

# MOOC Econometrics

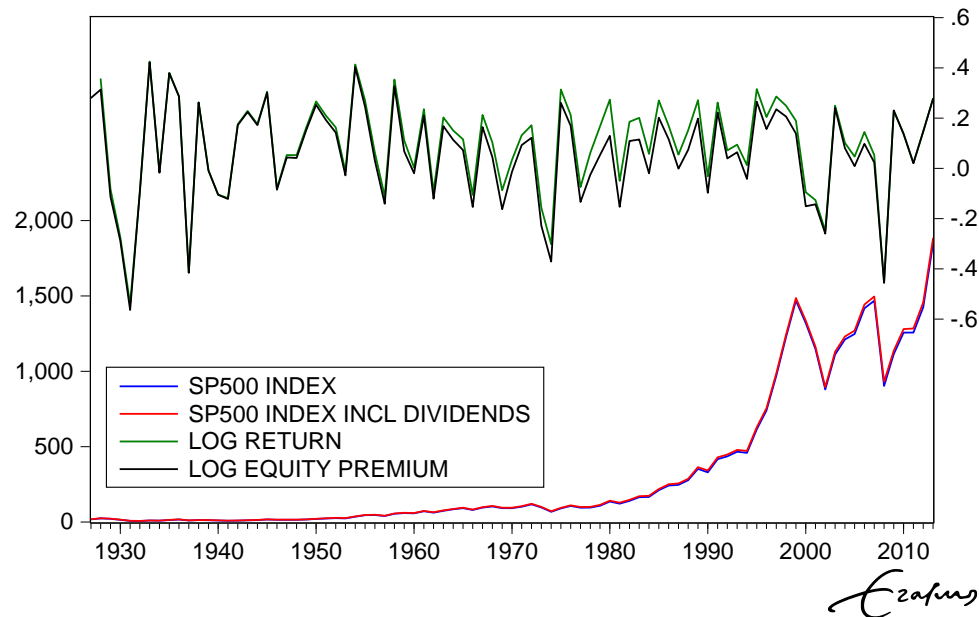
## Lecture 3.5 on Model Specification: Application

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### Transformation



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### Setting

Application:

- Model/forecast S&P500 stock index
  - ▶ Should we transform this index series?
- Large set of explanatory variables
  - ▶ Which to select?
- Choice of model
  - ▶ How to evaluate candidate models and how to compare them?
  - ▶ Is relationship stable over time?

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### Variable selection

Dependent variable: Log of equity premium; Sample size: 87

	Coefficients (p-values) by specification				
	(A)	(B)	(C)	(D)	(E)
Constant	0.166 (0.001)	0.062 (0.015)	-0.266 (0.076)	-0.027 (0.848)	0.065 (0.015)
Book-to-market	-0.185 (0.019)				
Issued Stock		-0.147 (0.850)			
Dividend/Price			-0.097 (0.029)		
Earnings/price				-0.032 (0.532)	
Inflation					-0.166 (0.746)
R-squared	0.063	0.000	0.055	0.005	0.001

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## General to specific

Dependent variable: Log of equity premium; Sample size: 87					
	Coefficients (p-values) by specification				
	(1)	(2)	(3)	(4)	(5)
Constant	0.234 (0.544)	0.205 (0.554)	0.215 (0.537)	0.489 (0.038)	0.166 (0.001)
Book-to-market	-0.176 (0.257)	-0.166 (0.249)	-0.191 (0.178)	-0.290 (0.008)	-0.185 (0.019)
Issued Stock	-0.146 (0.859)				
Dividend/Price	-0.120 (0.226)	-0.126 (0.174)	-0.090 (0.286)		
Earnings/price	0.167 (0.052)	0.167 (0.051)	0.127 (0.088)	0.097 (0.159)	
Inflation	-0.567 (0.337)	-0.564 (0.336)			
R-squared	0.108	0.108	0.098	0.085	0.063

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## Model comparison

	Full model	Book-to-market
$R^2$	0.108	0.063
AIC	-0.444	-0.486
BIC	-0.273	-0.430

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## Stability

$$\log(\text{EqPr})_i = \beta_1 + \beta_2 \text{BTM}_i + \beta_3 \text{BTM}_i \times D_i^{\text{War}} + \beta_4 \text{BTM}_i \times D_i^{\text{Oil}} + \varepsilon_i,$$

Dependent variable: Log of equity premium; Sample size: 87		
	Coefficients	p-values
Constant	0.160	0.002
Book-to-market	-0.175	0.036
Book-to-market $\times$ War-dummy	0.078	0.440
Book-to-market $\times$ Oil-dummy	-0.133	0.287
R-squared	0.085	

### Test

What is the coefficient on Book-to-market during the war years?

Answer:  $-0.175 + 0.078 = -0.097$ .

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## Model evaluation

Book-to-market		
	Test statistic	p-value
RESET ( $p = 1$ )	3.446	0.067
Chow Break	2.269	0.110
Chow Forecast	0.765	0.794
Jarque-Bera	7.155	0.028

Note: As break-point 1980 is chosen.

### Test

Will the p-values increase if the full model is considered?

Answer: Not possible to say.

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- Train yourself by making the training exercise (see the website).
- After making this exercise, check your answers by studying the webcast solution (also available on the website).

