

Package ‘iotables’

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Type Package

Title Importing and Manipulating Symmetric Input-Output Tables

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Author Daniel Antal CFA

Maintainer Daniel Antal <daniel.antal@ceemid.eu>

Description Pre-processing tasks related to working with Eurostat's symmetric input-output tables and provide basic input-output economics calculations. The package is a part of rOpenGov <<http://ropengov.github.io/>> to open source open government initiatives.

URL <https://github.com/rOpenGov/iotables>

BugReports <https://github.com/rOpenGov/iotables/issues>

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croatia_2010_1700 *Input-output table for Croatia, 2010.*

Description

1700 - Symmetric input-output table at basic prices (product x product) In thousand kunas (T_NAC)

Usage

```
data(croatia_2010_1700)
```

Format

A data frame with 13 variables.

t_rows2 Technology codes in row names, following the Eurostat convention.

t_rows2_lab Longer labels for t_rows2

t_cols2 Technology codes in column names, following the Eurostat convention.

t_cols2_lab Longer labels for t_cols2

iotables_col The standardized iotables column labelling for easier reading.

col_order The column ordering to keep the matrix legible.

row_order The row ordering to keep the matrix legible.

iotables_row The standardized iotables row labelling for easier reading.

unit Different from Eurostat tables, in thousand national currency units.

geo ISO / Eurostat country code for Croatia

geo_lab ISO / Eurostat country name, Croatia.

time Date of the SIOT

values The actual values of the table in thousand kunas

Source

[Eurostat Manual of Supply, Use and Input-Output Tables](#) Updated 17 December 2015.

croatia_2010_1800 *Input-output table for Croatia, 2010.*

Description

1800 - Symmetric input-output table for domestic production (product x product) In thousand kunas (T_NAC)

Usage

```
data(croatia_2010_1800)
```

Format

A data frame with 13 variables.

t_rows2 Technology codes in row names, following the Eurostat convention.

t_rows2_lab Longer labels for t_rows2

values The actual values of the table in thousand kunas

t_cols2 Column labels, following the Eurostat convention with differences. CPA_ suffix added to original DZS column names.

t_cols2_lab Longer labels for t_cols2

iotables_col The standardized iotables column labelling for easier reading.

col_order The column ordering to keep the matrix legible.

iotables_row The standardized iotables row labelling for easier reading.

row_order The row ordering to keep the matrix legible.

unit Different from Eurostat tables, in thousand national currency units.

geo ISO / Eurostat country code for Croatia

geo_lab ISO / Eurostat country name, Croatia.

time Date of the SIOT

Source

[Eurostat Manual of Supply, Use and Input-Output Tables](#) Updated 17 December 2015.

croatia_2010_1900 *Input-output table for Croatia, 2010.*

Description

1900 - Symmetric input-output table for imports (product x product) In thousand kunas (T_NAC)

Usage

```
data(croatia_2010_1900)
```

Format

A data frame with 13 variables.

t_rows2 Technology codes in row names, following the Eurostat convention.

t_rows2_lab Longer labels for t_rows2

values The actual values of the table in thousand kunas

t_cols2 Column labels, following the Eurostat convention with differences. CPA_ suffix added to original DZS column names.

t_cols2_lab Longer labels for t_cols2

iotables_col The standardized iotables column labelling for easier reading.

col_order The column ordering to keep the matrix legible.

iotables_row The standardized iotables row labelling for easier reading.

row_order The row ordering to keep the matrix legible.

unit Different from Eurostat tables, in thousand national currency units.

geo ISO / Eurostat country code for Croatia

geo_lab ISO / Eurostat country name, Croatia.

time Date of the SIOT

Source

[Eurostat Manual of Supply, Use and Input-Output Tables](#) Updated 17 December 2015.

`croatia_employment_2013`*Croatian employment data for the year 2013*

Description

Aggregate Croatian detailed employment statistics into the Croatian (EU standard) Symmetric input-output table format.

Usage

```
data(croatia_employment_2013)
```

Format

A data frame with 107 observations in 2 variables:

code Short labels

iotables_row iotables style labels

employment Employment in the sector in Croatia, not in thousands!

`croatia_employment_aggregation`*Aggregation table for Croatian employment statistics*

Description

Aggregate Croatian detailed employment statistics into the Croatian (EU standard) Symmetric input-output table format.

Usage

```
data(croatia_employment_aggregation)
```

Format

A data frame with 105 rows (including empty ones) and 2 variables.

employment_label Labelling in DZS English language export

t_cols2 Labelling of EU/DZS SIOTs.

equation_solve	<i>Solve a basic equation</i>
----------------	-------------------------------

Description

The function matches to parts of the matrix equation, using the named formats with row names and solves the matrix equation. This function is used in wrapper functions, such as `multiplier_create`, to solve particular problems, but it can be used directly, too. The function only performs the lhs pairing industries and checking for exceptions.

Usage

```
equation_solve(LHS = NULL, Im = NULL)
```

Arguments

LHS	A left-hand side vector with a key column containing the industry or product names for matching, for example the employment coefficients.
Im	A Leontieff-inverse with a key column containing the industry or product names for matching.

Examples

```
Im = data.frame (
  a = c("row1", "row2"),
  b = c(1,1),
  c = c(2,0))
LHS = data.frame (
  a = "lhs",
  b = 1,
  c = 0.5)
equation_solve (Im = Im, LHS = LHS)
```

germany_1990	<i>Simple input-output table for Germany, 1990.</i>
--------------	---

Description

For testing purposes a well documented example data set is used from the Eurostat manual. The table in the Eurostat manual is brought to the format used by the Eurostat database. It is a small dataset for examples, but it is also instructive to understand how Eurostat stores the highly structured SIOTs in long-form tidy datasets. The third and fourth quadrant labelling follows the current Eurostat labels.

Usage

```
data(germany_1990)
```

Format

A data frame with 228 observations and 10 variables.

t_rows2 Technology codes in row names, following the Eurostat convention.

t_rows2_lab Longer labels for t_rows2

t_cols2 Column labels, following the Eurostat convention with differences.

t_cols2_lab Longer labels for t_cols2

values The actual values of the table in million euros

unit MIO_EUR, the same as Eurostat

unit_lab Million euros. Eurostat usually has euro and national currency unit values, too.

geo ISO / Eurostat country code for Germany, i.e. DE

geo_lab ISO / Eurostat country name, Germany

time Date of the SIOT

#' @keywords data, datasets, input-output table, Germany

Source

[Eurostat Manual of Supply, Use and Input-Output Tables](#) p 492

input_coefficient_matrix_create

Create an input coefficient matrix

Description

Create an input coefficient matrix from the input flow matrix and the output vector. The two input vectors must have consistent labelling, i.e the same column names must be found in the use table (input flow) and the output vector.

Usage

```
input_coefficient_matrix_create(input_flow, output, digits = NULL)
```

Arguments

input_flow	An input flow matrix created with the use_table_get function.
output	An output vector with a key column, created by output_get .
digits	An integer showing the precision of the technology matrix in digits. If not given, no rounding is applied.

Details

If there are zero values in the output vector, they will be changed to 0.000001 and you will get a warning. Some analytical equations cannot be solved with zero elements. You either have faulty input data, or you have to use some sort of data modification to carry on your analysis.

An alternative that is not implemented here, because it requires analytical judgment, is the aggregation of elements into larger ones that are no longer equal to zero, i.e. merging an industry or product class that has a positive value with another industry or product class that is zero.

Examples

```
de_use <- use_table_get ( source = "germany_1990", geo = "DE",
                        year = 1990, unit = "MIO_EUR",
                        households = FALSE, labelling = "iotables")

de_output <- output_get ( source = "germany_1990", geo = "DE",
                        year = 1990, unit = "MIO_EUR",
                        households = FALSE, labelling = "iotables")
```

input_indicator_create

Create input indicator(s)

Description

The function creates the input indicators from the inputs and the outputs.

Usage

```
input_indicator_create(input_matrix, output_vector, digits = NULL)
```

Arguments

input_matrix	A named (primary) input(s) vector or matrix created by primary_input_get
output_vector	A named output vector created by output_get .
digits	Rounding digits, if omitted, no rounding takes place.

Examples

```
de_output <- output_get ( source = "germany_1990", geo = "DE",
                        year = 1990, unit = "MIO_EUR",
                        households = FALSE, labelling = "iotables")

de_emp <- primary_input_get ( input = "compensation_employees",
                            source = "germany_1990", geo = "DE",
                            year = 1990, unit = "MIO_EUR",
                            households = FALSE, labelling = "iotables")

de_emp_indicator <- input_indicator_create ( de_emp, de_output)
```

iotables_download	<i>Download input-output tables</i>
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Description

This function downloads standard input-output table files. Currently only Eurostat files are supported. You are not likely to use this function, because `iotable_get` will call this function if necessary and properly filter out an input-output table. The only parameter is the Eurostat code of the table: Symmetric input-output table - current prices (NACE Rev. 2) [naio_cp17_r2] Symmetric input-output table at basic prices (product by product) (naio_10_cp1700) Symmetric input-output table at basic prices (industry by industry) (naio_10_cp1750) Symmetric input-output table at basic prices (product by product) (previous years prices) (naio_10_pyp1700) Symmetric input-output table at basic prices (industry by industry) (previous years prices) (naio_10_pyp1750)

Usage

```
iotables_download(source = "naio_cp17_r2", stk_flow = "DOM")
```

Arguments

source	Currently only source = "eurostat" works. Later OECD Stan will be added.
stk_flow	Defaults to "TOTAL". Possible values are "DOM", "IMP", "TOTAL". In tables where no distinction is made it is not needed.

Details

EU-level tables Input-output table for domestic output at current prices, 60 branches - EU aggregates (NACE Rev. 2) (naio_18_agg_60_r2) Input-output table at current prices, 10 branches - EU aggregates (NACE Rev. 2) (naio_17_agg_10_r2) Input-output table at current prices, 6 branches - EU aggregates (naio_17_agg_6)

At the moment import and domestic tables are not yet supported in the package. The data is downloaded in the `tempdir()` under the name the statistical product as an rds file. (For example: `naio_10_cp1750.rds`) The temporary directory is emptied at every normal R session exit.

Examples

```
## Not run:  
io_tables <- iotables_download ( source = "naio_cp17_r2" )  
  
## End(Not run)
```

iotable_get	<i>Get an input-output table from bulk file</i>
-------------	---

Description

This function is used to filter out a single input-output table from a database, for example a raw file downloaded from the Eurostat website. It provides some functionality to avoid some pitfalls. Unless you want to work with bulk data files, you should not invoke `iotables_download` directly, rather via this function, if and when it is necessary.

Usage

```
iotable_get(source = "germany_1990", geo = "DE", year = 1990,
            unit = "MIO_EUR", stk_flow = "DOM", labelling = "iotables")
```

Arguments

source	A data source, for example "naio_10_cp1700". Possible codes are "naio_10_cp1700", "naio_10_cp1750", "naio_10_pyp1700", "naio_10_pyp1750", "naio_cp17_r2", "naio_17_agg_60_r2", "naio_17_agg_10_r2", "croatia_2010_1700", "croatia_2010_1800", "croatia_2010_1900". For further information consult the Eurostat Symmetric Input-Output Tables page.
geo	A country code or a country name. For example, "SK" or as "Slovakia".
year	A numeric variable containing the year. Defaults to 2010, because this year has the most data.
unit	A character string containing the currency unit, defaults to "MIO_NAC" (million national currency unit). The alternative is "MIO_EUR".
stk_flow	Defaults to "DOM", alternative "IMP".
labelling	Defaults to "iotables" which gives standard row and column names regardless of the source of the table, or if it is a product x product, industry x industry or product x industry table. The alternative is "short" which is the original short row or column code of Eurostat or OECD.

Examples

```
germany_table <- iotable_get( source = "germany_1990", geo = 'DE',
                             year = 1990, unit = "MIO_EUR",
                             labelling = 'iotables')
```

`leontieff_inverse_create`*Create the inverse of a Leontieff-matrix.*

Description

The inversion takes place after the basic properties of the Leontieff matrix.

Usage

```
leontieff_inverse_create(leontieff_matrix)
```

Arguments

`leontieff_matrix`

A Leontieff matrix created by the [leontieff_matrix_create](#) function.

Examples

```
de_use <- use_table_get ( source = "germany_1990", geo = "DE",
                        year = 1990, unit = "MIO_EUR",
                        households = FALSE, labelling = "iotables")

de_output <- output_get ( source = "germany_1990", geo = "DE",
                        year = 1990, unit = "MIO_EUR",
                        households = FALSE, labelling = "iotables")

de_coeff <- input_coefficient_matrix_create( de_use, de_output, digits = 4)

L <- iotables::leontieff_matrix_create( technology_coefficients_matrix = de_coeff )
I <- leontieff_inverse_create (L)
```

`leontieff_matrix_create`*Create a Leontieff matrix*

Description

Create a Leontieff matrix from technology matrix after some basic error handling. Most likely you will need this function as a step to invoke the function to create its inverse: [leontieff_inverse_create](#).

Usage

```
leontieff_matrix_create(technology_coefficients_matrix)
```

Arguments

`technology_coefficients_matrix`

A technology coefficient matrix created by the `input_coefficient_matrix_create`.

Examples

```
de_use <- use_table_get ( source = "germany_1990", geo = "DE",
  year = 1990, unit = "MIO_EUR",
  households = FALSE, labelling = "iotables")
```

```
de_output <- output_get ( source = "germany_1990", geo = "DE",
  year = 1990, unit = "MIO_EUR",
  households = FALSE, labelling = "iotables")
```

```
de_coeff <- input_coefficient_matrix_create( de_use, de_output, digits = 4)
```

```
L <- iotables::leontieff_matrix_create( technology_coefficients_matrix = de_coeff )
```

metadata

Metadata

Description

An arrangement of the Eurostat national accounts vocabulary, used to correctly order wide format rows and columns from bulk long-form tables.

Usage

```
data(metadata)
```

Format

A data frame with 10 variables. #'

variable Eurostat vocabulary source, i.e. `t_rows`, `t_cols`, `prod_na`, `induse`

group Informal labelling for macroeconomic groups

code Eurostat labels

label Eurostat label descriptions

quadrant Where to place the data from a long-form raw data file

account_group Different from Eurostat tables, in thousand national currency units.

digit_1 third digit for ordering

digit_2 fourth digit for ordering

numeric_label ordering from quadrant, `account_group`, `digit_1`, `digit_2`

iotables_label Custom, machine_readable snake format variable names

multiplier_create *Create multipliers*

Description

This function is in fact a wrapper around the [equation_solve](#) function, adding a key column with the name to the multiplier to maintain structural consistency.

Usage

```
multiplier_create(input_vector = NULL, Im = NULL,
  multiplier_name = "multiplier", digits = NULL)
```

Arguments

`input_vector` An input matrix or vector created by the [input_indicator_create](#) function.

`Im` The Leontieff inverse as a named object created by the [leontieff_inverse_create](#) function.

`multiplier_name` A variable name to be given to the returned multipliers. Defaults to 'multiplier'.

`digits` Rounding digits, if omitted, no rounding takes place.

Examples

```
de_use <- use_table_get ( source = "germany_1990", geo = "DE",
  year = 1990, unit = "MIO_EUR",
  households = FALSE, labelling = "iotables")

de_output <- output_get ( source = "germany_1990", geo = "DE",
  year = 1990, unit = "MIO_EUR",
  households = FALSE, labelling = "iotables")

de_emp <- primary_input_get ( input = "employment_total",
  source = "germany_1990", geo = "DE",
  year = 1990,
  households = FALSE, labelling = "iotables")

de_emp_indicator <- input_indicator_create (de_emp, de_output)

de_coeff <- input_coefficient_matrix_create( de_use,
  de_output, digits = 4)

L_de <- leontieff_matrix_create( technology_coefficients_matrix =
  de_coeff )

I_de <- leontieff_inverse_create(L_de)

employment_multipliers <- multiplier_create (
  input_vector      = de_emp_indicator,
  Im                = I_de,
```

```
multiplier_name = "employment_multiplier",
digits = 4 )
```

output_get

Get an output vector

Description

Get an output vector

Usage

```
output_get(source = "germany_1990", geo = "DE", year = 1990,
  unit = "MIO_EUR", households = FALSE, labelling = "iotables",
  stk_flow = "DOM", keep_total = FALSE)
```

Arguments

source	A data source, for example "naio_10_cp1700". Possible codes are "naio_10_cp1700", "naio_10_cp1750", "naio_10_pyp1700", "naio_10_pyp1750", "naio_cp17_r2", "naio_17_agg_60_r2", "naio_17_agg_10_r2", "croatia_2010_1700", "croatia_2010_1800", "croatia_2010_1900". For further information consult the Eurostat Symmetric Input-Output Tables page.
geo	A country code or a country name. For example, "SK" or as "Slovakia".
year	A numeric variable containing the year. Defaults to 2010, because this year has the most data.
unit	A character string containing the currency unit, defaults to "MIO_NAC" (million national currency unit). The alternative is "MIO_EUR".
households	If you need to make household demand endogenous, or "close the households off", TRUE selects wages and final household consumption. This is needed for induced-effects calculations.
labelling	Defaults to "iotables" which gives standard row and column names regardless of the source of the table, or if it is a product x product, industry x industry or product x industry table. The alternative is "short" which is the original short row or column code of Eurostat or OECD.
stk_flow	Defaults to "DOM", alternative "IMP".
keep_total	Logical variable. Defaults to FALSE and removes the totaling row and column from the matrix.

Examples

```
output_hr <- output_get(source = "croatia_2010_1800", geo = "HR",
  year = 2010, unit = "T_NAC", labelling = "iotables")
```

primary_inputs	<i>Primary input abbreviations</i>
----------------	------------------------------------

Description

Only currently used primary inputs. Abbreviations for filtering.

Usage

```
data("croatia_employment_aggregation")
```

Format

A data frame with 105 rows (including empty ones) and 2 variables.

t_rows2 Eurostat code of the input.

t_rows2_lab Labelling of the input by Eurostat.

source Eurostat / DZS

indicator Human readable abbreviation

primary_input_get	<i>Get primary inputs</i>
-------------------	---------------------------

Description

This function will retrieve any primary input from the input-output table. You can use the iotables or the original (Eurostat) short labels to select the primary input. If you work with the original Eurostat labels, you can review the codes of variables with 'View(metadata)'.

Usage

```
primary_input_get(input = "compensation_employees", source = "germany_1990",
  geo = "DE", year = 1990, unit = "MIO_EUR", households = FALSE,
  stk_flow = "DOM", labelling = "iotables")
```

Arguments

input A character string or a character vector containing the indicator names. Any of 'compensation_employees', 'wages_salaries', 'mixed_income_gross', 'gva' (for gross value added), 'surplus_mixed_gross', 'surplus_mixed_net', 'net_tax_production', 'import_goods_services' (and its breakup ..._MU, _non_MU, ..._EU, ...non_EU). If the indicator is not found in the table, you will get an error. The input parameter is case sensitive.

source	A data source, for example "naio_10_cp1700". Possible codes are "naio_10_cp1700", "naio_10_cp1750", "naio_10_pyp1700", "naio_10_pyp1750", "naio_cp17_r2", "naio_17_agg_60_r2", "naio_17_agg_10_r2", "croatia_2010_1700", "croatia_2010_1800", "croatia_2010_1900". For further information consult the Eurostat Symmetric Input-Output Tables page.
geo	A country code or a country name, defaults to "SK" that could be written as "Slovakia", too.
year	A numeric variable containing the year.
unit	The currency unit in the input-output table.
households	If the household are included in your model (adds final household expenditure column)
stk_flow	Defaults to "DOM", alternative "IMP".
labelling	Defaults to "iotables" which gives standard row and column names regardless of the source of the table, or if it is a product x product, industry x industry or product x industry table. The alternative is "short" which is the original short row or column code of Eurostat or OECD.

Examples

```
comp_employees_de <- primary_input_get(
  input = "compensation_employees",
  source = "germany_1990", geo = "DE",
  unit = "MIO_EUR",
  year = 1990, labelling = "iotables" )
```

use_table_get	<i>Create a use (input flow) matrix</i>
---------------	---

Description

The function invokes the `iotable_get` function and selects a national input-output table from the bulk downloaded file. If the file is not downloaded, it downloads it to the temporary directory.

Usage

```
use_table_get(source = "germany_1990", geo = "DE", year = 1990,
  unit = "MIO_EUR", stk_flow = "DOM", households = FALSE,
  keep_total = FALSE, labelling = "iotables")
```

Arguments

source	A data source, for example "naio_10_cp1700". Possible codes are "naio_10_cp1700", "naio_10_cp1750", "naio_10_pyp1700", "naio_10_pyp1750", "naio_cp17_r2", "naio_17_agg_60_r2", "naio_17_agg_10_r2", "croatia_2010_1700", "croatia_2010_1800", "croatia_2010_1900". For further information consult the Eurostat Symmetric Input-Output Tables page.
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