

Causality with the `marginalEffects`

marginalEffects.com

Fundamental Problem of Causal Inference



Potential Outcomes: Math test results

<u>School</u>	<u>Small class</u>	<u>Big class</u>
Maple	83%	?
Pine	91%	?
Oak	86%	?
Cedar	?	72%
Birch	?	69%
Elm	?	74%

Fit a Regression Model

$$\widehat{\text{Math results}} = f(\text{Class size, Control variables})$$

<u>School</u>	<u>Small class</u>	<u>Big class</u>
Maple	83%	?
Pine	91%	?
Oak	86%	?
Cedar	?	72%
Birch	?	69%
Elm	?	74%

Use Your Model to Predict the Missing Outcomes

$$\widehat{\text{Math results}} = f(\text{Class size, Control variables})$$

<u>School</u>	<u>Small class</u>	<u>Big class</u>
Maple	83%	76%
Pine	91%	79%
Oak	86%	80%
Cedar	81%	72%
Birch	78%	69%
Elm	83%	74%

Average Treatment Effect = Difference in Means

aka: G-computation or parameteric G Formula

<u>School</u>	<u>Small class</u>	<u>Big class</u>
Maple	83%	76%
Pine	91%	79%
Oak	86%	80%
Cedar	81%	72%
Birch	78%	69%
Elm	83%	74%
Mean	83.7%	75.0%
Difference in means	+8.7 percentage points	

With marginaeffects

```
library(marginaeffects)

# Fit model
model <- gam(Math ~ ClassSize + Income + s(Age))

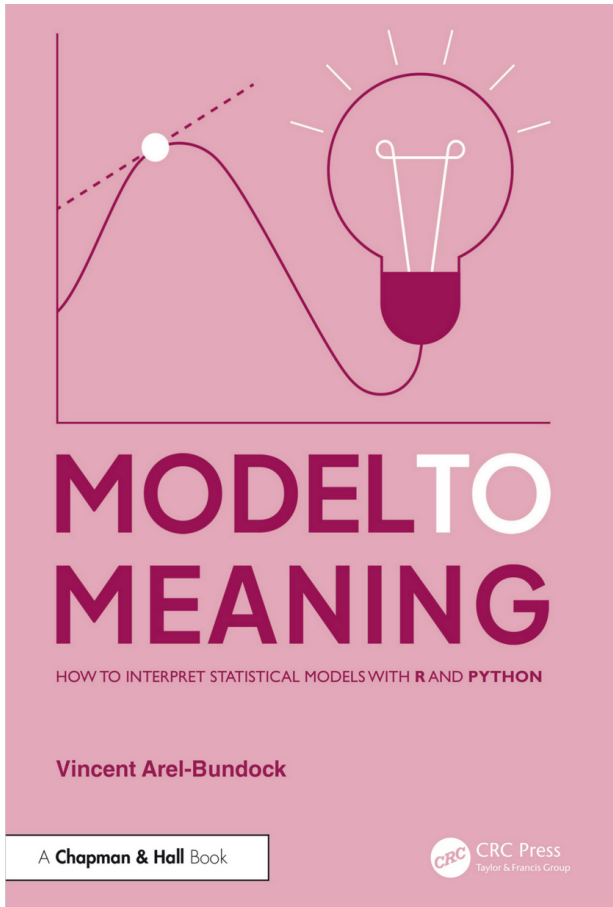
# Predict missing outcomes + Difference in means + Robust SEs
avg_comparisons(model, variables = "ClassSize", vcov = "robust")
```

Estimate	Std. Error	z	Pr(> z)	S	2.5 %	97.5 %
0.087	0.012	7.25	<0.001	41.2	0.063	0.111

marginalEffects supports 100+ model classes

- LM, GLM, GAM
- Survival models
- Categorical outcomes
- Machine learning
- Bayesian models

And it does **SO MUCH MORE** than this.



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