

Econometrics For Dummies

Econometric model

Econometrics for Dummies. Hoboken, NJ: Wiley. pp. 59-134. ISBN 978-1-118-53384-0. Manuscript of Bruce Hansen's book on Econometrics Econometrics lecture (introduction

Econometric models are statistical models used in econometrics. An econometric model specifies the statistical relationship that is believed to hold between the various economic quantities pertaining to a particular economic phenomenon. An econometric model can be derived from a deterministic economic model by allowing for uncertainty, or from an economic model which itself is stochastic. However, it is also possible to use econometric models that are not tied to any specific economic theory.

A simple example of an econometric model is one that assumes that monthly spending by consumers is linearly dependent on consumers' income in the previous month. Then the model will consist of the equation

C

t

=...

Dummy variable (statistics)

of the dummies removed making this the base category against which the others are assessed, for the following reason: If dummy variables for all categories

In regression analysis, a dummy variable (also known as indicator variable or just dummy) is one that takes a binary value (0 or 1) to indicate the absence or presence of some categorical effect that may be expected to shift the outcome. For example, if we were studying the relationship between biological sex and income, we could use a dummy variable to represent the sex of each individual in the study. The variable could take on a value of 1 for males and 0 for females (or vice versa). In machine learning this is known as one-hot encoding.

Dummy variables are commonly used in regression analysis to represent categorical variables that have more than two levels, such as education level or occupation. In this case, multiple dummy variables would be created to represent each level of the variable...

Chow test

Regression Analysis in Econometrics. CRC Press. p. 146. ISBN 978-0-8247-8049-4. Dougherty, Christopher (2007). Introduction to Econometrics. Oxford University

The Chow test (Chinese: Chow test), proposed by econometrician Gregory Chow in 1960, is a statistical test of whether the true coefficients in two linear regressions on different data sets are equal. In econometrics, it is most commonly used in time series analysis to test for the presence of a structural break at a period which can be assumed to be known a priori (for instance, a major historical event such as a war). In program evaluation, the Chow test is often used to determine whether the independent variables have different impacts on different subgroups of the population.

Multicollinearity

"Econometrics Beat: Dave Giles's Blog: Micronumerosity". Econometrics Beat. Retrieved 3 September 2023. Goldberger,(1964), A.S. (1964). Econometric Theory

In statistics, multicollinearity or collinearity is a situation where the predictors in a regression model are linearly dependent.

Perfect multicollinearity refers to a situation where the predictive variables have an exact linear relationship. When there is perfect collinearity, the design matrix

X

$\{\displaystyle X\}$

has less than full rank, and therefore the moment matrix

X

T

X

$\{\displaystyle X^{\mathsf{T}}X\}$

cannot be inverted. In this situation, the parameter estimates of the regression are not well-defined, as the system of equations has infinitely many solutions.

Imperfect multicollinearity refers to a situation...

Difference in differences

Difference in differences (DID or DD) is a statistical technique used in econometrics and quantitative research in the social sciences that attempts to mimic

Difference in differences (DID or DD) is a statistical technique used in econometrics and quantitative research in the social sciences that attempts to mimic an experimental research design using observational study data, by studying the differential effect of a treatment on a 'treatment group' versus a 'control group' in a natural experiment. It calculates the effect of a treatment (i.e., an explanatory variable or an independent variable) on an outcome (i.e., a response variable or dependent variable) by comparing the average change over time in the outcome variable for the treatment group to the average change over time for the control group. Although it is intended to mitigate the effects of extraneous factors and selection bias, depending on how the treatment group is chosen, this method...

Multiple treatments

Environments. Handbook of Econometrics, Vol 6, ed. by J. J. Heckman and E. E. Leamer. North Holland. Wooldridge, J. (2002): Econometric Analysis of Cross Section

Multiple treatments, like multivalued treatments, generalize the binary treatment effects framework. But rather than focusing on a treatment effect that can take on different values, the focus now is on different types of treatment. One example could be a job training program, where different types of job training are offered to the participants. The case of multiple treatments is relatively difficult to handle, as it can require additional functional form restrictions, especially when addressing the counterfactual or potential outcomes framework. Nevertheless, the general instrumental variable framework used to analyze binary treatment effects has been extended to allow for multiple treatments.

There are different approaches available to analyze multiple treatment effects. One can think...

Panel analysis

statistical method, widely used in social science, epidemiology, and econometrics to analyze two-dimensional (typically cross sectional and longitudinal)

Panel (data) analysis is a statistical method, widely used in social science, epidemiology, and econometrics to analyze two-dimensional (typically cross sectional and longitudinal) panel data. The data are usually collected over time and over the same individuals and then a regression is run over these two dimensions. Multidimensional analysis is an econometric method in which data are collected over more than two dimensions (typically, time, individuals, and some third dimension).

A common panel data regression model looks like

y

i

t

$=$

a

$+$

b

$$x$$

$$i$$

$$t$$

$$+$$

$$\varepsilon \dots$$

Gauss-Markov theorem

(1970). An Introduction to Econometrics. New York: W. W. Norton. p. 275. ISBN 0-393-09931-8. Hayashi, Fumio (2000). Econometrics. Princeton University Press

In statistics, the Gauss-Markov theorem (or simply Gauss theorem for some authors) states that the ordinary least squares (OLS) estimator has the lowest sampling variance within the class of linear unbiased estimators, if the errors in the linear regression model are uncorrelated, have equal variances and expectation value of zero. The errors do not need to be normal, nor do they need to be independent and identically distributed (only uncorrelated with mean zero and homoscedastic with finite variance). The requirement that the estimator be unbiased cannot be dropped, since biased estimators exist with lower variance. See, for example, the James-Stein estimator (which also drops linearity), ridge regression, or simply any degenerate estimator.

The theorem was named after Carl Friedrich Gauss...

Joshua Angrist

with Pischke, Angrist published Mostly Harmless Econometrics in 2008, in which they explore econometric tools used by empirical researchers. In 2014, Angrist

Joshua David Angrist (Hebrew: יושוא דאָויד אַנגריסט; born September 18, 1960) is an Israeli American economist and Ford Professor of Economics at the Massachusetts Institute of Technology. Angrist, together with Guido Imbens, was awarded the Nobel Memorial Prize in Economics in 2021 "for their methodological contributions to the analysis of causal relationships".

He ranks among the world's top economists in labor economics, urban economics, econometrics, and the economics of education, and is known for his use of quasi-experimental research designs (such as instrumental variables) to study the effects of public policies and changes in economic or social circumstances. He is a co-founder and co-director of MIT's Blueprint Labs, which researches the relationship between human capital and income inequality...

Fixed effects model

model parameters are random variables. In many applications including econometrics and biostatistics a fixed effects model refers to a regression model

In statistics, a fixed effects model is a statistical model in which the model parameters are fixed or non-random quantities. This is in contrast to random effects models and mixed models in which all or some of the model parameters are random variables. In many applications including econometrics and biostatistics a fixed effects model refers to a regression model in which the group means are fixed (non-random) as opposed to a random effects model in which the group means are a random sample from a population. Generally, data can be grouped according to several observed factors. The group means could be modeled as fixed or random effects for each grouping. In a fixed effects model each group mean is a group-specific fixed quantity.

In panel data where longitudinal observations exist for the...

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