MLDS CENTER
Maryland Longitudinal Data System
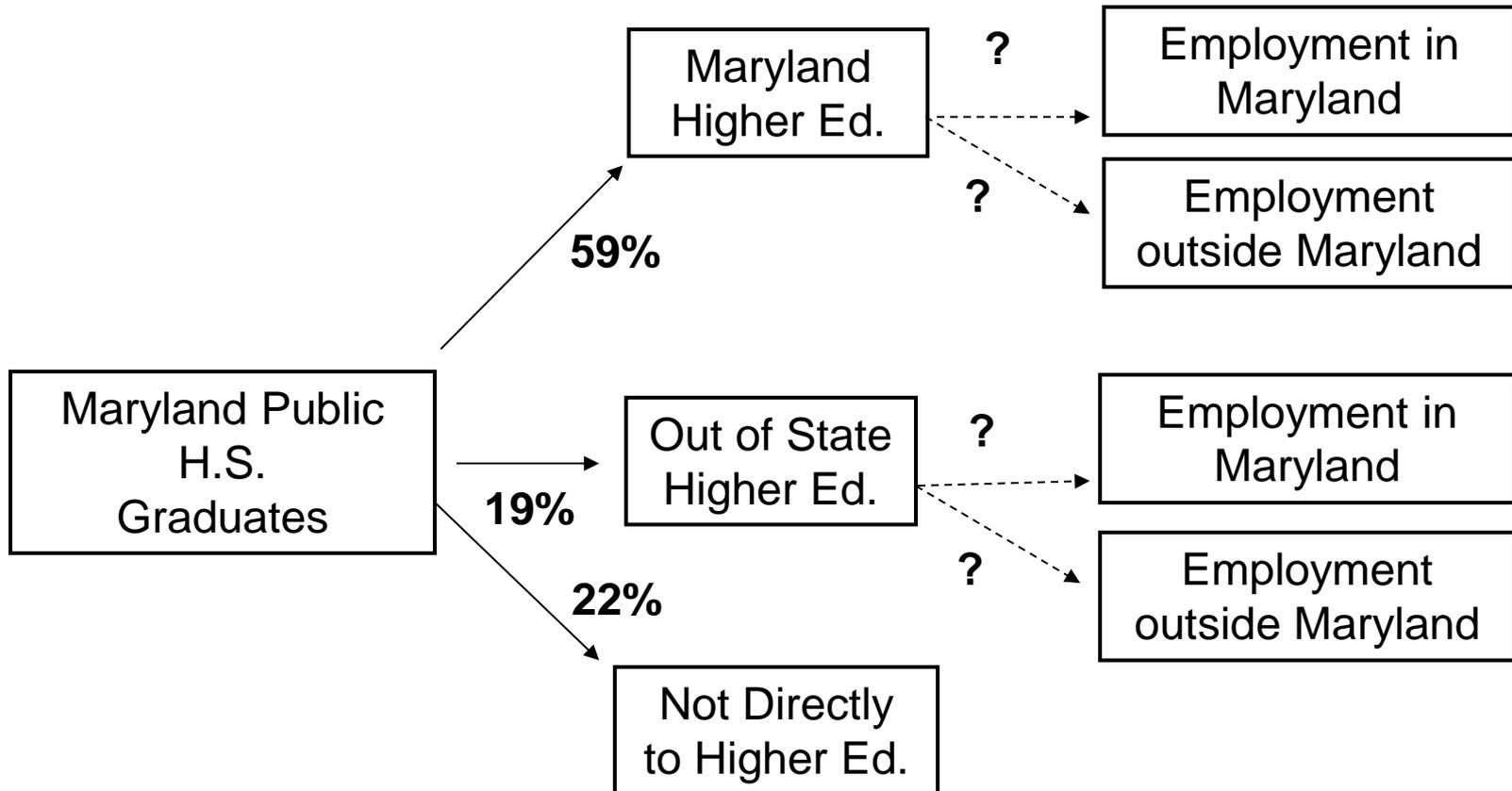
Better Data • Informed Choices • Improved Results

Investigating the "Brain-Drain" Phenomenon in Maryland

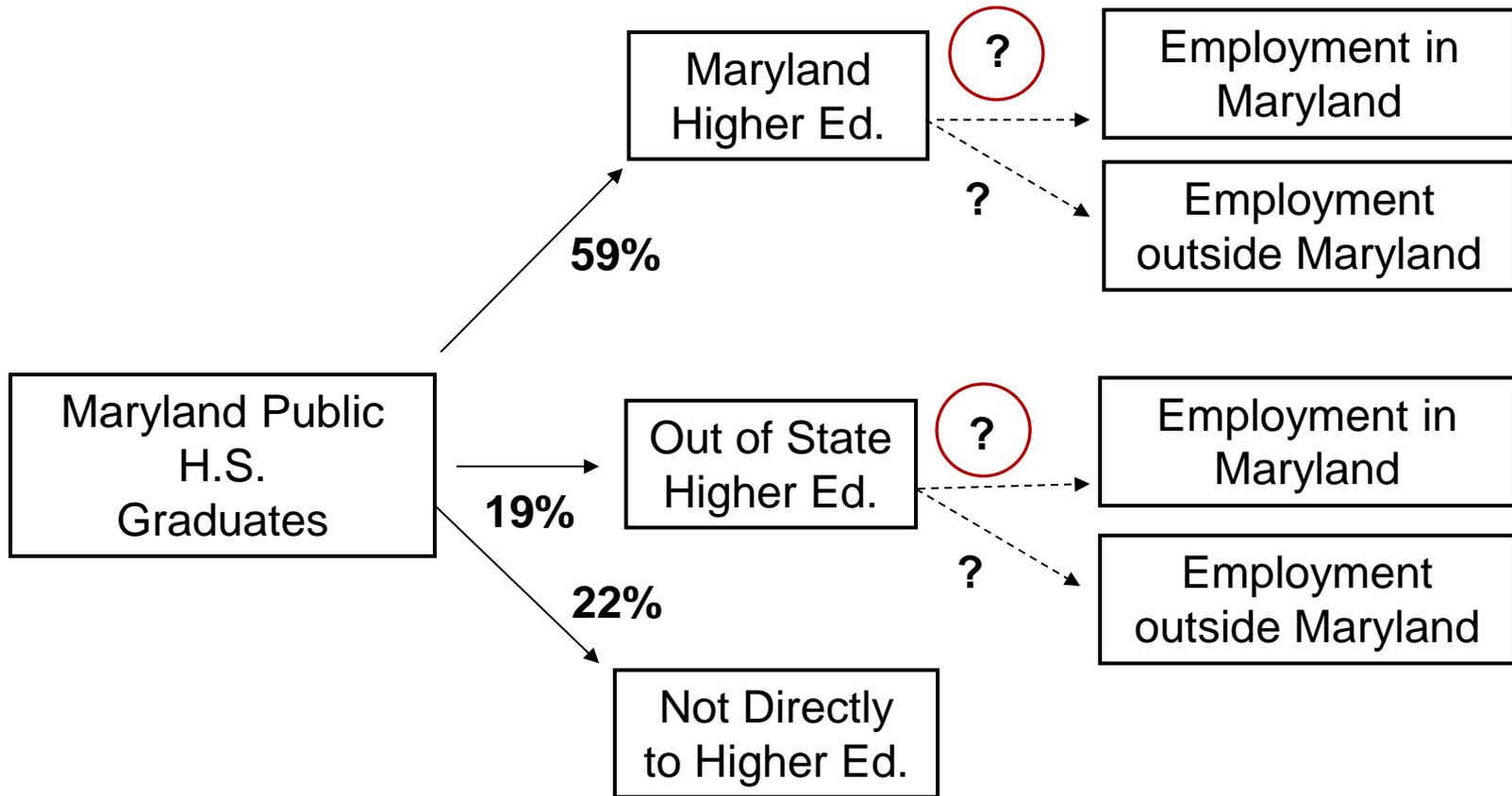Amber Bloomfield, Research Team, MLDSC and Data Scientist at IRPA-University of Maryland, College Park

Version 2.0 Updated February 2018

"Brain drain"

Maryland Public H.S. Graduates

59% → Maryland Higher Ed.
- ? → Employment in Maryland
- ? → Employment outside Maryland

19% → Out of State Higher Ed.
- ? → Employment in Maryland
- ? → Employment outside Maryland

22% → Not Directly to Higher Ed.

Source: 2008-2009 graduation year numbers in *Initial Postsecondary Enrollments - In-State vs. Out-of-State* dashboard; viewed at mldscenter.maryland.gov on 15Mar2017

"Brain drain"


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Maryland Public          59%          Maryland          ?          Employment in
H.S.             ──────────────►      Higher Ed.   ( ? ) ┄┄┄┄►        Maryland
Graduates                                               ?
                  19%              Out of State    ┄┄┄┄►       Employment
             ──────────────►       Higher Ed.                 outside Maryland
                  22%
             ──────────────►                        ?          Employment in
                                   Not Directly  ( ? ) ┄┄┄┄►       Maryland
                                   to Higher Ed.      ?
                                                  ┄┄┄┄►       Employment
                                                              outside Maryland
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Source: 2008-2009 graduation year numbers in *Initial Postsecondary Enrollments - In-State vs. Out-of-State* dashboard; viewed at mldscenter.maryland.gov on 15Mar2017

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Method

- Use deidentified data from the Maryland Longitudinal Data System Center

- Impute missing data to retain as many students as possible for analyses

- Correct for any differences between students attending in-state vs. out-of-state colleges using propensity score matching

Data housed in the MLDS Center

Person Info		
Race/ Ethnicity	Gender	Citizenship

(pre)K-12 (MSDE)				
Grades	Attendance	Courses	Assessments	Status

Postsecondary   (MHEC and NSC)

Workforce   (DLLR)

2007-2008 – 2015-2016

Data Scope and Limitations

- K-12 student data are from Maryland public schools
  - No private school students
  - No home schooled students
- Out-of-state higher education records are available only for Maryland public school students (National Student Clearinghouse)

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Data Scope and Limitations (cont'd)

- Workforce data do not include:
  - Federal employees (including military)
  - Private contractors
  - Self-employed
- Data are linked in the system for five years following the last Maryland education record in the system*

* As of Summer 2017, data will be linked for 20 years following the last Maryland education record.

Research Questions

- Do students who go out-of-state for college differ from those who stay in-state?

- Does location of the institution change likelihood of working in Maryland?

- Do students who attend college out-of-state and go on to work in Maryland differ from students who attend collge out-of-state and do not work in Maryland?

Selecting cohorts for analysis

- Time span needs to be wide enough to provide opportunity for completing college education and finding employment
  - Analyses focused on students initially enrolled in 2010 and not enrolled as undergraduates in 2016
- Disparity in 2-year and 4-year institution attendance
  - Analyses focused on students who enrolled at 4-year institutions

Available Data

- High school assessments
  - e.g., AP/IB, SAT/ACT
- Demographic info
  - e.g., Gender, Ethnicity
- School info
  - e.g., FARMS count, Total enrollment

Data cleaning

- Included: students who graduated HS in academic year 2009, enrolled in PS in 2010

- Extremely sparse variables excluded from analyses

- ACT scores converted to SAT scores

- Highest AP/IB scores and proficiency captured

- Under-represented minority variable created consistent with the NIH definition of URM in Sciences (http://grants.nih.gov/training/faq_diversity.htm#867)

In-state Attendees and Out-of-state Attendees: Achievement

- MD HS students who attended colleges in Maryland:
  - Slighty more likely to complete USM <u>and</u> Career and Technology program course requirements
  - Slightly more likely to take the SAT or ACT
  - Slightly more likely to meet Rigorous HS Program Requirements in all domains (e.g., Math, Foreign Language)
  - Slightly less likely to have IB and AP credits
  - Had lower SAT/ACT scores

In-state Attendees and Out-of-state Attendees: Demographics

- MD HS students who attended Maryland colleges:
  - Were more likely to be underrepresented minorities
  - Slightly less likely to be female

In-state Attendees and Out-of-state Attendees: HS Characteristics

- Maryland HS students who attended Maryland colleges went to high schools:
  - That had higher percentage of FARMS, lower total enrollment
  - That were slightly more likely to have met their performance and attendance goals and to be magnet schools

Data imputation

- Allows for values to be estimated where actual data are missing

- Multiple imputation
  - All potentially informative variables are included in the imputation model
  - Other variables are used to estimate missing values based on observed relationships
  - Several sets of data are created to represent the inherent uncertainty of the missing values

Results of data imputation

- Some missing values for HS characteristics and achievement variables (e.g., Science Indicator)
- "Missing" scores on tests like the SAT/ACT and highest AP score were coded into indicators of having a test score
  - The interaction between the indicator and the test score was used in the propensity score matching analysis
- Twenty datasets created

Propensity Score Matching

- Investigate impact of programs/treatments when experimental design is NOT used
- Attempts to match "treated" group members to "untreated" group members based on probability of being in the "treated" group
- Used to match students who enrolled in-state for college to students enrolled at an out-of-state college

Results of propensity score matching: SMD

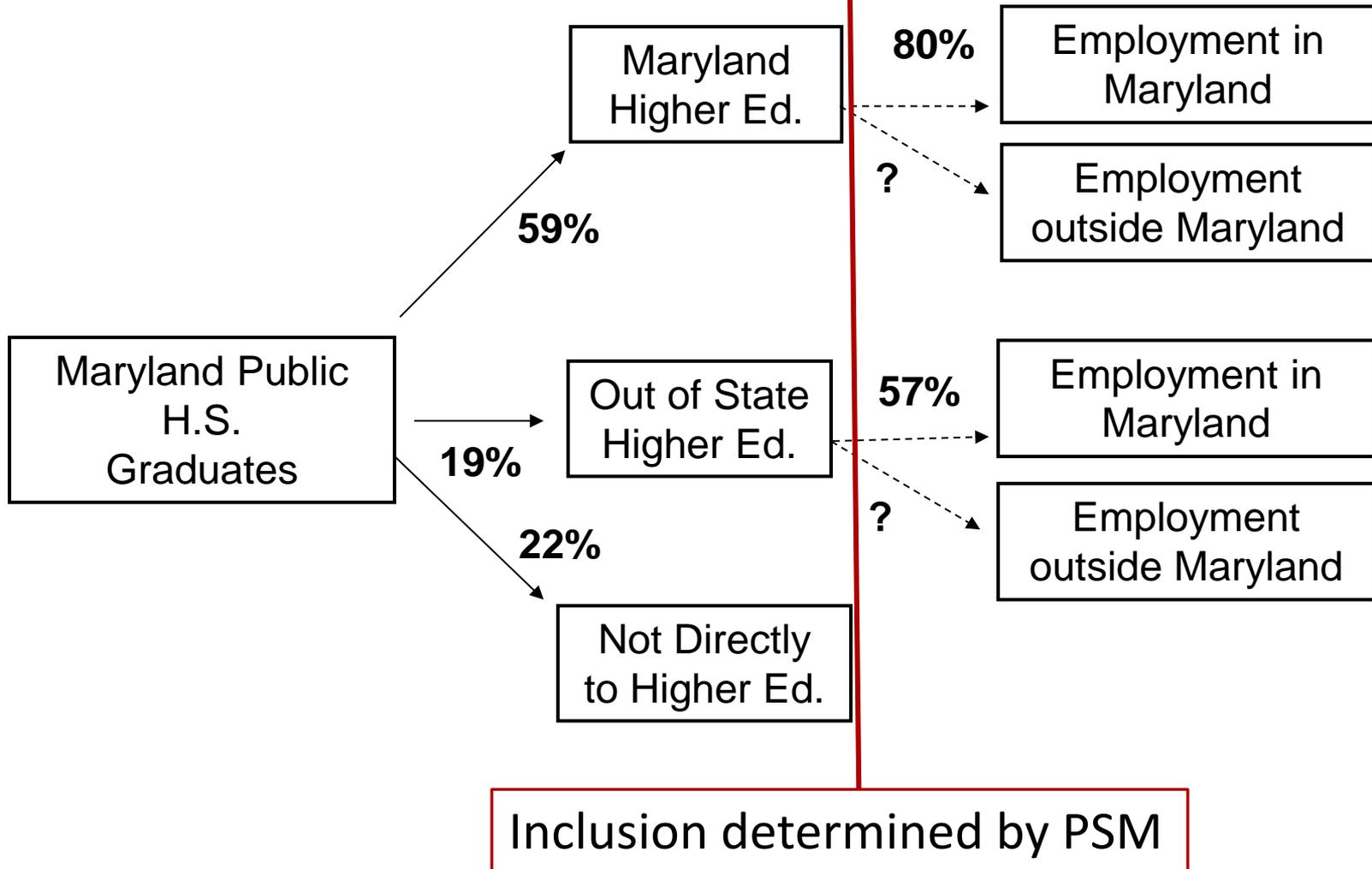~86% of students retained after matching
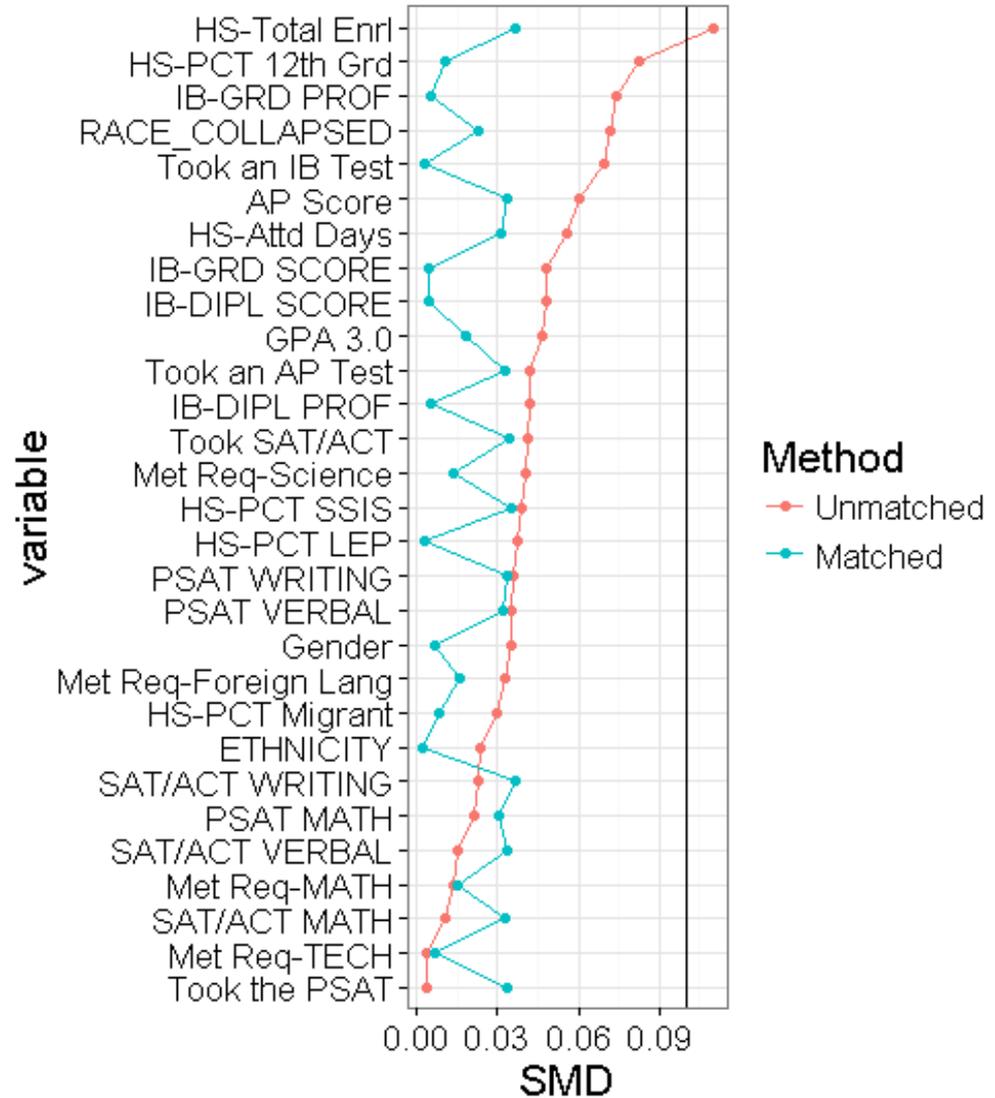
Results of propensity score matching: Propensity score distributions
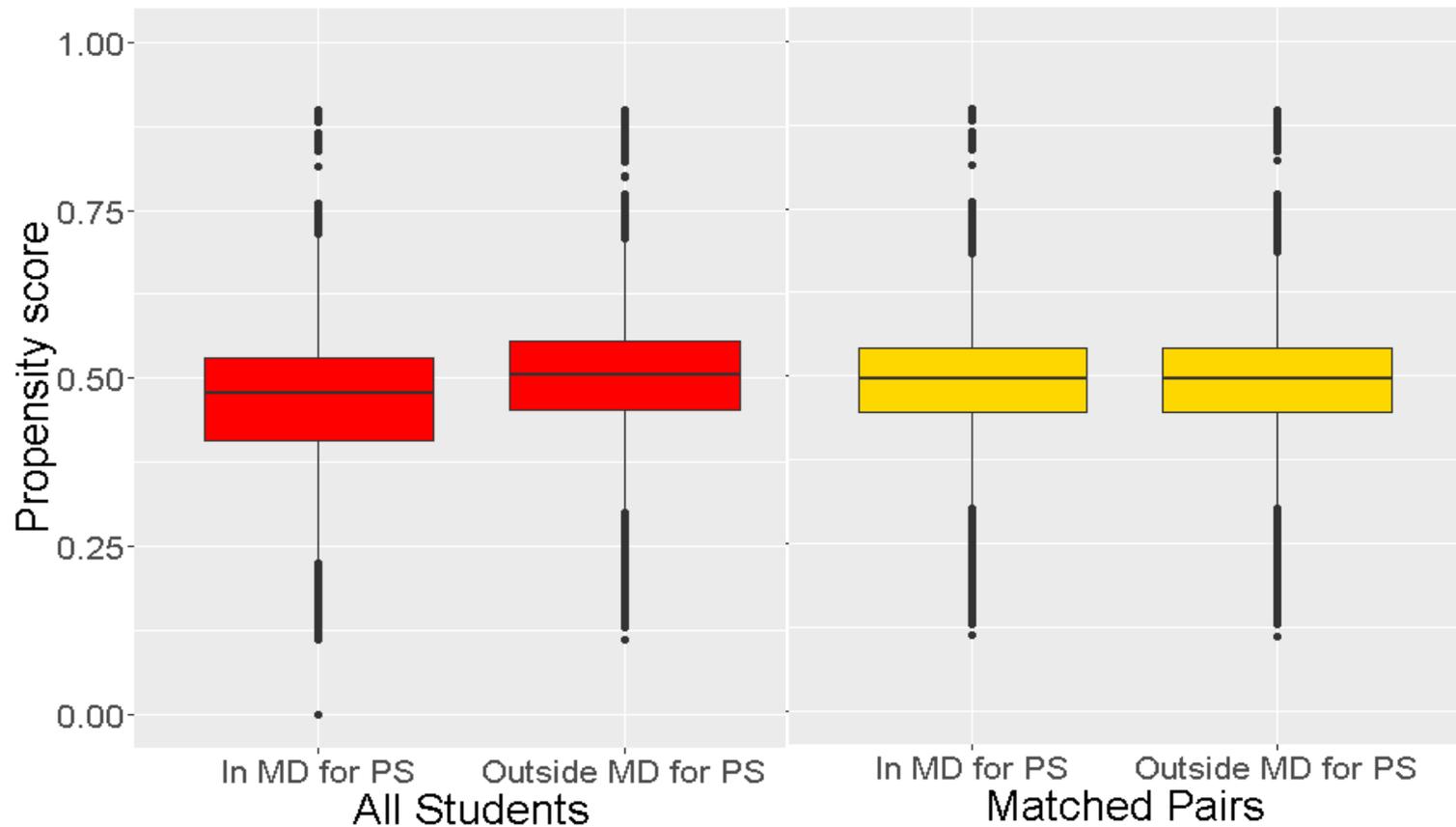
Predicting MD employment

- Model predicting employment in MD following the last term in college

    - Any person with a record of employment in MD in the fall quarter following their last term of college or later counted as "employed"

- Whether the student attended college in Maryland or out-of-state was the sole predictor

Is there brain drain?

Maryland Public H.S. Graduates

59% → **Maryland Higher Ed.**

80% → Employment in Maryland

? → Employment outside Maryland

19% → **Out of State Higher Ed.**

57% → Employment in Maryland

? → Employment outside Maryland

22% → **Not Directly to Higher Ed.**

Inclusion determined by PSM

Out-of-state students and post-college Maryland employment

- Out-of-state students who DID NOT appear in the Maryland employment data were:
  - Less likely to be under-represented minorities
  - Slightly less likely to be female
  - More likely to have received a bachelors degree
  - Had more positive high school academic indicators (e.g., SAT/ACT scores)

Conclusions

- MD public HS students who attend in-state post-secondary colleges differ from those who go out-of-state for college

- Evidence for brain-drain even after controlling for these differences

- Out-of-state students who do not return to the Maryland workforce are higher achieving than those who do return

Limitations of the current analyses

- Focus on initial college enrollment
- Potential employment category differences
- Other, unavailable variables may influence employment outcomes

Next steps

- Investigate the relationship between in-state and out-of-state college attendance and type of MD employment

- Explore which states (outside MD) a student attends college and how this impacts likelihood of working in MD

- Exploring college achievement as an intervening factor in the relationship between college location and employment in MD

Thank you! Questions?

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