Package: propopbirth (via r-universe)

June 5, 2026

Title Birth rate forecast based on the FSO methodology

Version 0.1.0

Description First, model input data are calculated. Second, TFR (total fertility rate) and MAB (mean age of the mother at birth) are predicted. Third, TFR and MAB forecasts are used to predict the age-specific birth rates.

URL Set URL, https://statistik-aargau.github.io/propopbirth/

License GPL (>= 3)

Depends R (>= 3.5)

Imports dplyr, tibble, forecast, BFS, assertthat, tidyr, purrr, stats, rlang, stringi, utils

Suggests knitr, ggplot2, rmarkdown, DT, readxl, data.table, testthat (>= 3.0.0), constructive (>= 1.3.0)

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Contents

`create_input_data` *Create model input data*

Description

Create model input data

Usage

```
create_input_data(
  population,
  births,
  year_first,
  year_last,
  age_fert_min,
  age_fert_max,
  fert_hist_years,
  binational = TRUE,
  digits_tfr = 3,
  digits_mab = 3,
  digits_fer = 5
)
```

Arguments

`population`	data frame, female population at 'fertile age'; columns: spatial_unit, year, age, pop, with or without nat (nationality).
`births`	data frame, births of females in the fertile age range; columns: spatial_unit, year, age, pop, with or without nat (nationality).
`year_first`	numeric, first year.
`year_last`	numeric, last year.
`age_fert_min`	numeric, minimum age (of 'fertile age').
`age_fert_max`	numeric, minimum age (of 'fertile age').
`fert_hist_years`	how many years are used to calculate age-specific fertility rates?

binational	boolean, TRUE indicates that projections discriminate between two groups of nationalities. FALSE indicates that the projection is run without distinguishing between nationalities.
digits_tfr	numeric, number of digits for tfr (total fertility rate).
digits_mab	numeric, number of digits for mab (mean age of the mother at birth).
digits_fer	numeric, number of digits for the fertility rate.

Value

list with:

- tfr (total fertility rate),
- mab (mean age of the mother at birth),
- fer (fertility rate of last year(s))

Examples

```
create_input_data(
  population = fso_pop,
  births = fso_birth |>
    dplyr::filter(spatial_unit %in% c("Stadt Zuerich", "Frauenfeld", "Aarau")),
  year_first = 2011,
  year_last = 2023,
  age_fert_min = 15,
  age_fert_max = 49,
  fert_hist_years = 1,
  binational = TRUE
)
```

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forecast_fertility_rate

Forecast age-specific fertility rates.

Description

Forecast age-specific fertility rates.

Usage

```
forecast_fertility_rate(
  fer_dat,
  tfr_dat,
  mab_dat,
  year_start,
  year_end,
  maxit = 1000,
  abstol = 0.001,
  digits_birth_rate = 5
)
```

Arguments

fer_dat	data frame, fertility data, tibble with variables spatial_unit, nat, age, fer.
tfr_dat	tfr data, tibble with variables spatial_unit, nat, year, tfr.
mab_dat	mab data, tibble with variables spatial_unit, nat, year, mab.
year_start	numeric, start of prediction.
year_end	numeric, end of prediction.
maxit	numeric, maximum iterations of optimization.
abstol	numeric, absolute tolerance of optimization.
digits_birth_rate	numeric, number of digits of the birth rate.

Value

birth rate, tibble with variables spatial_unit, nat, age, birth_rate.

---

forecast_tfr_mab *Forecast total fertility rate (TFR) or mean age of the mother at birth (MAB)*

Description

Forecast total fertility rate (TFR) or mean age of the mother at birth (MAB)

Usage

```
forecast_tfr_mab(
  topic,
  topic_data,
  trend_model,
  temporal_model,
  temporal_end = NA,
  constant_model
)
```

Arguments

topic	character, defines the parameter to calculate (tfr or mab).
topic_data	data frame, input data tailored to the topic with variables: spatial_unit, nat, year, either tfr or mab. This data is obtained by the function create_input_data(). Columns for spatial_unit and/or nat are optional.
trend_model	vector, specifies the model type (ARIMA or lm), the first (start) and last (end) year. If an lm model is used, the window of past years (trend_past) and the proportional amount of past years used to fit the model (trend_prop) can be specified.

temporal_model	vector, model type (cubic, Bezier or constant), first and last year, proportion of trend (trend_prop), proportion for slopes (z0_prop) and proportion of the slope at the end point (z1_prop).
temporal_end	data frame, contains y-values at the end of the temporal forecast period (y_end).
constant_model	model type (constant), first and last year.

Value

data frame, predictions for either tfr or mab.

---

fso_birth *FSO data for births*

Description

Data was retrieved from the FSO.

Usage

```
fso_birth
```

Format

A data frame with 437054 rows and 5 variables:

year year within the range 2010-2023

spatial_unit Swiss municipalities by name

nat Nationality; either "ch" = Swiss or "int" = international

age Age in full years

n_birth number of births

Examples

```
dplyr::glimpse(fso_birth)
```

fso_pop *Population data from the Federal Statistical Office*

Description

End year population from different spatial units.

Usage

```
fso_pop
```

Format

An object of class `tbl_df` (inherits from `tbl`, `data.frame`) with 2940 rows and 5 columns.

get_population_data *Get FSO population (females at 'fertile' age)*

Description

Get FSO population (females at 'fertile' age)

Usage

```
get_population_data(
  number_fso,
  year_first,
  year_last,
  age_fert_min,
  age_fert_max,
  spatial_code,
  spatial_unit,
  binational = TRUE
)
```

Arguments

`number_fso`	character, number of FSO table (STAT-TAB)
`year_first`	numeric, first year.
`year_last`	numeric, last year.
`age_fert_min`	numeric, minimum age (of 'fertile age').
`age_fert_max`	numeric, maximum age (of 'fertile age').
`spatial_code`	character, vector, official FSO codes.
`spatial_unit`	character, vector, spatial unit names (free choice).

`binational` boolean, `TRUE` indicates that projections discriminate between two groups of nationalities. `FALSE` indicates that the projection is run without distinguishing between nationalities.

Value

female population at 'fertile age' at the end of the year, tibble (spatial_unit, year, age, pop), with or without nat (nationality)

Examples

```
get_population_data(
  number_fso = "px-x-0102010000_101",
  year_first = 2020,
  year_last = 2023,
  age_fert_min = 15,
  age_fert_max = 49,
  spatial_code = c("0261", "4566", "4001"),
  spatial_unit = c("Stadt Zuerich", "Frauenfeld", "Aarau"),
  binational = TRUE
)
```

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