CTE | Career & Technical Education RESEARCH NETWORK

Career and Technical Education Research

An Overview

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Agenda

What We Know	▪ Big picture ▪ How confident are we in what we know?
Challenges in CTE Research	▪ Self-selection ▪ Why random assignment is usually a bad idea
Descriptive Evidence	▪ Why the focus on earnings? ▪ What funds CTE?
Causal Evidence	▪ Experimental ▪ Quasi-experimental
Salient Issues for Future Research	▪ Data and measures ▪ Identification ▪ Practical policy needs

Note: for best results, copy and paste this example slide as needed and overwrite text for additional Agenda slides.

What We Know About CTE and Outcomes

1. Most evidence points to better employment and earnings outcomes for students who were CTE concentrators in HS or who completed certificates in college.
2. Impact on academic outcomes has been ambiguous: test scores and grades.
3. Attainment of a high school diploma seems to be enhanced at some whole-school models of CTE.
4. College going may not be impacted, though it is not clear.
5. Do not know whether CTE area in HS => aligned later experiences

Source: Placeholder for sources and permissions (if needed).

Challenges to Conducting CTE Research

1. Self-selection – those who choose to participate in CTE differ in important ways from those who do not choose CTE.
2. Random assignment usually does not make sense.
   a. We assume those interested in CTE should be able to choose it.
   b. Assigning students randomly does not make sense, unless we do this among people who are interested but supply is limited.
3. Even if we see that individuals are similar on observable characteristics, they may differ on important unobserved dimensions:
   a. Motivation
   b. Knowledge of industries, family work history
4. Defining the treatment or treatment-control contrast is not trivial.

When Studying CTE, What Is the Treatment?

1. How is CTE exposure/treatment measured?
2. Compared to what?
    a. Defining the counterfactual or comparison condition means fully understanding and describing the CTE experience
3. What measures are available, and which are used?
    a. Number of courses/credits
    b. Whole-school models of CTE
    c. Integration of core math/ELA with technical work
    d. Multi-year mentorships from teachers/ cohort-based models
    e. Work-based learning experiences

How CTE's Past Informs Selection Concerns

1. Students with disabilities and those from lower-income families are historically overrepresented.
    a. Recent evidence differs by state (Dougherty & Macdonald, 2020; Giani, 2019)
2. Racial/ethnic disparities in representation persist in some fields (e.g. STEM)
3. Gender disparities by program of study/ cluster are substantial
4. Those from working-class backgrounds, even if their families are not eligible for subsidized meals, are likely overrepresented.

Descriptive Evidence

1. Most descriptive evidence looks at employment and earnings outcomes.
   a. Stems from economic theories that assume main benefit of CTE is specific skill development that should be rewarded in the workforce.
   b. For example, knowing how to repair a car => higher wages in auto repair relative to someone who is trained on the job only.
2. Less research has looked at learning or graduation/attainment outcomes.
3. There is an increased focus on specific sub-populations:
   a. Gender, race/ethnicity, students with disabilities
   b. Applied STEM programs of study

Notable Descriptive Evidence

1. Agodini & Deke (2004) – CTE and dropout
2. Bishop & Mane (2004)
3. Neumark & Rothstein (2006) – CTE and transitions to PSE/workforce
4. Kelly & Price (2009) – CTE and engagement
5. Plank, DeLuca, & Estacion (2008) – CTE and dropout
6. Cellini (2006) – Tech prep and college going
7. Meer (2007) – CTE and wage premiums
8. Stern, Dayton, & Raby (2010) – Career academies
9. Kreisman & Stange (2018) – optimal CTE policy & outcomes

Datasets Used in Descriptive Work

1. National Longitudinal Survey of Youth (NLSY79, NLSY97)
2. National Educational Longitudinal Survey 1988 (NELS-88)
3. National Longitudinal Survey 1972 (NLS-72)
4. High School and Beyond 1980 (BSB-80)
5. High School Longitudinal Survey, 2009 (HSLS:2009)
6. State-specific data
7. Cross-national survey data
8. See study list in Dougherty, Kamin, and Klein (2020).

How Has CTE Been Measured (Past)?

1. Course taking
    a. Total courses
    b. Total credits
    c. Focus areas (not clusters) (e.g., Business, computers versus trades)
2. Concentrator status (3+ credits in same content area)
3. Whole school
    a. Career academies
    b. Selective admissions/ oversubscribed schools
4. Linked learning

New Ways of Measuring CTE Elements

1. Course taking
2. Whole-school admission
3. Program offerings (supply-side measures) and changes
4. Work-based learning
5. Dual enrollment/ college partnerships/ articulation agreements
6. Mentoring
7. Employer partnerships
8. KEY: Define all elements of treatment and counterfactual to clarify contrast!
    a. See Dougherty, Kamin, & Klein (2020)

Knowledge Check

Causal Evidence

1. Only a small pool of causal evidence exists.
2. It largely capitalizes on naturally occurring experiments.
3. Rare opportunities for:
    a. Large-scale policy changes (funding, program offerings)
    b. Excess demand (leading to lottery-like admissions)
4. All focuses on medium-term outcomes of high school graduation and first decade of post-high school (one experiment that looked at short-term academic outcomes.
5. Only international examples of longer-term outcomes (Hanushek, Woessman, & Zhang, 2017; Silliman & Vertanen, 2019)

Notable Causal Studies

1. Stone, Alfeld, Pearson, Lewis, and Jensen (2007)
2. Kemple and Willner (2008)
3. Page (2012) – causal mediation, Career Academies
4. Dougherty (2018)
5. Brunner, Dougherty, and Ross (2019)
6. Hemelt, Lenard, and Paeplow (2019)
7. Silliman and Vertanen (2019)
8. Bonilla (2020)

Stone, Alfeld, Pearson, Lewis, & Jensen (2007)

- Professional development to enhance math instruction in CTE
- Teacher-level random assignment, RCT
- Effects: (~) math learning outcomes

Kemple and Willner (2008)

- Study of students randomly admitted to one of nine career academies
- RCT at individual level
- Treatment is whole-school model of career academy
- Counterfactual is typical high school setting
- Effects:
  - (~) HS grad. Or learning outcomes,
  - (+) employment & earnings 7 years after HS. ONLY for boys.
  - Moderated by exposure to WBL in HS (Page, 2012).

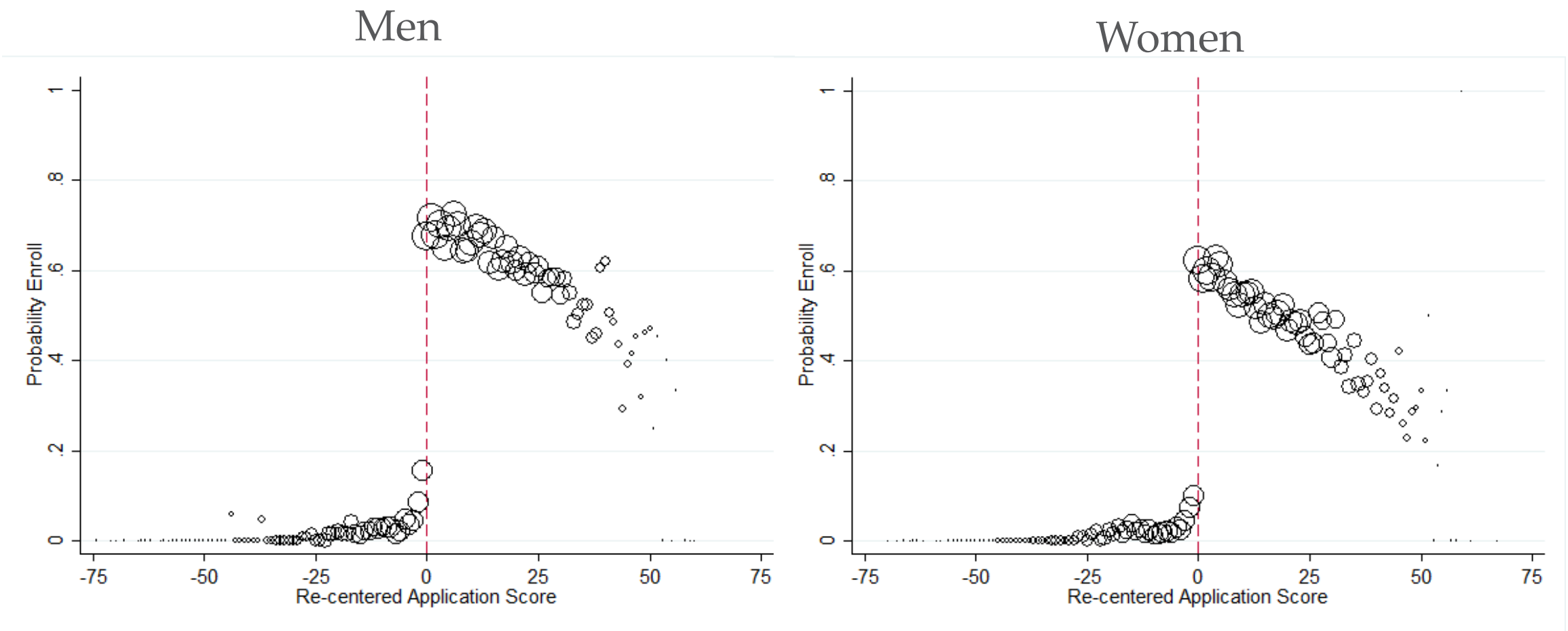
Dougherty (2008)

- Study of students admitted oversubscribed CTE-dedicated schools in MA (RVTS), along with OLS
- Regression-discontinuity and OLS with fixed effects
- Treatment is whole-school model of RVTS
- Counterfactual is typical high school setting
- Effects:
  - (+) HS grad. (~) test scores,
  - (+) persistence and earning am industry-recognized credential
  - Larger for students eligible for subsidized meals

Brunner, Dougherty, and Ross (2019)

- Study of oversubscribed technical HS in Connecticut
- Regression discontinuity design using application score to admit
- Effects are impacts for those near threshold of admission
- Treatment is whole-school model including:
  - Ability to explore multiple programs of study in 9th grade
  - Multi-year cohort with same students and teachers
- Counterfactual: comprehensive HS with fewer CTE program offerings
- Effects: ONLY for males
  - (+) HS grad., earnings and employment by age 23,
  - (-) initial college enrollment,
  - (~) college by age 23.

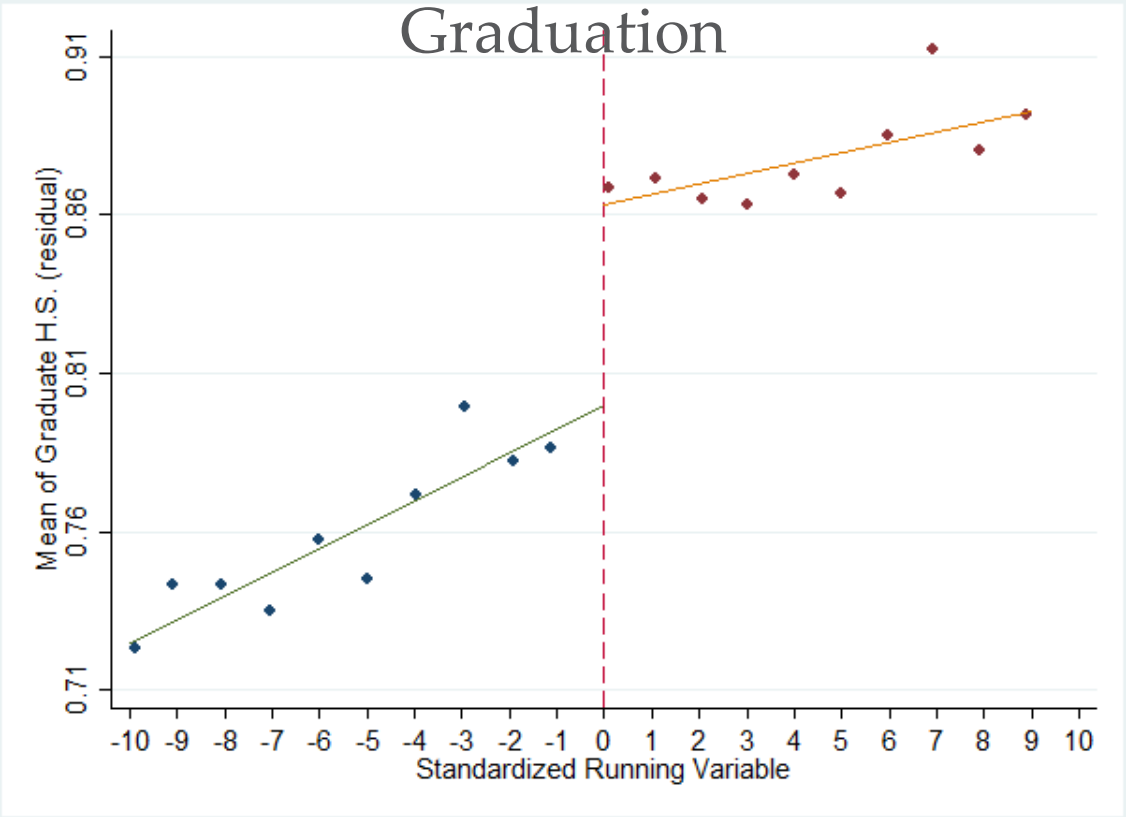
Capitalizing on a natural experiment



- Oversubscribed system of 16 CTE high schools
- Large jump in Pr(Enroll) at admission cutoff, creates variation to identify effect of attending

Effect of being admitted, men

HS Graduation



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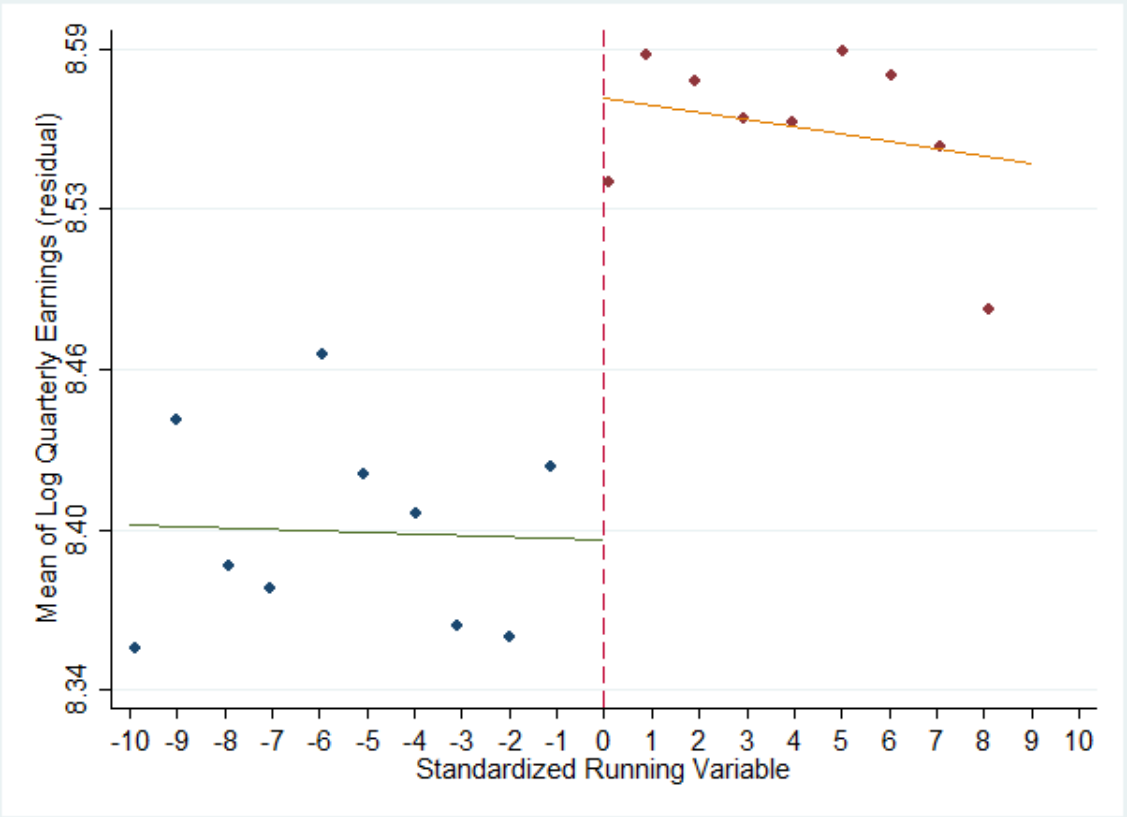


Hemelt, Lenard, and Paeplow (2019)

- Lottery admissions to a single career academy in Wake County, NC
- Treatment: Career Academy embedded in comprehensive HS, focus on information technology
- Counterfactual: residentially assigned HS at same location
- Effects:
  - (+) HS Grad.,
  - (~) college and immediate earnings
- Mechanisms: Attendance in Grade 9, test scores

Bonilla (2020)

- Impact of competitive grant funding provided to expand CTE offerings in California
- Regression discontinuity in grant application score to determine eligibility for financial award
- Effects:
  - (+) increase in funds in those awarded grant, with most $$ spent on intended programs (supplement, not supplant).
  - (-) dropout, LARGER for girls
- Mechanisms: Most program expansion was in health services, which tend to be female dominated.

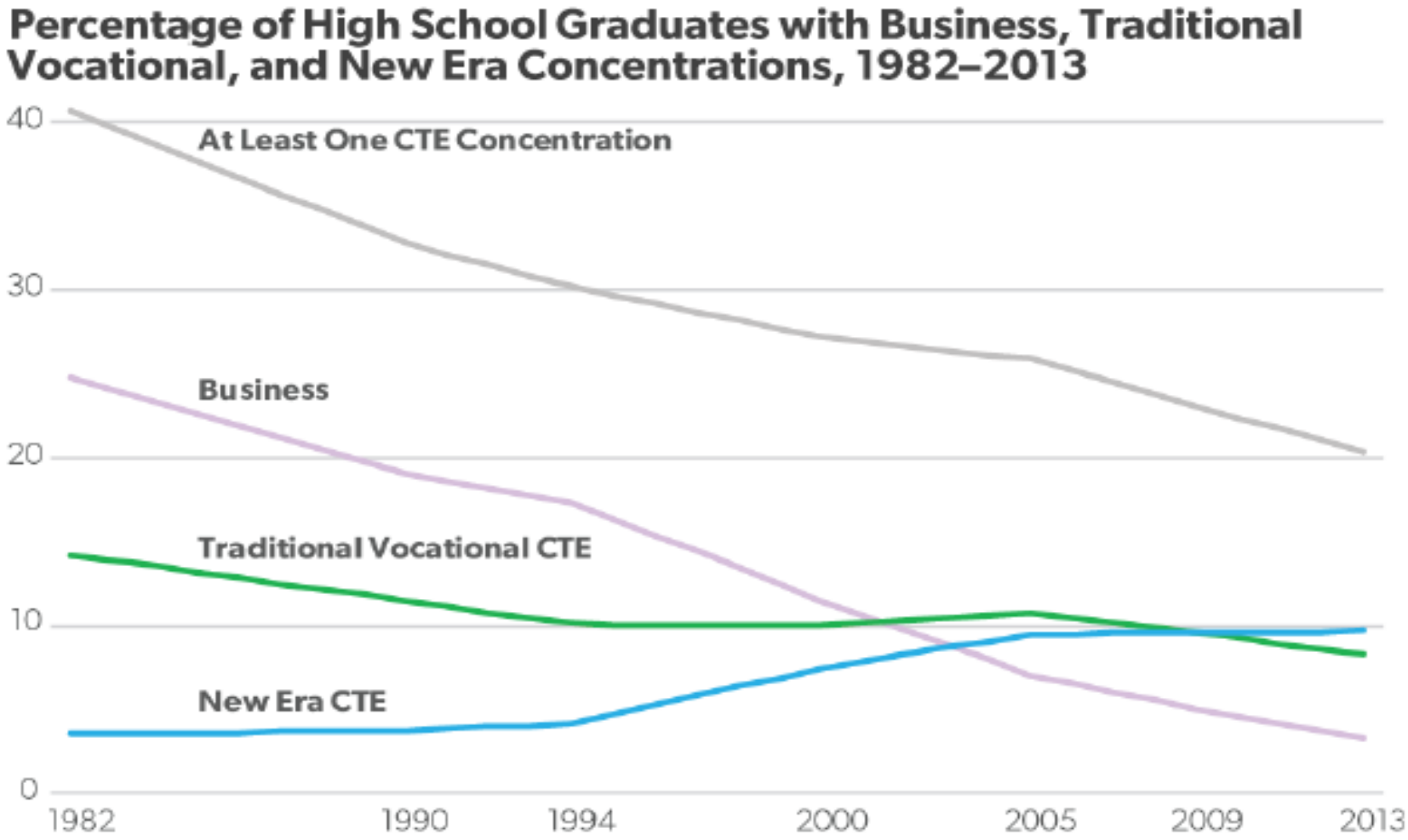
Silliman and Vertanen (2019)

- Impact of admission to vocational schools in Finland
- Regression discontinuity design using admissions test score
- Effects: (+) earnings up to 15 years after secondary completion

Salient Issues in Future Research

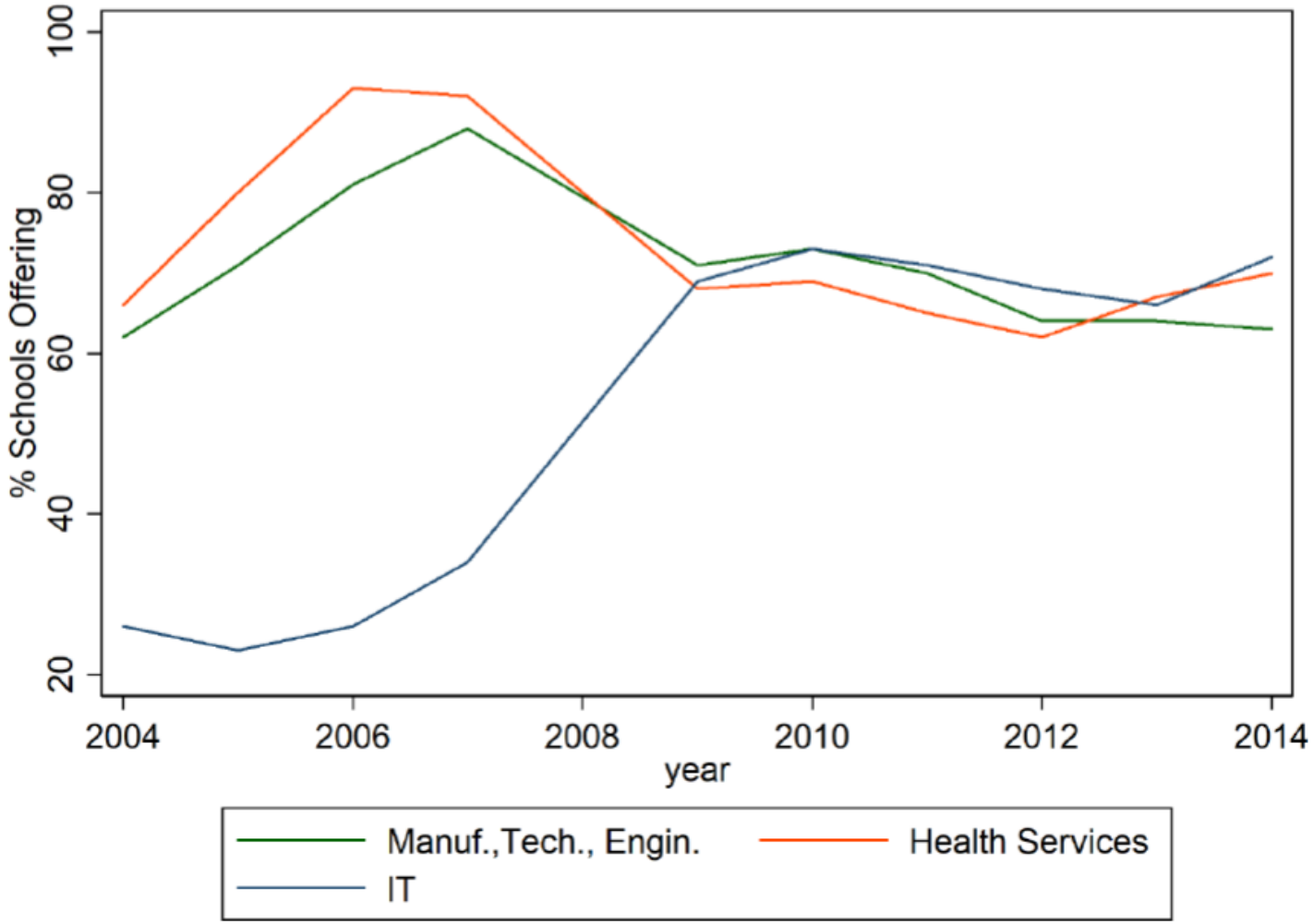
1. Changes in CTE offerings, “New CTE”
2. Vigilance around tracking
3. Representation by cluster/ program of study
    a. Especially underrepresentation by race/ethnicity, gender
4. Oversubscription of popular programs/schools
5. Identifying opportunities for natural experiments, policy changes.

Changes in CTE Participation, National



Source: Malkus 2019, *AEI*

Changes in CTE Offerings, Massachusetts



Source: Dougherty & Macdonald, 2019

Defining the treatment & counterfactual

1. Need to capture all elements of experience so that we can define the appropriate counterfactual on all dimensions
    a. *How much*?
        i. Credits, courses, concentrator, completer
    b. *Where*?
        i. School, technical center, CTE-focused school, Career academy
    c. *Including what components*?
    d. Using what outcomes?
    e. Heterogeneity & equity

Ongoing Research (IES Funded)

1. NYC CTE study
2. MDRC Ptech evaluation
3. Florida credential study
4. Northern California - EDC study
5. Dual enrollment- NC work
6. CTE and SWD (Gottfried)

CTE Research Structures

1. CTERN - https://cteresearchnetwork.org/
2. CTEx - https://gpl.gsu.edu/ctex/
3. MDRC - https://www.mdrc.org/project/mdrc-center-effective-career-and-technical-education
4. ACTER - https://www.acteronline.org/
5. CVER - http://cver.lse.ac.uk/
6. Swiss Leading House - https://www.educationeconomics.uzh.ch/en.html

CTEResearchNetwork.org

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