RESEARCH REPORT

Final Impact Report for Accelerating Opportunity

Appendices

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ABOUT THE URBAN INSTITUTE

The nonprofit Urban Institute is dedicated to elevating the debate on social and economic policy. For nearly five decades, Urban scholars have conducted research and offered evidence-based solutions that improve lives and strengthen communities across a rapidly urbanizing world. Their objective research helps expand opportunities for all, reduce hardship among the most vulnerable, and strengthen the effectiveness of the public sector.

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Appendix A. Required Elements of AO and Theory of Change

Nonnegotiable Elements of the AO Grant

1. Explicit articulation of two or more educational pathways, linked to career pathways, that begin with adult basic education or English as a second language classes and continue to a college-level certificate and beyond

2. Evidence of strong local demand for the selected pathways, including the presence on the workforce investment board demand list for the local area or other local data demonstrating robust demand

3. Acceleration strategies, including contextualized learning and the use of hybrid (online and classroom-based) course designs

4. Evidence-based dual enrollment strategies, including paired courses and I-BEST and I-BEST-like approaches

5. Comprehensive academic and social student supports (e.g., tutoring, child care, transportation, access to public benefits, and subsidized jobs)

6. Achievement of marketable, stackable, credit-bearing certificates and degrees and college readiness, with an explicit goal of bypassing developmental education

7. Award of some college-level professional-technical credits, which must be transcripted the quarter or semester in which they are earned

8. Partnerships with workforce investment boards and employers

(Source: JFF 2011)

States and colleges were expected to adhere to the nonnegotiable elements of the model except where infeasible. The elements specify that the states' programs should offer career pathways that are at least 12 credit-hours long, at least two pathways should be established in each of at least eight colleges, and pathways should have at least 25 percent team teaching. Students eligible for AO must have fallen within NRS functioning levels 4–6 (6th to 12th grade levels) on math, reading, or writing, or NRS functioning levels 5–6 in English-language skills. Enrolled students may have had a secondary school credential as long as they fell within the eligible skill ranges. States were asked to identify policy

levers and were expected to make at least 80 percent progress toward their policy goals by the end of the grant period. The goal is that within three years of operation, each participating state would produce at least 3,600 credentials. States were to offer credentials in industries with sufficient labor demand so students could reasonably become employed within their areas of study.

Figure A.1 shows JFF's original theory of change for the AO initiative, originally called "ABE to Credentials."

Accelrating Opportunity Theory of Change

Accelerating Opportunity Theory of Change – Definitions

Stakeholders & Levers | **Activities & Interim Outcomes** | **Long-Term Goals**

Stakeholders

Key beneficiaries, implementing or enabling entities, supporters, and funders with a demonstrable interest in the outcomes: community/technical colleges, ABE programs, higher education agencies & design teams, state policymakers, federal agencies, CBOs, WIBs, employers, students, TA providers, philanthropic partners.

Levers

Approaches that can be taken or domains that can be acted on to change behaviors, conditions, or attitudes.

College & Career Pathways

Evidence-based instructional and programmatic models that promote transition to and completion of credentialing programs in high-demand fields. Pathways must include acceleration and dual-enrollment strategies and comprehensive support, and culminate in marketable credentials and college readiness.

Culture Shift

The necessary changes in attitude at community colleges, and among policymakers, employers, and ABE students themselves to view those students as valued members of the community college population capable of earning marketable credentials and beyond, and worthy of governmental funding.

Scale & Sustainability

The increased percentage of student participation in ABE to Credentials pathways within a set of colleges in multiple states (depth), and the spread of pathway innovations to additional colleges and additional states (breadth); the ability for the innovations to continue over time as evidenced by viable funding mechanisms and the embeddedness of the innovations in the culture, environment, and postsecondary systems of multiple states.

System

Governing or coordinating higher education state agencies focused on community colleges and ABE programs, public higher education institutions, related state agencies (*e.g.,* workforce development, labor, commerce), associated employers, and community-based providers working in concert to develop labor-market-ready adults with marketable postsecondary credentials.

Students

Low-skill adult learners in community college-based ABE, ESL, and ASE programs

Accelerating Opportunity Theory of Change – Path to Impact for System and Students

Stakeholders & Levers	Activities	2-Year Outcomes	4-Year Outcomes	Long-Term Goals

Stakeholders & Levers (vertical text column):

Community/Technical Colleges ◆ ABE Programs ◆ State Policymakers ◆ Higher Education Agencies ◆ Students

Federal Agencies ◆ WIBs & One-Stops ◆ Employers ◆ Community-Based Organizations ◆ Philanthropic Partners ◆ Technical Assistance Providers

Data
Program
Innovation

Policy
Financing

College & Career Pathways

Activities:
- Target faculty professional development
- Engage faculty in course & pathway design, team teaching
- Redesign curriculum
- Create learning networks
- Analyze labor market & engage employers

2-Year Outcomes:
- Employers actively engage with colleges on pathway development
- 2 viable I-BEST or I-BEST-like pathways per participating college
- Multiple faculty members per college willing & able to deliver integrated curriculum to ABE students
- Implementation reflects emerging evidence & innovation

4-Year Outcomes:
- Multiple transparent ABE-to-credential pathways aligned with labor market in at least 8 colleges/state
- Pathway approaches are enduring and sustainable in at least 8 colleges/state
- At least 8 colleges/state move ≥ 25% of target students to achieve marketable credentials & college credit without Dev Ed in ≤ 4 years
- Robust, sustainable learning networks drive continuous program improvement

Culture Shift

Activities:
- Engage champions
- Launch strategic communications
- Track data on ABE students
- Promote access to campus resources for students

2-Year Outcomes:
- Growing awareness of problem/solutions by colleges, employers, states
- Greater ABE student access to campus resources
- ABE students seen as important population/pipeline in institutions
- ABE students seek college & career pathways
- States, colleges invest in ABE data tracking

4-Year Outcomes:
- ABE students supported (in academics, financial aid, college/career counseling) & integrated into colleges
- Students have knowledge of range of available supports
- Faculty, administrators & policymakers demonstrate commitment to ABE student success

Scale & Sustainability

Activities:
- Identify multi-sector resources
- Identify & advocate for removal of policy barriers in all sectors
- Provide state tools for cost-benefit analysis

2-Year Outcomes:
- Some financial aid barriers removed; ≥ 2 states successfully using models for ABE students to access Pell grants
- Colleges & students gain access to untapped state, federal & employer funding to support pathways
- Capacity, tools & data available in states & colleges to conduct cost-benefit analysis
- Colleges and states have greater capacity to track ABE student progress/outcomes & to link data to labor market

4-Year Outcomes:
- States, colleges, employers & initiative partners understand costs & ROI
- 3-4 viable financing models, including repurposed funding
- Participation at tipping point in multiple colleges (≥ 40% of target students)
- Sufficient data to inform replication
- First 4 states have changed policies to support scale beyond first 8 institutions
- Some federal policy barriers to financial aid & sustainable funding removed

Long-Term Goals

System
- Financially sustainable systems for integration of ABE students into marketable career pathways in college
- Consistent information flow on labor market demand & supply between business & colleges
- Colleges engage in continuous, data-driven program improvement
- Deep penetration of model in multiple colleges in diverse states

Students
- High completion of multiple career pathway options for low-skill adults
- Skills, credit accumulation make college completion viable
- Improved job placement & employment results for participating students

Source: JFF (2011); reproduced here with permission.

Notes: ABE = adult basic education; ASE = adult secondary education; CBOs = community-based organizations; ESL = English as a second language; ROI = return on investment; TA = technical assistance; WIBs = workforce investment boards.

Appendix B. AO Student Characteristics by State

This appendix provides a detailed description of AO students in each state.

AO Students in Illinois

This section presents descriptive characteristics of AO students in Illinois, overall and in each year of implementation. AO students in Illinois were largely recruited from adult education, so students are not separated by recruitment source in these analyses, unlike in Kansas and Kentucky. The comparison group for Illinois is only drawn from non-AO adult education students. Statewide, there were 1.4 million adults without high school credentials and 550,000 English-language learners on average from 2009 to 2011, constituting 11 percent and 4 percent of the total state population, respectively (OCTAE 2014).

Selected Characteristics of the AO Population in Illinois

Table B.1 presents some descriptive information about AO students in Illinois, divided into three occupational areas: health, manufacturing, and other (or occupations that were not clearly identifiable in the administrative data by course and credential histories).

AO students in Illinois were relatively evenly divided between the three occupational areas defined for this analysis, with about 37 percent in health pathways, 33 percent in manufacturing pathways, and 30 percent in other or unidentifiable pathways. Just over half of all students were female (55 percent), although the gender compositions of the students varied significantly by pathway. Over 92 percent of students in health pathways were female, while only about 9 percent of students in manufacturing pathways were female. The average age was around 30 for all AO students in Illinois, which was consistent with the other states. A plurality of students (almost 42 percent) were white, and there was a large share of black students as well (almost 39 percent). The racial and ethnic composition of AO students varied by pathway, with relatively fewer white and Hispanic students enrolled in health pathways and relatively more enrolling in manufacturing. Nearly one-third of students (30 percent) had a high school credential at entry.

Selected Variables for Illinois AO Students, by Occupational Pathway

	AO students	AO students in health pathways	AO students in manufacturing pathways	AO students in other or unidentifiable pathways
Female (%)	55.4	92.2	9.2	60.6
Average age at intake	28.9	30.0	28.7	27.8
White (%)	41.6	34.8	50.4	40.2
Black or African American (%)	38.9	52.0	27.5	35.2
Hispanic or Latino (%)	16.7	11.3	21.5	18.2
All other races and ethnicities (%)	1.8	1.9	NA	3.0
Missing race or ethnicity (%)	1.0	0.0	NA	3.4
High school diploma or HSE at entry (%)	29.8	32.6	35.2	20.5
Greater than high school at entry (%)	0.0	0.0	0.0	0.0
Pell grant recipient (%)	17.5	11.0	31.0	11.0
Predicted probability of college (%)	35.9	41.5	30.2	35.1
Average quarters employed in prior two years	2.9	3.2	3.2	2.3
Sample size	867	319	284	264

Notes: HSE = high school equivalency; NA = not applicable, values suppressed because of sample sizes of fewer than three observations.

Overall, only 17.5 percent of AO students in Illinois received a Pell grant, although this figure was 31 percent for students in manufacturing pathways. This may relate to the restriction on Pell grant eligibility for students who did not have high school credentials because the ability-to-benefit provision was terminated for the majority of AO implementation. The predicted probability of college for all AO students in Illinois was 35.9 percent, with higher probabilities for students in health pathways and lower probabilities for students in manufacturing pathways. Illinois AO students had less work experience in the two years prior to enrollment than AO students in the other three states, with an average of only 2.9 quarters of employment.

CHANGES IN CHARACTERISTICS OVER TIME

The characteristics of Illinois AO students over the course of implementation were more stable than other states. In the third year of the program, there were more black students (45 percent) and female students (61 percent) than in other program years, but none of this variation constituted a major trend in the composition of entering students over time.

Characteristics of Illinois AO Students over Time

Data for new enrollees from college records

Total enrollment, by calendar year

Students

Age, by calendar year

- 17–19
- 20–22
- 23–26
- 27–35
- 36–54
- Over 54

	Year 1	Year 2	Year 3
36–54	21%	23%	22%
27–35	24%	22%	23%
23–26	16%	19%	19%
20–22	19%	20%	15%
17–19	18%	14%	18%

Gender, by calendar year

- Male
- Female

	Year 1	Year 2	Year 3
Female	55%	50%	61%
Male	45%	50%	39%

Race or ethnicity, by calendar year

- White
- African American
- Hispanic/Latino
- Asian, multiple, other

	Year 1	Year 2	Year 3
Asian, multiple, other			6%
Hispanic/Latino	15%	18%	17%
African American	40%	31%	45%
White	43%	51%	32%

Educational attainment, by calendar year

- HS diploma or HSE
- Greater than HS
- No diploma

	Year 1	Year 2	Year 3
No diploma	77%	57%	75%
HS diploma or HSE	23%	43%	25%

Recruitment source, by calendar year

- Adult ed.
- Dev. ed.
- CTE
- Other

	Year 1	Year 2	Year 3
Adult ed.	100%	100%	100%
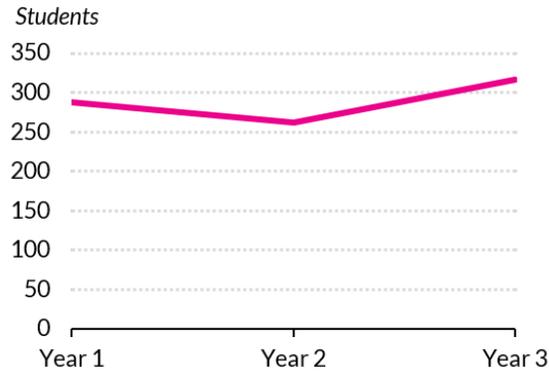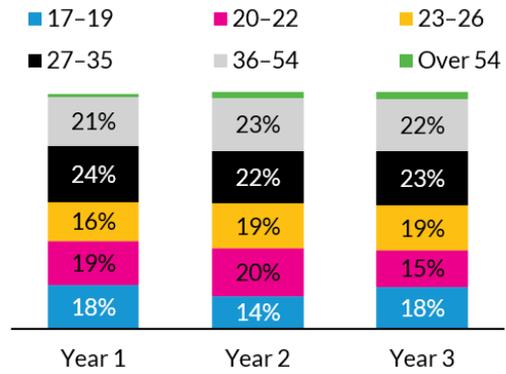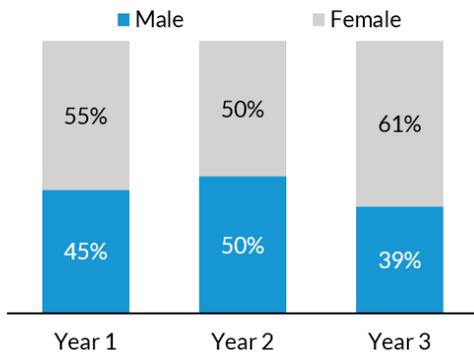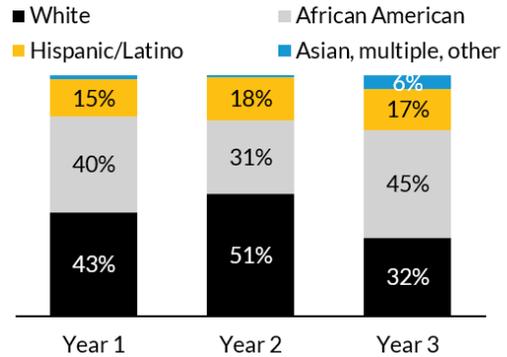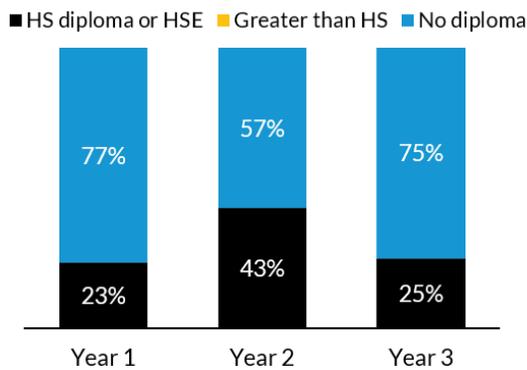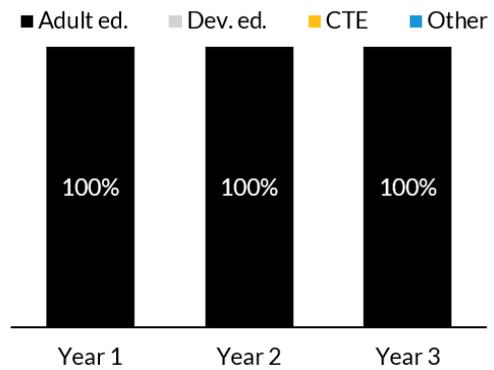
Sources: Illinois Community College Board Adult Education and Postsecondary Records.
Notes: CTE = career and technical education; HSE = high school equivalency; Dev. ed. = developmental education. Percentages are computed for students for whom data are available; missing values are excluded. Year 1 is 2012, year 2 is 2013, and year 3 is 2014.

AO Students in Kansas

Kansas relied heavily on the population of current CTE students for its recruitment; therefore, the impact analysis includes a second CTE comparison group in addition to the adult education comparison group. This section presents descriptive characteristics of Kansas AO students. Statewide, there were 237,000 adults without high school credentials and 62,000 English-language learners on average from 2009 to 2011, constituting 8 percent and 2 percent of the total state population, respectively (OCTAE 2014).

Selected Characteristics of the AO Population in Kansas

Descriptive statistics for AO students are presented separately by recruitment source (adult education and CTE).

CHARACTERISTICS OF ADULT EDUCATION STUDENTS

Table B.2 presents basic information on AO students recruited from adult education. As was the case in Illinois, AO students in Kansas can be divided into three major occupational pathways: health occupations, manufacturing occupations, and other occupations or occupations that were not clearly identifiable in the administrative data by course and credential histories.

Over 73 percent of AO students drawn from adult basic education programs were enrolled in health pathways. Seventy-seven percent of all adult education AO students and 89 percent of those in health pathways were female. Kansas adult education students were generally in their late twenties. Almost 43 percent of all Kansas adult education students were white, almost 20 percent were Hispanic or Latino, and just over 9 percent were black or African American. AO students in manufacturing pathways that were recruited from adult education were more likely to be black or African American and male than were students in other pathways.

Surprisingly, Kansas AO students recruited from adult education had relatively high levels of educational attainment; 68 percent of that population had a high school diploma or HSE at entry, and over 7 percent had at least some college education before AO. These adult education students may have earned a high school credential shortly before AO enrollment and therefore were measured as having one at AO entry, even though nationally most adult basic education students do not have a high school credential. Nonhealth adult education students (largely men) had much lower levels of educational attainment than those in health pathways (mainly women). The substantial educational attainment of AO students recruited from adult education highlights the importance of matching them

to a comparison group of adult education students with similar characteristics when estimating the impact of AO.

TABLE B.2

Selected Variables for Kansas AO Students Recruited from Adult Education, by Occupational Pathway

	AO students	AO students in health pathways	AO students in manufacturing pathways	AO students in other or unidentifiable pathways
Female (%)	76.9	89.3	40.2	40.4
Average age at intake	28.4	28.5	28.9	21.5
White (%)	42.9	42.7	39.1	40
Black or African American (%)	9.2	7.4	16.3	NA
Hispanic or Latino (%)	19.8	20.8	14.1	60
All other races and ethnicities (%)	4.8	4.5	6.5	NA
Missing race or ethnicity (%)	23.3	24.6	23.9	NA
HSE at entry (%)	16.8	15.4	22.8	NA
High school diploma at entry (%)	51.4	53.7	42.4	80
Greater than high school at entry (%)	7.6	9.5	NA	NA
Pell grant recipient (%)	24.6	23.7	27.2	40
Predicted probability of college (%)	25.5	26.1	25.5	22
Average quarters employed in prior two years	4.1	4.1	3.7	4.5
Sample size	459	337	126	10

Notes: HSE = high school equivalency; NA = not applicable, values suppressed because of sample sizes of fewer than three observations.

Pell grant receipt among students recruited from adult education was low at just under 25 percent. The ability-to-benefit provision discussed above may account for this low Pell grant receipt rate. Generally, manufacturing students had a slightly lower probability of attending college than health students, though the differences are not large. Kansas AO students from adult education had recorded employment on average in only 4.1 of the eight quarters before AO enrollment.

CHARACTERISTICS OF CTE STUDENTS

Although adult education students were the original target population for AO, 73 percent of the 1,698 AO students came from CTE. As is the case for the adult education students in Kansas, 58 percent of CTE students were in health pathways. Table B.3 presents descriptive statistics for the CTE population.

TABLE B.3

Selected Variables for Kansas AO Students Recruited from CTE before Match, by Occupational Pathway

	AO students	AO students in health pathways	AO students in manufacturing pathways	AO students in other or unidentifiable pathways

	AO students	AO students in health pathways	AO students in manufacturing pathways	AO students in other or unidentifiable pathways
Female (%)	52.9	86.0	6.5	11.4
Average age at intake	27.3	27.3	27.0	30.6
White (%)	54.9	58.9	50.9	31.8
Black or African American (%)	16	12.6	17.9	52.2
Hispanic or Latino (%)	15.9	14.3	18.7	11.4
All other races and ethnicities (%)	5.8	6.0	5.7	*
Missing race or ethnicity (%)	7.3	8.2	6.7	0.0
HSE at entry (%)	9.5	7.1	12.8	11.4
High school diploma at entry (%)	59.8	55.6	65.3	70.5
Greater than high school at entry (%)	24.9	30.8	16.8	15.9
Pell grant recipient (%)	43.5	33.3	56.8	68.2
Average quarters employed in prior two years	4.1	4.5	3.8	2.6
Sample size	1,239	719	475	44

Notes: HSE = high school equivalency; NA = not applicable, values suppressed because of sample sizes of fewer than three observations.

Out of all AO students recruited from CTE, almost 53 percent were female. The female share of students was higher in the health pathways (86 percent) and much lower in the manufacturing pathways (6.5 percent). The majority of students recruited from CTE (almost 55 percent) were white, a higher share than among the adult education population. The share of white students was high across all occupational pathways, but manufacturing and other pathways had a lower share of nonwhite students than health pathways. As may be expected, educational attainment for students from CTE was higher than it was for students from adult education, with over half of the population (59 percent) earning a high school diploma before entry, an additional 10 percent earning an HSE, and almost 25 percent had at least some college education. Pell grant receipt rates were nearly 44 percent among all CTE students; of students in manufacturing or other nonhealth pathways, well over half of all students (57 percent of manufacturing and 68 percent of students in other occupational areas) received Pell grants. Strikingly, the population recruited from CTE had approximately the same employment history as students recruited from adult education prior to AO enrollment (4.1 of the previous 8 semesters).

The predicted probability of attending college is not estimated for students recruited from CTE, because all of these students were already enrolled in college before coming into contact with AO. Thus, there is no possibility that AO increased college access for this population.

Changes in Characteristics over Time

Over the course of implementation, the characteristics of Kansas AO students shifted slightly toward non-white male students. These trends are apparent in the mini-charts in figure B.2.

Characteristics of Kansas AO Students over Time

Data for new enrollees from college records

Total enrollment, by calendar year

Students

Age, by calendar year

| ■ 17–19 | ■ 20–22 | ■ 23–26 |
| ■ 27–35 | ■ 36–54 | ■ Over 54 |

Gender, by calendar year

■ Male ■ Female

Race or ethnicity, by calendar year

| ■ White | ■ African American |
| ■ Hispanic/Latino | ■ Asian, multiple, other |

Educational attainment, by calendar year

■ HS diploma ■ HSE ■ Greater than HS ■ No diploma
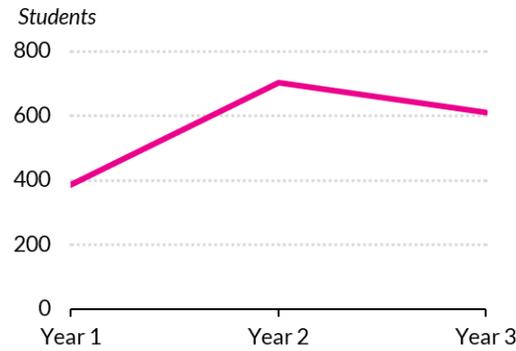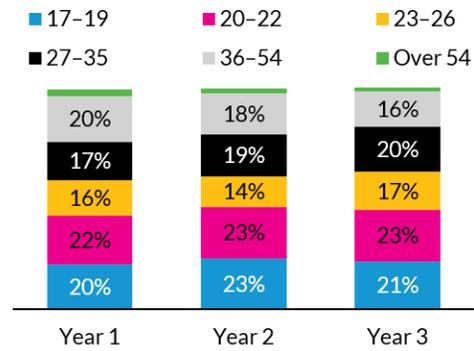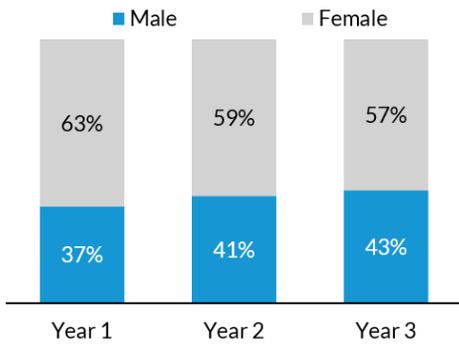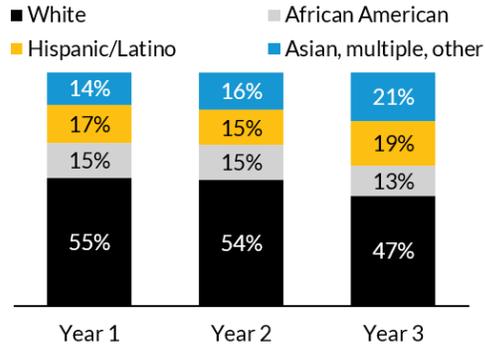
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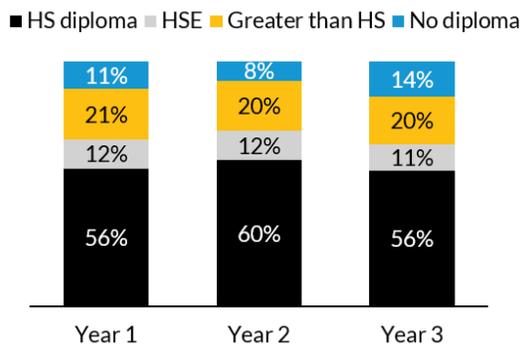
■ Adult ed. ■ Dev. ed. ■ CTE ■ Other
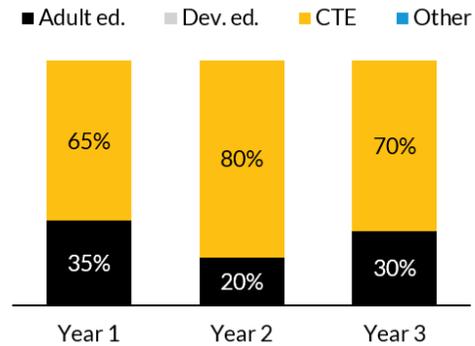
Sources: Kansas Board of Regents Postsecondary Records.
Notes: CTE = career and technical education; HSE = high school equivalency; Dev. ed. = developmental education. Percentages are computed for students for whom data are available; missing values are excluded. Year 1 is 2012, year 2 is 2013, and year 3 is 2014.

AO Students in Kentucky

Like Kansas, Kentucky recruited most of its AO participants from college developmental education or routed new students who would have needed to enroll in developmental education into AO. This section presents descriptive characteristics of Kentucky AO students. Statewide, there were 575,000 adults without high school credentials and 39,000 English-language learners on average from 2009 to 2011, constituting 13 percent and 1 percent of the total state population, respectively (OCTAE 2014).

Selected Characteristics of the AO Population in Kentucky

CHARACTERISTICS OF ADULT EDUCATION STUDENTS

Table B.4 presents some basic information on AO students recruited from adult education. As was the case in Illinois and Kansas, AO students in Kentucky can be divided into three major occupational pathways: health occupations, manufacturing occupations, and other occupations or occupations that were not clearly identifiable in the administrative data by course and credential histories.

TABLE B.4

Selected Variables for Kentucky AO Students Recruited from Adult Education, by Occupational Pathway

	AO students	AO students in health pathways	AO students in manufacturing pathways	AO students in other or unidentifiable pathways
Female (%)	56.6	92.3	9.5	60.7
Average age at intake	29.3	28.6	31.4	27.6
White (%)	75.4	80.8	80.8	60.7
Black or African American (%)	21.3	19.2	16.7	32.1
Hispanic or Latino (%)	0.0	0.0	0.0	0.0
All other races and ethnicities (%)	3.3	0.0	*	*
Missing race or ethnicity (%)	0.0	0.0	0.0	0.0
HSE at entry (%)	14.8	15.4	16.7	10.7
High school diploma at entry (%)	0.0	0.0	0.0	0.0
Greater than high school at entry (%)	0.0	0.0	0.0	0.0
Pell grant recipient (%)	32.8	32.7	21.4	50.0
Predicted probability of college (%)	21.3	19.2	20.7	26.2
Average quarters employed in prior two years[†]	3.1	2.7	3.9	2.6
Sample size	122	52	44	26

Notes: HSE = high school equivalency; NA = not applicable, values suppressed because of sample sizes of fewer than three observations.

Over 40 percent of AO students in Kentucky were enrolled in health pathways, a much lower figure than in Kansas but higher than in Illinois. This may relate to the characteristics of the adult education-recruited AO population. Fifty-seven percent of students from adult education were female, but over

92 percent of those in health pathways were female. Conversely, only about 10 percent of the students in manufacturing pathways were female. Kentucky adult education students were in their late twenties and early thirties, with somewhat younger students entering health pathways and somewhat older students entering manufacturing pathways. About 75 percent of all Kentucky adult education students were white, over 21 percent were Black or African American, and no AO students from adult education were Hispanic or Latino. The relatively few students in pathways other than health and manufacturing were somewhat more likely to be identified as Black or African American than students in health and manufacturing.

About 15 percent of Kentucky students from adult education had an HSE at entry, which they would have earned in the semester immediately before AO enrollment, based on the definitional distinction between students recruited from adult education and those recruited from developmental education. None had a prior postsecondary credential.

Pell grant receipt among students recruited from adult education was low – at 33 percent. Pell grant receipt was much higher for AO students in other (i.e., nonhealth, nonmanufacturing) pathways, at 50 percent. Health students had the lowest probabilities of attending college, at about 19 percent, while the values for manufacturing and other students were somewhat higher. The average AO student recruited from adult education was employed for 3.1 of the 8 quarters preceding enrollment. Students in manufacturing pathways had higher prior employment rates than students in health and other pathways.

CHARACTERISTICS OF DEVELOPMENTAL EDUCATION STUDENTS

Most students in Kentucky were recruited from developmental education classes. AO students recruited from developmental education were relatively evenly split between health and manufacturing pathways with 55 percent in health, 38 percent in manufacturing, and the remainder in other pathways. Out of all AO students recruited from developmental education, almost 55 percent were female. As in other states, the female share of students was higher in health pathways (87 percent) and much lower in manufacturing pathways (6 percent). The large majority of students recruited from developmental education (84 percent) were white, which is about 8 percentage points higher than the share from adult education. The share of white students was high across all occupational pathways, but manufacturing and other pathways had a higher share of non-white students than health pathways. By construction, students from developmental education all had either a HSE or a high school diploma, and a small share had some postsecondary degree or certification. Pell grant receipt rates were about 50 percent among all developmental education students, with the highest rates among students in health pathways. The average AO student recruited from developmental education was employed for 3.5 of the eight quarters preceding enrollment. Unlike the adult education population, students in manufacturing and other pathways had somewhat lower prior employment rates.

Table B.5 presents descriptive statistics for the developmental education population.

Out of all AO students recruited from developmental education, almost 55 percent were female. As in other states, the female share of students was higher in health pathways (87 percent) and much lower in manufacturing pathways (6 percent). The large majority of students recruited from developmental education (84 percent) were white, which is about 8 percentage points higher than the share from adult education. The share of white students was high across all occupational pathways, but manufacturing and other pathways had a higher share of non-white students than health pathways. By construction, students from developmental education all had either a HSE or a high school diploma, and a small share had some postsecondary degree or certification. Pell grant receipt rates were about 50 percent among all developmental education students, with the highest rates among students in health pathways. The average AO student recruited from developmental education was employed for 3.5 of the eight quarters preceding enrollment. Unlike the adult education population, students in manufacturing and other pathways had somewhat lower prior employment rates.

TABLE B.5

Selected Variables for Kentucky AO Students Recruited from Developmental Education, by Occupational Pathway

	AO students	AO students in health pathways	AO students in manufacturing pathways	AO students in other or unidentifiable pathways
Female (%)	54.8	86.9	5.7	72.2
Average age at intake	29.5	28.6	30.8	28.6
White (%)	83.9	85.4	83.3	75.6
Black or African American (%)	10.8	8.6	12.7	16.7
Hispanic or Latino (%)	2.9	2.8	2.5	5.6
All other races and ethnicities (%)	2.4	3.1	1.5	NA
Missing race or ethnicity (%)	0.0	0.0	0.0	0.0
HSE at entry (%)	10.9	9.8	12.1	12.2
High school diploma at entry (%)	89.1	87.5	87.1	86.7
Greater than high school at entry (%)	1.8	2.7	0.9	NA
Pell grant recipient (%)	49.7	54.0	43.6	48.9
Average quarters employed in prior 2 years[†]	3.5	3.8	3.0	2.9
Sample size	1,234	674	472	88

Notes: HSE = high school equivalency; NA = not applicable, values suppressed because of sample sizes of fewer than three observations. Columns do not sum to sample sizes because 14 AO participants had pathways that could not be identified

CHANGES IN CHARACTERISTICS OVER TIME

Over the course of implementation, the characteristics of Kentucky AO students shifted toward more male students. Changes over time in race, high school credential attainment, and recruitment source were not statistically significant at p < 0.10. The values are presented in the mini-charts in figure B.3.

Characteristics of Kentucky AO Students over Time

Data for new enrollees from college records

Total enrollment, by calendar year

Students

Age, by calendar year

■ 17–19 ■ 20–22 ■ 23–26
■ 27–35 ■ 36–54 ■ Over 54

	Year 1	Year 2	Year 3
36–54	23%	22%	22%
27–35	20%	20%	21%
23–26	17%	15%	15%
20–22	20%	22%	21%
17–19	16%	16%	17%

Gender, by calendar year

■ Male ■ Female

	Year 1	Year 2	Year 3
Female	62%	59%	48%
Male	38%	41%	52%

Race or ethnicity, by calendar year

■ White ■ African American
■ Hispanic/Latino ■ Asian, multiple, other

	Year 1	Year 2	Year 3
African American	8%	15%	11%
White	86%	80%	84%

Educational attainment, by calendar year

■ HS diploma ■ HSE ■ Greater than HS ■ No diploma

	Year 1	Year 2	Year 3
No diploma	11%	6%	7%
HSE	10%	8%	14%
HS diploma	75%	85%	78%

Recruitment source, by calendar year

■ Adult ed. ■ Dev. ed. ■ CTE ■ Other

	Year 1	Year 2	Year 3
Dev. ed.	89%	93%	91%
Adult ed.	11%	7%	9%
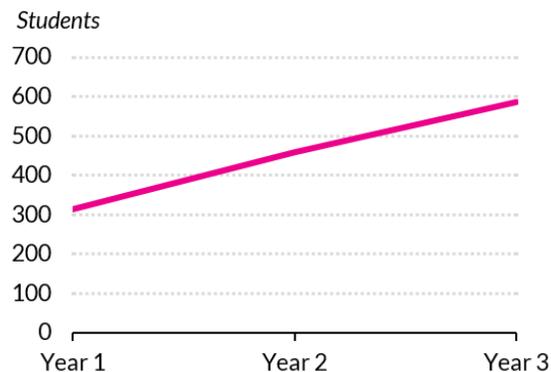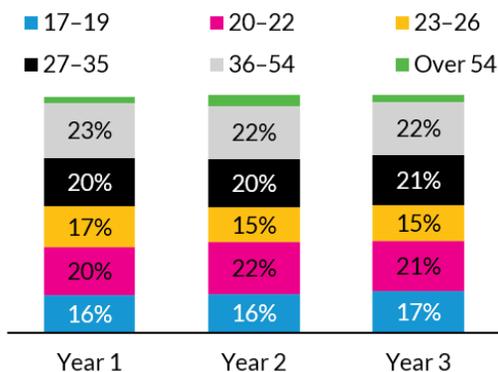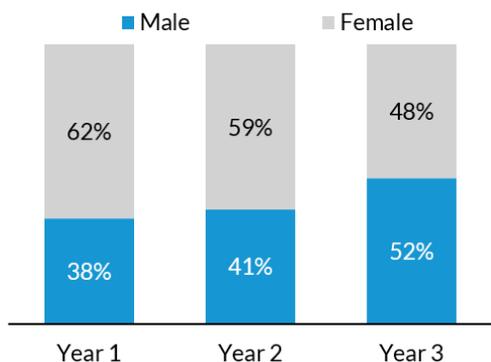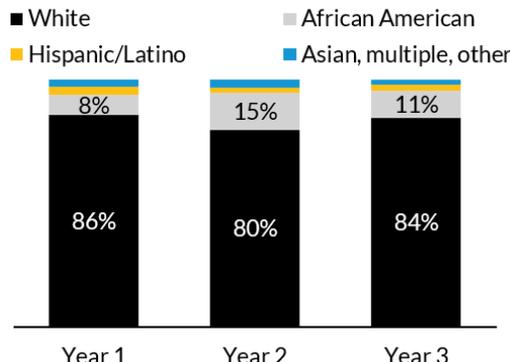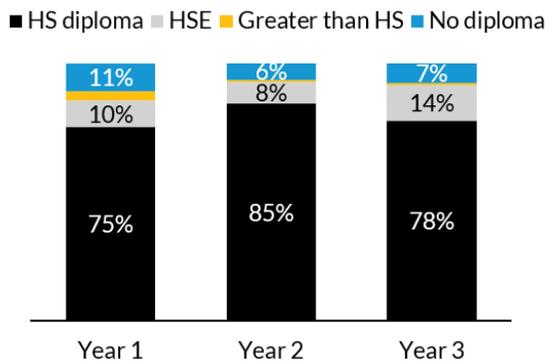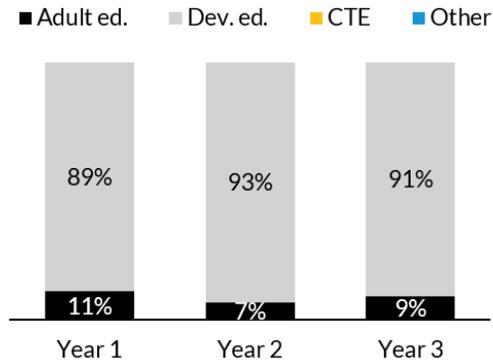
Sources: Kentucky Community and Technical College System Postsecondary Records.
Notes: CTE = career and technical education; HSE = high school equivalency; Dev. ed. = developmental education. Percentages are computed for students for whom data are available; missing values are excluded. Year 1 is 2012, year 2 is 2013, and year 3 is 2014.

AO Students in Louisiana

The characteristics of AO students in Louisiana differ markedly from the patterns in Kentucky and Kansas, largely because AO students in Louisiana were drawn only from the adult education system. AO students in Louisiana were more similar to AO students in Illinois; both states recruited primarily from adult education. Statewide, there were 601,000 adults without high school credentials and 50,000 English language learners on average from 2009 to 2011, constituting 13 percent and 1 percent of the total state population, respectively (OCTAE 2014). It is important for the reader to remember that only AO students who took at least one credit-bearing class are included in these descriptive statistics, and these students constitute less than half of the students flagged as AO in the state data system.

Selected Characteristics of the AO Population in Louisiana

Table B.6 presents some descriptive information about Louisiana AO students overall and in the occupational areas of health, manufacturing, and other (or occupations that were not clearly identifiable in the administrative data by course and credential histories). The results in Table B.6 refer only to adult education students, given that Louisiana AO students were only drawn from one recruitment source.

Similar to adult education students in Kentucky, AO were relatively evenly split between health and manufacturing pathways with 44 percent in health, 35 percent in manufacturing, and the remainder in other or unidentifiable pathways.

TABLE B.6

Selected Variables for Louisiana AO Students, by Occupational Pathway

	AO students	AO students in health pathways	AO students in manufacturing pathways	AO students in other or unidentifiable pathways
Female (%)	64.1	90.1	33.1	61.7
Average age at intake	25.8	26.5	24.0	27.6
White (%)	36.8	39.1	38.3	30.9
Black or African American (%)	50.2	50.0	49.3	50.6
Hispanic or Latino (%)	2.7	2.6	3.3	NA
All other races and ethnicities (%)	6.4	6.8	5.8	6.2
Missing race or ethnicity (%)	3.9	1.6	3.3	9.9
HSE at entry (%)	0.7	NA	NA	0.0
High school diploma at entry (%)	11.6	8.9	17.5	7.4
Greater than high school at entry (%)	1.6	2.1	NA	NA
Pell grant recipient (%)	21.6	13.0	33.8	19.8
Predicted probability of college (%)	9.5	10.0	9.6	7.6
Average quarters employed in prior 2 years	3.5	3.7	3.3	3.2
Sample size	440	192	154	81

Notes: HSE = high school equivalency; NA = not applicable, values suppressed because of sample sizes of fewer than three observations.

Almost two thirds of AO students in Louisiana were female. As in other states, the female share of students was much higher in health pathways (over 90 percent), although not as low in manufacturing pathways as the other states (33 percent). About half of all AO students from Louisiana were black or African American, a share that held fairly consistently across occupational areas. Approximately one third of the total was white, with the remainder being Hispanic or Latino, being of another race or ethnicity or having missing information on race and ethnicity. AO students in Louisiana had low educational attainment levels, with 1 percent and 12 percent holding an HSE or a high school diploma at entry, respectively. Almost all the rest had not completed high school, although a small share (almost 2 percent) had earned a postsecondary award of some kind. Pell grant receipt rates were 22 percent for AO students as a whole. This low rate of Pell grant receipt may be partially explained by the generous use of tuition waivers by Louisiana AO colleges, as permitted by the state. The predicted probability of attending college was low for AO students in all pathways, with a 9 percent probability of attending college on average. This indicates that the AO students recruited from adult education were not necessarily those who were most likely to be college-goers based on their test scores and demographics. The average AO student in Louisiana worked for 3.5 of the eight quarters prior to enrollment, with stronger employment histories for students in health pathways than in other occupational areas.

CHANGES IN CHARACTERISTICS OVER TIME

Over the course of implementation, the characteristics of Louisiana AO students shifted toward more male students (statistically significant at $p < 0.10$). There were no significant time trends in educational attainment or age.

Characteristics of Louisiana AO Students over Time

Data for new enrollees from college records

Total enrollment, by academic year
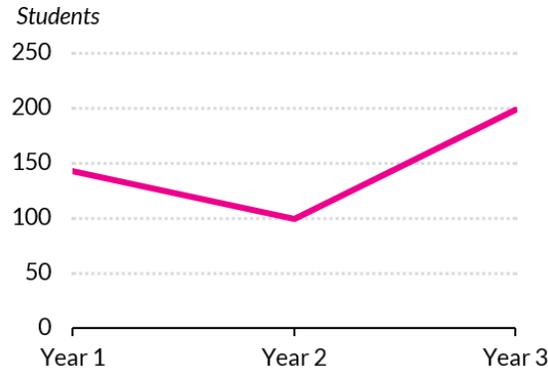
Age, by academic year
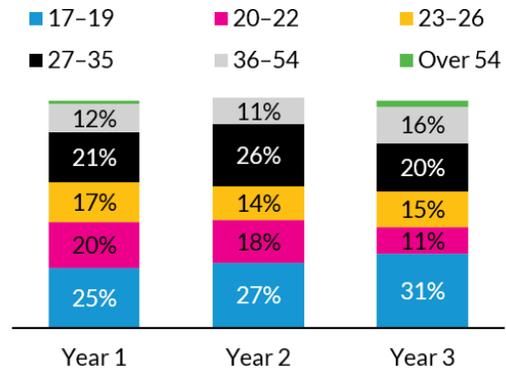
Gender, by academic year
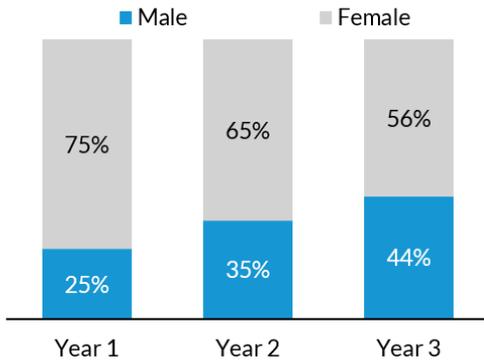
Race or ethnicity, by academic year
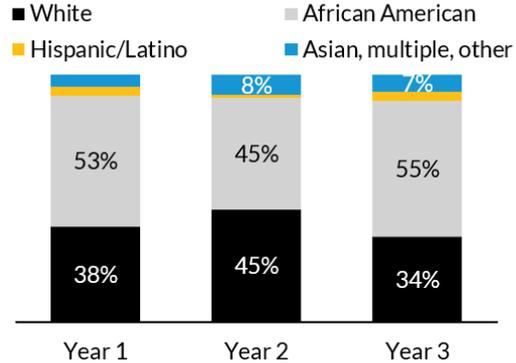
Educational attainment, by academic year
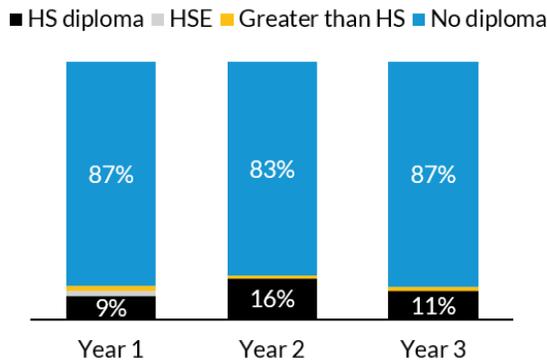
Recruitment source, by academic year
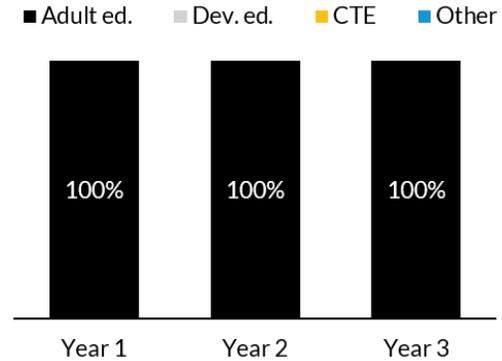
Sources: Louisiana Community and Technical College System Postsecondary Records.

Notes: CTE = career and technical education; HSE = high school equivalency; Dev. ed. = developmental education. Percentages are computed for students for whom data are available; missing values are excluded. Year 1 is 2012, year 2 is 2013, and year 3 is 2014.

Appendix C. Labor Market Impact Results Tables

This appendix reports detailed results for the employment and earnings impacts of AO, by state.

TABLE C.1

Employment and Earnings Impact Results for Illinois

Outcomes by quarter after enrollment	All comparison mean outcome	All AO impact
Employment (%-point) by quarter after enrollment		
Quarter 1 (total *n* = 4,996)	44.1%	-2.9%**
Quarter 2 (total *n* = 4,996)	46.7%	-2.1%*
Quarter 3 (total *n* = 4,996)	50.6%	-1.1%
Quarter 4 (total *n* = 4,996)	52.4%	3.3%***
Quarter 5 (total *n* = 4,981)	55.3%	4.9%***
Quarter 6 (total *n* = 4,968)	57.4%	4.2%***
Quarter 7 (total *n* = 4,473)	57.0%	2.5%*
Quarter 8 (total *n* = 4,285)	58.0%	2.0%
Quarter 9 (total *n* = 3,675)	59.9%	1.4%
Quarter 10 (total *n* = 3,096)	58.6%	1.2%
Quarter 11 (total *n* = 2,878)	55.8%	5.6%***
Quarter 12 (total *n* = 2,335)	53.5%	8.0%***
Earnings by quarter after enrollment		
Quarter 1 (total *n* = 4,996)	$1,303	-$146**
Quarter 2 (total *n* = 4,996)	$1,376	-$184***
Quarter 3 (total *n* = 4,996)	$1,682	-$63
Quarter 4 (total *n* = 4,996)	$1,815	$215***
Quarter 5 (total *n* = 4,981)	$2,035	$293***
Quarter 6 (total *n* = 4,968)	$2,468	$16
Quarter 7 (total *n* = 4,473)	$2,408	$67
Quarter 8 (total *n* = 4,285)	$2,533	$115
Quarter 9 (total *n* = 3,675)	$2,583	$156
Quarter 10 (total *n* = 3,096)	$2,494	-$52
Quarter 11 (total *n* = 2,878)	$2,718	-$62
Quarter 12 (total *n* = 2,335)	$2,799	-$26

Note: Statistical significance is indicated as asterisks where *** $p<0.01$, ** $p<0.05$, * $p<0.10$. Impact estimates without coefficients are not statistically different from zero.

TABLE C.2

Employment and Earnings Impact Results for Kansas

Outcome by quarter after enrollment	All comparison mean outcome	All AO Impact	By Recruitment Source			
			Comparison from adult ed. mean outcome	AO from Adult ed. impact	Comparison from CTE mean outcome	AO from CTE impact
Employment (%-point) by quarter after enrollment						
Quarter 1 (total *n* = 11,652)	58.4%	3.7%***	60.8%	-0.4%	57.5%	4.7%***
Quarter 2 (total *n* = 10,479)	59.4%	5.0%***	59.9%	2.1%	59.2%	5.1%***
Quarter 3 (total *n* = 9,336)	63.8%	3.8%***	70.7%	-1.3%	61.4%	5.3%***
Quarter 4 (total *n* = 9,336)	67.9%	1.5%*	75.3%	-4.2%	65.5%	3.1%***
Quarter 5 (total *n* = 6,950)	66.2%	4.2%***	69.8%	1.3%	64.8%	4.3%***
Quarter 6 (total *n* = 6,043)	68.7%	1.2%	78.5%	-4.5%	65.0%	2.4%**
Quarter 7 (total *n* = 4,716)	72.0%	1.3%	84.7%	-8.3%	65.3%	6.9%***
Quarter 8 (total *n* = 4,716)	72.0%	0.2%	84.6%	-8.3%*	65.4%	5.5%***
Earnings by quarter after enrollment						
Quarter 1 (total *n* = 11,652)	$2,142	$233***	$1,995	$46	$2,198	$325***
Quarter 2 (total *n* = 10,479)	$2,468	$507***	$2,300	$346*	$2,527	$565***
Quarter 3 (total *n* = 9,336)	$2,598	$490***	$2,907	$118	$2,495	$676***
Quarter 4 (total *n* = 9,336)	$3,010	$553***	$3,173	-$20	$2,955	$734***
Quarter 5 (total *n* = 6,950)	$3,251	$466***	$3,411	$63	$3,188	$605***
Quarter 6 (total *n* = 6,043)	$3,896	$350***	$4,610	-$284	$3,630	$610***
Quarter 7 (total *n* = 4,716)	$3,551	$630***	$3,832	-$150	$3,402	$964***
Quarter 8 (total *n* = 4,716)	$3,666	$811***	$3,779	$53	$3,606	$1,188***

Note: Statistical significance is indicated as asterisks where *** p<0.01, ** p<0.05, * p<0.10.

TABLE C.3

Employment and Earnings Impact Results for Kentucky

Outcome by quarter after enrollment	All comparison mean outcome	All AO impact	By Recruitment Source			
			Comparison from adult ed. mean outcome	AO from adult ed. impact	Comparison from dev. ed. mean outcome	AO from dev. ed. impact
Employment (%-point) by quarter post enrollment						
Quarter 1 (total *n* = 20,011)	42.7%	-0.3%	42.3%	-1.2%	42.8%	-0.8%
Quarter 2 (total *n* = 20,011)	43.4%	1.7%***	46.0%	-5.7%***	43.2%	2.4%***
Quarter 3 (total *n* = 20,011)	46.5%	4.6%***	47.8%	-1.1%	46.3%	4.9%***
Quarter 4 (total *n* = 20,011)	48.0%	3.0%***	42.6%	4.8%***	48.5%	2.4%***
Quarter 5 (total *n* = 20,011)	50.3%	2.8%***	46.9%	6.4%***	50.6%	1.7%**
Quarter 6 (total *n* = 20,011)	49.0%	3.5%***	45.0%	6.0%***	49.4%	3.1%***
Quarter 7 (total *n* = 20,011)	52.0%	2.3%***	46.7%	10.0%***	52.6%	1.4%**
Quarter 8 (total *n* = 17,134)	50.6%	1.5%**	45.5%	2.9%	51.1%	1.7%**
Quarter 9 (total *n* = 16,503)	52.9%	3.2%***	47.0%	4.6%**	53.4%	2.5%***
Quarter 10 (total *n* = 14,129)	53.6%	2.7%***	50.6%	2.8%	53.8%	1.9%**
Quarter 11 (total *n* = 14,129)	55.8%	0.7%	46.3%	3.2%	56.7%	-0.4%
Quarter 12 (total *n* = 10,630)	54.3%	2.5%***	49.5%	1.9%	54.9%	3.6%***
Earnings by quarter post enrollment						
Quarter 1 (total *n* = 20,011)	$1,687	-$198***	$2,145	-$701***	$1,642	-$221
Quarter 2 (total *n* = 20,011)	$1,703	-$132***	$2,164	-$913***	$1,657	-$16
Quarter 3 (total *n* = 20,011)	$1,922	$23	$2,162	-$133	$1,898	$74*
Quarter 4 (total *n* = 20,011)	$2,114	-$22	$1,854	$342***	$2,140	-$59
Quarter 5 (total *n* = 20,011)	$2,383	-$43	$2,085	$575***	$2,412	-$79*

Outcome by quarter after enrollment	All comparison mean outcome	All AO impact	By Recruitment Source			
			Comparison from adult ed. mean outcome	AO from adult ed. impact	Comparison from dev. ed. mean outcome	AO from dev. ed. impact
Quarter 6 (total *n* = 20,011)	$2,344	-$129***	$2,172	$156	$2,361	-$99**
Quarter 7 (total *n* = 20,011)	$2,583	-$92*	$2,247	$505***	$2,616	-$86*
Quarter 8 (total *n* = 17,134)	$2,522	-$108**	$1,826	$436***	$2,589	-$71
Quarter 9 (total *n* = 16,503)	$2,915	-$155***	$1,984	$855***	$3,004	-$163***
Quarter 10 (total *n* = 14,129)	$2,652	-$87	$2,161	$827***	$2,699	-$12
Quarter 11 (total *n* = 14,129)	$2,885	$49	$2,233	$629***	$2,948	$104
Quarter 12 (total *n* = 10,630)	$2,952	$111	$2,118	$687***	$3,045	$249***

Note: Statistical significance is indicated as asterisks where *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

TABLE C.4

Employment and Earnings Impact Results for Louisiana

Outcomes by quarter after enrollment	All comparison mean outcome	All AO impact
Employment (%-point) by quarter post enrollment		
Quarter 1 (total *n* = 3,455)	48.6%	6.3%***
Quarter 2 (total *n* = 3,455)	51.9%	6.2%***
Quarter 3 (total *n* = 3,455)	53.5%	4.4%***
Quarter 4 (total *n* = 3,209)	52.1%	7.3%***
Quarter 5 (total *n* = 2,751)	50.2%	10.8%***
Quarter 6 (total *n* = 2,751)	49.1%	9.1%***
Quarter 7 (total *n* = 2,458)	56.7%	-1.8%
Quarter 8 (total *n* = 2,440)	57.8%	-4.8%**
Quarter 9 (total *n* = 2,418)	60.5%	-3.9%**
Quarter 10 (total *n* = 2,418)	62.6%	0.7%
Quarter 11 (total *n* = 1,549)	51.4%	5.4%**
Quarter 12 (total *n* = 1,302)	62.2%	-1.0%
Earnings by quarter post enrollment		
Quarter 1 (total *n* = 3,455)	$1,532	$205***
Quarter 2 (total *n* = 3,455)	$1,721	$166**
Quarter 3 (total *n* = 3,455)	$1,884	$193**
Quarter 4 (total *n* = 3,209)	$1,988	$316***
Quarter 5 (total *n* = 2,751)	$1,868	$710***
Quarter 6 (total *n* = 2,751)	$1,920	$500***
Quarter 7 (total *n* = 2,458)	$2,231	-$212**
Quarter 8 (total *n* = 2,440)	$2,564	-$363***
Quarter 9 (total *n* = 2,418)	$2,983	-$500***
Quarter 10 (total *n* = 2,418)	$3,278	-$610***
Quarter 11 (total *n* = 1,549)	$3,041	-$491***
Quarter 12 (total *n* = 1,302)	$3,686	-$633***

Note: Statistical significance is indicated as asterisks where *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

Appendix D. Balancing Tests

This appendix reports output from the Stata "pstest" command, which produces balancing tests. These represent balancing tests for the match of the entire sample, as utilized for reporting education impacts. Earnings and employment impacts were based on rematched samples to account for the changing sample composition caused by right-hand time censoring of later cohorts. The results of balancing tests for the quarterly samples are available from the authors upon request.

These results show the balance of the treatment and comparison samples before regression adjustment. The regression adjustment should control for remaining imbalances in observable characteristics. Some characteristics may remain unbalanced after the propensity score matching exercise because the large number of matching variables relative to the sample makes it difficult to exactly align each matching variable.

Illinois

TABLE D.1

Balancing Test Results for Propensity Score Match in Illinois, All Students

```
--------------------------------------------------------------------------------------
                     Unmatched |       Mean              %reduct |   t-test    | V(T)/
Variable             Matched   | Treated Control  %bias   |bias|  |   t    p>|t| | V(C)
-----------------------------+-------------------------------------+--------------+---------
abeged_collegeintent   U  |  .3586    .44285   -44.1           | -12.18  0.000 |  1.20*
                       M  |  .3586    .37372    -7.9    82.1  |  -1.59  0.111 |  1.04
                          |                                   |              |
enroll_term201201      U  | .09689    .33907   -61.3           | -14.48  0.000 |   .
                       M  | .09689    .12118    -6.2    90.0  |  -1.62  0.105 |   .
                          |                                   |              |
enroll_term201202      U  | .05075    .05619    -2.4           |  -0.64  0.524 |   .
                       M  | .05075    .05475    -1.8    26.4  |  -0.37  0.710 |   .
                          |                                   |              |
enroll_term201203      U  | .18454    .12715    15.9           |   4.47  0.000 |   .
                       M  | .18454    .18511    -0.2    99.0  |  -0.03  0.976 |   .
                          |                                   |              |
enroll_term201301      U  | .09112    .10366    -4.2           |  -1.11  0.266 |   .
                       M  | .09112    .08462     2.2    48.2  |   0.48  0.633 |   .
                          |                                   |              |
enroll_term201303      U  |  .1857    .10729    22.3           |   6.46  0.000 |   .
                       M  |  .1857    .18322     0.7    96.8  |   0.13  0.894 |   .
                          |                                   |              |
enroll_term201401      U  | .16609    .11213    15.6           |   4.43  0.000 |   .
                       M  | .16609    .13245     9.7    37.6  |   1.97  0.049 |   .
                          |                                   |              |
enroll_term201402      U  | .03114    .03221    -0.6           |  -0.16  0.871 |   .
                       M  | .03114     .036     -2.8  -354.5  |  -0.56  0.575 |   .
```

enroll_term201403	U	.1684	.08404	25.6		7.61	0.000	.
	M	.1684	.17751	-2.8	89.2	-0.50	0.616	.
test_NRS1_2_ae	U	.01499	.01986	-3.7		-0.95	0.340	.
	M	.01499	.01099	3.1	17.6	0.74	0.461	.
test_NRS3_ae	U	.15456	.12206	9.4		2.61	0.009	.
	M	.15456	.09818	16.3	-73.5	3.54	0.000	.
test_NRS4_ae	U	.33564	.35723	-4.5		-1.21	0.227	.
	M	.33564	.36024	-5.2	-14.0	-1.08	0.282	.
test_NRS6_ae	U	.14994	.217	-17.4		-4.45	0.000	.
	M	.14994	.14837	0.4	97.7	0.09	0.927	.
hs_diplomaentry	U	.29758	.39089	-19.7		-5.17	0.000	.
	M	.29758	.26981	5.9	70.2	1.28	0.200	.
enroll_priorPS	U	.03806	.01792	12.2		3.73	0.000	.
	M	.03806	.04127	-1.9	84.1	-0.34	0.732	.
char_singleparent	U	.07958	.05062	11.8		3.39	0.001	.
	M	.07958	.06522	5.8	50.4	1.15	0.249	.
char_singleparent_miss	U	.32295	.55074	-47.2		-12.38	0.000	.
	M	.32295	.34195	-3.9	91.7	-0.84	0.401	.
char_ageinstenroll	U	28.894	28.339	5.3		1.42	0.157	0.95
	M	28.894	29.965	-10.3	-93.2	-2.03	0.042	0.78*
char_ageinstenroll_sq	U	940	914.13	3.6		0.96	0.339	0.93
	M	940	1033.3	-13.0	-260.6	-2.46	0.014	0.65*
char_female	U	.55363	.64907	-19.6		-5.31	0.000	.
	M	.55363	.56949	-3.3	83.4	-0.67	0.506	.
char_race_white	U	.41522	.38799	5.6		1.49	0.135	.
	M	.41522	.33117	17.1	-208.6	3.63	0.000	.
char_race_hispanic	U	.16724	.17898	-3.1		-0.82	0.411	.
	M	.16724	.20243	-9.3	-199.9	-1.89	0.059	.
char_race_other	U	.01845	.02034	-1.4		-0.36	0.718	.
	M	.01845	.04595	-19.9	-1355.2	-3.25	0.001	.
char_race_miss	U	.01038	.01259	-2.1		-0.54	0.590	.
	M	.01038	.00832	1.9	6.8	0.45	0.656	.
fin_pell	U	.17532	.13466	11.2		3.12	0.002	.
	M	.17532	.14275	9.0	19.9	1.85	0.064	.
enroll_CIP_hc	U	.36794	.24316	27.3		7.61	0.000	.
	M	.36794	.37871	-2.4	91.4	-0.46	0.643	.
enroll_CIP_manu	U	.33103	.11141	54.8		16.95	0.000	.
	M	.33103	.32647	1.1	97.9	0.20	0.840	.
enroll_CIP_AOother	U	.40138	.32357	16.2		4.41	0.000	.
	M	.40138	.38851	2.7	83.5	0.55	0.584	.

```
                     |                              |                  |
enroll_CIP_other     U | .79815   .58755   46.9            | 11.80  0.000 |      .
                     M | .79815   .78829    2.2    95.3 |   0.51  0.612 |      .
                     |                              |                  |
enroll_CIP_32only    U | .00231   .00605   -5.8            | -1.37  0.171 |      .
                     M | .00231   .00275   -0.7    88.2 |  -0.18  0.854 |      .
                     |                              |                  |
ue_enroll            U | 8.0054   8.2466  -20.3            | -5.30  0.000 |  0.86*
                     M | 8.0054   8.0675   -5.2    74.3 |  -1.07  0.285 |  0.81*
                     |                              |                  |
emp_pre_total        U | 2.9493   2.6881    9.2            |  2.44  0.015 |  0.94
                     M | 2.9493   3.0164   -2.4    74.3 |  -0.50  0.621 |  0.97
                     |                              |                  |
earn_pre5_8          U | 2482.7   3426.5  -12.3            | -3.04  0.002 |  0.61*
                     M | 2482.7   2852.6   -4.8    60.8 |  -1.12  0.264 |  0.89
                     |                              |                  |
earn_pre3_4          U | 2773.6   2626.8    2.9            |  0.77  0.440 |  0.89
                     M | 2773.6   2755.3    0.4    87.6 |  0.08  0.936 |  1.09
                     |                              |                  |
earn_pre2            U | 1413.3   1356.5    2.1            |  0.55  0.581 |  0.91
                     M | 1413.3   1288.2    4.6  -120.5 |  1.03  0.301 |  1.25*
                     |                              |                  |
earn_pre1            U | 1370.5   1387.8   -0.6            | -0.17  0.868 |  0.76*
                     M | 1370.5   1177.1    7.3 -1018.6 |  1.70  0.089 |  1.21*
                     |                              |                  |
earn_pre5_8sq        U | 5.1e+07  8.6e+07  -11.0            | -2.50  0.012 |  0.27*
                     M | 5.1e+07  5.8e+07   -2.4    78.5 | -0.67  0.501 |  0.68*
                     |                              |                  |
earn_pre3_4sq        U | 3.1e+07  3.3e+07   -2.0            | -0.52  0.605 |  0.75*
                     M | 3.1e+07  2.9e+07    1.9     8.5 |  0.46  0.649 |  1.48*
                     |                              |                  |
earn_pre2sq          U | 9.0e+06  9.5e+06   -1.4            | -0.33  0.739 |  0.48*
                     M | 9.0e+06  7.3e+06    4.6  -235.2 |  1.26  0.207 |  1.27*
                     |                              |                  |
earn_pre1sq          U | 8.0e+06  1.0e+07   -4.9            | -1.12  0.264 |  0.27*
                     M | 8.0e+06  6.4e+06    3.8    22.3 |  1.20  0.231 |  0.95
                     |                              |                  |
emp_pre2             U | .39677   .3737     4.7            |  1.27  0.203 |      .
                     M | .39677   .39947   -0.6    88.3 | -0.11  0.909 |      .
                     |                              |                  |
emp_pre1             U | .41292   .38799    5.1            |  1.37  0.172 |      .
                     M | .41292   .39138    4.4    13.6 |  0.91  0.361 |      .
                     |                              |                  |
earn_premiss5_8      U | .53979   .33979   41.1            | 11.20  0.000 |      .
                     M | .53979   .48287   11.7    71.5 |  2.37  0.018 |      .
                     |                              |                  |
----------------------------------------------------------------------------------------
* if variance ratio outside [0.88; 1.14] for U and [0.88; 1.14] for M

--------------------------------------------------------------------------------
 Sample   | Ps R2  LR chi2  p>chi2  MeanBias  MedBias    B      R     %Var
-----------+--------------------------------------------------------------------
 Unmatched | 0.227  1045.83  0.000    14.9      9.4    123.8*  1.63    62
 Matched   | 0.031    75.16  0.001     5.2      3.8     41.9*  0.96    62
--------------------------------------------------------------------------------
* if B>25%, R outside [0.5; 2]
```

ACCELERATING OPPORTUNITY FINAL IMPACT REPORT: APPENDICES

Kansas

Balancing Test Results for Propensity Score Match in Kansas, All Students

```
--------------------------------------------------------------------------------
              Unmatched |     Mean              %reduct |    t-test     | V(T)/
Variable      Matched   | Treated Control  %bias |bias|  |   t    p>|t| | V(C)
------------------------+-------------------------------+---------------+---------
collegeintent    U | .06906   .00987   56.0          | 31.54  0.000 | 5.53*
                 M | .06906   .07299   -3.7    93.4 | -0.82  0.410 | 0.96
                   |                               |               |
semester1        U | .03534   .09035  -22.8          | -7.70  0.000 |   .
                 M | .03534   .04288   -3.1    86.3 | -1.13  0.257 |   .
                   |                               |               |
semester2        U | .05124   .09488  -16.8          | -5.91  0.000 |   .
                 M | .05124   .06379   -4.8    71.2 | -1.57  0.116 |   .
                   |                               |               |
semester3        U | .14075   .15871   -5.0          | -1.91  0.056 |   .
                 M | .14075   .13049    2.9    42.9 |  0.87  0.383 |   .
                   |                               |               |
semester4        U | .17903    .0813   29.3          | 13.10  0.000 |   .
                 M | .17903   .17205    2.1    92.9 |  0.53  0.593 |   .
                   |                               |               |
semester5        U | .08598   .06042    9.8          |  4.06  0.000 |   .
                 M | .08598   .08705   -0.4    95.8 | -0.11  0.912 |   .
                   |                               |               |
semester6        U |  .149    .16943   -5.6          | -2.12  0.034 |   .
                 M |  .149    .15162   -0.7    87.2 | -0.21  0.831 |   .
                   |                               |               |
semester7        U |  .1702   .06749   32.1          | 14.78  0.000 |   .
                 M |  .1702   .15472    4.8    84.9 |  1.22  0.221 |   .
                   |                               |               |
semester8        U | .05713   .08543  -11.0          | -3.99  0.000 |   .
                 M | .05713   .05751   -0.1    98.7 | -0.05  0.962 |   .
                   |                               |               |
semester9        U | .13133   .19198  -16.5          | -6.05  0.000 |   .
                 M | .13133   .13989   -2.3    85.9 | -0.73  0.466 |   .
                   |                               |               |
NRSlow           U | .00059    .0004    0.9          |  0.36  0.717 |   .
                 M | .00059   .00032    1.2   -37.7 |  0.36  0.719 |   .
                   |                               |               |
NRS3             U | .01649   .00254   14.4          |  8.37  0.000 |   .
                 M | .01649   .01318    3.4    76.3 |  0.80  0.425 |   .
                   |                               |               |
NRS4             U | .07951   .01191   32.8          | 18.94  0.000 |   .
                 M | .07951   .06035    9.3    71.7 |  2.19  0.029 |   .
                   |                               |               |
NRS5             U | .12309   .01501   43.6          | 26.00  0.000 |   .
                 M | .12309   .14662   -9.5    78.2 | -2.01  0.045 |   .
                   |                               |               |
NRS6             U | .05065   .00659   26.7          | 15.90  0.000 |   .
                 M | .05065   .04984    0.5    98.2 |  0.11  0.914 |   .
                   |                               |               |
NRSmissing       U | .72968   .96356  -68.6          | -38.79 0.000 |   .
                 M | .72968   .72968   -0.0   100.0 | -0.00  1.000 |   .
                   |                               |               |
priorged         U | .11484   .08241   10.9          |  4.47  0.000 |   .
                 M | .11484   .11108    1.3    88.4 |  0.35  0.730 |   .
                   |                               |               |
highschool       U | .57538    .8447  -62.1          | -27.39 0.000 |   .
                 M | .57538   .56694    1.9    96.9 |  0.50  0.619 |   .
                   |                               |               |
gthighschool     U | .20259   .00889   66.3          | 45.63  0.000 |   .
                 M | .20259   .20607   -1.2    98.2 | -0.25  0.802 |   .
```

```
                         |                          |                   |
singleparent          U | .02532   .04367   -10.1   | -3.56  0.000 |     .
                      M | .02532   .02607    -0.4    95.9 | -0.14  0.891 |     .
                         |                          |                   |
age                   U | 27.572   25.851    18.0   |  7.35  0.000 | 1.33*
                      M | 27.572   27.847    -2.9    84.0 | -0.79  0.431 | 1.03
                         |                          |                   |
agesq                 U |  864.9   747.27    17.8   |  7.40  0.000 | 1.42*
                      M |  864.9   877.55    -1.9    89.2 | -0.52  0.603 | 1.04
                         |                          |                   |
female                U | .59364   .55284     8.3   |  3.18  0.001 |     .
                      M | .59364   .57008     4.8    42.3 |  1.39  0.164 |     .
                         |                          |                   |
white                 U | .51708   .68035   -33.8   | -13.42  0.000 |     .
                      M | .51708   .49544     4.5    86.7 |  1.26  0.207 |     .
                         |                          |                   |
black                 U | .14193   .08408    18.3   |  7.80  0.000 |     .
                      M | .14193   .14011     0.6    96.8 |  0.15  0.879 |     .
                         |                          |                   |
hispanic              U | .16961   .10965    17.4   |  7.24  0.000 |     .
                      M | .16961   .21102   -12.0    30.9 | -3.08  0.002 |     .
                         |                          |                   |
otherrace             U | .05536   .05296     1.1   |  0.41  0.679 |     .
                      M | .05536   .05117     1.8   -74.3 |  0.54  0.587 |     .
                         |                          |                   |
missingrace           U | .11602   .07297    14.8   |  6.22  0.000 |     .
                      M | .11602   .10225     4.7    68.0 |  1.29  0.198 |     .
                         |                          |                   |
pell                  U | .38457   .32926    11.6   |  4.53  0.000 |     .
                      M | .38457   .36987     3.1    73.4 |  0.88  0.377 |     .
                         |                          |                   |
collegeintent         U | .06906   .00987    56.0   | 31.54  0.000 | 5.53*
                      M | .06906   .07299    -3.7    93.4 | -0.82  0.410 | 0.96
                         |                          |                   |
collegeintentmissing  U | .72968   .96356   -68.6   | -38.79  0.000 |     .
                      M | .72968   .72968    -0.0   100.0 | -0.00  1.000 |     .
                         |                          |                   |
semester1             U | .03534   .09035   -22.8   | -7.70  0.000 |     .
                      M | .03534   .04288    -3.1    86.3 | -1.13  0.257 |     .
                         |                          |                   |
semester2             U | .05124   .09488   -16.8   | -5.91  0.000 |     .
                      M | .05124   .06379    -4.8    71.2 | -1.57  0.116 |     .
                         |                          |                   |
semester3             U | .14075   .15871    -5.0   | -1.91  0.056 |     .
                      M | .14075   .13049     2.9    42.9 |  0.87  0.383 |     .
                         |                          |                   |
semester4             U | .17903   .0813     29.3   | 13.10  0.000 |     .
                      M | .17903   .17205     2.1    92.9 |  0.53  0.593 |     .
                         |                          |                   |
semester5             U | .08598   .06042     9.8   |  4.06  0.000 |     .
                      M | .08598   .08705    -0.4    95.8 | -0.11  0.912 |     .
                         |                          |                   |
semester6             U |  .149    .16943    -5.6   | -2.12  0.034 |     .
                      M |  .149    .15162    -0.7    87.2 | -0.21  0.831 |     .
                         |                          |                   |
semester7             U |  .1702   .06749    32.1   | 14.78  0.000 |     .
                      M |  .1702   .15472     4.8    84.9 |  1.22  0.221 |     .
                         |                          |                   |
semester8             U | .05713   .08543   -11.0   | -3.99  0.000 |     .
                      M | .05713   .05751    -0.1    98.7 | -0.05  0.962 |     .
                         |                          |                   |
semester9             U | .13133   .19198   -16.5   | -6.05  0.000 |     .
                      M | .13133   .13989    -2.3    85.9 | -0.73  0.466 |     .
                         |                          |                   |
ACT                   U |-.03924   -.0128   -11.1   | -4.43  0.000 | 1.18*
                      M |-.03924  -.04602     2.8    74.3 |  0.78  0.437 | 0.91
                         |                          |                   |
ACTmissing            U | .92815   .91909     3.4   |  1.29  0.196 |     .
```

		Mean Treated	Mean Control	%bias	%reduct |bias|	t	p>|t|	V(T)/V(C)
	M	.92815	.93581	-2.9	15.5	-0.89	0.376	.
ACTsq	U	.06322	.05233	3.4		1.38	0.167	1.24*
	M	.06322	.06988	-2.1	38.8	-0.54	0.592	0.74*
COMPASS	U	-.03475	-.00024	-12.3		-5.33	0.000	1.69*
	M	-.03475	-.06144	9.5	22.6	2.27	0.023	0.73*
COMPASSmissing	U	.89399	.93545	-14.9		-6.32	0.000	.
	M	.89399	.86082	11.9	20.0	2.95	0.003	.
COMPASSsq	U	.09953	.05804	8.7		3.60	0.000	1.40*
	M	.09953	.13915	-8.3	4.5	-1.93	0.054	0.59*
ACCUPLACER	U	-.00236	.00135	-2.8		-1.30	0.193	2.53*
	M	-.00236	-.00087	-1.1	59.9	-0.28	0.780	1.18*
ACCUPLACERmissing	U	.9629	.99111	-18.9		-9.96	0.000	.
	M	.9629	.96983	-4.6	75.4	-1.12	0.263	.
ACCUPLACERsq	U	.02591	.01024	7.3		3.01	0.003	1.38*
	M	.02591	.02194	1.8	74.7	0.57	0.572	1.78*
priorged	U	.11484	.08241	10.9		4.47	0.000	.
	M	.11484	.11108	1.3	88.4	0.35	0.730	.
highschool	U	.57538	.8447	-62.1		-27.39	0.000	.
	M	.57538	.56694	1.9	96.9	0.50	0.619	.
gthighschool	U	.20259	.00889	66.3		45.63	0.000	.
	M	.20259	.20607	-1.2	98.2	-0.25	0.802	.
singleparent	U	.02532	.04367	-10.1		-3.56	0.000	.
	M	.02532	.02607	-0.4	95.9	-0.14	0.891	.
age	U	27.572	25.851	18.0		7.35	0.000	1.33*
	M	27.572	27.847	-2.9	84.0	-0.79	0.431	1.03
agesq	U	864.9	747.27	17.8		7.40	0.000	1.42*
	M	864.9	877.55	-1.9	89.2	-0.52	0.603	1.04
female	U	.59364	.55284	8.3		3.18	0.001	.
	M	.59364	.57008	4.8	42.3	1.39	0.164	.
white	U	.51708	.68035	-33.8		-13.42	0.000	.
	M	.51708	.49544	4.5	86.7	1.26	0.207	.
black	U	.14193	.08408	18.3		7.80	0.000	.
	M	.14193	.14011	0.6	96.8	0.15	0.879	.
hispanic	U	.16961	.10965	17.4		7.24	0.000	.
	M	.16961	.21102	-12.0	30.9	-3.08	0.002	.
otherrace	U	.05536	.05296	1.1		0.41	0.679	.
	M	.05536	.05117	1.8	-74.3	0.54	0.587	.
missingrace	U	.11602	.07297	14.8		6.22	0.000	.
	M	.11602	.10225	4.7	68.0	1.29	0.198	.
pell	U	.38457	.32926	11.6		4.53	0.000	.
	M	.38457	.36987	3.1	73.4	0.88	0.377	.
health	U	.62191	.66217	-8.4		-3.28	0.001	.
	M	.62191	.59714	5.2	38.5	1.48	0.139	.
manufacturing	U	.33392	.2663	14.8		5.87	0.000	.
	M	.33392	.3432	-2.0	86.3	-0.57	0.568	.

```
othercip          U | .41932   .56776   -30.0         | -11.60  0.000 |    .
                  M | .41932   .41536     0.8    97.3 |   0.23  0.815 |    .
                    |                                 |               |
emptotal          U | 4.1243   4.6314   -16.3         |  -6.25  0.000 | 0.96
                  M | 4.1243   4.1441    -0.6    96.1 |  -0.18  0.854 | 0.95
                    |                                 |               |
emp1              U | .55418   .64264   -18.1         |  -7.11  0.000 |    .
                  M | .55418   .57192    -3.6    79.9 |  -1.04  0.298 |    .
                    |                                 |               |
emp2              U | .55418   .60889   -11.1         |  -4.33  0.000 |    .
                  M | .55418   .54416     2.0    81.7 |   0.59  0.558 |    .
                    |                                 |               |
earn1             U | 2244.1   2763.2   -13.9         |  -5.34  0.000 | 0.97
                  M | 2244.1   2244.1     0.0   100.0 |   0.00  1.000 | 1.21*
                    |                                 |               |
earn2             U | 2289.3   2654.1    -9.7         |  -3.67  0.000 | 0.87*
                  M | 2289.3   2324.6    -0.9    90.3 |  -0.29  0.776 | 1.01
                    |                                 |               |
earn3_4           U | 4675.4   5271.2    -8.2         |  -3.12  0.002 | 0.92
                  M | 4675.4   4742.3    -0.9    88.8 |  -0.28  0.782 | 1.05
                    |                                 |               |
earn5_8           U | 8465.6   9405.3    -6.7         |  -2.55  0.011 | 0.96
                  M | 8465.6   8851.7    -2.7    58.9 |  -0.81  0.418 | 1.02
                    |                                 |               |
unemployment      U | 6.1962   5.5941    50.2         |  18.17  0.000 | 0.69*
                  M | 6.1962   6.0694    10.6    78.9 |   3.30  0.001 | 0.88*
                    |                                 |               |
--------------------------------------------------------------------------------
* if variance ratio outside [0.91; 1.10] for U and [0.91; 1.10] for M

--------------------------------------------------------------------------------
 Sample    | Ps R2   LR chi2  p>chi2   MeanBias  MedBias    B      R     %Var
-----------+--------------------------------------------------------------------
 Unmatched | 0.291   3033.55   0.000     20.8     14.9    146.2*  2.57*   78
 Matched   | 0.015     72.92   0.007      3.2      2.3     29.5*  0.97    39
--------------------------------------------------------------------------------
* if B>25%, R outside [0.5; 2]
```

TABLE D.3

Balancing Test Results for Propensity Score Match in Kansas, Adult Education Students

```
--------------------------------------------------------------------------------
                Unmatched |     Mean          %reduct |    t-test    | V(T)/
Variable        Matched   | Treated Control  %bias |bias| |   t    p>|t| | V(C)
------------------------+----------------------------+--------------+---------
collegeintent     U | .25547   .27087   -10.2         |  -1.54  0.124 | 0.96
                  M | .25547   .27002    -9.6     5.5 |  -1.52  0.130 | 1.13
                    |                                 |               |
semester1         U | .05882   .08715   -10.9         |  -1.65  0.099 |    .
                  M | .05882   .06116    -0.9    91.8 |  -0.15  0.882 |    .
                    |                                 |               |
semester2         U | .11765   .07843    13.2         |   2.00  0.046 |    .
                  M | .11765   .12909    -3.9    70.8 |  -0.53  0.599 |    .
                    |                                 |               |
semester3         U | .11547   .13725    -6.6         |  -0.99  0.321 |    .
                  M | .11547   .07419    12.4   -89.5 |   2.14  0.033 |    .
                    |                                 |               |
semester4         U | .11547   .11765    -0.7         |  -0.10  0.918 |    .
                  M | .11547   .13903    -7.3  -981.4 |  -1.07  0.285 |    .
                    |                                 |               |
semester5         U | .11111   .09368     5.7         |   0.87  0.384 |    .
                  M | .11111   .14465   -11.1   -92.4 |  -1.52  0.128 |    .
                    |                                 |               |
semester6         U | .07625   .16776   -28.2         |  -4.27  0.000 |    .
                  M | .07625   .09908    -7.0    75.1 |  -1.22  0.222 |    .
                    |                                 |               |
semester7         U | .18083   .11547    18.5         |   2.80  0.005 |    .
```

	M		.18083	.1372	12.3	33.2	1.81	0.071	.
semester8	U		.1024	.05882	16.0		2.43	0.015	.
	M		.1024	.1009	0.6	96.6	0.08	0.940	.
semester9	U		.122	.14379	-6.4		-0.97	0.331	.
	M		.122	.11472	2.1	66.6	0.34	0.733	.
NRSlow	U		.00218	.01089	-10.8		-1.64	0.102	.
	M		.00218	.0012	1.2	88.8	0.36	0.719	.
NRS3	U		.061	.06972	-3.5		-0.53	0.594	.
	M		.061	.04875	5.0	-40.5	0.81	0.416	.
NRS4	U		.29412	.3268	-7.1		-1.07	0.285	.
	M		.29412	.22327	15.3	-116.8	2.46	0.014	.
NRS5	U		.45534	.41176	8.8		1.33	0.183	.
	M		.45534	.54239	-17.6	-99.8	-2.64	0.008	.
NRS6	U		.18736	.18083	1.7		0.26	0.799	.
	M		.18736	.18438	0.8	54.4	0.12	0.908	.
NRSmissing	U		0	0	.		.	.	.
	M		0	0	.	.	.	.	.
priorged	U		.16776	.59477	-97.8		-14.81	0.000	.
	M		.16776	.17287	-1.2	98.8	-0.21	0.837	.
highschool	U		.51416	.20261	68.6		10.40	0.000	.
	M		.51416	.45527	13.0	81.1	1.79	0.074	.
gthighschool	U		.07625	.02614	22.9		3.46	0.001	.
	M		.07625	.10142	-11.5	49.8	-1.34	0.181	.
singleparent	U		.03922	.06536	-11.8		-1.78	0.075	.
	M		.03922	.03635	1.3	89.0	0.23	0.820	.
age	U		28.353	26.607	17.5		2.66	0.008	1.23*
	M		28.353	29.419	-10.7	39.0	-1.55	0.122	1.01
agesq	U		912.88	796.64	16.9		2.56	0.011	1.30*
	M		912.88	973.02	-8.7	48.3	-1.25	0.213	1.00
female	U		.76906	.4902	60.3		9.13	0.000	.
	M		.76906	.74573	5.0	91.6	0.82	0.410	.
white	U		.42919	.66449	-48.6		-7.36	0.000	.
	M		.42919	.39821	6.4	86.8	0.95	0.341	.
black	U		.0915	.06318	10.6		1.61	0.108	.
	M		.0915	.1099	-6.9	35.0	-0.93	0.355	.
hispanic	U		.19826	.14379	14.5		2.19	0.028	.
	M		.19826	.25432	-14.9	-2.9	-2.03	0.042	.
otherrace	U		.04793	.06318	-6.7		-1.01	0.314	.
	M		.04793	.04683	0.5	92.8	0.08	0.938	.
missingrace	U		.23312	.06536	48.4		7.33	0.000	.
	M		.23312	.19073	12.2	74.7	1.57	0.116	.
pell	U		.24619	.34205	-21.1		-3.20	0.001	.
	M		.24619	.28245	-8.0	62.2	-1.25	0.213	.
health	U		.7342	.52723	43.9		6.64	0.000	.
	M		.7342	.68259	10.9	75.1	1.72	0.086	.

```
manufacturing       U  | .20044   .39651   -43.8          |  -6.64  0.000 |    .
                    M  | .20044   .25275   -11.7    73.3 |  -1.89  0.058 |    .
                       |                                 |               |
othercip            U  | .41394   .61002   -40.0          |  -6.05  0.000 |    .
                    M  | .41394   .32394    18.3    54.1 |   2.84  0.005 |    .
                       |                                 |               |
emptotal            U  | 4.0697   4.0501     0.6          |   0.10  0.924 |  1.05
                    M  | 4.0697   4.1985    -4.2  -556.6 |  -0.63  0.526 |  1.07
                       |                                 |               |
emp1                U  | .51416   .55991    -9.2          |  -1.39  0.165 |    .
                    M  | .51416   .57178   -11.6   -25.9 |  -1.75  0.080 |    .
                       |                                 |               |
emp2                U  | .52723   .54031    -2.6          |  -0.40  0.692 |    .
                    M  | .52723   .53676    -1.9    27.1 |  -0.29  0.773 |    .
                       |                                 |               |
earn1               U  | 1866.2   2378.4   -14.0          |  -2.12  0.034 |  0.55*
                    M  | 1866.2   1928.9    -1.7    87.8 |  -0.31  0.759 |  0.98
                       |                                 |               |
earn2               U  | 1972.4   2261.8    -7.8          |  -1.18  0.238 |  0.51*
                    M  | 1972.4   2124.1    -4.1    47.6 |  -0.70  0.485 |  0.75*
                       |                                 |               |
earn3_4             U  | 4115.4   4890.9   -10.1          |  -1.53  0.127 |  0.39*
                    M  | 4115.4   4502.2    -5.0    50.1 |  -0.96  0.336 |  0.82*
                       |                                 |               |
earn5_8             U  | 7828.6   9579.6   -11.0          |  -1.67  0.096 |  0.38*
                    M  | 7828.6   8861.4    -6.5    41.0 |  -1.29  0.199 |  0.89
                       |                                 |               |
unemployment        U  | 6.0473   5.8593    16.9          |   2.57  0.010 |  1.00
                    M  | 6.0473   5.9833     5.8    66.0 |   0.86  0.391 |  0.93
                       |                                 |               |
------------------------------------------------------------------------------------
* if variance ratio outside [0.83; 1.20] for U and [0.83; 1.20] for M


------------------------------------------------------------------------------
 Sample    | Ps R2   LR chi2   p>chi2   MeanBias   MedBias     B      R     %Var
-----------+------------------------------------------------------------------
 Unmatched | 0.342   435.02    0.000      20.4      11.8    159.6*  0.98    67
 Matched   | 0.049    62.37    0.004       7.4       6.9     53.1*  1.38    22
------------------------------------------------------------------------------
* if B>25%, R outside [0.5; 2]
```

TABLE D.4

Balancing Test Results for Propensity Score Match in Kansas, CTE Students

```
------------------------------------------------------------------------------------
                Unmatched |     Mean              %reduct |   t-test    | V(T)/
Variable        Matched   | Treated Control   %bias |bias| |   t    p>|t| | V(C)
------------------------+------------------------------------+--------------+----------
semester1           U  | .02663   .09047   -27.4          |  -7.71  0.000 |    .
                    M  | .02663   .03611    -4.1    85.2 |  -1.35  0.176 |    .
                       |                                 |               |
semester2           U  | .02663   .0955    -29.1          |  -8.12  0.000 |    .
                    M  | .02663   .0396     -5.5    81.2 |  -1.80  0.071 |    .
                       |                                 |               |
semester3           U  | .15012   .15953    -2.6          |  -0.86  0.388 |    .
                    M  | .15012   .15135    -0.3    86.9 |  -0.09  0.932 |    .
                       |                                 |               |
semester4           U  | .20258   .07993    35.8          |  14.39  0.000 |    .
                    M  | .20258   .18428     5.3    85.1 |   1.15  0.249 |    .
                       |                                 |               |
semester5           U  | .07667   .05916     7.0          |   2.46  0.014 |    .
                    M  | .07667   .06572     4.4    37.4 |   1.06  0.289 |    .
                       |                                 |               |
semester6           U  | .17595   .1695      1.7          |   0.58  0.565 |    .
                    M  | .17595   .17109     1.3    24.7 |   0.32  0.750 |    .
                       |                                 |               |
semester7           U  | .16626   .06567    31.8          |  12.88  0.000 |    .
```

		Mean		%bias	%reduct |bias|	t	p>|t|	V(T)/V(C)
	M	.16626	.16121	1.6	95.0	0.34	0.734	.
semester8	U	.04036	.08644	-19.0		-5.63	0.000	.
	M	.04036	.04143	-0.4	97.7	-0.14	0.892	.
semester9	U	.13479	.1938	-16.0		-5.07	0.000	.
	M	.13479	.14922	-3.9	75.5	-1.03	0.304	.
ACT	U	-.04342	-.01307	-12.3		-4.34	0.000	1.26*
	M	-.04342	-.0474	1.6	86.9	0.38	0.704	0.99
ACTmissing	U	.92333	.91636	2.6		0.85	0.398	.
	M	.92333	.92264	0.3	90.2	0.06	0.949	.
ACTsq	U	.06964	.05388	4.7		1.70	0.089	1.44*
	M	.06964	.07042	-0.2	95.1	-0.05	0.958	0.93
COMPASS	U	-.04278	.00066	-15.2		-5.87	0.000	1.89*
	M	-.04278	-.04766	1.7	88.8	0.36	0.721	0.86*
COMPASSmissing	U	.88781	.93878	-18.2		-6.90	0.000	.
	M	.88781	.87765	3.6	80.1	0.79	0.432	.
COMPASSsq	U	.10896	.05686	10.5		3.89	0.000	1.57*
	M	.10896	.12672	-3.6	65.9	-0.72	0.470	0.67*
ACCUPLACER	U	-.00161	.00148	-2.1		-0.93	0.351	3.11*
	M	-.00161	-.00057	-0.7	66.4	-0.15	0.882	1.11
ACCUPLACERmissing	U	.954	.99102	-22.8		-11.26	0.000	.
	M	.954	.95971	-3.5	84.6	-0.70	0.484	.
ACCUPLACERsq	U	.03228	.01038	9.3		3.55	0.000	1.75*
	M	.03228	.02902	1.4	85.1	0.35	0.729	1.75*
priorged	U	.09524	.06304	11.9		4.35	0.000	.
	M	.09524	.08819	2.6	78.1	0.61	0.544	.
highschool	U	.59806	.86898	-64.4		-25.63	0.000	.
	M	.59806	.60832	-2.4	96.2	-0.52	0.602	.
gthighschool	U	.24939	.00824	77.1		51.39	0.000	.
	M	.24939	.24484	1.5	98.1	0.26	0.793	.
singleparent	U	.02018	.04285	-13.0		-3.85	0.000	.
	M	.02018	.02226	-1.2	90.8	-0.36	0.719	.
age	U	27.282	25.822	15.3		5.44	0.000	1.31*
	M	27.282	27.265	0.2	98.8	0.04	0.965	1.04
agesq	U	847.13	745.4	15.5		5.59	0.000	1.41*
	M	847.13	842.18	0.8	95.1	0.18	0.860	1.07
female	U	.52865	.55521	-5.3		-1.79	0.073	.
	M	.52865	.50501	4.7	11.0	1.18	0.239	.
white	U	.54964	.68095	-27.2		-9.38	0.000	.
	M	.54964	.53146	3.8	86.2	0.91	0.364	.
black	U	.16061	.08487	23.2		8.82	0.000	.
	M	.16061	.1513	2.9	87.7	0.64	0.523	.
hispanic	U	.159	.10836	14.9		5.37	0.000	.
	M	.159	.19498	-10.6	28.9	-2.35	0.019	.
otherrace	U	.05811	.05257	2.4		0.83	0.407	.
	M	.05811	.05278	2.3	3.8	0.58	0.562	.

```
missingrace         U |  .07264   .07325    -0.2           |  -0.08  0.937 |    .
                    M |  .07264   .06948     1.2   -415.0 |   0.31  0.760 |    .
                      |                                   |               |
pell                U |  .43584   .32877    22.2           |   7.60  0.000 |    .
                    M |  .43584   .40226     6.9    68.6 |   1.69  0.090 |    .
                      |                                   |               |
health              U |  .58031   .66727   -18.0           |  -6.16  0.000 |    .
                    M |  .58031   .56548     3.1    83.0 |   0.75  0.456 |    .
                      |                                   |               |
manufacturing       U |  .38337   .26137    26.3           |   9.21  0.000 |    .
                    M |  .38337    .3767     1.4    94.5 |   0.34  0.732 |    .
                      |                                   |               |
othercip            U |  .42131   .56617   -29.3           |  -9.80  0.000 |    .
                    M |  .42131   .44923    -5.6    80.7 |  -1.40  0.161 |    .
                      |                                   |               |
emptotal            U |  4.1445   4.6534   -16.4           |  -5.43  0.000 | 0.95
                    M |  4.1445   4.1239     0.7    96.0 |   0.16  0.871 | 0.90
                      |                                   |               |
emp1                U |  .56901   .64576   -15.8           |  -5.36  0.000 |    .
                    M |  .56901   .57197    -0.6    96.1 |  -0.15  0.882 |    .
                      |                                   |               |
emp2                U |  .56416   .61149    -9.6           |  -3.25  0.001 |    .
                    M |  .56416   .54691     3.5    63.5 |   0.86  0.388 |    .
                      |                                   |               |
earn1               U |  2384.1   2777.8   -10.3           |  -3.50  0.000 | 1.08
                    M |  2384.1   2360.9     0.6    94.1 |   0.16  0.875 | 1.28*
                      |                                   |               |
earn2               U |  2406.7     2669    -6.8           |  -2.28  0.022 | 0.97
                    M |  2406.7   2398.9     0.2    97.1 |   0.05  0.959 | 1.09
                      |                                   |               |
earn3_4             U |  4882.8   5285.5    -5.4           |  -1.83  0.067 | 1.06
                    M |  4882.8   4831.3     0.7    87.2 |   0.17  0.861 | 1.11
                      |                                   |               |
earn5_8             U |  8701.6   9398.7    -4.9           |  -1.66  0.098 | 1.09
                    M |  8701.6   8848.1    -1.0    79.0 |  -0.25  0.801 | 1.05
                      |                                   |               |
unemployment        U |  6.2513   5.5841    55.8           |  17.33  0.000 | 0.66*
                    M |  6.2513   6.1014    12.5    77.5 |   3.35  0.001 | 0.85*
                      |                                   |               |
--------------------------------------------------------------------------------
* if variance ratio outside [0.89; 1.12] for U and [0.89; 1.12] for M

--------------------------------------------------------------------------------
 Sample    | Ps R2   LR chi2   p>chi2   MeanBias   MedBias      B       R     %Var
-----------+--------------------------------------------------------------------
 Unmatched | 0.255   2108.14    0.000     18.1       15.2     130.1*  3.07*    67
 Matched   | 0.012     41.31    0.413      2.7        1.7      25.9*  0.92     40
--------------------------------------------------------------------------------
* if B>25%, R outside [0.5; 2]
```

Kentucky

TABLE D.5

Balancing Test Results for Propensity Score Match in Kentucky, All Students

Variable	Unmatched Matched	Mean Treated Control	%bias	%reduct |bias|	t-test t p>|t|	V(T)/ V(C)
unemployment	U	9.2107 7.9434	40.9		18.70 0.000	2.67*
	M	9.1934 8.9381	8.2	79.9	1.89 0.059	1.28*

collegeintent	U	.12081	.20658	-37.6			-11.04	0.000	0.29*
	M	.12109	.22995	-47.8	-26.9		-11.78	0.000	0.26*
collegeintentmiss	U	.00441	.00616	-2.4			-0.81	0.421	.
	M	.00369	.00442	-1.0	58.1		-0.30	0.764	.
preAOdeg	U	.01618	.01362	2.1			0.78	0.434	.
	M	.01622	.02181	-4.6	-118.3		-1.07	0.287	.
preAOPS	U	.51103	.36735	29.3			10.58	0.000	.
	M	.51254	.49769	3.0	89.7		0.77	0.440	.
preAOAE	U	.2875	.65076	-78.1			-27.22	0.000	.
	M	.28835	.33329	-9.7	87.6		-2.53	0.011	.
ageEnroll	U	29.453	28.47	9.2			3.37	0.001	1.15*
	M	29.443	29.482	-0.4	96.1		-0.09	0.928	0.99
ageEnroll2	U	990.17	917.34	9.4			3.42	0.001	1.11*
	M	989.6	992.87	-0.4	95.5		-0.11	0.916	0.96
ageEnrollMiss	U	0	0	.			.	.	.
	M	0	0	.	.		.	.	.
female	U	.54853	.56049	-2.4			-0.86	0.391	.
	M	.54941	.52914	4.1	-69.4		1.06	0.290	.
race_black	U	.11691	.16328	-13.4			-4.50	0.000	.
	M	.11726	.11741	-0.0	99.7		-0.01	0.990	.
race_otherunknown	U	.05221	.05784	-2.5			-0.86	0.389	.
	M	.05162	.05443	-1.2	50.1		-0.33	0.744	.
singleparentAO	U	.1625	.19716	-9.0			-3.12	0.002	.
	M	.16298	.16092	0.5	94.1		0.15	0.884	.
singleparentAOmiss	U	.33088	.28003	11.1			4.02	0.000	.
	M	.33038	.32571	1.0	90.8		0.26	0.796	.
pellAO	U	.48015	.55556	-15.1			-5.40	0.000	.
	M	.48156	.4814	0.0	99.8		0.01	0.993	.
aoEnrollSem201202	U	.03456	.03141	1.8			0.64	0.522	.
	M	.03466	.0385	-2.1	-21.9		-0.53	0.595	.
aoEnrollSem201203	U	.11544	.18558	-19.7			-6.49	0.000	.
	M	.11578	.13341	-5.0	74.9		-1.39	0.165	.
aoEnrollSem201301	U	.13456	.15315	-5.3			-1.84	0.065	.
	M	.13422	.12447	2.8	47.5		0.76	0.449	.
aoEnrollSem201302	U	.01912	.03318	-8.8			-2.84	0.005	.
	M	.01917	.01754	1.0	88.4		0.32	0.752	.
aoEnrollSem201303	U	.18382	.17523	2.2			0.80	0.422	.
	M	.18437	.20255	-4.7	-111.7		-1.20	0.231	.
aoEnrollSem201401	U	.18971	.1145	21.1			8.26	0.000	.
	M	.18953	.15957	8.4	60.2		2.06	0.040	.
aoEnrollSem201402	U	.01691	.03039	-8.9			-2.84	0.005	.
	M	.01696	.01466	1.5	82.9		0.48	0.631	.
aoEnrollSem201403	U	.22574	.13771	23.0			8.95	0.000	.
	M	.22493	.20849	4.3	81.3		1.04	0.299	.
CIPhealth	U	.53382	.19603	74.9			29.71	0.000	.
	M	.53392	.5067	6.0	91.9		1.42	0.156	.

```
                       |                        |            |
CIPmanu               U | .39118  .10432   70.4         | 31.78  0.000 |    .
                      M | .39012  .41813   -6.9   90.2 | -1.49  0.137 |    .
                       |                        |            |
CIPanyother           U | .66176  .90968  -63.4         | -29.13  0.000 |    .
                      M | .66298  .67279   -2.5   96.0 | -0.54  0.588 |    .
                       |                        |            |
emptotal              U | 3.4949  3.6059   -3.6         | -1.26  0.207 | 0.98
                      M | 3.4941  3.3891    3.4    5.5 |  0.88  0.380 | 1.00
                       |                        |            |
earnings1             U | 1703.9  1985.8   -8.1         | -2.80  0.005 | 0.87*
                      M |   1709  1715.9   -0.2   97.5 | -0.05  0.958 | 0.93
                       |                        |            |
earnings2             U |   1860  1961.3   -2.7         | -1.01  0.311 | 1.21*
                      M | 1859.9  1754.8    2.8   -3.8 |  0.73  0.465 | 1.17*
                       |                        |            |
earnings3_4           U | 4086.4  3913.8    2.3         |  0.83  0.409 | 0.95
                      M | 4065.3  3917.5    2.0   14.4 |  0.53  0.596 | 1.01
                       |                        |            |
earnings5_8           U | 8124.4  7082.9    7.0         |  2.72  0.007 | 1.41*
                      M | 8103.6  7730.3    2.5   64.2 |  0.63  0.528 | 1.16*
                       |                        |            |
emp1                  U | .45441  .49209   -7.6         | -2.68  0.007 |    .
                      M | .45575  .44374    2.4   68.1 |  0.63  0.530 |    .
                       |                        |            |
emp2                  U | .44632  .47778   -6.3         | -2.24  0.025 |    .
                      M | .44617  .43371    2.5   60.4 |  0.65  0.514 |    .
                       |                        |            |
earnings1sq           U | 1.4e+07  1.7e+07   -3.6         | -1.15  0.249 | 0.53*
                      M | 1.4e+07  1.5e+07   -1.1   69.0 | -0.33  0.742 | 0.76*
                       |                        |            |
earnings2sq           U | 1.9e+07  1.6e+07    2.5         |  1.21  0.225 | 3.46*
                      M | 1.9e+07  1.6e+07    2.8  -14.8 |  0.73  0.468 | 3.06*
                       |                        |            |
earnings3_4sq         U | 7.0e+07  7.1e+07   -0.1         | -0.04  0.972 | 0.04*
                      M | 6.9e+07  6.8e+07    0.2  -34.0 |  0.10  0.918 | 0.21*
                       |                        |            |
earnings5_8sq         U | 3.2e+08  2.3e+08    3.5         |  1.30  0.192 | 1.21*
                      M | 3.2e+08  2.8e+08    1.6   53.7 |  0.51  0.609 | 4.03*
                       |                        |            |
NRS3                  U | .01985  .02101   -0.8         | -0.29  0.773 |    .
                      M | .01844  .02273   -3.0 -270.1 | -0.79  0.431 |    .
                       |                        |            |
NRS4                  U | .03676   .0342    1.4         |  0.50  0.616 |    .
                      M |  .0354  .03121    2.3  -63.1 |  0.61  0.544 |    .
                       |                        |            |
NRS5                  U | .01103   .0126   -1.5         | -0.50  0.615 |    .
                      M | .01106  .00803    2.8  -93.2 |  0.81  0.418 |    .
                       |                        |            |
NRS6                  U | .00588  .01421   -8.4         | -2.56  0.011 |    .
                      M |  .0059  .00573    0.2   98.0 |  0.06  0.954 |    .
                       |                        |            |
NRSm                  U |  .0375  .16071  -42.1         | -12.25  0.000 |    .
                      M | .03761  .18853  -51.6  -22.5 | -12.77  0.000 |    .
                       |                        |            |
ACTscoreStd           U |-.01017  -.01919    3.0         |  1.11  0.267 | 1.24*
                      M | -.0102  -.01003   -0.1   98.1 | -0.01  0.989 | 1.08
                       |                        |            |
ACTscoreStd2          U | .10233  .08271    4.0         |  1.46  0.145 | 1.16*
                      M | .10264   .0946    1.6   59.1 |  0.40  0.688 | 0.95
                       |                        |            |
ACTscoreStdMissing    U | .78676   .7569    7.1         |  2.49  0.013 |    .
                      M | .78909  .79669   -1.8   74.5 | -0.49  0.625 |    .
                       |                        |            |
--------------------------------------------------------------------------------
* if variance ratio outside [0.90; 1.11] for U and [0.90; 1.11] for M

--------------------------------------------------------------------------------
```

```
 Sample   | Ps R2   LR chi2   p>chi2   MeanBias   MedBias      B       R      %Var
-----------+-----------------------------------------------------------------------
 Unmatched | 0.389   3861.99   0.000      15.4       7.3     188.8*   0.64     87
 Matched   | 0.065    246.09   0.000       4.8       2.5      60.1*   0.36*    53
-------------------------------------------------------------------------------------
* if B>25%, R outside [0.5; 2]
note: ageEnrollMiss omitted because of collinearity
```

TABLE D.6

Balancing Test Results for Propensity Score Match in Kentucky, Adult Education Students

Variable	Unmatched Matched	Mean Treated	Control	%bias	%reduct |bias|	t-test t	p>|t|	V(T)/ V(C)
unemployment	U	9.8008	8.6682	31.1		3.90	0.000	1.69*
	M	9.6287	9.1056	14.4	53.8	1.08	0.283	1.28
collegeintent	U	.20999	.36743	-45.9		-4.62	0.000	0.66*
	M	.21592	.2312	-4.5	90.3	-0.38	0.706	0.92
collegeintentmiss	U	.02381	.02723	-2.2		-0.23	0.817	.
	M	.01639	.03063	-9.0	-316.3	-0.73	0.465	.
preAOPS	U	.19048	.18985	0.2		0.02	0.986	.
	M	.19672	.24025	-11.1	-6901.6	-0.82	0.413	.
preAOAE	U	.43651	.47296	-7.3		-0.80	0.423	.
	M	.45082	.4491	0.3	95.3	0.03	0.979	.
ageEnroll	U	29.405	28.4	9.5		1.03	0.303	0.95
	M	29.295	29.462	-1.6	83.4	-0.13	0.900	1.04
ageEnroll2	U	972.48	921.17	6.9		0.73	0.463	0.90
	M	965.56	971.3	-0.8	88.8	-0.06	0.951	1.04
ageEnrollMiss	U	0	0	.		.	.	.
	M	0	0	.	.	.	.	.
female	U	.55556	.53077	5.0		0.54	0.586	.
	M	.56557	.54746	3.6	26.9	0.28	0.777	.
race_black	U	.20635	.15144	14.3		1.67	0.095	.
	M	.21311	.21688	-1.0	93.2	-0.07	0.943	.
race_otherunknown	U	.03968	.05893	-8.9		-0.90	0.367	.
	M	.03279	.04561	-5.9	33.4	-0.51	0.608	.
singleparentAO	U	.16667	.19396	-7.1		-0.76	0.448	.
	M	.17213	.16672	1.4	80.2	0.11	0.911	.
singleparentAOmiss	U	.4127	.33308	16.5		1.85	0.065	.
	M	.40984	.44089	-6.4	61.0	-0.49	0.625	.
pellAO	U	.31746	.44275	-26.0		-2.77	0.006	.
	M	.32787	.34014	-2.5	90.2	-0.20	0.840	.
aoEnrollSem201202	U	.06349	.05483	3.7		0.42	0.678	.
	M	.06557	.07776	-5.2	-40.6	-0.37	0.714	.
aoEnrollSem201203	U	.11905	.18239	-17.7		-1.81	0.070	.
	M	.12295	.14134	-5.1	71.0	-0.42	0.673	.
aoEnrollSem201301	U	.13492	.1809	-12.6		-1.32	0.188	.
	M	.13115	.12318	2.2	82.7	0.19	0.852	.
aoEnrollSem201302	U	.03968	.04215	-1.2		-0.13	0.893	.

```
                      M  |  .04098    .0393      0.8     31.6 |    0.07  0.947 |      .
                         |                                    |                |
aoEnrollSem201303     U  |   .0873    .18463   -28.6          |   -2.78  0.005 |      .
                      M  |  .09016    .11456    -7.2     74.9 |   -0.63  0.532 |      .
                         |                                    |                |
aoEnrollSem201401     U  |  .19841    .08355    33.4          |    4.45  0.000 |      .
                      M  |  .19672     .1452    15.0     55.1 |    1.07  0.287 |      .
                         |                                    |                |
aoEnrollSem201402     U  |  .02381    .02275     0.7          |    0.08  0.938 |      .
                      M  |  .02459    .01928     3.5   -402.4 |    0.28  0.778 |      .
                         |                                    |                |
aoEnrollSem201403     U  |   .2381    .11451    32.8          |    4.18  0.000 |      .
                      M  |  .22951    .23441    -1.3     96.0 |   -0.09  0.928 |      .
                         |                                    |                |
CIPhealth             U  |  .42857    .15479    63.0          |    8.14  0.000 |      .
                      M  |  .42623    .38427     9.7     84.7 |    0.67  0.506 |      .
                         |                                    |                |
CIPmanu               U  |  .35714    .11712    58.7          |    7.97  0.000 |      .
                      M  |  .34426    .34557    -0.3     99.5 |   -0.02  0.983 |      .
                         |                                    |                |
CIPanyother           U  |  .62698    .87728   -60.4          |   -8.15  0.000 |      .
                      M  |  .63934    .63637     0.7     98.8 |    0.05  0.962 |      .
                         |                                    |                |
emptotal              U  |  3.1111    3.0802     1.0          |    0.11  0.914 |   0.92
                      M  |  3.0902    3.3399    -8.1   -707.9 |   -0.63  0.529 |   0.93
                         |                                    |                |
earnings1             U  |  1499.7    2056.9   -13.3          |   -1.38  0.168 |   0.76
                      M  |  1548.9    1588.9    -1.0     92.8 |   -0.08  0.937 |   0.99
                         |                                    |                |
earnings2             U  |  1524.2    2055.2   -13.0          |   -1.35  0.177 |   0.78
                      M  |  1512.5    1635.4    -3.0     76.9 |   -0.25  0.804 |   1.00
                         |                                    |                |
earnings3_4           U  |  4269.2    4112.2     1.9          |    0.21  0.836 |   1.00
                      M  |  4040.5    4508.7    -5.6   -198.2 |   -0.44  0.657 |   0.99
                         |                                    |                |
earnings5_8           U  |  8844.9    7846.1     6.1          |    0.67  0.500 |   1.02
                      M  |  8636.4      9633    -6.1      0.2 |   -0.47  0.638 |   0.90
                         |                                    |                |
emp1                  U  |  .30952    .41813   -22.7          |   -2.42  0.016 |      .
                      M  |  .31967    .35835    -8.1     64.4 |   -0.64  0.525 |      .
                         |                                    |                |
emp2                  U  |  .34127    .40172   -12.5          |   -1.35  0.176 |      .
                      M  |  .33607    .38034    -9.2     26.8 |   -0.72  0.473 |      .
                         |                                    |                |
earnings1sq           U  | 1.7e+07   2.4e+07    -7.8          |   -0.76  0.449 |   0.55*
                      M  | 1.8e+07   1.8e+07    -0.3     96.2 |   -0.03  0.980 |   0.81
                         |                                    |                |
earnings2sq           U  | 1.7e+07   2.3e+07    -8.0          |   -0.81  0.416 |   0.70*
                      M  | 1.7e+07   1.7e+07    -0.5     93.2 |   -0.04  0.965 |   0.82
                         |                                    |                |
earnings3_4sq         U  | 8.7e+07   8.6e+07     0.4          |    0.04  0.969 |   0.79
                      M  | 8.3e+07   8.8e+07    -1.8   -374.1 |   -0.14  0.887 |   0.89
                         |                                    |                |
earnings5_8sq         U  | 3.4e+08   3.3e+08     1.8          |    0.18  0.859 |   0.68*
                      M  | 3.3e+08   3.8e+08    -4.4   -148.6 |   -0.34  0.731 |   0.67*
                         |                                    |                |
NRS3                  U  |  .21429    .14621    17.7          |    2.10  0.036 |      .
                      M  |  .20492    .25264   -12.4     29.9 |   -0.89  0.377 |      .
                         |                                    |                |
NRS4                  U  |  .39683    .23797    34.6          |    4.06  0.000 |      .
                      M  |  .39344    .34694    10.1     70.7 |    0.75  0.454 |      .
                         |                                    |                |
NRS5                  U  |  .11905    .08765    10.3          |    1.21  0.227 |      .
                      M  |  .12295    .08929    11.0     -7.2 |    0.85  0.395 |      .
                         |                                    |                |
NRS6                  U  |  .06349    .09884   -12.9          |   -1.31  0.191 |      .
                      M  |  .06557    .06371     0.7     94.7 |    0.06  0.953 |      .
                         |                                    |                |
```

```
NRSm                        U |  .1746  .39649    -50.6          |  -5.02  0.000 |    .
                            M |  .18033 .21523     -8.0    84.3  |  -0.68  0.496 |    .
                              |                                  |               |
--------------------------------------------------------------------------------------
* if variance ratio outside [0.70; 1.42] for U and [0.70; 1.43] for M


------------------------------------------------------------------------------
 Sample    | Ps R2   LR chi2   p>chi2   MeanBias   MedBias    B       R     %Var
-----------+------------------------------------------------------------------
 Unmatched | 0.267   274.99    0.000      17.7      12.6    137.5*   0.63    38
 Matched   | 0.033    11.29    1.000       5.1       4.4     41.3*   0.60     8
------------------------------------------------------------------------------
* if B>25%, R outside [0.5; 2]
```

TABLE D.7

Balancing Test Results for Propensity Score Match in Kentucky, Developmental Education Students

```
------------------------------------------------------------------------------------------
                    Unmatched |      Mean              %reduct |    t-test   | V(T)/
Variable            Matched   | Treated  Control  %bias  |bias| |   t    p>|t| | V(C)
----------------------------+--------------------------------+--------------+---------
unemployment            U | 9.1504   7.8217    44.3          | 20.08  0.000 | 3.14*
                        M | 9.1504   8.9216     7.6    82.8  |  1.63  0.103 | 1.28*
                          |                                  |              |
preAOdeg                U | .01783   .01527     2.0          |  0.70  0.484 |   .
                        M | .01783   .02253    -3.7   -84.3  | -0.83  0.406 |   .
                          |                                  |              |
preAOPS                 U | .54376   .39715    29.7          | 10.13  0.000 |   .
                        M | .54376   .52314     4.2    85.9  |  1.03  0.305 |   .
                          |                                  |              |
preAOAE                 U | .27229   .68061   -89.6          |-29.73  0.000 |   .
                        M | .27229   .32185   -10.9    87.9  | -2.70  0.007 |   .
                          |                                  |              |
ageEnroll               U | 29.458   28.481     9.1          |  3.20  0.001 | 1.18*
                        M | 29.458   29.484    -0.2    97.4  | -0.06  0.954 | 0.99
                          |                                  |              |
ageEnroll2              U | 991.97   916.7      9.7          |  3.37  0.001 | 1.14*
                        M | 991.97   995.01    -0.4    96.0  | -0.09  0.926 | 0.95
                          |                                  |              |
ageEnrollMiss           U |      0        0      .           |    .      .  |   .
                        M |      0        0      .       .   |    .      .  |   .
                          |                                  |              |
female                  U | .54781   .56548    -3.6          | -1.21  0.228 |   .
                        M | .54781   .52733     4.1   -15.9  |  1.02  0.308 |   .
                          |                                  |              |
race_black              U | .10778   .16527   -16.8          | -5.30  0.000 |   .
                        M | .10778   .10757     0.1    99.6  |  0.02  0.987 |   .
                          |                                  |              |
race_otherunknown       U | .05348   .05766    -1.8          | -0.61  0.544 |   .
                        M | .05348   .05531    -0.8    56.3  | -0.20  0.842 |   .
                          |                                  |              |
singleparentAO          U | .16207   .1977     -9.3          | -3.04  0.002 |   .
                        M | .16207   .16034     0.5    95.1  |  0.12  0.907 |   .
                          |                                  |              |
singleparentAOmiss      U | .32253   .27113    11.3          |  3.90  0.000 |   .
                        M | .32253   .31432     1.8    84.0  |  0.44  0.662 |   .
                          |                                  |              |
pellAO                  U | .49676   .5745    -15.6          | -5.32  0.000 |   .
                        M | .49676   .49537     0.3    98.2  |  0.07  0.945 |   .
                          |                                  |              |
aoEnrollSem201202       U | .0316    .02748     2.4          |  0.85  0.396 |   .
                        M | .0316    .03461    -1.8    27.0  | -0.42  0.676 |   .
                          |                                  |              |
aoEnrollSem201203       U | .11507   .18611   -20.0          | -6.25  0.000 |   .
                        M | .11507   .13263    -4.9    75.3  | -1.32  0.186 |   .
                          |                                  |              |
aoEnrollSem201301       U | .13452   .14849    -4.0          | -1.33  0.182 |   .
```

```
                      M |  .13452   .12459    2.8   28.9 |   0.73  0.463 |    .
                        |                               |               |
aoEnrollSem201302     U |  .01702   .03168   -9.5        |  -2.88  0.004 |    .
                      M |  .01702   .01539    1.1   88.9 |   0.32  0.749 |    .
                        |                               |               |
aoEnrollSem201303     U |  .19368   .17366    5.2        |   1.78  0.075 |    .
                      M |  .19368   .21125   -4.5   12.2 |  -1.09  0.278 |    .
                        |                               |               |
aoEnrollSem201401     U |  .18882   .11969   19.2        |   7.09  0.000 |    .
                      M |  .18882   .16099    7.7   59.7 |   1.82  0.069 |    .
                        |                               |               |
aoEnrollSem201402     U |  .01621   .03168  -10.1        |  -3.04  0.002 |    .
                      M |  .01621   .01421    1.3   87.1 |   0.41  0.685 |    .
                        |                               |               |
aoEnrollSem201403     U |  .22447   .14161   21.5        |   7.92  0.000 |    .
                      M |  .22447   .20593    4.8   77.6 |   1.12  0.262 |    .
                        |                               |               |
CIPhealth             U |  .54457   .20295   75.5        |  28.21  0.000 |    .
                      M |  .54457    .5188    5.7   92.5 |   1.28  0.200 |    .
                        |                               |               |
CIPmanu               U |  .39465   .10217   71.9        |  30.95  0.000 |    .
                      M |  .39465   .42531   -7.5   89.5 |  -1.55  0.122 |    .
                        |                               |               |
CIPanyother           U |  .66532   .91511  -64.4        | -28.49  0.000 |    .
                      M |  .66532   .67639   -2.9   95.6 |  -0.59  0.559 |    .
                        |                               |               |
emptotal              U |   3.534   3.6941   -5.1        |  -1.73  0.083 |  0.99
                      M |   3.534    3.394    4.5   12.5 |   1.12  0.264 |  1.00
                        |                               |               |
earnings1             U |  1724.8   1973.9   -7.4        |  -2.46  0.014 |  0.93
                      M |  1724.8   1728.5   -0.1   98.5 |  -0.03  0.979 |  0.93
                        |                               |               |
earnings2             U |  1894.3   1945.6   -1.4        |  -0.51  0.612 |  1.33*
                      M |  1894.3   1766.6    3.5 -149.0 |   0.85  0.397 |  1.19*
                        |                               |               |
earnings3_4           U |  4067.7   3880.5    2.6        |   0.87  0.385 |  0.96
                      M |  4067.7     3859    2.9  -11.4 |   0.73  0.468 |  1.01
                        |                               |               |
earnings5_8           U |  8050.9   6954.9    7.5        |   2.82  0.005 |  1.53*
                      M |  8050.9   7542.2    3.5   53.6 |   0.83  0.408 |  1.20*
                        |                               |               |
emp1                  U |  .46921   .50451   -7.1        |  -2.39  0.017 |    .
                      M |  .46921   .45218    3.4   51.8 |   0.85  0.396 |    .
                        |                               |               |
emp2                  U |  .45705   .49055   -6.7        |  -2.27  0.023 |    .
                      M |  .45705   .43898    3.6   46.1 |   0.90  0.367 |    .
                        |                               |               |
earnings1sq           U |  1.4e+07  1.6e+07   -2.5        |  -0.76  0.448 |  0.54*
                      M |  1.4e+07  1.5e+07   -1.2   50.2 |  -0.34  0.731 |  0.75*
                        |                               |               |
earnings2sq           U |  1.9e+07  1.5e+07    3.8        |   1.90  0.058 |  4.28*
                      M |  1.9e+07  1.6e+07    3.1   18.5 |   0.76  0.449 |  3.38*
                        |                               |               |
earnings3_4sq         U |  6.8e+07  6.8e+07   -0.1        |  -0.01  0.989 |  0.03*
                      M |  6.8e+07  6.6e+07    0.2 -336.6 |   0.13  0.895 |  0.19*
                        |                               |               |
earnings5_8sq         U |  3.2e+08  2.2e+08    3.8        |   1.34  0.180 |  1.17*
                      M |  3.2e+08  2.7e+08    1.9   51.3 |   0.57  0.570 |  4.27*
                        |                               |               |
ACTscoreStd           U | -.01121  -.02241    3.5        |   1.22  0.224 |  1.17*
                      M | -.01121  -.01102   -0.1   98.4 |  -0.01  0.989 |  1.08
                        |                               |               |
ACTscoreStd2          U |  .11278   .09659    3.1        |   1.06  0.288 |  1.09
                      M |  .11278   .10396    1.7   45.5 |   0.40  0.688 |  0.94
                        |                               |               |
ACTscoreStdMissing    U |   .8671   .88394   -5.1        |  -1.77  0.077 |    .
                      M |   .8671   .87545   -2.5   50.4 |  -0.62  0.536 |    .
                        |                               |               |
```

```
-------------------------------------------------------------------------------
* if variance ratio outside [0.89; 1.12] for U and [0.89; 1.12] for M

-------------------------------------------------------------------------------
 Sample    | Ps R2   LR chi2   p>chi2   MeanBias   MedBias      B        R      %Var
-----------+-------------------------------------------------------------------
 Unmatched | 0.389   3457.17   0.000      16.4       7.4     177.2*    0.46*    71
 Matched   | 0.011     38.70   0.306       3.0       2.9      20.9     0.57     50
-------------------------------------------------------------------------------
* if B>25%, R outside [0.5; 2]
```

Louisiana

Balancing Test Results for Propensity Score Match in Louisiana, All Students

```
-------------------------------------------------------------------------------
                Unmatched |        Mean              %reduct |    t-test     | V(T)/
Variable        Matched   | Treated Control   %bias   |bias| |   t    p>|t|  | V(C)
--------------------------+--------------------------------------+------------+------
collegeintent     U | .09448   .09978   -17.1          | -3.45   0.001 | 1.17
                  M | .09448    .0937     2.5    85.3   |  0.36   0.719 | 1.01
                    |                                   |               |
semester1         U | .05455   .23582   -53.2          | -8.77   0.000 |   .
                  M | .05455   .07192    -5.1    90.4   | -1.06   0.290 |   .
                    |                                   |               |
semester2         U | .16136   .16882    -2.0          | -0.39   0.696 |   .
                  M | .16136   .13498     7.1  -253.8   |  1.10   0.271 |   .
                    |                                   |               |
semester3         U | .10909   .06401    16.1          |  3.47   0.001 |   .
                  M | .10909   .09569     4.8    70.3   |  0.66   0.513 |   .
                    |                                   |               |
semester4         U | .17045   .26567   -23.2          | -4.30   0.000 |   .
                  M | .17045   .13652     8.3    64.4   |  1.40   0.163 |   .
                    |                                   |               |
semester5         U | .02727   .00332    19.6          |  5.93   0.000 |   .
                  M | .02727   .02237     4.0    79.5   |  0.47   0.641 |   .
                    |                                   |               |
semester6         U | .02727   .00199    21.2          |  6.93   0.000 |   .
                  M | .02727   .01092    13.7    35.3   |  1.77   0.077 |   .
                    |                                   |               |
semester7         U | .15455   .06998    27.0          |  6.11   0.000 |   .
                  M | .15455   .17309    -5.9    78.1   | -0.74   0.458 |   .
                    |                                   |               |
semester8         U |  .225    .11907    28.3          |  6.15   0.000 |   .
                  M |  .225    .25818    -8.9    68.7   | -1.15   0.251 |   .
                    |                                   |               |
NRSlow            U | .02045   .02753    -4.6          | -0.86   0.389 |   .
                  M | .02045   .02445    -2.6    43.5   | -0.40   0.689 |   .
                    |                                   |               |
NRS3              U | .05227   .07496    -9.3          | -1.72   0.086 |   .
                  M | .05227   .06514    -5.3    43.3   | -0.81   0.417 |   .
                    |                                   |               |
NRS4              U | .26591   .18109    20.5          |  4.23   0.000 |   .
                  M | .26591   .25488     2.7    87.0   |  0.37   0.710 |   .
                    |                                   |               |
NRS5              U | .22727   .29552   -15.6          | -2.96   0.003 |   .
                  M | .22727   .23108    -0.9    94.4   | -0.13   0.893 |   .
                    |                                   |               |
NRS6              U | .10909   .19204   -23.3          | -4.23   0.000 |   .
                  M | .10909   .13492    -7.3    68.9   | -1.17   0.242 |   .
                    |                                   |               |
```

```
NRSmissing      U | .32727   .23217    21.3          |   4.35  0.000 |    .
                M | .32727   .29084     8.2   61.7 |   1.17  0.243 |    .
                  |                                  |               |
priorged        U | .00682   .00829    -1.7          |  -0.32  0.747 |    .
                M | .00682    .0175   -12.3  -624.7 |  -1.45  0.149 |    .
                  |                                  |               |
highschool      U | .11591   .03284    32.0          |   8.06  0.000 |    .
                M | .11591   .15716   -15.9    50.3 |  -1.78  0.075 |    .
                  |                                  |               |
gthighschool    U | .01591   .00796     7.3          |   1.65  0.099 |    .
                M | .01591   .01772    -1.7    77.2 |  -0.21  0.835 |    .
                  |                                  |               |
singleparent    U |     .1   .06965    10.9          |   2.28  0.023 |    .
                M |     .1   .13229   -11.6    -6.4 |  -1.49  0.135 |    .
                  |                                  |               |
age             U | 25.775   25.661     1.2          |   0.23  0.821 | 0.86
                M | 25.775    25.52     2.6  -123.6 |   0.42  0.676 | 1.10
                  |                                  |               |
agesq           U | 749.94    757.8    -1.2          |  -0.24  0.813 | 0.86
                M | 749.94   729.28     3.3  -163.1 |   0.52  0.603 | 1.15
                  |                                  |               |
female          U | .64091   .40962    47.6          |   9.24  0.000 |    .
                M | .64091    .6216     4.0    91.7 |   0.59  0.553 |    .
                  |                                  |               |
white           U | .36818   .38043    -2.5          |  -0.49  0.621 |    .
                M | .36818   .34536     4.7   -86.3 |   0.71  0.480 |    .
                  |                                  |               |
black           U | .50227   .51542    -2.6          |  -0.52  0.606 |    .
                M | .50227   .51216    -2.0    24.8 |  -0.29  0.770 |    .
                  |                                  |               |
hispanic        U | .02727   .03582    -4.9          |  -0.91  0.360 |    .
                M | .02727   .02729    -0.0    99.8 |  -0.00  0.998 |    .
                  |                                  |               |
otherrace       U | .06364   .03914    11.1          |   2.39  0.017 |    .
                M | .06364   .06389    -0.1    99.0 |  -0.02  0.988 |    .
                  |                                  |               |
missingrace     U | .03864   .02919     5.2          |   1.08  0.281 |    .
                M | .03864   .05131    -7.0   -34.1 |  -0.91  0.365 |    .
                  |                                  |               |
pell            U | .21591   .17944     9.2          |   1.84  0.065 |    .
                M | .21591   .29852   -20.8  -126.5 |  -2.81  0.005 |    .
                  |                                  |               |
unemployment    U | 6.1377    5.876    22.0          |   5.18  0.000 | 2.41*
                M | 6.1377   6.1629    -2.1    90.4 |  -0.33  0.742 | 3.52*
                  |                                  |               |
health          U | .43636   .05705    97.9          |  26.56  0.000 |    .
                M | .43636   .43709    -0.2    99.8 |  -0.02  0.983 |    .
                  |                                  |               |
manufacturing   U |    .35   .29519    11.7          |   2.34  0.019 |    .
                M |    .35   .34888     0.2    98.0 |   0.03  0.972 |    .
                  |                                  |               |
othercip        U | .18409   .54328   -80.4          | -14.49  0.000 |    .
                M | .18409   .18007     0.9    98.9 |   0.15  0.877 |    .
                  |                                  |               |
emptotal        U | 3.5045   2.2763    42.4          |   8.43  0.000 | 1.08
                M | 3.5045   3.6562    -5.2    87.7 |  -0.72  0.469 | 0.83*
                  |                                  |               |
emp1            U | .48636   .31509    35.5          |   7.15  0.000 |    .
                M | .48636   .49187    -1.1    96.8 |  -0.16  0.870 |    .
                  |                                  |               |
emp2            U | .46591   .30381    33.8          |   6.83  0.000 |    .
                M | .46591   .50916    -9.0    73.3 |  -1.28  0.200 |    .
                  |                                  |               |
emp3_4          U | .52727   .35091    36.1          |   7.20  0.000 |    .
                M | .52727    .5464    -3.9    89.2 |  -0.57  0.570 |    .
                  |                                  |               |
emp5_8          U | .56136   .39502    33.7          |   6.65  0.000 |    .
                M | .56136   .55178     1.9    94.2 |   0.29  0.775 |    .
```

```
                          |                              |                |
earnings1            U | 1508.2   1153.4    13.2         |  2.51  0.012 |  0.85
                     M | 1508.2   1704.2    -7.3   44.8  | -1.09  0.275 |  0.88
                          |                              |                |
earnings2            U |   1458   1114.1    13.2         |  2.50  0.013 |  0.81*
                     M |   1458     1649    -7.4   44.5  | -1.11  0.268 |  0.85
                          |                              |                |
earnings3_4          U |   2927     2177    14.8         |  2.81  0.005 |  0.83*
                     M |   2927   3256.7    -6.5   56.0  | -1.00  0.319 |  0.93
                          |                              |                |
earnings5_8          U | 5491.8   4097.2    14.2         |  2.67  0.008 |  0.81*
                     M | 5491.8   5945.4    -4.6   67.5  | -0.71  0.475 |  0.96
                          |                              |                |
-------------------------------------------------------------------------------------
* if variance ratio outside [0.83; 1.21] for U and [0.83; 1.21] for M


-------------------------------------------------------------------------------------
 Sample     | Ps R2   LR chi2   p>chi2   MeanBias   MedBias     B       R     %Var
-----------+-------------------------------------------------------------------------
 Unmatched | 0.321    845.85    0.000      21.7       16.1    166.1*   1.37    44
 Matched   | 0.027     32.73    0.786       5.5        4.7     38.7*   1.00    22
-------------------------------------------------------------------------------------
* if B>25%, R outside [0.5; 2]
```

Appendix E. Standards for Causal Interpretation of Impact Results

Several criteria must be satisfied for an evaluation to be accepted as rigorous evidence of a program's causal impact on participants. Although individual researchers have their own understanding of what constitutes scientific rigor, many organizations have developed consensus standards for judging whether an evaluation's results can be interpreted causally. The consensus standards that are most relevant to Accelerating Opportunity are the Department of Labor's Clearinghouse for Labor Evaluation and Research (CLEAR) standards and the Department of Education's What Works Clearinghouse (WWC) standards. This appendix discusses how the methodology of this report meets these standards.

CLEAR Standards for Causal Evidence

CLEAR only identifies studies as having a "high" causal evidence rating if they use either the randomized controlled trial or the interrupted time series method. Since this report uses propensity score matching, it can be rated as having a "moderate" causal evidence rating. Propensity score matching studies are judged according to regression analysis guidelines because the analysis is conducted using a regression framework. The first requirement is that comparison groups are similar to treatment groups on preintervention characteristics (both observed and unobserved). This requirement is achieved in most cases after reweighting the comparison group using the results of the propensity score matching analysis. Some preintervention characteristics are not similar between treatment and comparison groups even after matching. In such cases, CLEAR evidence guidelines require that these characteristics are included in a subsequent regression analysis used to estimate the treatment effect. In this report, *all matching variables* are included in the regression that produces the impact estimates. All impact estimates provided in this report are estimated using a regression adjustment of the matched comparison group, so all impact estimates in the report meet this standard.

Different types of interventions require controlling for different pre-intervention characteristics. For this report, we followed the protocol for evaluations of community college programs. This protocol requires the inclusion of the following control variables: age, race or ethnicity, gender, state, a preintervention measure of financial disadvantage, and a preintervention measure of academic

achievement. Each of these controls is included in the analysis. Pell grant receipt and preintervention earnings are included as measures of financial disadvantage. NRS levels, and standardized postsecondary placement tests (including ACT, SAT, ACCUPLACER, and COMPASS, depending on the state), high school completion status, and prior postsecondary experience are included as measures of preintervention academic achievement. Because employment and earnings are key outcomes, eight quarters of lagged employment and earnings are included as matching variables as well. Lagged outcomes are not required in the CLEAR community college review protocol, but they are recommended in the causal evidence guidelines. Although PSM is not a method that identifies the effects of an intervention by comparing changes in an outcome over time (as in a difference-in-differences or fixed effects model), equivalent trends are guaranteed by matching on prior trends in employment and earnings and controlling for these variables in the regression.

An important concern in any propensity score matching study is the equivalence of the comparison group on unobserved characteristics. This study avoids this problem by matching on and controlling for pretreatment employment and earnings histories. Although these characteristics are "observed," they are determined by several unobserved characteristics that are also determinants of the outcomes. Controlling for pretreatment employment and earnings essentially controls for any idiosyncratic individual characteristics affecting labor market performance that are not observed in the analysis. We also control for semester of enrollment, which should absorb unobserved characteristics associated with differences between fall enrollments (which may disproportionately be coming from high school) and other enrollees.

The second requirement is that the study does not have any confounding factors. The analysis does not suffer from confounding factors, including $N=1$ confounds. Students in the comparison group attend the same schools and live in the same states as treatment cases. Although in some cases very few treatment cases have a certain value for a control variable (e.g., very few, if any, treatment cases had prior post-secondary experience), the comparison group was sufficiently large relative to the treatment group that there are always comparison cases with the same characteristics. These $N=1$ confounds are automatically reported by the statistical software, and all statistical output was checked to ensure the absence of $N=1$ confounds.

The third requirement is that participants do not anticipate the intervention. There is no risk that students anticipated the AO intervention or adjusted their behavior to gain entry into the program.

The analysis estimates (average) individual level effects, not group level effects such as the impact of AO on a school or a county. As a result, the fourth requirement, which relates to group compositional

changes, does not apply to this study. The analysis also does not use fixed effects, random effects, or instrumental variables, so requirements associated with those designs do not apply to this study. Our measure of the predicted probability of college is a predicted value estimated in a prior model, but it is not functioning as an instrument and no exclusion restrictions are satisfied (i.e., the variables in the model determining the predicted probability of attending college are all included in the main model).

WWC Standards for Causal Evidence

Similar to CLEAR, WWC only identifies studies as meeting WWC standards "without reservations" if they use a randomized controlled trial. Because this evaluation uses propensity score matching, it can be rated as meeting WWC standards "with reservations," which is available to well-executed quasi-experimental designs. The first WWC requirement for studies that do not randomly assign treatment is that baseline equivalence is achieved between the treatment and comparison group. Baseline equivalence is satisfied when the mean differences between two individual characteristics is less than 0.05 standard deviations. Although some baseline characteristics satisfy this criteria (see appendix D), many do not. In studies with many matching variables, it is common that no vector of weights can simultaneously satisfy baseline equivalence on all variables. Rather than build in a bias in favor of studies that use fewer matching variables to achieve greater baseline equivalence, postmatching regression adjustment can satisfy baseline equivalence. All impact estimates in this analysis use regression adjustment to control for any remaining lack of baseline equivalence.

WWC also requires that outcome measures have face validity and reliability. All the outcome measures in this analysis satisfy those criteria. The outcome measures do not attempt to measure any latent characteristic—they are direct measures of credits earned, credentials earned, employment, and earnings. Outcome measures must also not be overaligned with the treatment, and they must be collected in the same manner for both the treatment and comparison groups. Our analysis satisfies both requirements. The AO treatment is not defined by the accumulation of a specific number of credits or credentials, much less subsequent employment, so the outcome measure is not overaligned. Outcomes are measured for treatment and comparison cases using the same data sources; postsecondary administrative records for credits and credentials, and unemployment insurance wage records for employment and earnings.

WWC requires that if subgroups are analyzed findings are also presented for the full sample. This analysis satisfies that requirement. Recruitment source subgroups in Kansas and Kentucky are

analyzed, but analyses of the total sample in these states are also included. Finally, WWC requires that there are no confounding factors associated with treatment. As noted in the CLEAR discussion above, there are no relevant confounding factors in this analysis.

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About the Authors

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