The Impact of Prisoner Education on Recidivism, Labor Market Outcomes, and Public Assistance Utilization

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Motivation

- Formerly incarcerated people face large re-entry challenges that limit labor market outcomes and lead to high recidivism rates.
  - About 62% of people who leave prison are rearrested within three years, and 39% return to prison (Kang et al. 2026).
- Incarcerated people tend to have low levels of human capital and poor labor market outcomes.
  - 41% have no HS diploma or GED, 46% have a HS diploma or GED, and 13% have some postsecondary education.
  - 1/3 of Federal prisoners were not employed within four years after release (Carson et al., 2021), and their earnings are substantially below those with a similar level of education (Finlay and Mueller-Smith 2021).
- Much focus on GED programs in US prisons, also called Adult Basic Education (ABE).
  - Little evidence that ABE programs lead to better outcomes (Darolia et al., 2021; Davis et al., 2013; Tyler and Kling, 2007).
  - Could be because the return to a GED in general is quite low (Jepsen et al. 2016; Heckman et al. 2014; Heckman and Kautz 2014).

Career and Technical Education (CTE)

- CTE programs, often termed vocational programs, have the potential to significantly positively affect post-release outcomes of inmates.
  - Existing evidence indicates a broad pattern of correlations between CTE, recidivism, and labor market outcomes (Stickle and Schuster 2023).
- Train people for specific careers and often provide certifications for occupations that are in high demand.
  - Examples: automotive repair, plumbing, masonry, culinary arts.
  - Does not require advanced education.
  - Provides clear evidence of specific skills to employers as well as (potentially) information about desire for sustained employment.
- CTE certificates have a high return in the labor market:
  - Median estimates of the earnings return to CTE degrees within 5 years for men is about 5% (Lovenheim and Smith 2023).

CTE Courses in Tennessee

- TN offers 16 CTE programs in state prisons, directly linked to high-value occupations across the state:

automotive mechanical technology	barbering
carpentry	computer aided design and drafting
computer applications and literacy	construction
cosmetology	culinary arts
electrical	HVAC and refrigeration
landscaping/horticulture/grounds keeping	leisure craft/small engine technology
masonry	painting
plumbing	welding

What We Do

- We use merged administrative data in Tennessee (TN) that contains K-12, higher education, earnings (UI), and criminal justice records for all inmates for 2007-2024.
  - Anyone incarcerated in a state prison or jail is included.
- We employ an IV approach that leverages differential exposure to CTE programs based on the length of time people are in different prisons and the supply of courses in those prisons.
  - Prison transfers are ubiquitous, and they are not based on educational programming.
  - CTE programs vary over time within prisons.
  - Prisoners are differentially exposed because of their sentence length (and time in jails).
- We examine 3-year recidivism, employment, and quarterly earnings post-release.
- Our main results indicate that all outcomes improve substantially as a result of CTE course enrollment.

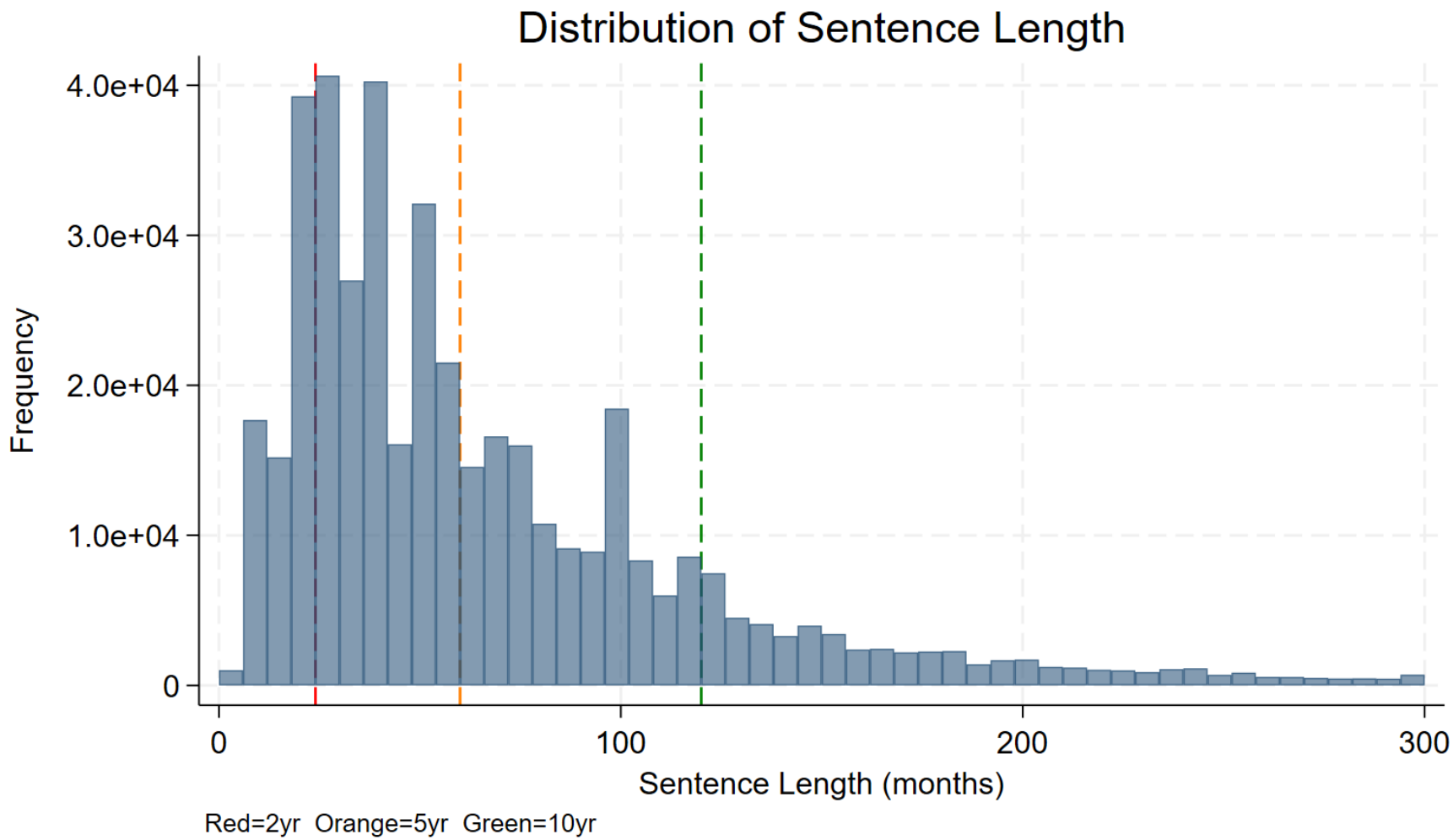
Prior Research

- Most prior research focused on the GED, finding modest to null effects (Darolia et al. 2021; Davis et al. 2013; Tyler and Kling 2007).
  - The GED has low returns in the general population.
- IGNITE program in Flint, MI (Alsan et al. 2025)
  - Intensive instruction, mostly ABE, as well as a change in "culture" in jails.
  - Treatment while incarcerated is about 2 weeks, generating large reductions in recidivism.
  - We focus on prisons rather than jails, can isolate education effects of CTE, and focus on education programs that are much longer in duration.
- Arbour et al. (forthcoming)
  - Use variation in rehabilitation programs across seven prisons in Quebec.
  - Treated population incarcerated for at most 2 years, and none of the programs are CTE.
  - Canada $\neq$ USA!
- We examine labor market outcomes and (eventually) public assistance

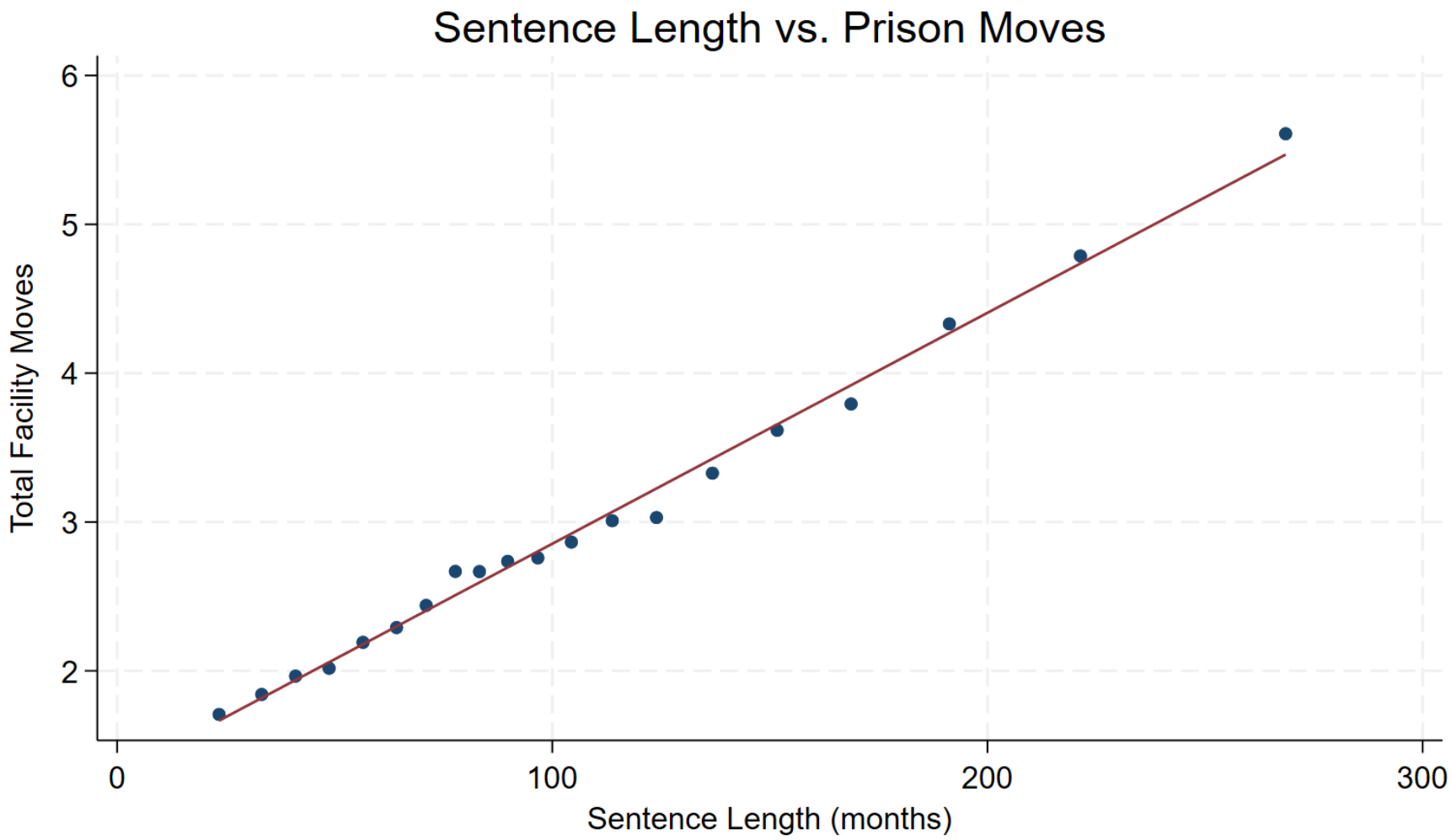
Data

- Administrative data from Tennessee, 2007-2024:
  - K-12 and higher education records.
  - Prison records: convictions, sentence length, time in prison, infractions, education program participation, prison of incarceration.
  - Quarterly earnings and employment from UI records – includes SNAP participation and UI claims.
- We focus on outcomes 3 years post-release:
  - Recidivism: going back to prison.
  - Postsecondary enrollment and completion.
  - Number of quarters of positive earnings.
  - Average earnings (including zeros).
- We control for prison set fixed effects: people who are incarcerated in the same set of prisons (not at the same time).

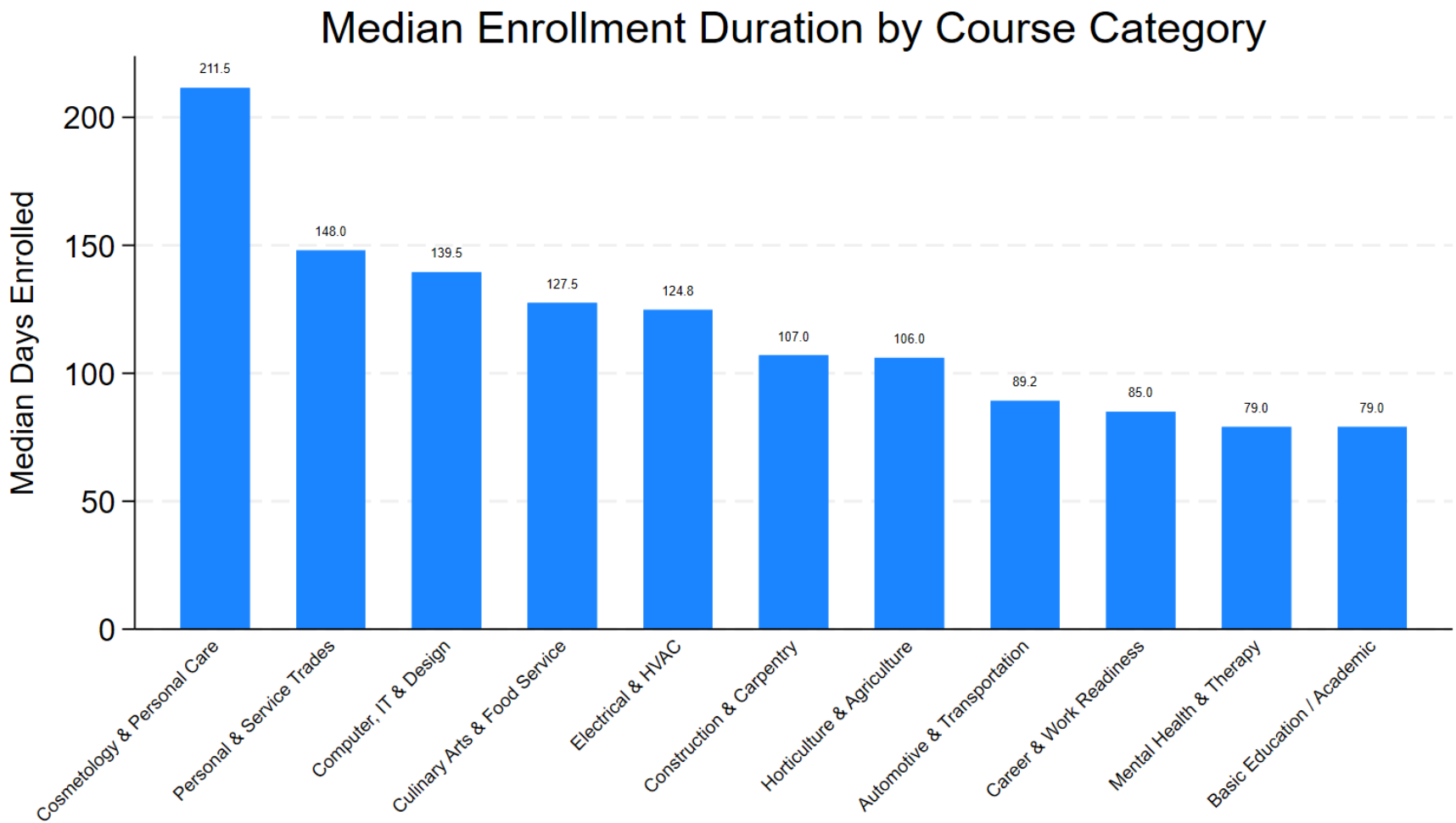
Distribution of Sentence Length



Sentence Length and Prison Transfers



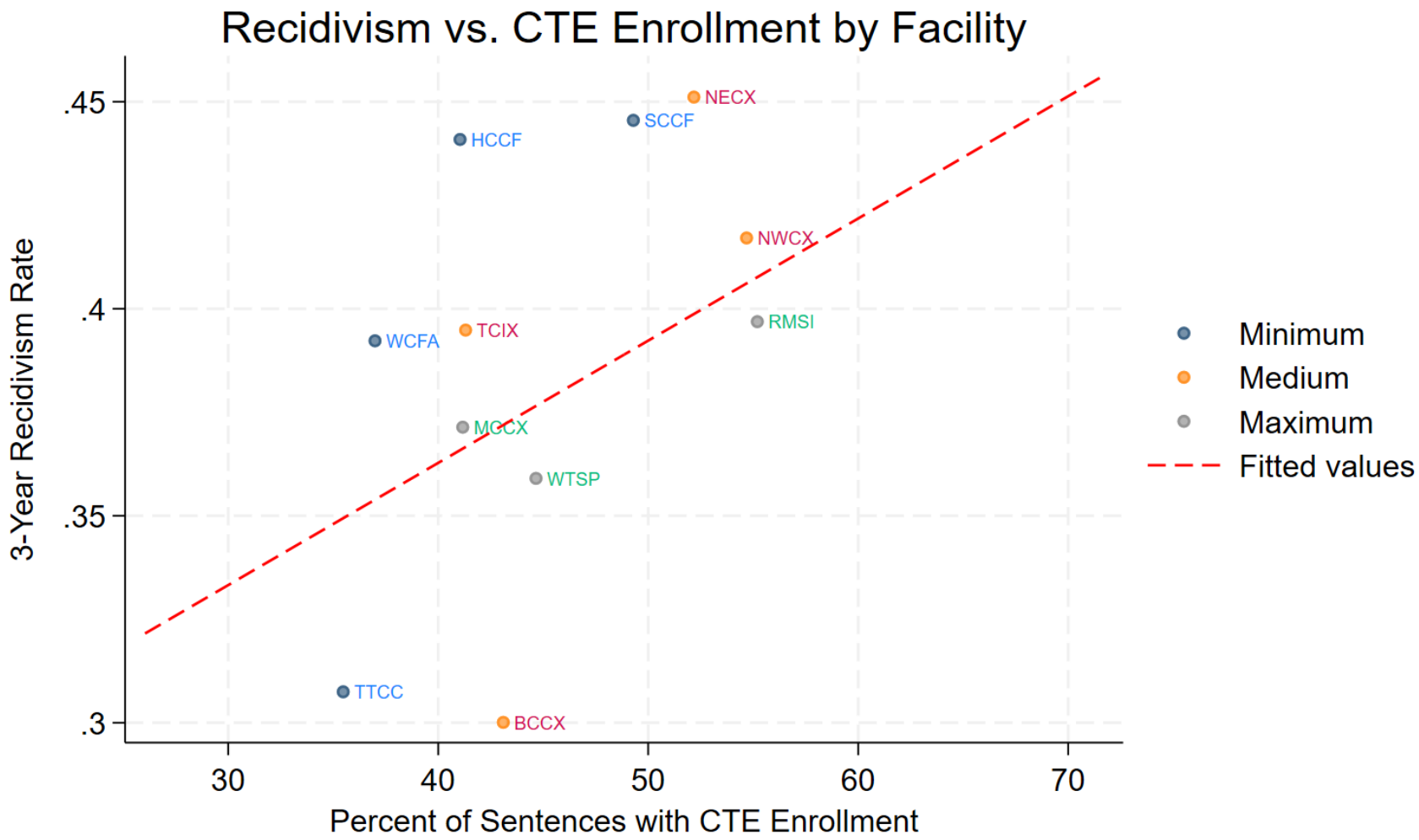
CTE Enrollment Length by Program



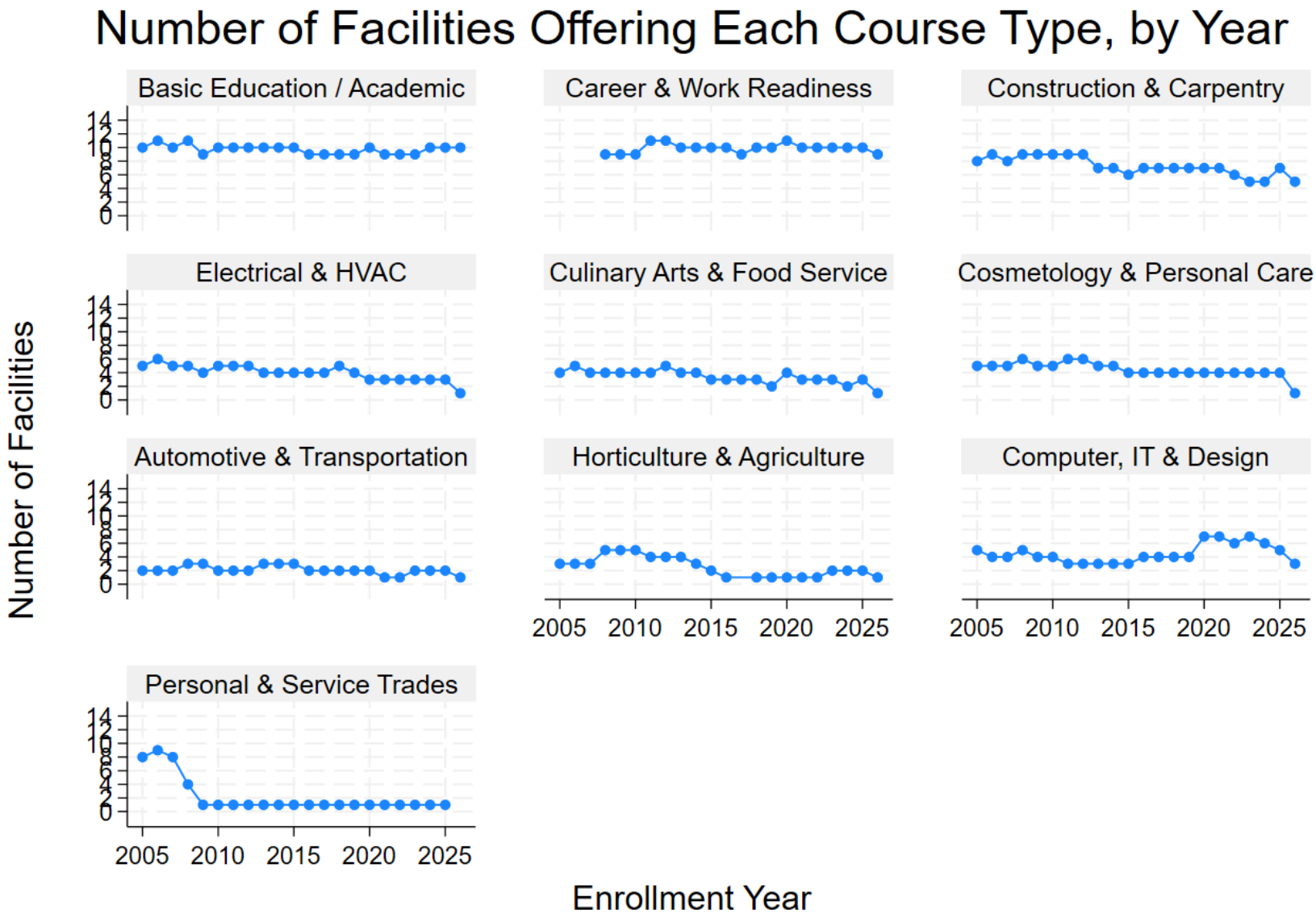
Empirical Approach - CTE Supply IV

- Enrollment in education programs is endogenous; those participating are likely to be positively selected.
- We instrument enrollment with a measure of CTE supply: time-weighted, leave-one-out share of the relevant prison population participating in CTE.
  - Own participation is removed.
  - Incorporates moves across prisons, sentence length, and within-prison changes in program availability.
  - Programs are over-subscribed, so this measures supply rather than demand.
- The exclusion restriction requires that inmates with better potential post-release outcomes are not sorted to prisons with more CTE supply.
- None of the myriad reasons for transfers in the data are associated with education access or outcomes.
  - Prison supply is *positively* correlated with recidivism.

Recidivism and CTE Participation Across Prisons



CTE Course Supply by Program



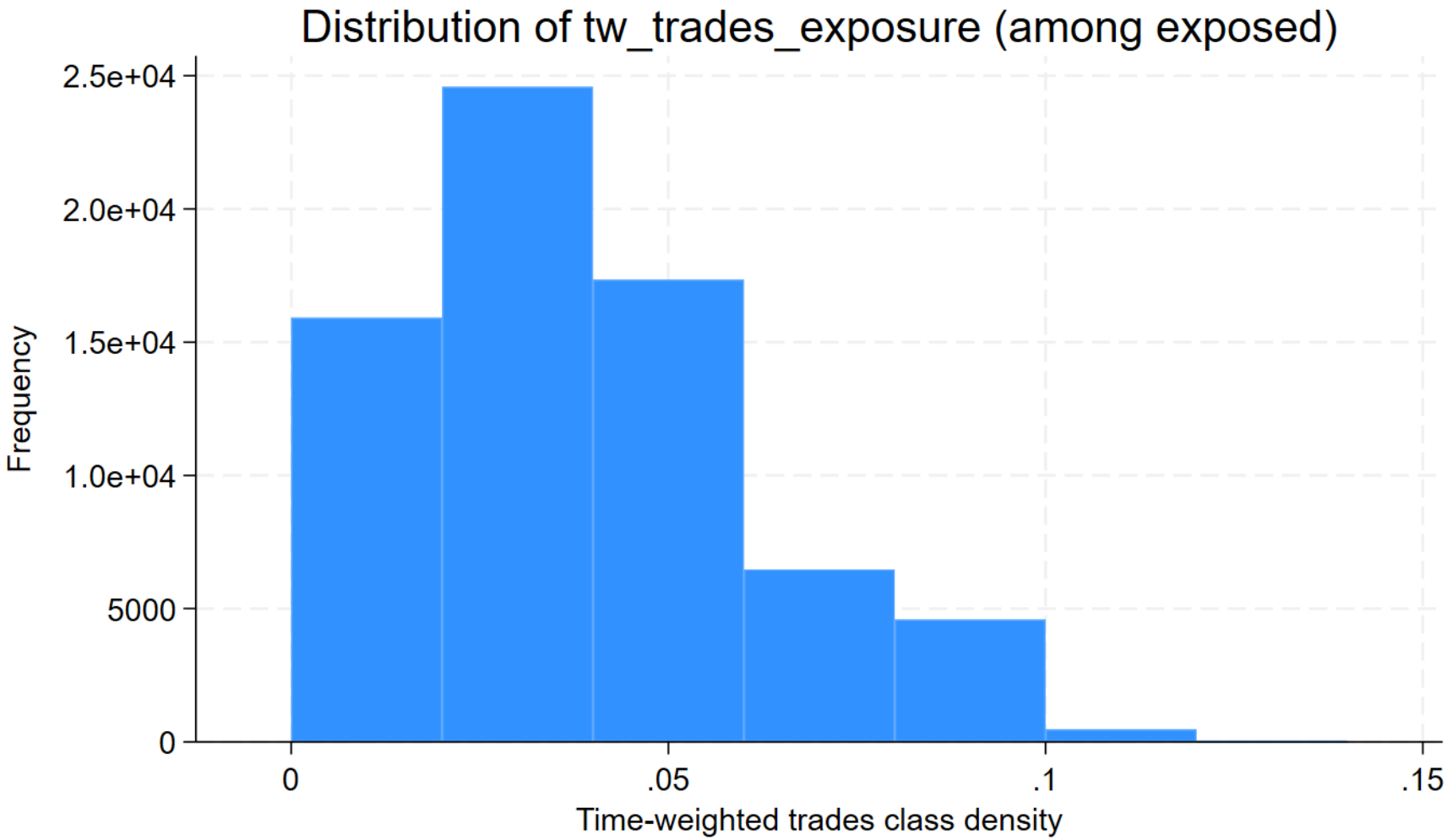
Empirical Model

- Second stage:

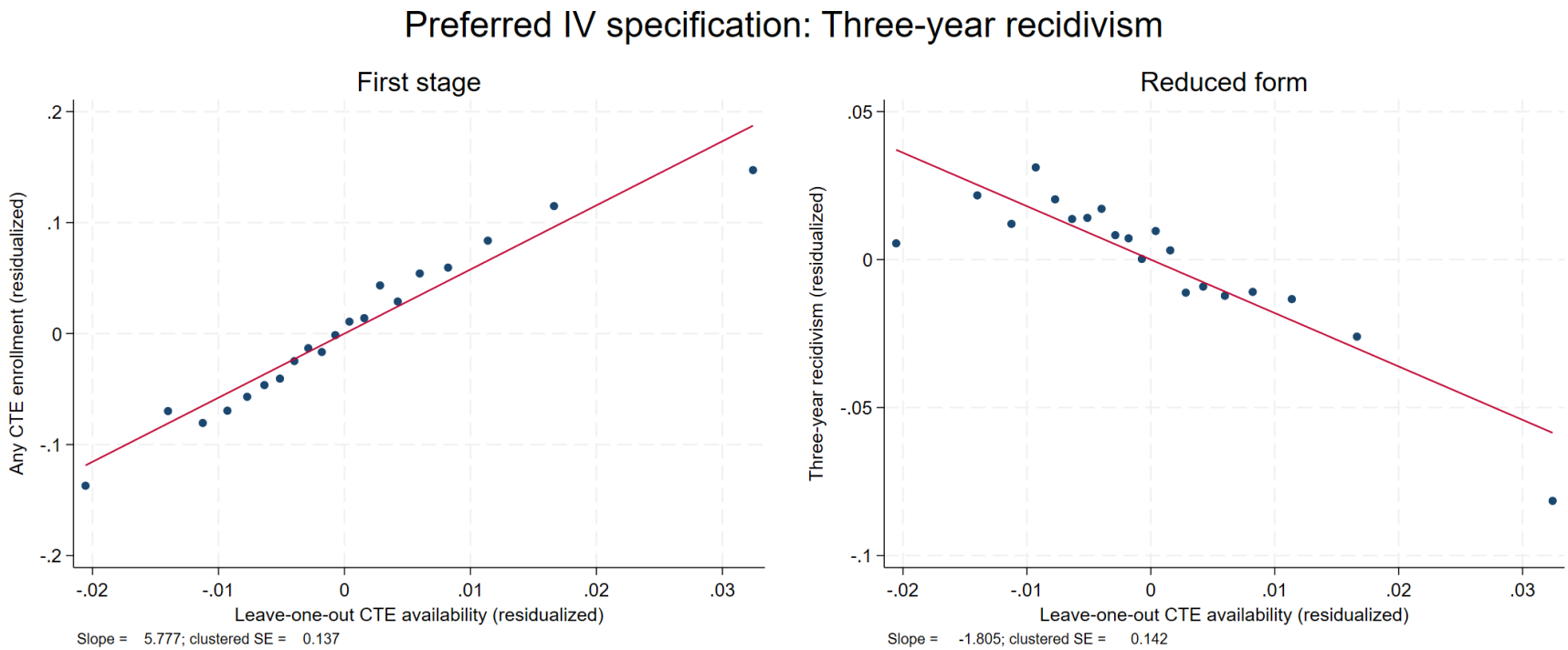
$$Y_{i_s pt} = \beta_0 + \beta_1 \widehat{CTE}_{i_s p} + \gamma X_{i_s} + \theta I_{i_s p} + \delta R_{i_s} + \phi Emp_{i_s p} + \psi_p + \epsilon_{i_s pt}$$

- Y is post-release outcome for individual i in prison spell s in prison set p with release year t.
- CTE is enrollment in any CTE course.
- X_{i_s}: age at release, sex, race, sentence length (quadratic), felony class, prior incarceration.
- $I_{i_s p}$: in-prison experiences – infraction counts and rate, ABE participation and days, facility size.
- $Emp_{i_s p}$: pre-prison labor market outcomes – any employment, quarters employed, average earnings.
- ψ_p: prison set fixed effects (people in the same set of prisons).

Distribution of the Instrument



CTE Supply and 3-year Recidivism



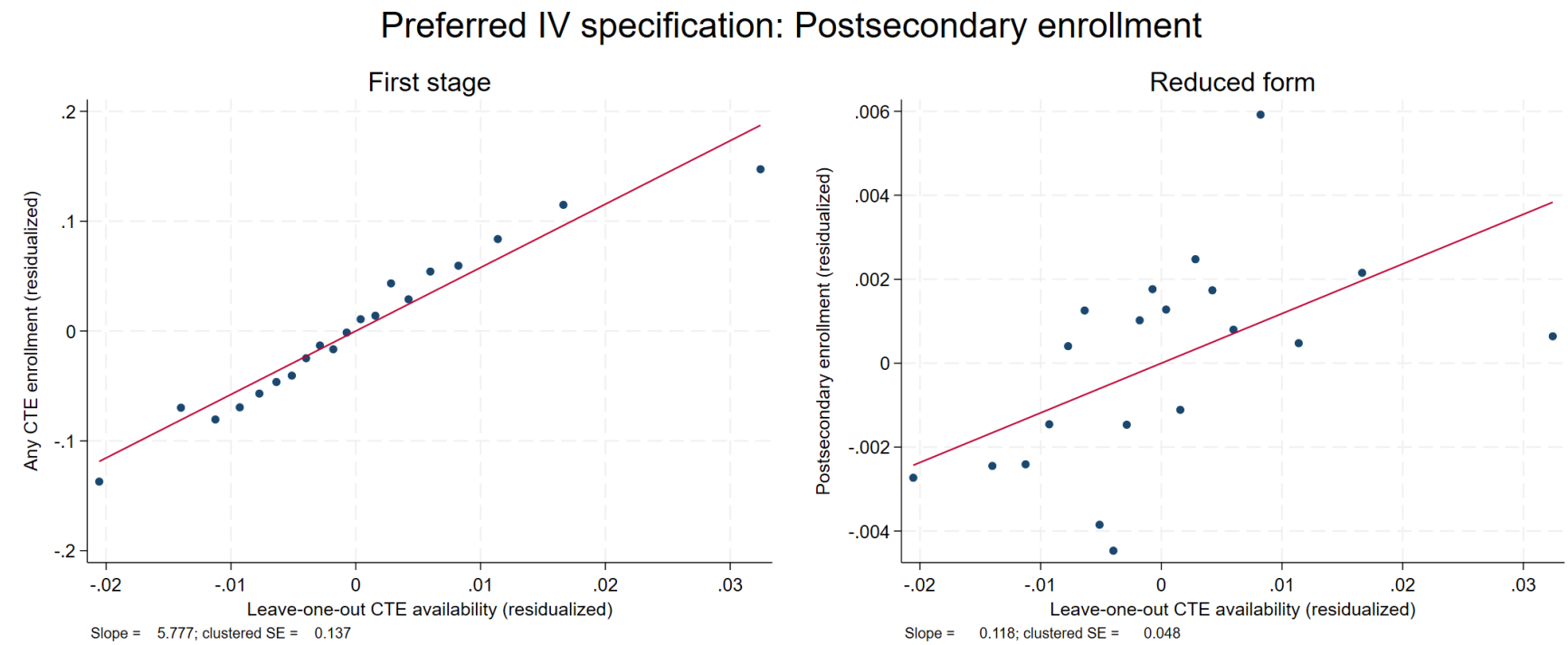
20 equal-frequency bins. Prison-set and release-year FE; full preferred controls.

Results: 3-Year Recidivism

	Baseline	+ in-prison controls	+ pre-prison E	+parole
	(1)	(2)	(3)	(4)
First Stage:				
CTE Supply	4.365***	5.738***	5.720***	5.777***
	(0.131)	(0.137)	(0.137)	(0.137)
Reduced Form:				
CTE Supply	-2.592***	-2.591***	-2.615***	-1.805***
	(0.138)	(0.145)	(0.144)	(0.142)
IV:				
CTE Enroll	-0.594***	-0.452***	-0.457***	-0.312***
	(0.036)	(0.027)	(0.027)	(0.026)

All models include prison set and release year fixed effects and controls for time in prison, sentence length, demographics, and prior incarceration. N=66733; Dep. Var. Mean = 0.427. Standard errors are clustered at the individual level.

CTE Supply and Postsecondary Enrollment 3-years Post-release



20 equal-frequency bins. Prison-set and release-year FE; full preferred controls.

Results: Any Postsecondary Enrollment 3 Years Post-Release

	Baseline	+ in-prison controls	+ pre-prison E	+parole
	(1)	(2)	(3)	(4)
First Stage:				
CTE Supply	4.365***	5.738***	5.720***	5.777***
	(0.131)	(0.137)	(0.137)	(0.137)
Reduced Form:				
CTE Supply	-0.061	0.100**	0.086*	0.118**
	(0.046)	(0.048)	(0.048)	(0.048)
IV:				
CTE Enroll	-0.014	0.017**	0.015*	0.021**
	(0.011)	(0.008)	(0.008)	(0.008)

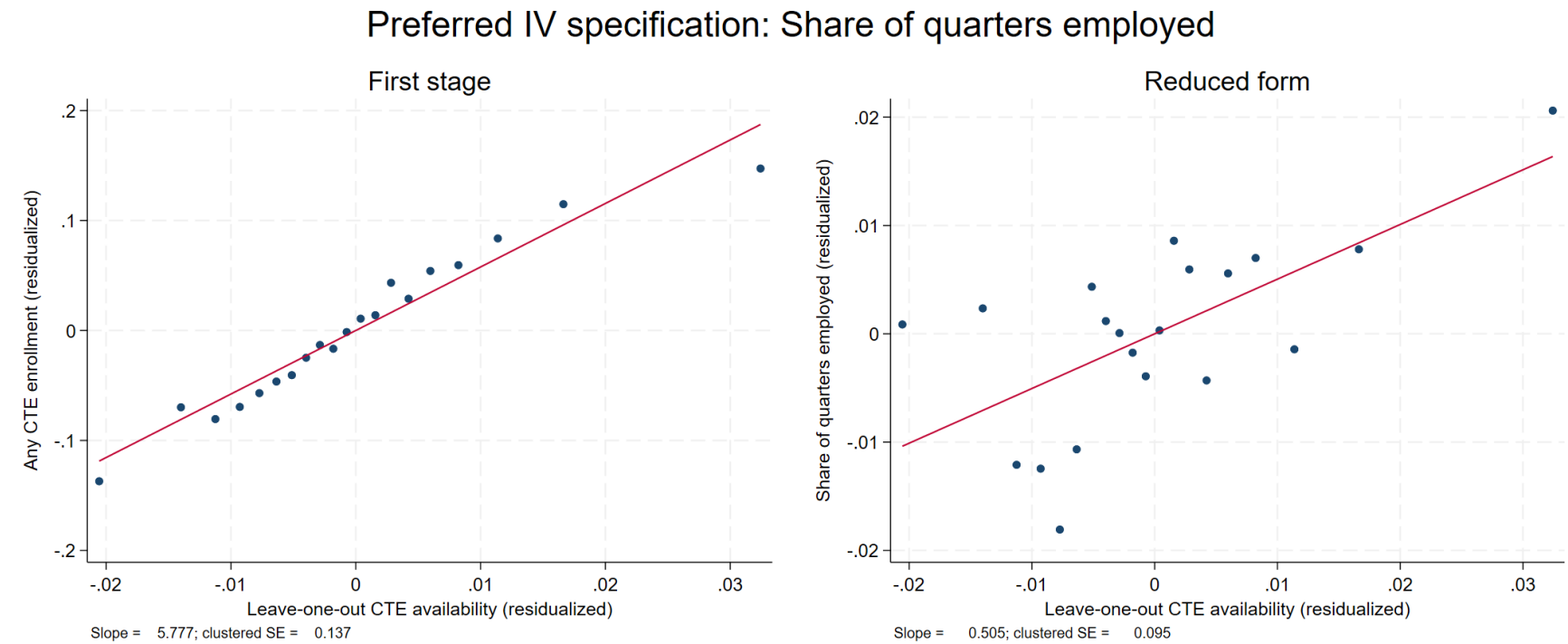
All models include prison set and release year fixed effects and controls for time in prison, sentence length, demographics, and prior incarceration. N=66733; Dep. Var. Mean = 0.024. Standard errors are clustered at the individual level.

Results: Any Postsecondary Award 3 Years Post-Release

	Baseline	+ in-prison controls	+ pre-prison E	+parole
	(1)	(2)	(3)	(4)
First Stage:				
CTE Supply	4.365***	5.738***	5.720***	5.777***
	(0.131)	(0.137)	(0.137)	(0.137)
Reduced Form:				
CTE Supply	-0.016	0.032	0.028	0.034
	(0.024)	(0.026)	(0.026)	(0.026)
IV:				
CTE Enroll	-0.004	0.006	0.005	0.006
	(0.006)	(0.005)	(0.005)	(0.005)

All models include prison set and release year fixed effects and controls for time in prison, sentence length, demographics, and prior incarceration. N=66733; Dep. Var. Mean = 0.006. Standard errors are clustered at the individual level.

CTE Supply and Employment 3-years Post-release



20 equal-frequency bins. Prison-set and release-year FE; full preferred controls.

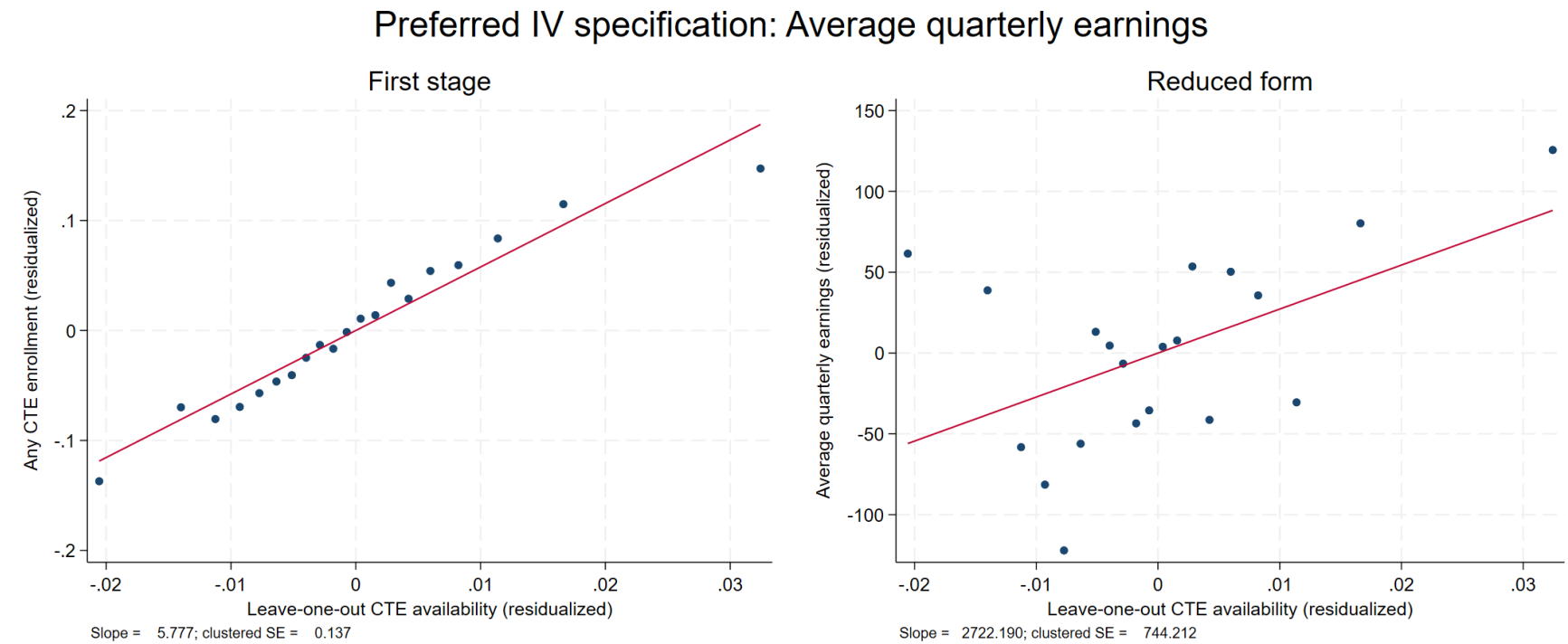
Results: Positive Earnings Quarters 3 Years Post-Release

	Baseline	+ in-prison controls	+ pre-prison E	+parole
	(1)	(2)	(3)	(4)
First Stage:				
CTE Supply	4.365***	5.738***	5.720***	5.777***
	(0.131)	(0.137)	(0.137)	(0.137)
Reduced Form:				
CTE Supply	-5.149***	6.541***	5.232***	6.059***
	(1.173)	(1.246)	(1.136)	(1.139)
IV:				
CTE Enroll	-1.180***	1.140***	0.915***	1.049***
	(0.274)	(0.217)	(0.199)	(0.198)

All models include prison set and release year fixed effects and controls for time in prison, sentence length, demographics, and prior incarceration. N=66422; Dep. Var. Mean = 2.770. Standard errors are clustered at the individual level.

▸ Excluding Reincarceration

CTE Supply and Earnings 3-years Post-release



20 equal-frequency bins. Prison-set and release-year FE; full preferred controls.

Results: Average Quarterly Earnings 3 Years Post-Release

	Baseline	+ in-prison controls	+ pre-prison E	+parole
	(1)	(2)	(3)	(4)
First Stage:				
CTE Supply	4.365***	5.738***	5.720***	5.777***
	(0.131)	(0.137)	(0.137)	(0.137)
Reduced Form:				
CTE Supply	-2940***	3446***	3054***	2722***
	(725)	(785)	(740)	(744)
IV:				
CTE Enroll	-673***	601***	534***	471***
	(168)	(137)	(130)	(129)

All models include prison set and release year fixed effects and controls for time in prison, sentence length, demographics, and prior incarceration. N=66422; Dep. Var. Mean = 952. Standard errors are clustered at the individual level.

▸ Excluding Reincarceration ▸ Excluding Zeros

Mechanisms: In-Prison Infractions, ABE, and Parole

	Any Incident (1)	Total Incidents (2)	Enroll in ABE (3)	Paroled (4)
First Stage:				
CTE Supply	5.704***	5.704***	4.812***	5.720***
	(0.133)	(0.133)	(0.136)	(0.137)
Reduced Form:				
CTE Supply	7.115***	159.732***	3.971***	-3.367***
	(0.135)	(3.659)	(0.153)	(0.110)
IV:				
CTE Enroll	1.247***	28.002***	0.825***	-0.588***
	(0.037)	(0.908)	(0.041)	(0.024)
Dep. Var. Mean:	0.675	6.900	0.459	0.302

All models include prison set and release year fixed effects and controls for time in prison, sentence length, demographics, and prior incarceration (excluded if it is the dependent variable). N=66422. Standard errors are clustered at the individual level.

Conclusion

- CTE enrollment has large positive effects on post-release outcomes:
  - Reduces recidivism by 31 percentage points (73%).
  - Increases postsecondary enrollment by 2.1 percentage points (88%).
  - Increases number of quarters worked by 1.05 (38%).
  - Increases quarterly earnings by $471 (49%).
- Enrollment also increases within-prison infractions. The effects on education and labor market outcomes (but not recidivism) are conditional on controlling for this intermediate mechanism.
  - Likely due to CTE programs being more prevalent in more restrictive prison environments.
  - Enrollees also potentially held to higher standards.
- Our results are unique in showing large positive benefits of prison education, likely because of the focus on in-demand, occupation-specific training.

Next Steps

- Examine program completion
- Estimate effects by CTE program area
- Examine heterogeneity by inmate observables: sentence length, race, age, and prior educational attainment.
- Estimate effects on SNAP participation and UI benefit claiming; conduct cost-benefit analyses.
- Use the fact that you can only enroll in programs if your time of remaining incarceration is more than the program length as a refined instrument.

Results: Positive Earnings Quarters 3 Years Post-Release, Excluding Reincarcerations

	Baseline (1)	+ in-prison controls (2)	+ pre-prison E (3)	+parole (4)
First Stage:				
CTE Supply	4.365***	5.738***	5.720***	5.777***
	(0.131)	(0.137)	(0.137)	(0.137)
Reduced Form:				
CTE Supply	-5.360***	6.320***	5.084***	6.352***
	(1.159)	(1.231)	(1.130)	(1.133)
IV:				
CTE Enroll	-1.228***	1.101***	0.889***	1.100***
	(0.271)	(0.214)	(0.198)	(0.197)

All models include prison set and release year fixed effects and controls for time in prison, sentence length, demographics, and prior incarceration. N=66422; Dep. Var. Mean = 2.627. Standard errors are clustered at the individual level.

▸ Return

Results: Average Quarterly Earnings 3 Years Post-Release, Excluding Reincarceration

	Baseline	+ in-prison controls	+ pre-prison E	+parole
	(1)	(2)	(3)	(4)
First Stage:				
CTE Supply	4.398***	5.767***	5.749***	5.805***
	(0.132)	(0.139)	(0.139)	(0.139)
Reduced Form:				
CTE Supply	-2500***	3967***	3526***	3117***
	(737)	(798)	(751)	(755)
IV:				
CTE Enroll	-568***	688***	613***	537***
	(169)	(139)	(131)	(130)

All models include prison set and release year fixed effects and controls for time in prison, sentence length, demographics, and prior incarceration. N=64969; Dep. Var. Mean = 982. Standard errors are clustered at the individual level.

▸ Return

Results: Average Quarterly Earnings 3 Years Post-Release, Excluding Zeros

	Baseline	+ in-prison controls	+ pre-prison E	+parole
	(1)	(2)	(3)	(4)
First Stage:				
CTE Supply	5.198***	6.760***	6.718***	6.760***
	(0.207)	(0.217)	(0.217)	(0.218)
Reduced Form:				
CTE Supply	-5080***	5235***	4027***	1877***
	(1471)	(1595)	(1522)	(1537)
IV:				
CTE Enroll	-977***	774***	599***	278***
	(288)	(236)	(227)	(227)

All models include prison set and release year fixed effects and controls for time in prison, sentence length, demographics, and prior incarceration. N=32108; Dep. Var. Mean = 3079. Standard errors are clustered at the individual level.

▸ Return