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Automatisch generierte Beschreibung

In model (1) Assumption LRM4 (Zero conditional mean) is violated. The other two control variables and are omitted factors in although their correlation with is non-zero (or “almost uncorrelated”). LRM4 only hold if . This is not the case in model (1) as . The estimator is biased.

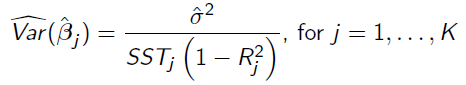
In model (2) Assumptions MRM1-MRM4 hold. All relevant variables are included in the model. for are unbiased estimators for for .

The estimator of model (1) and the estimator in model (2) tend to be similar as is almost uncorrelated with and . The estimators and do not affect the estimator in the multiple regression model. The intercept parameters must fulfil .

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Automatisch generierte Beschreibung

is the total sample variation in the dependent variable. This factor is in the denominator for . The standard error increases when the denominator decreases. Recall the relation .



As and have large partial effects on , the estimators and are large. as is almost uncorrelated with and . This means the denominator of is while the denominator of is . As and are omitted variables, the residual is larger than . We expect to be smaller than.

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Automatisch generierte Beschreibung

In model (1) assumption LRM4 (Zero conditional mean) is violated. The other two control variables and are omitted factors in although being highly correlated with . This model has an omitted variable bias. The estimator is biased.

In model (2) assumptions MRM1-MRM4 hold. All relevant variables are included in the model. for are unbiased estimators for for .

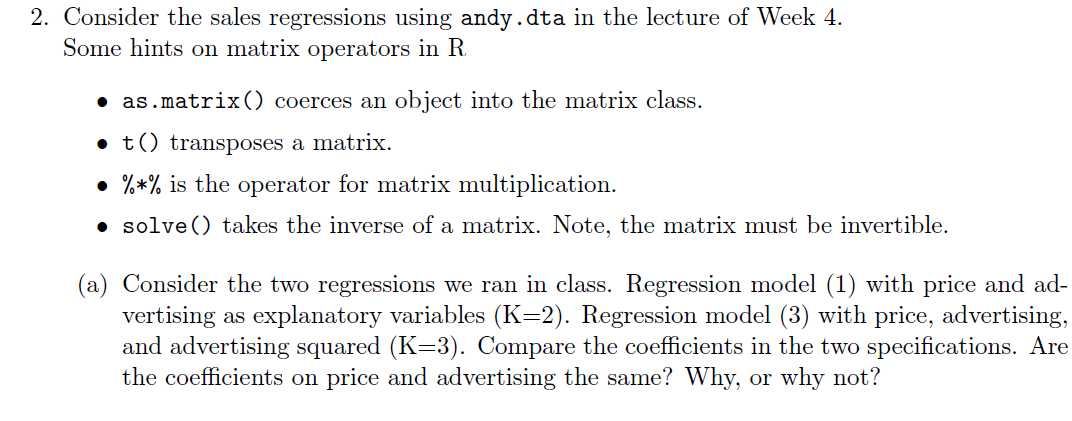
The estimator of model (1) and the estimator in model (2) tend to be very different. The estimators and do effect the estimator in the multiple regression model due to being highly correlated. Moreover, and have large partial effects on the dependent variable.

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Automatisch generierte Beschreibung

Recall in b). The denominator of is larger than the dominator of .

As and have small partial effects on , the estimators and are small. The variables and tend to increase the standard error of the estimator (as as is highly correlated with and ). We expectto be smaller than. As and explain little of the variation in but both are included in the model as they are highly correlated with , including those factors increase the variance of .



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Automatisch generierte Beschreibung

With advertising held constant, an increase in price of $1 is associated with a $7,908 decrease in sales revenue.

With price held constant, an increase in advertising of $1,000 is associated with an $1,863 increase in sales revenue.

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Automatisch generierte Beschreibung

With advertising and advertising squared held constant, an increase in price of $1 is associated with a $7,640 decrease in sales.

With price and advertising squared held constant, an increase in advertising of $1,000 is associated with an $12,151 increase in sales.

With price and advertising held constant, an increase in advertising squared of $1,000 is associated with a $2,768 decrease in sales.



The coefficients for price hardly differ from the two models as advertising and advertising squared hardly effect price (price is almost uncorrelated with advertising and advertising squared).

The coefficients for advertising differ a lot from the two models as advertising squared significantly effect advertising (advertising is highly correlated with advertising squared).

The parameters remain the same if the regressors are independent or/and if the added variable has no explanatory power.

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Automatisch generierte Beschreibung

sales on advertising squared:

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Automatisch generierte Beschreibung

price on advertising squared:

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Automatisch generierte Beschreibung

advertising on advertising squared:

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Automatisch generierte Beschreibungsales residuals on advertising and price residuals:

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Automatisch generierte Beschreibung

The coefficients of the regression of the sales residuals on the advertising residuals and the price residuals are the same as in regression model (3).

The residuals of sales on advertising squared include all factors about sales which cannot be explained by advertising squared. The residuals of price on advertising squared include all factors about price which cannot be explained by advertising squared. And the residuals of advertising on advertising squared include all factors about advertising which cannot be explained by advertising squared. This explains the result that we receive the same regression.

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Automatisch generierte Beschreibung

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Automatisch generierte Beschreibung

The results are the same as in regression model (3).

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Automatisch generierte Beschreibung

compute :

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Automatisch generierte Beschreibung

compute :

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Automatisch generierte Beschreibung

verify :



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Automatisch generierte Beschreibung

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Automatisch generierte Beschreibung

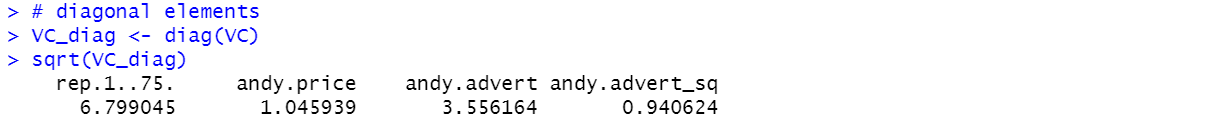
The results are the same as in regression model (3).

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Automatisch generierte Beschreibung

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Automatisch generierte Beschreibung

A 1 unit increase in education is associated with a 7.49% increase in wage when holding other variables constant.

A 1 unit increase in experience is associated with a 1.53% increase in wage when holding other variables constant.

A 1 unit increase in tenure is associated with a 1.34% increase in wage when holding other variables constant.

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Automatisch generierte Beschreibung

We want to test weather is true, there for the null hypothesis is following:

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Automatisch generierte Beschreibung

Therefore, the test statistic is:

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Automatisch generierte Beschreibung

The difference of and do not vary from zero enough that it would be statistically significant. That means we cannot reject H0.

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Automatisch generierte Beschreibung

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Automatisch generierte Beschreibung