Financial Aid, Debt Management, and Socioeconomic Outcomes
The Post-college Effects of Merit-based Aid

Judith Scott-Clayton (co-authored with Basit Zafar, FRBNY)

Teachers College, Columbia University & CCRC

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Motivation

- Broad-based financial aid increasingly central to US higher ed finance, as states reduce direct subsidies and sticker prices rise

- Research shows that broad based state merit aid programs can increase college enrollment and completion, but questions remain about whether benefits justify the costs

- Policy conversation increasingly focused on *post-college implications*, but limited research

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What do we know about impacts of state merit aid?

- Broad-based merit aid in general: positive effects on enrollment and completion
  - Dynarski (2004,2008); Cornwall, Mustard & Sridhar (2006); Pallais (2009); Zhang & Ness (2010); Bruce & Carruthers (2014)

- Caveats and conflicting findings
  - Fitzpatrick & Jones (2012); Sjoquist & Winters (2012); Cohodes & Goodman (2014); Dynarski (2000); Cornwell, Lee & Mustard (2005); Carruthers & Ozek (2013)

- WV PROMISE (Scott-Clayton 2011)
  - Increased GPAs, credits, and BA completion after 5 years, particularly large effects on on-time grad
  - Renewal reqs key to success – may not generalize

- Post-college: only one other rigorous study, by Bettinger, Gurantz, Kawano, & Sacerdote (2016)

Our study

- Examines the WV PROMISE Scholarship
  - Beginning in 2002, provided full tuition & fees for up to four years of in-state college attendance
  - Required HS GPA of 3.0+ (overall and in set of core courses) and 21+ on ACT (or 1000+ SAT)
  - Compared to other state programs, has stringent annual renewal criteria (requires 30 credits + 3.0 GPA to renew)
- Use RD & DD strategies to identify effects
- Merge multiple data sources – academic, employment, and credit to create unique dataset
- Examine outcomes up to 11 years post college entry

Data, Sample, Outcomes

- WVHEPC data:
  - Four cohorts of degree-seeking first-time entrants
  - ~52,000 overall; limited to ~20,000 age 19 or under, WV resident, HSGPA 3.0+
  - Transcripts, financial aid, employment for 10 yrs

- Equifax data:
  - 85% ever match (no program effect on match rate)
  - Can observe zipcode of residence (matched to IRS data on income), homeownership & max mortgage value, credit delinquencies and credit scores

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Source of identification: RD and DD

Actual PROMISE Receipt
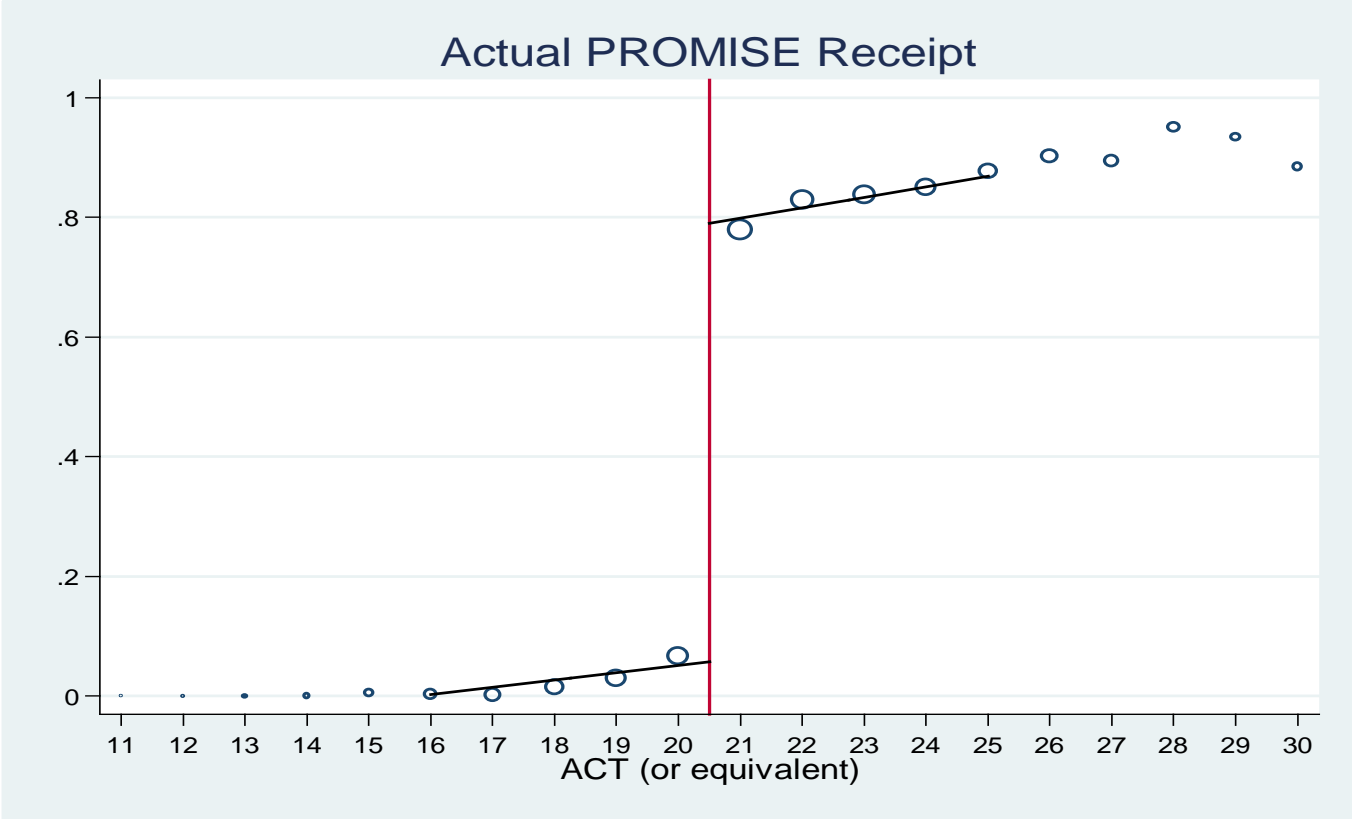
Visual Overview of RD and DD

Mean Zipcode Income
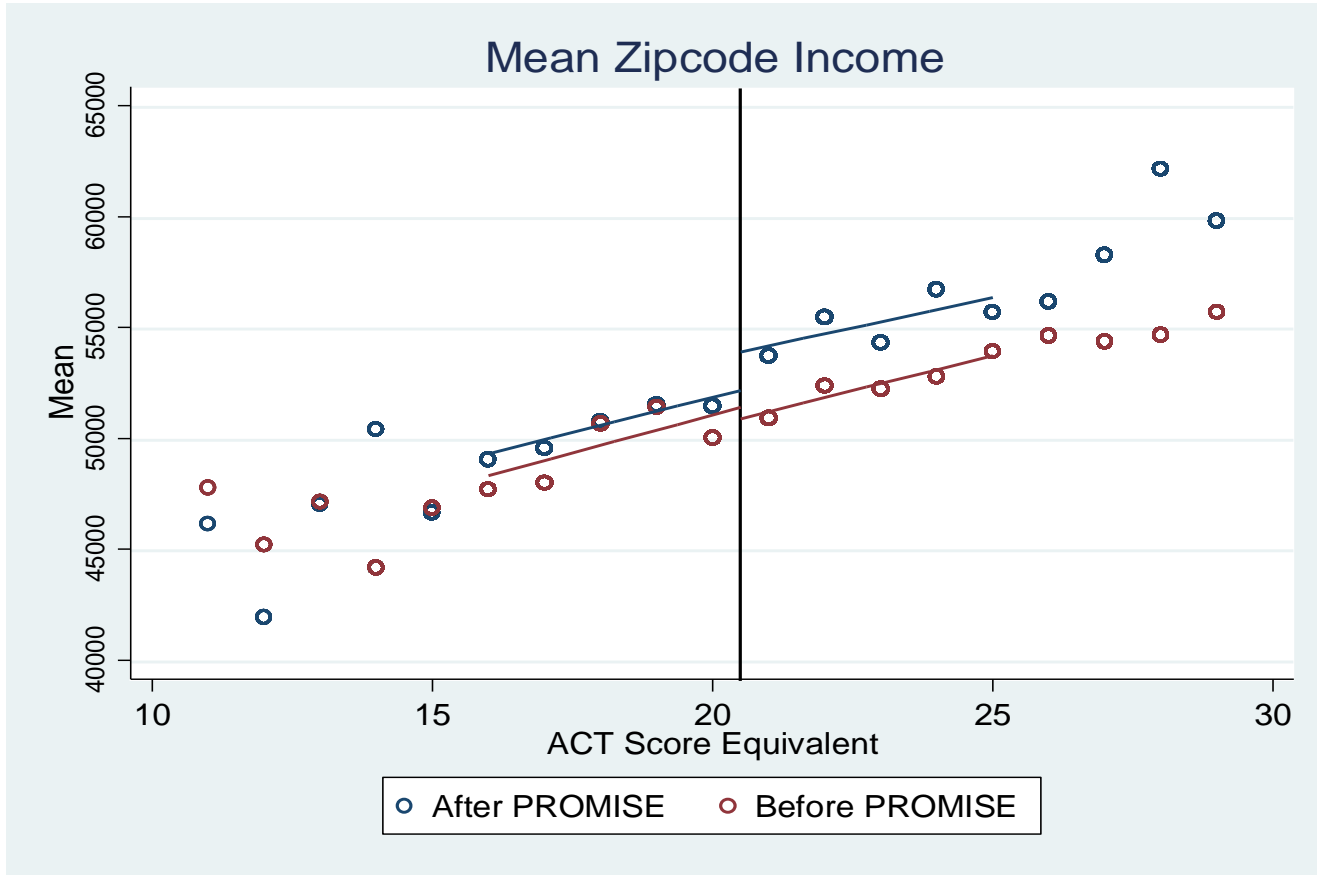
Causal Identification

$$P_i = \lambda + \psi(above_i) + \gamma(ACTdist_i * below_i) + \varphi(ACTdist_i * above_i) + X_i\phi + \varepsilon_i$$

$$P_{it} = \lambda + \gamma(ABOVE_i * AFTER_t) + \theta(ACTFE_i) + \vartheta(COHORTFE_t) + X_i\phi + u_{it}$$

- Two complementary strategies
  - Primary: RD for eligible cohorts with 3.0+ HSGPA
  - Secondary: Diff-in-diff comparing before vs. after, above vs. below ACT cutoff (limited to those with 3.0+ GPA)

- IV is layered on top of this to account for mismeasurement in our eligibility variable
  - First stage: 75-80pp; resulting estimates tell us the impact per student actually receiving the award

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Main threat to validity:
Program effects on enrollment

ACT Distribution Among HSGPA-Elg Enrollees
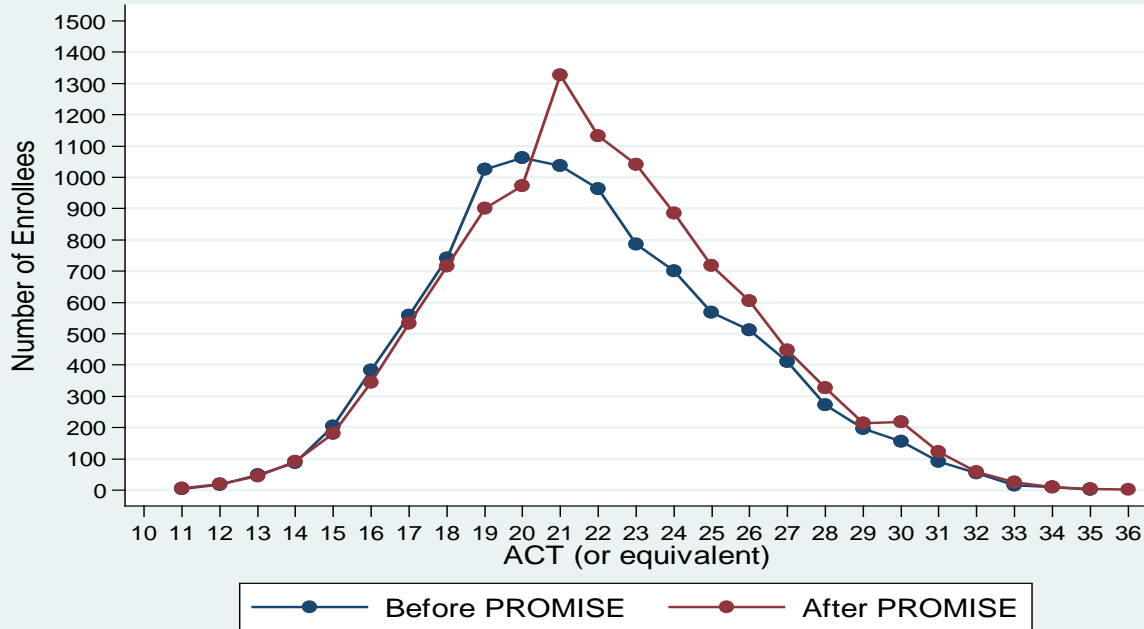
- Substantial additional mass above the cut-off suggests about 25% of treatment group is "marginal"

- Low rates of out-of-state enrollment, limited "missing" density below cutoff imply that at least 75% of this is *new* enrollment.

- Note this will affect identification in both the RD and the DD.

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Main Results: Regression Discontinuity

Outcome	(1) Mean at ACT=20	(2) IV-RD ACT: 16-25		(3) No covariates	
Earned BA within 4 years	0.154	0.096 (0.022)	***	0.103 (0.021)	***
Earned a BA within 10 years	0.543	0.019 (0.028)		0.038 (0.028)	
Graduate degree w/in 10 years	0.106	0.042 (0.019)	**	0.050 (0.018)	***
Sample size	974	8,578		8,800	

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Employed year round (in Year 10)	0.511	-0.014 (0.029)		-0.012 (0.029)	
Annual earnings|empl. yr-round	$40,086	$2,724 (1809)		$3,561 (1902)	*
Earn year 10 | Living in WV	$27,607	$1,150 (1786.14)		$1,332 (1812.93)	
Matched to Equifax	0.923	-0.002 (0.015)		0.000 (0.016)	
Ever living outside WV	0.228	-0.003 (0.025)		-0.002 (0.025)	
Zipcode: mean income	$49,556	$2,409 (1193)	**	$2,576 (1208)	**
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Ever owned a home	0.361	0.060 (0.029)	**	0.054 (0.029)	*
Ever take out a student loan	0.622	-0.052 (.027)	**	-0.049 (.027)	*
Student loan balance (incl. 0s)	$15,931	$2,805 (1739)		$3,321 (1734)	*
Ever past due: stud/auto/home loan	0.367	-0.026 (0.029)		-0.029 (0.029)	
Ever had account in collections	0.479	-0.047 (0.029)		-0.051 (0.030)	*
Credit score	665.3	3.863 (5.838)		4.998 (5.954)	
Index	-0.044	0.179 (0.122)		0.185 (0.124)	
Sample size	974	8,578		8,800	

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RD falsification test

Outcome	(2) IV-RD ACT: 16-25		(7) Falsification: RD Before 2002	
Earned BA within 4 years	0.096 (0.022)	***	0.012 (0.015)	
Earned a BA within 10 years	0.019 (0.028)		-0.024 (0.020)	
Graduate degree w/in 10 years	0.042 (0.019)	**	0.016 (0.014)	
Employed year round (in Year 10)	-0.014 (0.029)		0.014 (0.021)	
Annual earnings|empl. yr-round	$2,724 (1809)		$1,297 (1364)	
Earn year 10 | Living in WV	$1,150 (1786.14)		$2,709 (1440.48)	*
Matched to Equifax	-0.002 (0.015)		0.013 (0.013)	
Ever living outside WV	-0.003 (0.025)		0.012 (0.019)	
Zipcode: mean income	$2,409 (1193)	**	-$39.72 (895)	
Ever owned a home	0.060 (0.029)	**	0.011 (0.022)	
Ever take out a student loan	-0.052 (.027)	**	-0.018 (0.020)	
Student loan balance (incl. 0s)	$2,805 (1739)		-$1,038 (1178)	
Ever past due: stud/auto/home loan	-0.026 (0.029)		-0.005 (0.021)	
Ever had account in collections	-0.047 (0.029)		-0.006 (0.022)	
Credit score	3.863 (5.838)		3.393 (4.283)	
Index	0.179 (0.122)		0.081 (0.091)	
Sample size	8,578		7,830	

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Other robustness checks

- Diff-in-diff results are broadly consistent, but generally more muted – suggesting impacts may be smaller for those further above score cutoff

- Results generally robust to alternate bandwidths, including using methods of optimal bandwidth selection

- Multiple hypothesis testing: All outcomes robust w/ false discovery rate of 0.20 or below

- We also utilize bounding analyses to explore the possible role of selection bias: our results are robust to reasonable assumptions, but not to the most extreme assumptions

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What could drive these post-college effects?

- Improved human capital acquisition during college

- Reductions in undergraduate debt may facilitate graduate enrollment and homeownership by relaxing credit constraints

- Acceleration of time to degree could give students a head start on whatever next phase of life holds (graduate school, career, homeownership)

Controlling for intermediate outcomes

Outcome	(2) IV-RD ACT: 16-25	Controlling for intermediate outcome:	
		On-time BA completion	Cum. Undergraduate borrowing
Earned BA within 4 years	0.096 (0.022) ***	n/a	0.086 (0.012) ***
Earned a BA within 10 years	0.019 (0.028)	-0.028 (0.026)	0.036 (0.027)
Graduate degree w/in 10 years	0.042 (0.019) **	0.023 (0.018)	0.045 (0.019) **
Employed year round (in Yr 10)	-0.014 (0.029)	-0.012 (0.029)	-0.014 (0.029)
Annual earnings|empl. yr-round	$2,724 (1809)	$1,958 (1814)	$2,780 (1809)
Earn year 10 | Living in WV	$1,150 (1786)	$444 (1790)	$1,316 (1788)
Matched to Equifax	-0.002 (0.015)	-0.005 (0.015)	-0.000 (0.015)
Ever living outside WV	-0.003 (0.025)	-0.013 (0.025)	0.000 (0.025)
Zipcode: mean income	$2,409 (1193) **	$1,873 (1183)	$2,459 (1193) **
Ever owned a home	0.060 (.029) **	0.042 (0.029)	0.055 (0.029) *
Ever take out a student loan	-0.052 (.027) **	-0.061 (0.029) **	-0.029 (0.026)
Student loan balance (incl. 0s)	$2,805 (1739)	$2,324 (1748)	$4,467 (1616) ***
Ever past due: stud/auto/home loan	-0.026 (0.029)	-0.006 (0.027)	-0.017 (0.027)
Ever had account in collections	-0.047 (0.029)	-0.023 (0.029)	-0.039 (0.029)
Credit score	3.863 (5.838)	-1.483 (5.745)	2.363 (5.819)
Index	0.179 (0.122)	0.056 (0.120)	0.152 (0.121)
Sample size	8,578		

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Summary & Implications

- Students who just barely qualified for PROMISE:
  - More likely to graduation on-time, earn graduate degrees
  - No more likely to live or work out of state
  - Live in higher-income zipcodes and are more likely to own a home
  - Earnings, credit impacts are noisy but in good direction

- Generally consistent, but somewhat muted pattern for students higher up ACT score distribution

- Reduction in time-to-degree appears more plausible mechanism than reductions in undergraduate debt

- Results here would easily pass a cost-benefit test – but not clear how generalizable to other aid programs

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Center for Analysis of Postsecondary Education and Employment

Teachers College, Columbia University

525 West 120th Street, Box 174, New York, NY 10027

TEL: 212.678.3091 | capsee@columbia.edu

Sample descriptives

Outcome	BPS Sample, 2003	Full WV Analysis Sample	Promise Eligible Sample	Main RD Sample
Female	0.575	0.546	0.561	0.604
White	0.615	0.951	0.968	0.959
Black, non-hispanic	0.138	0.033	0.014	0.024
Hispanic	0.149	0.006	0.005	0.005
Other race/ethnicity	0.097	0.011	0.012	0.011
Age at entry	22.1	18.6	18.3	18.6
Graduated from private HS	0.082	0.031	0.034	0.026
HS GPA	2.82	3.23	3.63	3.50
Took SAT	0.640	0.105	0.127	0.106
Took ACT		0.926	0.907	0.942
ACT (or equivalent score)	21.0	20.8	24.2	21.0
Had 3.0+ HSGPA and 20+ ACT	n/a	0.429	1.000	0.595
Pell Recip. in 1st year	0.357	0.370	0.323	0.367
Enrolled full-time at entry	0.714	0.929	0.985	0.985
Enrolled in four-year college	0.407	0.697	0.868	0.788
Sample size	16,500	30,107	13,636	8,578

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RD Robustness – complete results

Outcome	(2) IV-RD ACT: 16-25		Alternate Bandwidths				(6) Full sample, local quadratic		(7) Falsification: RD Before 2002	
			(4) ACT: 18-23		(5) ACT: 11-30					
Earned BA within 4 years	0.096 (0.022)	***	0.099 (0.029) ***		0.080 (0.017)	***	0.085 (0.025)	***	0.012 (0.015)	
Earned a BA within 10 years	0.019 (0.028)		-0.013 (0.037)		-0.006 (0.023)		0.018 (0.033)		-0.024 (0.020)	
Graduate degree w/in 10 years	0.042 (0.019)	**	0.045 (0.024) *		0.023 (0.015)		0.032 (0.022)		0.016 (0.014)	
Employed year round (in Year 10)	-0.014 (0.029)		-0.026 (0.037)		0.017 (0.024)		-0.029 (0.034)		0.014 (0.021)	
Annual earnings|empl. yr-round	$2,724 (1809)		$4,438 (2270) *		$1,769 (1518)		$2,838 (2169)		$1,297 (1364)	
Earn year 10 | Living in WV	$1,150 (1786.14)		$2,737 (2297.34)		$2,555 (1478.40) *		$1,064 (2120.83)		$2,709 (1440.48) *	
Matched to Equifax	-0.002 (0.015)		-0.001 (0.019)		0.004 (0.012)		-0.000 (0.017)		0.013 (0.013)	
Ever living outside WV	-0.003 (0.025)		0.023 (0.032)		-0.002 (0.025)		0.009 (0.029)		0.012 (0.019)	
Zipcode: mean income	$2,409 (1193)	**	$3,714 (1540) **		$1,796 (1011)	*	$2,739 (1346)	**	-$39.72 (895)	
Ever owned a home	0.060 (0.029)	**	0.046 (0.037)		0.054 (0.029)	*	0.068 (0.034)	**	0.011 (0.022)	
Ever take out a student loan	-0.052 (.027)	**	-0.029 (.034)		-0.034 (.022)		-0.036 (.0316)		-0.018 (0.020)	
Student loan balance (incl. 0s)	$2,805 (1739)		$1,946 (2201)		$1,440 (1445)		$3,066 (2032)		-$1,038 (1178)	
Ever past due: stud/auto/home loan	-0.026 (0.029)		-0.029 (0.037)		-0.010 (0.024)		-0.029 (0.034)		-0.005 (0.021)	
Ever had account in collections	-0.047 (0.029)		-0.073 (0.038) *		-0.003 (0.024)		-0.066 (0.034)	*	-0.006 (0.022)	
Credit score	3.863 (5.838)		7.486 (7.554)		-1.739 (4.851)		8.131 (6.899)		3.393 (4.283)	
Index	0.179 (0.122)		0.248 (0.155)		-0.026 (0.100)		0.231 (0.143)	*	0.081 (0.091)	
Sample size	8,578		6,096		10,732		10,953		7,830	

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Alternative RD: Using first year GPA

Outcome			
Earned BA within 4 Years	0.208	(0.016)	***
Earned BA within 10 Years	0.234	(0.023)	***
Any grad degree w/in 10 years	0.103	(0.014)	***
Employed year round (in Year 10)	0.005	(0.023)	
Earnings|year round emp, Yr 10	$3,471	(1569)	**
Earn year 10 | Living in WV	$7,437	(1726.51)	***
Matched to Equifax	0.014	(0.012)	
Ever living outside WV	0.062	(0.020)	***
Zipcode: mean income	$4,057	(974)	***
Ever owned a home	0.09	(0.023)	***
Ever take out a student loan	-0.089	(0.023)	***
Student loan balance (inc. 0s)	$2,452	(1574)	
Ever past due: stud/auto/home loan	-0.156	(0.023)	***
Ever had account in collections	-0.179	(0.024)	***
Credit score	35.69	(4.54)	***
Index	0.977	(0.112)	***
Sample Size		2,791	

Impacts over time

Zipcode: mean income

Annual earnings|empl. yr-round

Ever owned a home

PROMISE Impact — — — — 90% CI
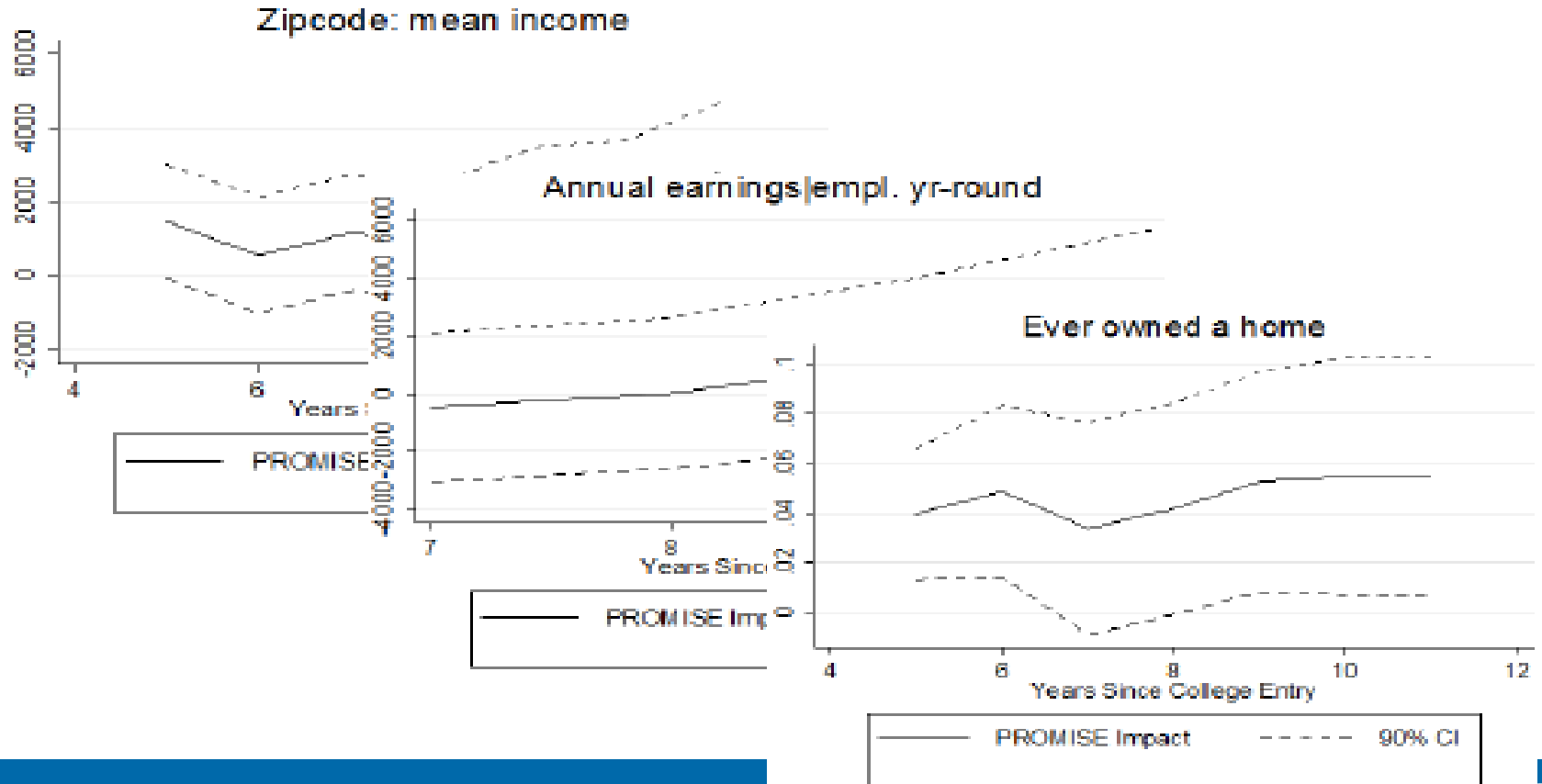
Proposed Structure of Data Flow
for Scott-Clayton & Zafar Project on Later-Life Outcomes of Education

WVHEPC
Master Data (Identifiable education records)

Data agreements
(for de-identified education data):
WVHEPC-ScottClayton (O)
WVHEPC-Zafar (O)

Data agreement
(to share ID file, no other data):
WVHEPC and Equifax (O)

RESEARCH TEAM (SCOTT-CLAYTON AND ZAFAR)
Research team receives DE-IDENTIFIED WVHEPC EDUCATION DATA FILES with a scrambled ID for linking across files. Scott-Clayton already has the necessary data (except for one file which was incomplete) from a prior project with WVHEPC. Because Zafar and Scott-Clayton are at different institutions, two separate (but identical) data agreements are needed.

EQUIFAX
Equifax receives single CROSSWALK FILE with only scrambled ID, SSN, and possibly name/DOB (NO education data). Merges on credit report variables, then removes all identifiers other than the scrambled ID from merged file, to create the DE-IDENTIFIED CREDIT DATA FILE. Crosswalk file with identifiers can then be destroyed.

Data agreement
(to merge de-identified WVHEPC and Equifax data):
ScottClayton-FRBNY (X)

Data agreement
(for de-identified credit data):
Equifax-FRBNY (X)

RESEARCH TEAM - SECURE FRBNY SERVER
Research team merges the de-identified credit data file to the de-identified WVHEPC education data files to create a DE-IDENTIFIED, MERGED ANALYSIS FILE. File will be stored and analyzed only by the research team and only on-site at the FRBNY using their secure server. Data can be analyzed only for the agreed-upon purpose, and will be destroyed at the end of the project.

Research report(s) and policy brief(s) produced by research team. In addition to the formal project deliverables, research team is happy to run additional sub-analyses of interest to WVHEPC, as long as they fall within the approved project agreements.

NOTES: (0) indicates data agreements still under development/review. (X) indicates data agreements in place or ready to sign.

Who are the marginal enrollees?

Fall Enrollment Rates of Recent WV HS Grads
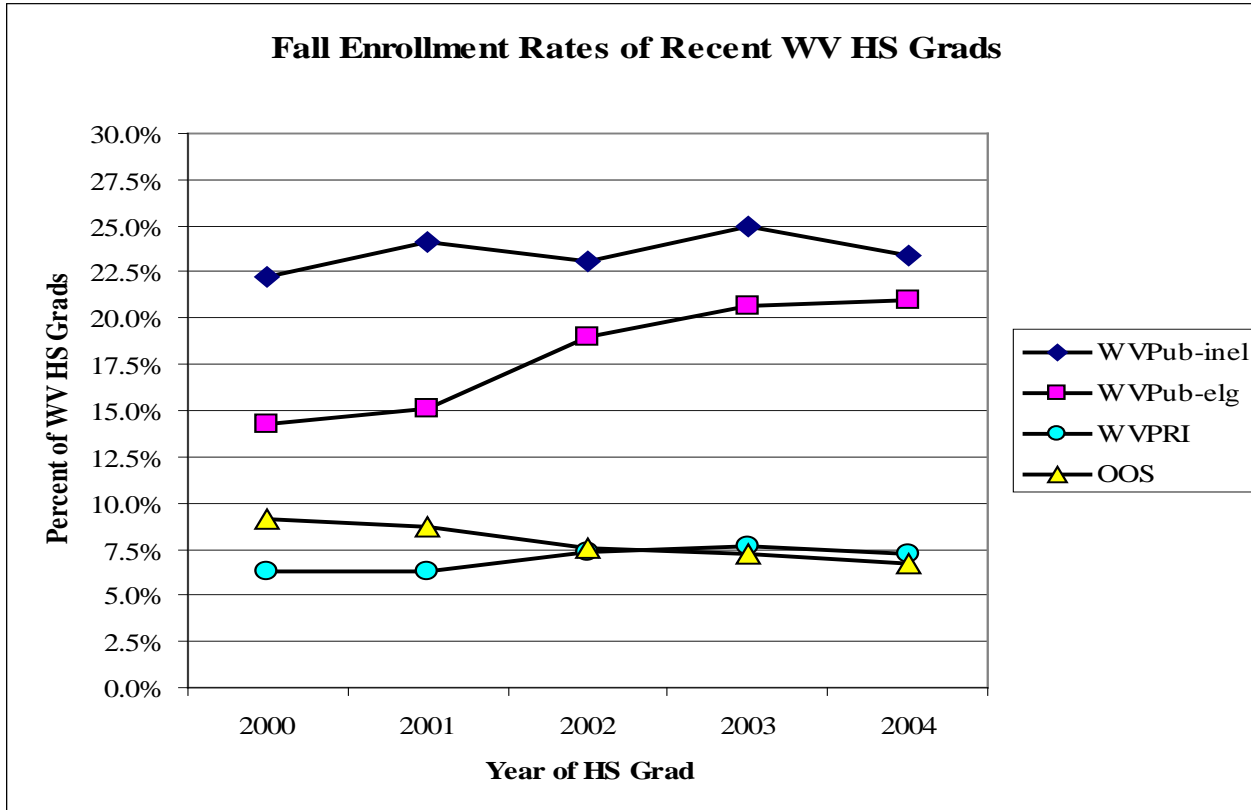
Out of 20 eligible enrollees…