Branching Out

The Role of Selection in Branch Entry and Economic Growth

Anthony Zdrojewski

Job Talk

November 13, 2024

Is there a relationship between bank branch entry and local economic growth?

Finance-Growth Nexus: An Old Debate

- Does financial development cause growth? (Schumpeter '69)

or

- Merely anticipate growth? (Robinson '52)

Bank branching deregulation literature attempts to address this question using **state-level** shocks (Jayaratne & Strahan '96, Chava et al. '13, Amore et al. '13, Cornaggia et al. '15, Kroszner & Strahan '99, Freeman '02, Berger et al. '21, Huang '08)

My paper addresses the question on a *local* level

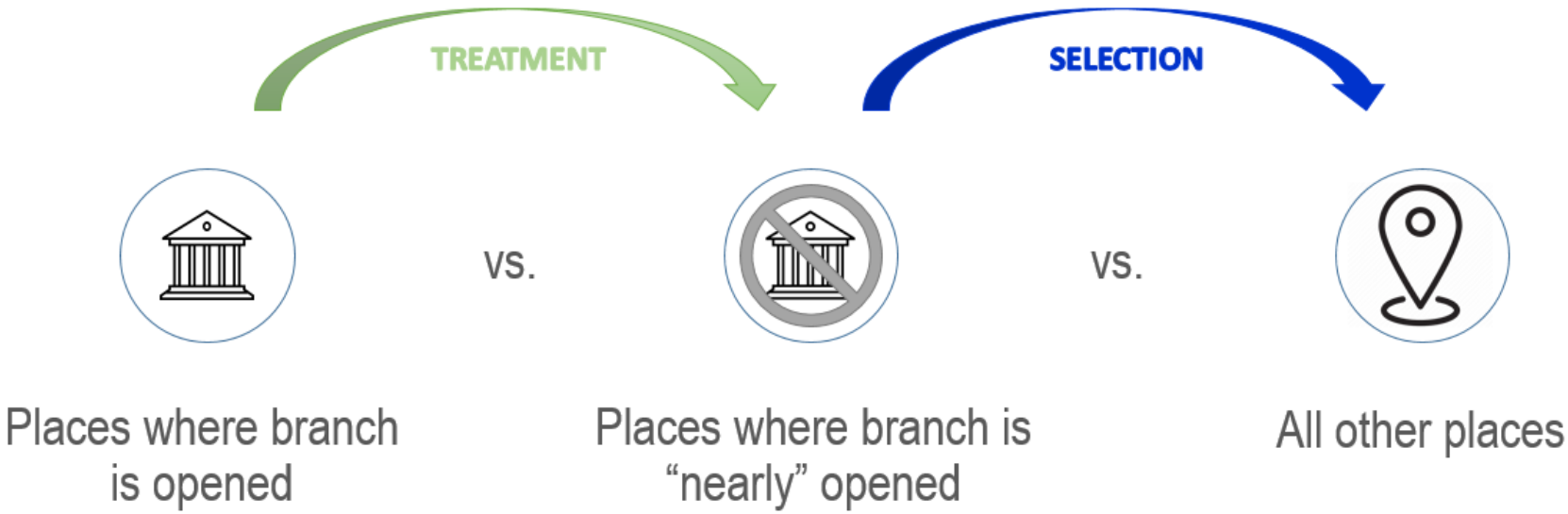
Distance matters in lending (Petersen and Rajan '02, Degryse and Onega '05), suggesting effects may be **local**

Research questions

- Does bank branch entry cause local economic growth? (Treatment Effect)
- Do banks open branches in places that are going to grow anyway? (Selection Effect)
- Are these effects localized?

Identification Strategy: Treatment vs. Selection

I compare 3 types of locations:



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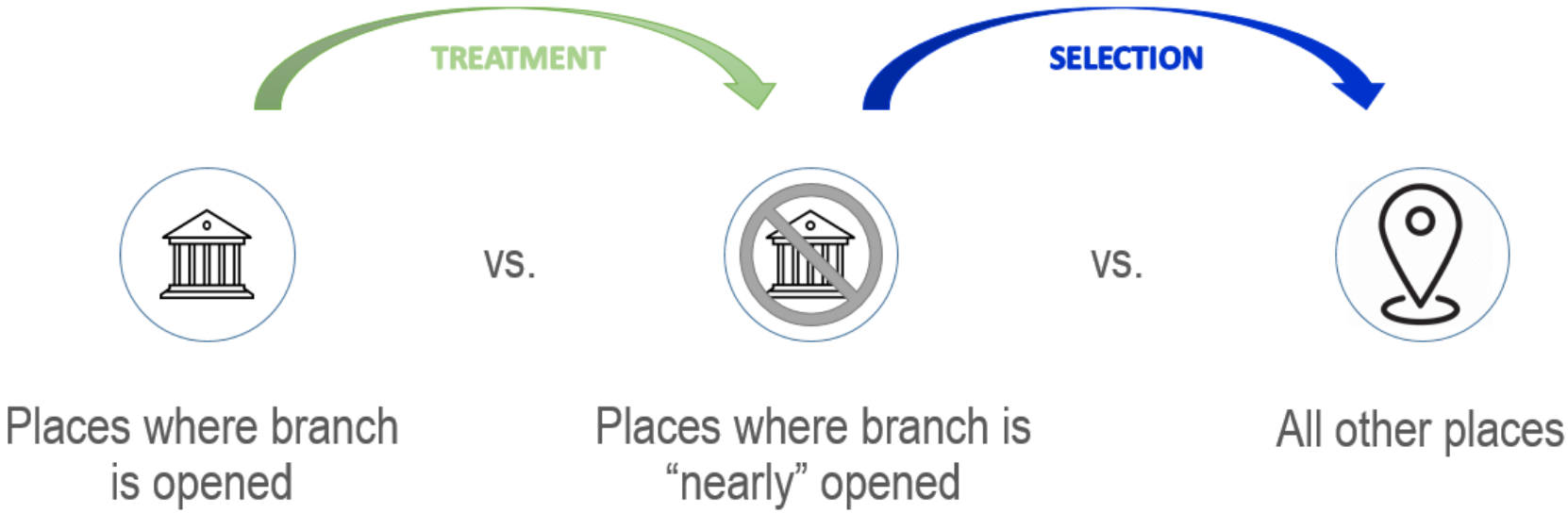


"Nearly": A bank applied to open a branch, but did not complete it.
(Institutional details to follow)

Overview of results

Selection Effects are much larger than **Treatment Effects**:

Outcome Variable	**Selection Effect**	**Treatment Effect**
Night Lights	2.4 % **	.6 % **
New Business Registrants	5 % **	.2 %
SBA-7a Lending Amounts	74 % **	4.5 %

Both effects are localized (i.e. strongest within 5 km of proposed branch)

Main Contributions

1. Weak treatment effect runs counter to prior literature (Jayaratne and Strahan '96, Chava et al. '13, Amore et al. '13, Cornaggia et al. '15)

2. Strong selection effect missed by prior literature

3. Both effects are localized - distance matters in lending (Petersen and Rajan '02, Degryse and Onega '05)

4. Novel identification strategy may be used for similar questions (e.g., Gilje et al. '16, Nguyen '19)

Outline

"Almost" branched locales may be good counterfactuals

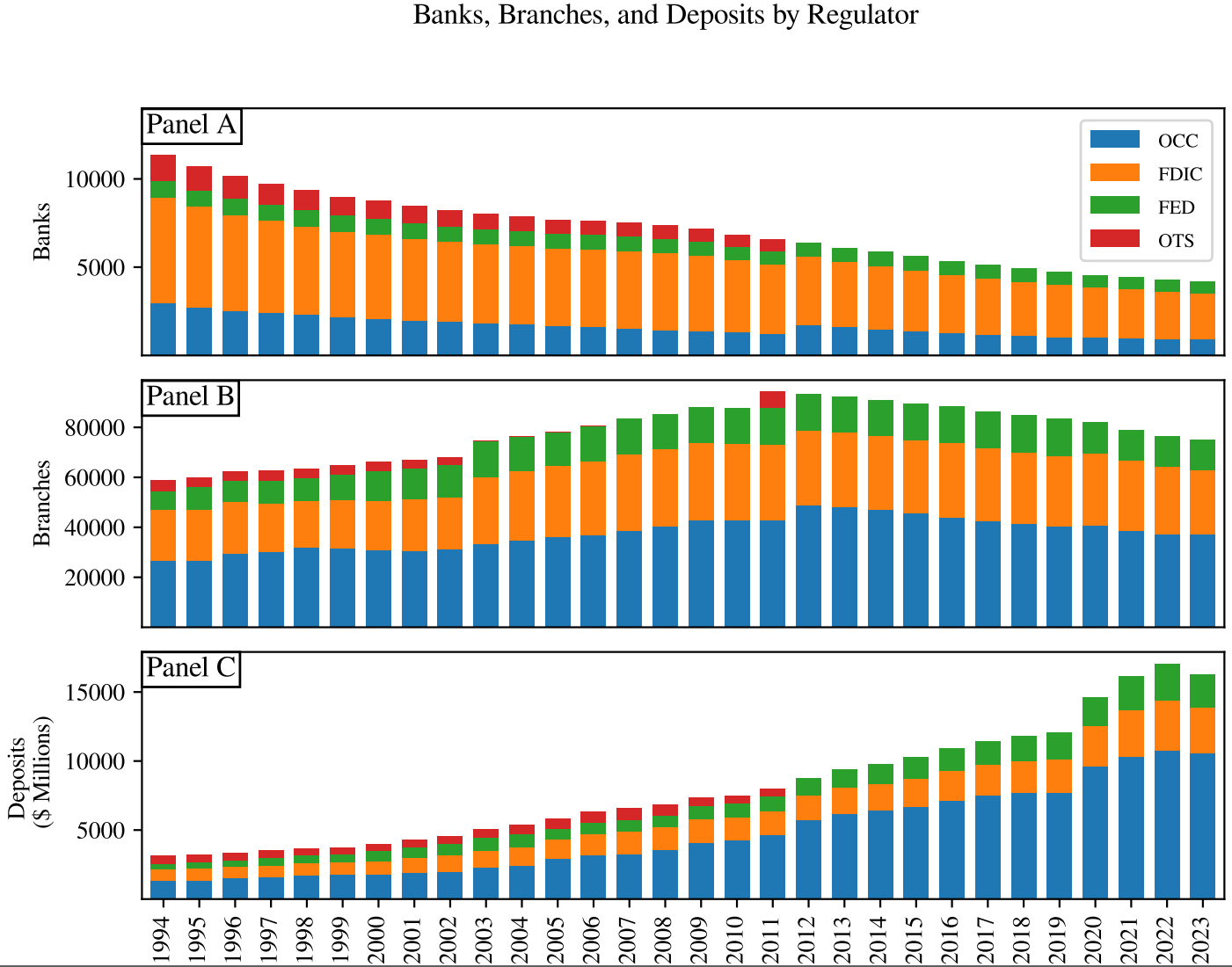
Banks maximize profit → branch entry likely correlates with expected growth.

Key intuition: locations that "almost" open a branch are (more) likely to be suitable counterfactuals for opening locations.

I identify places that "almost" open a branch using branch establishment application records.

OCC-regulated banks must apply to open new branches

OCC: National banks, federal savings associations, and foreign banks.

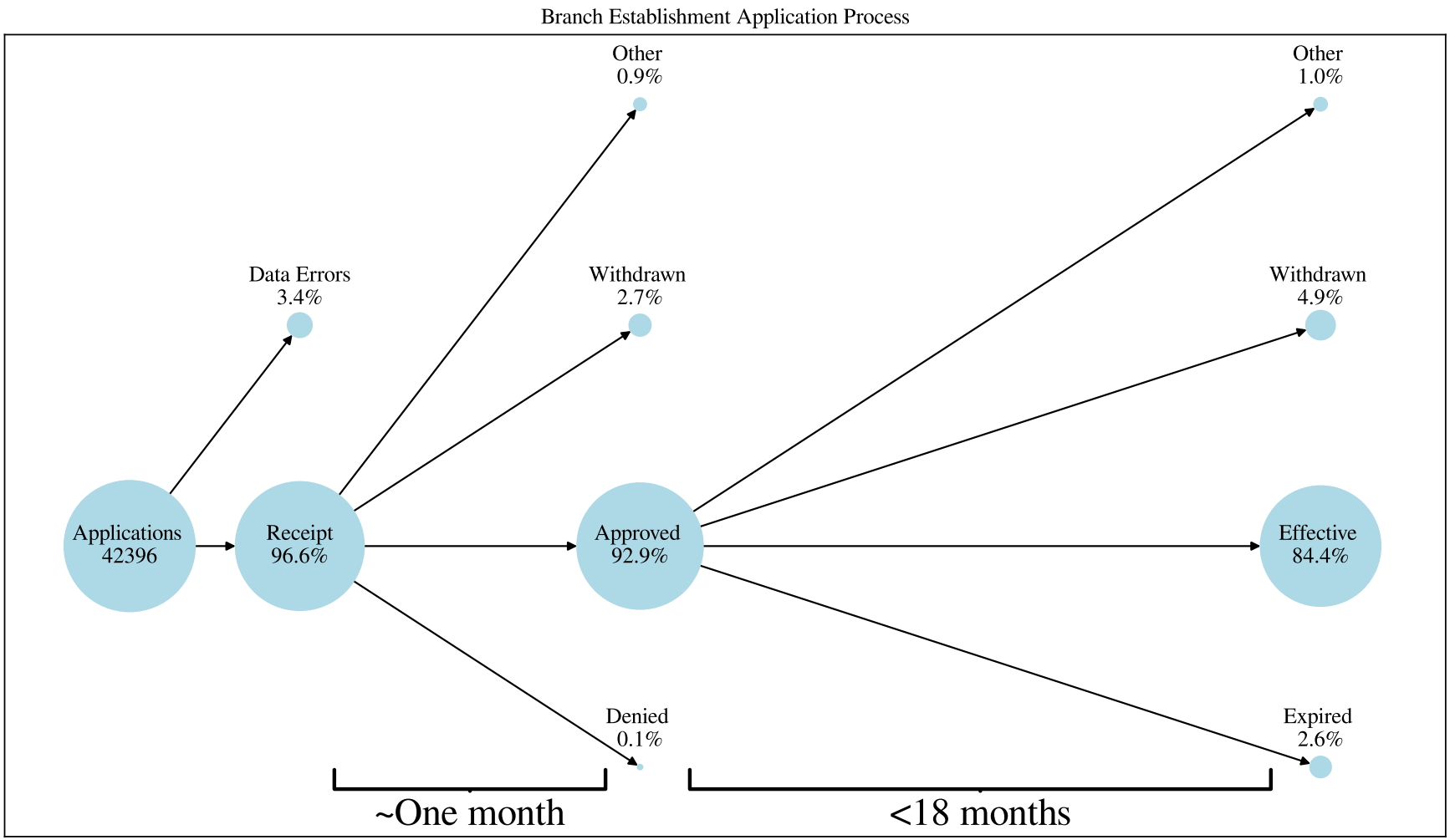


To establish a new branch, these banks must:

- Submit an application with precise planned location
- Publish their intent to establish a branch in the local newspaper
- Allow for a public commenting period
- Obtain legal analysis (if there are complicating legal factors – there frequently are)
- Establish branch operations within 18 months of approval

Given the involved process, application is a strong signal of intent to branch.

Visualizing the application process



Example fulfilled application

Corporate Applications Search Result Details

Details For OCC Control Number: **2000-SE-05-0027**

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Application Type: Branch Establishment

Transaction Form: Branch Establishment - Staffed Branch

Bank: **The First National Bank of Alachua**

Charter/License #: **8980**

Bank Headquarters Location: 15000 NW 140TH STREET
ALACHUA , FL 32616
County: Alachua

Proposed Branches:

Branch Name	Street Address	Suite	City	State	Zip	County	Certification #
NEWBERRY BRANCH	24202 WEST NEWBERRY ROAD, SUITE F		NEWBERRY	FL	32669	Alachua	117659A

Public Comment Information:

Comment Period Start Date	Comment Period End Date	Adjusted Period Start Date	Adjusted Period End Date	OCC Contact
2000-02-17	2000-03-17			Southeast District Office Contact Info

Filing Status:

Action	Date
Receipt	2000-02-15
Approved	2000-03-23
Consummated/Effective	2000-05-08

▸ Go to Example Unfulfilled Application

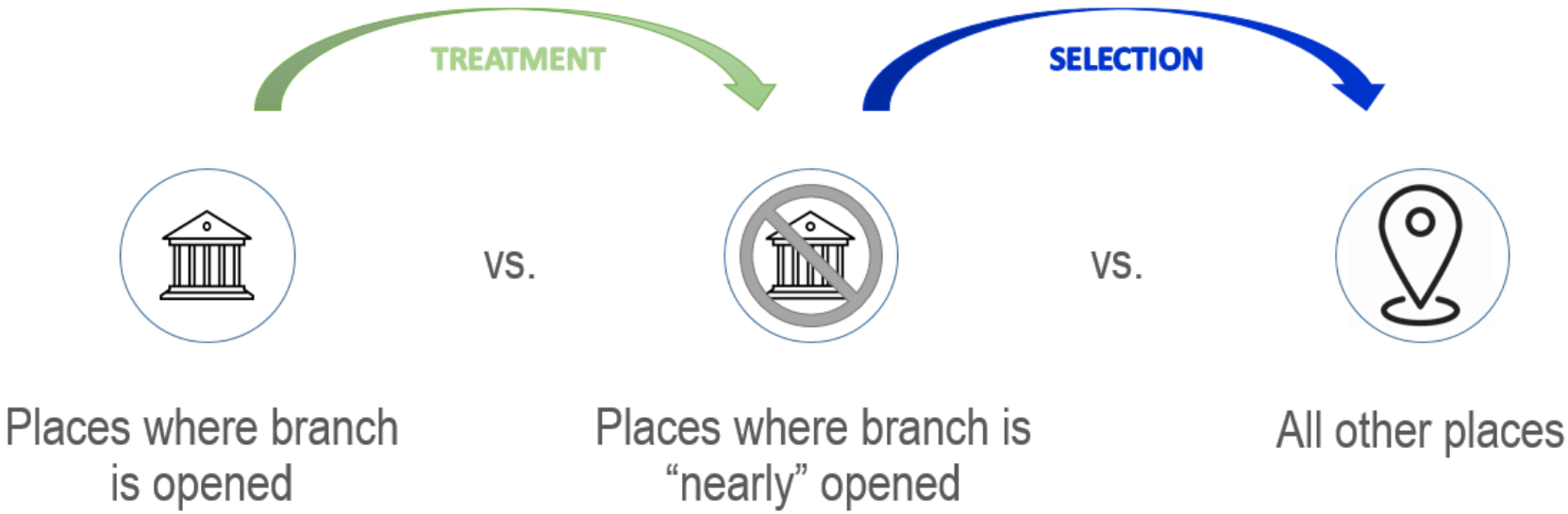
Withdrawal of application is plausibly exogenous

- The application process is involved and has a $\sim$ 90% consummation rate
- Few (<100) applications are rejected
- Banks have a short, 18 month window to open
- According to the OCC, withdrawals are "usually due to construction delays"
  $\rightarrow$ idiosyncratic cause

▸ Withdrawal Map ▸ Withdrawals Over Time

Recall: Identification Strategy

I compare 3 types of locations:



Recall: Identification Strategy

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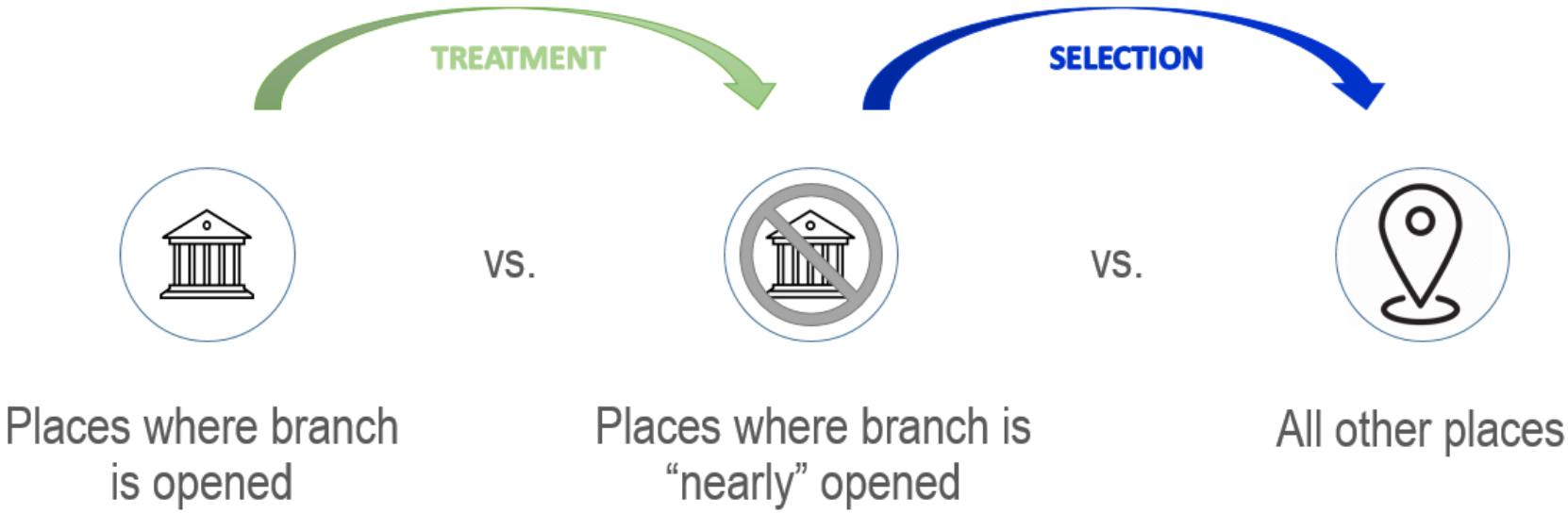
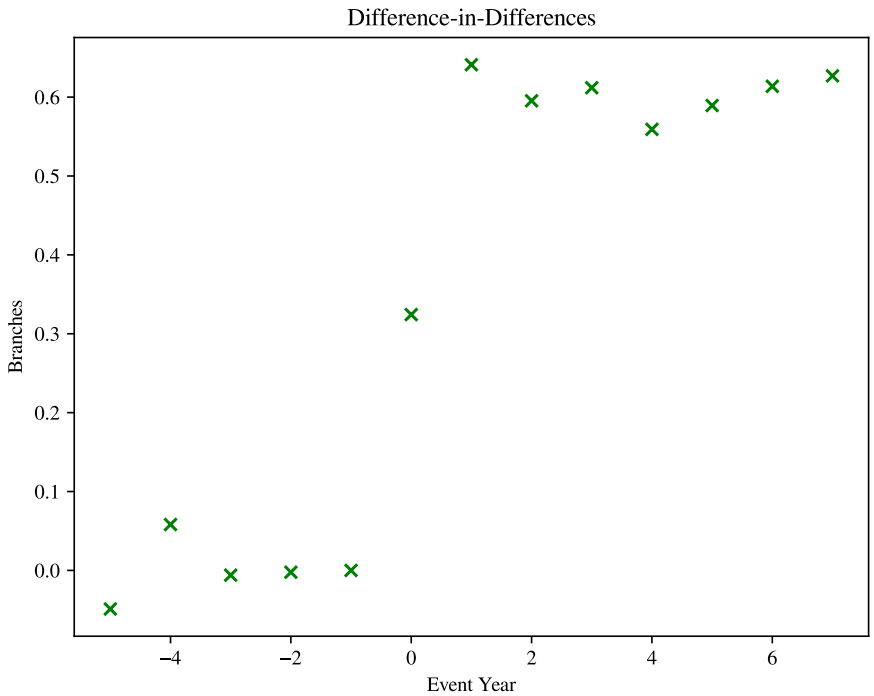
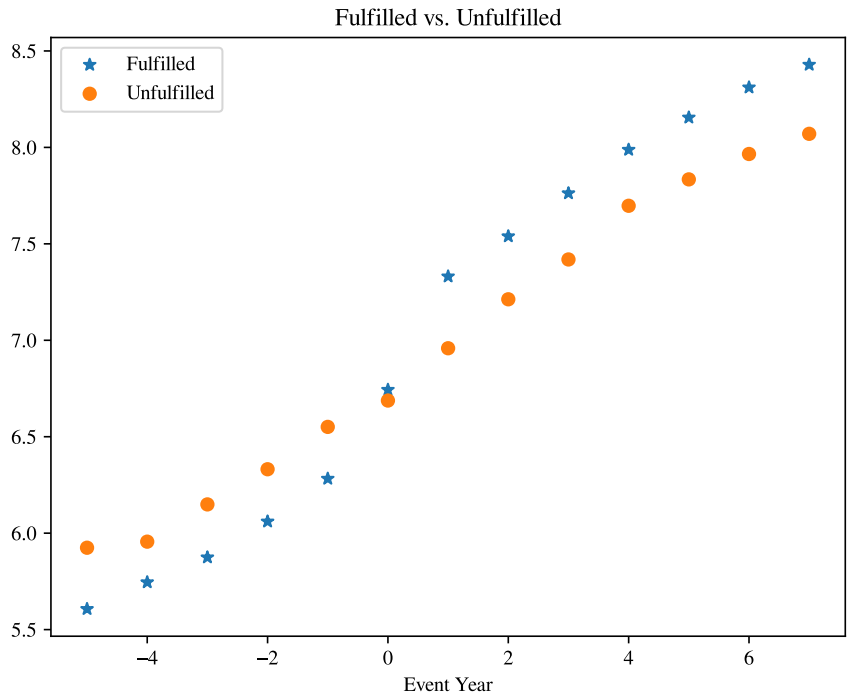


Does the first comparison yield suitable variation in the number of banks in an area?

Number of branches in ZIP-codes with Fulfilled vs. Unfulfilled applications





▸ OCC only

Outline

Data sources and coverage

Conventional data sources

- New Business Registration (ZIP-code) from Startup Cartography Project, 1988 - 2016
- SBA lending (borrower ZIP-code), 1991 – 2024
- FDIC Summary of Deposits, 1994-2024

Unconventional data sources

- OCC branch application data from their Corporate Application Search (CAS), 1990 – 2024
- Lights – Google Earth Engine, 1992 – 2013

Nighttime lights measure local economic development

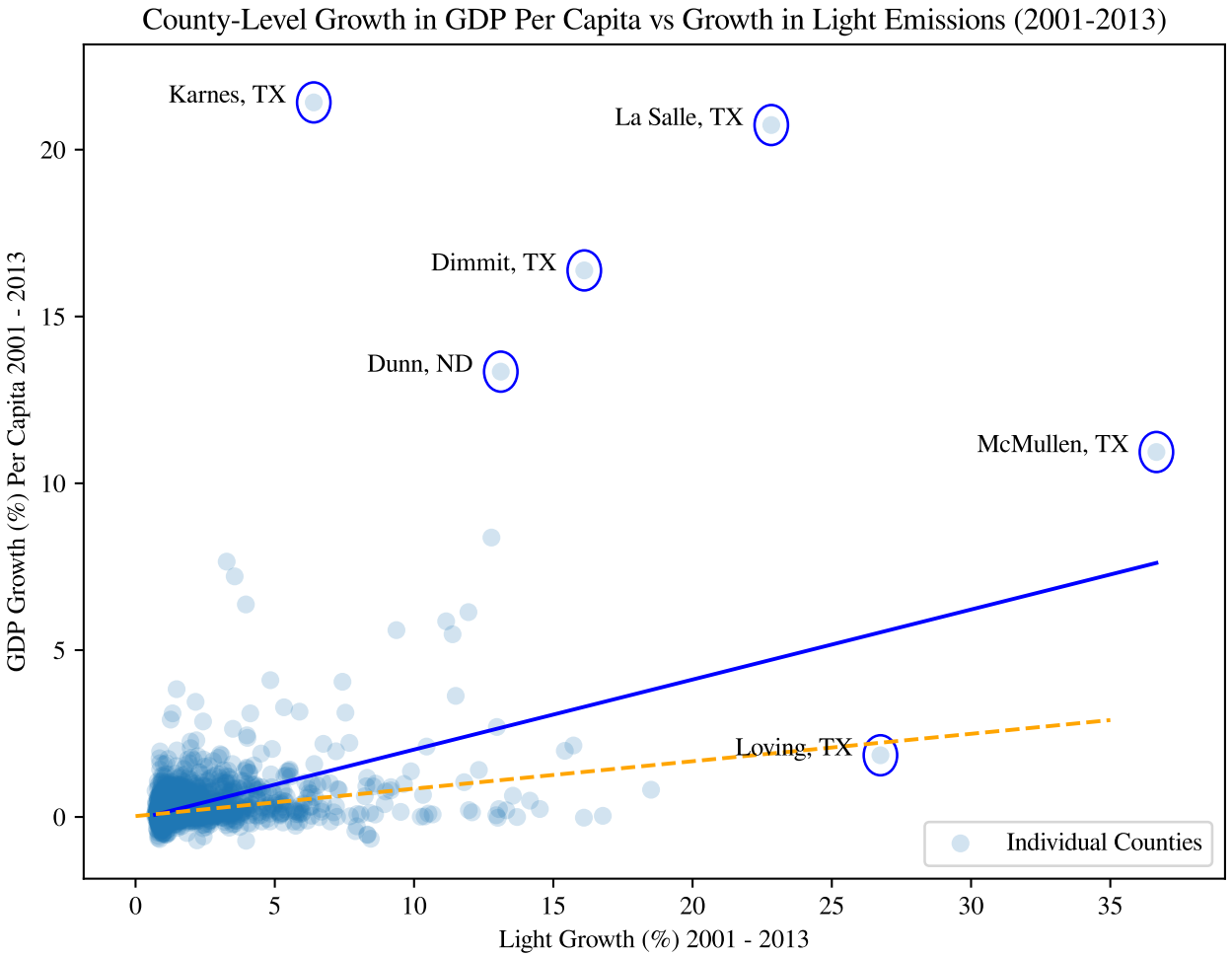
Henderson et al. '12 : when conventional GDP growth is unreliable, an optimal estimate of economic growth is a roughly equal-weighted blend of conventional GDP growth and growth predicted by changes in light emissions.

Nearly all economic activity at night results in increased light output.

The granularity of the lights data make it a promising outcome variable to explore the local impact of branch entry.

▸ More Detail

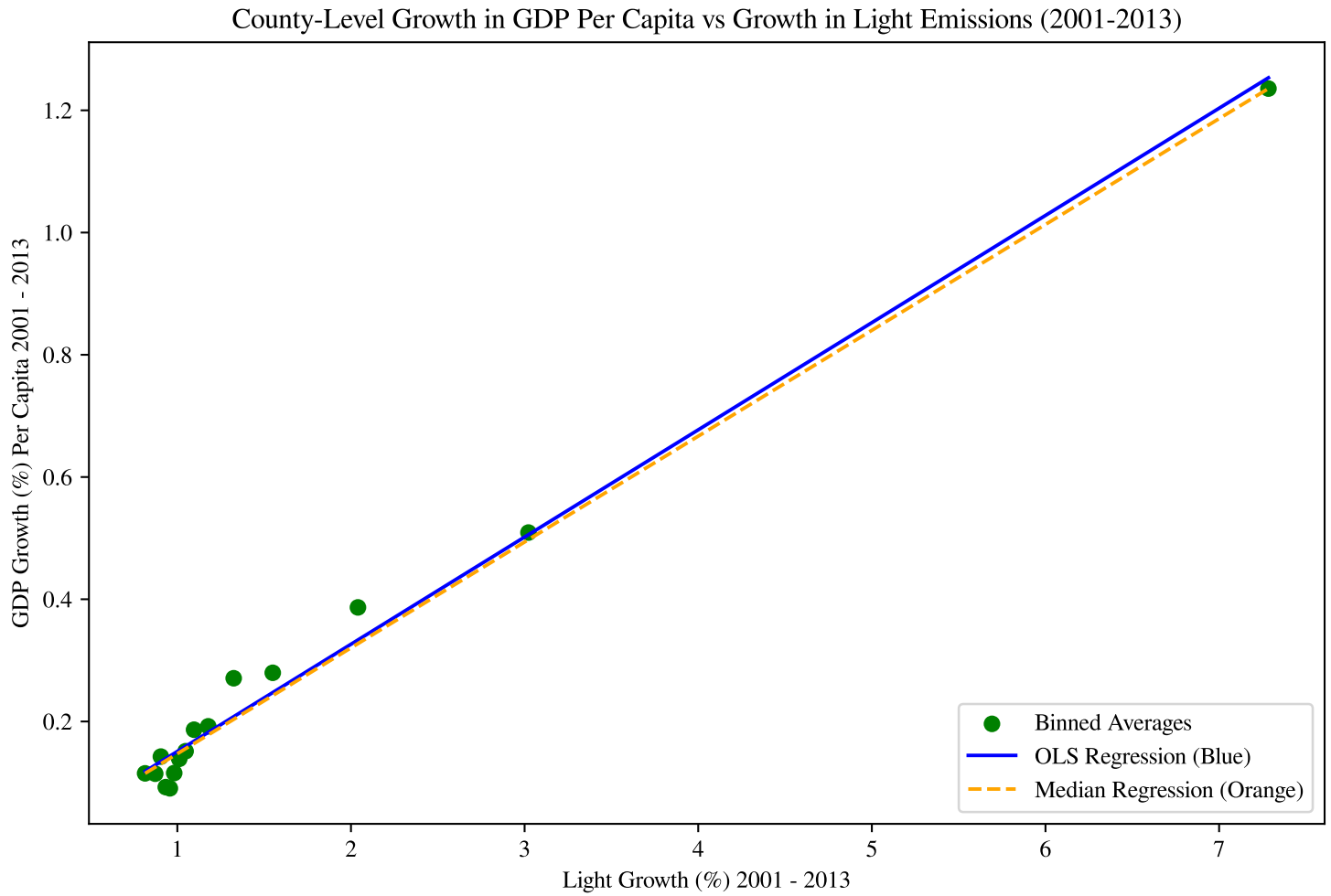
County-level light growth correlates to GDP growth



OLS Regression (Blue):
y = -0.08 + 0.21*x
T-statistics: (-4) (29)
R-squared: 0.21

Median Regression (Orange):
y = 0.03 + 0.08*x
T-statistics: (4) (35)
R-squared: ----------

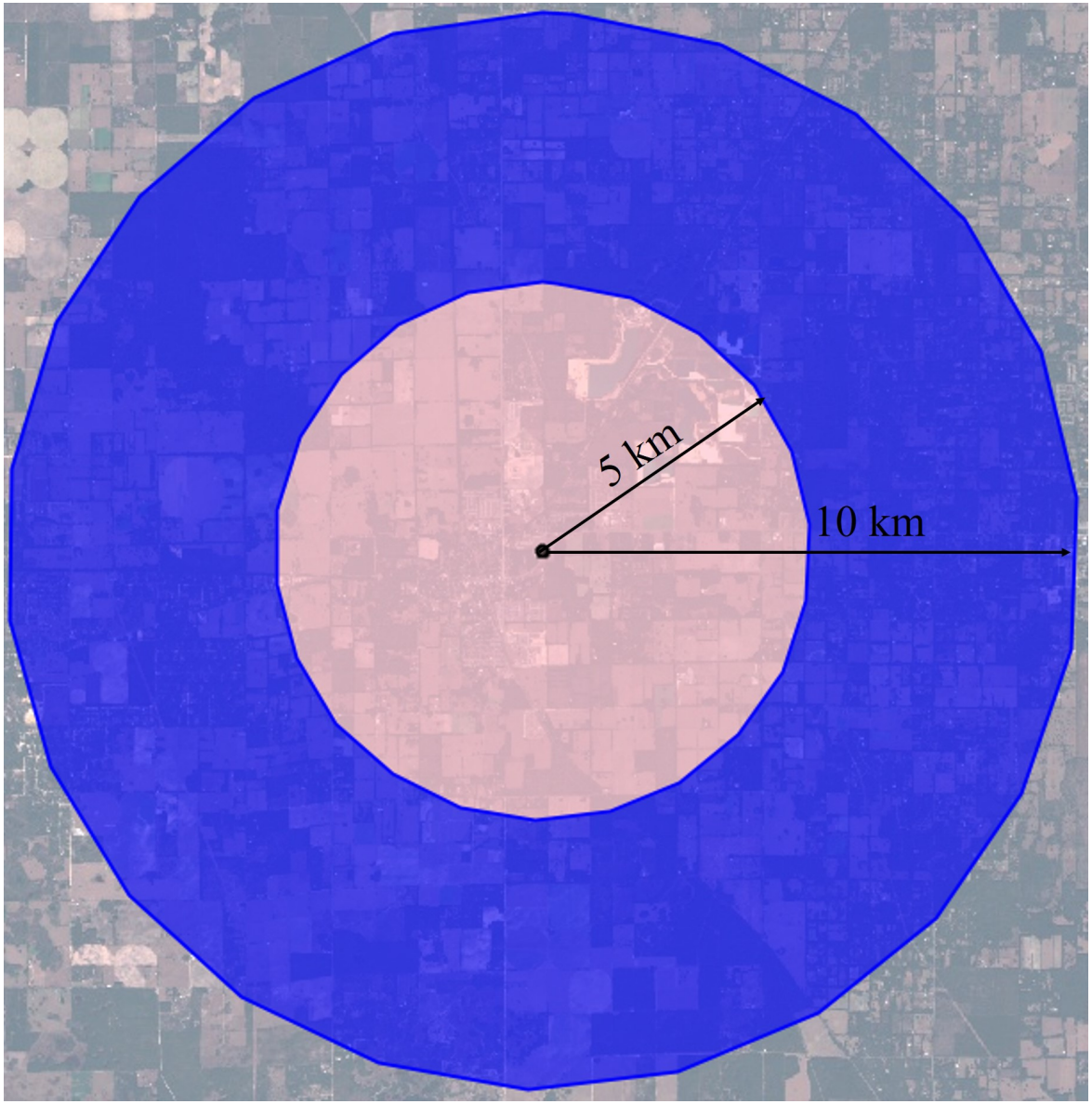
County-level light growth correlates to GDP growth



OLS Regression (Blue):
y = -0.02 + 0.18*x
T-statistics: (-2) (32)
R-squared: 0.99

Median Regression (Orange):
y = -0.03 + 0.17*x
T-statistics: (-1) (21)
R-squared: ----------

Lights Data: Newberry, Florida Example



Disentangling treatment and selection

Disentangling treatment and selection

Modified Callaway and Sant'Anna '21 Approach

CSA use either **not yet treated** or **never treated** units as controls.

Similarly, I compare locations with unfulfilled branches to locations with fulfilled branches:

$$\begin{aligned} ATU(g,t) =& \mathbb{E}[Y_t(g,0) - Y_{g-1}(g,0) \mid G = g, U = 0] \\ & - \mathbb{E}[Y_t(g,1) - Y_{g-1}(g,1) \mid G = g, U = 1] \end{aligned} \tag{1}$$

- G is the calendar year of application (i.e., cohort)
- U is an indicator equal to one if the application is unfulfilled
- t is the event year.

▸ With covariates ▸ Parallel trends

Covariate Balance

Covariate Balance: Fulfilled vs. Unfulfilled Branches

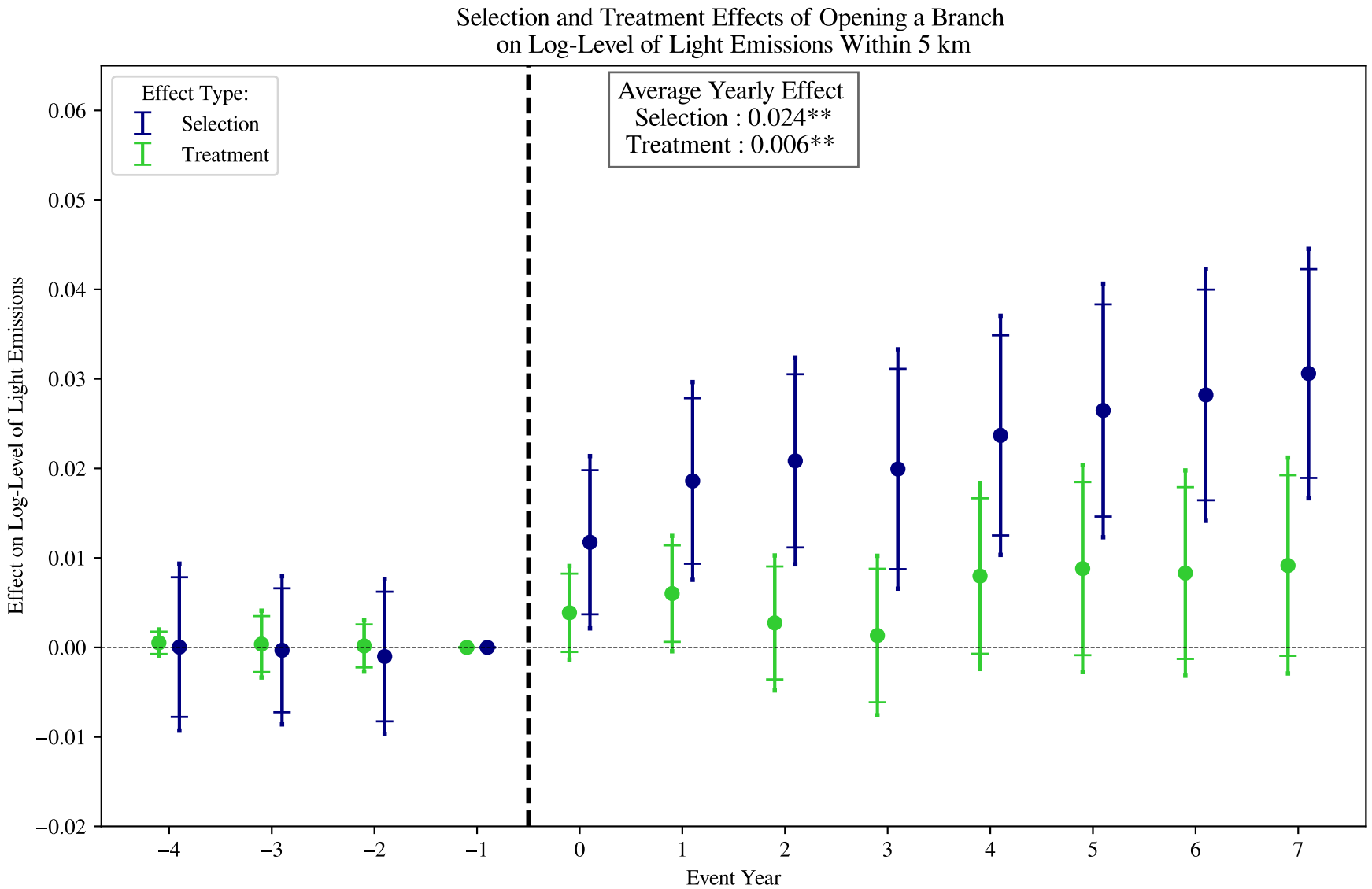
	Fulfilled			Unfulfilled			Difference	
	Count	Mean	Median	Count	Mean	Median	Mean	p-value
$lights_{t-1}$	5733	38.54	41.14	349	38.27	41.45	0.27	0.69
$\Delta lights_{t-2,t-1}\%$	5733	-0.01	-0.01	349	-0.00	-0.00	-0.00	0.26
$\Delta lights_{t-4,t-1}\%$	5733	-0.01	-0.00	349	-0.00	0.00	-0.01	0.08
$branches_{t-1}$	5733	7.43	7.00	349	7.64	7.00	-0.21	0.52
$log(deposits)_{t-1}$	5544	12.22	12.41	340	12.21	12.45	0.01	0.85
$\Delta deposits_{t-2,t-1}\%$	5551	0.05	0.03	340	0.07	0.03	-0.01	0.16
$\Delta deposits_{t-4,t-1}\%$	4240	0.28	0.08	284	0.29	0.08	-0.02	0.74

Outline

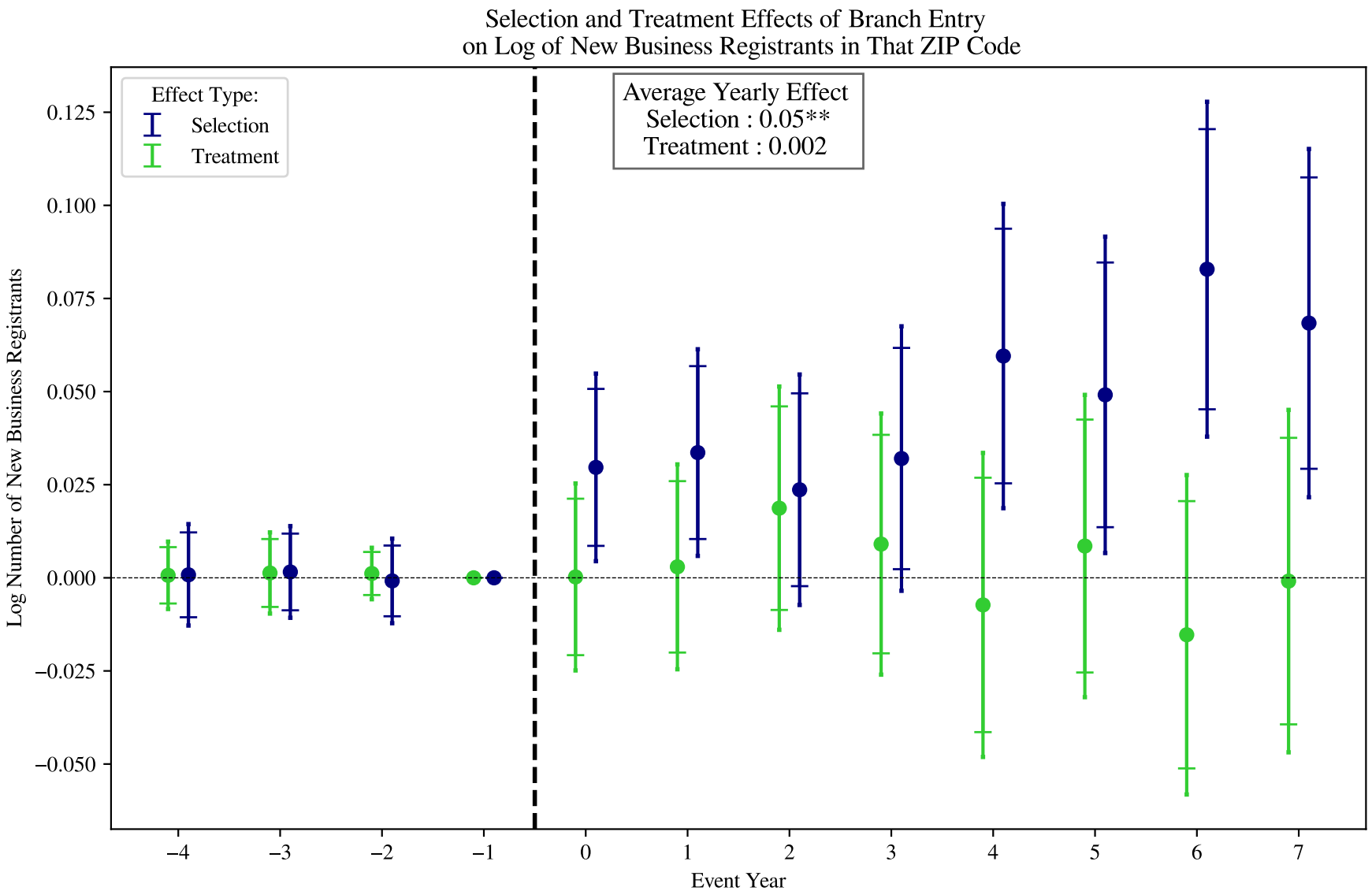
Number of observations with lights data

Year	Unfulfilled Branches	Fulfilled Branches
1996	28	634
1997	29	719
1998	46	572
1999	34	595
2000	35	409
2001	27	451
2002	21	411
2003	29	428
2004	34	575
2005	30	495
2006	36	444
Total	349	5733

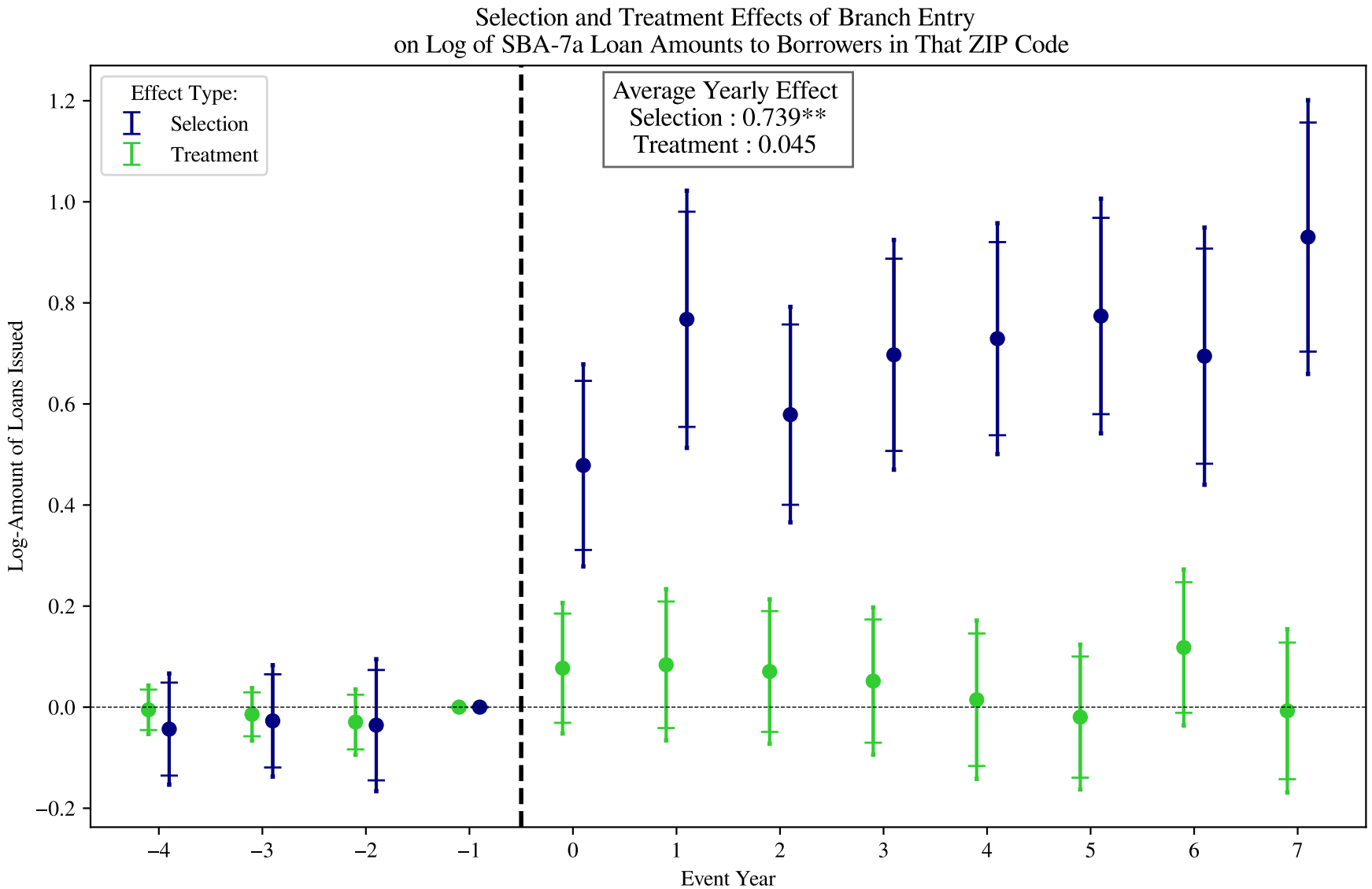
Night lights within 5 kilometers



New Business Registrants



SBA 7A Loan Amounts



Robustness checks

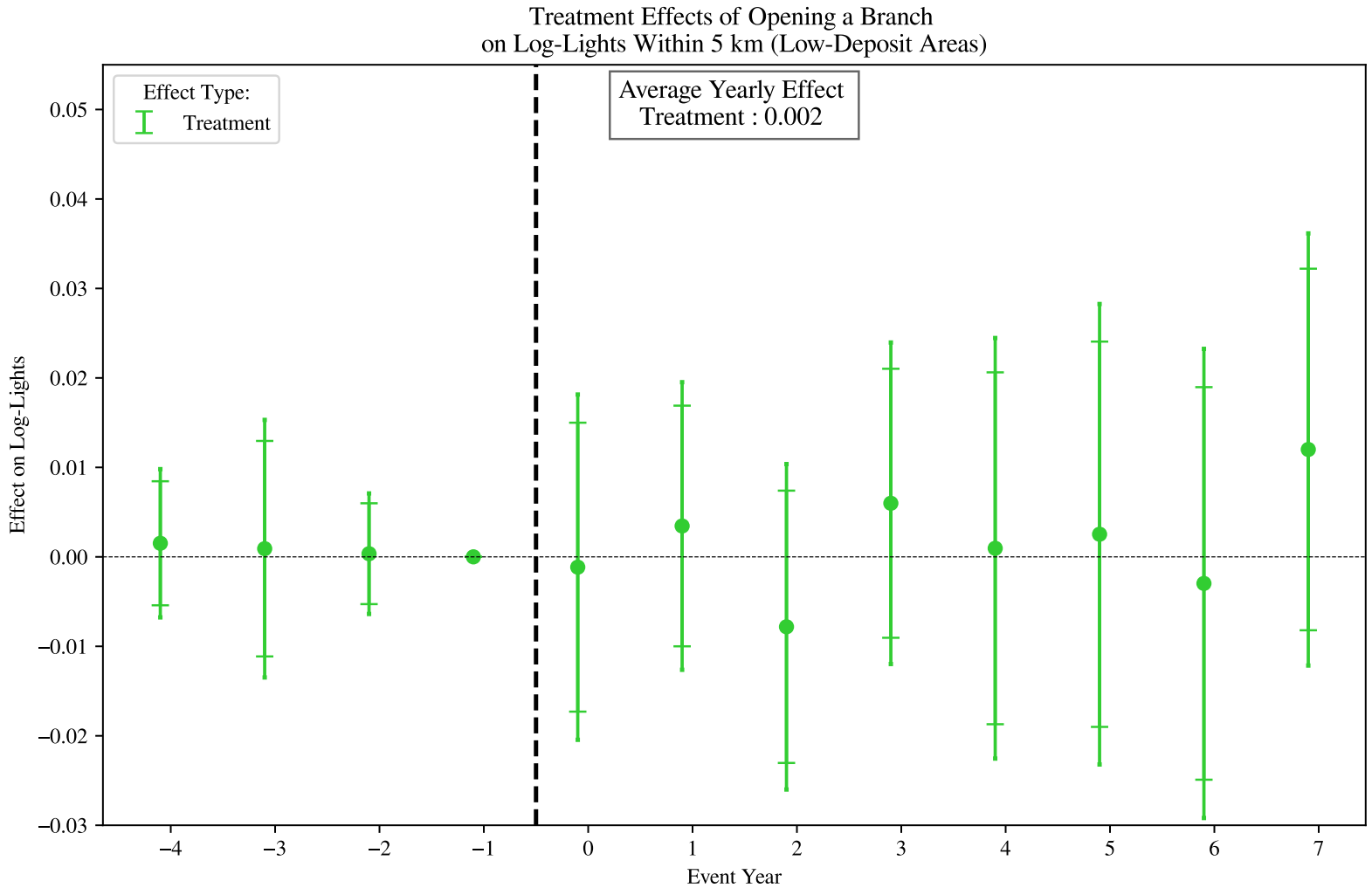
I find similar results when I:

- Consider only low-deposit areas
  ▸ low-deposit areas
- Equal-weight each cohort rather than weighting by withdrawals
  ▸ equal-weight
- Do not include controls
  ▸ no controls

No clear trend in the effects over time:

▸ Lights ▸ New Business Registrants ▸ SBA-7a lending

Treatment effects remain weak low-deposit areas



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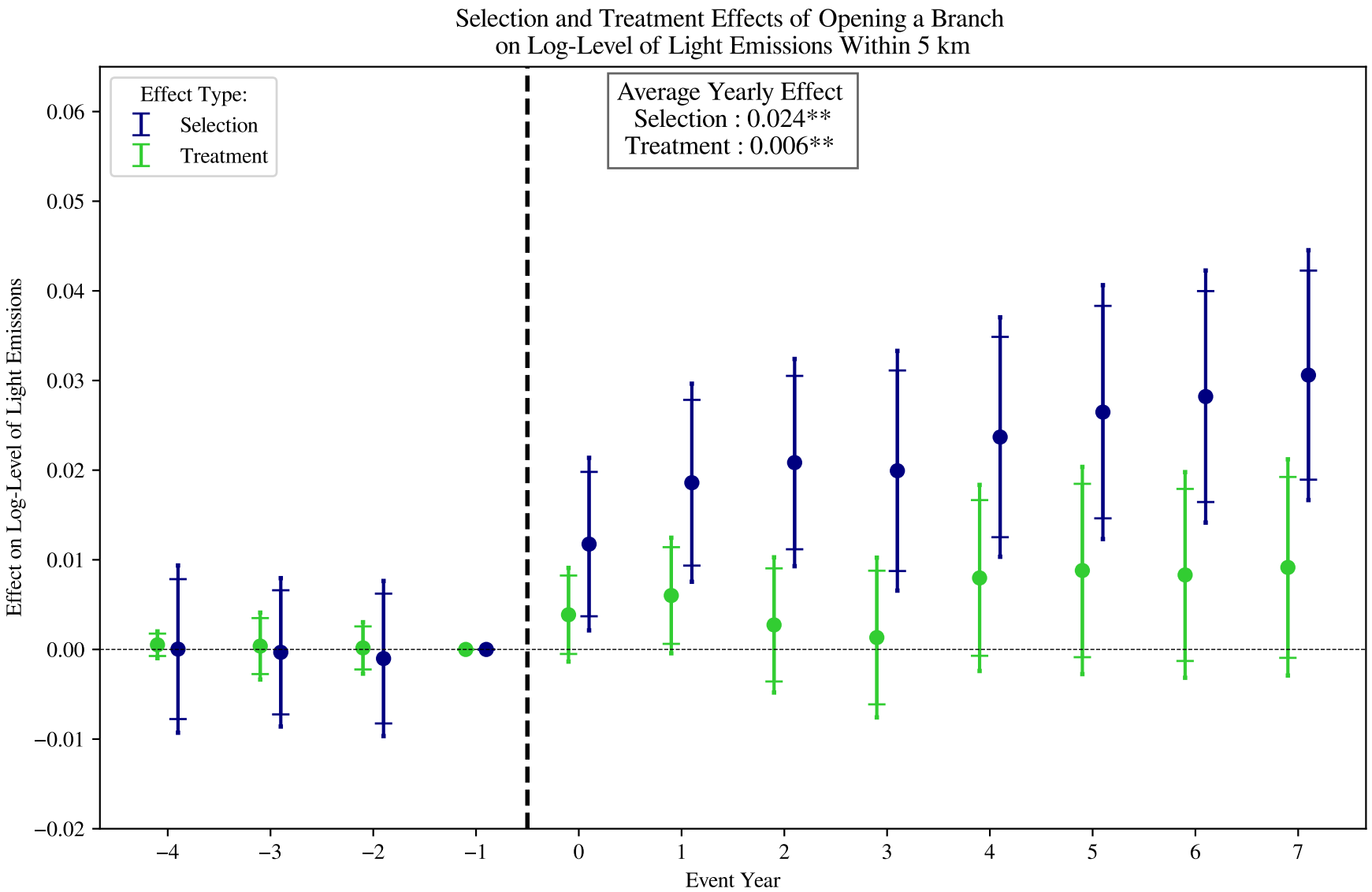
Effect Localization



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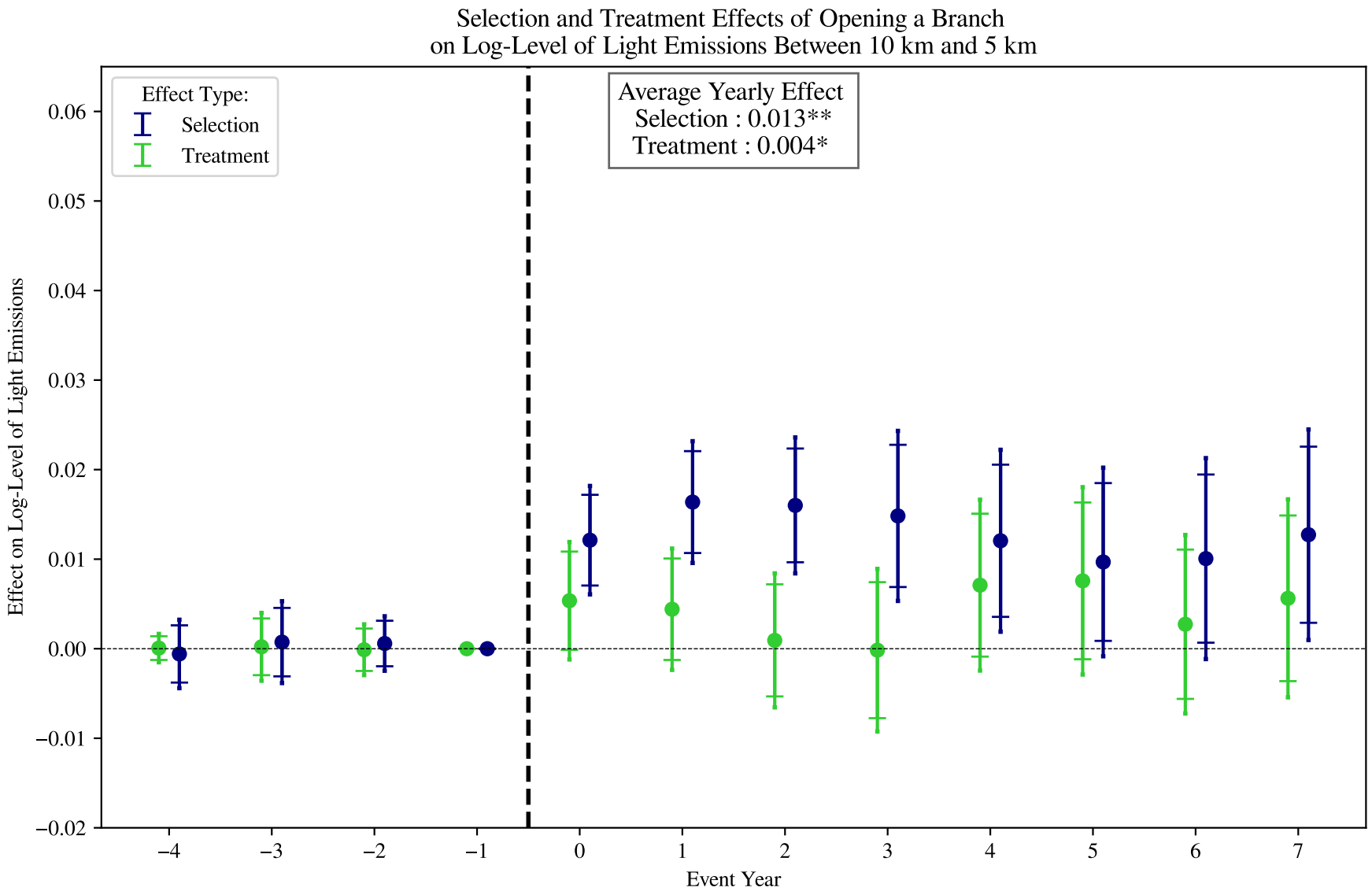

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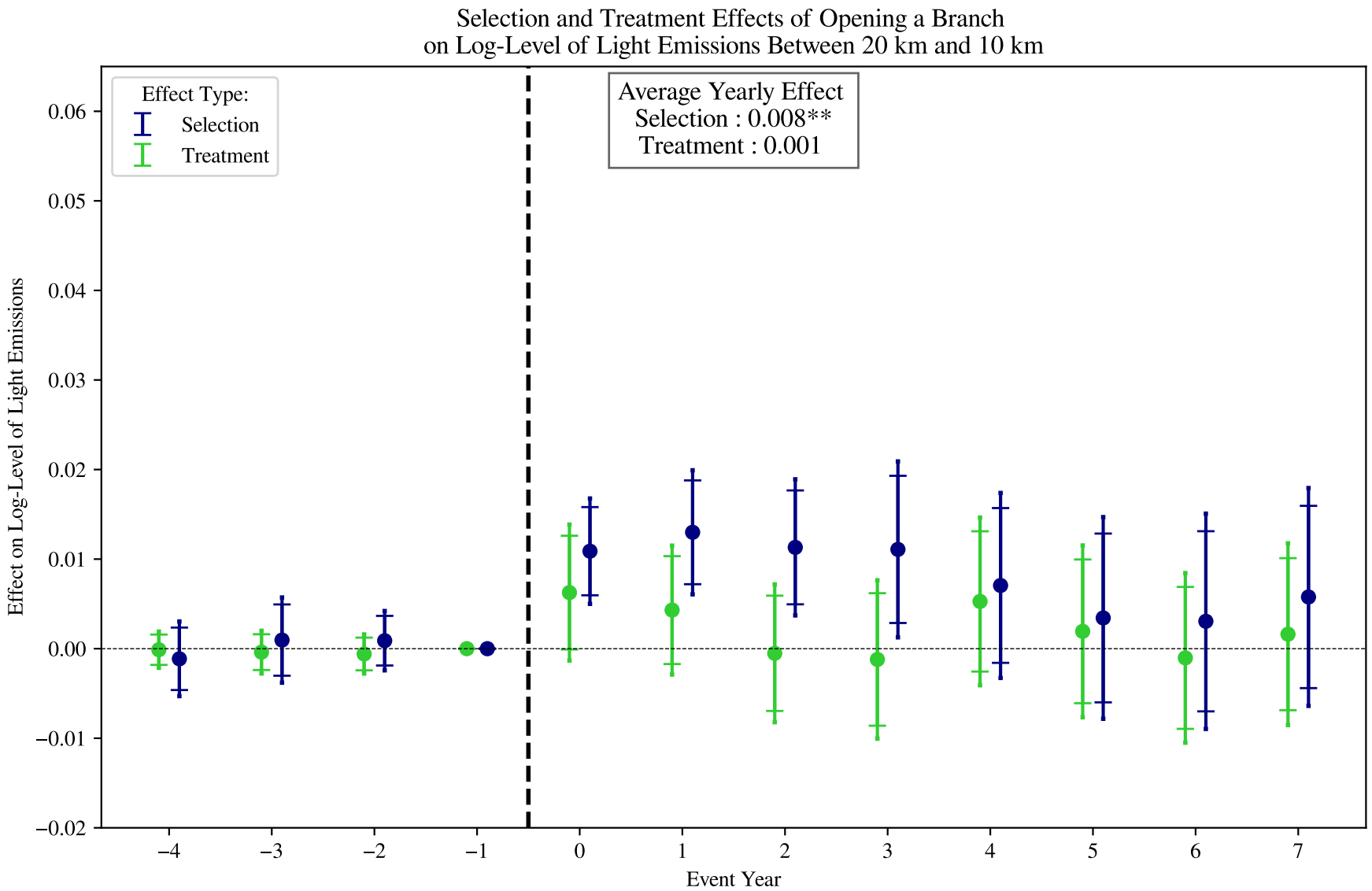

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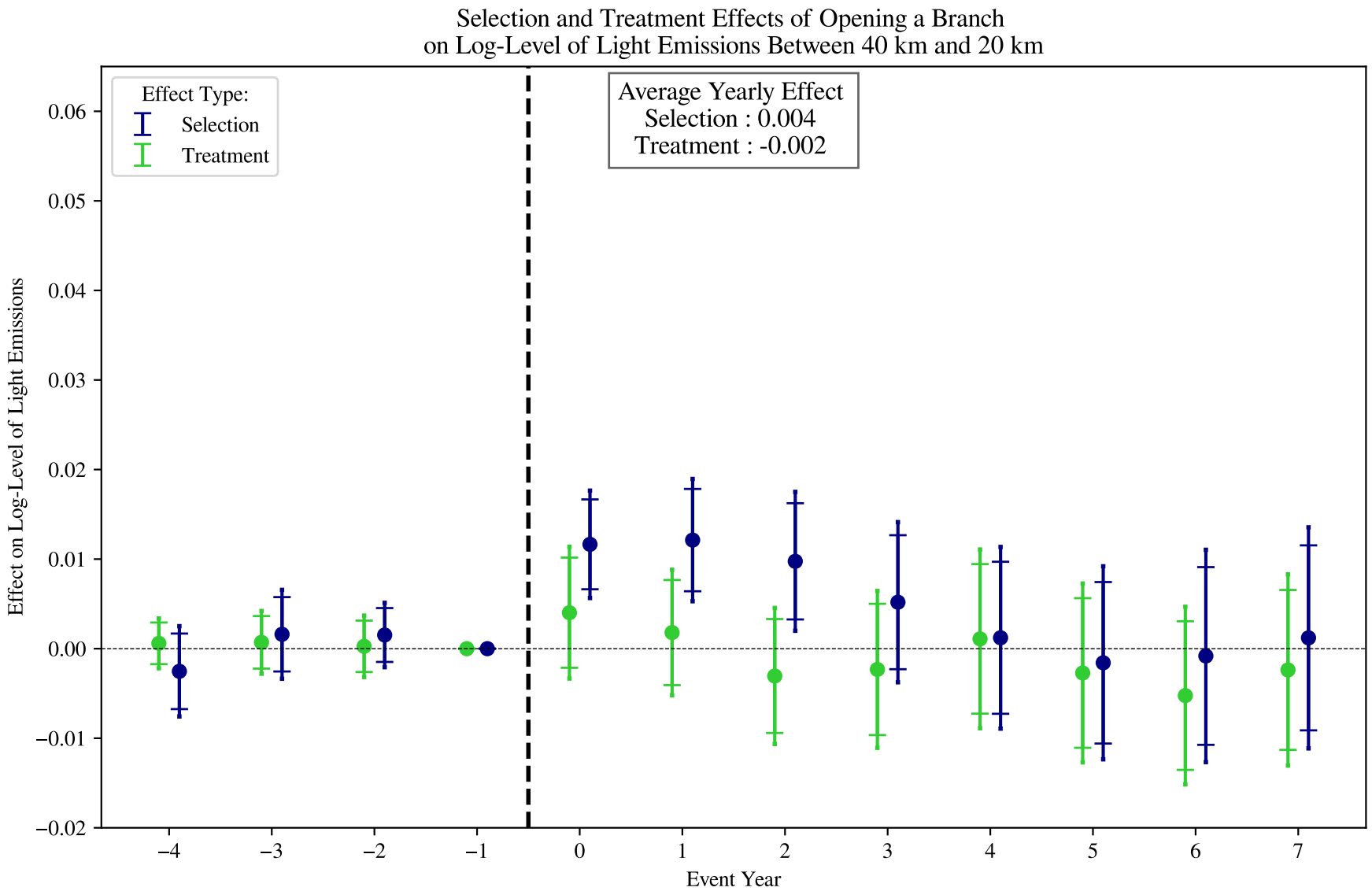

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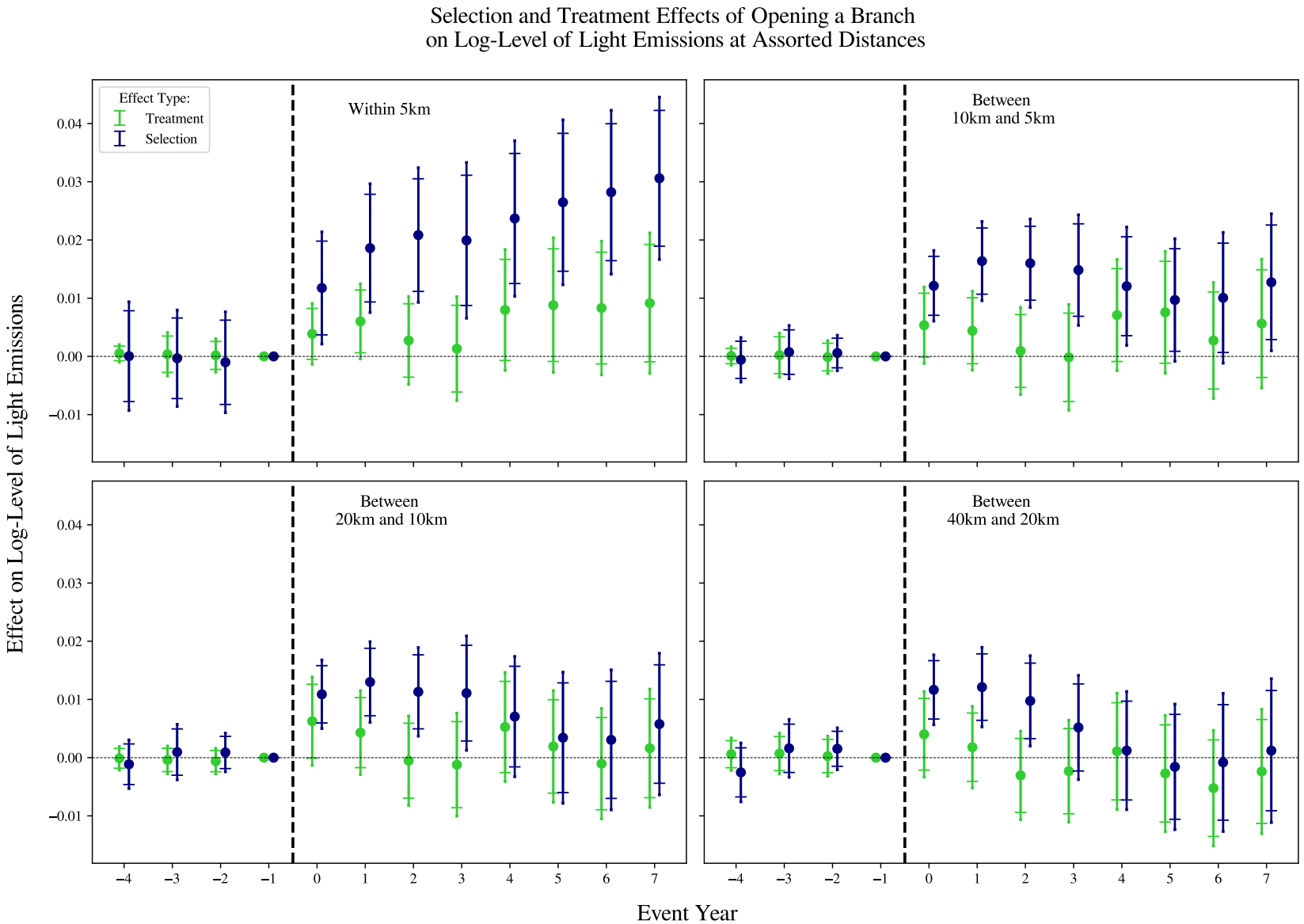
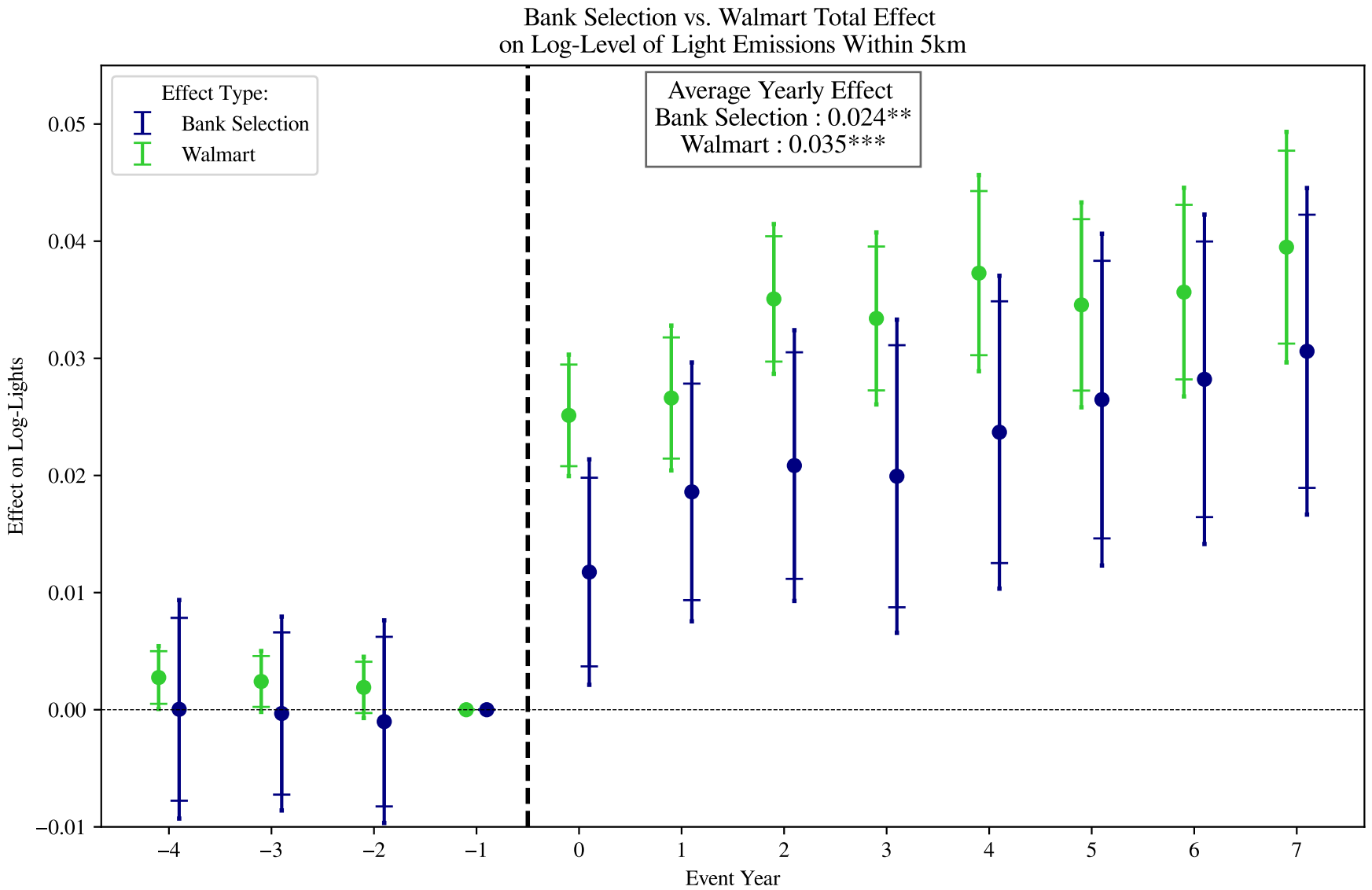


Plausibility check: comparing to Walmart



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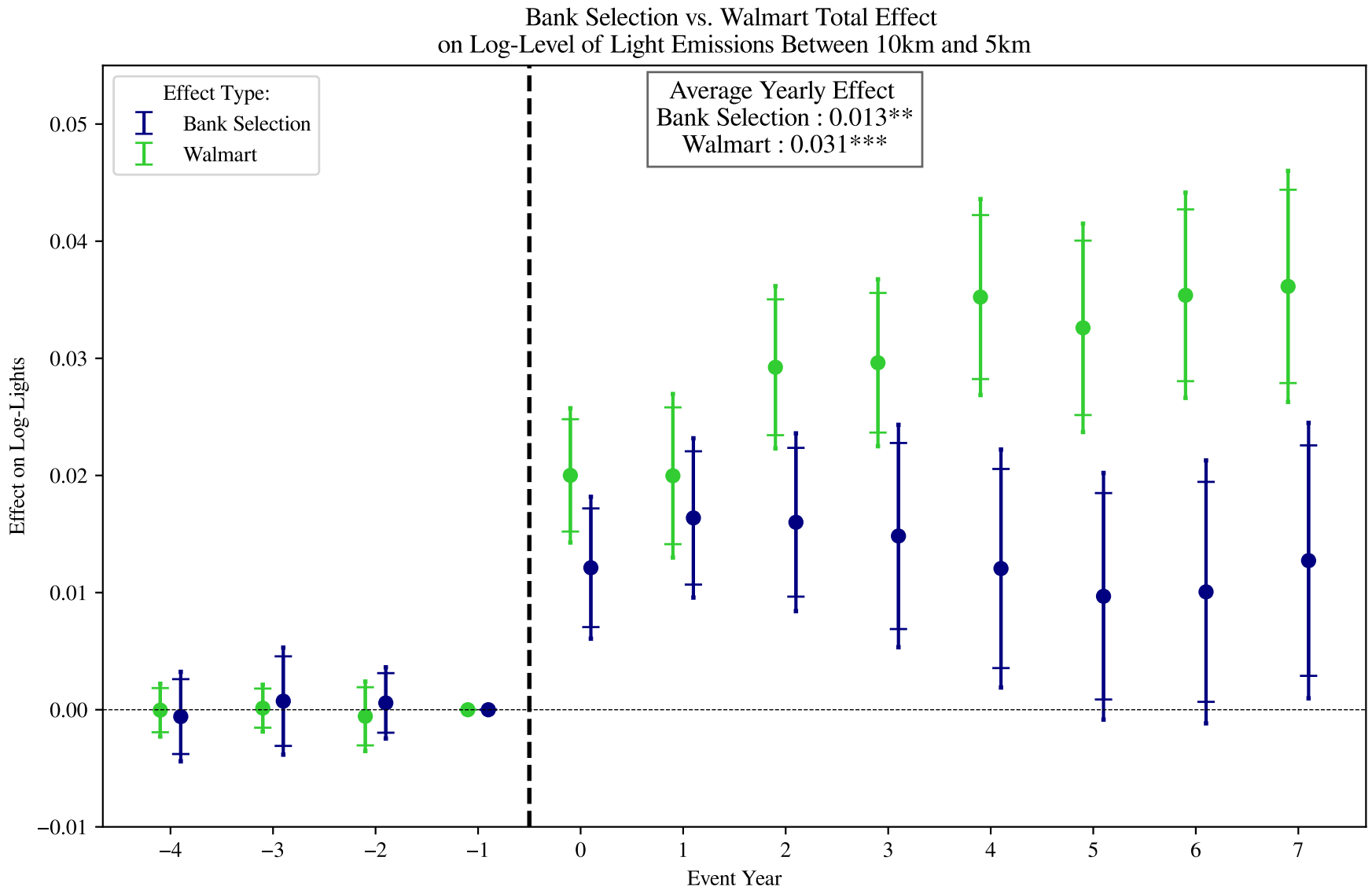

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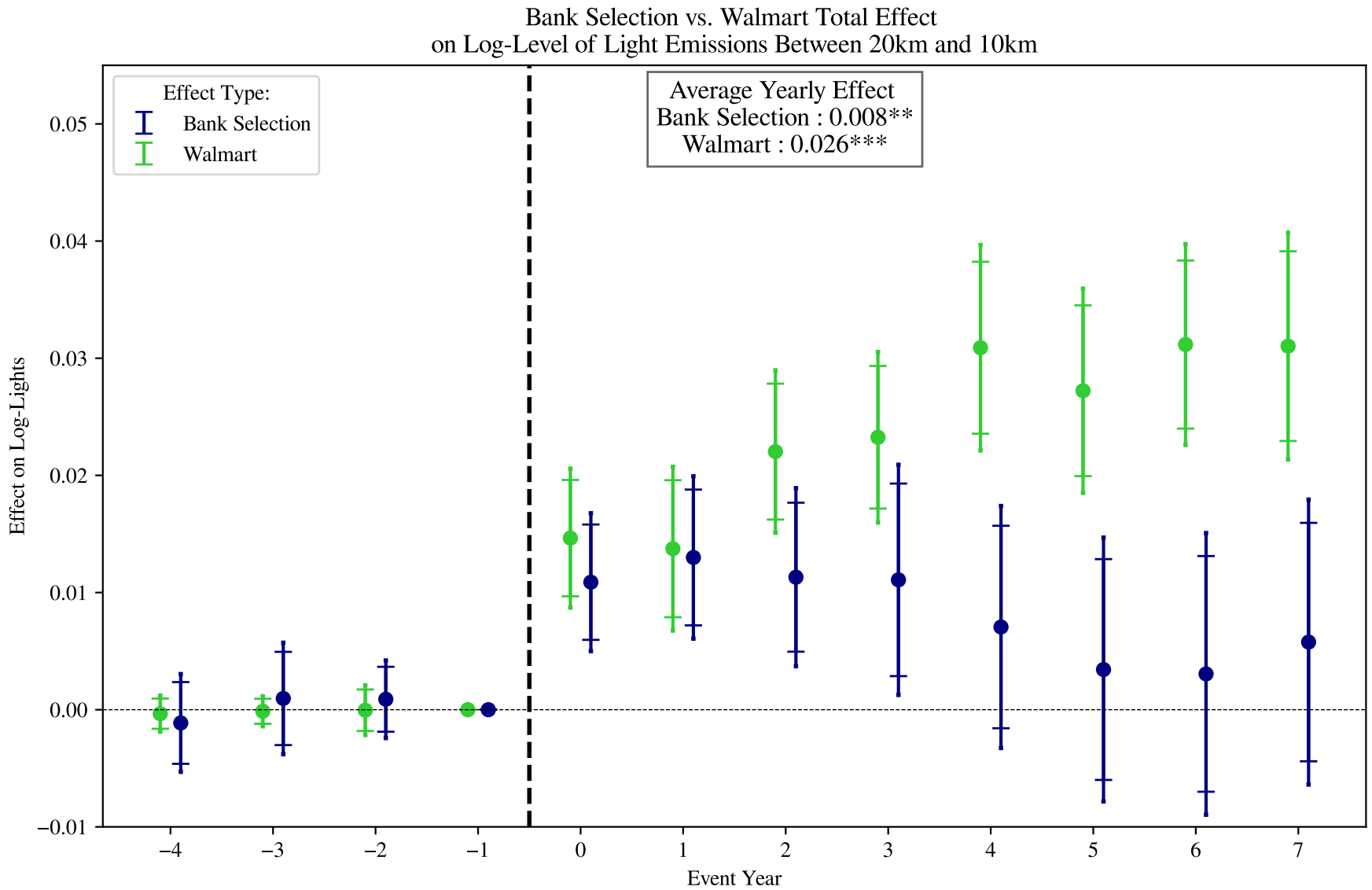

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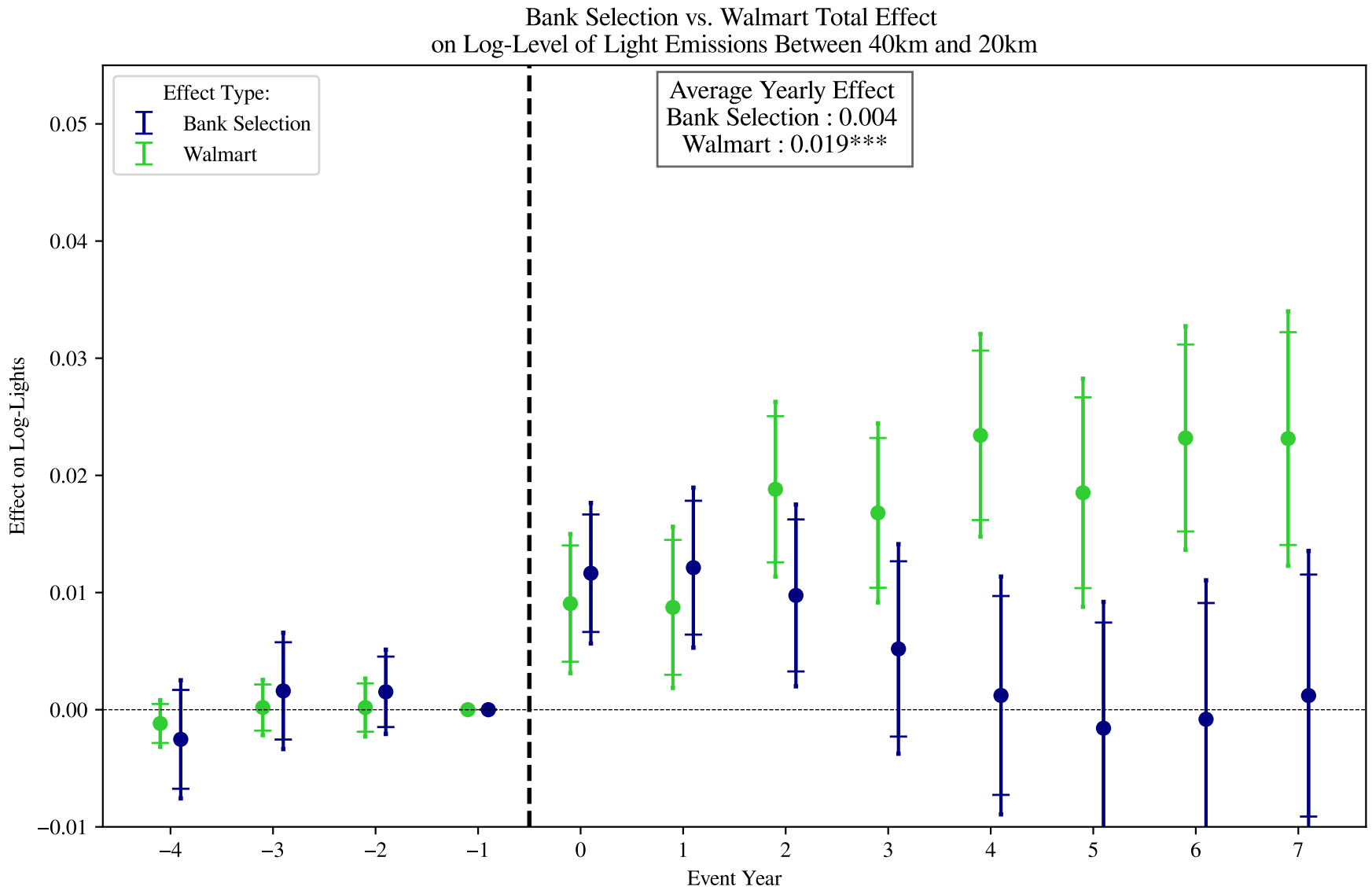

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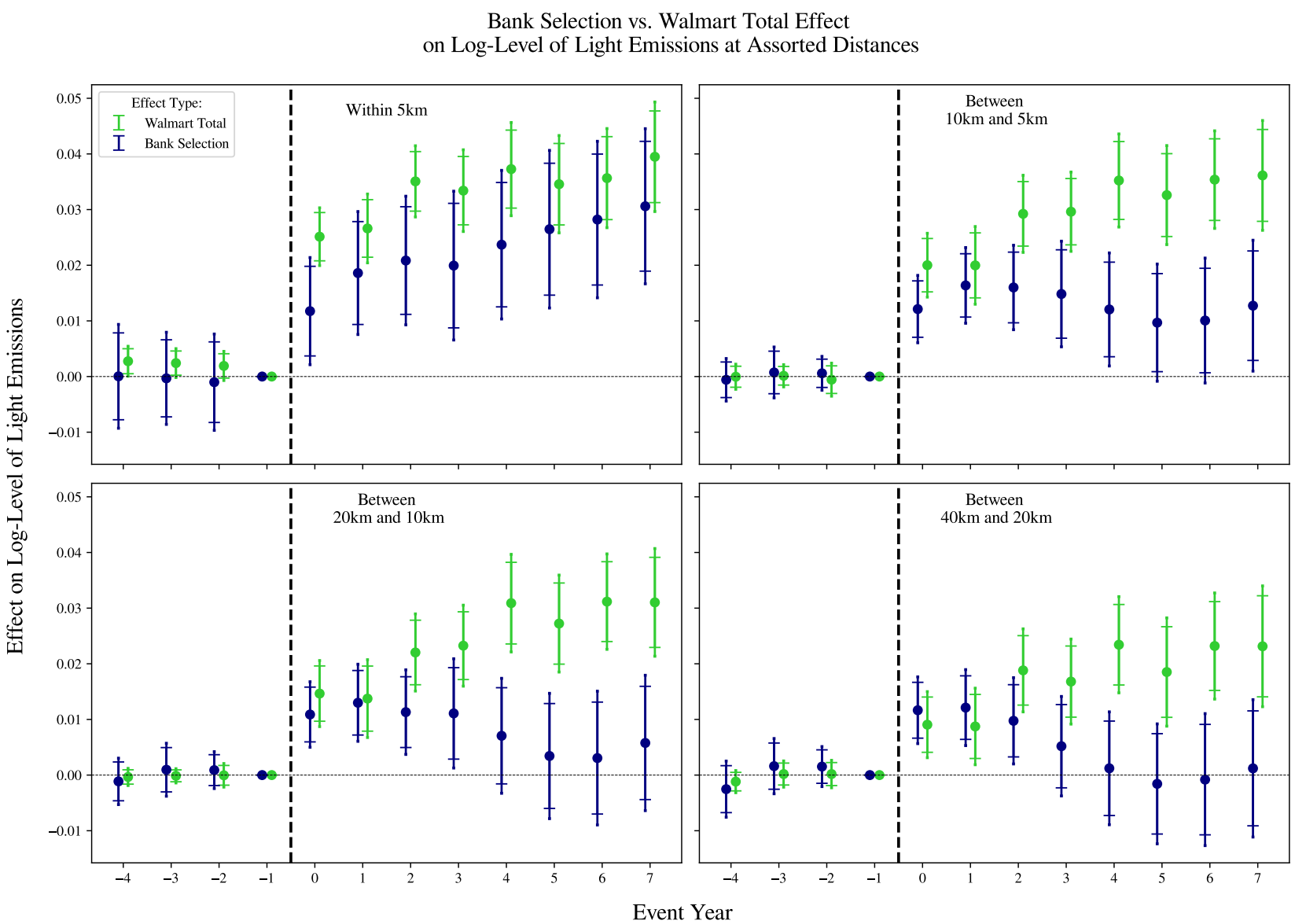

Outline

Discussion: Summarizing Results

- I introduce a novel identification strategy to disentangle selection and treatment effects of branch entry.
- Across three outcome variables, I find large, positive selection effects and small, generally insignificant treatment effects.
- The near-zero treatment effect runs counter to prior literature
- From a policy perspective, this should discourage attempts to artificially increase branch presence

Discussion: Selection in Bank Branching Deregulation Literature

- Large literature reports that state-level branching deregulation shocks improved economic outcomes (Jayaratne & Strahan '96, Chava et al. '13, Amore et al. '13, Cornaggia et al. '15)

- Subsequent papers suggest there may be *state-level* selection into deregulation (Kroszner & Strahan '99, Freeman '02, Berger et al. '21, Huang '08)

- I show that there are branch location selection effects *within* states that the deregulation approach does not take into account

This suggests, *but only suggests*, that local selection effects may be baked in to estimated treatment effects in the prior literature.

Questions?

Thank you!

Outline

News: branching is back?

America's Biggest Bank Is Growing the Old-Fashioned Way: Branches

Banking has gone digital, but JPMorgan is building bricks-and-mortar branches

By David Benoit Follow | *Photographs by José A. Alvarado Jr. for The Wall Street Journal*

Updated Feb. 6, 2024 10:42 am ET

"It is a love affair with branches, just to be totally clear"
– Chase CEO of CIB

"[JPMorgan] ran a block-by-block analysis of credit-card data to figure out where customers swiped and what they purchased"

"[BoA] evaluated hundreds of demographic variables and zeroed in on those that [predict] success: how many residents live nearby and household income growth. . . "

Example unfulfilled application

Corporate Applications Search Result Details

Details For OCC Control Number: **1999-ML-05-0220**

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Application Type: Branch Establishment

Transaction Form: Branch Establishment - Staffed Branch

Bank: **FIRST UNION NATIONAL BANK**

Charter/License #: 1

Bank Headquarters Location: FIRST UNION PLAZA
CHARLOTTE , NC 28288
County: Mecklenburg

Proposed Branches:

Branch Name	Street Address	Suite	City	State	Zip	County	Certification #
CLARKE ROAD BRANCH	VICINITY OF SE SILVER STAR AND CLARKE ROAD		OCOEE	FL	32701	Orange	116857A

Public Comment Information:

Comment Period Start Date	Comment Period End Date	Adjusted Period Start Date	Adjusted Period End Date	OCC Contact
1999-09-28	1999-10-27			ML Contact Info

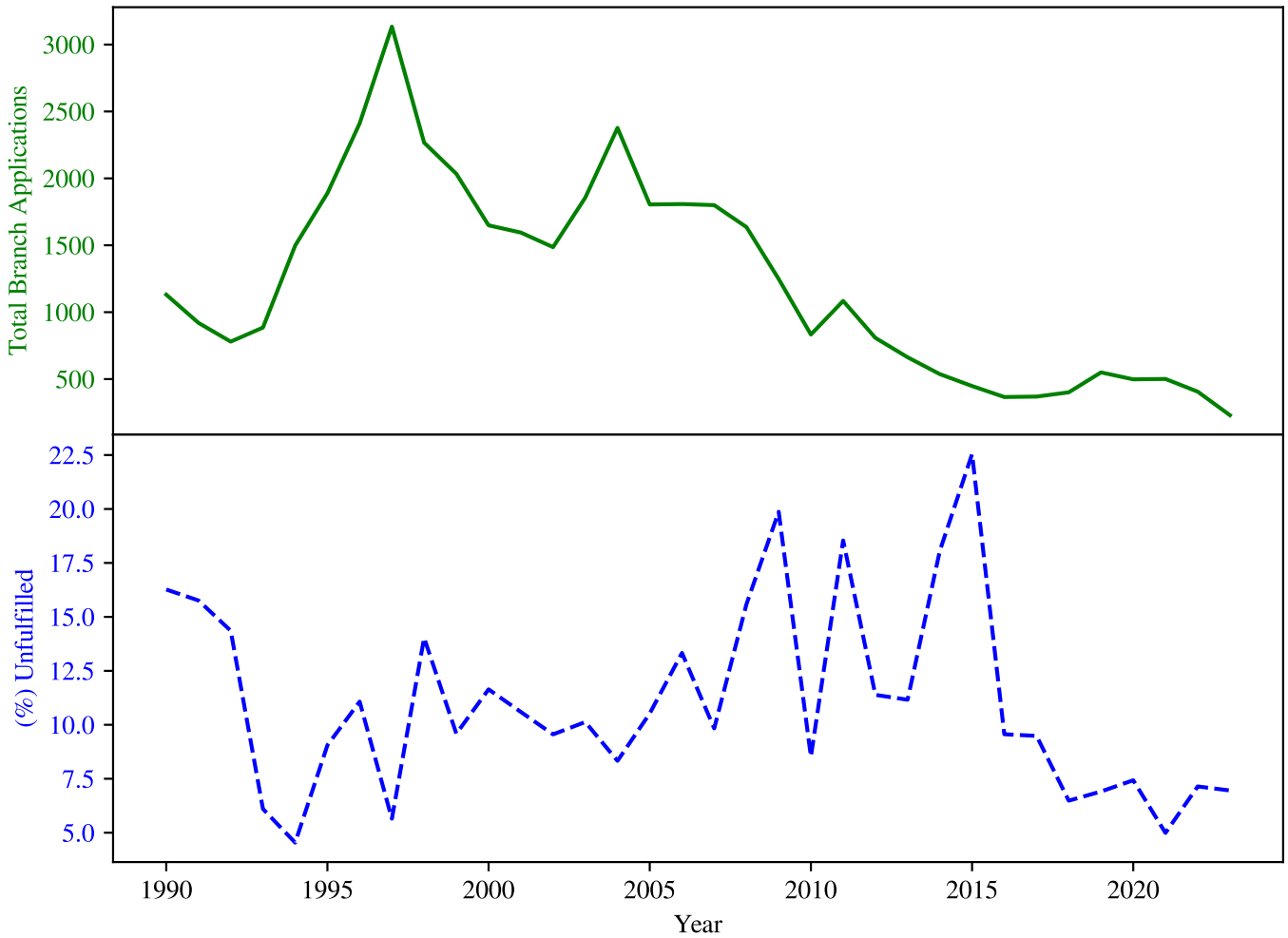
Filing Status:

Action	Date
Receipt	1999-09-28
Approved	1999-10-29
Withdrawn	2000-10-27

Go to Example Fulfilled Application

Unfulfilled applications over time

Number of Bank Branch Applications and Percentage Unfulfilled Over Time



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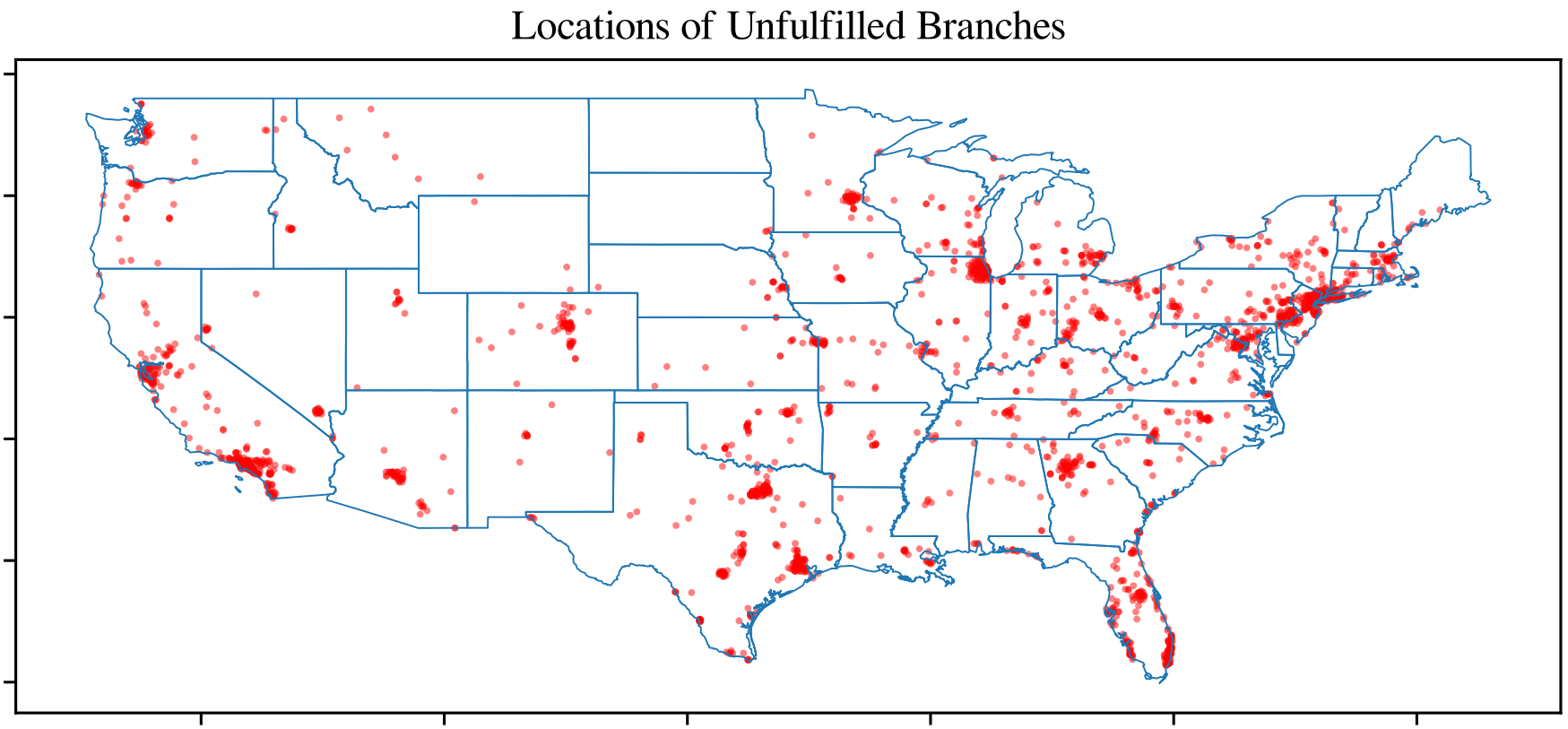
Withdrawal map



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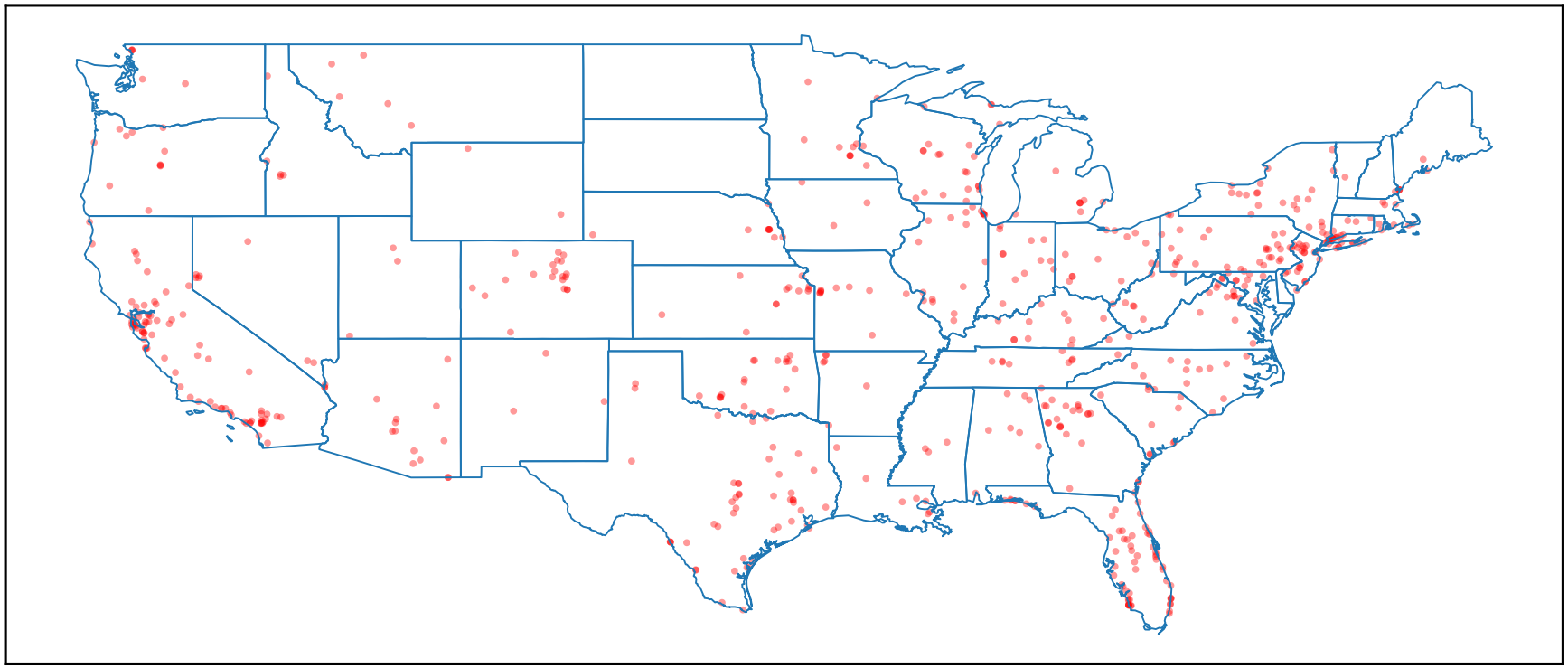
Withdrawal map

Locations of Unfulfilled Branches



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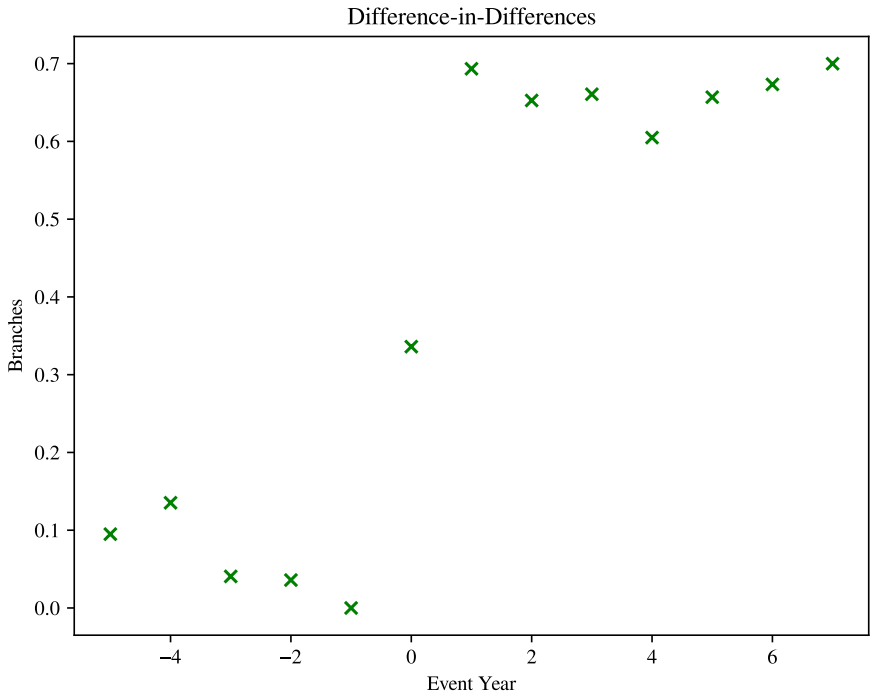
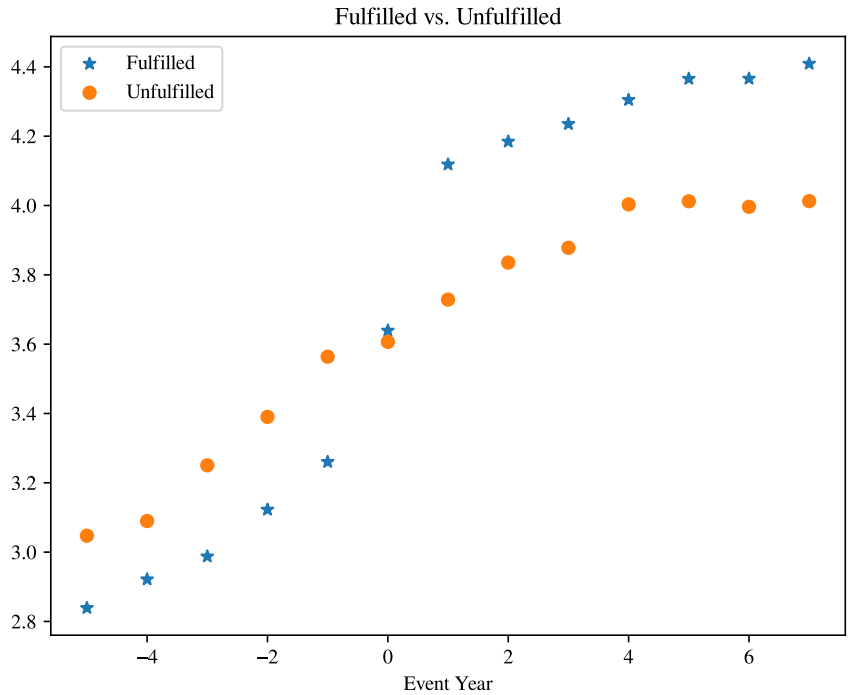
Number of branches in ZIP-codes with Fulfilled vs. Unfulfilled applications

Limited to OCC-regulated banks





▸ All branches

Nighttime lights data: more detail

DMSP-OLS : provided by Google Earth

- 14 Satellite Orbits per day, generating global coverage every 24 hours
- Data available in annual composites for 1992-2013 with $< 1km^2$ pixel granularity
- I intercalibrate individual satellites following Elvidge et al. '09

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Incorporating Covariates

- **Before:**

$$\begin{aligned} ATU(g,t) =& \mathbb{E}[Y_t(g,0) - Y_{g-1}(g,0) \mid G = g, U = 0] \\ & - \mathbb{E}[Y_t(g,1) - Y_{g-1}(g,1) \mid G = g, U = 1] \end{aligned} \tag{2}$$

- **With covariates:**

$$ATU_{ipw}(g,t) = \mathbb{E}\left[\left(\frac{\frac{p_g(X)F_g}{1-p_g(X)}}{\mathbb{E}\left[\frac{p_g(X)F_g}{1-p_g(X)}\right]} - \frac{U_g}{\mathbb{E}[U_g]}\right)(Y_t - Y_{g-1}) \middle| G = g\right]$$

- U_g (F_g) is an indicator equal to one if the application is in cohort g and is **U**nfulfilled (**F**ulfilled)
- $p_g(X)$ is the probability that an application in cohort g is Unfulfilled, conditional on the covariates X

Reweights fulfilled units to emphasize those most like unfulfilled within that cohort. back

Parallel trends assumption

(Analogous to Callaway and Sant'anna '21)

For each application year group g and each time $t \geq g$:

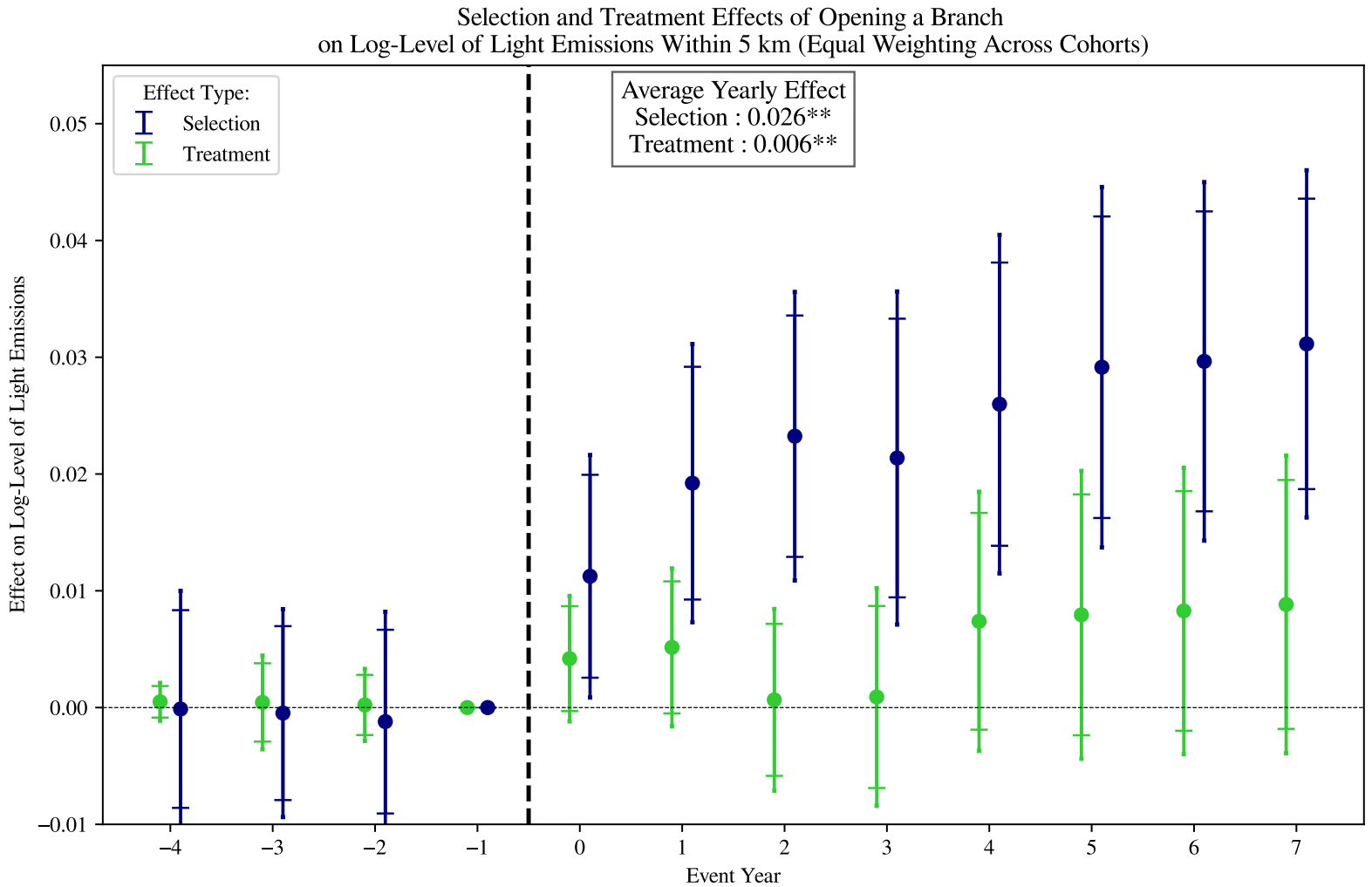
$$\begin{aligned} &\mathbb{E}[Y_t(g,0) - Y_{t-1}(g,0) | G = g, U = 1] \\ &\quad = \mathbb{E}[Y_t(g,0) - Y_{t-1}(g,0) | G = g, U = 0] \end{aligned} \tag{3}$$

In words: If an unfulfilled branch from application year g had instead been completed, the outcome at its location would have changed the same amount between $t-1$ and t as it did at the locations where the branch was in fact completed. back

Year	ZIP Codes with Unfulfilled Branches	ZIP Codes with Fulfilled Branches
1992	11	157
1993	4	197
1994	14	290
1995	15	424
1996	42	494
1997	22	598
1998	61	450
1999	37	382
2000	38	318
2001	27	317
2002	20	312
2003	26	350
2004	28	433
2005	31	363
2006	38	350
2007	32	363
2008	36	299
2009	31	200
Total	513	6297

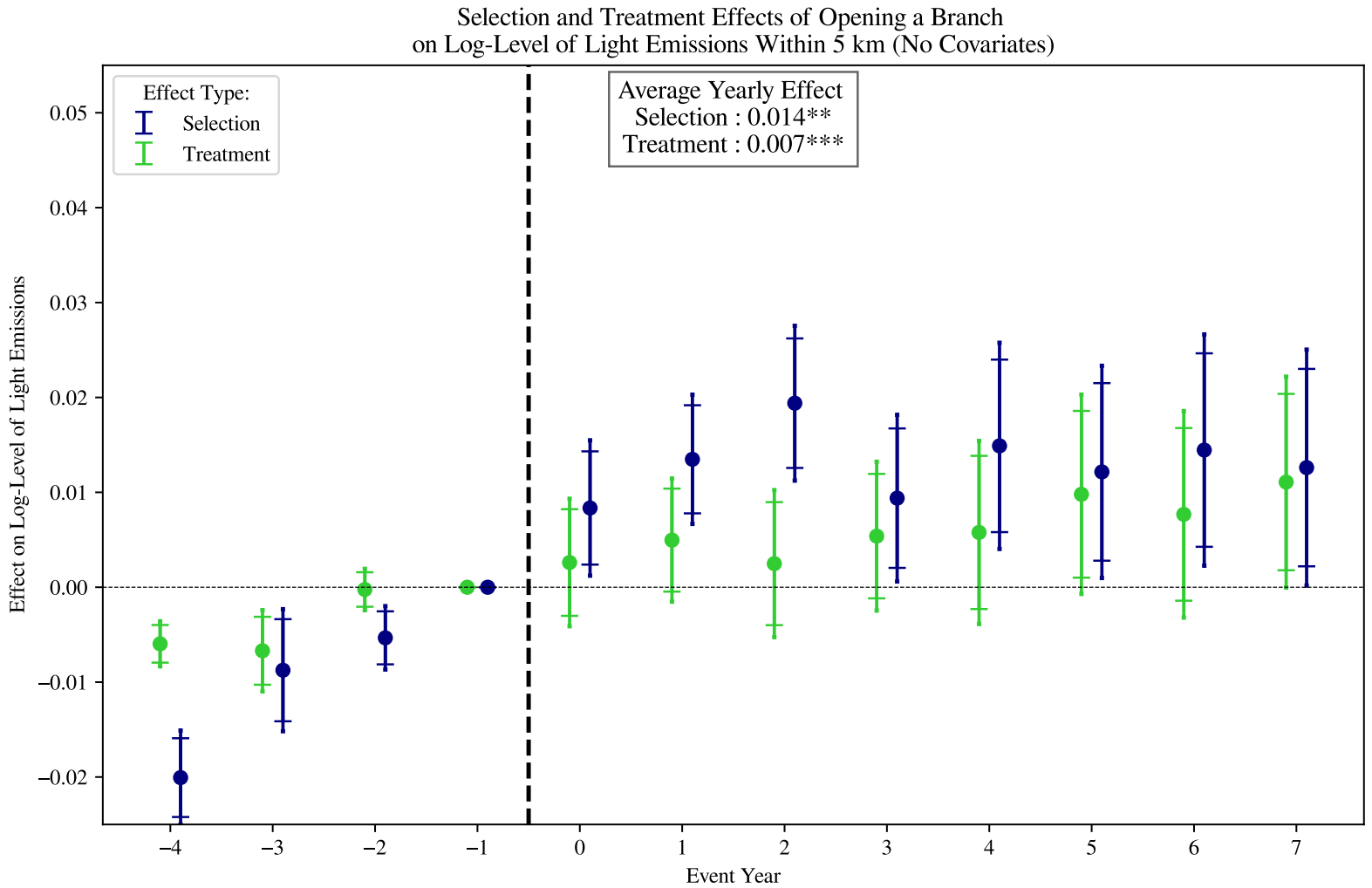
Year	ZIP Codes with Unfulfilled Branches	ZIP Codes with Fulfilled Branches
1995	7	135
1996	21	172
1997	11	239
1998	34	176
1999	15	148
2000	18	150
2001	7	149
2002	9	121
2003	13	175
2004	14	225
2005	14	171
2006	19	152
2007	11	197
2008	22	157
2009	12	115
2010	5	89
2011	4	108
2012	6	69
2013	7	61
2014	10	52
2015	9	30
2016	3	34

Equal-weighting each cohort



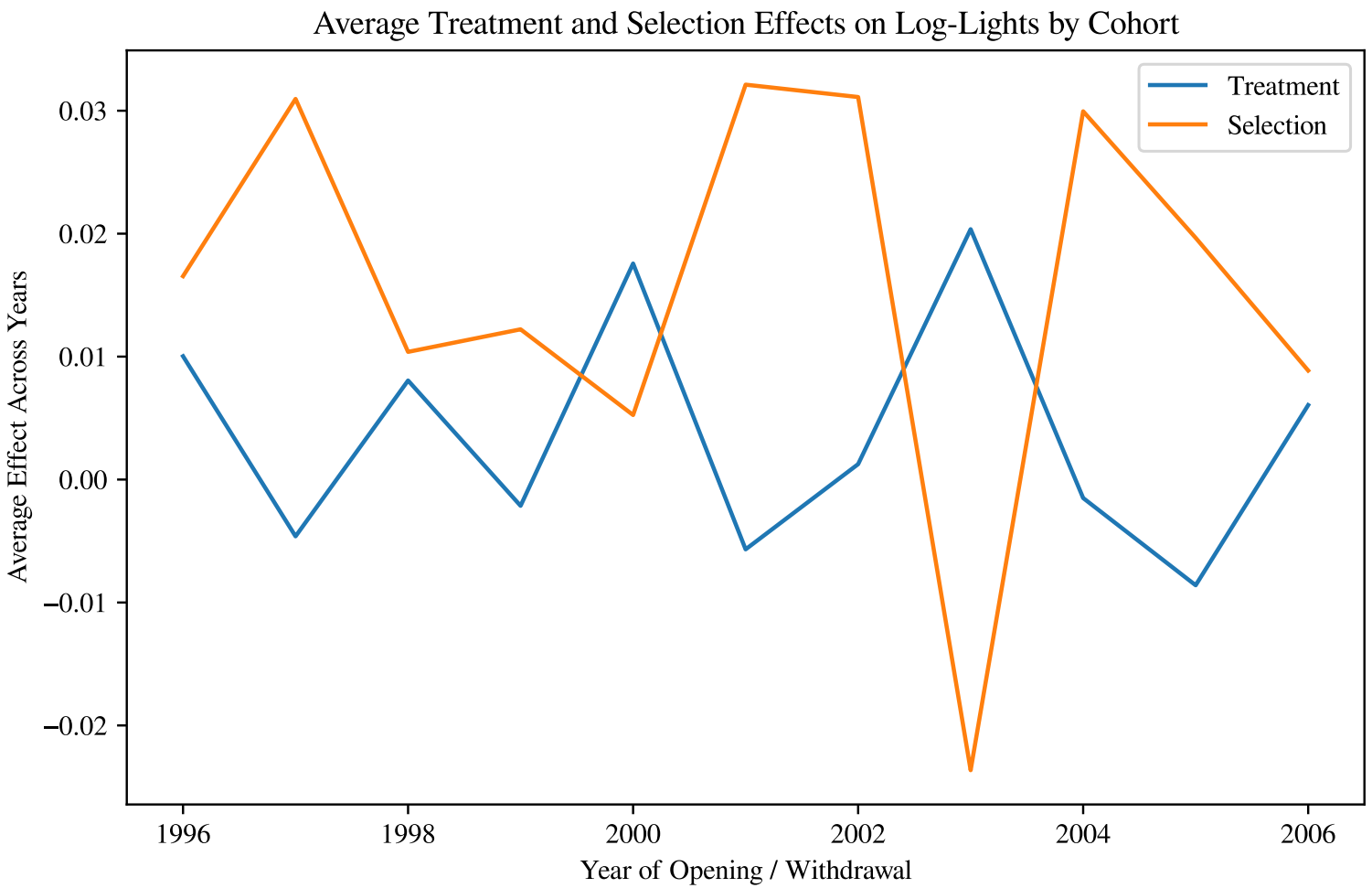
Back

Without controls



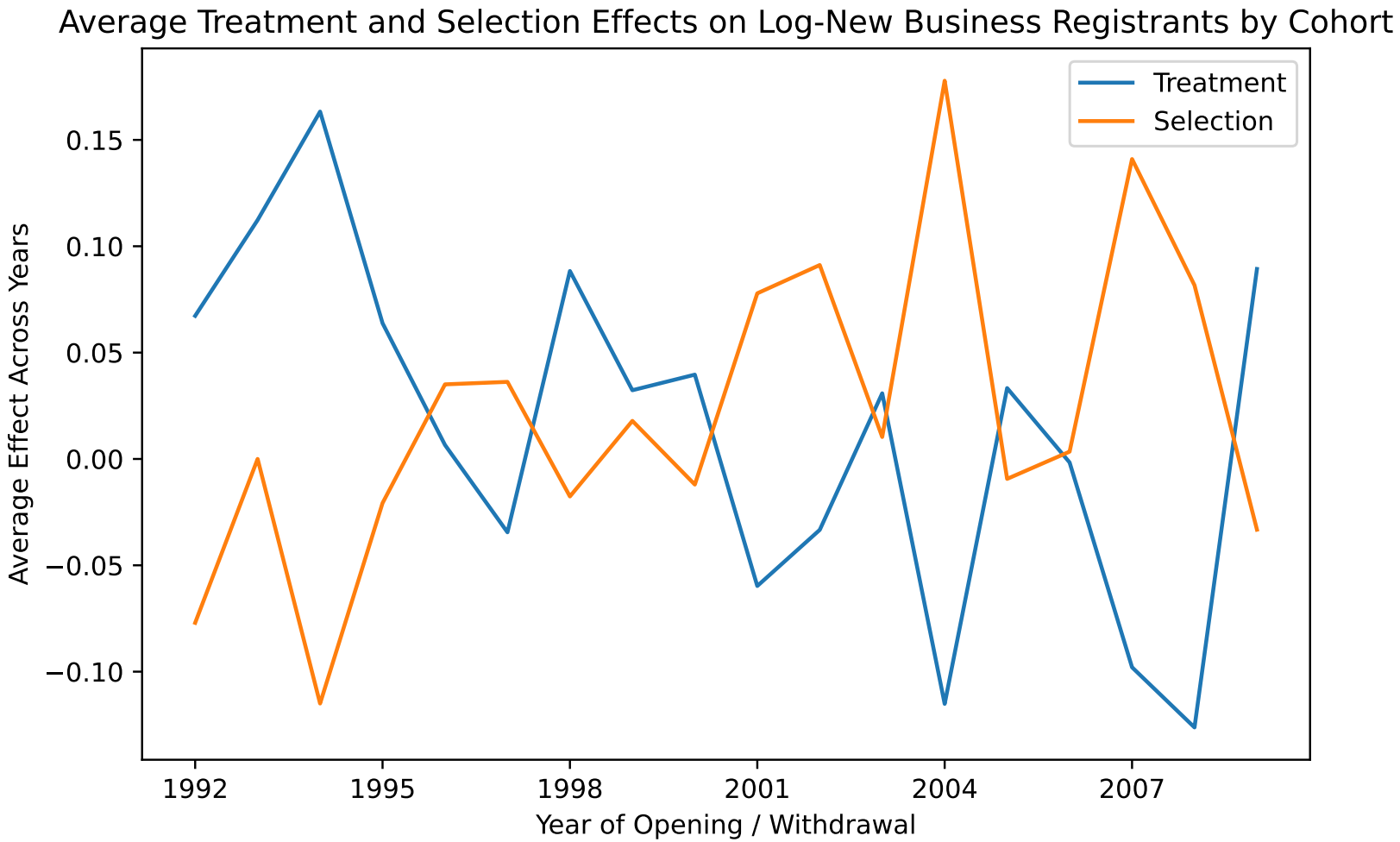
Back

Light effect over time



back

New business registrants effect over time



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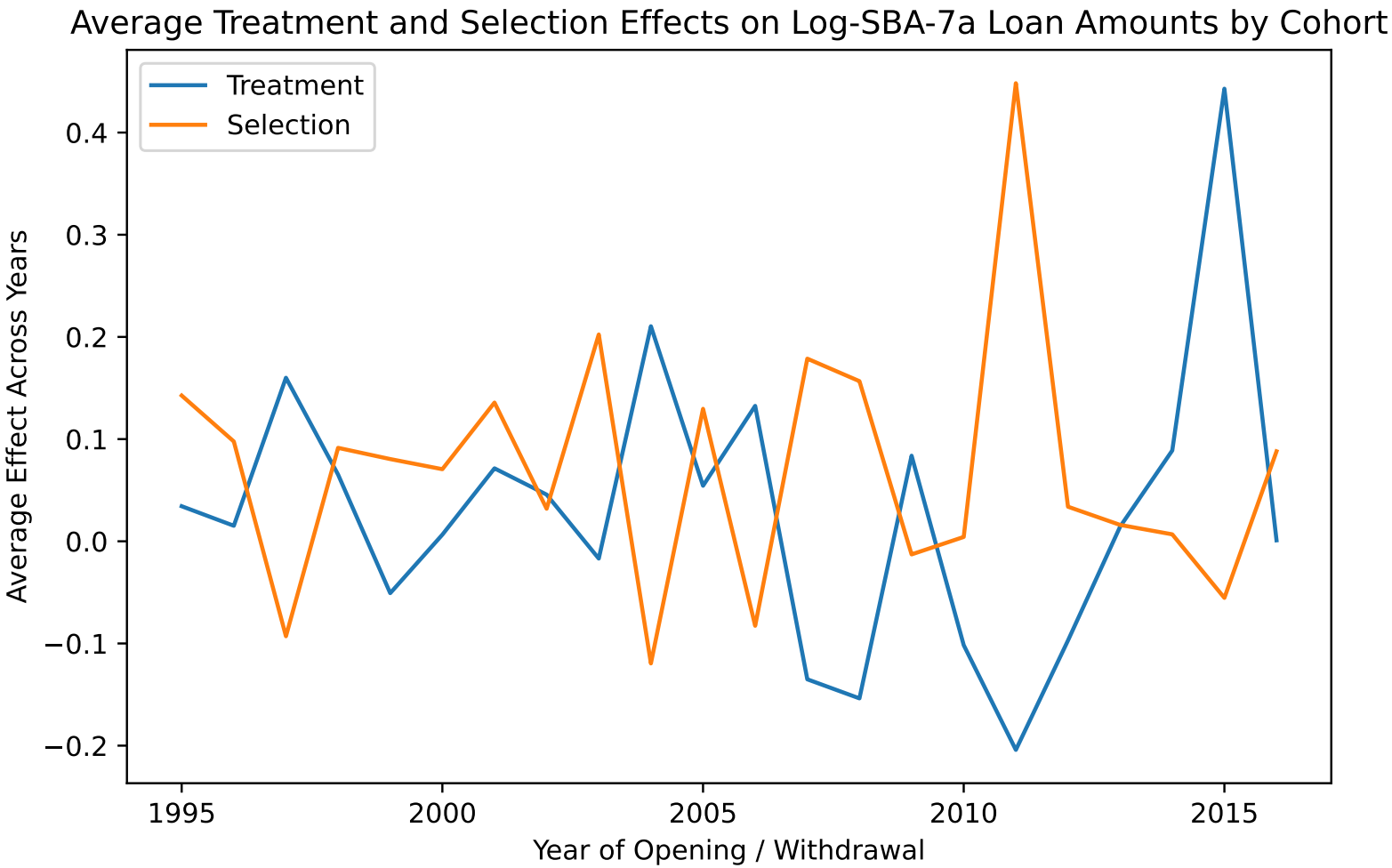
SBA-7a lending effect over time



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