

# EuroCity\_vignett9871

Madlen Hoffstadt

2023-05-31

```
library(EuroCity)
library(knitr)
#> Warning: Paket 'knitr' wurde unter R Version 4.2.3 erstellt
```

## Overview: Functionality of the EuroCity package

### What do I use the EuroCity package for?

EuroCity provides a user interface in form of a shiny app to compare selected European cities regarding:

- country-wide self-reported life satisfaction
- inhabitants' satisfaction with several quality of life criteria
- Product prices & living expenses

It also provides you the respective data sets, as well as functions to filter these data sets for certain city names, product prices, and quality of life criteria.

The following vignette gives you an overview over how to use the `shall_I_move` shiny app (1), what the included data sets contain (2), and how to use filter functions (3).

---

## 1: Shiny app user interface - `shall_I_move()`

You can start the shiny app for city comparison by running:

```
shall_I_move()
```

This command opens the user interface. It consists of 2 tabs:

1. **Life satisfaction:** Comparing country-wide life satisfaction and satisfaction with quality of life criteria for 2 chosen cities.
2. **Living expenses:** Comparing prices of selected products for 2 chosen cities.

## Shall I move? - Comparing European Cities

### What is this about?

This shiny app will relief some of your stress caused by ruminating whether you should move to another city (and perhaps more importantly: where to?).

Just choose two cities you would like to compare and those criteria that matter most to you.

The app will show you how these cities compare to each other in nice graphs and plots



Figure 1: EuroCity shall I move app

This figure shows a close-up of the sidebar input fields. The first field, 'Choose country of first city', has a dropdown menu with 'Select' as the current choice. The second field, 'Choose country of second city', has a dropdown menu with 'France' as the current choice. The third field, 'Choose the second city to compare', has a dropdown menu with 'Bordeaux' as the current choice. Below this field, a list of cities is displayed: Bordeaux, Lille, Marseille, Paris, Rennes, and Strasbourg. The 'Paris' option is highlighted with a grey background.

Figure 2: Sidebar of EuroCity shall I move app

## Sidebar: Choosing countries and cities

Both tabs contain a side bar, allowing the user to choose 2 cities to compare.

To facilitate search, users can first choose the country of interest. This causes a conditional drop-down menu to appear, showing those cities within the chosen country that are included in the data:

*NOTE:* The app will return an error if:

- You have not selected any countries or cities yet. In this case, the plots illustrating the comparisons do not appear.
- You have chosen the same city twice. In this case, please select two non-identical cities for comparison
- Furthermore, there unfortunately is not data available on the self-reported life satisfaction in the UK. However, you can still see how well cities in the UK have been rated regarding quality of life criteria.

## Tab 1: Comparing Life Satisfaction of 2 European cities

Already after having chosen 2 countries, 2 plots will appear on the right-hand side: \* A line graph showing the trajectory of self-reported life satisfaction in the two chosen countries from 2003 until 2021 \* A map illustrating the country-means of life satisfaction in 2021 for all European countries included in the app

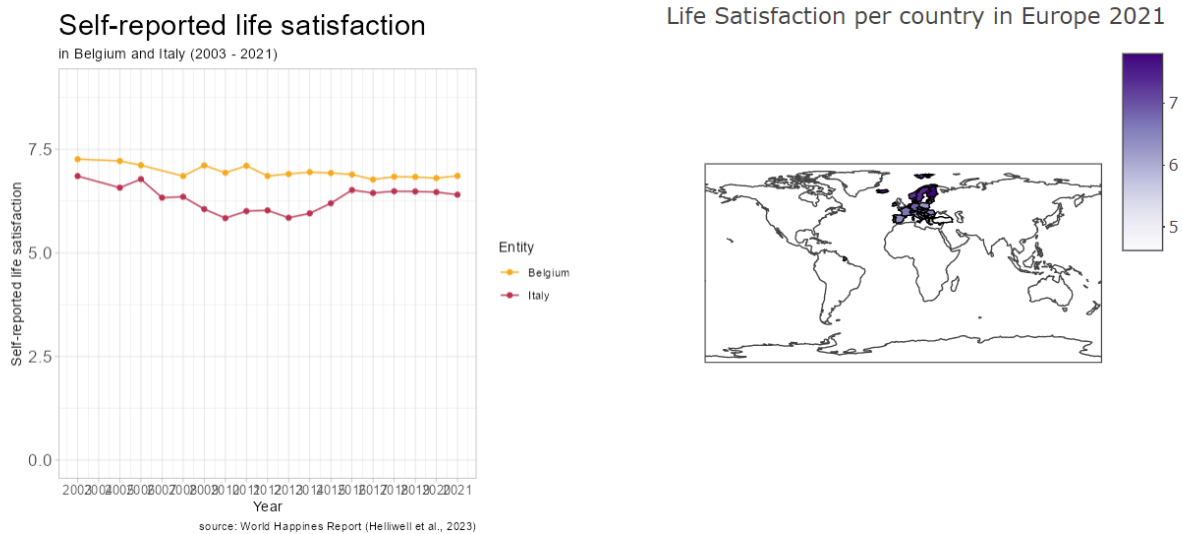


Figure 3: Menu to choose quality of life criteria

Next, select a criterion that you are interested in in the radio-button-menu below:

You will then see a bar plot comparing citizens' ratings of the chosen criterion for the respective cities:

## Tab 2: Comparing Living Expenses of 2 European cities

To compare living expenses, direct to the **Living Expenses** tab and choose two cities of interest in the side bar.

Below, you will find a drop-down menu in which you can choose the product for which you would like to compare prices. Just like in the drop-down menu for country and city, first choose a product category. The following categories are available:

Which criterion matters most to you?

- ☒ Public transport
- ☐ Nice green spaces
- ☐ Air quality
- ☐ Cleanliness
- ☐ Diverse cultural offer
- ☐ Sport facilities
- ☐ LGBTQI+ friendliness
- ☐ Quality of life for ethnic minorities
- ☐ Education
- ☐ Quality of health system
- ☐ Low noise level
- ☐ Safety
- ☐ General satisfaction of inhabitants

Figure 4: Menu to choose quality of life criteria

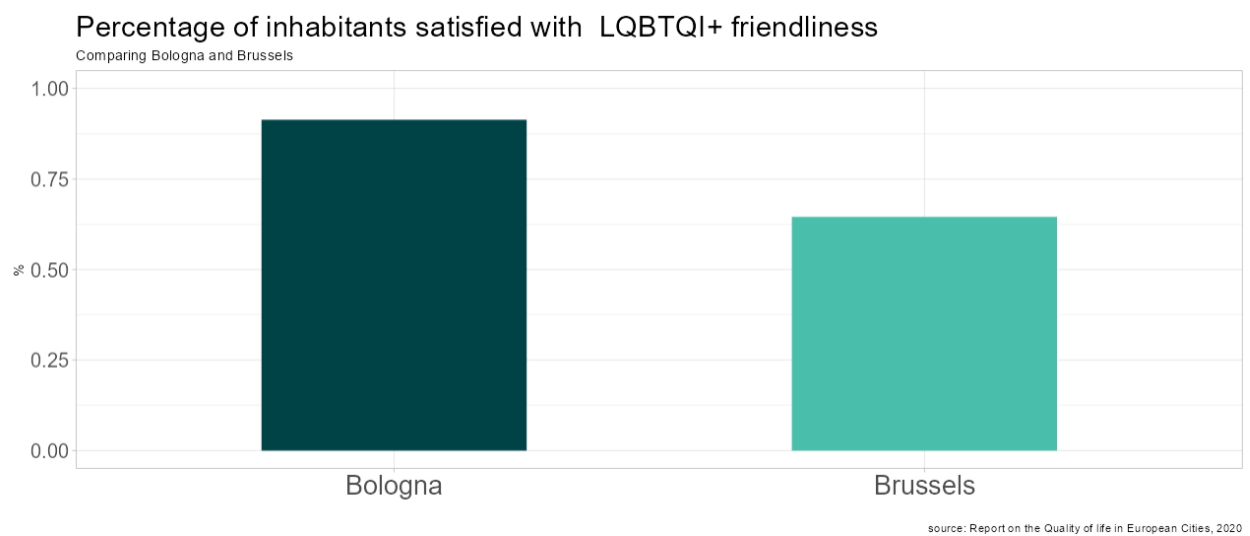
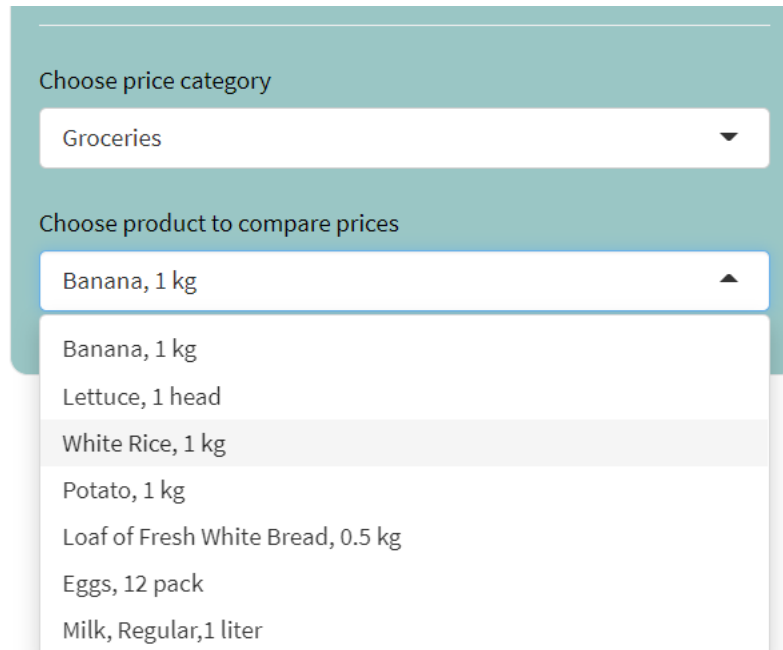


Figure 5: Menu to choose quality of life criteria

- Housing
- Groceries
- Alcoholic Beverages
- Leisure Time and Going Out
- Transportation

After having chosen a category, a second drop-down menu will appear in which you can select a specific product within this category:



Choose price category

Groceries ▼

Choose product to compare prices

Banana, 1 kg ▲

Banana, 1 kg

Lettuce, 1 head

White Rice, 1 kg

Potato, 1 kg

Loaf of Fresh White Bread, 0.5 kg

Eggs, 12 pack

Milk, Regular, 1 liter

Figure 6: Menu to choose quality of life criteria

In the main panel on the right, a bar plot will be shown which illustrates how much the chosen product cost on average in May 2023 in the chosen cities (prices in €):

## 2: Included data sets

The following data sets are included in **EuroCity**:

- **cities**: overview over the cities included in the package. This is mainly used for internal computations (but feel free to use it).
- **price\_categories**: overview over the products which are included in the living expenses comparison tab. This is also mainly used for internal function calls.
- **city\_prices**: contains the minimum, maximum, and average price of several goods in each European city (in May 2023).
- **life\_satisfaction**: contains the mean self-reported life satisfaction of each European country between 2003 and 2021.
- **qualityOL**: Contains the percentage of a city's inhabitants reporting to be either "rather satisfied" or "very satisfied" with a range of quality of life criteria in their city

Below you find a summary of the 3 main data sets in **EuroCity**:

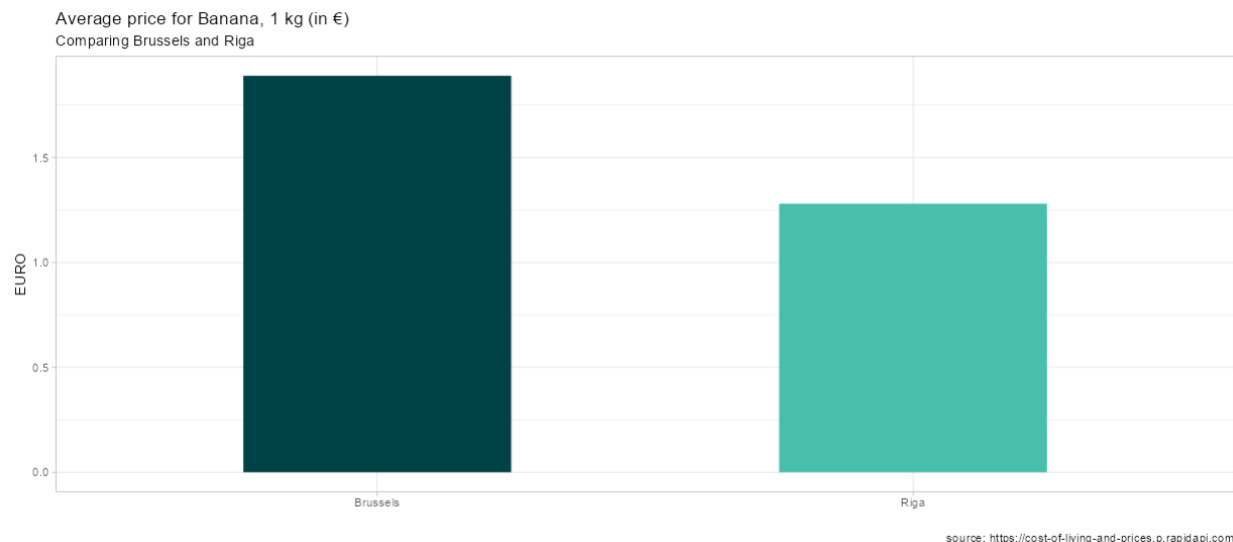


Figure 7: Menu to choose quality of life criteria

### The city\_prices data set

This data frame contains prices of various goods in European cities. Prices are reported in Euro and were retrieved in May 2023. Data was taken from Cost of Living & Prices API. Copyright therefore does not fall under the MIT license but belongs to Cost of Living & Prices API.

Call this data set by running `city_prices`

#### Format:

The data frame includes:

- **country:** The country name
- **city:** The city name (in English)
- **item\_name:** The name of the product
- **category:** The Category which the product belongs to. Values are “Housing”, “Groceries”, “Alcoholic Beverages”, “Leisure time and going out”, “Transportation”
- **min:** lowest price of the product in the city (in €)
- **avg:** average price of the product in the city (in €). This value is presented in the shiny app comparison.
- **max:** highest price of the product in the city (in €)

```
head(city_prices)
#>   country      city
#> 1  Spain Barcelona
#> 2  Spain Barcelona
#> 3  Spain Barcelona
#> 4  Spain Barcelona
#> 5  Spain Barcelona
#> 6  Spain Barcelona
#>                                     item_name
#> 1 Price per square meter to Buy Apartment Outside of City Center
#> 2   Price per square meter to Buy Apartment in City Center
#> 3                                     Banana, 1 kg
#> 4                               Bottle of Wine, Mid-Range Price
```

```
#> 5                      Eggs, 12 pack
#> 6                      Lettuce, 1 head
#>      category      min      max      avg
#> 1      Housing 2373.44 4127.72 3133.32
#> 2      Housing 4127.72 6191.59 4968.95
#> 3      Groceries 1.24    3.10    1.83
#> 4 Alcoholic Beverages 3.10    8.25    5.16
#> 5      Groceries 1.24    3.87    2.25
#> 6      Groceries 0.62    1.55    1.02
```

### The life\_satisfaction data set

This data frame contains a subset of the data of the World Happiness Report 2023. Data were collected yearly from 2003 to 2021 and includes country-wide means of self-reported life satisfaction on a scale of 0 to 10.

Call this data set by running `life_satisfaction`

#### Format:

The data frame includes:

- **Entity:** the Country name
- **Year:** Year of measurement
- **Life\_satisfaction:** Country mean of self-reported life satisfaction on a scale of 0 to 10
- **Code:** Country Code (used for plotting map in shiny)

```
head(life_satisfaction)
#>      Entity Year Life_satisfaction Code
#> 1 Albania 2005      4.634252 ALB
#> 2 Albania 2007      5.485470 ALB
#> 3 Albania 2008      5.268937 ALB
#> 4 Albania 2009      5.867422 ALB
#> 5 Albania 2010      5.510124 ALB
#> 6 Albania 2011      4.550648 ALB
```

### The qualityOL data set

Contains the results of the Report on the Quality of life in European Cities, reported in 2019 and published in 2020.

Call this data set by running `qualityOL`

#### Format:

The data frame includes:

- **country:** Country name
- **city:** City name
- **variable:** Criterion participants were asked to rate. Values are:
  - “LGBTQI” = LGBTQI+ friendliness
  - “air” = Air quality
  - “clean” = Cleanness
  - “culture” = Diverse cultural offer

- “edu” = Quality of education
  - “greenery” = Presence of green spaces
  - “health” = Quality of health system
  - “noise” = Low noise level
  - “racial” = Quality of life for ethnic minorities
  - “safety” = Perceived safety
  - “sport” = Presence of sport facilities
  - “transp” = Public transport
  - “satisfaction” = general life satisfaction
- **percentage**: percentage of participants reporting to be ‘rather satisfied’ or ‘very satisfied’ with the respective criterion in their city

---

### 3: Filter functions

The package also includes functions which you can use to filter the data sets presented above to get the data you are interested in.

There are two options:

- Filter the `city_prices` data set for 2 cities. This can be done using the `filter_prices()` function.
- Filter the `qualityOL` data set for 2 cities and a criterion of your interest. For this, use the `filter_QoL_comparison` function.

#### Filter\_prices()

If you want to do your own analyses apart from the shiny App and wish to compare living expenses between 2 cities, you can use the `filter_prices()` function.

#### Function arguments

It takes as arguments 2 city names:

```
filter_prices(city1, city2)
```

You can find valid values for `city1` and `city2` either in the documentation (run `?filter_prices`) or by running:

```
unique(city_prices$city)
#> [1] "Barcelona" "Athens" "Amsterdam" "Bologna" "Bordeaux"
#> [6] "Brussels" "Helsinki" "Copenhagen" "Lisbon" "Dublin"
#> [11] "Hamburg" "Groningen" "Berlin" "Aalborg" "Bratislava"
#> [16] "Bucharest" "Budapest" "Madrid" "Rome" "Oslo"
#> [21] "Paris" "Prague" "Stockholm" "Sofia" "Rotterdam"
#> [26] "Tallinn" "Vilnius" "Zagreb" "Warsaw" "Verona"
#> [31] "Zurich" "Vienna" "Ljubljana" "Lille" "Malmö"
#> [36] "Munich" "Riga" "Reykjavik" "Valletta" "Gdańsk"
#> [41] "Oulu" "Leipzig" "Braga" "Marseille" "Antwerp"
#> [46] "Tirana" "Strasbourg" "Skopje" "Podgorica" "Białystok"
#> [51] "Nicosia" "Miskolc" "Málaga" "Košice" "Graz"
#> [56] "Heraklion" "Oviedo" "Geneva" "Burgas" "Ostrava"
```



```
#> [61] "Turin"      "Rostock"    "Rennes"    "Palermo"   "Naples"
#> [66] "Manchester" "London"    "Glasgow"   "Cardiff"   "Belfast"
#> [71] "Dortmund"   "Essen"     "Liège"
```

## Demonstration

For instance, if you would like to get data on the living expenses in Berlin and Amsterdam, run the following code:

```
BerAms_prices <- filter_prices("Berlin", "Amsterdam")
```

This function returns a data frame in the same format as `city_prices`(see above):

```
head(BerAms_prices)
#>      city                                     item_name
#> 1 Amsterdam Price per square meter to Buy Apartment Outside of City Center
#> 2 Amsterdam Price per square meter to Buy Apartment in City Center
#> 3 Amsterdam Banana, 1 kg
#> 4 Amsterdam Bottle of Wine, Mid-Range Price
#> 5 Amsterdam Eggs, 12 pack
#> 6 Amsterdam Lettuce, 1 head
#>      category      avg
#> 1 Housing 5380.00
#> 2 Housing 7837.98
#> 3 Groceries 1.74
#> 4 Alcoholic Beverages 7.22
#> 5 Groceries 2.93
#> 6 Groceries 0.96
```

But it now only contains data on Amsterdam and Berlin:

```
unique(BerAms_prices$city)
#> [1] "Amsterdam" "Berlin"
```

## Filter quality of life rating

Likewise, you can also filter the `qualityOL` data set for 2 cities and a criterion you are interested in.

### Function arguments

The function takes two city names as arguments, as well as the criterion you would like to compare the cities on:

```
filter_QoL_comparison(city1, city2, criterion)
```

To find out which cities and criteria you can filter by, check the documentation (`?filter_QoL_comparison`).

## Demonstration

Say you want to compare citizen's satisfaction with the public transport system in Amsterdam and Berlin, run the following code:

```
BerAms_transport <- filter_QoL_comparison("Berlin", "Amsterdam", "transp")
```

This returns a data set in the same format as `qualityOL` but now only containing 2 rows:

```
BerAms_transport
#> # A tibble: 2 x 3
#> # Groups:   variable [1]
#>   variable city      percentage
#>   <chr>    <chr>         <dbl>
#> 1 transp  Amsterdam      0.813
#> 2 transp  Berlin         0.829
```