**Data management project – Fall 2024**

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**Objective:**

Estimate a gravity model to analyze the impact of internet access on intra-EU trade in digitally deliverable services from 2013 to 2023. We chose this exercise because it involves intensive data manipulation. As outlined in the proposal, the primary goal is to assess the impact of internet access on intra-EU digital services trade. The trade data provided by the OECD does not include a specific value for digitally deliverable services trade; instead, it must be computed by aggregating various trade components. Furthermore, the Eurostat data on internet coverage is not organized bilaterally, which introduces additional complexity when merging the data. The data from IMF and CEPPI are also not trivial to be merge with the other datasets, as the mapping between datasets must be revised and corrected in cases of not corresponding codes (e.g. countries that change states over time, example: Yugoslavia changing to Serbia and Montenegro).

The novelty of this exercise relies in exploring a gravity model that explains **digitally deliverable trade in services** by introducing a variable for internet coverage.

**Inputs:**

|  |  |  |
| --- | --- | --- |
| **Source** | **Data set name** | **Description** |
| OECD | [International trade in services dataset](https://data-explorer.oecd.org/vis?fs%5B0%5D=Topic,0%7CTrade%23TRD%23&fs%5B1%5D=Topic,2%7CTrade%23TRD%23%7CTrade%20in%20goods%20and%20services%23TRD_GDS%23%7CTrade%20in%20services%23TRD_GDS_STR%23&pg=0&fc=Topic&snb=4&vw=ov&df%5Bds%5D=dsDisseminateFinalDMZ&df%5Bid%5D=DSD_BOP@DF_TIS&df%5Bag%5D=OECD.SDD.TPS&df%5Bvs%5D=1.0&dq=AUS..S.B..A.USD_EXC.&pd=2009,&to%5BTIME_PERIOD%5D=false&ly%5Bcl%5D=TIME_PERIOD&ly%5Brw%5D=COUNTERPART_AREA) | Annual trade in services statistics in OECD countries. |
| EUROSTAT | [Broadband internet coverage by speed](https://ec.europa.eu/eurostat/databrowser/view/isoc_cbs/default/table?lang=en) | Annual percentage of households with 100 mbs or higher internet connection. |
| Centre d'études prospectives et d'informations internationales (CEPII) | [The CEPII Gravity database](https://www.cepii.fr/CEPII/en/bdd_modele/bdd_modele_item.asp?id=8) | For any pair of countries, from 1948 to 2020, Gravity provides all the information required to estimate gravity equations: trade flows, geographical distances, trade facilitation measures, macroeconomic indicators, etc... |
| IMF | [World Economic Outlook 2024](https://www.imf.org/en/Publications/WEO/weo-database/2024/October/download-entire-database) | The World Economic Outlook (WEO) is a survey of prospects and policies by the IMF staff, usually published twice a year, with updates in between. It presents analyses and projections of the world economy in the near and medium term, which are integral elements of the IMF’s surveillance of economic developments and policies in its member countries and of the global economic system. |

**Estimation technique:**

**Generalized Linear model:** glm(., family = poisson). This is especially useful when dealing with count data or data with large variation in trade volumes (e.g., many zero trade flows or very high flows).

**Model:**

**digital\_trade\_𝑖𝑗𝑡** = 𝛽0 + 𝛽1 distance\_𝑖𝑗 + 𝛽2 gdp\_pc\_𝑖𝑡 + 𝛽3 gdp\_pc \_𝑗𝑡 + 𝛽4 factor(year\_𝑡) + 𝛽5 same\_continent \_𝑖𝑗 + 𝛽6 contiguity\_𝑖𝑗 + 𝛽7 common\_language\_𝑖𝑗 + 𝛽8 digital\_serv\_world\_𝑖𝑡 + 𝛽9 digital\_serv\_world\_ 𝑗𝑡 + 𝛽10 factor(partner) + **𝛽11 internet\_coverage\_ 𝑖𝑡** + **𝛽12 internet\_coverage\_ 𝑗𝑡** +𝜀𝑖𝑗

Where:

* digital\_trade\_𝑖𝑗𝑡 = bilateral digitally deliverable trade between country i and j in year t
* distance\_𝑖𝑗 = distance between countries i and j in year t
* gdp\_pc\_𝑖𝑡 = GDP per capita country i in year t
* gdp\_pc \_𝑗𝑡 = GDP per capita country j in year t
* factor(year\_𝑡) = Fixed effects of year t
* same\_continent \_𝑖𝑗 = 1 if countries i and j are in the same continent
* contiguity\_𝑖𝑗 = 1 if countries i and j are neighboring countries
* common\_language\_𝑖𝑗 = 1 if countries i and j share common language
* digital\_serv\_world\_𝑖𝑡 = total digital services trade with partner world of country i in year t
* digital\_serv\_world\_ 𝑗𝑡 = total digital services trade with partner world of country j in year t
* factor(partner) = fixed effects of country j
* internet\_coverage\_ 𝑖𝑡 = internet coverage in country i in year t
* internet\_coverage\_ 𝑗𝑡 = internet coverage in country j in year t
* 𝜀𝑖𝑗 = error term