

The Returns to Community College Career Technical Education Programs in California

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Estimating the Returns to Education

$$\ln(Earnings_i) = \alpha + \beta Education_i + \gamma X_i + v_i$$

- Key obstacle: ability bias
 - Students who graduate from a program are systematically different than students who do not
 - Higher ability
 - More motivated
 - Estimates of β will be biased (too large)

Solutions to Ability Bias

- Since educational attainment is not randomly distributed, researchers have looked for experimental or quasi-experimental assignment of educational attainment
 - “Quarter of Birth”
 - Twin Studies and intra-family comparisons
 - Vietnam Draft Lottery
 - Charter school lotteries

Individual Fixed Effects: Intuition

- Compare a student's own earnings before and after an education intervention (i.e. degree receipt)
- In each time period, estimate the deviation from an individual's average earnings over the study period
- Any characteristic that does not change over time is absorbed by the fixed effect
 - Ability
 - Demographics

Individual Fixed Effects: Equation

$$\ln(Earnings)_{it} = \alpha_i + \beta Degree_{it} + \gamma X_{it} + u_{it}$$

- α_i : individual fixed effect
- $Degree_{it}$: dummy for post-degree
 - After degree = 1
 - Before degree = 0
- X_{it} : time-varying characteristics
 - Age, enrollment status, grades that term, etc.
 - NOT: race, gender, SAT scores

When to use Individual Fixed Effects

- This model accounts for ability bias if ability is time-invariant
- So why is the model not used more often?
 - Need before/after degree data on earnings
- Not appropriate for estimates of return to elementary or secondary schooling, or traditional-age college students who do not have valid pre-education earnings.

Is this appropriate for returns to college programs?

- Strengths
 - Many students in postsecondary schooling are non-traditional age
 - Many students have multiple years of prior earnings
 - Especially true in CTE programs
- Limitations
 - Model only represents returns to postsecondary program for the types of students with prior earnings
 - Model drops those who go to college straight from high school

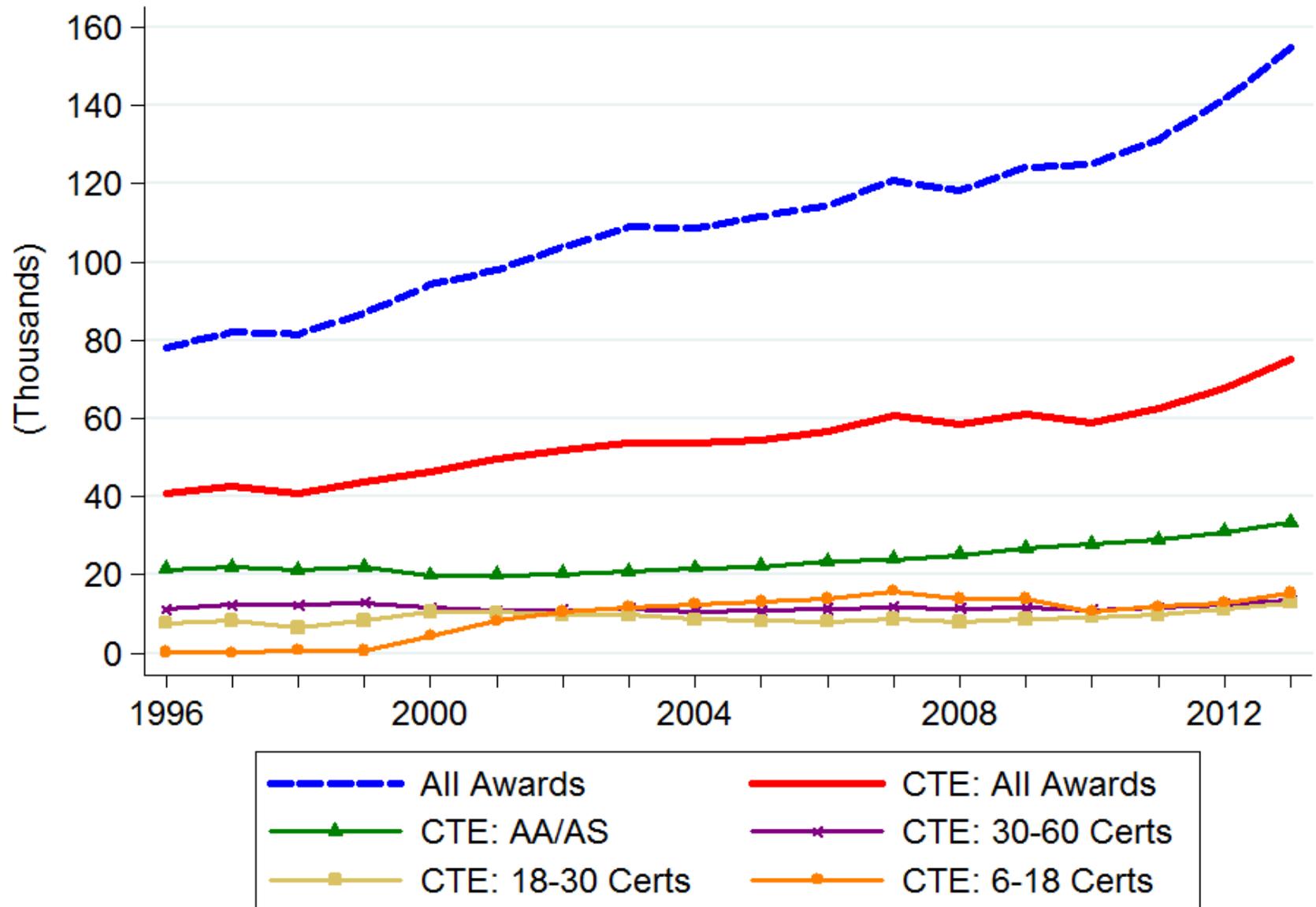
- Falling wages for Americans without a college degree
- Falling fraction of students completing traditional college degrees
- Community Colleges are key in raising number of college graduates and skill level of workforce
 - Transfer
 - Basic Skills (math and English)
 - Career Technical Education (CTE)

Previous research

- Enrollment in CCs and degree receipt are rewarded in labor market
 - Kane and Rouse (1999), Leigh and Gill (1997),
- Bailey et al. (2004), review of occupational degrees in CCs
- Jepsen et al. (2014) analyze certificates, diplomas and AA degrees in Kentucky
 - Returns to vocational associate degrees
 - Returns to vocational diplomas for men, less for women

- Census of students enrolled at one of 112 Community Colleges between 1993 and 2010
 - Focus on students who earned a degree or certificate
 - AA/AS
 - Certificate: 30-60 Credits
 - Certificate: 18-30 Credits
 - Certificate: 6-18 Credits
- Quarterly earnings data from state unemployment records, between 1992 and 2012
- Use CCC Chancellor's categorization of CTE programs

Degree Receipt at CA CC's, 1996-2013



Sample: Graduates

- Focus on CTE programs by “discipline”
 - Broadest category of program defined by CCC Chancellor's Office
- Limit sample to students who:
 - Ever got a CTE degree or certificate
 - Highest degree was between 2003-2007
 - Wages only measured if 18 or older

Analytic Strategy: Individual Fixed Effects

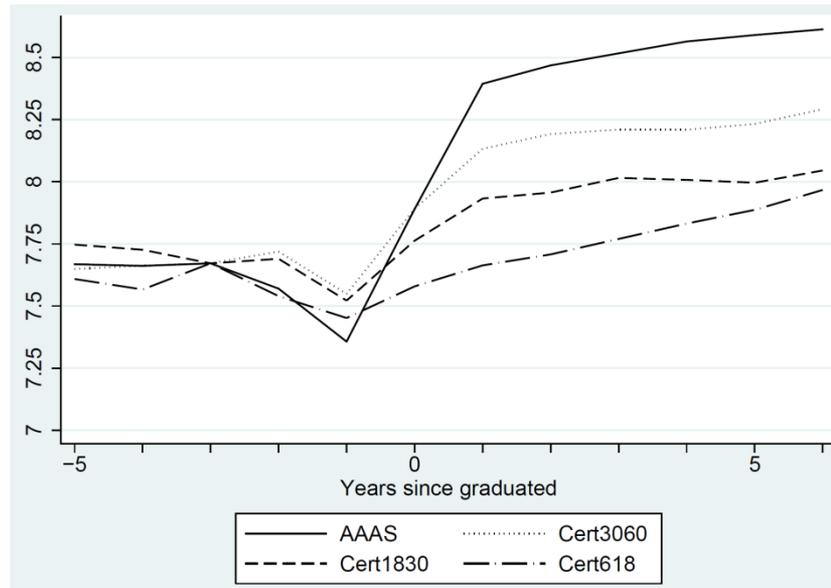
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- Individual Fixed Effects Model
- Two additions:
 - Control group
 - Individual-specific time trends

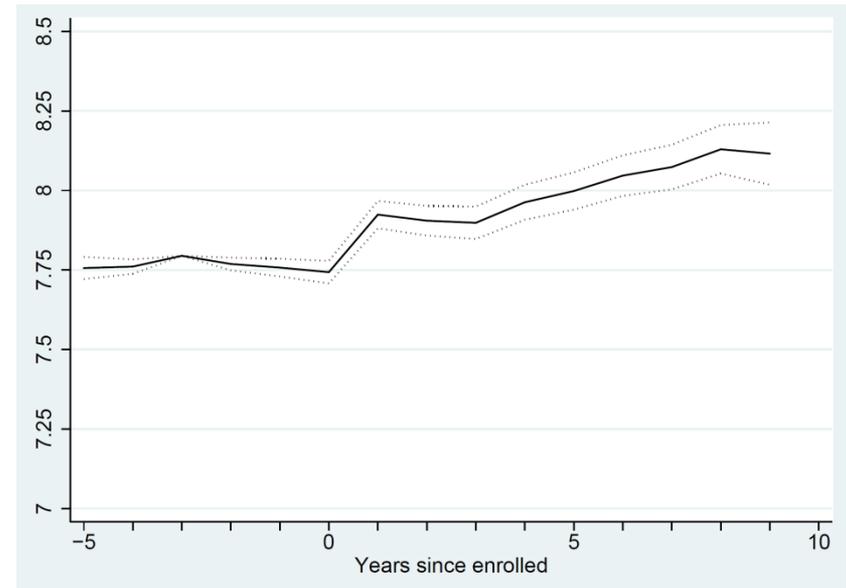
Analytic Strategy: Adding a Control Group

- Control group establishes counterfactual:
 - What would earnings have looked like for non-graduates?

Graduates, Health



Controls, Health



Sample: Control Group

- Based on CCC Chancellor's definition of CTE degree seekers
 - At least 8 units earned within 3 years in a single discipline
 - No degree earned
 - We restrict to having first enrolled between 2001-2005

Adding Individual Time Trends

- Individual Fixed Effects accounts for time-invariant ability bias
- What if graduates have different earnings growth rates?
 - i.e. Time-varying ability bias
- Individual trends account for this

Summary Statistics

	Business		Information Tech		Engineering	
	Treat	Control	Treat	Control	Treat	Control
Male	0.43	0.46	0.78	0.73	0.93	0.88
White	0.36	0.38	0.45	0.38	0.37	0.35
Black	0.08	0.07	0.06	0.05	0.06	0.07
Hispanic	0.25	0.20	0.17	0.15	0.32	0.32
Asian	0.17	0.21	0.15	0.25	0.11	0.09
N	20,440	61,457	3,611	21,633	18,324	46,837

	Health		Family/Consumer		Public/Prot	
	Treat	Control	Treat	Control	Treat	Control
Male	0.34	0.34	0.14	0.11	0.75	0.70
White	0.42	0.41	0.29	0.36	0.47	0.44
Black	0.07	0.09	0.11	0.09	0.07	0.07
Hispanic	0.20	0.21	0.37	0.33	0.28	0.29
Asian	0.10	0.09	0.10	0.09	0.04	0.04
N	36,407	15,736	15,461	35,831	26,842	40,637

Summary Statistics

	Business		Information Tech		Engineering	
	Treat	Control	Treat	Control	Treat	Control
Pre-enrollment Quarters	7.79	9.57	15.20	11.04	12.21	11.02
Employed pre-enrollment	0.30	0.41	0.39	0.47	0.42	0.47
Age at enrollment	25.50	27.30	29.02	29.66	26.19	27.55
N	20,440	61,457	3,611	21,633	18,324	46,837

	Health		Family/Consumer		Public/Prot	
	Treat	Control	Treat	Control	Treat	Control
Pre-enrollment Quarters	12.08	12.92	9.17	9.39	12.42	12.76
Employed pre-enrollment	0.48	0.54	0.35	0.40	0.50	0.53
Age at enrollment	26.32	29.22	28.23	28.80	25.17	26.46
N	36,407	15,736	15,461	35,831	26,842	40,637

Main results, total

All Disciplines	All	Men	Women
AA/AS	0.286 (0.011)	0.198 (0.017)	0.351 (0.016)
30-60 Units	0.203 (0.018)	0.128 (0.023)	0.321 (0.029)
18-30 Units	0.135 (0.020)	0.114 (0.026)	0.164 (0.033)
6-18 Units	0.117 (0.015)	0.131 (0.019)	0.098 (0.023)

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The average return to a 6-18 unit certificate is 0.117 log points, or about 12%

Main results, total

Excluding Health

	All	Men	Women
AA/AS	0.055 (0.010)	0.072 (0.015)	0.042 (0.015)
30-60 Units	0.083 (0.016)	0.079 (0.021)	0.090 (0.026)
18-30 Units	0.103 (0.018)	0.102 (0.023)	0.106 (0.031)
6-18 Units	0.097 (0.013)	0.112 (0.017)	0.076 (0.021)

Main results, by discipline

Health	<i>All</i>	<i>Older than 30</i>
AA/AS	0.690*** (0.0081)	0.672*** (0.0109)
30-60 Units	0.394*** (0.0129)	0.392*** (0.0180)
18-30 Units	0.282*** (0.0244)	0.298*** (0.0340)
6-18 Units	0.0964*** (0.0147)	0.113*** (0.0223)
Public/Protective		
AA/AS	0.126*** (0.0111)	0.150*** (0.0217)
30-60 Units	0.151*** (0.0154)	0.0911*** (0.0212)
18-30 Units	0.163*** (0.0119)	0.167*** (0.0156)
6-18 Units	0.132*** (0.0093)	0.135*** (0.0142)

Coefficients on degree received from separate regressions for each discipline and award type/length. Standard errors clustered by individual.

Main results, by discipline

Business/Management	<i>All</i>	<i>Older than 30</i>
AA/AS	0.0375*** (0.0090)	0.103*** (0.0155)
30-60 Units	0.116** (0.0356)	0.113* (0.0462)
18-30 Units	0.141*** (0.0221)	0.129*** (0.0251)
6-18 Units	0.157*** (0.0232)	0.129*** (0.0281)
Engineering/Industrial		
AA/AS	0.161*** (0.0154)	0.185*** (0.0256)
30-60 Units	0.0722*** (0.0115)	0.0456** (0.0170)
18-30 Units	0.0428** (0.0144)	0.0562** (0.0196)
6-18 Units	0.125*** (0.0157)	0.135*** (0.0221)

Coefficients on degree received from separate regressions for each discipline and award type/length. Standard errors clustered by individual.

Conclusions and Next Steps

- There are positive returns to a variety of sub-baccalaureate CTE programs at California Community Colleges
- For some disciplines (Health, Public/Protective Services) the returns are very large
 - Need to look closer at individual programs
 - Need to understand why health returns are so large (restricted supply versus high, growing demand)
- Variation in returns points to need (students and colleges) for increased information on returns; and a better understanding of selection into specific programs