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This program contains two examples (which you will treat as problem 1 and problem 2). In each example, two regressions are run. Indicate what each example tells you about the problems that can arise if you focus on R2 and on standardized (path) rather than metric (structural) coefficients. Do your best to explain why these problems occur.

```
. * First, compute the means using the correct and
. * incorrect weights. Observe the differences.
. mean inc inc2 white [pw=wgtright]
```

	Mean	Std. Err.	[95% Conf. Interval]	
inc	4444.444	21.21481	4402.843	4486.046
inc2	4444.444	35.49031	4374.85	4514.039
white	.8888889	.0040329	.8809805	.8967973

	Mean	Std. Err.	[95% Conf. Interval]	
inc	4250	17.43405	4215.813	4284.187
inc2	4250	28.43102	4194.248	4305.752
white	.5	.0102083	.4799819	.5200181

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```
. * Show the metric coefficients side by side
. esttab mlright mlwrong, mtitles r2 scalar(F)
```

	(1) mlright	(2) mlwrong
white	500.0*** (14.99)	500*** (14.99)
_cons	4000.0*** (169.63)	4000*** (169.63)
N	2400	2400
R-sq	0.036	0.086
F	224.8	224.8

t statistics in parentheses

* p<0.05, ** p<0.01, *** p<0.001

```
. * Show the standardized coefficients side by side
. esttab mlright mlwrong, mtitles r2 scalar(F) beta
```

	(1) mlright	(2) mlwrong
white	0.189*** (14.99)	0.293*** (14.99)
N	2400	2400
R-sq	0.036	0.086
F	224.8	224.8

Standardized beta coefficients; t statistics in parentheses

* p<0.05, ** p<0.01, *** p<0.001

The incorrect weighting scheme results in incorrect estimates of R^2 and standardized coefficients. However, the metric coefficients are not affected. In a more “real world” example, they probably would be, but still, if the model is indeed perfectly specified, the metric coefficients would remain unbiased even under a flawed weighting scheme.

In this case, the differential weighting causes the variance of the IV, white, to differ between the two regressions. The variance is greater with incorrect weighting, which in turn causes R^2 to be greater. As Duncan notes, such a seemingly simple change in one variance can affect all of the underlying variances and covariances, even though the underlying structural model is the same. Standardized coefficients are not invariant against such changes in the IV variance, but structural coefficients are.

Obviously, incorrect weighting is undesirable and will lead to many bad consequences. But, if the model is good, the metric coefficients will not be as affected as other parameters (e.g. standardized coefficients and R^2) will be.

In problem 2, two regressions are again run. In the second regression, there is more random variability in the DV than there is in the first. This might occur because (a) there is more random measurement error in the 2nd DV (b) one population is more affected by random influences than

is another (c) across time, random influences on a DV may increase in the population. Following is a side by side comparison:

```
. * Show the metric coefficients side by side
. esttab m2inc m2inc2, r2 scalar(F)
```

	(1) inc	(2) inc2
white	500.0*** (14.99)	500.0*** (8.94)
_cons	4000.0*** (169.63)	4000.0*** (101.11)
N	2400	2400
R-sq	0.036	0.013
F	224.8	79.86

t statistics in parentheses

* p<0.05, ** p<0.01, *** p<0.001

```
. * Show the standardized coefficients side by side
. esttab m2inc m2inc2, r2 scalar(F) beta
```

	(1) inc	(2) inc2
white	0.189*** (14.99)	0.114*** (8.94)
N	2400	2400
R-sq	0.036	0.013
F	224.8	79.86

Standardized beta coefficients; t statistics in parentheses

* p<0.05, ** p<0.01, *** p<0.001

We see that higher levels of random variability result in smaller R^2 values, smaller standardized coefficients, and smaller values for the significance test statistics. However, the metric coefficients remain unchanged. Again, in a more “real world” example, they probably wouldn’t be identical, but the metric coefficients would be unbiased either way. Looking at the standardized coefficients alone would distort the underlying similarities between the two regressions.

When random variability is added to the DV, its variance increases. Because there is more random variance, the proportion of explained variance, R^2 , goes down. Similarly, the standardized effects go down (because their computation involves the variance of the DV). Estimates of the underlying structural relationships are not biased by random measurement error in the DV though. When we talked about random measurement error earlier, we also noted that random error in the DV did not bias the metric coefficients but did result in larger standard errors and smaller T values. We are seeing the same thing now, with the added insight that standardized coefficients and other statistics are affected by random measurement error in the DV.

Problem 3. Present a substantive example, real or hypothetical, in which the value of R^2 may be high but inaccurate or misleading, e.g. the model is mis-specified in some way. If possible, cite a real example from the published literature, but otherwise make one up. If hypothetical, try to make the example “reasonable,” i.e. the model might at first glance seem to make sense but on closer examination it really isn’t correct.

I already gave my examples in class. But, I’ll be happy to comment on yours if you want to bring them to me.