ESPON

EUROPEAN UNION

Co-financed by the European Regional Development Fund

Inspire Policy Making with Territorial Evidence

// Data visualisation: Generating maps with ESPON mapkit and open data

Excercise
Analysing Foreign Direct Investments to European regions

Context

ESPON study: **The World in Europe: Global FDI Flows towards Europe**

Provides recommendations that could support regions and cities in their positioning and defining their policies towards receiving FDI, as well as integrating the attraction of foreign firms in regional development strategies by focusing on:

- FDI patterns & trends
- Factors for attracting FDI
- Relevance for regional growth, competitiveness and disparities
- Policy responses

Context

europa.eu/rapid/press-release_IP-19-1532_en.htm

European Commission - Press release

Foreign Investment Screening: new European framework to enter into force in April 2019

Brussels, 5 March 2019

The Council of the EU today approved a new framework to screen foreign direct investments coming into the European Union, thus concluding the legislative process on this proposal.

This means, the new framework will enter into force in April this year. Based on a Commission proposal presented by President Juncker in his 2017 State of the Union Address, the new framework will help safeguarding Europe's security, public order and strategic interests when it comes to foreign investments into our Union.

In reaction to the Council's decision President Jean-Claude **Juncker** said*: "Today's decision is a proof the EU is able to act quickly when strategic interests of our citizens and economy are at stake. With the new investment screening framework, we are now much better equipped to ensure that investments coming from countries outside the EU actually benefit our interests. I committed to work for a Europe that protects, in trade as in other areas; with this new legislation in place we are delivering on a crucial part of our promise."*

Context

https://www.independent.co.uk/topic/foreign-direct-investment

INDEPENDENT

NEWS POLITICS VOICES FINAL SAY SPORT CULTURE VIDEO INDY/LIFE INDYBEST LONG READS INDY100 VOUCHE

w.theguardian.com/business/2018/may/21/brexit-blamed-for-dramatic-fall-in-uk-business-registrations

Brexit blamed for dramatic fall in UK business registrations

Collapse is mirrored by tumble in direct foreign investment into Britain of 90%

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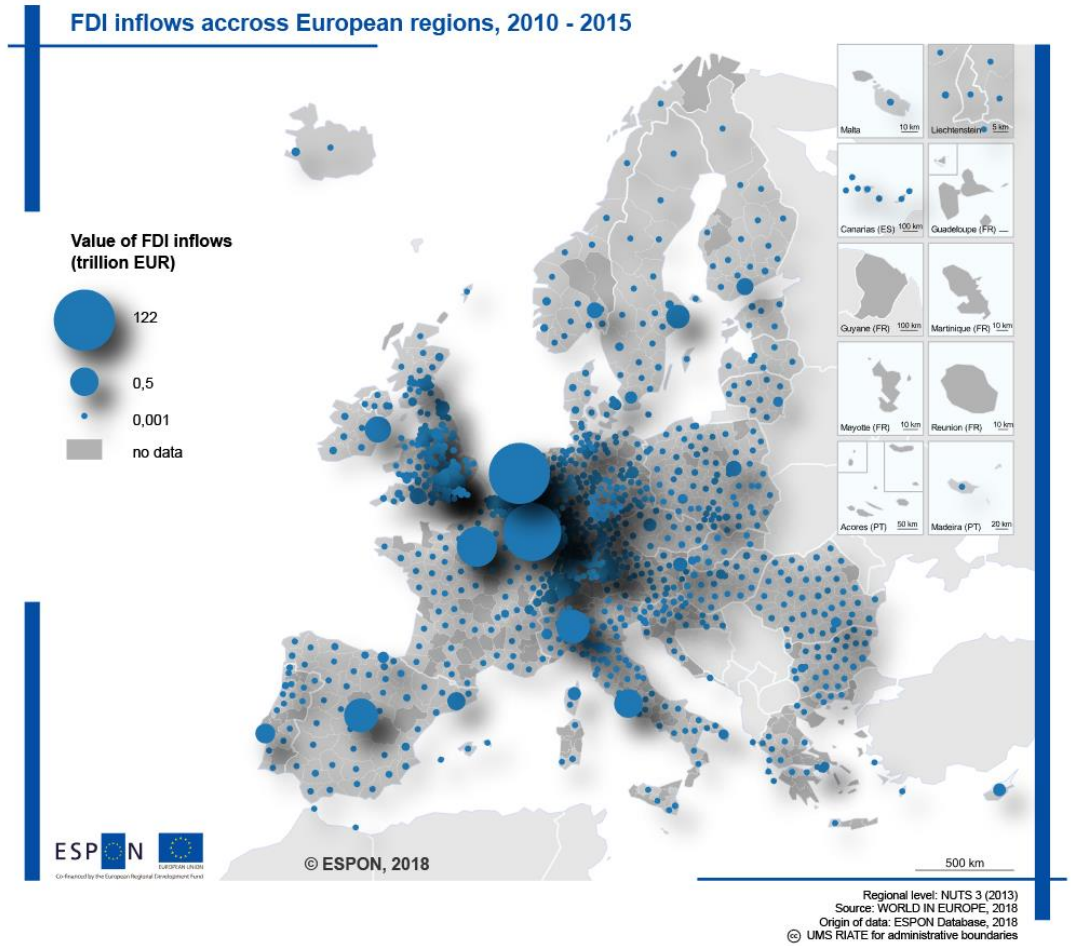
foreign direct investment

Scenario for excercise I

The study provides information of the FDI inflows to NUTS3 regions cumulatively for the periods for 2003 – 2009 and 2010 – 2015.

We are interested in understanding the the size of the average annual investments over the period 2010 – 2015 in per capita, in order to compare the attractiveness of investments among groups of regions with different population size.



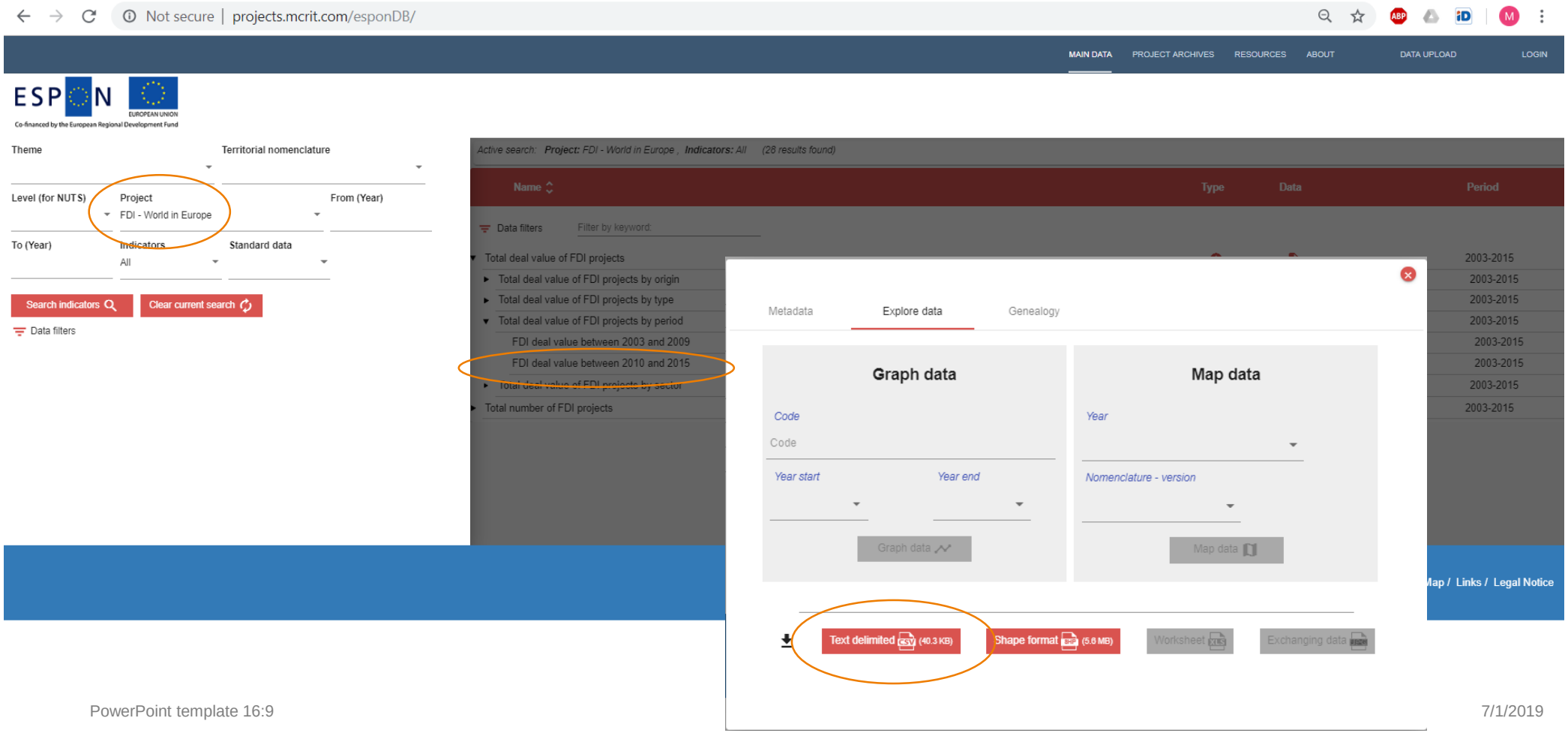
Downloading the data from ESPON Database Portal

What do we need?

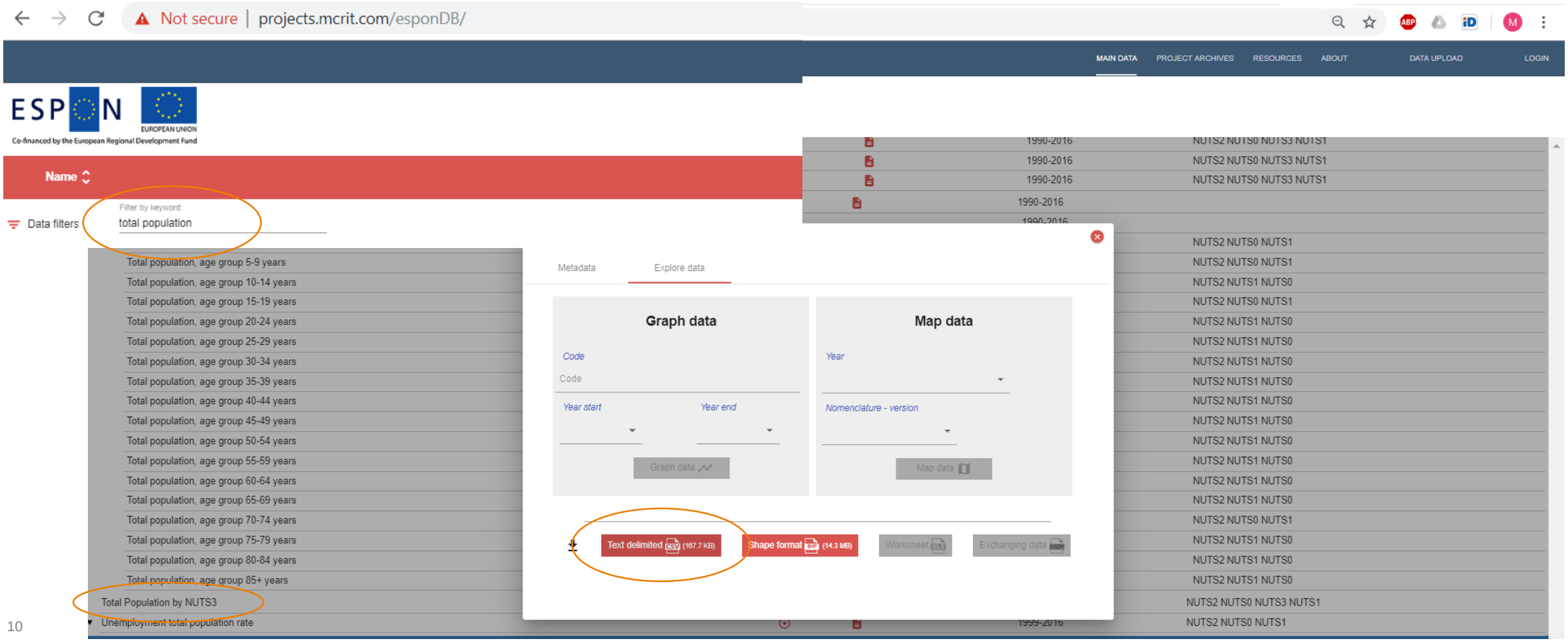
- FDI deal values.
- Population data for normalisation.

Normalisation is transforming a set of data so that they may be compared in a meaningful way.

Find FDI data by project, keyword or theme



Find population data by keyword or theme



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Preparing the data for mapping

Text delimited or shape format?

- Shape format has geometries, administrative codes as well as statistical attributes.
- Text delimited file has administrative codes and statistical attributes.

Shape formats from ESPON database portal are ready for spatial analysis and mapping.

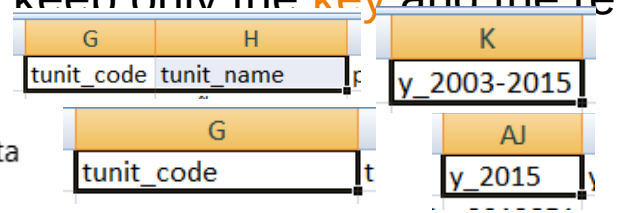
Text delimited data needs to be joined with shapes first.

Both types of data allows to associate records in one table with records in another table through a common field, known as a key. Most common key in spatial data analysis is code for administrative units. In the EU level statistics, this is regulated by the NUTS regulation.

While it is easier to prepare data (add/subtract/multiply/divide) cells/rows/columns in excel type spreadsheet application, than in QGIS, we will use text delimited data for our exercise.

Preparing the data

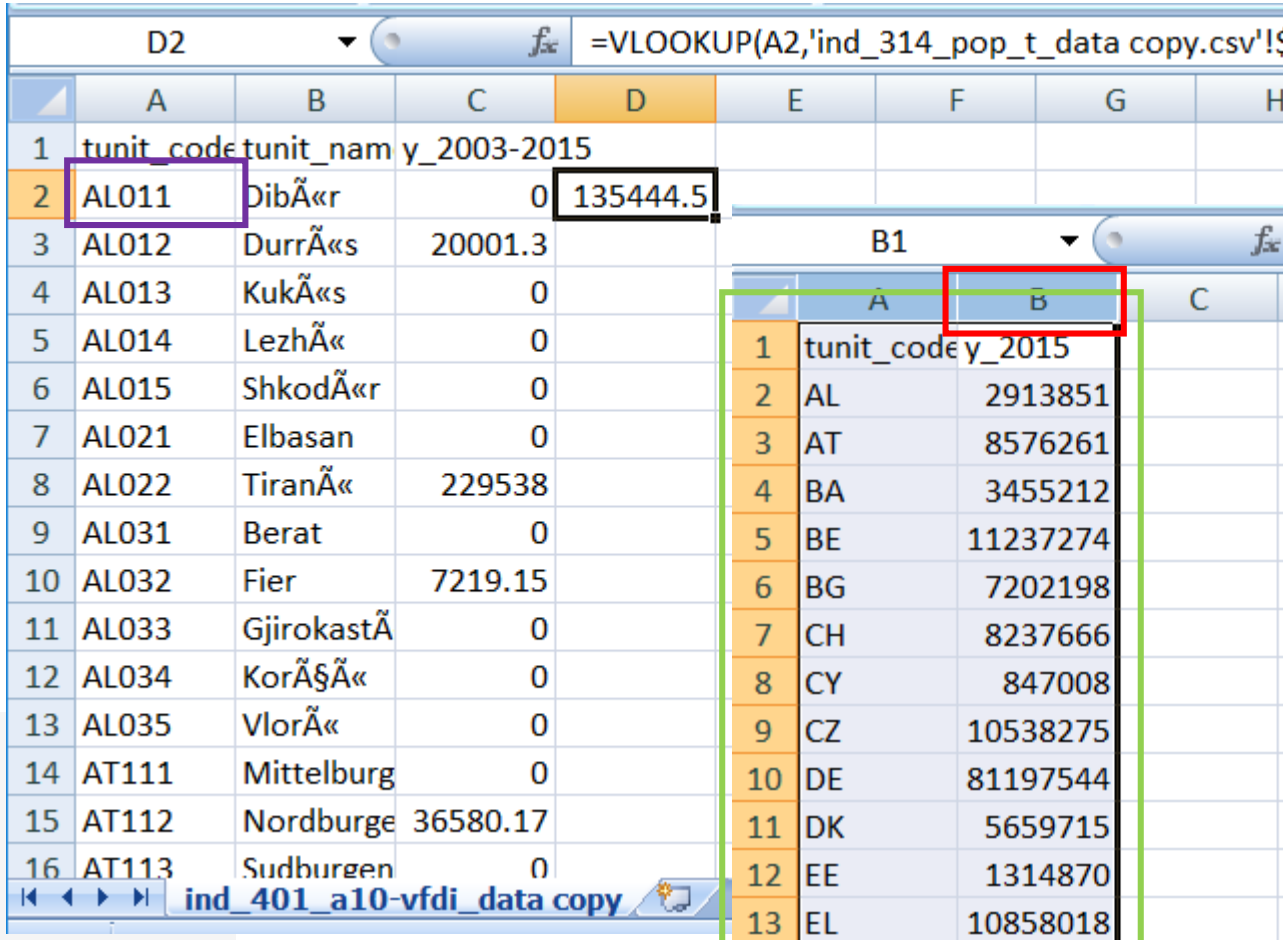
- Save the data in a work folder where we can easily access it.
- Make copies so you can always easily backtrack your steps or restart the analysis.
- Open and explore the data and the metadata.
- Identify relevant columns such as the key and attributes.
- Clean up the dataset, and keep only the key and the relevant attributes for easier navigation.
  - FDI ind_401_a10-vfdi_data copy
  - Population ind_314_pop_t_data



- Use VLOOKUP or similar functions to join different tables using the key when working with spreadsheets.

Using VLOOKUP in Excel to combine tables

- Open the FDI table.
- Click on cell D2.
- Enter the formula =VLOOKUP(A2,'ind_314_pop_t_ data copy.csv'!$A:$B,2,FALSE).
- Expand the formula.
- Save as new table “fdi inh”



value - The value to look for in the first column of a table.

table - The table from which to retrieve a value.

col_index - The column in the table from which to retrieve a value.

range_lookup - [optional] TRUE = approximate match (default). FALSE = exact match.

Make the necessary calculations

- Open the FDI table
- Multiply FDI values by 1000 (values, population values and metadata).
- Calculate FDI per inhabitant in a year by dividing

TIP: pay attention to auto formatting of cells in Excel.

- When opening a data table in Excel, pay attention to the auto formatting of cells.
- Excel by default tends to convert information that it recognises as a date to date.
- Therefore, 1 German NUTS2 and 6 NUTS3 regions will be converted into date, which you need to manually correct again.
  - Insert the correct codes
  - Set the type for the cells as Text.

DEB3I	Rhein-Pfalz-Kreis
DEB3J	Mainz-Bingen
DEB3K	SÃ¼dwestpfalz
DEC01	Regionalverband SaarbrÃ¼cken
DEC02	Merzig-Wadern
DEC03	Neunkirchen
DEC04	Saarlouis
DEC05	Saarpfalz-Kreis
DEC06	St. Wendel
DED21	Dresden, Kreisfreie Stadt
DED2C	Bautzen
DED2D	GÃ¶rlitz

DEB3I	Rhein-Pfalz-Kreis
DEB3J	Mainz-Bingen
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Dec-03	Neunkirchen
Dec-04	Saarlouis
Dec-05	Saarpfalz-Kreis
Dec-06	St. Wendel
DED21	Dresden, Kreisfreie Stadt
DED2C	Bautzen
DED2D	Gorlitz

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Explore QGIS and the MapKit

ESPON Public MapKit - why to use it?

- Free & open source map template with predesigned layout.
- Quick and easy way to get into mapping without prior extensive knowledge about coordination systems, projections, etc.
- A large variety of spatial data with creative commons license.
- Easy to use with both new and old data.

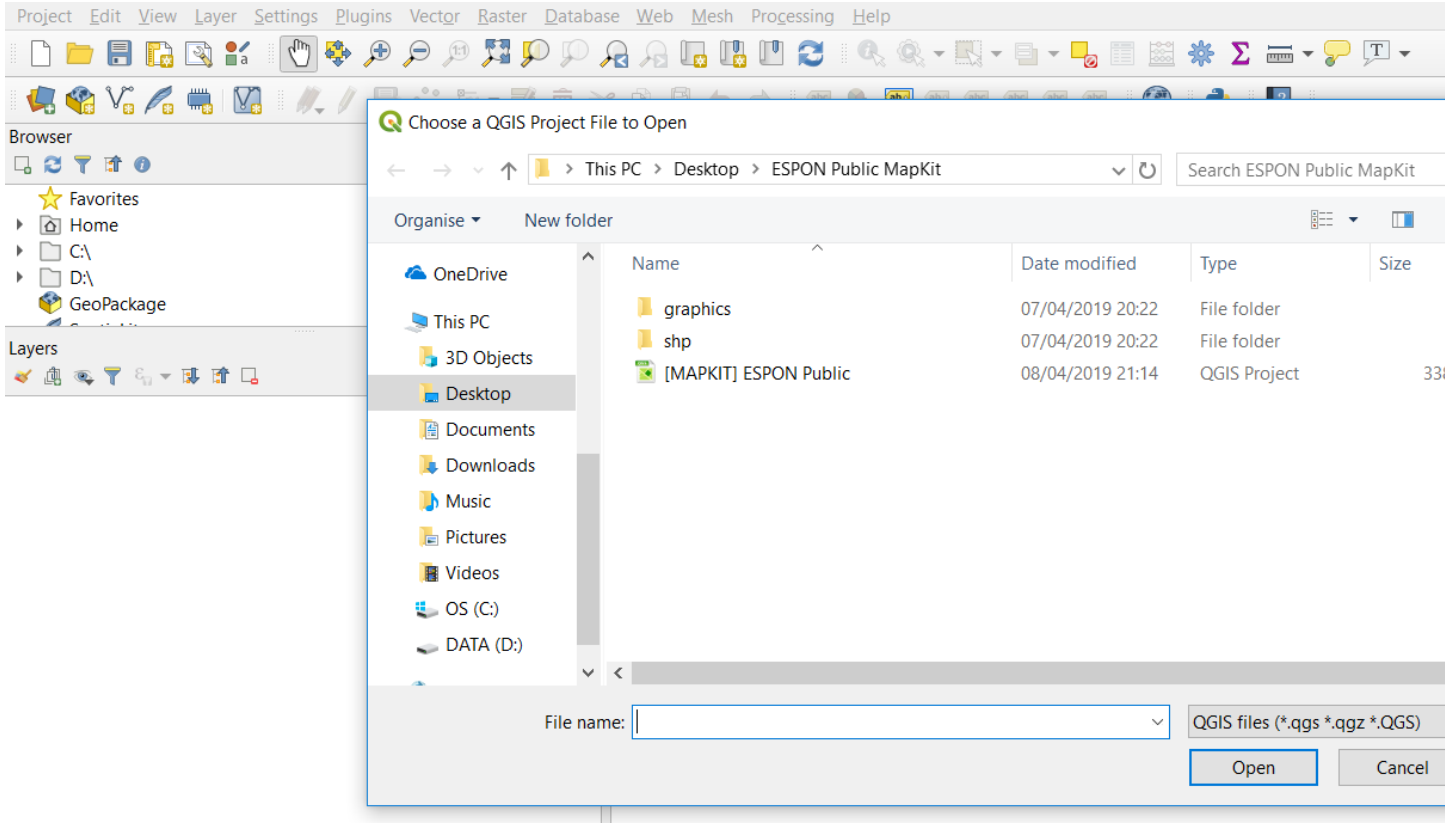
QGIS- why to use it?

- QGIS is a user friendly Open Source Geographic Information System (GIS) licensed under the GNU General Public License. QGIS is an official project of the Open Source Geospatial Foundation (OSGeo). It runs on Linux, Unix, Mac OSX, Windows and Android and supports numerous vector, raster, and database formats and functionalities.

- https://qgis.org/

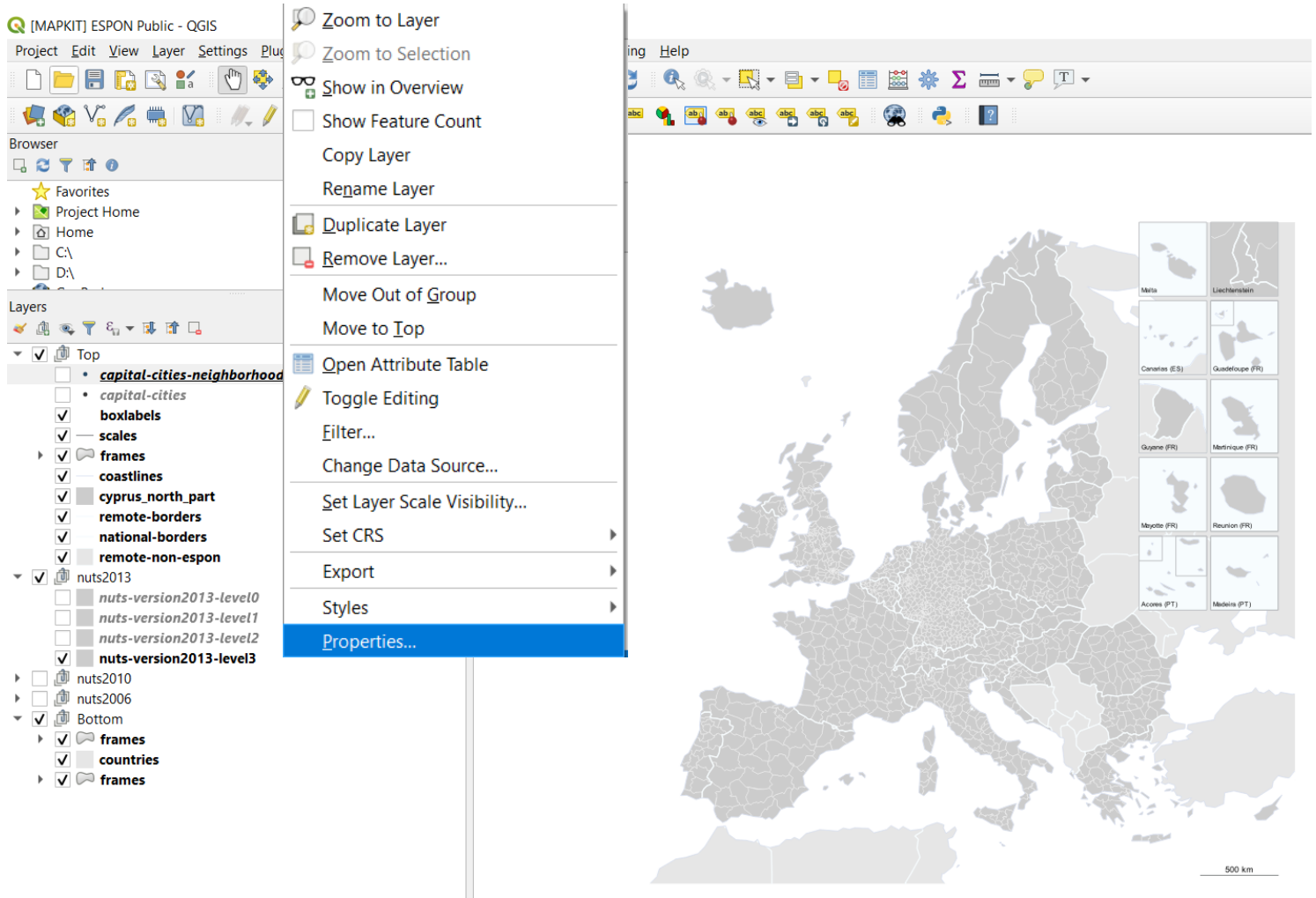
Download and open the ESPON Public MapKit

- Download the ESPON Public MapKit from the resource section of the ESPON Database.
- Open QGIS Desktop.
- Click on Project - Open – and locate the ESPON Public MapKit QGIS project file.
- Alternatively, locate the ESPON Public MapKit file and open it from the folder.



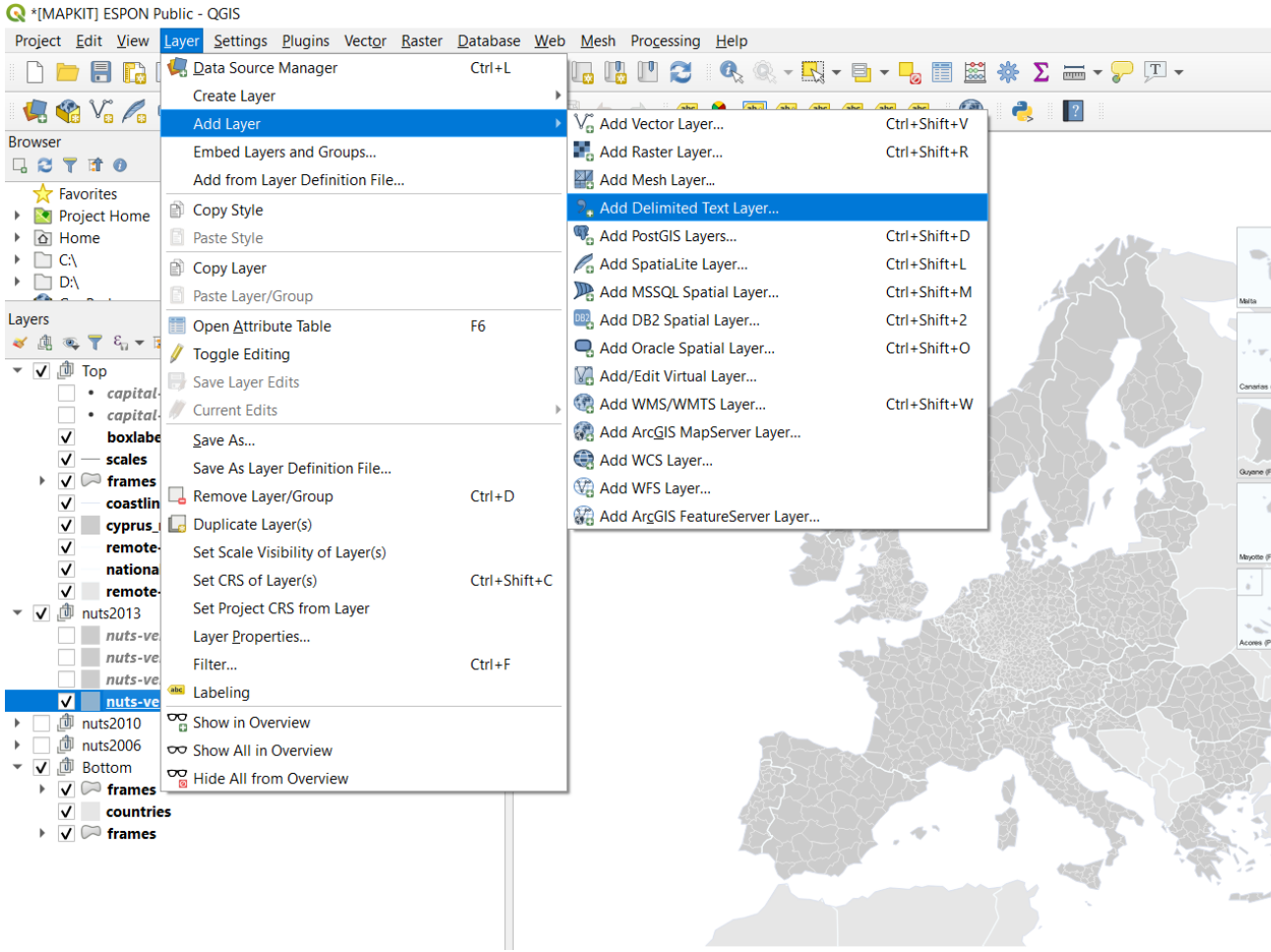
Explore the MapKit and QGIS: Data view

- Data view (default) for analysis
  - Layer tree for navigation (right click)
    - Open Attribute Table – view data
    - Duplicate layer
    - Properties
      - Source fields – type of data
      - Join – joining tables
      - Symbology – visualising data



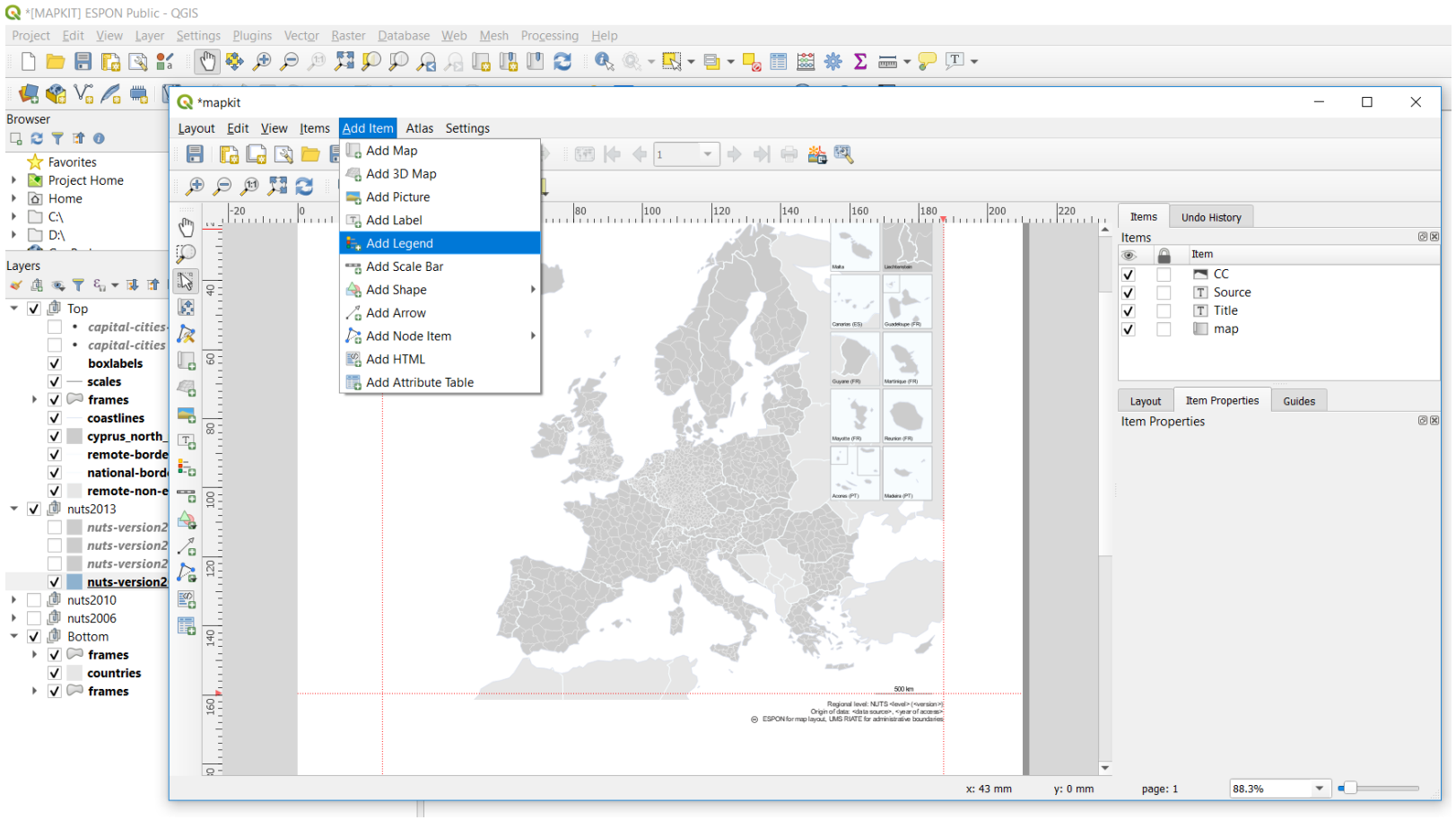
Explore the MapKit and QGIS: Data view

- Data view (default) for analysis
  - Top menu
    - Add layer – adding additional data
      - Add vector layer – add shapes
      - Add Delimited Text layer – add data tables
    - Processing
      - Toolbox – powerful GIS tools
        - Refactor tool – change attribute type



Explore the MapKit and QGIS: Layout view

- Layout view for publishing
  - Top menu
    - Project – Layout – mapkit



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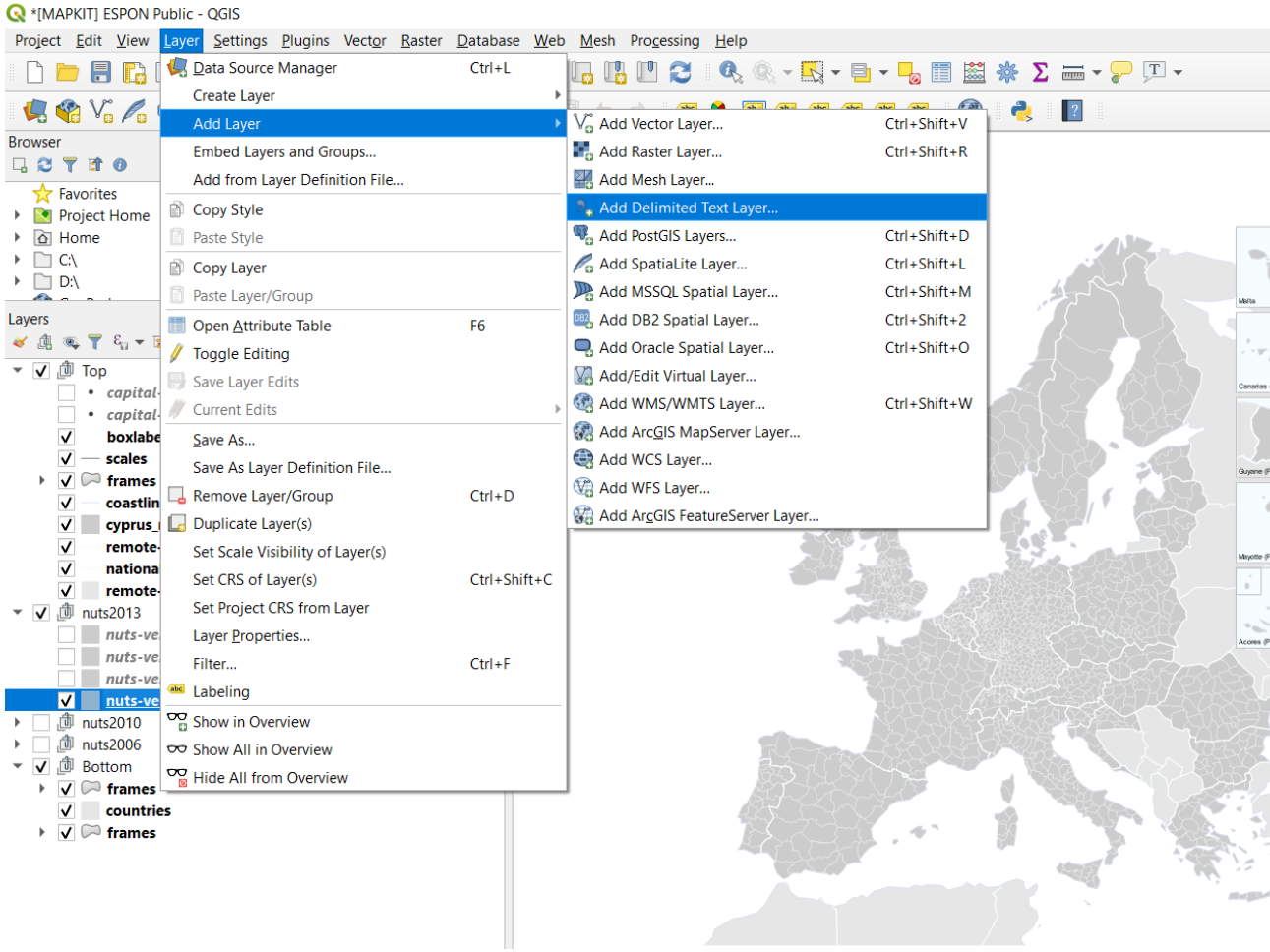
Joining data in QGIS

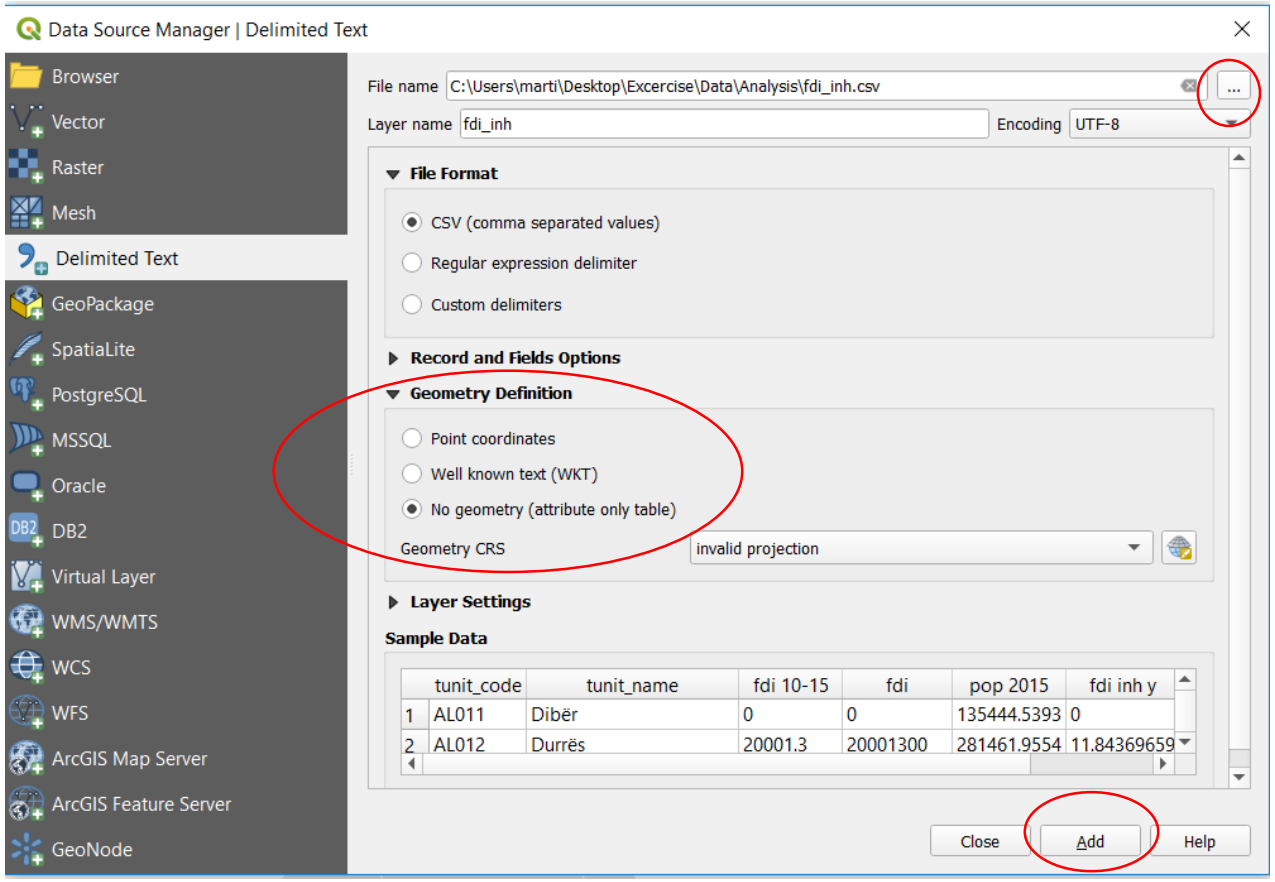
Add layer

- Data view (default) for analysis
  - Top menu
    - Add layer – adding additional data
      - Add Delimited Text layer – add data tables



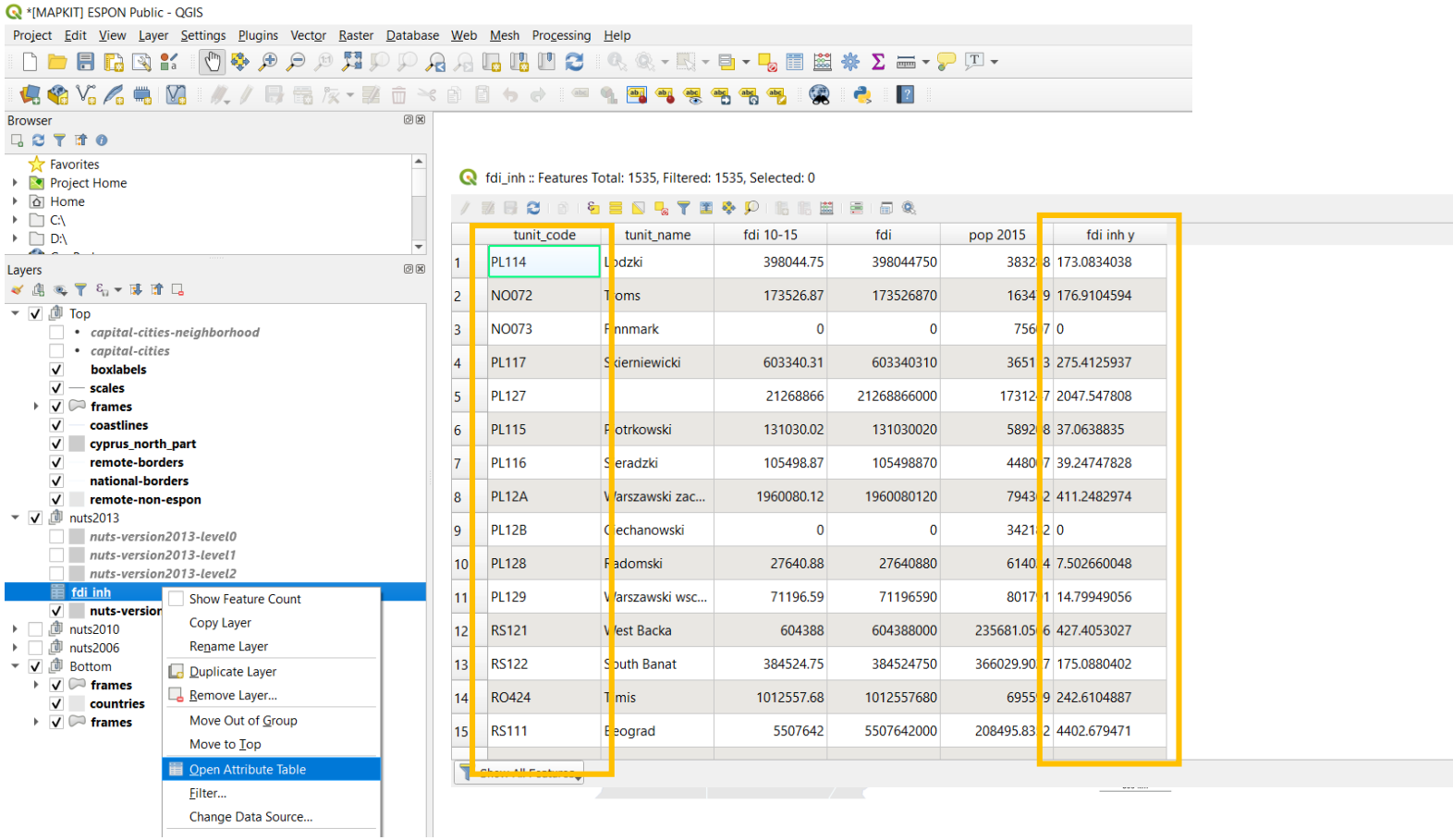
Add Layer (Delimited Text)

- Browse the file fdi inh.csv and import under File name - ...
- Find
- Tick the box No Geometry under the Geometry Definition
- Click Add.
- Layer is now visible in Layer tree.



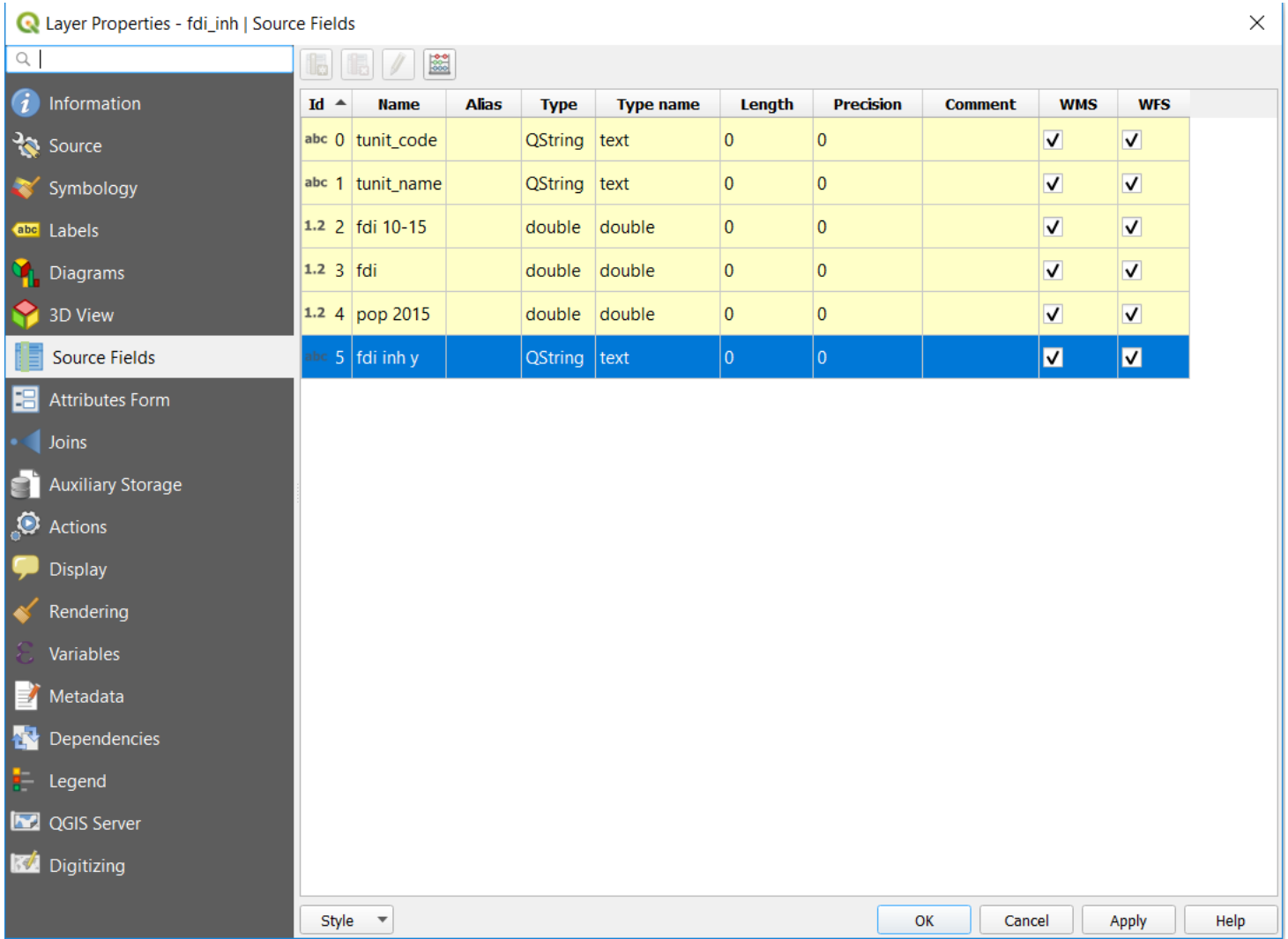
View attributes

- Right click on the layer fdi inh
- Click on Open Attribute Table
- Browse column tunit_code (key for joining)
- Browse column fdi inh y (this we map)
  - Data type looks like String! Should be Double!



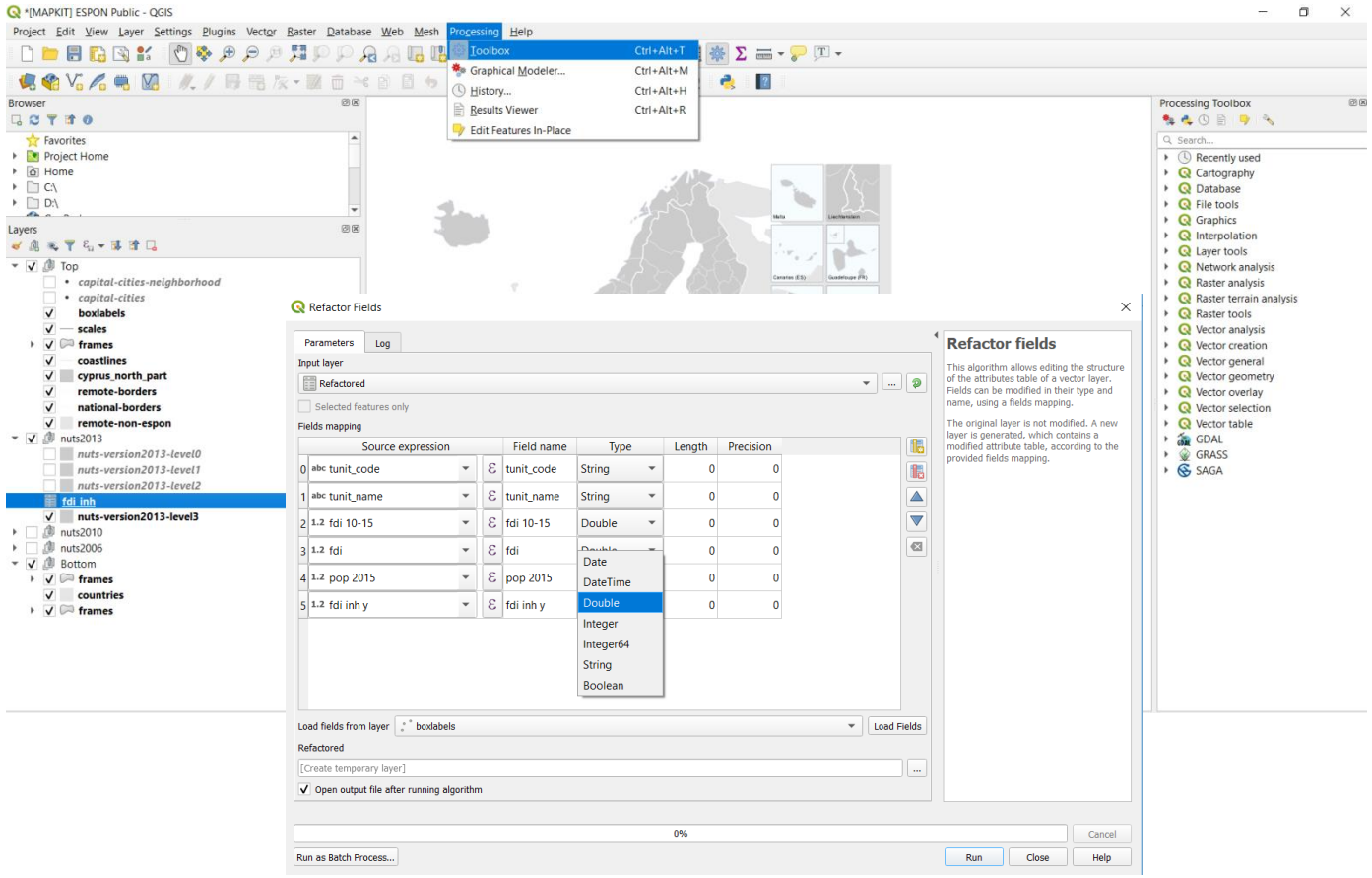
Prepare for join – right data type

- Correct the data type if necessary
- Check data types – Layer tree – Right click - Properties - Source fields
- Data for mapping should not text



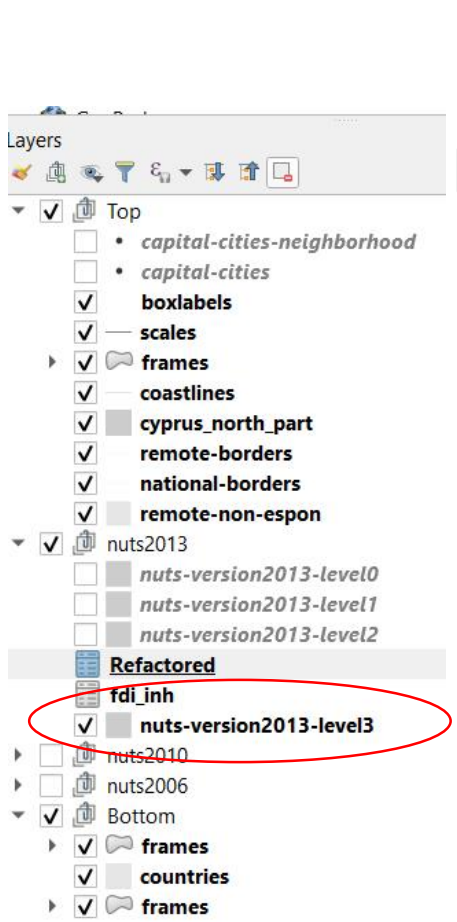
Prepare for join – change type

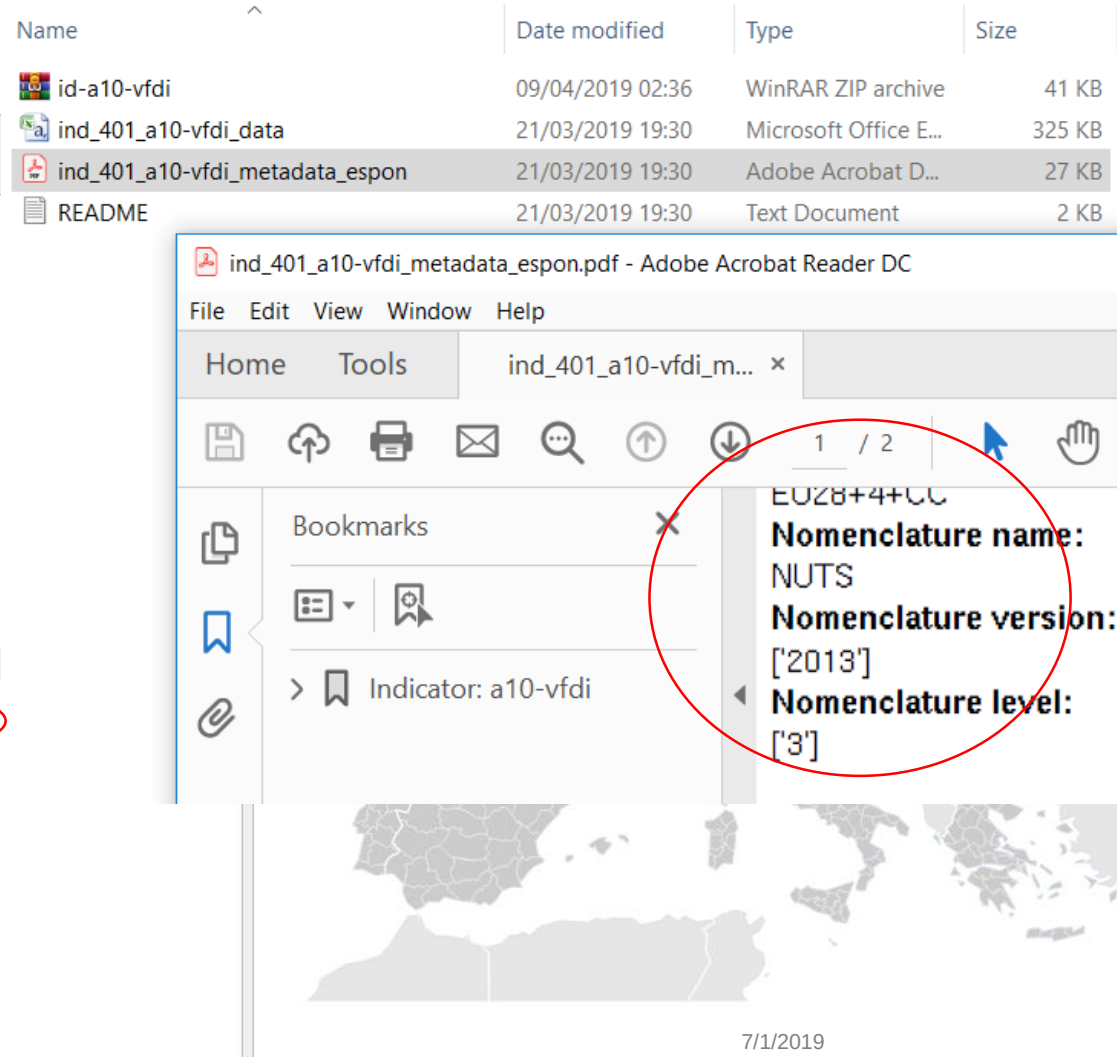
- Top Menu - Processing
- Check data types – Layer tree – Right click - Properties - Toolbox
- Search for Refactor tool – change attribute type to Double.
- Click Run.
- New layer is added ”Refactored”
- This layer will be used for Join.



Prepare for join – Check NUTS version

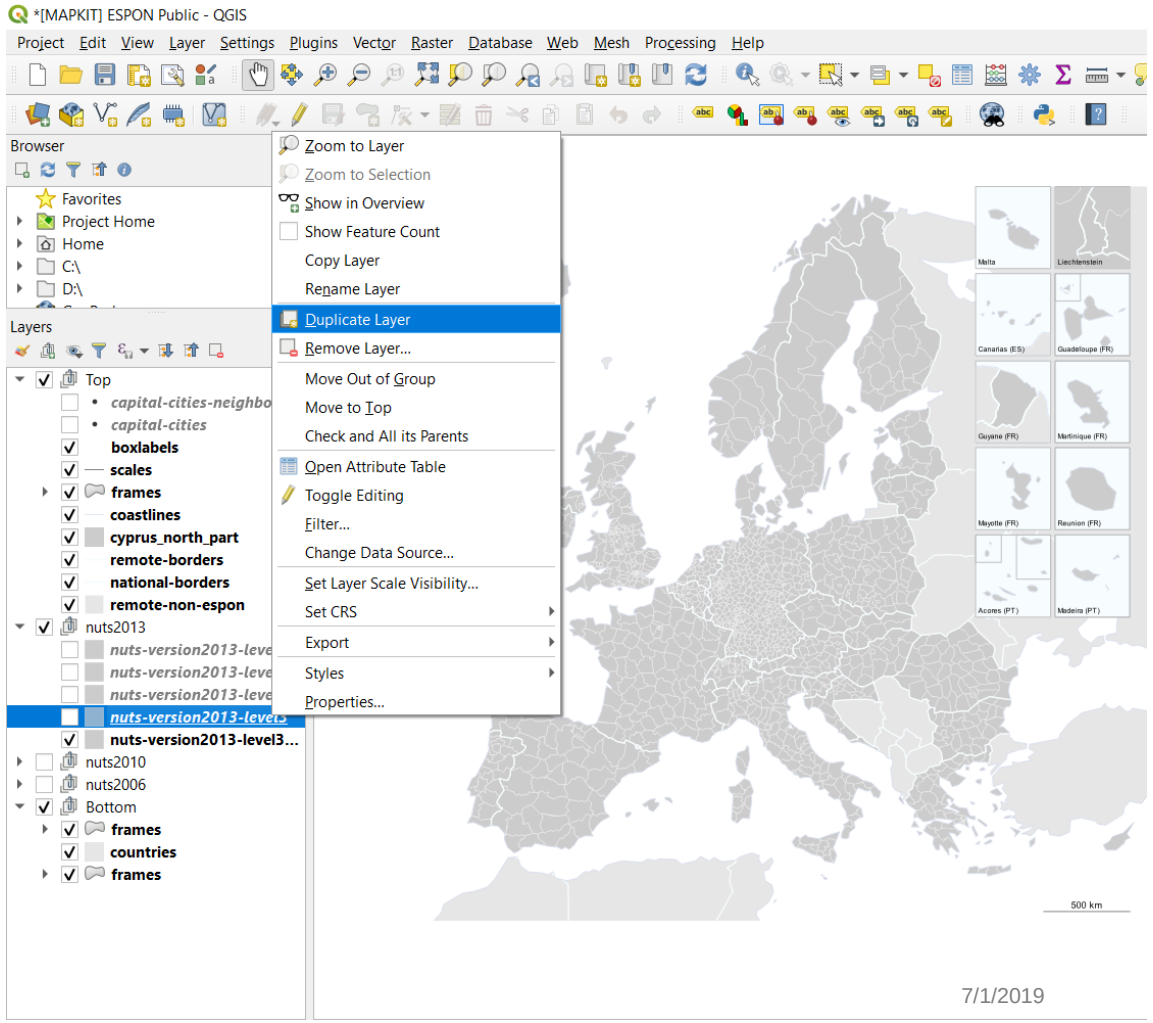
- Open the data download zip for the data you downloaded and intend to display.
- Open metadata PDF.
- Check for NUTS version (2006/2010/2013/2016) and level.
- Identify which shape file corresponds to that NUTS version and level in the Layer Tree.





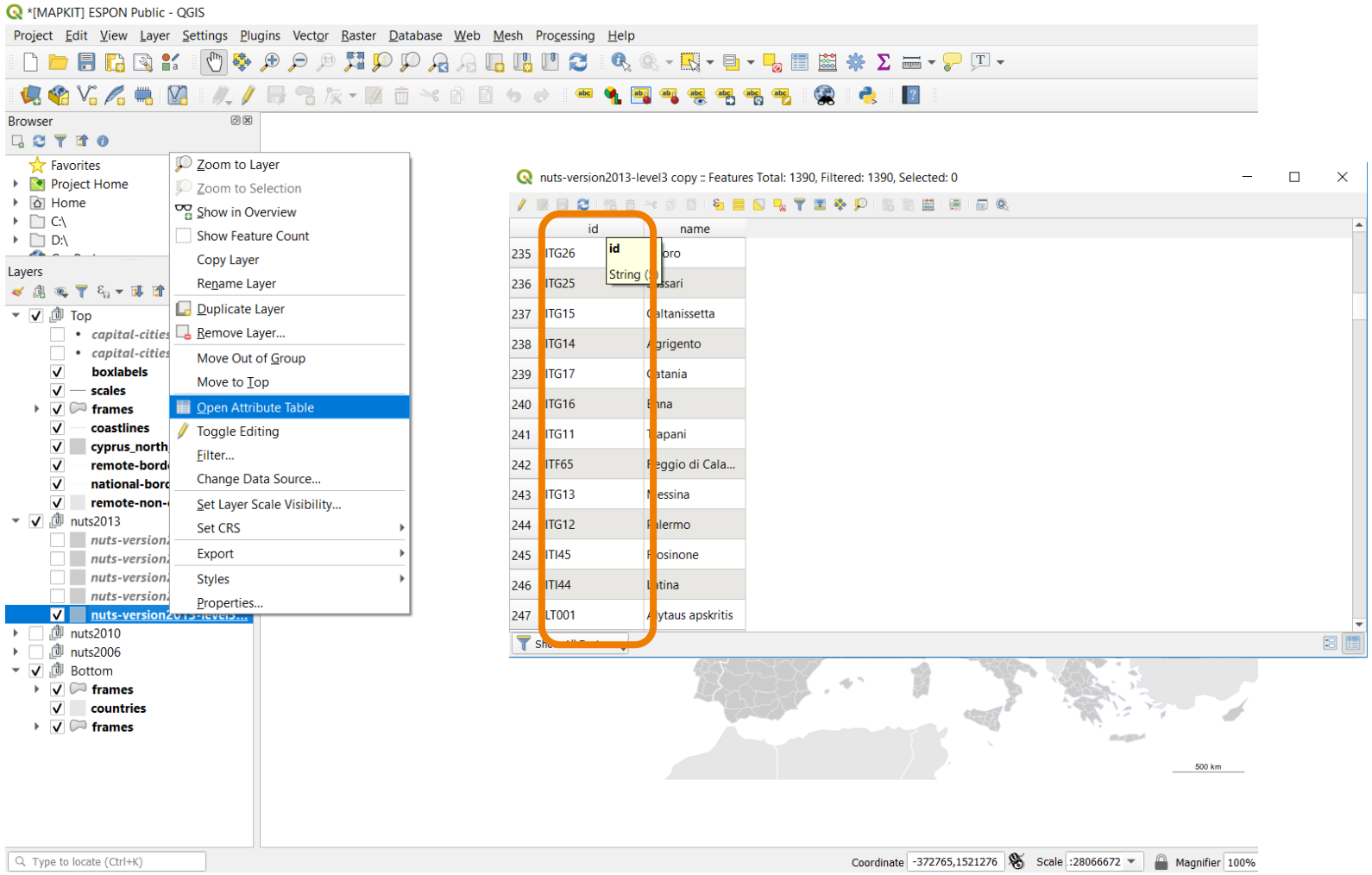
Tip: Duplicate layers you plan to modify

- It is always good to make a copy of a layer you plan to modify. This way you can easily go restore the default starting point before the analysis.
  - Find the layer you want to modify
  - Right click on it
  - Select ”duplicate layer”



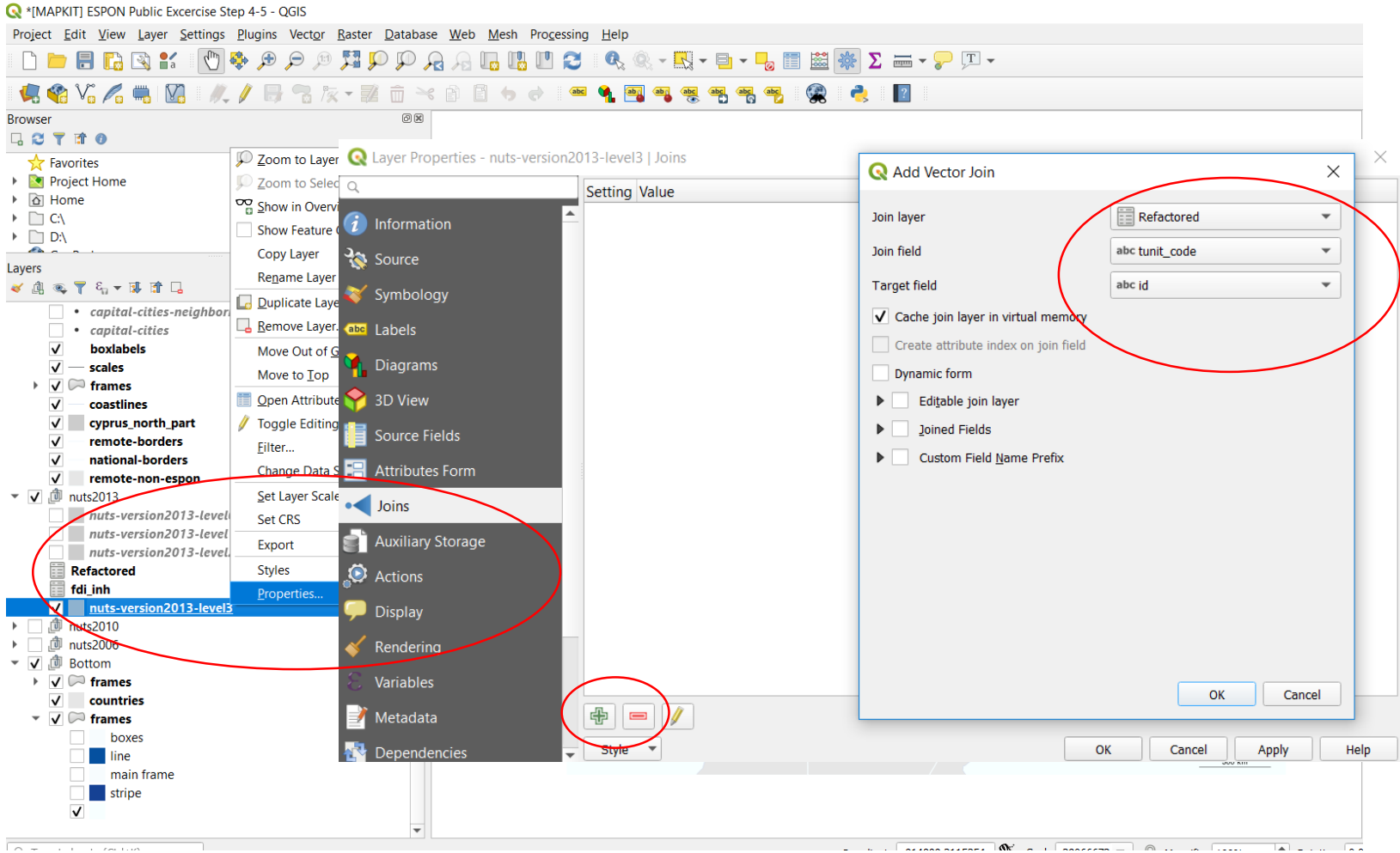
View attribute tables

- Check also attribute layer for the shape file prior to join.

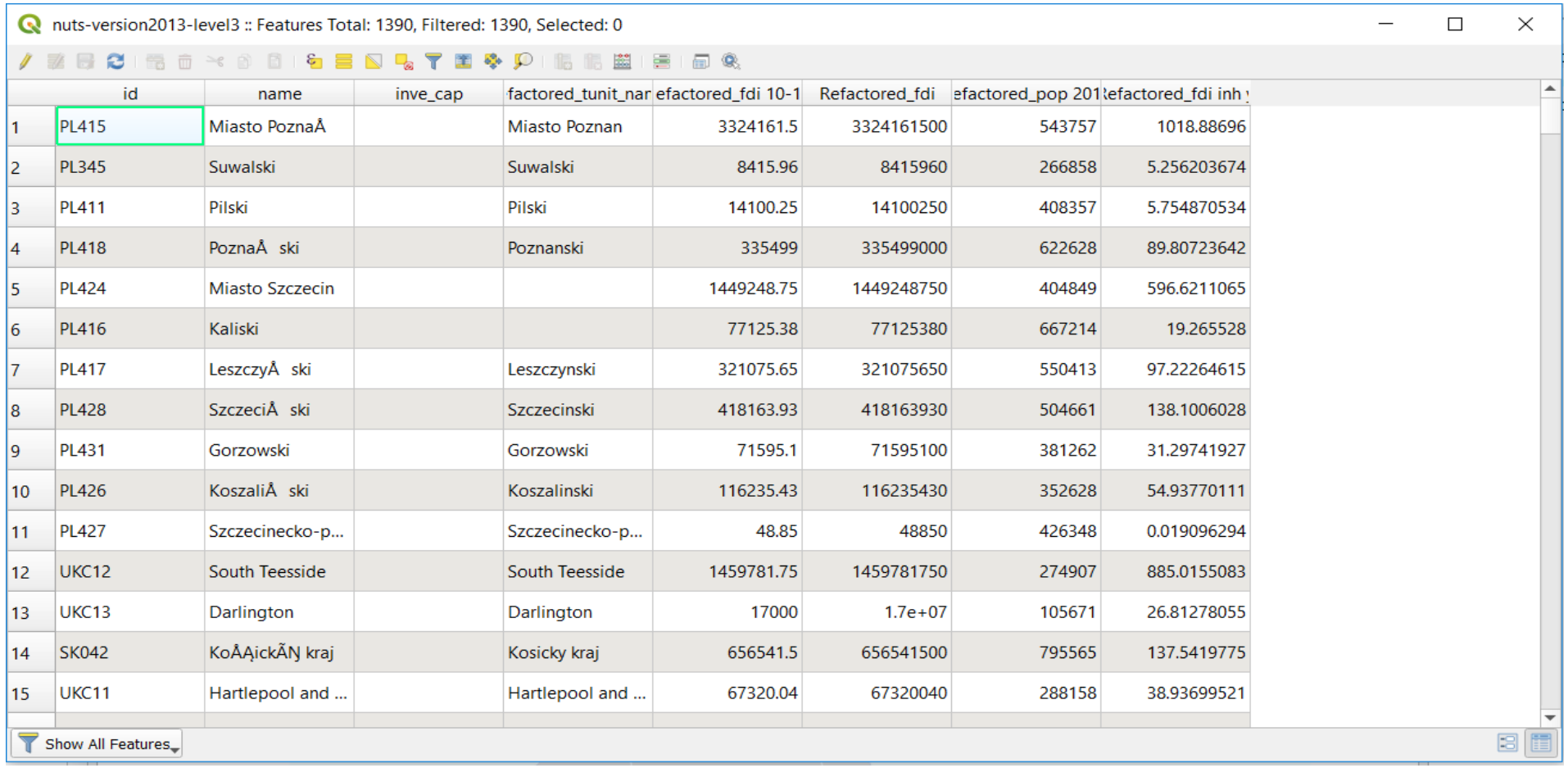


Join Data

- Right Click on Properties on the NUTS-version2013-level 3 layer in the Layer Tree.
- Click on Join.
- Click on Plus Symbol.
- Select the data table Refactored.
- Select the join key - NUTS3 code - for both datasets.
- Click on Ok.



View attribute table to confirm the join



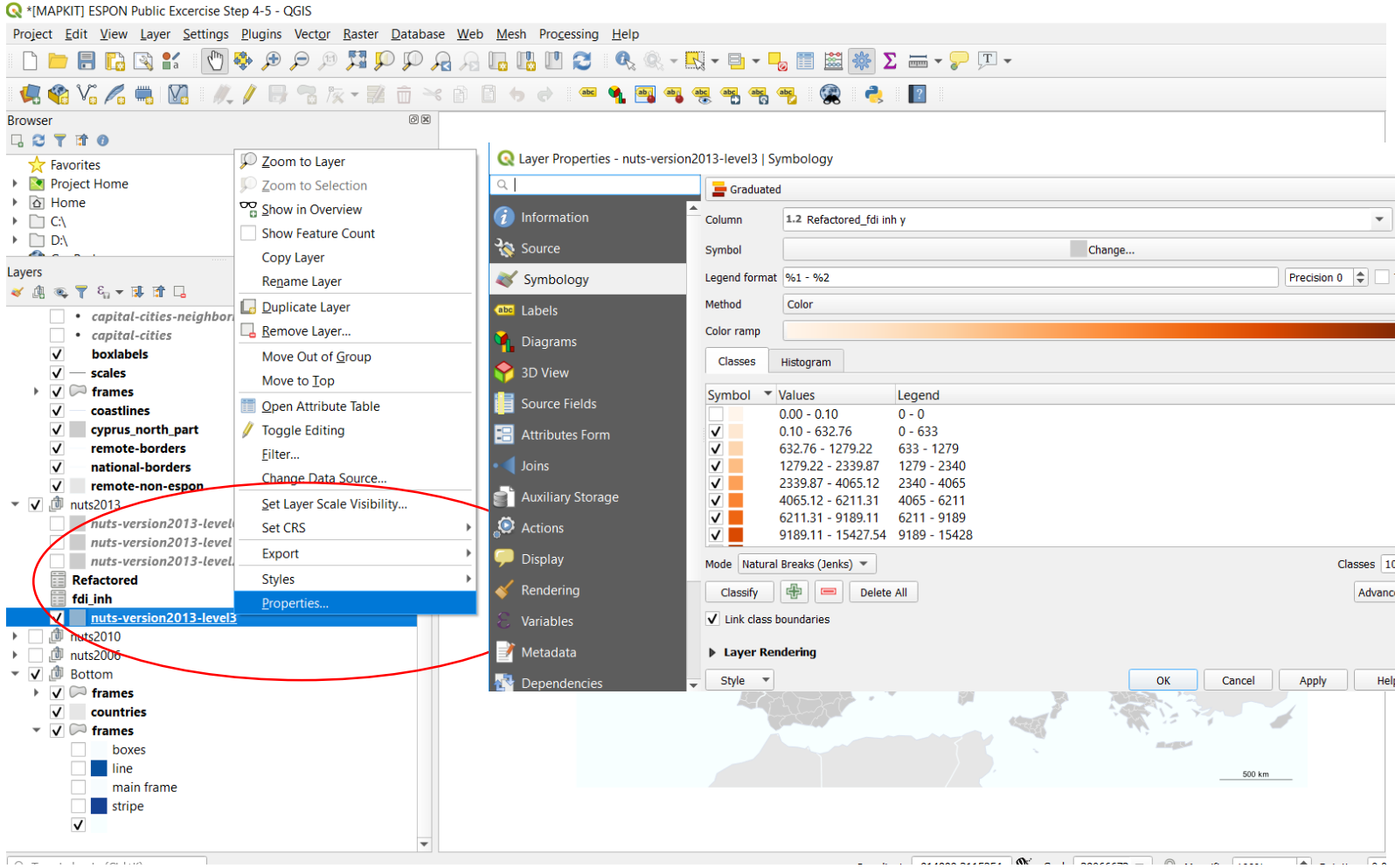
	id	name	inve_cap	factored_tunit_nar	efactored_fdi 10-1	Refactored_fdi	efactored_pop 201	efactored_fdi inh
1	PL415	Miasto PoznaÅ		Miasto Poznan	3324161.5	3324161500	543757	1018.88696
2	PL345	Suwalski		Suwalski	8415.96	8415960	266858	5.256203674
3	PL411	Pilski		Pilski	14100.25	14100250	408357	5.754870534
4	PL418	PoznaÅ ski		Poznanski	335499	335499000	622628	89.80723642
5	PL424	Miasto Szczecin			1449248.75	1449248750	404849	596.6211065
6	PL416	Kaliski			77125.38	77125380	667214	19.265528
7	PL417	LeszczyÅ ski		Leszczynski	321075.65	321075650	550413	97.22264615
8	PL428	SzczeciÅ ski		Szczecinski	418163.93	418163930	504661	138.1006028
9	PL431	Gorzowski		Gorzowski	71595.1	71595100	381262	31.29741927
10	PL426	KoszaliÅ ski		Koszalinski	116235.43	116235430	352628	54.93770111
11	PL427	Szczecinecko-p...		Szczecinecko-p...	48.85	48850	426348	0.019096294
12	UKC12	South Teesside		South Teesside	1459781.75	1459781750	274907	885.0155083
13	UKC13	Darlington		Darlington	17000	1.7e+07	105671	26.81278055
14	SK042	KoÅąickÃŇ kraj		Kosicky kraj	656541.5	656541500	795565	137.5419775
15	UKC11	Hartlepool and ...		Hartlepool and ...	67320.04	67320040	288158	38.93699521

5

Displaying the data

Display the data

- Right Click on Properties on the NUTS-version2013-level 3 layer in the Layer Tree.
- Click on Symbology.
- Click on Graduated.
- Select the data column fdy inh y.
- Select the Natural Breaks - for Classification.
- Pick 10 Classes.
- Select 0 for the first class value and untick the box.
- Click Ok.



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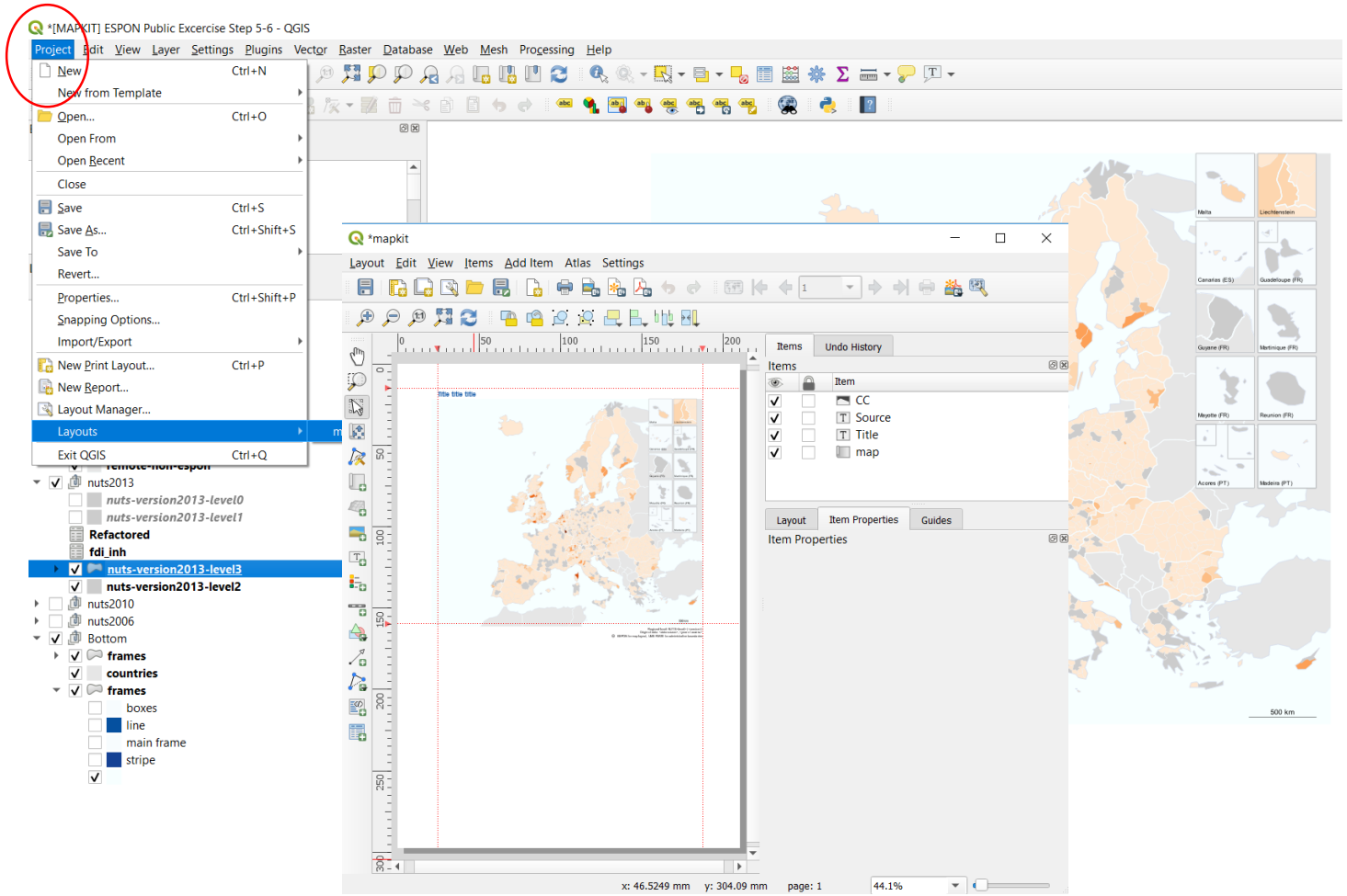
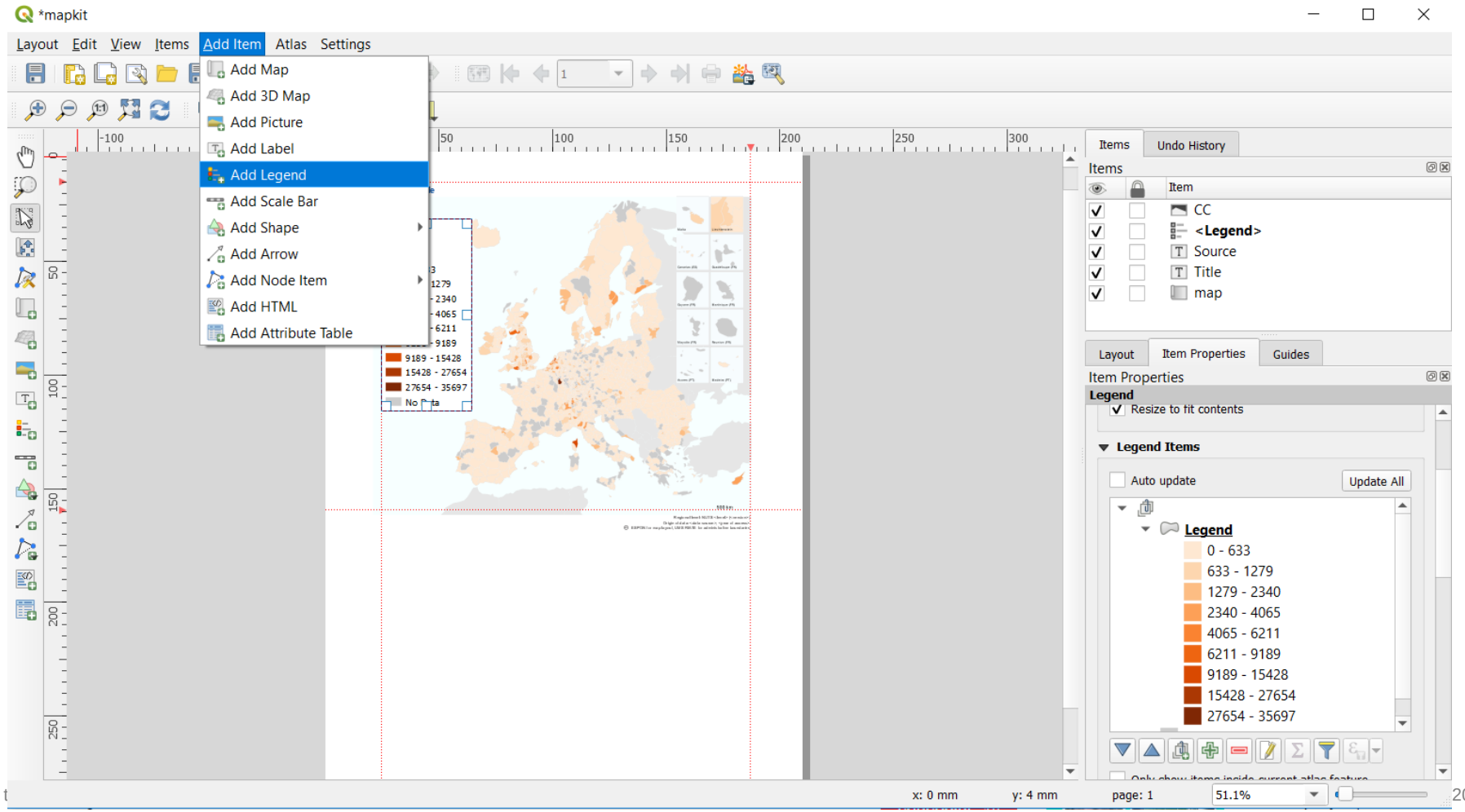
Finalising layout for publishing

Display the map in layout view

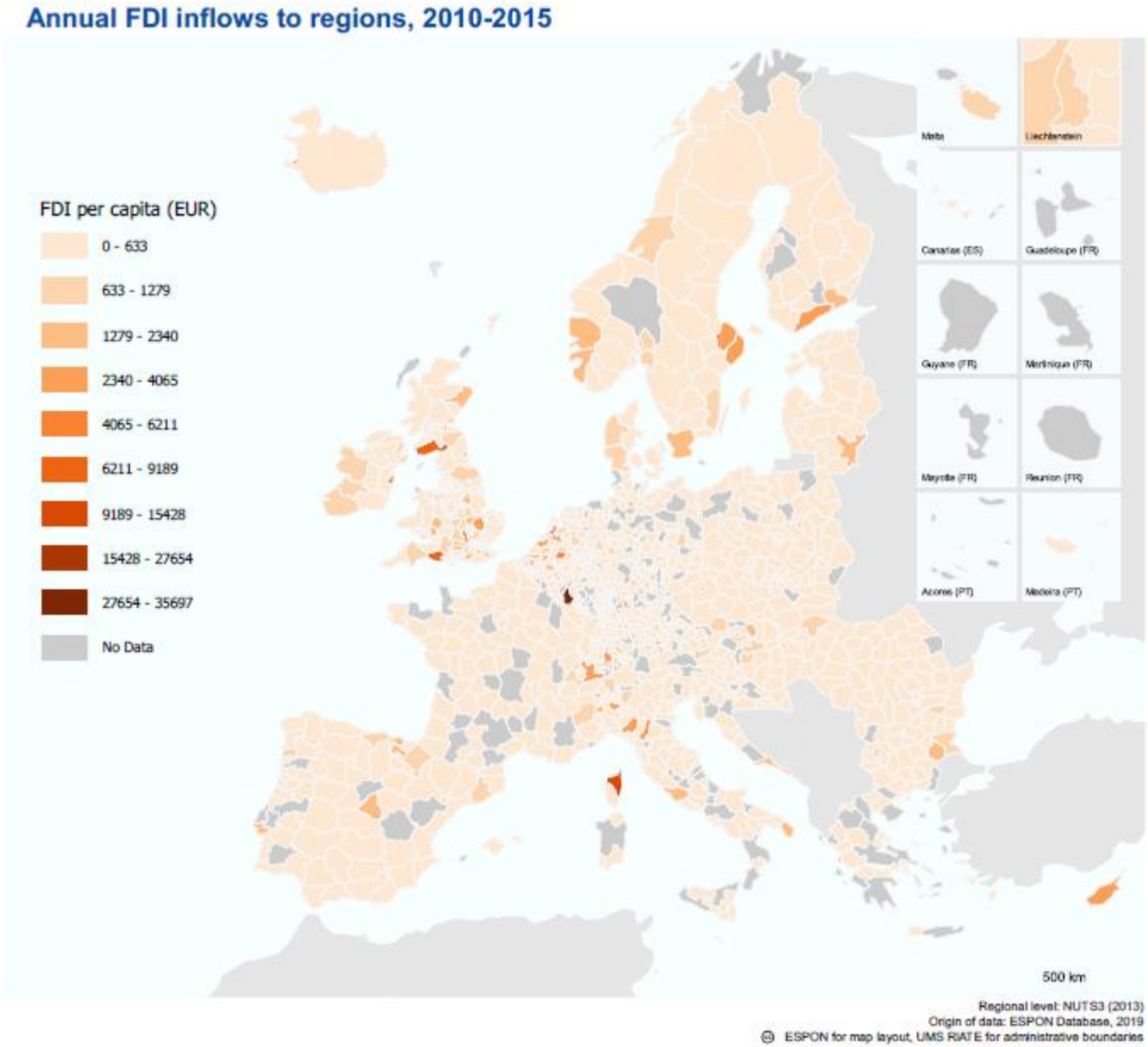
- Layout view for publishing
  - Top menu
    - Project – Layout – mapkit



Create and customise legend, title & metainfo



Export as PDF



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// Thank you

Martin Gauk, ESPON EGTC, martin.gauk@espon.eu

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