

Package ‘comtrade’

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Title Access and Analyse UN Comtrade International Trade Data

Version 0.1.1

Description Download and analyse international merchandise and services trade data from the United Nations Comtrade database
<<https://comtradeplus.un.org/>>. Retrieve bilateral trade flows, compute trade analytics (revealed comparative advantage, trade concentration, trade balance), and convert between commodity classifications (Harmonised System 'HS', Standard International Trade Classification 'SITC', Broad Economic Categories 'BEC'). Covers 200+ reporter countries, 60+ years of goods trade data (1962-present), and services trade via Extended Balance of Payments Services ('EBOPS'). Works without registration for basic queries. A free Application Programming Interface ('API') key from
<<https://comtradedeveloper.un.org/>> unlocks full access.

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<https://github.com/charlescoverdale/comtrade>

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ct_available	<i>Check Data Availability</i>
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Description

Check which years and classifications have data available for a given reporter country.

Usage

```
ct_available(reporter, cache = TRUE)
```

Arguments

reporter	Character. Reporter country ISO3 code.
cache	Logical. Cache results. Default TRUE.

Value

A data.frame with columns: year, classification, type (C/S), frequency (A/M).

Examples

```
op <- options(comtrade.cache_dir = tempdir())
avail <- tryCatch(ct_available("GBR"), error = function(e) NULL)
if (!is.null(avail)) head(avail)
options(op)
```

ct_balance	<i>Trade Balance by Partner</i>
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Description

Compute the trade balance (exports minus imports) for a reporter country against each trading partner.

Usage

```
ct_balance(  
  reporter,  
  partner = "0",  
  year = NULL,  
  commodity = "TOTAL",  
  cache = TRUE  
)
```

Arguments

reporter	Character. Reporter country ISO3 code.
partner	Character. Partner country code, or "0" for World. Default "0".
year	Integer. Year(s) to query.
commodity	Character. Commodity code. Default "TOTAL".
cache	Logical. Default TRUE.

Value

A data.frame with columns: partner, partner_desc, year, exports, imports, balance.

Examples

```
op <- options(comtrade.cache_dir = tempdir())  
  
# The Comtrade API is rate-limited and can return a non-JSON response  
# under load. tryCatch so the example degrades gracefully if that  
# happens during the CRAN check.  
bal <- tryCatch(ct_balance("GBR", year = 2023), error = function(e) NULL)  
if (!is.null(bal)) head(bal)  
  
options(op)
```

ct_cache_clear	<i>Clear the Comtrade Cache</i>
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Description

Remove all cached Comtrade API responses from the local cache directory.

Usage

```
ct_cache_clear()
```

Value

Invisibly returns TRUE if the cache was cleared, FALSE if no cache directory existed.

Examples

```
op <- options(comtrade.cache_dir = tempdir())
ct_cache_clear()
options(op)
```

ct_commodities	<i>Search Commodity Codes</i>
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Description

Search the HS (Harmonized System) commodity classification for codes matching a keyword or code pattern. Uses a built-in table of 96 two-digit HS chapters with descriptions.

Usage

```
ct_commodities(query = NULL, level = NULL)
```

Arguments

query	Character. Search term (matched against commodity descriptions) or a partial HS code (e.g., "27" for mineral fuels). Default NULL (return all).
level	Integer. HS digit level to return. Currently only level 2 is available from the built-in table. Default NULL (all levels).

Value

A data.frame with columns:

code HS 2-digit chapter code

description Chapter description

level Digit level (always 2 for built-in table)

parent Parent code (NA for 2-digit chapters)

Examples

```
# Search for petroleum-related codes
ct_commodities("petroleum")

# List all 2-digit HS chapters
ct_commodities()

# Find codes starting with "27" (mineral fuels)
ct_commodities("27")
```

ct_compare

Compare Countries

Description

Compare multiple countries' trade in a given commodity, showing exports, imports, balance, and revealed comparative advantage.

Usage

```
ct_compare(reporters, commodity = "TOTAL", year = NULL, cache = TRUE)
```

Arguments

reporters	Character vector. ISO3 codes for countries to compare.
commodity	Character. Commodity code. Default "TOTAL".
year	Integer. Year to query.
cache	Logical. Default TRUE.

Value

A data.frame with columns: reporter, reporter_desc, exports, imports, balance, rca.

Examples

```

op <- options(comtrade.cache_dir = tempdir())

cmp <- tryCatch(ct_compare(c("GBR", "DEU", "FRA"), commodity = "87",
                          year = 2023),
               error = function(e) NULL)
if (!is.null(cmp)) head(cmp)

options(op)

```

ct_concordance	<i>Convert Between Trade Classifications</i>
----------------	--

Description

Convert commodity codes between HS (Harmonized System), SITC, and BEC classifications. Uses a built-in concordance table covering the most common 2-digit HS chapters mapped to SITC sections and BEC categories.

Usage

```
ct_concordance(code, from = "HS", to = "SITC")
```

Arguments

code	Character. The commodity code(s) to convert.
from	Character. Source classification: "HS", "SITC", or "BEC".
to	Character. Target classification: "HS", "SITC", or "BEC".

Details

For detailed 4/6-digit concordances, see the concordance R package on CRAN.

Value

A data.frame with columns: from_code, from_desc, to_code, to_desc.

Examples

```

# Convert HS chapter 27 (mineral fuels) to SITC
ct_concordance("27", from = "HS", to = "SITC")

# Convert SITC section 0 (food) to HS
ct_concordance("0", from = "SITC", to = "HS")

```

ct_growth

Trade Growth Over Time

Description

Compute year-on-year and cumulative trade growth for a bilateral flow.

Usage

```
ct_growth(
  reporter,
  partner = "0",
  commodity = "TOTAL",
  flow = "X",
  years = NULL,
  cache = TRUE
)
```

Arguments

reporter	Character. Reporter country ISO3 code.
partner	Character. Partner country code. Default "0" (World).
commodity	Character. Commodity code. Default "TOTAL".
flow	Character. "X" or "M". Default "X".
years	Integer vector. Years to query (at least 2).
cache	Logical. Default TRUE.

Value

A data.frame with columns: year, value, growth_yoy, growth_cumulative, index_100.

Examples

```
op <- options(comtrade.cache_dir = tempdir())

g <- tryCatch(ct_growth("GBR", flow = "X", years = 2018:2023),
              error = function(e) NULL)
if (!is.null(g)) head(g)

options(op)
```

ct_hhi	<i>Trade Concentration Index (HHI)</i>
--------	--

Description

Compute the Herfindahl-Hirschman Index measuring the concentration of a country's trade across partners or products.

Usage

```
ct_hhi(
  reporter,
  flow = "X",
  year = NULL,
  by = "partner",
  level = 2L,
  cache = TRUE
)
```

Arguments

reporter	Character. Reporter country ISO3 code.
flow	Character. "X" or "M". Default "X".
year	Integer. Year to query.
by	Character. Concentrate by "partner" or "product". Default "partner".
level	Integer. HS digit level (only used when by = "product"). Default 2.
cache	Logical. Default TRUE.

Details

HHI ranges from 0 (perfectly diversified) to 10,000 (single partner/product). Interpretation: < 1,500 = low concentration, 1,500-2,500 = moderate, > 2,500 = high.

Value

A data.frame with columns: year, hhi, concentration, n_items, top_item, top_share_pct.

Examples

```
op <- options(comtrade.cache_dir = tempdir())

# Export partner concentration
tryCatch(ct_hhi("AUS", flow = "X", year = 2023, by = "partner"),
  error = function(e) NULL)

# Export product concentration
tryCatch(ct_hhi("AUS", flow = "X", year = 2023, by = "product"),
```

```

      error = function(e) NULL)

options(op)

```

ct_rca

Revealed Comparative Advantage (Balassa Index)

Description

Compute the Revealed Comparative Advantage for a country's exports. $RCA > 1$ indicates the country has a comparative advantage in that product.

Usage

```
ct_rca(reporter, year = NULL, level = 2L, cache = TRUE)
```

Arguments

reporter	Character. Reporter country ISO3 code.
year	Integer. Year to query.
level	Integer. HS digit level: 2, 4, or 6. Default 2.
cache	Logical. Default TRUE.

Details

The Balassa index is defined as: $RCA = (\text{country exports of product } i / \text{country total exports}) / (\text{world exports of product } i / \text{world total exports})$

Value

A data.frame with columns: commodity_code, commodity_desc, reporter_value, world_value, reporter_share, world_share, rca, has_advantage.

Examples

```

op <- options(comtrade.cache_dir = tempdir())

rca <- tryCatch(ct_rca("AUS", year = 2023), error = function(e) NULL)
# Products where Australia has comparative advantage
if (!is.null(rca)) rca[rca$has_advantage, ]

options(op)

```

ct_reporters	<i>List Reporter Countries</i>
--------------	--------------------------------

Description

Get the list of countries that report trade data to UN Comtrade, with their ISO3 codes and M49 numeric codes.

Usage

```
ct_reporters(cache = TRUE)
```

Arguments

cache Logical. Cache the reference table locally. Default TRUE.

Value

A data.frame with columns:

code M49 numeric country code (used in API queries)

iso3 ISO 3166-1 alpha-3 code (e.g., GBR, USA, AUS)

name Country name

is_group Logical. TRUE for country groups (e.g., EU, OECD)

Examples

```
op <- options(comtrade.cache_dir = tempdir())
# The Comtrade API is rate-limited and can return a non-JSON response
# under load. tryCatch so the example degrades gracefully if that
# happens during the CRAN check.
reporters <- tryCatch(ct_reporters(), error = function(e) NULL)
if (!is.null(reporters)) head(reporters)
options(op)
```

ct_services	<i>Get Services Trade Data</i>
-------------	--------------------------------

Description

Download international services trade data from the UN Comtrade database using the EBOPS (Extended Balance of Payments Services) classification.

Usage

```
ct_services(
  reporter,
  partner = "0",
  service = "TOTAL",
  flow = c("X", "M"),
  year = NULL,
  cache = TRUE
)
```

Arguments

reporter	Character. Reporter country ISO3 code.
partner	Character. Partner country code. Default "0" (World).
service	Character. EBOPS service code. Default "TOTAL".
flow	Character. Trade flow: "X" (exports), "M" (imports). Can be a vector. Default c("X", "M").
year	Integer. Year(s) to query (2000-present). Default: most recent available year.
cache	Logical. Cache results locally. Default TRUE.

Value

A data.frame with columns: reporter, reporter_desc, partner, partner_desc, flow, flow_desc, service_code, service_desc, year, trade_value_usd.

Examples

```
op <- options(comtrade.cache_dir = tempdir())

# UK services exports to the world
srv <- tryCatch(ct_services("GBR", year = 2022, flow = "X"),
  error = function(e) NULL)
if (!is.null(srv)) head(srv)

options(op)
```

ct_set_key

Set the Comtrade API Key

Description

Store your UN Comtrade API key for the current session. The key is saved as an R option and optionally as an environment variable for persistence.

Usage

```
ct_set_key(key, install = FALSE)
```

Arguments

- key Character. Your Comtrade API subscription key.
- install Logical. If TRUE, also sets the COMTRADE_API_KEY environment variable via `Sys.setenv()`, which persists for the current R session. For permanent storage, add COMTRADE_API_KEY=your-key to your .Renvirom file. Default FALSE.

Details

Get a free API key at <https://comtradedeveloper.un.org/>. The free tier allows 500 calls per day and up to 100,000 records per call.

Value

Invisibly returns the key.

Examples

```
ct_set_key("your-subscription-key-here")
```

ct_share	<i>World Trade Share</i>
----------	--------------------------

Description

Compute a country’s share of world trade in a given commodity.

Usage

```
ct_share(reporter, commodity = "TOTAL", flow = "X", year = NULL, cache = TRUE)
```

Arguments

- reporter Character. Reporter country ISO3 code.
- commodity Character. Commodity code. Default "TOTAL".
- flow Character. "X" or "M". Default "X".
- year Integer. Year to query.
- cache Logical. Default TRUE.

Value

A data.frame with columns: commodity_code, reporter_value, world_value, share_pct.

Examples

```

op <- options(comtrade.cache_dir = tempdir())

sh <- tryCatch(ct_share("AUS", commodity = "2601", flow = "X", year = 2023),
               error = function(e) NULL)
if (!is.null(sh)) head(sh)

options(op)

```

ct_top_partners	<i>Top Trading Partners</i>
-----------------	-----------------------------

Description

Rank a country's trading partners by total trade value.

Usage

```
ct_top_partners(reporter, flow = "X", year = NULL, n = 20L, cache = TRUE)
```

Arguments

reporter	Character. Reporter country ISO3 code.
flow	Character. "X" for exports, "M" for imports. Default "X".
year	Integer. Year to query.
n	Integer. Number of top partners to return. Default 20.
cache	Logical. Default TRUE.

Value

A data.frame with columns: partner, partner_desc, value, share_pct, rank.

Examples

```

op <- options(comtrade.cache_dir = tempdir())

top <- tryCatch(ct_top_partners("GBR", flow = "X", year = 2023),
                error = function(e) NULL)
if (!is.null(top)) head(top)

options(op)

```

ct_top_products	<i>Top Export or Import Products</i>
-----------------	--------------------------------------

Description

Rank a country's traded products by value, showing the top N with percentage shares.

Usage

```
ct_top_products(
  reporter,
  flow = "X",
  year = NULL,
  n = 20L,
  level = 2L,
  cache = TRUE
)
```

Arguments

reporter	Character. Reporter country ISO3 code.
flow	Character. "X" for exports, "M" for imports.
year	Integer. Year to query.
n	Integer. Number of top products to return. Default 20.
level	Integer. HS digit level: 2, 4, or 6. Default 2.
cache	Logical. Default TRUE.

Value

A data.frame with columns: commodity_code, commodity_desc, value, share_pct, rank.

Examples

```
op <- options(comtrade.cache_dir = tempdir())

top <- tryCatch(ct_top_products("AUS", flow = "X", year = 2023),
               error = function(e) NULL)
if (!is.null(top)) head(top)

options(op)
```

ct_trade	<i>Get Bilateral Trade Data</i>
----------	---------------------------------

Description

Download merchandise trade data from the UN Comtrade database. Returns bilateral trade flows between reporter and partner countries, optionally filtered by commodity code and trade flow direction.

Usage

```
ct_trade(
  reporter,
  partner = "0",
  commodity = "TOTAL",
  flow = c("X", "M"),
  year = NULL,
  frequency = "A",
  classification = "HS",
  cache = TRUE
)
```

Arguments

reporter	Character. Reporter country ISO3 code (e.g., "GBR", "USA", "AUS") or numeric M49 code. Use "all" for all reporters (limited to 1 per query on the free tier).
partner	Character. Partner country ISO3 code, or "0" / "W00" for World (all partners aggregated). Default "0" (World).
commodity	Character. HS commodity code(s). "TOTAL" for aggregate trade, "AG2" for all 2-digit chapters, or specific codes like "2709" (crude petroleum). Default "TOTAL".
flow	Character. Trade flow: "X" (exports), "M" (imports), "RX" (re-exports), "RM" (re-imports). Can be a vector for multiple flows. Default c("X", "M").
year	Integer. Year(s) to query (1962-present). Can be a vector. Maximum 12-year span per query on the free tier. Default: most recent available year.
frequency	Character. "A" for annual (default), "M" for monthly.
classification	Character. Commodity classification system. Default "HS" (latest Harmonized System revision). See ct_commodities() for available classifications.
cache	Logical. Cache results locally for 24 hours. Default TRUE.

Value

A data.frame with columns:

reporter Reporter country code

reporter_desc Reporter country name
partner Partner country code
partner_desc Partner country name
flow Trade flow code (X, M, RX, RM)
flow_desc Trade flow description
commodity_code Commodity code
commodity_desc Commodity description
year Reference year
period Reference period (year or year-month)
trade_value_usd Trade value in US dollars
net_weight_kg Net weight in kilograms
quantity Quantity in supplementary units
quantity_unit Supplementary quantity unit

Examples

```
op <- options(comtrade.cache_dir = tempdir())

# The Comtrade API is rate-limited and can return a non-JSON response
# under load. tryCatch so the examples degrade gracefully if that
# happens during the CRAN check.

# UK total exports to the world, 2023
uk <- tryCatch(ct_trade("GBR", year = 2023, flow = "X"),
               error = function(e) NULL)
if (!is.null(uk)) head(uk)

# US imports of crude petroleum from Saudi Arabia
tryCatch(ct_trade("USA", partner = "SAU", commodity = "2709", flow = "M",
                 year = 2020:2023),
         error = function(e) NULL)

# Australia's top-level trade with China
tryCatch(ct_trade("AUS", partner = "CHN", year = 2023),
         error = function(e) NULL)

options(op)
```

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