Package 'panelAR'

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Title Estimation of Linear AR(1) Panel Data Models with Cross-Sectional Heteroskedasticity and/or Correlation

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Imports car

Description The package estimates linear models on panel data structures in the presence of AR(1)-type autocorrelation as well as panel heteroskedasticity and/or contemporaneous correlation. First, AR(1)-type autocorrelation is addressed via a two-step Prais-Winsten feasible generalized least squares (FGLS) procedure, where the autocorrelation coefficients may be panel-specific. A number of common estimators for the autocorrelation coefficient are supported. In case of panel heteroskedasticty, one can choose to use a sandwich-type robust standard error estimator with OLS or a panel weighted least squares estimator after the two-step Prais-Winsten estimator. Alternatively, if panels are both heteroskedastic and contemporaneously correlated, the package supports panel-corrected standard errors (PCSEs) as well as the Parks-Kmenta FGLS estimator.

License GPL (>= 2)

BugReports https://github.com/kkashin/panelAR/issues

NeedsCompilation no

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R topics documented:

`BrooksKurtz` *Brooks and Kurtz (2012) Replication Data*

Description

Replication data for Brooks and Kurtz (2012). Data structure is panels of Latin American countries from 1983-2007. Data contains measurements of capital account openness, capital account openness diffusion variables, and a variety of economic and financial controls.

Usage

```
BrooksKurtz
```

Format

A dataframe with the following variables:

- `country`: country identifier (string).
- `conum`: country identifier (numeric).
- `year`: year identifier.

Dependent variable:

- `kaopen`: capital account openness. Higher value indicates more open capital account.

Diffusion variables, constructed to be a weighted average of the lagged outcome variable for all countries in a given government's "neighborhood". Proximity is defined via a weight matrix W such that the diffusion variable is constructed as WY_{t-1}. The weight matrix differs across the following diffusion variables. See pages 112-114 of Brooks and Kurtz (2012) for details.

- `ldiffpeer`: baseline diffusion effect / all countries diffusion variable.
- `ldiffisi`: import-substituting industrialization (ISI) peer diffusion variable.
- `ldiffgrowth`: economic success diffusion variable.
- `ldiffinflation`: inflation performance diffusion variable.
- `ldiffneg`: negative learning diffusion variable.
- `ldiffembi`: competition diffusion variable
- `limf`: dummy variable that is equal to 1 if a country entered into an agreement with the IMF at time $t-1$.

Controls:

- isi_objective: dummy variable for country-years with ISI policy.
- partisan: partisanship coded as 0 for leftist, 1 for centrist, and 2 for conservative governments.
- checks: checks on authority.
- y1995: dummy for year 1995.
- lngdpcap: log of GDP per capita.
- lngdp: log of GDP.
- timetrend: linear time trend.
- brk: dummy for structural break in the data source for kaopen in 1996.
- lusffr: US federal funds rate at time $t-1$.
- linflation: log of inflation at time $t-1$.
- lbankra: bank reserve-to-asset ratio at time $t-1$.
- lcab: current account deficit at time $t-1$.
- lgrowth: growth of per capita GDP at time $t-1$.
- ltradebalance: trade deficit at time $t-1$.

Source

Brooks, Sarah M. and Marcus J. Kurtz. 2012. "Paths to Financial Policy Diffusion: Statist Legacies in Latin America's Globalization." *International Organization* 66:95-128.

See Also

panelAR. Run demo(BrooksKurtz) for examples which use BrooksKurtz.

LupPon *Lupu and Pontusson (2011) Replication Data*

Description

Replication data for Table 2, "Determinants of Redistribution", in Lupu and Pontusson (2011). Data structure is panels of OECD countries from 1969 to 2005. Data contains measurements of redistribution, various summaries of the earnings distribution, and controls.

Usage

LupPon

Format

A dataframe with the following variables:

- `country`: country name.
- `id`: country identifier.
- `year`: time identifier.
- `redist`: percentage change in Gini coefficients as move from gross market income to disposable income.
- `ratio9050`: ratio of earnings of a worker in the 90th percentile of the earnings distribution to the earnings of the worker with median income.
- `ratio5010`: ratio of earnings of a worker with median income to the earnings of a worker in the 10th percentile of the earnings distribution.
- `ratio9010`: ratio of earnings of a worker in the 90th percentile of the earnings distribution to the earnings of a worker in the 10th percentile of the earnings distribution.
- `skew`: ratio of the 90-50 ratio to the 50-10 ratio.
- `turnout`: turnout (as a percentage of eligible voters) in the most recent national election.
- `fempar`: proportion of working-age women in the labor force.
- `propind`: electoral system proportionality index (between 0 and 1, where 1 is the highest level of proportionality).
- `pvoc`: enrollment in vocational training programs as percent of secondary school enrollment.
- `union`: annual net union density.
- `unempl`: annual rate of unemployment.

Source

Lupu, Noam and Jonas Pontusson. 2011. "The Structure of Inequality and the Politics of Redistribution." *APSR* 105(2): 316-336.

Full dataset is available at: `http://www.noamlupu.com/LupPon_APSR.dta`.

See Appendix of Lupu and Pontusson (2011) for details of variable sources.

See Also

`panelAR`. Run `demo(LupPon)` for examples which use `LupPon`.

panelAR *Estimation of Linear AR(1) Panel Data Models with Cross-Sectional Heteroskedasticity and/or Correlation*

Description

The function estimates linear models on panel data structures in the presence of AR(1)-type autocorrelation as well as panel heteroskedasticity and/or contemporaneous correlation. First, AR(1)-type autocorrelation is addressed via a two-step Prais-Winsten feasible generalized least squares (FGLS) procedure, where the autocorrelation coefficients may be panel-specific. Subsequently, one can choose to implement 'sandwich'-type robust standard errors with OLS, panel weighted least squares (WLS), panel-corrected standard errors (PCSEs), or the Parks-Kme4nta FGLS estimator.

Usage

```
panelAR(formula, data, panelVar, timeVar, autoCorr = c("ar1",
    "none", "psar1"), panelCorrMethod = c("none","phet","pcse","pwls",
    "parks"), rhotype ="breg", bound.rho = FALSE, rho.na.rm = FALSE,
    panel.weight = c("t-1", "t"), dof.correction = FALSE,
    complete.case = FALSE, seq.times = FALSE, singular.ok=TRUE)
```

Arguments

formula	an object of class "formula" (or one that can be coerced to that class): a symbolic description of the model to be fitted.
data	a data frame containing the variables in the model, as well as a variables defining the units and time.
panelVar	the column name of data that contains the panel ID. It cannot contain any NAs. May be set to NULL, in which case all observations are assumed to belong to the same unit.
timeVar	the column of data that contains the time ID. It must be a vector of integers and cannot contain any NAs. Duplicate time observations per panel are not allowed. At least two time periods are required.
autoCorr	character string denoting structure of autocorrelation in the data: ar1 denotes AR(1)-type autocorrelation with a common correlation coefficient across all panels, psar1 denotes AR(1)-type autocorrelation with a unique correlation coefficient for each panel, and none denotes no autocorrelation. Default: ar1.
panelCorrMethod	character string denoting method used for dealing with panel heteroskedasticity and/or correlation. none denotes homoskedasticity and no correlation across panels, phet denotes a Huber-White style sandwich estimator for panel heteroskedasticity, pcse denotes panel-corrected standard errors that are robust to both heteroskedasticity and contemporaneous correlation across panels, pwls denotes that a panel weighted least squares procedure is to deal with panel heteroskedasticity, and parks means that Parks-Kmenta FGLS is used to estimate both panel heteroskedasticity and correlation. Default: none.

rhotype	character string denoting method used for estimating autocorrelation coefficient, ρ. Possible options are breg, scorr, freg, theil, dw, and theil-nagar. See 'Details'. Default: breg.
bound.rho	logical. If TRUE, the panel-specific autocorrelation coefficient ρ_i is bounded to $[-1, 1]$ in the calculation of ρ; used only for autoCorr="ar1". Default: TRUE.
rho.na.rm	logical. If FALSE and ρ_i cannot be calculated for a panel, function returns error. If TRUE, ρ_is that are NA are ignored if calculating a common AR(1) coefficient or set to 0 if calculating panel-specific AR(1) coefficients. Default: FALSE.
panel.weight	the weight to be used for each panel when combining panel-specific autocorrelations ρ_i to a common ρ. Weight is either the number of time periods in the corresponding panel (t) or the number of time periods minus 1 (t-1). Default: t.
dof.correction	logical. If TRUE, standard errors are adjusted by a factor of $N/(N-k)$, where N is total number of observations and k is the rank of the linear model. Default: FALSE.
complete.case	logical. If TRUE, use only the time periods where every panel has a valid observation in the estimation of PCSEs or the Parks-Kmenta estimator. Otherwise, use pairwise procedure. Default: FALSE.
seq.times	logical. If TRUE, observations are temporally ordered by panel and assigned a sequential time variable that ignores any gaps in the runs. Default: FALSE.
singular.ok	logical. If FALSE, a singular failure results in an error. Default: TRUE.

Details

Function for running two-step Prais-Winsten models on panel data that exhibit AR(1)-type autocorrelation. Following the two-step estimation, one can choose to use a 'sandwich'-type robust standard error estimator with OLS or a panel weighted least squares estimator to address panel heteroskedasticity. Alternatively, if panels are both heteroskedastic and contemporaneously correlated, the package supports panel-corrected standard errors (PCSEs) as well as the Parks-Kmenta FGLS estimator. Note that the Parks-Kmenta estimator should ideally be reserved for use only when the number of time periods is significantly greater than the number of panels (see Beck and Katz). The function is robust to unbalanced panel structures, panels with just one observation, multiple runs per panel, and the presence of panels without any overlapping observations.

While generally designed to estimate Prais-Winsten models on panel data, setting panelVar to NULL will estimate an AR(1) time-series model treating the entire dataset as one unit. In this case, the panelCorrMethod is ignored since equal variances are assumed across all observations.

A number of common estimators for the autocorrelation coefficient are supported. Specifically:

breg Linear regression estimator: $\hat{\rho}_{breg} = \frac{\sum_{t=2}^{T_i} \hat{\epsilon}_{i,t}\hat{\epsilon}_{i,t-1}}{\sum_{t=1}^{T_i-1} \hat{\epsilon}_{i,t}^2}$

scorr Sample correlation coefficient estimator: $\hat{\rho}_{scorr} = \frac{\sum_{t=2}^{T_i} \hat{\epsilon}_{i,t}\hat{\epsilon}_{i,t-1}}{\sum_{t=1}^{T_i} \hat{\epsilon}_{i,t}^2}$

freg Forward linear regression estimator: $\hat{\rho}_{freg} = \frac{\sum_{t=1}^{T_i-1} \hat{\epsilon}_{i,t}\hat{\epsilon}_{i,t+1}}{\sum_{t=1}^{T_i-1} \hat{\epsilon}_{i,t+1}^2}$

theil Theil estimator: $\hat{\rho}_{theil} = \hat{\rho}_{scorr}\frac{T_i-k}{T_i-1}$

`dw` Durbin-Watson estimator: $\hat{\rho}_{dw} = 1 - \frac{1}{2}\frac{\sum_{t=2}^{T_i}(\hat{\epsilon}_{i,t} - \hat{\epsilon}_{i,t-1})^2}{\sum_{t=1}^{T_i}\hat{\epsilon}_{i,t}^2}$

`theil-nagar` Theil-Nagar estimator: $\hat{\rho}_{theil-nagar} = \frac{T_i^2\hat{\rho}_{dw} + k^2}{T_i^2 - k^2}$

In the expressions above, $\hat{\epsilon}$ denotes observed residuals from the first stage OLS regression, T_i is the number of observations in panel i, and k is the rank of the model matrix. Some of these estimators cannot be calculated for panels with one observation or multiple runs of one observation. In these cases, `rho.na.rm` controls the treatment of these autocorrelation coefficients. If `TRUE`, ignore panel-specific autocorrelation coefficients for panels where ρ_i returns `NA` if calculating a common AR(1) coefficient, and set them to 0 if calculating panel-specific AR(1) coefficients.

If PCSEs or the Parks-Kmenta estimator are selected, the default is to use all pairwise observations to estimate the time-constant covariances across units. In the case of no overlapping observations between panels, the panel covariance is assumed to be 0. If `complete.case` is set to `TRUE`, then only the time periods where every panel has a valid observation are used for the calculation of the contemporaneous correlation matrix.

Value

`panelAR` returns an object of class `"panelAR"`.

The function `summary` can be used to obtain and print a summary of the results. Note that default methods `coefficients`, `fitted.values`, and `residuals` returns vectors of regression coefficients, fitted values, and residuals, respectively. `vcov` returns the estimated variance-covariance matrix of the coefficients.

An object of class `"panelAR"` contains the following components, very similar to the outputs of the standard `lm` function:

`coefficients`	the named vector of coefficients.
`residuals`	the residuals.
`fitted.values`	the fitted mean values.
`rank`	the numeric rank of the fitted linear model.
`df.residual`	the residual degrees of freedom.
`call`	the matched call.
`terms`	the terms object used.
`model`	the model frame used.
`aliased`	named logical vector designating if original coefficients are aliased.
`na.action`	information returned by model.frame in the handling of `NA`s.
`vcov`	estimated variance-covariance matrix of coefficients.
`r2`	R^2 based on quasi-differenced data from the Prais-Winsten regression. Set to `NULL` if PWLS or Parks-Kmenta procedures are used.
`panelStructure`	a list of several objects which contain information on the panel structure of the data. See details below.

Details of `panelStructure`:

obs.mat	logical matrix of dimension $N_p \times T$, where N_p is the number of panels. If cell value is TRUE, panel i at time t has a valid observation. Panel structure is balanced if entire matrix is TRUE.
rho	autocorrelation parameters. Scalar if "ar1" option was used, vector of length N_p (number of panels) if "psar1" option was used, and NULL if "none" option was used.
Sigma	$N_p \times N_p$ matrix of estimated panel covariances.
N.cov	number of panel covariances estimated.

Author(s)

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References

Beck, Nathaniel and Jonathan N. Katz. 1995. "What to do (and not to do) with time-series cross-section data." *Am. Polit. Sci. Rev.* 89:634-47.

Greene, William H. 2012. *Econometric Analysis*. 7ed. Prentice Hall.

Judge, George G., William E. Griffiths, R. Carter Hill, Helmut Lütkepohl, and Tsoung-Chao Lee. 1985. *The Theory and Practice of Econometrics*. 2ed. John Wiley & Sons.

Prais, S., and C. Winsten. 1954. "Trend Estimation and Serial Correlation." Cowles Commission Discussion Paper No. 383, Chicago.

See Also

summary.panelAR for summary.

predict.panelAR for prediction.

plot.panelAR to plot image of panel structure.

run.analysis for analysis of runs.

Examples

```
# Common AR(1) with PCSE
data(Rehm)
out <- panelAR(NURR ~ gini + mean_ur + selfemp + cum_right + tradeunion + deficit +
tradeopen + gdp_growth, data=Rehm, panelVar='ccode', timeVar='year', autoCorr='ar1',
panelCorrMethod='pcse', rho.na.rm=TRUE, panel.weight='t-1', bound.rho=TRUE)
summary(out)

# Panel-specific AR(1) with PCSE
data(WhittenWilliams)
# expect warning urging to use 'complete.case=FALSE'
out2 <- panelAR(milex_gdp~lag_milex_gdp+GOV_rl+gthreat+GOV_min+GOV_npty+election_yr+
lag_real_GDP_gr+cinclag+lag_alliance+lag_cinc_ratio+lag_us_change_milex_gdp,
data=WhittenWilliams, panelVar="ccode", timeVar="year", autoCorr="psar1",
panelCorrMethod="pcse", complete.case=TRUE)
summary(out2)
summary(out2)$rho
```

```
# Panel-specific AR(1) correlation with PWLS
data(BrooksKurtz)
out3 <- panelAR(kaopen ~ ldiffpeer + ldiffisi + ldiffgrowth + ldiffinflation +
ldiffneg + ldiffembi + limf + isi_objective + partisan + checks +  lusffr +
linflation + lbankra + lcab + lgrowth +  ltradebalance + lngdpcap + lngdp +
brk + timetrend + y1995, data=BrooksKurtz, panelVar='country', timeVar='year',
autoCorr='psar1', panelCorrMethod='pwls',rho.na.rm=TRUE, panel.weight='t',
seq.times=TRUE)
summary(out3)
```

`plot.panelAR` *Plot Panel Structure*

Description

Plots grid of panels and times, colored to distinguish observed and missing data.

Usage

```
## S3 method for class 'panelAR'
plot(x,legend=TRUE,rot.axis=c(0,0),...)
```

Arguments

`x`	an object of class `"panelAR"`.
`legend`	logical. If `TRUE`, legend is printed.
`rot.axis`	vector of degrees for rotation of axis labels. First element corresponds to time labels and second element corresponds to panel labels.
`...`	further arguments passed to or from other methods.

Author(s)

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See Also

panelAR.

Examples

```
data(WhittenWilliams)
# expect warning urging to use 'complete.case=FALSE'
out <- panelAR(milex_gdp~lag_milex_gdp+GOV_rl+gthreat+GOV_min+GOV_npty+election_yr+
lag_real_GDP_gr+cinclag+lag_alliance+lag_cinc_ratio+lag_us_change_milex_gdp,
data=WhittenWilliams, panelVar="ccode", timeVar="year", autoCorr="psar1",
panelCorrMethod="pcse", complete.case=TRUE)

par(cex.axis=0.6)
plot(out, rot.axis=c(45,0))
```

predict.panelAR *Predict method for fitted objects of class* "panelAR".

Description

Predicted values from Prais-Winsten regression.

Usage

```
## S3 method for class 'panelAR'
predict(object,newdata=NULL,se.fit = FALSE,
      conf.interval = FALSE, conf.level = 0.95, na.action=na.pass,...)
```

Arguments

object	an object of class "panelAR".
newdata	an optional data frame used for prediction. If omitted, the fitted values are used.
se.fit	logical. If TRUE, standard errors of predicted values are reported. Default: FALSE.
conf.interval	logical. If TRUE, a confidence interval for predicted values is returned. Default: FALSE.
conf.level	A number in the range $(0, 1)$ denoting the confidence level. Default: 0.95.
na.action	function denoting how to handle missing values in newdata. See predict.lm for details. Default: na.pass, which predicts NA values.
...	further arguments passed to or from other methods.

Value

fit	either a vector or a data frame containing the fitted values, as well as standard errors and/or intervals (if specified). If se.fit="TRUE", se.fit column provides the standard errors. If interval is set, lb and ub provide the lower and upper bounds of the interval, respectively.
df	degrees of freedom.

Author(s)

Konstantin Kashin <kkashin@fas.harvard.edu>

See Also

The function panelAR.

See predict.lm and napredict for additional details.

Examples

```
data(Rehm)
out <- panelAR(NURR ~ gini, data=Rehm, panelVar='ccode', timeVar='year', autoCorr='ar1',
panelCorrMethod='pcse', rho.na.rm=TRUE, panel.weight='t-1', bound.rho=TRUE)
summary(out)

# fitted values (with SE and CI)
predict(out, se.fit=TRUE, conf.interval=TRUE)
```

Rehm *Rehm (2011) Replication Data*

Description

Replication data for macro-level study in Rehm (2011), specifically to replicate results reported in Table 3. Data structure is panels of OECD countries from 2001-2004. Data contains measurements of unemployment benefit generosity, Rehm's homogeneity of the risk pool measure, and various controls.

Usage

```
Rehm
```

Format

A dataframe with the following variables:

- `year`: time identifier.
- `ccode`: country identifier.
- `NURR`: net unemployment replacement rate, as a proxy for unemployment benefit generosity.
- `gini`: Gini coefficient of unemployment risk.
- `mean_ur`: national unemployment rate, calculated as weighted mean of occupational unemployment rates (weights are occupation sizes).
- `selfemp`: self-employment as a percentage of civilian employment.
- `cum_right`: cumulative percent of total cabinet posts held by right-wing parties since 1990 (weighted by days).
- `tradeunion`: trade union density.
- `deficit`: budget deficit as a percentage of GDP.
- `tradeopen`: trade openness (sum of imports and exports as proportion of GDP).
- `gdp_growth`: GDP growth.

Source

Rehm, Philipp. 2011. "Social Policy by Popular Demand." *World Politics* 63(2): 271-299.

See Also

panelAR. Run demo(Rehm) for examples which use Rehm.

---

run.analysis *Run Analysis for Panel Data*

Description

Provides a run analysis within each panel. Calculates number of runs per panel and returns start time, end time, and the length of each run.

Usage

```
run.analysis(object)
```

Arguments

object	an object of class "panelAR".

Value

The output of the function is an object of class "panelAR.runs".

run.count	a named vector indicating the number of runs per panel.
runs	a data frame, with each row corresponding to a run in the data. Panels with multiple runs appear in multiple rows. The data frame contains the start time of the run, the end time of the run, and the length of the run.
rho	autocorrelation parameters. Scalar if "ar1" option was used, vector of length N_p (number of panels) if "psar1" option was used, and NULL if "none" option was used.

Author(s)

Konstantin Kashin <kkashin@fas.harvard.edu>

See Also

The function panelAR.

Examples

```
data(WhittenWilliams)
# expect warning urging to use 'complete.case=FALSE'
out <- panelAR(milex_gdp~lag_milex_gdp+GOV_rl+gthreat+GOV_min+GOV_npty+election_yr+
lag_real_GDP_gr+cinclag+lag_alliance+lag_cinc_ratio+lag_us_change_milex_gdp,
data=WhittenWilliams, panelVar="ccode", timeVar="year", autoCorr="psar1",
panelCorrMethod="pcse", complete.case=TRUE)

run.analysis(out) # overview
run.analysis(out)$runs # details of each run
```

---

summary.panelAR *Summary method for fitted objects of class* "panelAR"

Description

summary method for class "panelAR".

Usage

```
## S3 method for class 'panelAR'
summary(object, ...)

## S3 method for class 'summary.panelAR'
print(x,digits = max(3, getOption("digits") - 3),
    signif.stars = getOption("show.signif.stars"),...)
```

Arguments

object	an object of class "panelAR".
x	an object of class "summary.panelAR".
digits	integer. the number of significant digits to use when printing.
signif.stars	logical. If TRUE, 'significance stars' are printed for each coefficient.
...	further arguments passed to or from other methods.

Value

The function summary.panelAR returns a list of summary statistics from the fitted model in object. The list contains the following components:

call	the matched call.
terms	the terms object used.
coefficients	the named vector of coefficients.
residuals	the residuals.
aliased	named logical vector designating if original coefficients are aliased.

df	vector of the form $(k, N-k, k^*)$, where k is the rank of the model matrix, $N-k$ gives the residual degrees of freedom, and k^* is the number of total coefficients.
rho	autocorrelation parameters. Scalar if "ar1" option was used, vector of length N_p (number of panels) if "psar1" option was used, and NULL if "none" option was used.
Sigma	$N_p \times N_p$ matrix of estimated panel covariances.
r2	R^2 based on quasi-differenced data from the Prais-Winsten regression. Set to NULL if PWLS or Parks-Kmenta procedures are used.
wald	results of Wald test.
vcov	estimated variance-covariance matrix of coefficients.
na.action	information passed on from obj about the handling of NAs.
panelStructure	a list of several objects which contain information on the panel structure of the data. See details below.

Contents of panelStructure:

N	number of observations.
N.panel	number of panels.
N.time	number of times.
balanced	logical indicating whether panels are balanced.
N.min	minimum number of observations per panel.
N.max	maximum number of observations per panel.
N.avg	average number of observations per panel.
N.per.panel	named vector giving number of observations per panel.

Author(s)

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See Also

The function panelAR. Function coef will extract the table of coefficients, standard errors, t-statistics, and p-values.

Examples

```
data(WhittenWilliams)
# expect warning urging to use 'complete.case=FALSE'
out <- panelAR(milex_gdp~lag_milex_gdp+GOV_rl+gthreat+GOV_min+GOV_npty+election_yr+
lag_real_GDP_gr+cinclag+lag_alliance+lag_cinc_ratio+lag_us_change_milex_gdp,
data=WhittenWilliams, panelVar="ccode", timeVar="year", autoCorr="psar1",
panelCorrMethod="pcse", complete.case=TRUE)

summary(out)
summary(out)$rho # psar1 coefficients
summary(out)$Sigma # panel covariances
summary(out)$wald # results of Wald test
```

vcov.panelAR *Variance-covariance method for fitted objects of class "panelAR"*

Description

vcov method for class "panelAR".

Usage

```
## S3 method for class 'panelAR'
vcov(object, ...)
```

Arguments

object	an object of class "panelAR".
...	further arguments passed to or from other methods.

Value

A matrix of estimated covariances between parameter estimates. The row and column names correspond to the parameter names obtained using the coef method.

Author(s)

Konstantin Kashin <kkashin@fas.harvard.edu>

See Also

The function panelAR.

WhittenWilliams *Whitten and Williams (2011) Replication Data*

Description

Replication data for Whitten and Williams (2011). Data structure is panels of 19 advanced democracies from 1945-2000. Data contains measurements of military spending as a percentage of GDP as well as other variables.

Usage

```
WhittenWilliams
```

Format

A dataframe with the following variables:

- ccode: country identifier (Correlates of War).
- year: year identifier.
- milex_gdp: military expenditures as a percentage of GDP.
- lag_milex_gdp: military expenditures as a percentage of GDP for t-1.
- GOV_rl: left-right position of government.
- GOV_welfare: government welfare position.
- GOV_hawk1: government international position.
- gthreat: conflict involvement index.
- gthreat_GOV_rl: conflict involvement interacted with left-right position of government.
- gthreat_GOV_welfare: conflict involvement interacted with government welfare position.
- gthreat_GOV_hawk1: conflict involvement interacted with government international position.
- GOV_min: percentage of year that country had a minority government.
- GOV_npty: average number of government parties.
- election_yr: dummy variable for election year (1=election year).
- cinc: Composite Index of National Capabilities (CINC).
- alliance: alliance with US.
- real_GDP_gr: growth in real GDP per capita.
- lag_real_GDP_gr: growth in real GDP per capita for t-1.
- cinclag: CINC for t-1.
- cinc_ratio: ratio of US to Soviet CINC scores.
- us_change_milex_gdp: growth in US defense spending as a fraction of GDP.
- lag_alliance: alliance with US for t-1.
- lag_us_change_milex_gdp: growth in US defense spending as a fraction of GDP for t-1.
- lag_cinc_ratio: ratio of US to Soviet CINC scores for t-1.

Source

Whitten, Guy D. and Laron K. Williams. 2011. "Buttery Guns and Welfare Hawks: The Politics of Defense Spending in Advanced Industrial Democracies." *American Journal of Political Science* 55(1): 117-134.

See Also

panelAR. Run demo(WhittenWilliams) for examples which use WhittenWilliams.

Index