

Package: decompr (via r-universe)

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Title Global Value Chain Decomposition

Description Four global value chain (GVC) decompositions are implemented. The Leontief decomposition derives the value added origin of exports by country and industry as in Hummels, Ishii and Yi (2001). The Koopman, Wang and Wei (2014) decomposition splits country-level exports into 9 value added components, and the Wang, Wei and Zhu (2013) decomposition splits bilateral exports into 16 value added components. The Borin and Mancini (2019) decomposition splits country-, sector- or bilateral-level exports into up to 13 value added and GVC components. Various GVC indicators based on these decompositions are computed in the complimentary 'gvc' package.
--- References: --- Hummels, D., Ishii, J., & Yi, K. M. (2001). The nature and growth of vertical specialization in world trade. *Journal of international Economics*, 54(1), 75-96.
Koopman, R., Wang, Z., & Wei, S. J. (2014). Tracing value-added and double counting in gross exports. *American Economic Review*, 104(2), 459-94. Wang, Z., Wei, S. J., & Zhu, K. (2013). Quantifying international production sharing at the bilateral and sector levels (No. w19677). National Bureau of Economic Research. Borin, A., & Mancini, M. (2019). Measuring What Matters in Global Value Chains and Value-Added Trade. World Bank Policy Research Working Paper 8804.

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Depends R (>= 3.5.0)

Imports matrixStats

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URL <https://github.com/bquast/decompr>

BugReports <https://github.com/bquast/decompr/issues>

Suggests gvc, testthat, knitr, rmarkdown

VignetteBuilder knitr

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decompr-package*Global Value Chain Decomposition*

Description

Four global value chain (GVC) decompositions are implemented. The Leontief decomposition derives the value added origin of exports by country and industry as in Hummels, Ishii and Yi (2001). The Koopman, Wang and Wei (2014) decomposition splits country-level exports into 9 value added components, and the Wang, Wei and Zhu (2013) decomposition splits bilateral exports into 16 value added components. The Borin and Mancini (2019) decomposition splits country-, sector- or bilateral-level exports into up to 13 value added and GVC components, and also provides a corrected version of the (biased) KWW decomposition. Various GVC indicators based on these decompositions are computed in the complimentary 'gvc' package.

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References

Hummels, D., Ishii, J., & Yi, K. M. (2001). The nature and growth of vertical specialization in world trade. *Journal of international Economics*, 54(1), 75-96.

Koopman, R., Wang, Z., & Wei, S. J. (2014). Tracing value-added and double counting in gross exports. *American Economic Review*, 104(2), 459-94.

Wang, Zhi, Shang-Jin Wei, and Kunfu Zhu (2013). Quantifying international production sharing at the bilateral and sector levels (No. w19677). *National Bureau of Economic Research*.

Borin, A., & Mancini, M. (2019). Measuring What Matters in Global Value Chains and Value-Added Trade. *World Bank Policy Research Working Paper 8804*.

See Also

<https://qua.st/decompr/>

bm

*Borin-Mancini Decomposition of Gross Exports***Description**

Decomposes gross exports into value-added and Global Value Chain (GVC) components following the Borin and Mancini (2019) framework, as implemented in the Stata `icio` command (Belotti, Borin and Mancini 2021). It is the R counterpart of the `decompose()` function in the Julia package `ICIO.jl`, and operates on a `decompr` object created by [load_tables_vectors](#).

Usage

```
bm(
  x,
  aggregation = c("country", "sector", "bilateral"),
  perspective = c("exporter", "world"),
  approach = c("source", "sink")
)
```

Arguments

| | |
|--------------------------|---|
| <code>x</code> | an object of class <code>decompr</code> obtained from load_tables_vectors . |
| <code>aggregation</code> | character. The level of the decomposition: "country" (one row per exporting country), "sector" (one row per exporting country-industry), or "bilateral" (one row per exporting country-industry and importing country, excluding within-country flows). Default "country". |
| <code>perspective</code> | character. The accounting perspective defining the perimeter for double counting: "exporter" (exporting-country perspective, additive across sectors and destinations, 13 terms) or "world" (world perspective, 9 terms, only available for <code>aggregation = "country"</code>). Default "exporter". |
| <code>approach</code> | character. How double-counted items are allocated across shipments: "source" (value added recorded the first time it leaves the country of origin) or "sink" (the last time). "exporter" requires "source"; "world" requires "sink". Default "source". |

Details

For the default exporter / source perspective the decomposition yields 13 terms; the world / sink perspective (country level only, the "corrected KWW" decomposition) yields 9. All terms are in the same units as the input-output table (e.g. millions of USD). The following accounting identities hold: $GEXP = DC + FC$, $DC = DVA + DDC$, $FC = FVA + FDC$, $DVA = VAX + REF$, and (exporter/source only) $GVC = GVCB + GVCF = GEXP - DAVAX$ and $GVCB = FC + DDC$.

| | |
|-----------|---------------------------------|
| GEXP | Gross exports. |
| DC / FC | Domestic / foreign content. |
| DVA / FVA | Domestic / foreign value added. |

| | |
|-------------|--|
| DDC / FDC | Domestic / foreign double counting. |
| VAX | Domestic value added absorbed abroad (Johnson and Noguera 2012). |
| REF | Reflection: domestic value added returning home. |
| DAVAX | Domestic value added directly absorbed by the importer. |
| GVC | GVC-related trade (value added crossing more than one border). |
| GVCB / GVCF | Backward / forward GVC participation. |

The exporter / source decomposition is additive: the "sector" result is the sum of the "bilateral" result over importers, and the "country" result is the sum of the "sector" result over industries.

Value

A `data.frame` with one row per unit and one column per value-added term, preceded by factor identifier columns: `Exporting_Country` (country); `Exporting_Country`, `Exporting_Industry` (sector); or `Exporting_Country`, `Exporting_Industry`, `Importing_Country` (bilateral). The attribute "decomposition" is set to "bm".

Author(s)

Sebastian Krantz

References

- Borin, A. and Mancini, M. (2019). Measuring What Matters in Global Value Chains and Value-Added Trade. *World Bank Policy Research Working Paper 8804*.
- Belotti, F., Borin, A. and Mancini, M. (2021). `icio`: Economic analysis with intercountry input-output tables. *The Stata Journal*, 21(3), 708-755.

See Also

[kww](#), [wwz](#), [leontief](#), [decompr-package](#)

Examples

```
# Load example data and create a 'decompr' object
data(leather)
dec <- load_tables_vectors(leather)

# Country-level decomposition (exporter perspective, source approach; 13 terms)
bm(dec)

# Country-level "corrected KWW" (world perspective, sink approach; 9 terms)
bm(dec, perspective = "world", approach = "sink")

# Sector- and bilateral-sector-level decompositions
bm(dec, aggregation = "sector")
bm(dec, aggregation = "bilateral")
```

decomp

*Interface Function for Decompositions***Description**

This function loads an ICIO table and runs a specified decomposition. It provides a compact interface for quick analysis.

Usage

```
decomp(
  iot,
  x,
  y,
  k,
  i,
  o = NULL,
  v = NULL,
  method = c("leontief", "kww", "wwz", "bm"),
  ...
)
```

Arguments

| | |
|-----|--|
| iot | a Input Output Table object - a list with elements 'inter' (= x), 'final' (= y), 'output' (= o), 'countries' (= k) and 'industries' (= i) of class 'iot'. Alternatively these objects can be passed directly to the function, at least x, y, k and i need to be supplied. |
| x | intermediate demand table supplied as a numeric matrix of dimensions GN x GN (G = no. of country, N = no. of industries). Both rows and columns should be arranged first by country, then by industry (e.g. C1I1, C1I2, ..., C2I1, C2I2, ...) and should match (symmetry), such that rows and columns refer to the same country-industries. |
| y | final demand table supplied as a numeric matrix of dimensions GN x MN (M = no. of final demand categories recorded for each country). The rows of y need to match the rows of x, and the columns should also be arranged first by country, then by final demand category (e.g. C1FD1, C1FD2, ..., C2FD1, C2FD2, ...) with the order of the countries the same as in x. |
| k | character. A vector of country or region names of length G, arranged in the same order as they occur in the rows and columns of x, y. |
| i | character. A vector of country or region names of length N, arranged in the same order as they occur in the rows and columns of x and rows of y. |
| o | numeric. A vector of final outputs for each country-industry matching the rows of x and y. If not provided it will be computed as $\text{rowSums}(x) + \text{rowSums}(y)$. |
| v | numeric. A vector of value added for each country-industry matching the columns of x. If not provided it will be computed as $o - \text{colSums}(x)$. |

method character. The decomposition method, either "leontief", "kww", "wwz" or "bm".

... further arguments passed to [leontief](#), [kww](#), [wwz](#) or [bm](#).

Details

For more detailed analysis with multiple decompositions consider using [load_tables_vectors](#) to create a 'decomp' class object and then run the decomposition functions [leontief](#), [kww](#) and [wwz](#) on the object.

Value

Depends on the decomposition, see [leontief](#), [kww](#), [wwz](#) or [bm](#).

Author(s)

Bastiaan Quast

References

Timmer, Marcel P. (ed) (2012), "The World Input-Output Database (WIOD): Contents Sources and Methods", *WIOD Working Paper Number 10*, downloadable at <http://www.wiod.org/publications/papers/wiod10.pdf>

Wang, Zhi, Shang-Jin Wei, and Kufu Zhu (2013). Quantifying international production sharing at the bilateral and sector levels. *No. w19677. National Bureau of Economic Research*.

See Also

[decomp-r-package](#)

Examples

```
# Load leather example data
data(leather)

# Explore the data
str(leather)

## Decomposing gross exports:

# Perform the Leontief decomposition
decomp(leather, method = "leontief")

# Perform the KWW decomposition
decomp(leather, method = "kww")

# Perform the WWZ decomposition
decomp(leather, method = "wwz")

# Perform the Borin-Mancini decomposition
decomp(leather, method = "bm")
decomp(leather, method = "bm", aggregation = "bilateral")
```

kww

*Koopman-Wang-Wei Decomposition of Gross Exports***Description**

This function performs the Koopman-Wang-Wei (2014) decomposition of a countries gross exports into 9 separate value added components.

Usage

```
kww(x)
```

Arguments

`x` an object of the class 'decomp' obtained from [load_tables_vectors](#).

Value

A data frame where a countries gross exports is decomposed into 9 components (columns), as detailed in Figure 1 of the AER paper:

| <i>Term</i> | <i>Description</i> |
|-------------|---|
| DVA_FIN | Domestic VA in final goods exports. |
| DVA_INT | Domestic VA in intermediate exports absorbed by direct importers (used to produce a locally consumed |
| DVA_INTrex | Domestic VA in intermediate exports reexported to third countries and absorbed there. |
| RDV_FIN | Domestic VA in intermediate exports that returns home via final imports. |
| RDV_INT | Domestic VA in intermediate exports that returns home via intermediate imports (used to produce a dom |
| DDC | Double counted DVA in intermediate exports (arising from 2-way trade in intermediate goods). |
| FVA_FIN | Foreign VA in final goods exports. |

| | |
|---------|--|
| FVA_INT | Foreign VA in intermediate exports. |
| FDC | Double counted FVA in intermediate exports (arising from 2-way trade in intermediate goods). |

Note

The KWW decomposition is known to be biased. As shown by Borin and Mancini (2019), it systematically underestimates the foreign value added in exports – and correspondingly overstates foreign double counting – because the entire foreign content that the direct importer re-exports to third countries is classified as 'foreign double counted', including the part (value added generated in the importing country and re-exported onwards) that is never recorded as foreign value added in any other flow. KWW also overlooks the bilateral dimension of trade, so it cannot correctly split domestic value added between absorption by the direct importer and by third markets (hence indicators such as DAVAX cannot be derived from it). Borin and Mancini (2019) correct these issues using a sink-based, world-level perspective for the foreign content of exports; this corrected KWW decomposition is available as `bm(x, perspective = "world", approach = "sink")`.

Author(s)

Sebastian Krantz

References

Koopman, R., Wang, Z., & Wei, S. J. (2014). Tracing value-added and double counting in gross exports. *American Economic Review*, 104(2), 459-94.

Borin, A., & Mancini, M. (2019). Measuring What Matters in Global Value Chains and Value-Added Trade. *World Bank Policy Research Working Paper 8804*.

See Also

[bm](#), [wwz](#), [wwz2kww](#), [decompr-package](#)

Examples

```
# Load example data
data(leather)

# Create intermediate object (class 'decompr')
decompr_object <- load_tables_vectors(leather)

# Perform the KWW decomposition
kww(decompr_object)
```

 leather

Leather Example ICIO Data

Description

An example 3 x 3 ICIO table describing a GVC for leather products with industries 'Agriculture', 'Textile and Leather' and 'Transport Equipment' for the countries 'Argentina', 'Turkey' and 'Germany'.

Usage

```
data("leather")
```

Format

A list of class 'iot' with the following elements:

`inter` 9 x 9 input output matrix where each column gives the value of inputs supplied to the corresponding country-industry by each row country-industry.

`final` 9 x 3 final demand matrix showing the final demand in each country (column) for each country-industry's (rows) produce.

`countries` character vector of country names (matching columns of `final`).

`industries` character vector of industries, such that `as.vector(t(outer(countries, industries, FUN = paste, sep = ".")))` generates the row- and column-names of `inter` and the row-names of `final`.

`out` A vector of gross country-industry output. In a complete productive system it should be equal to `rowSums(inter) + rowSums(final)`.

See Also

[decompr-package](#)

 leontief

Leontief Decomposition

Description

The Leontief decomposition of gross flows (exports, final demand, output) into their value added origins.

Usage

```
leontief(x, post = c("exports", "output", "final_demand", "none"), long = TRUE)
```

Arguments

| | |
|------|--|
| x | an object of class <code>decompr</code> . |
| post | post-multiply the value added multiplier matrix [$VB = V(I - A)^{-1}$] with something to deduce the value added origins thereof. The default is "exports" $VAE = V(I - A)^{-1}E$, where E is a diagonal matrix with exports along the diagonal yielding the country-industry level sources of value added (rows) for each using (column) country-industry; similarly for "output". Option "final_demand" computes value added origins of final demand by source country-industry and importing country, by computing $VA Y = V(I - A)^{-1}Y$ where Y is the corresponding GN x G matrix contained in x. Option "none" just returns VB which gives the value added shares. |
| long | logical. Transform the output data into a long (tidy) data set or not, default is TRUE. |

Details

The Leontief decomposition is obtained by pre-multiplying the flow measure (e.g. exports) with the value added multiplier matrix [$VB = V(I - A)^{-1}$], obtained by pre-multiplying the Leontief Inverse matrix [$B = (I - A)^{-1}$] with a diagonal matrix [V] containing the direct value added share in each industries output.

V is obtained as `diag(v / o)` where `o` is total industry output. `v` is either supplied to `load_tables_vectors` or computed as `o - colSums(x)` with `x` the raw IO matrix. If `o` is not supplied to `load_tables_vectors`, it is computed as `rowSums(x) + rowSums(y)` where `y` is the matrix of final demands. If both `o` and `v` are not supplied to `load_tables_vectors`, this is equivalent to computing V as `diag(1 - colSums(A))`, with A is the row-normalized IO matrix also used to compute the Leontief Inverse [B].

Value

If `long = TRUE` a molten data frame containing the elements of the decomposed flows matrix in the final column, preceded by several identifier columns. If `long = FALSE` the decomposed flows matrix is simply returned.

Author(s)

Bastiaan Quast

References

- Leontief, W. (Ed.). (1986). Input-output economics. *Oxford University Press*.
- Hummels, D., Ishii, J., & Yi, K. M. (2001). The nature and growth of vertical specialization in world trade. *Journal of international Economics*, 54(1), 75-96.
- Wang, Zhi, Shang-Jin Wei, and Kunfu Zhu (2013). Quantifying international production sharing at the bilateral and sector levels (No. w19677). *National Bureau of Economic Research*.

See Also

[bm](#), [kww](#), [wwz](#), [decompr-package](#)

Examples

```
# Load example data
data(leather)

# Create intermediate object (class 'decompr')
decompr_object <- load_tables_vectors(leather)

# Perform the Leontief decomposition of each country-industries
# exports into their value added origins by country-industry
leontief(decompr_object)
```

| | |
|-------------|---|
| load_tables | <i>Load the Input-Output and Final Demand Tables: Depreciated Interface</i> |
|-------------|---|

Description

This function loads the demand tables and defines all variables for the decomposition. It is kept in the package for backward compatibility. New users should use [load_tables_vectors](#) instead.

Usage

```
load_tables(x, y)
```

Arguments

- | | |
|---|--|
| x | the intermediate demand table, it has dimensions GN x GN (G = no. of country, N = no. of industries), excluding the first row and the first column which contains the country names, and the second row and second column which contain the industry names for each country. In addition, an extra row at the end should contain final demand. |
| y | the final demand table it has dimensions GN x MN, excluding the first row and the first column which contains the country names, the second column which contains the industry names for each country, and second row which contains the five decomposed final demands (M). |

Details

Adapted from code by Fei Wang.

Value

A 'decompr' class object.

Author(s)

Bastiaan Quast

See Also[load_tables_vectors](#)

load_tables_vectors *Load the Input-Output and Final Demand Tables*

Description

This function loads the demand tables and creates all matrices and variables required for the GVC decompositions.

Usage

```
load_tables_vectors(
  iot,
  x,
  y,
  k,
  i,
  o = NULL,
  v = NULL,
  null_inventory = FALSE
)
```

Arguments

| | |
|-----|--|
| iot | a Input Output Table object - a list with elements 'inter' (= x), 'final' (= y), 'output' (= o), 'countries' (= k) and 'industries' (= i) of class 'iot'. Alternatively these objects can be passed directly to the function, at least x, y, k and i need to be supplied. |
| x | intermediate demand table supplied as a numeric matrix of dimensions GN x GN (G = no. of country, N = no. of industries). Both rows and columns should be arranged first by country, then by industry (e.g. C1I1, C1I2, ..., C2I1, C2I2, ...) and should match (symmetry), such that rows and columns refer to the same country-industries. |
| y | final demand table supplied as a numeric matrix of dimensions GN x MN (M = no. of final demand categories recorded for each country). The rows of y need to match the rows of x, and the columns should also be arranged first by country, then by final demand category (e.g. C1FD1, C1FD2, ..., C2FD1, C2FD2, ...) with the order of the countries the same as in x. |
| k | character. A vector of country or region names of length G, arranged in the same order as they occur in the rows and columns of x, y. |
| i | character. A vector of industry names of length N, arranged in the same order as they occur in the rows and columns of x and rows of y. |

- o numeric. A vector of final outputs for each country-industry matching the rows of x and y . If not provided it will be computed as $\text{rowSums}(x) + \text{rowSums}(y)$.
- v numeric. A vector of value added for each country-industry matching the columns of x . If not provided it will be computed as $o - \text{colSums}(x)$.
- null_inventory logical. TRUE sets the inventory (last final demand category for each country) to zero.

Details

Adapted from code by Fei Wang.

Value

A 'decompr' class object - a list with the following elements:

| | |
|--------|---|
| Am | Imported / Exported goods IO shares matrix (x column-normalized by output o , with domestic entries set to 0) |
| B | Leontief Inverse matrix $(I - A)^{-1}$ where A is x column-normalized by output o . |
| Bd | Domestic part of Leontief Inverse matrix (inter-country elements of B set to 0, needed for WWZ decomposition) |
| Bm | Imported / Exported part of Leontief Inverse matrix (domestic elements of B set to 0, needed for WWZ decomposition) |
| L | Domestic economy Leontief Inverse matrix $(I - Ad)^{-1}$ where Ad is A with all inter-country elements set to 0 |
| E | Total Exports (output of each country-industry servicing foreign production or foreign final demand). |
| ESR | Total Exports by destination country. |
| Eint | Exports for intermediate production by destination country. |
| Efd | Exports for final demand by destination country. |
| Vc | Value added content of output (v / o). |
| G | Number of countries. |
| N | Number of industries. |
| GN | Number of country-industries. |
| k | Vector of country names. |
| i | Vector of industry names. |
| rownam | Unique country-industry names identifying the rows / columns of x and rows of y . |
| X | Total Output ($= o$). |
| Y | Total Final Demand by destination country. |
| Yd | Domestic Final Demand. |
| Ym | Foreign Final Demand. |

Author(s)

Bastiaan Quast

See Also

[leontief](#), [kww](#), [wwz](#), [decompr-package](#)

Examples

```
# Load example data
data(leather)
```

```
# Create intermediate object (class 'decompr')
decompr_object <- load_tables_vectors(leather)

# Examine the object
str(decompr_object)
```

 wwz

Wang-Wei-Zhu Decomposition of Gross Exports

Description

This function performs the Wang-Wei-Zhu decomposition of country-sector level gross exports into 16 value added components by importing country.

Usage

```
wwz(x, verbose = FALSE)
```

Arguments

`x` an object of the class 'decompr' obtained from [load_tables_vectors](#).
`verbose` logical, should timings of the calculation be displayed? Default is FALSE

Details

Adapted from code by Fei Wang.

Value

A data frame with exports decomposed into 16 components (columns), as detailed in Table E1 in the appendix of the paper, and additional diagnostic items:

| <i>Term</i> | <i>Description</i> |
|--------------|---|
| DVA_FIN | Domestic VA in final goods exports. |
| DVA_INT | Domestic VA in intermediate exports used by direct importer to produce domestic final goods consu |
| DVA_INTrexI1 | Domestic VA in intermediate exports used by the direct importer to produce intermediate exports fo |
| DVA_INTrexF | Domestic VA in intermediate exports used by the direct importer to produce final goods exports to t |

| | |
|--------------|--|
| DVA_INTrexI2 | Domestic VA in Intermediate exports used by the direct importer to produce intermediate exports to |
| RDV_INT | Domestic VA in intermediate exports that returns via intermediate imports (i.e. is used to produce a |
| RDV_FIN | Domestic VA in intermediate exports that returns home via final goods imports from the direct impo |
| RDV_FIN2 | Domestic VA in intermediate exports that returns home via in final goods imports from third countr |
| OVA_FIN | Third countries' VA in final goods exports. |
| MVA_FIN | Direct importer's VA in final goods exports. |
| OVA_INT | Third countries' VA in intermediate exports. |
| MVA_INT | Direct importer's VA in intermediate exports. |
| DDC_FIN | Double counted Domestic VA used to produce final goods exports. |
| DDC_INT | Double counted Domestic VA used to produce intermediate exports. |
| ODC | Double counted third countries' VA in home country's exports production. |
| MDC | Double counted direct importer's VA in home country's exports production. |

| <i>Diagnostic Item</i> | <i>Description</i> |
|------------------------|--|
| texp | Total Exports (matrix 'ESR' from load_tables_vectors). |
| texpint | Exports for intermediate production (matrix 'Eint' from load_tables_vectors). |

| | |
|--------------------|--|
| texpfd | Exports for final demand (matrix 'Efd' from load_tables_vectors). |
| texpdiff | Difference between Total Exports and the sum of the 16 terms. |
| texpdiffpercent | ... in percent of total exports. |
| texpfddiff | Difference between Final Exports and the sum of terms DVA_FIN, OVA_FIN and MVA_FIN. |
| texpfddiffpercent | ... in percent of final exports. |
| texpintdiff | Difference between Intermediate Exports and the sum of all the remaining terms (except DVA_FIN). |
| texpintdiffpercent | ... in percent of intermediate exports. |
| DViX_Fsr | DVA embodied in gross exports based on forward linkage. |

Author(s)

Bastiaan Quast

References

Wang, Zhi, Shang-Jin Wei, and Kunfu Zhu (2013). Quantifying international production sharing at the bilateral and sector levels (No. w19677). *National Bureau of Economic Research*.

See Also

[bm](#), [kww](#), [wwz2kww](#), [decompr-package](#)

Examples

```
# Load example data
data(leather)

# Create intermediate object (class 'decompr')
decompr_object <- load_tables_vectors(leather)

# Perform the WWZ decomposition
wwz(decompr_object)
```

wwz2kww

*Koopman-Wang-Wei from Wang-Wei-Zhu Decomposition***Description**

This function by default returns a disaggregated version of the the Koopman-Wang-Wei (KWW) decomposition breaking up sector-level gross exports into 9 value added terms, from an already computed and more detailed (16 term) Wang-Wei-Zhu decomposition of sector-level gross exports. An aggregation option also allows obtaining the aggregate KWW decomposition.

Usage

```
wwz2kww(x, aggregate = FALSE)
```

Arguments

x a data frame with the WWZ decomposition obtained from [wwz](#). Alternatively a 'decompr' class object from [load_tables_vectors](#) can be supplied, which will toggle calling `wwz()` first.

aggregate logical. TRUE aggregates the KWW decomposition to the country level, giving exactly the same output as [kww](#). FALSE maintains the sector level decomposition in KWW format.

Details

The mapping of the 16 terms in the WWZ decomposition to the 9 terms in the KWW decomposition is provided in table E2 in the appendix of the WWZ (2013) paper. The table is reproduced here using the term naming conventions followed in this package.

| <i>WWZ Terms</i> | <i>KWW Term</i> | <i>Description</i> |
|---------------------------|-----------------|---|
| DVA_FIN | DVA_FIN | Domestic VA in final goods exports. |
| DVA_INT, DVA_INTrexI1 | DVA_INT | Domestic VA in intermediate exports absorbed by direct import |
| DVA_INTrexF, DVA_INTrexI2 | DVA_INTrex | Domestic VA in intermediate exports reexported to third countr |
| RDV_FIN, RDV_FIN2 | RDV_FIN | Domestic VA in intermediate exports that returns home via fina |
| RDV_INT | RDV_INT | Domestic VA in intermediate exports that returns via intermedia |

| | | |
|------------------|---------|--|
| DDC_FIN, DDC_INT | DDC | Double counted Domestic Value Added in gross exports. WWZ separates DDC from DDC |
| MVA_FIN, OVA_FIN | FVA_FIN | Foreign VA in final goods exports. WWZ separates FVA from DDC |
| MVA_INT, OVA_INT | FVA_INT | Foreign VA in intermediate exports. WWZ separates FVA from DDC |
| MDC, ODC | FDC | Double counted Foreign Value Added in gross exports. WWZ separates FDC from DDC |

Value

A data frame with exports decomposed into 9 components (columns), see the table above and [kww](#) for a shorter description of the 9 terms.

Note

If both WWZ and KWW decompositions are required, it is computationally more efficient to call `wwz2kww(x, aggregate = TRUE)` on an already computed WWZ decomposition, than to call [kww](#) on a 'decompr' object.

Author(s)

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References

Koopman, R., Wang, Z., & Wei, S. J. (2014). Tracing value-added and double counting in gross exports. *American Economic Review*, 104(2), 459-94.

Wang, Zhi, Shang-Jin Wei, and Kufu Zhu (2013). Quantifying international production sharing at the bilateral and sector levels (No. w19677). *National Bureau of Economic Research*.

See Also

[wwz](#), [kww](#), [decompr-package](#)

Examples

```
# Load example data
data(leather)

# Create intermediate object (class 'decompr')
decompr_object <- load_tables_vectors(leather)

# Perform the WWZ decomposition
WWZ <- wwz(decompr_object)

# Obtain a disaggregated KWW decomposition
```

```
KWW <- wwz2kww(WWZ)

# Aggregate KWW
wwz2kww(WWZ, aggregate = TRUE)

# Same as running KWW directly, but the former is more efficient
# if we already have the WWZ
kww(decompr_object)
```

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