood to engage in rites of integration pre-scandal
# peripheral members' likelihood to engage in rites of passage pre-scandal
# peripheral members' likelihood to engage in rites of integration pre-scandal
# reaction of core members to the scandal
# reaction of peripheral members to the scandal
# post-scandal likelihood to engage in each type of rite for each type of member

# Output:
# the decrease in engagement in rites of passage / decrease in engagement in rites of
integration as result of scandal

# Set starting points using member engagement baselines from Table 1 in the paper.
# Note however that these values are irrelevant to the main simulation results
because the outcome is a *relative* change.
avg_member_count <- 4677 # average parish membership size
avg_rites_integration <- 1366.74
avg_rites_passage <- 128.11
baseline_prob_rites_passage <- avg_rites_passage/avg_member_count

main_sim <- function(sim_count, core_scandal_drop_random) {
  # Org-level storage of simulation output
  org_panel <- data.table(core_member_pct = numeric(), # parish-level % core members
                          core_scandal_drop = numeric(),
                          pre_rites_integration_total = numeric(), # total simulated
engagement in rites of integration pre-scandal
                          pre_rites_passage_total = numeric(), # total simulated
engagement in rites of passage pre-scandal
                          post_rites_integration_total = numeric(), # total simulated
engagement in rites of integration post-scandal
                          post_rites_passage_total = numeric()) # # total simulated
engagement in rites of passage post-scandal

  for(x in 1:sim_count) {

    ### STEP 0
    # Create a single simulated org
    simorg <-  data.table(agent_ID=1:avg_member_count)

    # Define org-level parameters
    # Importance of rites of passage to each type of member:
```

```
    core_passage_meaning <- 0.98 # meaning inputs are based on CARA, 2008 survey
    periph_passage_meaning <- 0.815 # average number of baptisms and marriages from
CARA, 2008 survey; potentially conservative, alternatively use 89% which reflects
members who don't go less than weekly
    # Effect of scandal on each type of member:
    if(core_scandal_drop_random == T) {
      core_scandal_drop <- sample(c(.05, .10, .20, .25, .3), 1)
    } else {
      core_scandal_drop <- 0.15 # 15% of core members (i.e., people that said they
attended mass at least weekly) went to mass less often because of scandal (Pew, 2019)
    }
    peripheral_scandal_drop <- 0.32  # 32% of peripheral members (i.e., people that
said they rarely attend mass) went to mass less often (Pew, 2019)

    # Variables at the org level to examine sensitivity of assumptions
    # Percent core/peripheral members in the org
    core_member_pct <- runif(1, min = 0.01, max = .99) # 1% to 99% core members
    # Peripheral member likelihood of engagement in rites of integration
    peripheral_pre_rites_integration <- 6/52 # peripheral members engage in rites of
integration once every-other month

    ### STEP 1: Define different types of members
    simorg[, member_type := as.character(rbinom(.I, 1, core_member_pct))]
    simorg[member_type == 1]$member_type <- "core"
    simorg[member_type == 0]$member_type <- "peripheral"

    ### STEP 2: Calculate member's *pre-scandal* engagement choices

    # Likelihood of engaging in a rite of integration, pre-scandal
    simorg[member_type == "core",
             pre_rites_integration := rbinom(.N, 1, 1)]
    simorg[member_type == "peripheral",
             pre_rites_integration := rbinom(.N, 1,
peripheral_pre_rites_integration)]

    # Likelihood of engaging in a rite of passage, pre-scandal
    simorg[, pre_rites_passage := integer()]
    simorg[member_type == "core",
             pre_rites_passage := rbinom(.N, 1, core_passage_meaning *
baseline_prob_rites_passage)]
    simorg[member_type == "peripheral",
             pre_rites_passage := rbinom(.N, 1, periph_passage_meaning *
baseline_prob_rites_passage)]

    ### STEP 3 Calculate member's *post-scandal* engagement choices
    simorg[, post_rites_integration := integer()]
    simorg[, post_rites_passage := integer()]

    # Likelihood of engaging in a rite of integration, post-scandal
    simorg[member_type == "core",
             post_rites_integration := rbinom(.N, 1, (1 - core_scandal_drop))]
    simorg[member_type == "peripheral",
           post_rites_integration := rbinom(.N, 1, (peripheral_pre_rites_integration
* (1-peripheral_scandal_drop)))]
```

```
    # Likelihood of engaging in a rite of passage, post-scandal; highlighting
multiple scenarios
    simorg[member_type == "core",
             post_rites_passage := rbinom(.N, 1, core_passage_meaning *
baseline_prob_rites_passage * (1-core_scandal_drop))]
    simorg[member_type == "peripheral",
             post_rites_passage := rbinom(.N, 1, periph_passage_meaning *
baseline_prob_rites_passage * (1-peripheral_scandal_drop))]

    # Store results
    temp <- data.table(core_member_pct,
                       core_scandal_drop,
                       pre_rites_integration_total = simorg[,
sum(pre_rites_integration)],
                       pre_rites_passage_total = simorg[, sum(pre_rites_passage)],
                       post_rites_integration_total = simorg[,
sum(post_rites_integration)],
                       post_rites_passage_total = simorg[, sum(post_rites_passage)])
    org_panel <- rbind(org_panel, temp) # add row to panel
    rm(temp, core_member_pct,
       core_passage_meaning, periph_passage_meaning,
       core_scandal_drop, peripheral_scandal_drop)
  }

  ### Calculate total effects
  org_panel[, scandal_effect_rites_integration := (post_rites_integration_total-
pre_rites_integration_total)/pre_rites_integration_total]
  org_panel[, scandal_effect_rites_passage := (post_rites_passage_total-
pre_rites_passage_total)/pre_rites_passage_total]
  org_panel[, relative_drops :=
scandal_effect_rites_passage/scandal_effect_rites_integration]

return(org_panel)
}

##### Run the above simulation code twice, once for each figure:

# For Figure 3a
fig_a_data <- main_sim(sim_count = 5000, core_scandal_drop_random = F)

# For Figure 3b
fig_b_data <- main_sim(sim_count = 25000, core_scandal_drop_random = T)

# Plot of outcomes ratio as function of core member %

# Fig (a)
ggplot(fig_a_data, aes(core_member_pct, relative_drops)) +
  geom_smooth() +
  geom_hline(yintercept = 1, linetype = 'dashed') +
  labs(x = "Pct. core members",
       y = "Drop in rites of passage\nrel to rites of integration",
       caption = paste0("Sim runs: ", prettyNum(nrow(fig_a_data), big.mark = ","))) +
  scale_linetype_manual(values=c(2,3,1,4,5)) +
  theme(text=element_text(family="Times New Roman", size=11)) +
  scale_x_continuous(breaks = c(.01, 0.25, .5, .75, .99)) +
```

```
  scale_y_continuous(labels = label_number(accuracy = 0.01))
# ggsave("sim_scenarios_basic.png", width = 6, height = 5, units = "in")

# Fig (b)
ggplot(fig_b_data, aes(core_member_pct, relative_drops)) +
  geom_smooth(aes(color = sprintf("%0.2f", core_scandal_drop), linetype =
sprintf("%0.2f", core_scandal_drop))) +
  geom_hline(yintercept = 1, linetype = 'dashed') +
  labs(x = "Pct. core members",
       y = "Drop in rites of passage\nrel to rites of integration",
       color = "Core members'\nlikelihood of withdrawal\nafter scandal",
       linetype = "Core members'\nlikelihood of withdrawal\nafter scandal",
       caption = paste0("Sim runs: ", prettyNum(nrow(fig_b_data), big.mark = ","))) +
  scale_linetype_manual(values=c(2,3,1,4,5)) +
  theme(text=element_text(family="Times New Roman", size=11)) +
  scale_x_continuous(breaks = c(.01, 0.25, .5, .75, .99)) +
  scale_y_continuous(labels = label_number(accuracy = 0.01))
# ggsave("sim_scenarios_core_members.png", width = 6, height = 5, units = "in")
```