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Statistical Literacy: Confounding

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University of St. Thomas. December 2010

Slides at www.StatLit.org/pdf/2010-Schild-USt-Confounding-Slides.pdf

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Statistical Literacy

Statistical literacy is the ability to read and interpret summary statistics in everyday life.

Statistical Literacy studies

- (1) the relation between statistical associations and causation, and
- (2) the kinds of influence on a statistic or statistical association. [Take CARE]

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Take CARE

C: Context
The influence of factors taken into account

- by comparisons of counts, averages, ratios and comparisons of averages and ratios;
- by epidemiological models (cf., deaths attributable to obesity);
- by regression models; and
- by the study design (cf., controlled vs. uncontrolled; longitudinal vs. cross-sectional; experiment vs. observational study) or by selection in tables and graphs.

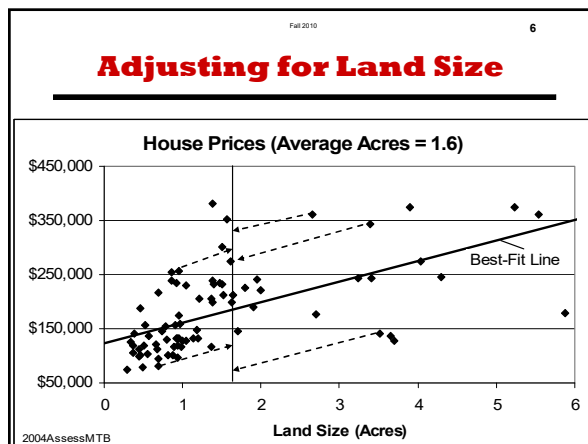
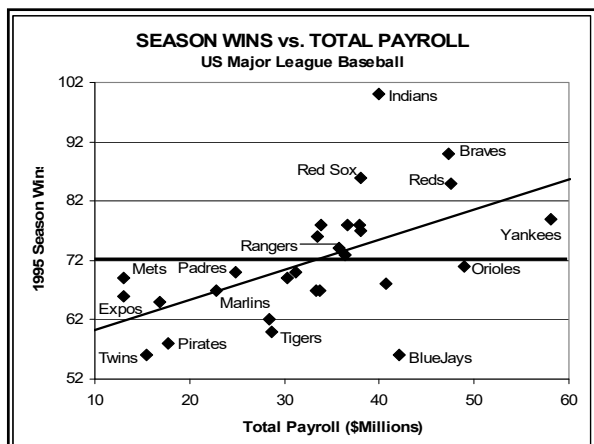
The influence of related factors (confounders) not taken into account in the study and not blocked by the study design.

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Take CARE

C: Context
The influence of related factors (confounders) that were not taken into account in the study and that were not blocked by the study design.

Two continuous measures



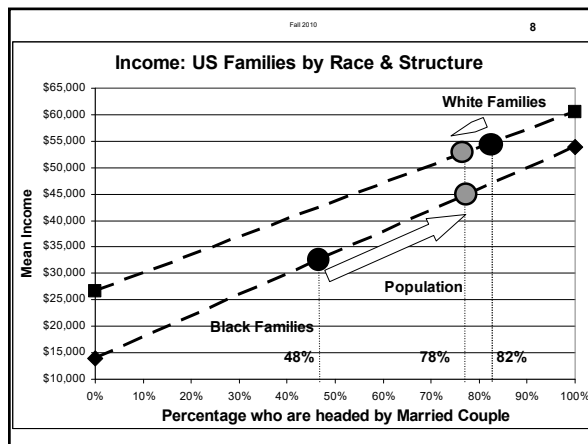
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Take CARE

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Two-group averages



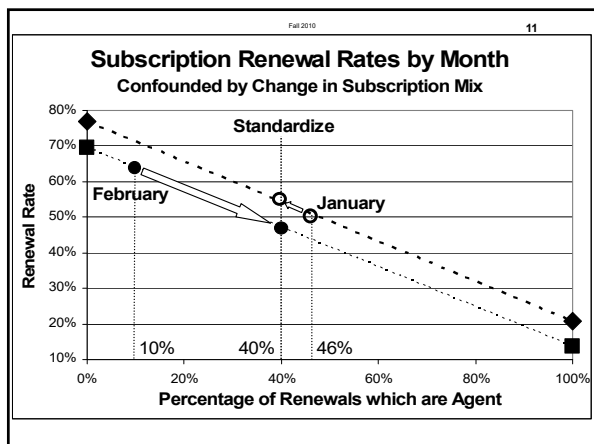
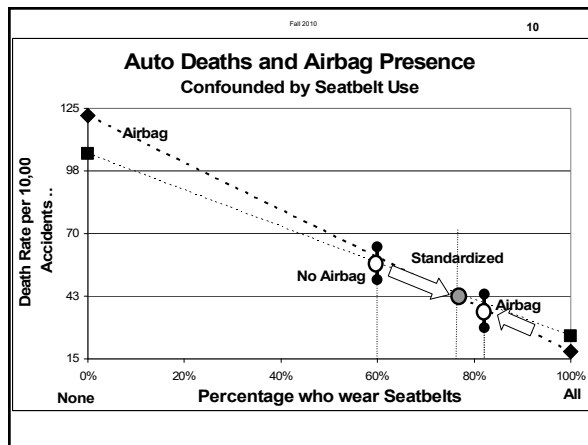
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Take CARE

C: Context

The influence of related factors (confounders) that were not taken into account in the study and that were not blocked by the study design.

Two-group rates or percentages



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Conclusion

Statistical literacy is an art as well as a science.

Seeing plausible confounders as a major influence on statistics is a skill that requires training.

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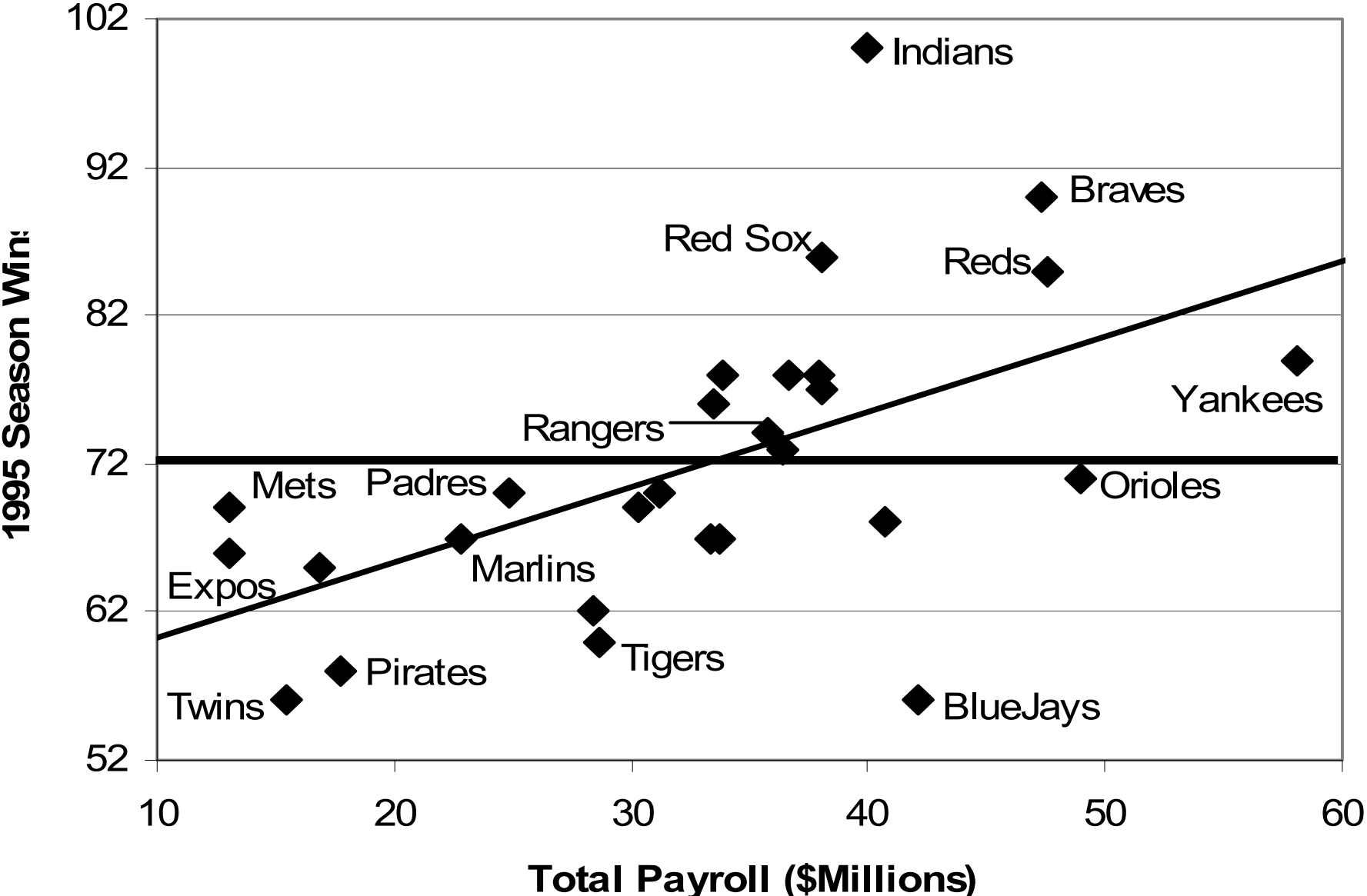
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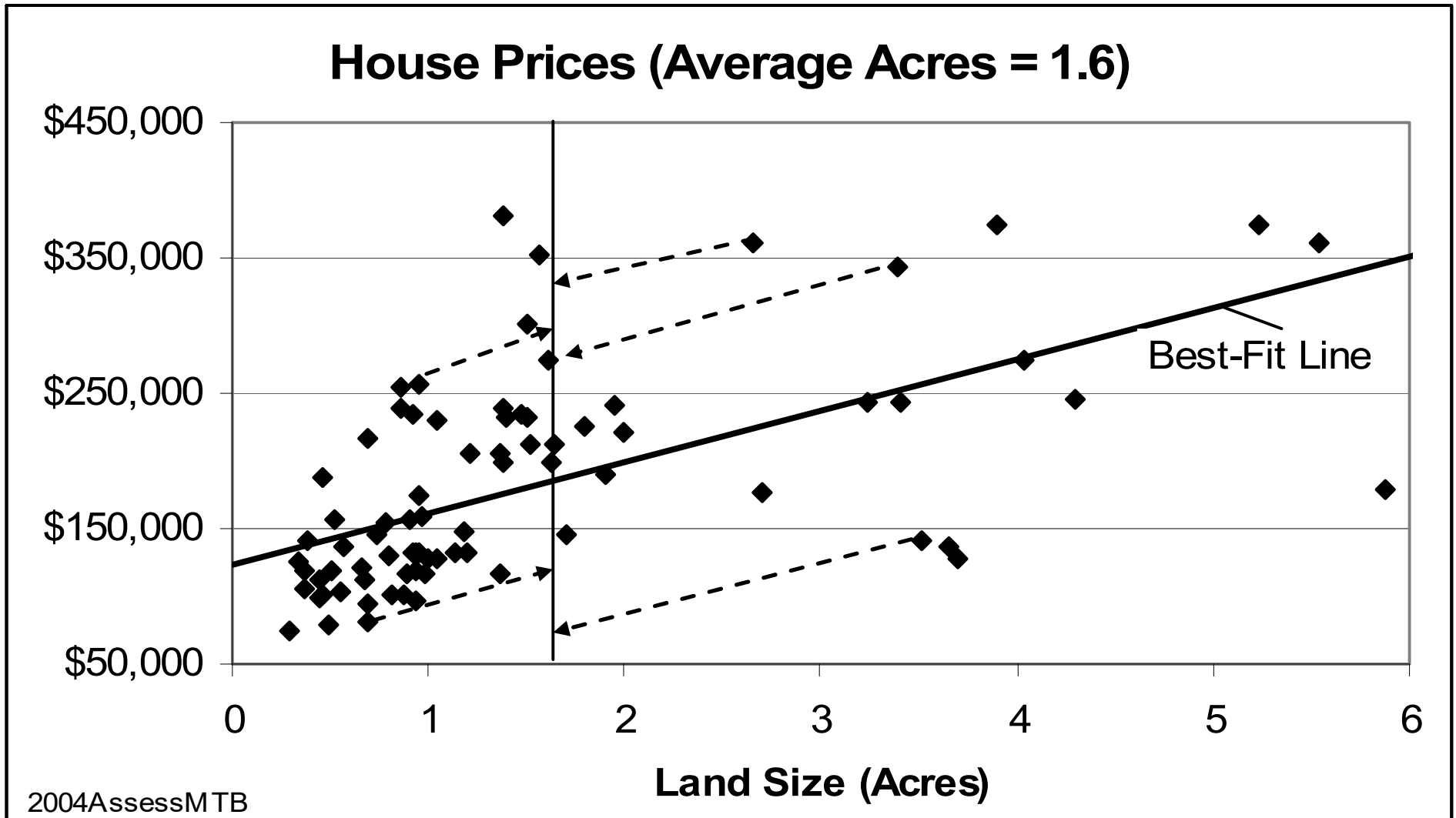
Two continuous measures

SEASON WINS vs. TOTAL PAYROLL

US Major League Baseball



Adjusting for Land Size



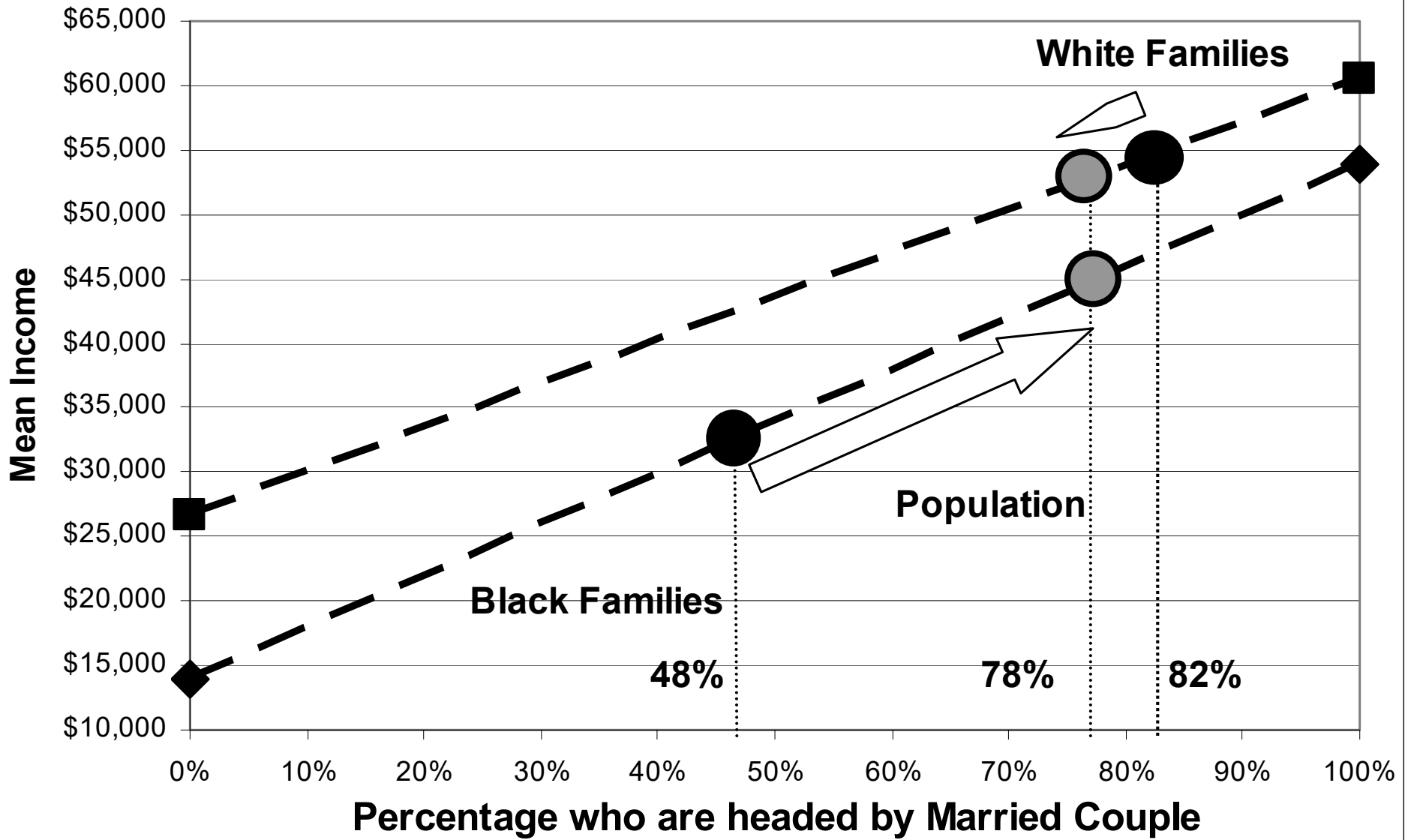
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Two-group averages

Income: US Families by Race & Structure



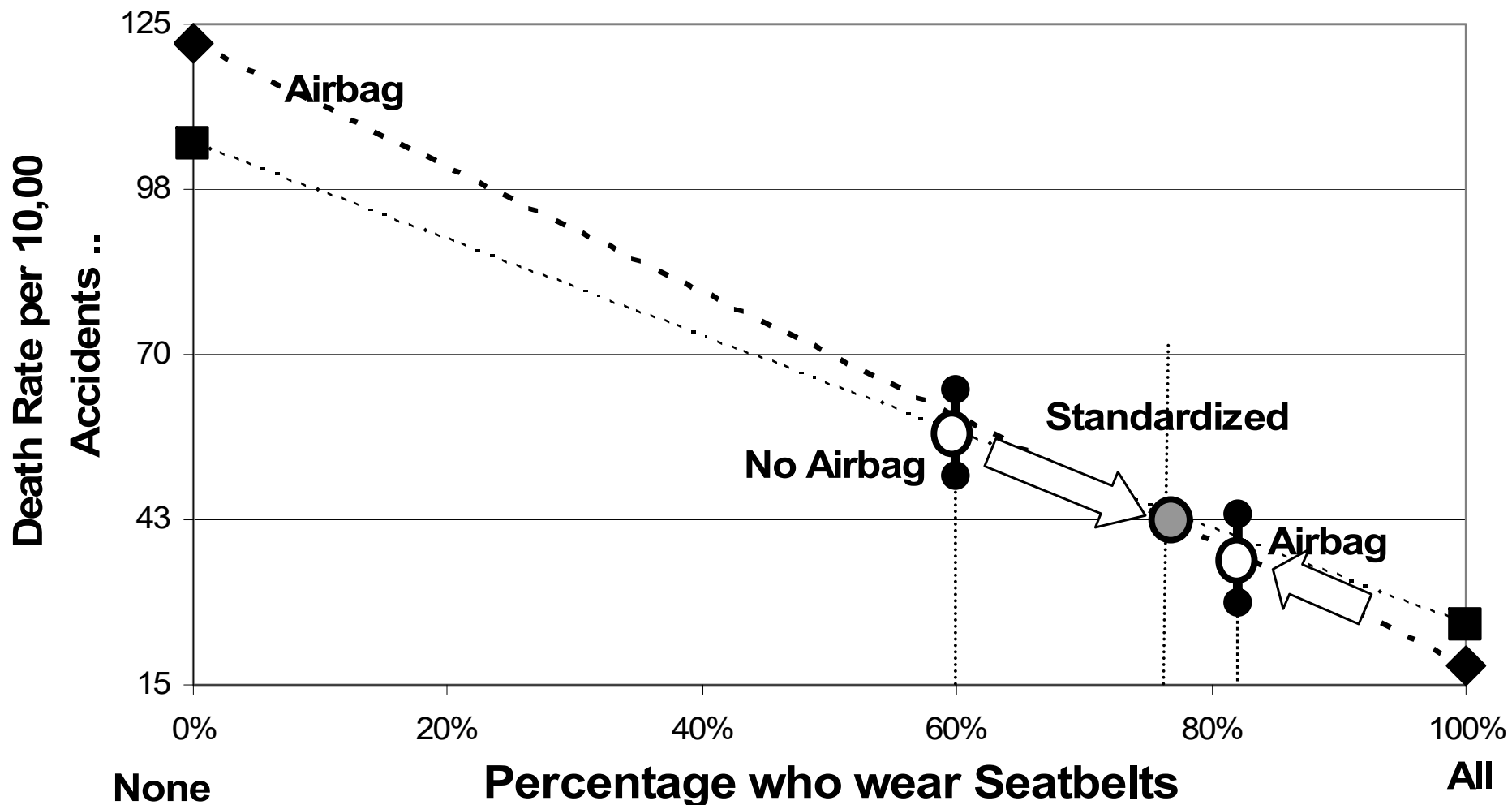
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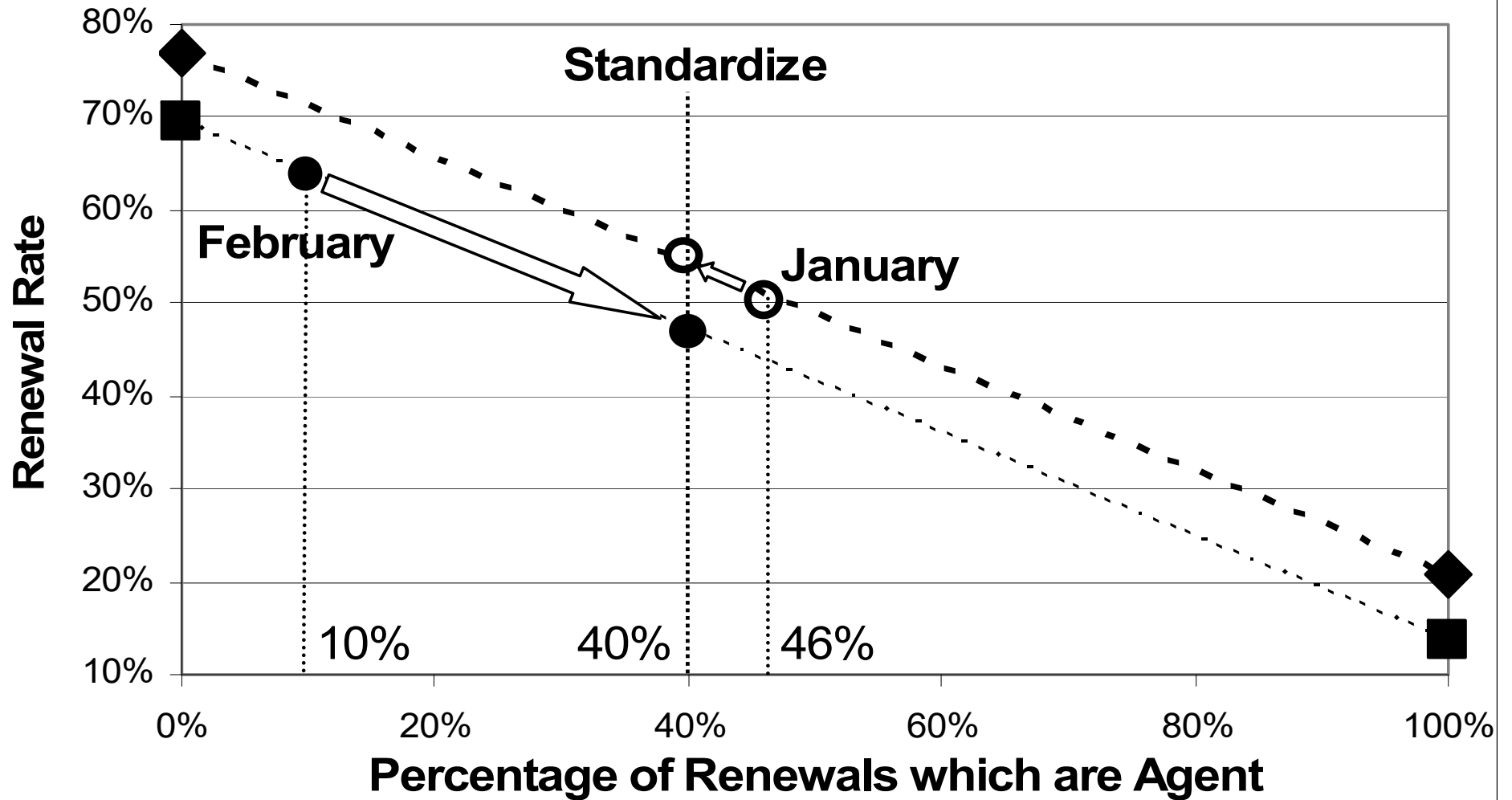
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Two-group rates or percentages

Auto Deaths and Airbag Presence Confounded by Seatbelt Use



Subscription Renewal Rates by Month Confounded by Change in Subscription Mix



Conclusion

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as well as a science.

Seeing plausible confounders
as a major influence on statistics
is a skill
that requires training.