

The `econometrics` package

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Abstract

This package contains commands for notation in econometric writing as proposed by Abadir and Magnus (2002).

1 Introduction

Abadir and Magnus (2002) propose standards for mathematical and statistical notation when writing economic or econometric articles. Their proposed standards concern the notation of sets, vectors, matrices and some common operators. The package provides commands based on their proposal. It has also circulated as `ee.sty`.

To use the package, include the command `\usepackage{econometrics}` in the preamble of your document. No general options are available. The package requires the presence of the packages `amsmath`, `amssymb` and `bm`.

2 Using the package

2.1 Typesetting single letters

The package contains the following commands for typesetting letters to denote mathematical concepts

- Sets: `\S` followed by another letter sets the letter in blackboard bold type.
Example: `\SN` produces \mathbb{N} to denote the set of natural numbers.
Available for C, N, Q, R, and Z.
- Vectors: `\v` followed by another lower case letter sets the letter in bold type.
Example: `\va` produces \mathbf{a} ; `\valpha` produces $\boldsymbol{\alpha}$.
Available for all lower case Latin and Greek letters.

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- Matrices: `\m` followed by a capital letter sets the letter in bold type.
Example: `\mG` produces **G**; `\mGamma` produces **Γ**.
Available for all upper case Latin letters and the Greek upper case letters that differ from Latin ones.
- Calligraphic letters: `\cal` followed by a capital letter sets the letter in calligraphic type.
Example: `\calF` produces \mathcal{F} .
Available for all upper case Roman letters.
- Roman letters: `\r` followed by a letter sets the letter in roman type.
Example: `\rb` produces *b*; `\rB` produces *B*.
Available for b, B, C, D, f, F, G, H, L, N, t, U. and W.

2.2 Typesetting constants, statistical distributions and symbols

The package contains the following commands for typesetting constants, statistical distributions, symbols and special matrices and vectors.

command	produces	description
<code>\eu, \e</code>	e	Euler's constant
<code>\iu</code>	i	imaginary unit
<code>\rGam</code>	Gam	Gamma distribution
<code>\rBeta</code>	Beta	Beta distribution
<code>\Bin</code>	Bin	Binomial distribution
<code>\LN</code>	LN	Lognormal distribution
<code>\IN</code>	IN	sequence of independent normal distributions
<code>\Poi</code>	Poi	Poisson distribution
<code>\Infmat</code>	\mathcal{I}	information matrix
<code>\Hesmat</code>	\mathcal{H}	Hessian matrix
<code>\vones</code>	$\mathbf{1}$	vector with ones
<code>\vzeros</code>	$\mathbf{0}$	vector with zeros
<code>\mZeros</code>	\mathbf{O}	matrix with zeros

The commands `\ap` (from apex) and `\ped` (from pedex) both take one argument and typeset it as a superscript or subscript in math-roman. Examples: `\r\ap{e}_t` produces r_t^e , which is typically used to denote a return at time t in excess of the risk-free rate; `\r\ped{f}` produce r_f , which is typically used to denote the risk-free rate.

The command `\bcdot` can be used when indicating a row or column from a matrix. Example: row i or column j of a $(m \times n)$ matrix A (with $0 < i \leq m$, $0 < j \leq n$) can be referred to as $A_{i.}$ (`A_{i\bcdot}`) and $A_{.j}$ (`A_{\bcdot j}`).

2.3 Common functions and operators

The operators `\Re` and `\Im` that return the real and imaginary part of a complex number are redefined to produce Re and Im in math-roman (instead of the capital fraktur typesetting).

The notation for the differential and partial differential operators can be generated by the commands `\deriv` and `\pderiv` that both take two mandatory arguments (for the numerator and the denominator) and one optional argument for the order. They are defined with the `\frac` command. Examples: `\deriv{f}{x}`, `\deriv[2]{f}{x}` and `\pderiv[n]{y}{x}` produces $\frac{df}{dx}$ and $\frac{\partial^2 f}{\partial x^2}$ $\frac{\partial^n x}{\partial y^n}$ (inline) and

$$\frac{df}{dx}, \quad \frac{d^2 f}{dx^2}, \quad \frac{\partial^n x}{\partial y^n},$$

in the `equation` environment.

The following commands are defined by `\operatorname`.

command	produces	description
<code>\bias</code>	bias	bias (of an estimator)
<code>\col</code>	col	column space (of a matrix)
<code>\corr</code>	corr	correlation
<code>\cov</code>	cov	covariance
<code>\dg</code>	dg	returns the diagonal elements of a matrix
<code>\diag</code>	diag	returns a diagonal matrix with arguments on the diagonal
<code>\E</code>	E	expectation
<code>\etr</code>	etr	exponential of the trace of a matrix
<code>\ip</code>	int	integer part
<code>\kur</code>	kur	kurtosis
<code>\MSE</code>	MSE	mean squared error
<code>\MSFE</code>	MSFE	mean squared forecasting error
<code>\OLS</code>	OLS	ordinary least squares
<code>\plim</code>	plim	probability limit
<code>\resid</code>	resid	residuals
<code>\rk</code>	rk	matrix rank
<code>\SE</code>	SE	standard error
<code>\sgn</code>	sgn	sign
<code>\tr</code>	tr	trace of a matrix
<code>\var</code>	var	variance
<code>\vec</code>	vec	vectorisation of a matrix
<code>\vech</code>	vech	vectorisation of the lower triangle of a matrix

2.4 New names for existing commands

The package introduces some new commands that are equivalent with existing commands, and some derived commands.

command	produces	equivalent	description
<code>\distr</code>	\sim	<code>\sim</code>	distributed as
<code>\adistr</code>	$\overset{a}{\sim}$		asymptotically distributed as
<code>\diff</code>	Δ	<code>\Delta</code>	difference operator
<code>\bdiff</code>	Δ_b		backward difference operator
<code>\fdiff</code>	Δ_f		forward difference operator
<code>\eps</code>	ϵ	<code>\epsilon</code>	arbitrarily small positive number
<code>\epsi</code>	ε	<code>\varepsilon</code>	disturbance term
<code>\longto</code>	\longrightarrow	<code>\longrightarrow</code>	almost sure convergence to
<code>\pto</code>	\xrightarrow{p}		convergence in probability to
<code>\pto</code>	\xrightarrow{d}		convergence in distribution to
<code>\wto</code>	\xrightarrow{w}		weak convergence to
<code>\e</code>	e	<code>\e</code>	Euler's constant
<code>\mply</code>	\cdot	<code>\cdot</code>	multiplication

References

Abadir, K.M., and Magnus, J.R. (2002). Notation in Econometrics: A Proposal for a Standard. *The Econometrics Journal*, 5:76–90 .