Churches and Local Economies

Zane Kashner
Stanford GSB

Max Pienkny
Northwestern

August 6, 2025

Religion in the US

Religion has long been a major social institution in the United States

- 90% of US identified as Christian in the 1990s [Pew 2022]
- Now 63% do $\rightarrow$ shift to unaffiliated

Religious institutions:

1. Integral to system of belief
2. Center of social support, communal identity, and civic life

Founding of US $\rightarrow$ emphasis on religious liberty and pluralism

- Diverse religious landscape
- Two largest Christian orgs. in US: Catholic Church and Southern Baptist Convention

The Southern Baptist Convention

Evangelical Christian denomination

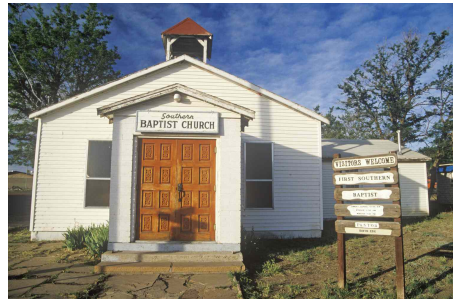
- Separated from National Convention in 1845
- Stemmed from disputes over slavery

Membership peaked at 16 million in 2006

- $\downarrow$ in membership since

40,000+ congregations throughout US

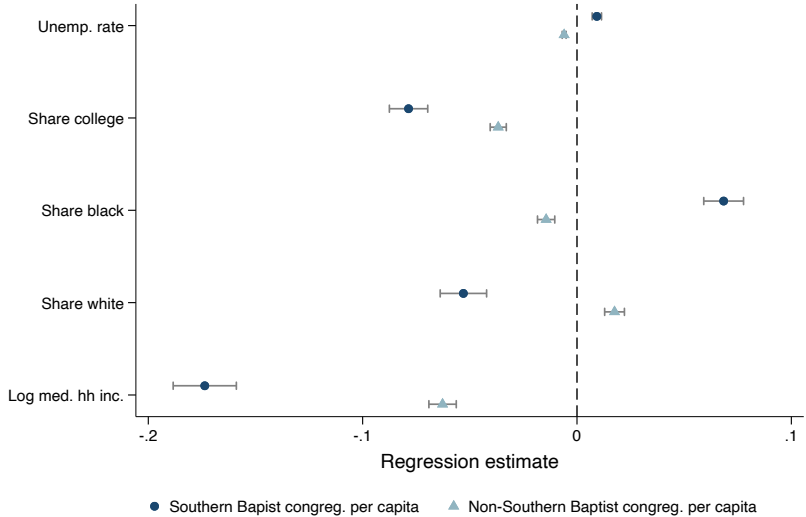
- Churches are fully autonomous & independent
- $\rightarrow$ diff. SBC churches imperfect substitutes



A Southern Baptist Church

Area characteristics and church presence

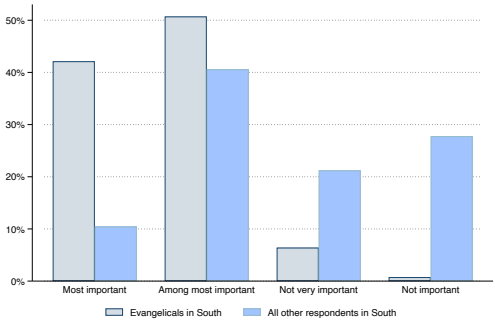
SBC church presence → negative selection on all economic indicators



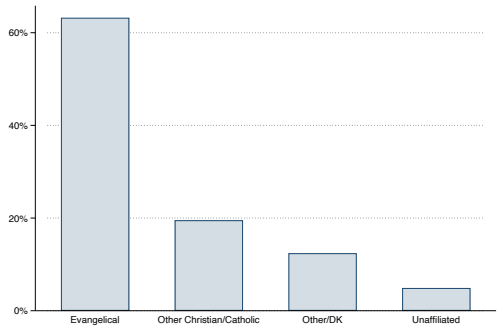
The SBC church in American life

Over 40% of SBC adherents say religion most important part of life (90+% among most)

- Social networks very segregated by religion



(a) Religious importance



(b) Friend composition

Research questions

What is the *causal* role of religion for economic & social outcomes?

- Square personal importance with negative selection

Research questions

What is the *causal* role of religion for economic & social outcomes?

- Square personal importance with negative selection

Exploit local "religion shocks" in the SBC to answer:

1. How do communities respond to religious shocks?

Research questions

What is the *causal* role of religion for economic & social outcomes?

- Square personal importance with negative selection

Exploit local "religion shocks" in the SBC to answer:

1. How do communities respond to religious shocks?
2. How do religious changes affect outcomes?

Research questions

What is the *causal* role of religion for economic & social outcomes?

- Square personal importance with negative selection

Exploit local "religion shocks" in the SBC to answer:

1. How do communities respond to religious shocks?
2. How do religious changes affect outcomes?
3. What is the role of religion & social connection as place-based amenities?

What is a local religious shock?

Explore in two ways:

What is a local religious shock?

Explore in two ways:

1. **Pastor deaths**
   - SBC churches use single pastor for leadership
   - 1-1 mapping from pastor deaths to church closures
   - Pastor deaths $\rightarrow$ *supply shifter* for church access

What is a local religious shock?

Explore in two ways:

1. **Pastor deaths**
   - SBC churches use single pastor for leadership
   - 1-1 mapping from pastor deaths to church closures
   - Pastor deaths $\rightarrow$ *supply shifter* for church access

2. **Pastor convictions**
   - Sexual abuse in SBC church $\rightarrow$ 2019 Houston Chronicle exposé
   - $\downarrow$ religious attendance & belief after local pastor conviction
   - Shock to *religious institutional trust*

What is a local religious shock?

Explore in two ways:

1. **Pastor deaths**
   - SBC churches use single pastor for leadership
   - 1-1 mapping from pastor deaths to church closures
   - Pastor deaths $\rightarrow$ *supply shifter* for church access

2. **Pastor convictions**
   - Sexual abuse in SBC church $\rightarrow$ 2019 Houston Chronicle exposé
   - $\downarrow$ religious attendance & belief after local pastor conviction
   - Shock to *religious institutional trust*

Shocks distinct in *timing* & *granularity*

- *Both* show religious disruptions shape outcomes

Preview of results

After a pastor death:

- **First stage**: SBC churches close $\rightarrow$ persistent effects
- **Social**: $\downarrow$ social activity, no voting changes
- **Health**: No changes
- **Economic**: labor force participation (LFP) $\downarrow$ $\sim$0.25pp, unemployment $\uparrow$ $\sim$0.25pp

Preview of results

After a pastor death:

- **First stage**: SBC churches close $\rightarrow$ persistent effects
- **Social**: $\downarrow$ social activity, no voting changes
- **Health**: No changes
- **Economic**: labor force participation (LFP) $\downarrow$ $\sim$0.25pp, unemployment $\uparrow$ $\sim$0.25pp

After a pastor conviction:

- **First stage**: $\downarrow$ church attendance & later $\downarrow$ affiliation
- **Social**: voting changes ($\uparrow$ $\sim$0.5pp shift left)
- **Health**: $\uparrow$ opioid mortality
- **Economic**: LFP & unemployment $\rightarrow$ same magnitude as deaths analysis

Preview of results

After a pastor death:

- **First stage**: SBC churches close $\rightarrow$ persistent effects
- **Social**: $\downarrow$ social activity, no voting changes
- **Health**: No changes
- **Economic**: labor force participation (LFP) $\downarrow$ $\sim$0.25pp, unemployment $\uparrow$ $\sim$0.25pp

After a pastor conviction:

- **First stage**: $\downarrow$ church attendance & later $\downarrow$ affiliation
- **Social**: voting changes ($\uparrow$ $\sim$0.5pp shift left)
- **Health**: $\uparrow$ opioid mortality
- **Economic**: LFP & unemployment $\rightarrow$ same magnitude as deaths analysis

Hedonic demand: WTP >\$3,000 for church proximity (1 mi.) $\rightarrow$ 80% of pref. from non-employment factors

Related literature

1. Religion & social/economic outcomes
   - Economic outcomes: Weber (1905), Gruber (2005), McCleary and Barro (2006), and Campante and Yanagizawa-Drott (2015)
   - Health outcomes and "deaths of despair": Gruber and Hungerman (2008), Case and Deaton (2015), Case and Deaton (2021), and Giles, Hungerman, and Oostrom (2023)
   - Religious outcomes: Bottan and Perez-Truglia (2015)

   → Novel granular variation + focus on large denomination

Related literature

1. Religion & social/economic outcomes

2. Social capital & labor markets
   - Granovetter (1973), Topa (2001), Calvo-Armengol and Jackson (2004), Pallais and Sands (2016), Chetty et al. (2022a), Chetty et al. (2022b), and Chetty et al. (2024)

   → Explore shocks to social capital in new setting

Related literature

1. Religion & social/economic outcomes

2. Social capital & labor markets

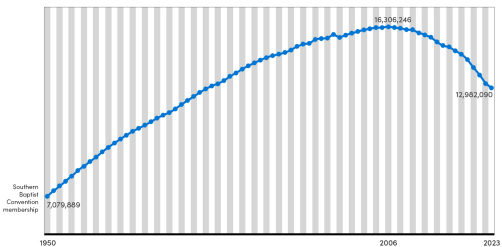
3. Religion & social connection as place-based amenities
   - **Valuing place-based amenities:** Rosen (1974), Bajari and Benkard (2005), Chay and Greenstone (2005), Greenstone and Gallagher (2008), and Linden and Rockoff (2008)
   - **Determinants of place-based amenities:** Diamond (2016) and Almagro and Domínguez-Iino (2024)
   - **Social connection and outcomes:** Putnam (2000) and Glaeser, Laibson, and Sacerdote (2002)

   → Explicitly consider *religion* & *social connection* as place-based amenities

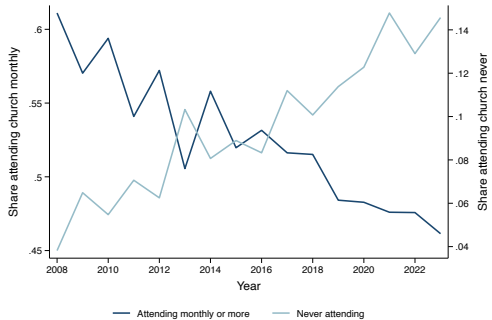
Outline

SBC church trends

Membership ↓ 20% since 2006 → over 3 million people

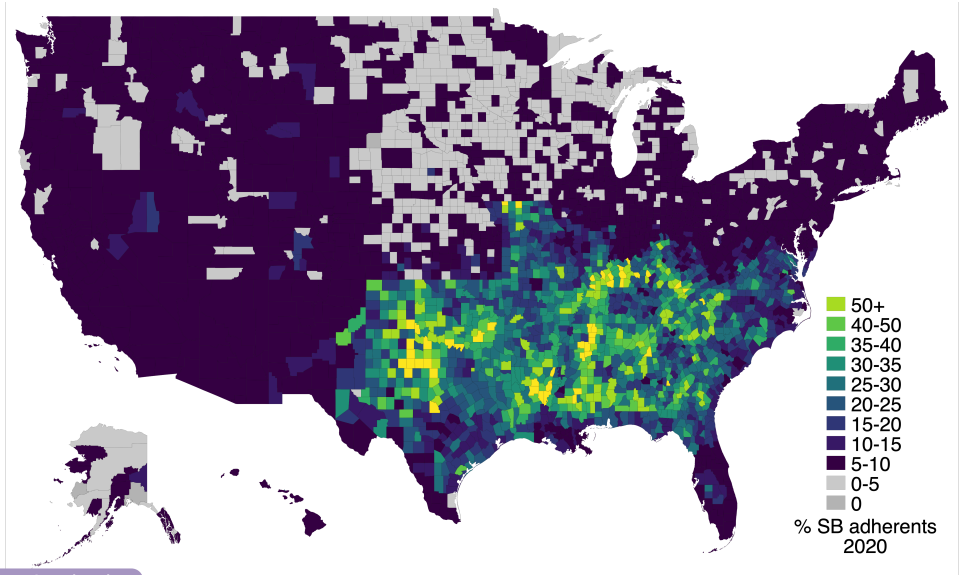


(a) Membership (Lifeway)



(b) Attendance (CCES)

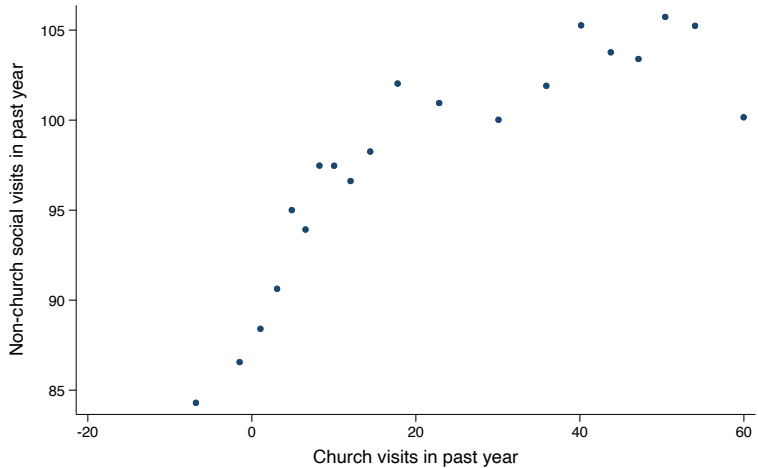
Where is the SBC present?



competing churches

Church attendance and social activity

↑ church visits associated with ↑ non-church social activity



Beta: 0.261, t-stat: 18.828. Specification: county, state X year, and demographic X year FEs

Outline

Basic model: valuing religion

Why should we expect religion to matter? Model three key features:

1. Religion as a *source of social capital*
2. Religion as an *amenity*
3. Religion as an *source of norms*

Basic model: valuing religion

Why should we expect religion to matter? Model three key features:

1. Religion as a *source of social capital*
2. Religion as an *amenity*
3. Religion as an *source of norms*

Individual recieves utility from church attendance a and some other action y:

$$U(a,y) = \overbrace{\big[e(a)w + \big(1-e(a)\big)b\big] + \quad \gamma a}^{\text{attendance channel}} + \overbrace{\quad \lambda y \quad - \quad \frac{1}{2}\varphi y^2}^{\text{norms channel}}$$

Basic model: valuing religion

Why should we expect religion to matter? Model three key features:

1. Religion as a *source of social capital*
2. Religion as an *amenity*
3. Religion as an *source of norms*

Individual recieves utility from church attendance a and some other action y:

$$U(a,y) = \underbrace{[e(a)w + (1-e(a))b]}_{\text{expected income}} + \quad \gamma a \quad + \quad \lambda y \quad - \quad \frac{1}{2}\varphi y^2$$

- Job-finding rate $m(a) = \underbrace{\alpha}_{\substack{\text{help-wanted} \\ \text{ads}}} + \underbrace{\beta a}_{\substack{\text{church} \\ \text{referrals}}} \implies e(a) \approx e_0 + \kappa a$ (networks $\rightarrow$ jobs)

Basic model: valuing religion

Why should we expect religion to matter? Model three key features:

1. Religion as a *source of social capital*
2. Religion as an *amenity*
3. Religion as an *source of norms*

Individual recieves utility from church attendance a and some other action y:

$$U(a,y) = \big[e(a)w + \big(1-e(a)\big)b\big] + \underbrace{\gamma a}_{\text{amenity val.}} + \lambda y - \frac{1}{2}\varphi y^2$$

- Direct amenity value from church attendance, $\gamma > 0$

Basic model: valuing religion

Why should we expect religion to matter? Model three key features:

1. Religion as a *source of social capital*
2. Religion as an *amenity*
3. Religion as an *source of norms*

Individual recieves utility from church attendance a and some other action y:

$$U(a,y) = \big[e(a)w + \big(1-e(a)\big)b\big] + \quad \gamma a \quad + \underbrace{\lambda y}_{\substack{\text{hedonic} \\ \text{“reward”}}} - \underbrace{\frac{1}{2}\varphi y^2}_{\substack{\text{cost of deviating} \\ \text{from church}}}$$

- Norms channel $\rightarrow$ cost (governed by φ) of actions not aligned with church values
  - Church bliss point normalized to 0: $y^* = \frac{\lambda}{\varphi}$ $\rightarrow$ hedonic/alignment tradeoff

Testable implications

Pastor deaths $\implies$ church closures: $\downarrow a$

Church abuse scandals $\implies$ belief shock: $\downarrow a$ and $\downarrow \varphi$

Effects for both:

1. $\uparrow$ unemployment (networks)
2. $\downarrow$ labor force participation (networks)
3. $\downarrow$ home prices (bundled amenities + job-finding benefits)

Effects only with scandals:

1. $\uparrow$ Norm compliance / moral adherence ($\downarrow$ belief $\implies$ $\downarrow$ deviation costs)

Today: Reduced-form evidence & some decomposition

Outline

Estimating the effects of pastor deaths: data

Scan & OCR universe of SBC pastors from 1970 to 2008

→ Pastor names & locations biannually

Merge to Social Security Death Master File & Infutor

→ Universe of deaths & locations up to 2013

Variation in *pastor deaths* with *exact church locations*

PASTORS

Aaron Joseph L Rt 1 Bx 69 Geneva Al 36340
Aaron Lafayette Rt 1 Cussetta Al 36852
Aaron Marvin 3005 Sheldon Clovis NM 88101
Abanathy Charles PO Bx 97 Black Rock Ar 72415
Abbott Barney 305 E 4th Penn W Holdenville Ok 74848
Abbott Clifford E Modena Bp Ch Modena Mo 64663
Abbott Cloyd Rt 3 Tazewell Tn 37879
Abbott Don PO Bx 334 Forrest City Ar 72335
Abbott E A 705 No Jackson St Albany Ga 31705
Abbott Earl Rt 5 Bx 922 London Ky 40741
Abbott Eugene Thompsonville Il 62890
Abbott H W 3162 Pershall Rd Saint Louis Mo 63136
Abbott Ivan J 411 E Waggoner St Sullivan Il 61951
Abbott James 105 Bullard St Enterprise Al 36330
Abbott John B Bx B B Espanola NM 87532
Abbott Kenneth L 509 E Woodard Dennison Tx 75020
Abbott Lewis 429 So Riverhills Dr Temple Terrace Fl 33617
Abbott Raymond C-26 Madison Square Apt Madison Tn 37115
Abbott Wilburn 1906 Lydia Dr Owensboro Ky 42301
Abbott Frank A Jr 1445 Downing St Charleston SC 29407
Abel H B Rt 1 Vance Ms 38964
Abel Harlan A 6503 W Cameron Tulsa Ok 74127
Abel Jim PO Bx 37 SBC Walnut Ridge Ar 72476
Abel Richard St Johns Bp Ch Ehrhardt SC 29081
Abel W B Noxapater Ms 39346
Abel William M PO Bx 582 Newland NC 28657
Abell Troy D Bx 117 Wheatley Ky 40389
Abercombie Alex N Collins Ms 39428
Abercombie C L 1310 No Crain Altus Ok 73521
Abercrombie C M Wheeler Tx 79096
Abercrombie J B Bellview Bp Ch Laurens SC 29360
Abercrombie M L Rt 4 Pickens SC 29671
Abercrombie Robert M Rt 1 Bx 6236 McCalla Al 35111
Abernathy D J 741 No Mills Av Orlando Fl 32803
Abernathy Dan Rt 1 Bx 211 New London NC 28127
Abernathy Donald Rt 1 Fyffe Al 35971
Abernathy Eugene 2611 SW 13 Pl Fort Lauderdale Fl 33312
Abernathy James W 3407 Kester Wood Dr Knoxville Tn 37918
Abernathy Jerry D 706 Pecan Crossett Ar 71635
Abernathy Paul J 700 Morgan Falls Rd Dunwoody Ga 30043
Abernathy Roy Rt 3 Canton Ga 30114

1970 SBC Annual

Estimating the effects of pastor deaths: regression

Exploit variation in treatment & timing $\rightarrow$ **matched controls**

- Match on state, income, education, race, & church presence

$$Y_{zt} = \gamma_t + \delta_z + \sum_{k \neq -1} \beta_k PastorDeath_z \times \mathbf{1}\{t - T_z = k\} + \lambda \mathbf{X}_{zt} + \varepsilon_{zt}$$

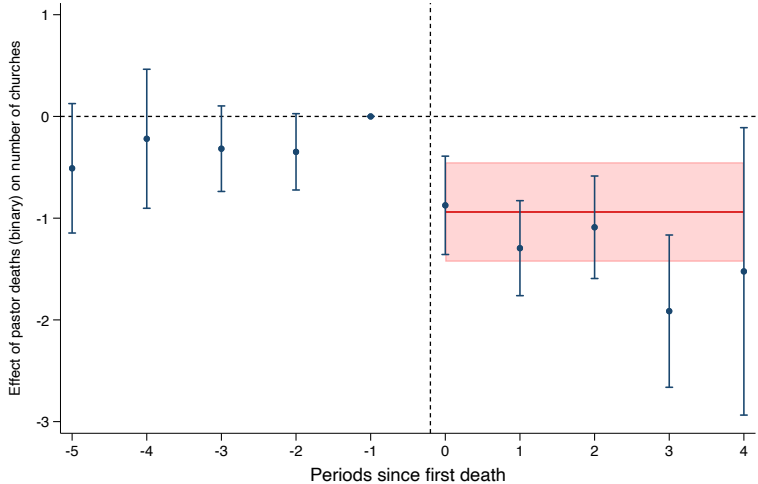
Y_{zt}: outcome in zip code z in year t

$t - T_z$: time from first pastor death

β_k: effect of pastor deaths

$\mathbf{X}_{zt}$: time-varying controls

Churches close when pastors die



Robust to using non-binary, non-absorbing treatment [Chaisemartin & D'Haultfœuille, 2024]

▸ CD estimator ▸ cumulative dead

Estimating the effects of pastor convictions: data

125 SBC pastor convictions for sex crimes from *The Houston Chronicle*

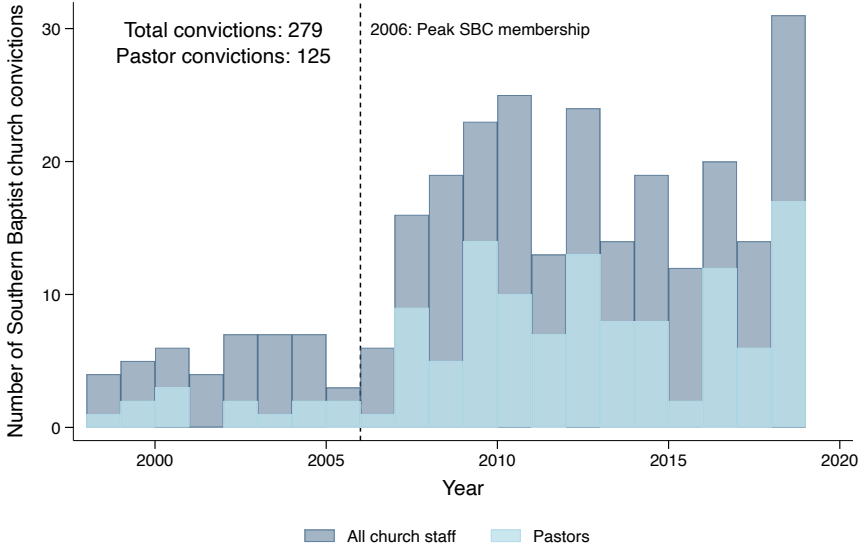
Abuse of Faith: The database

Part 1 Part 2 Part 3 Part 4 Part 5 Part 6 Database Videos

ABUSE *of* FAITH

In the past 20 years, hundreds of Southern Baptists with formal church roles have engaged in sexual misconduct, a new investigation by the Houston Chronicle and San Antonio Express-News reveals. They were pastors. Deacons. Youth pastors.

Timing of convictions



Estimating the effects of pastor convictions: regression

Follow same matched controls strategy as in deaths analysis

DiD with individual-level data:

$$Y_{ict} = \alpha + \delta_c + \gamma_t + \sum_{k \neq -1} \beta_k Conviction_c \times \mathbf{1}\{t - T_c = k\} + \lambda \mathbf{X}_{it} + \varepsilon_{ict}$$

Y_{ict}: outcome for individual i in county c in year t

$t - T_c$: time from year of conviction T_c in county c

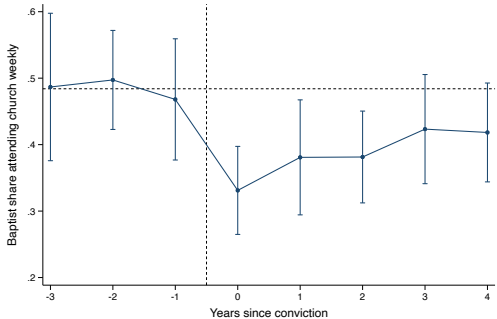
β_k: effect of pastor conviction

$\mathbf{X}_{it}$: Time-varying controls

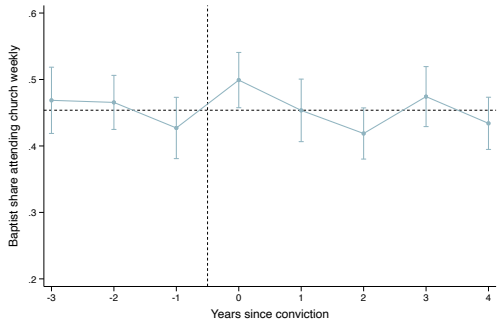
▸ reg with aggregate data

Baptists stop attending church after convictions

Large decline in church attendance for Baptists in treatment counties



(a) Treatment counties (Baptist)

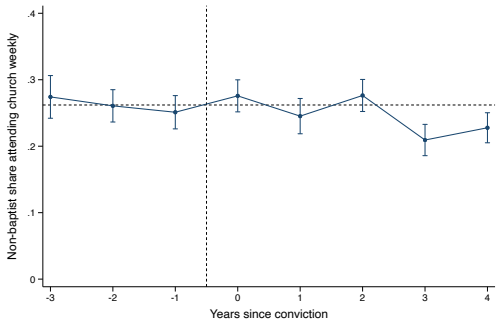


(b) Control counties (Baptist)

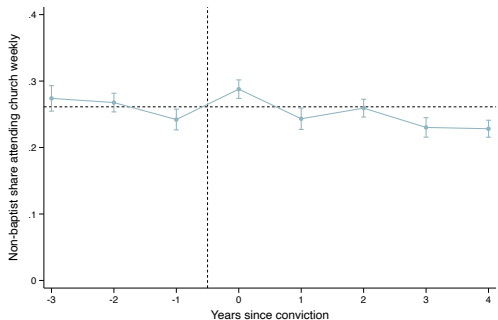
▸ other attendance measures

Other denominations not affected

No effects for non-Baptists

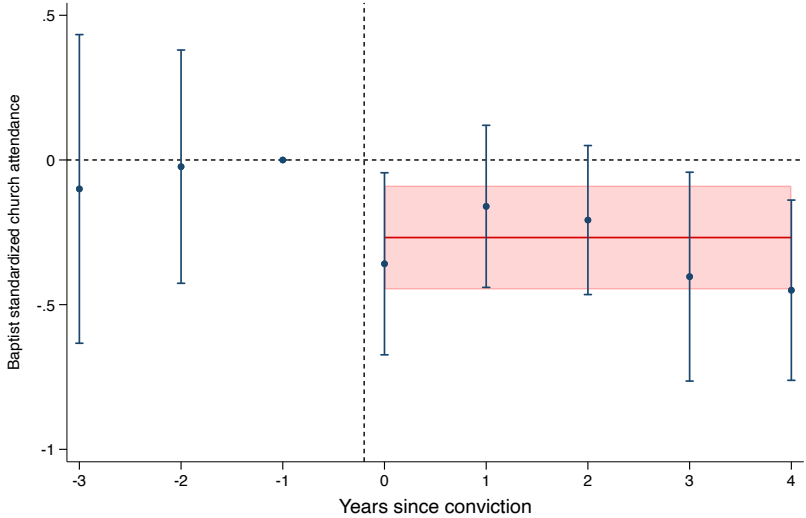


(a) Treatment counties (Non-Baptist)



(b) Control counties (Non-Baptist)

Persistent deceases in attendance

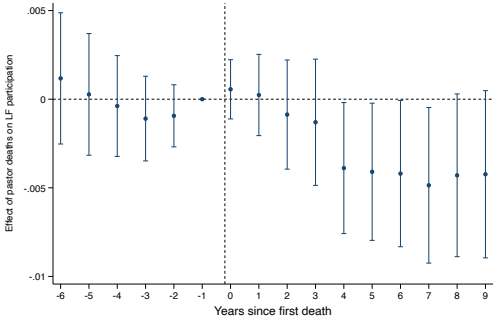


▸ non-religious share

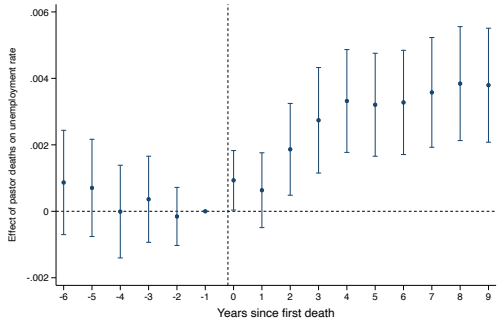
Outline

Pastor deaths: economic outcomes

LFP ↓, unemployment ↑



(a) Labor force participation



(b) Unemployment

Not driven by church employment ▸ church employment

Pastor deaths: social effects

Table 1: Effect of pastor death on social activities

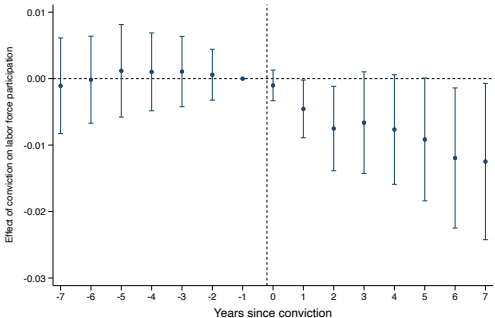
Dependent Variables:	**Church visits** (1)	**Social visits** (2)	**Bowling visits** (3)
Variables			
$\log(\frac{\text{PastorDead}_{zt}+0.1}{\text{Matched}_z+0.1})$	-0.031**	-0.014**	-0.173***
	(0.014)	(0.006)	(0.067)
Fixed effects			
County	X	X	X
State × Year	X	X	X
Race × Year	X	X	X
Age group × Year	X	X	X
Sex × Year	X	X	X
City size × Year	X	X	X
Fit statistics			
Observations	20,650	17,768	19,678
Pseudo R^2	0.12	0.05	0.14

*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

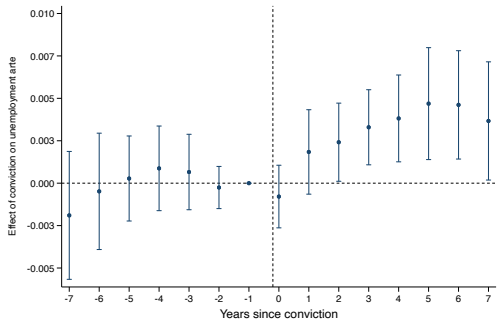
Outline

Pastor convictions: economic effects

LFP ↓, unemployment ↑ → same direction/magnitude as deaths analysis



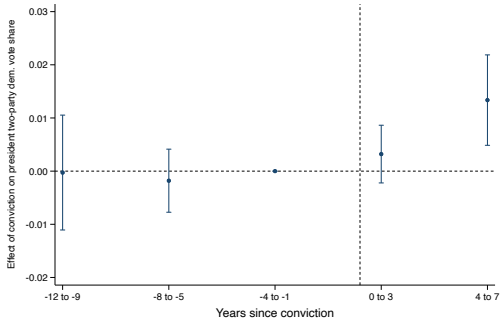
(a) Labor force participation



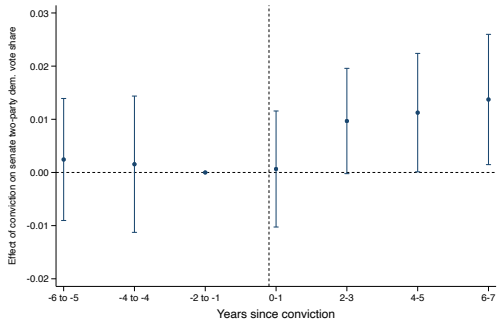
(b) Unemployment

Pastor convictions: social effects

Voting behavior → shift left in presidential & senate elections



(a) Presidential vote shares

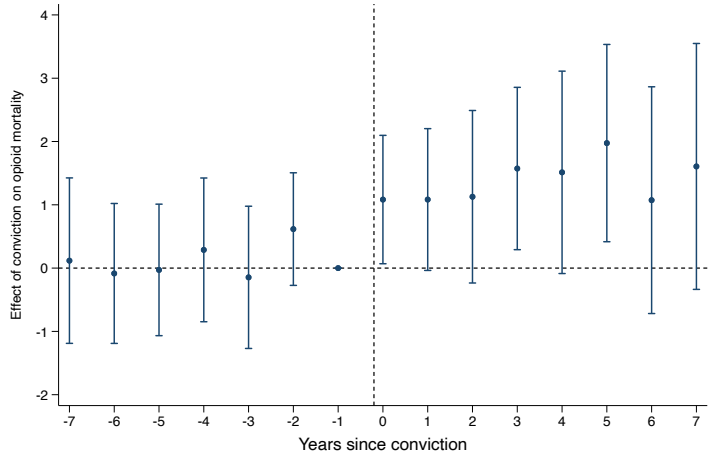


(b) Senate vote shares

▸ turnout ▸ voting and pastor deaths

Pastor convctions: deaths of despair

25% ↑ opioid-related mortality relative to baseline



No effects with aggregate health ▸ aggregate deaths ▸ pastor deaths

Outline

Pastor deaths: home price effects of nearby churches

Can leverage *exact* church locations for spatial decomposition

Estimate the following with non-parametric IV:

$$\log(P_{jt}) = \underbrace{\theta(\delta_{jt})}_{\text{Church dist}} + \underbrace{\phi(\delta_{j,1994})}_{\text{1994 dist}} + \underbrace{\beta X_j}_{\text{Chars.}} + \underbrace{\gamma_{c(j)t}}_{\substack{\text{County} \times \\ \text{year FEs}}} + \underbrace{\zeta_{n(j)}}_{\text{Tract FEs}} + \varepsilon_{jt}$$

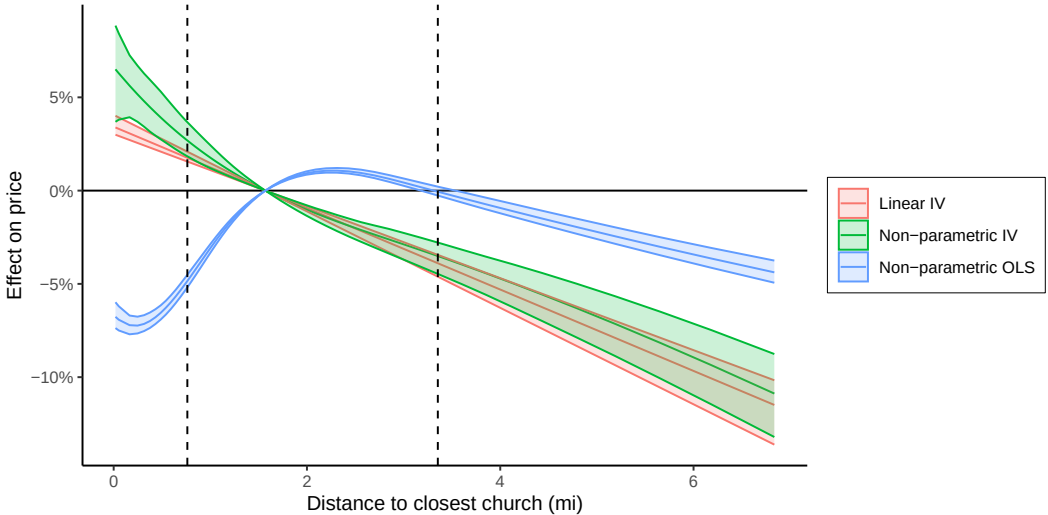
Flexibly control for pre-period distance from church with ϕ
(Borusyak and Hull, 2022)

Instrument for δ_{jt} with an interaction of pre-period distance $\delta_{j,1994}$ & death timing

Estimate nonparametric effect $\hat{\theta}(\delta)$ of church distance on log home prices using NPIV
(Chen and Christensen, 2018; Newey and Powell, 2003)

Sample: 7,470,446 home transactions from 1990-2008 from Corelogic

The nearest church being farther → lower home values



From price effects to preferences

Assume household i chooses housing option J_i to maximize indirect utility:

$$U_{ij} = -\beta_i \, \delta_j + U_i^{(-\delta)}\left(A_j, \eta_{n(j)}\right) + \xi_j - P_j$$

- P_j: sale price of house j
- δ_j: distance from house j to nearest SBC church
- A_j and $\eta_{n(j)}$: observed home chars. & unobserved neighborhoods chars., repsectively
- ξ_j: vertical unobserved quality of house j
- Let $X_j := \left(\delta_j, A_j, \eta_{n(j)}, \xi_j\right)$

From price effects to preferences

Assume household i chooses housing option J_i to maximize indirect utility:

$$U_{ij} = -\beta_i \, \delta_j + U_i^{(-\delta)}\left(A_j, \eta_{n(j)}\right) + \xi_j - P_j$$

Two ingredients:

1. Continuity: choice of housing option $j \rightarrow$ equiv. to choice of continuous house, neighborhood chars. X_j for price P_j

   $\rightarrow$ >7 million home transactions $\Rightarrow \approx$ continuous choice of δ_j

2. Bajari and Benkard (2005): no i-specific taste for particular housing options

   $\rightarrow$ housing option j's price P_j = smooth function p of j's observed, unobserved chars.

From price effects to preferences

Assume household i chooses housing option J_i to maximize indirect utility:

$$U_{ij} = -\beta_i \, \delta_j + U_i^{(-\delta)}\left(A_j, \eta_{n(j)}\right) + \xi_j - P_j$$

Two ingredients:

1. Continuity: choice of housing option $j \rightarrow$ equiv. to choice of continuous house, neighborhood chars. X_j for price P_j

   $\rightarrow$ >7 million home transactions $\Rightarrow \approx$ continuous choice of δ_j

2. Bajari and Benkard (2005): no i-specific taste for particular housing options

   $\rightarrow$ housing option j's price P_j = smooth function p of j's observed, unobserved chars.

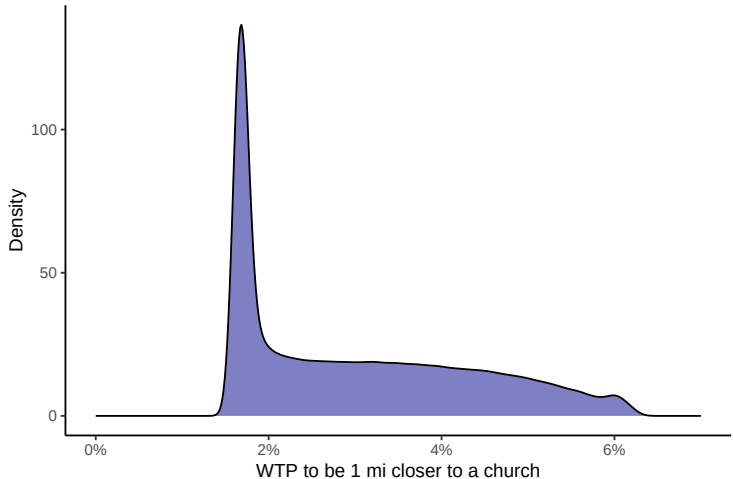
Continuous choices of char. bundles + smooth price function $P_j = p(\delta_j, A_j, \eta_{n(j)}, \xi_j)$

$\rightarrow$ Household i's FOC identifies disutility from church distance β_i

▸ FOC

Hedonic willingness-to-pay

Dollar-denominated average WTP to be 1 mile closer to church = $3,235



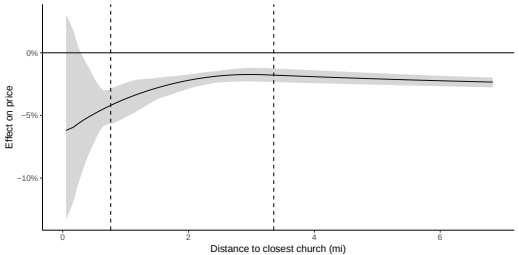
▸ WTP in $

Decomposition of church value

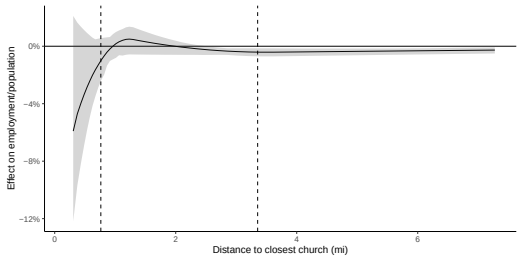
Split value of proximity into *employment channel* $e(\delta_j)$ and *residual amenity value* δ_j^r

$$-\beta_i \, \delta_j \;=\; -\alpha_i \, \delta_j^r + \gamma_i \, e(\delta_j), \qquad (\alpha_i, \gamma_i) \sim \mathcal{N}(\mu, \Sigma).$$

Differential slopes of price effects and employment effects help decompose WTP



(a) Home price effects slope



(b) Employment effects slope

Employment value vs. other amenities

Over 80% of church proximity value comes from non-employment factors

Conclusion

We study effects of religion in the US with two complementary strategies

Provide framework for how religion affects outcomes $\rightarrow$ key features:

- Religion as an amenity
- Religion as a source of social captial

Find reduced-form effects of religious loss on:

- Economic outcomes (LFP & unemployment)
- Social outcomes (social activity & voting)
- Health outcomes (opioid mortality)

Characterize household preferences for church proximity

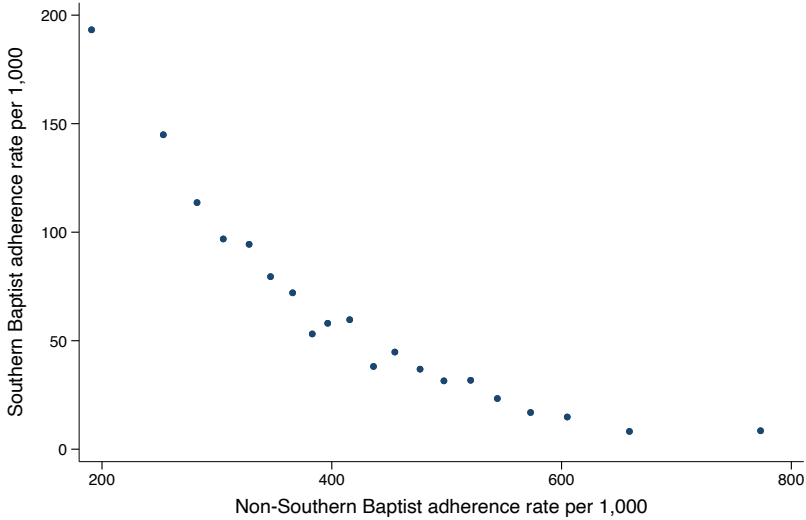
- Many households willing to pay to be closer to churches
- Effects come both from $\uparrow$ employment effects (20%) and other amenities (80%)

Thank you!

mpienkny@u.northwestern.edu

Appendix

Few other competing churches



back

Estimating the effects of pastor deaths: regression

Difference-in-differences with non-binary treatment [Chaisemartin & D'Haultfœuille, 2024]

$$Y_{zt} = \gamma_t + \delta_z + \sum_{k \neq -1} \beta_k \Big[\log \left(\frac{PastorDead_{zt} + 0.1}{Matched_z + 0.1} \right) \times \mathbf{1}\{t - T_{zt} = k\} \Big] + \varepsilon_{zt}$$

Y_{zt}: outcome in zip code z in year t

$t - T_{zt}$: time from pastor death $\rightarrow$ allows for multiple events

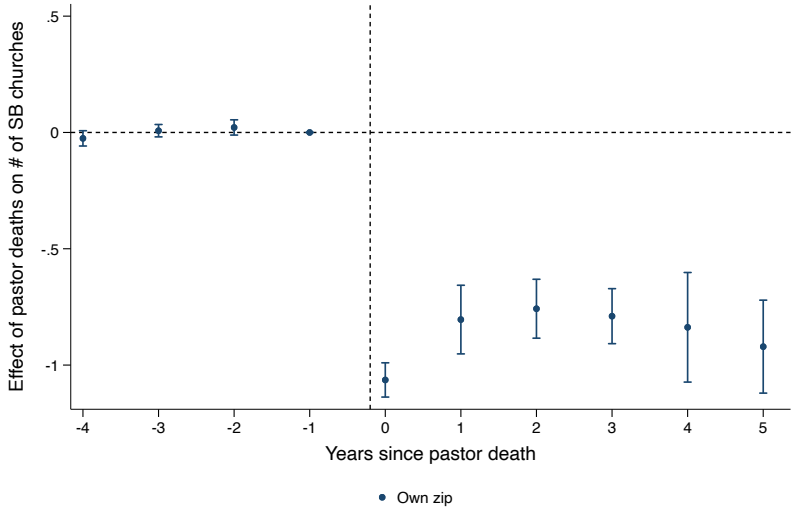
β_k: effect of pastor deaths

Intuition: compare outcomes for "switchers" & control units with same baseline treatment status

- Estimand is AVSQ $\rightarrow$ average of actual versus status quo outcomes
- Identification comes from parallel trends *conditional on baseline treatment*

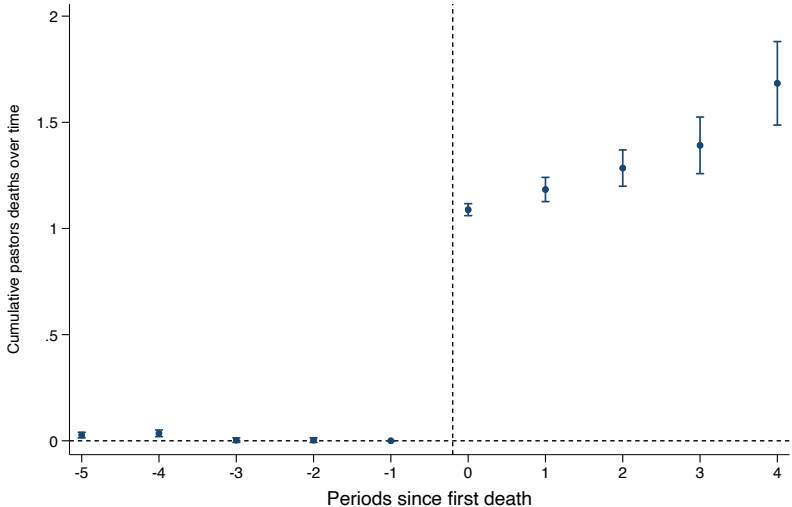
back

Churches close when pastors die



back

Cumulative deaths following first death



back

Estimating the effects of pastor convictions for other outcomes

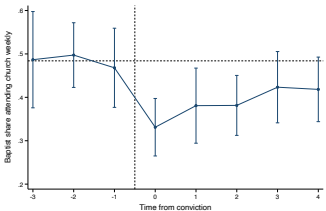
Apply same matched controls approach to aggregate outcomes

With aggregate data:

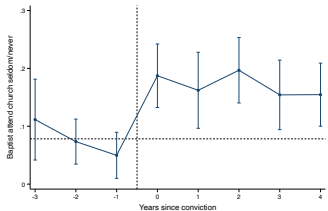
$$Y_{ct} = \delta_c + \gamma_t + \sum_{k \neq -1} \beta_k Conviction_c \times \mathbf{1}\{t - T_c = k\} + \mathbf{X}_{ct} + \varepsilon_{ct}$$

back

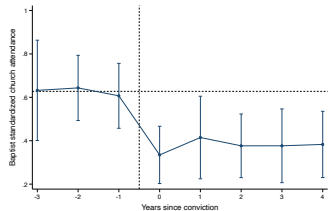
Various measures of church attendance



(a) Attend weekly



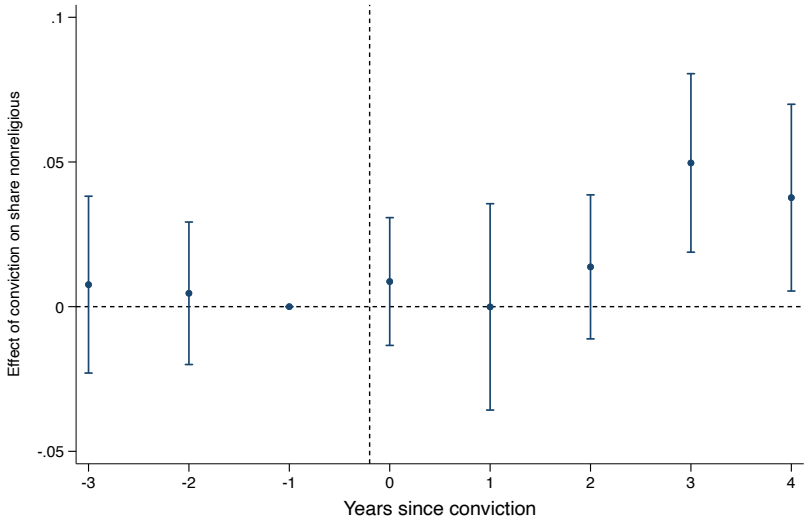
(b) Attend seldom/never



(c) Std. attend

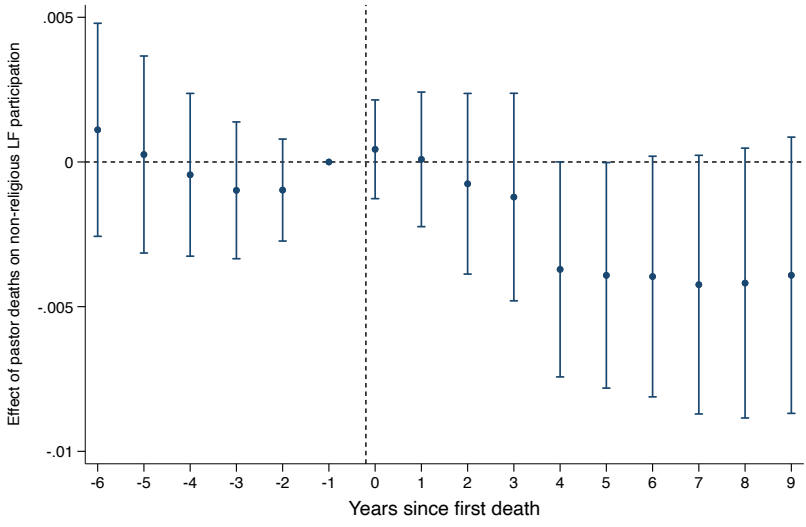
back

Delayed increase in non-religious share



back

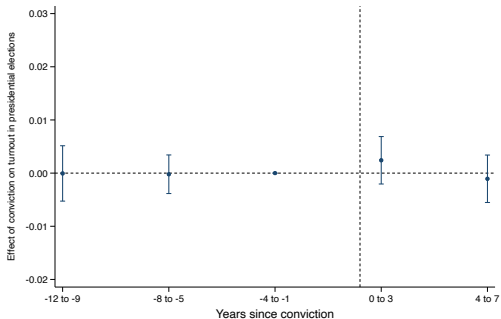
Non-church employment effects



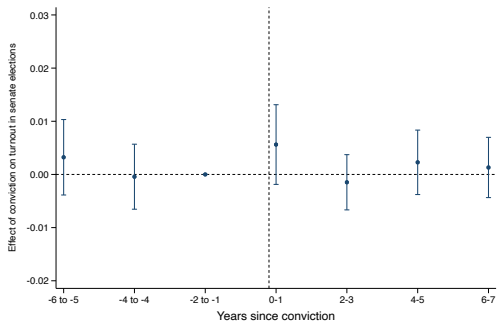
back

Driven by persuasion, not mobilization

No effects on turnout



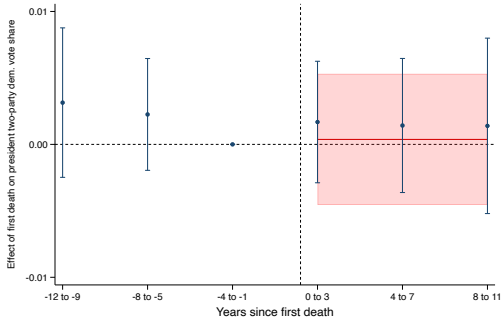
(a) Presidential election turnout



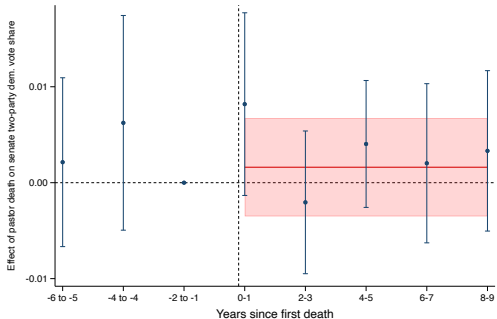
(b) Senate election turnout

back

No effect on voting outcomes



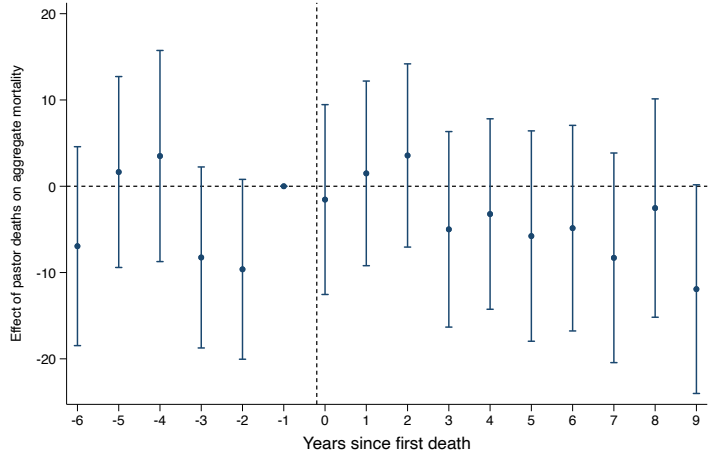
(a) Presidential vote shares



(b) Senate vote shares

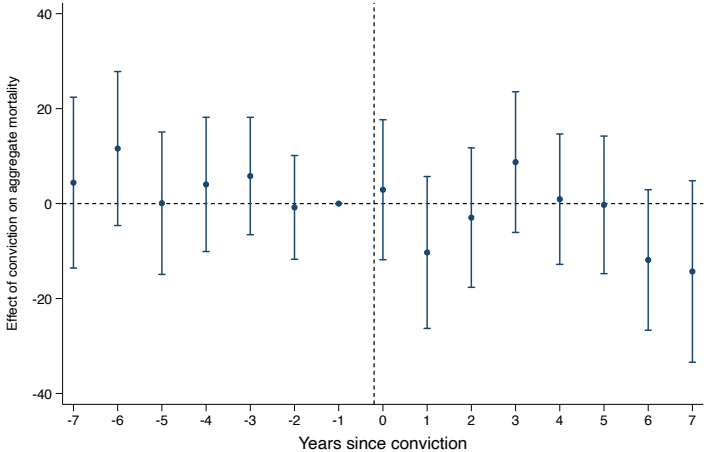
back

No aggregate health effects



back

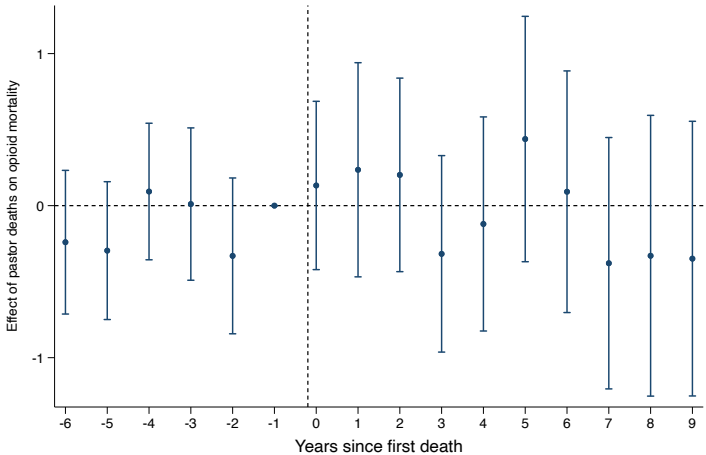
No aggregate health effects



back

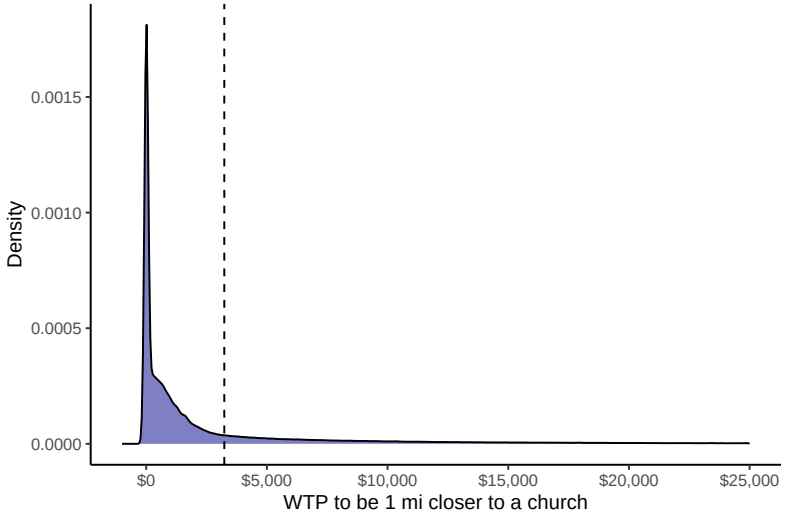
Pastor deaths: deaths of despair

No change in opioid mortality



No effects with aggregate health ▸ aggregate deaths ▸ back

WTP in dollars



back

Prices to preferences derivation

From NPIV on home prices we nonparametrically recover $\theta(\delta) = \dfrac{\partial \log(P)}{\partial \delta}$

Rewrite household optimization problem to be directly over bundles of housing characteristics:

$$\max_{\delta,a,\eta,\xi \in \mathcal{X}} u_i(\delta, a, \eta, \xi) - p(\delta, a, \eta, \xi), \qquad u_i(\delta, a, \eta, \xi) = -\beta_i \delta + U_i^{(-C)}(a, \eta) + \xi$$

And take the FOC:

$$\left.\frac{\partial u_i}{\partial \delta}\right|_{X_{J_i}} - \left.\frac{\partial p}{\partial \delta}\right|_{X_{J_i}} = 0 \implies \beta_i = \left.\frac{\partial u_i}{\partial \delta}\right|_{X_{J_i}} = \left.\frac{\partial p}{\partial \delta}\right|_{X_{J_i}} = p\left(X_{J_i}\right)\theta\left(\delta_{J_i}\right)$$

back