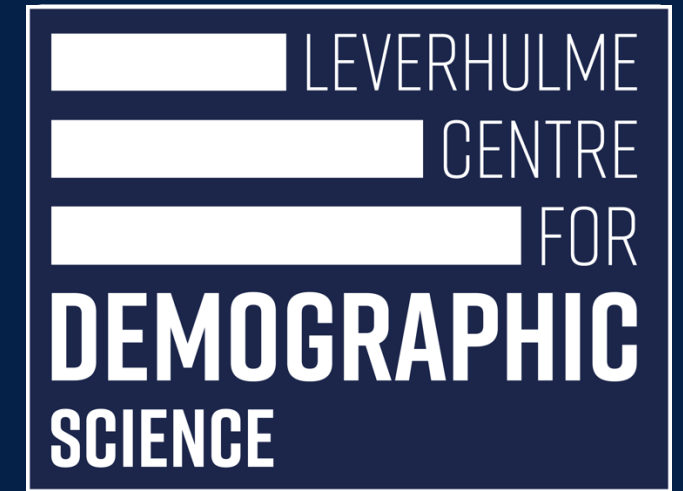




University of
Zurich^{UZH}



What can we do with MoNAn? An application to migration networks

Micol Matilde Morellini^{1,2}

¹Nuffield College, University of Oxford; ²University of Zurich

MoNAn Workshop, Zurich, 09.10.2024

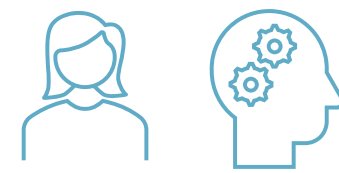
Migration and mobility networks

- Migration processes are characterized by **interdependencies**
 - Cumulative causation
 - Return migration
 - Migrant competition
 - Multilateral resistance to migration
- **Yet, migration networks still understudied: a “missing link” in the literature**
(Bilecen et al. 2018)

Agency and structure in migration

- Migration processes are inherently multilevel

Agency



Micro: individual characteristics, aspirations, motivations

Structure

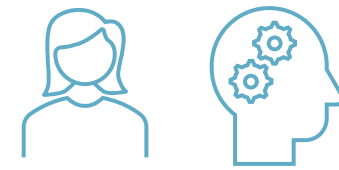


Macro: origin and destination characteristics, international agreements

Agency and structure in migration

- Migration processes are inherently multilevel

Agency



Micro: individual characteristics, aspirations, motivations

Structure



Macro: origin and destination characteristics, international agreements



Leisure and lifestyle migration
Retirement migration

Organizational migration (Lucassen 2023)
Soldiers, diplomats

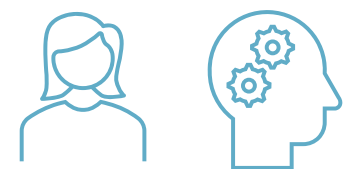
From structure to networks

- Structural factors particularly understudied (Findlay 2010)
 - Often due to data limitations: how do we measure institutions?
- **Normally, we would need explicit measures**
- **Our proposed solution: to use networks to operationalize structure**

From structure to networks

- Structural factors particularly understudied (Findlay 2010)
 - Often due to data limitations: how do we measure institutions?
- **Normally, we would need explicit measures**
- **Our proposed solution: to use networks to operationalize structure**

Degree student
mobility



Erasmus student
mobility



Background: international student mobility

- International student mobility: people moving internationally for higher education
 - Long-term: **degree**
 - Short-term: **credit, Erasmus+**

Background: international student mobility

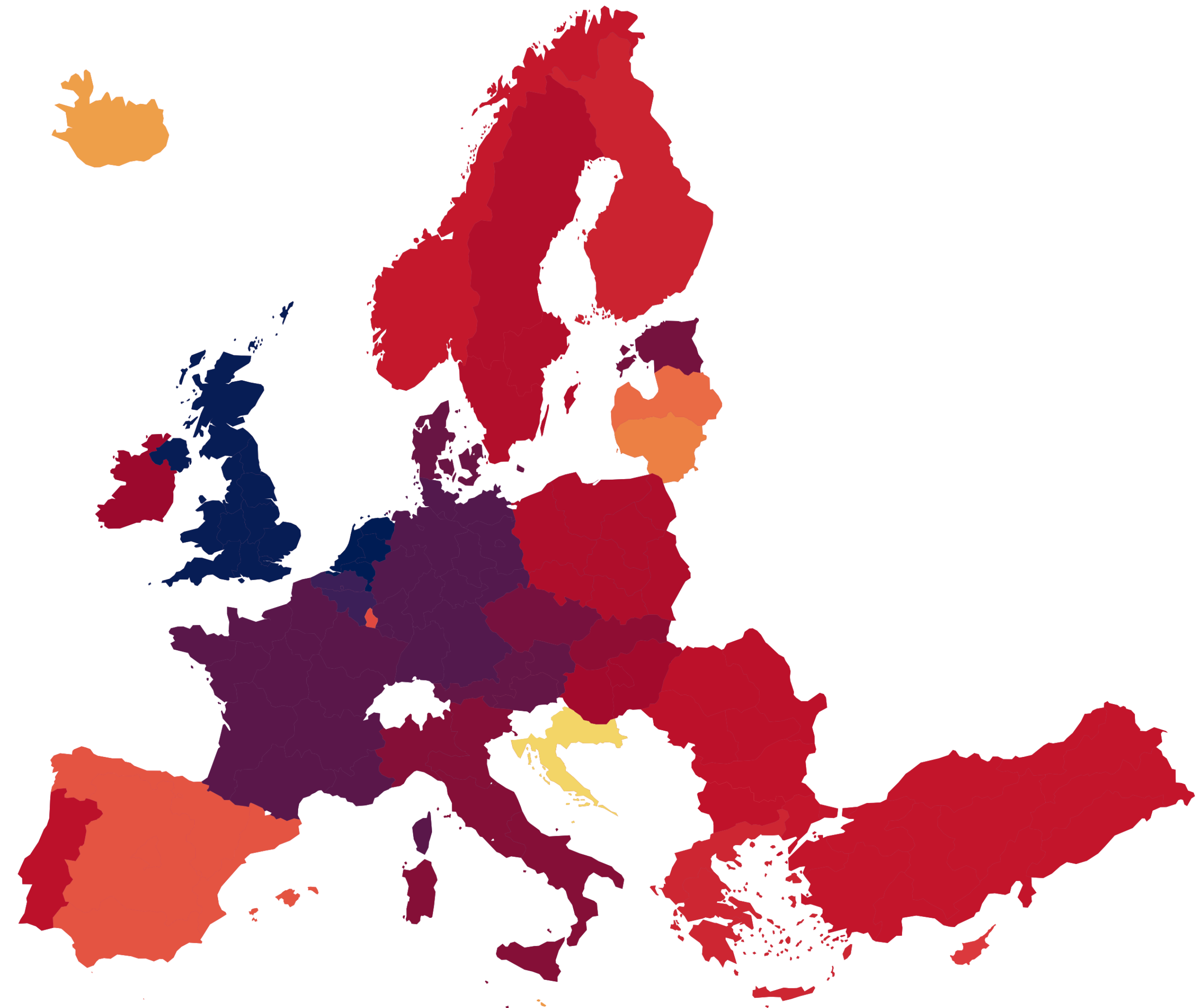
- International student mobility: people moving internationally for higher education
 - Long-term: **degree**
 - Short-term: **credit, Erasmus+**
- Evidence of **inequalities in ISM**:
 - **Aggregate level:** asymmetric patterns, **core-periphery structures** (Barnett et al. 2015; Brzenik & Skrbinjek 2020, Hou & Du 2020; Kondacki, Bedenlier, & Zawacki-Richter 2018; Restaino, Primerano, & Vitale 2020, 2021)
 - **Individual level:** different participation rates by gender, with more males in degree mobility and more females in Erasmus+ (Böttcher et al. 2016; Salisbury, Paulsen, & Pascarella 2010)

Research design: data


Total incoming students in 2019 (log)

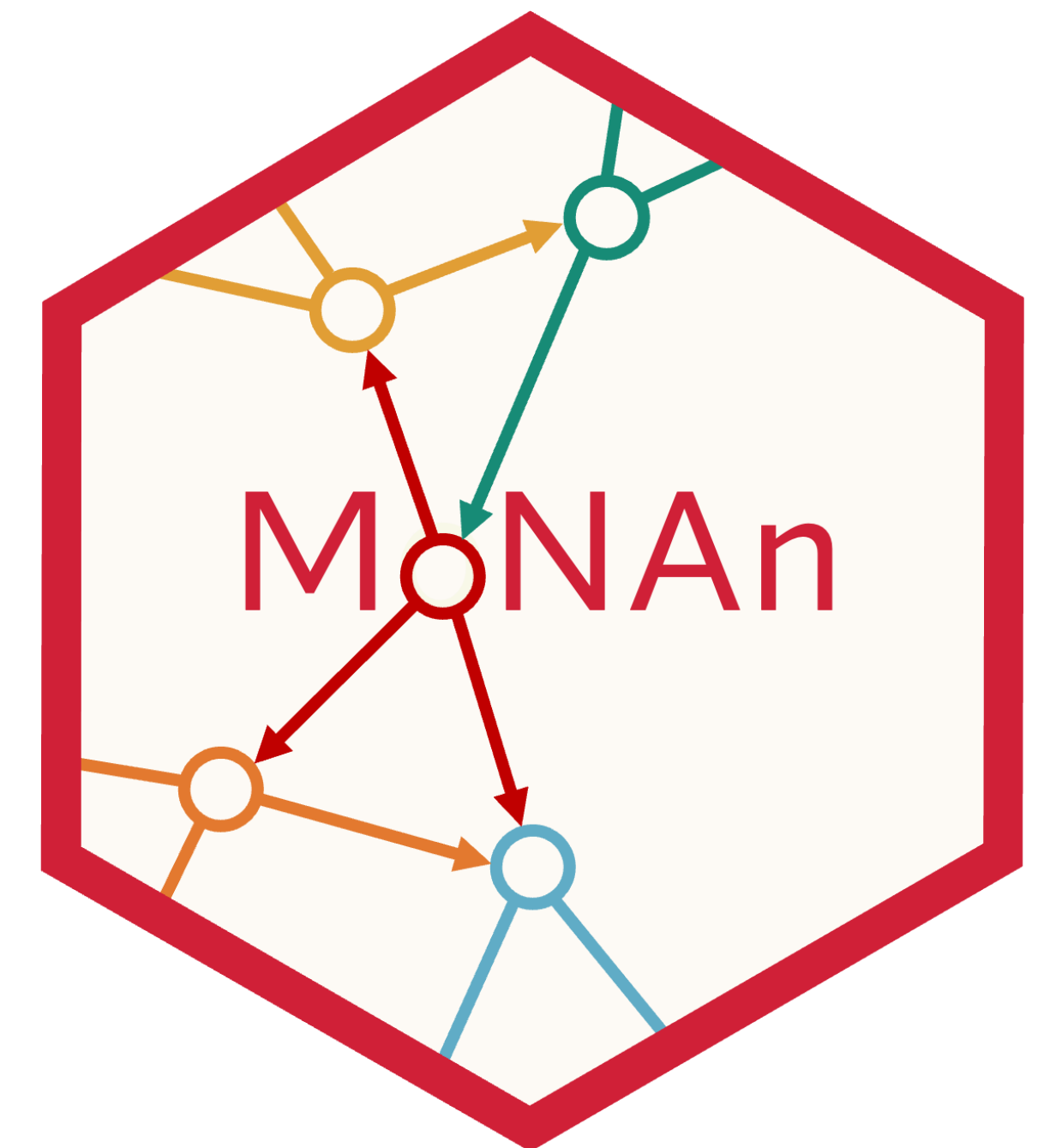


- 30 European countries
- All degree and Erasmus flows that occurred in 2019, disaggregated by gender
- **Degree:** 230,523 students
- **Erasmus:** 194,972 students
- **Gender breakdown:**
Degree 56% women
Erasmus 60% women



Research design: methods

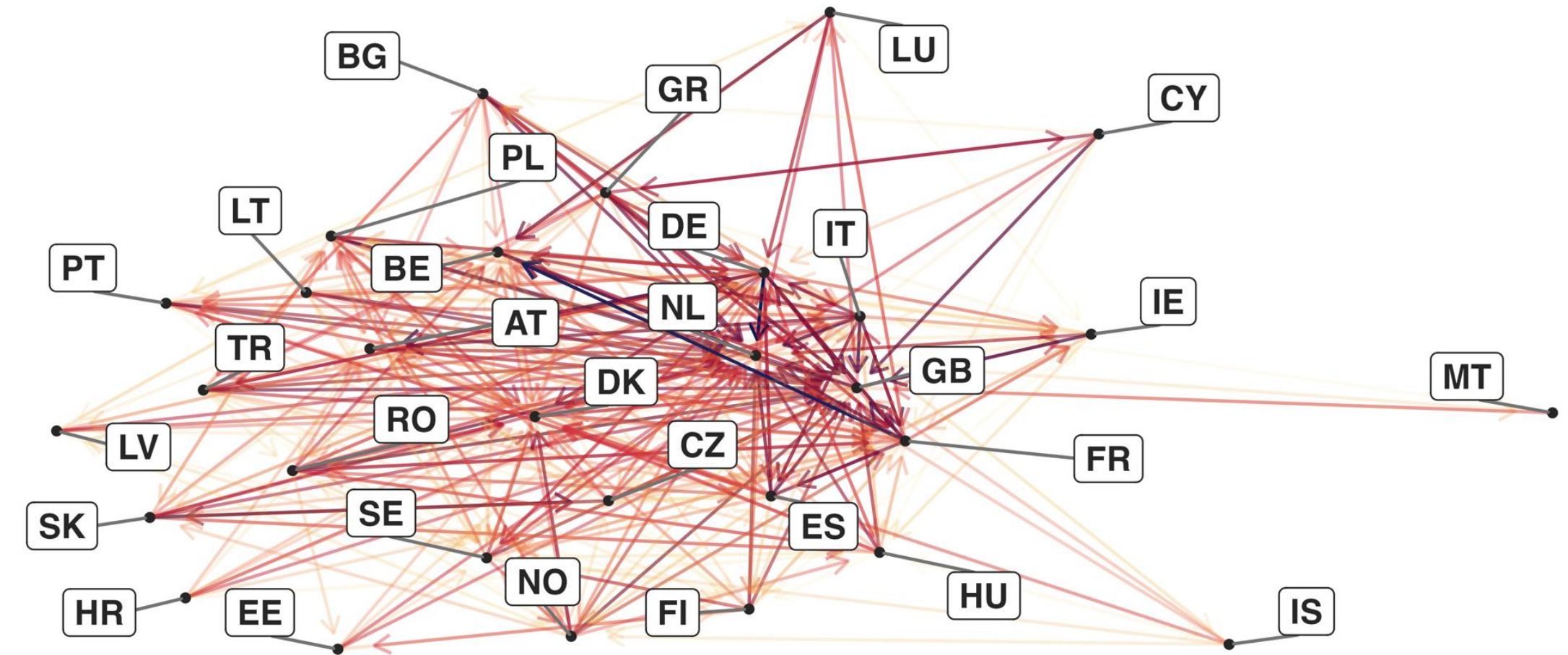
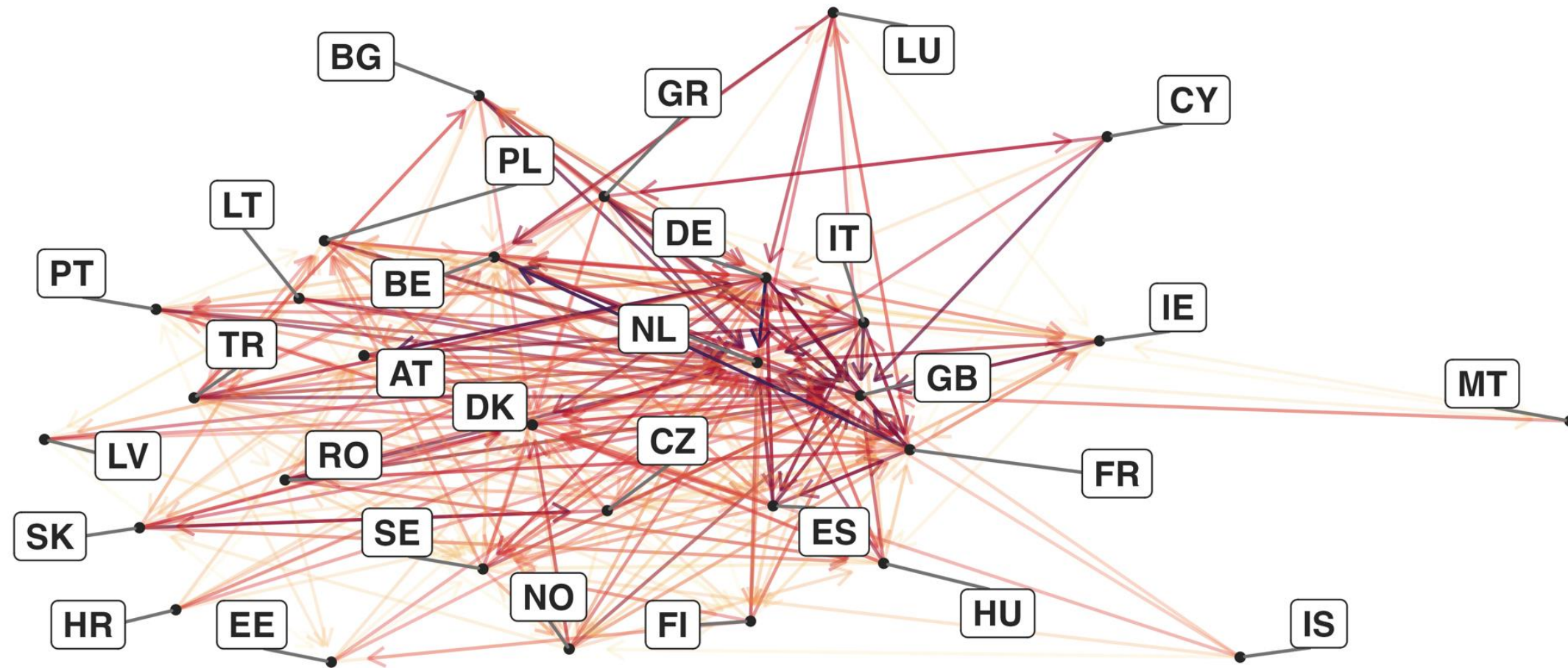
- Degree and Erasmus mobility as **weighted directed networks** with countries as nodes and mobility flows as edges
- We apply a **MoNAn** to assess the impact of:
 - **Individual-level factors (agency)**  
 - **Endogenous and exogeneous factors (structure)**  



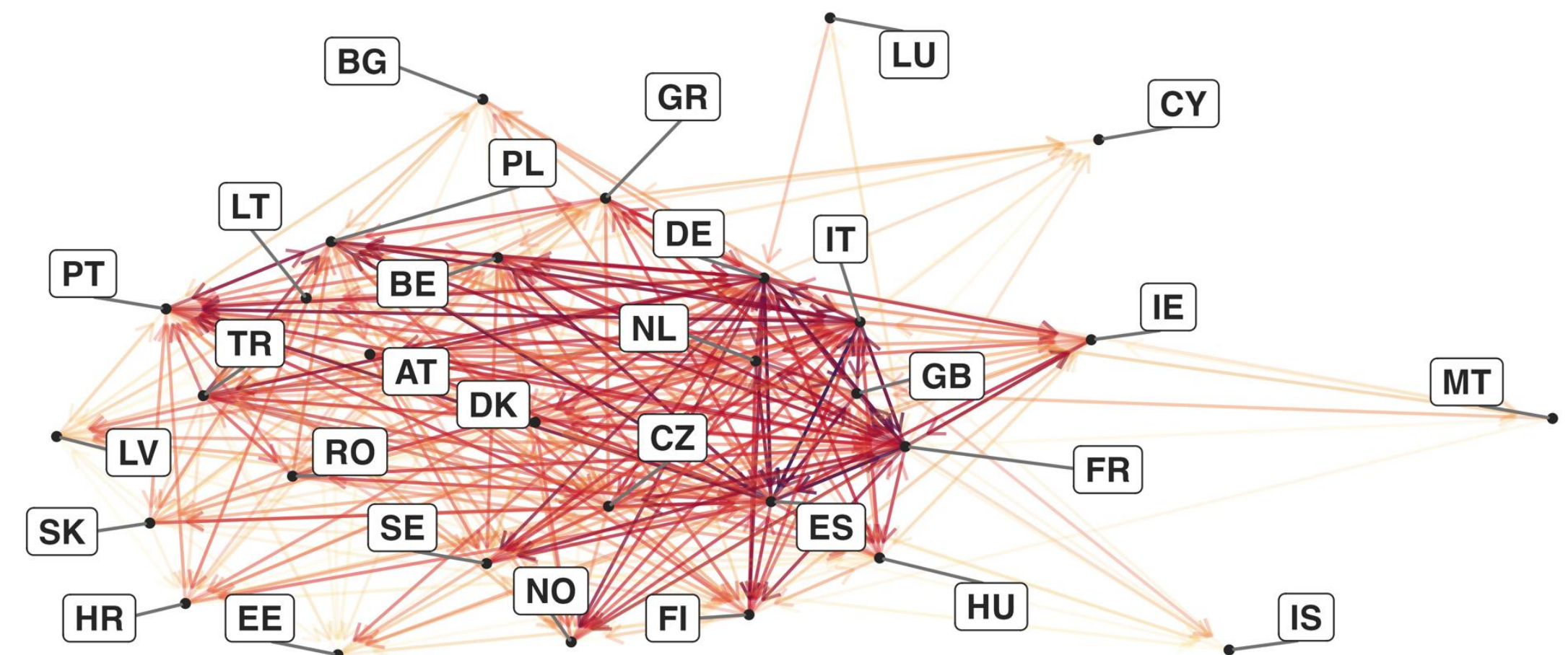
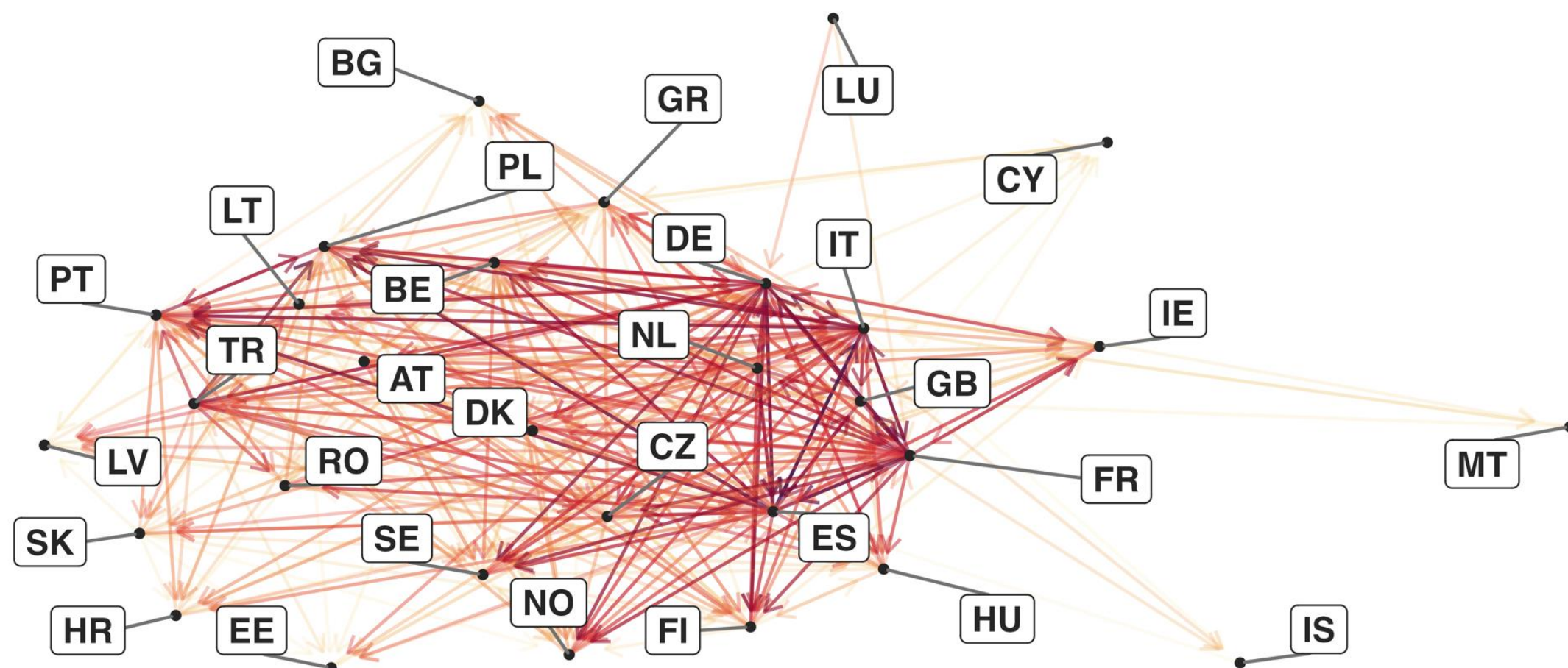
Networks of International Student Mobility in Europe, 2018-2019

Male students

Female students

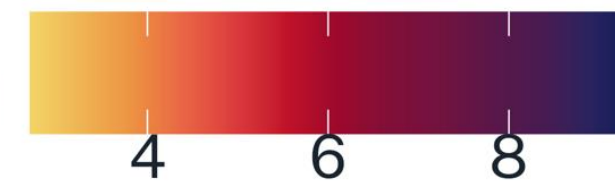


Degree

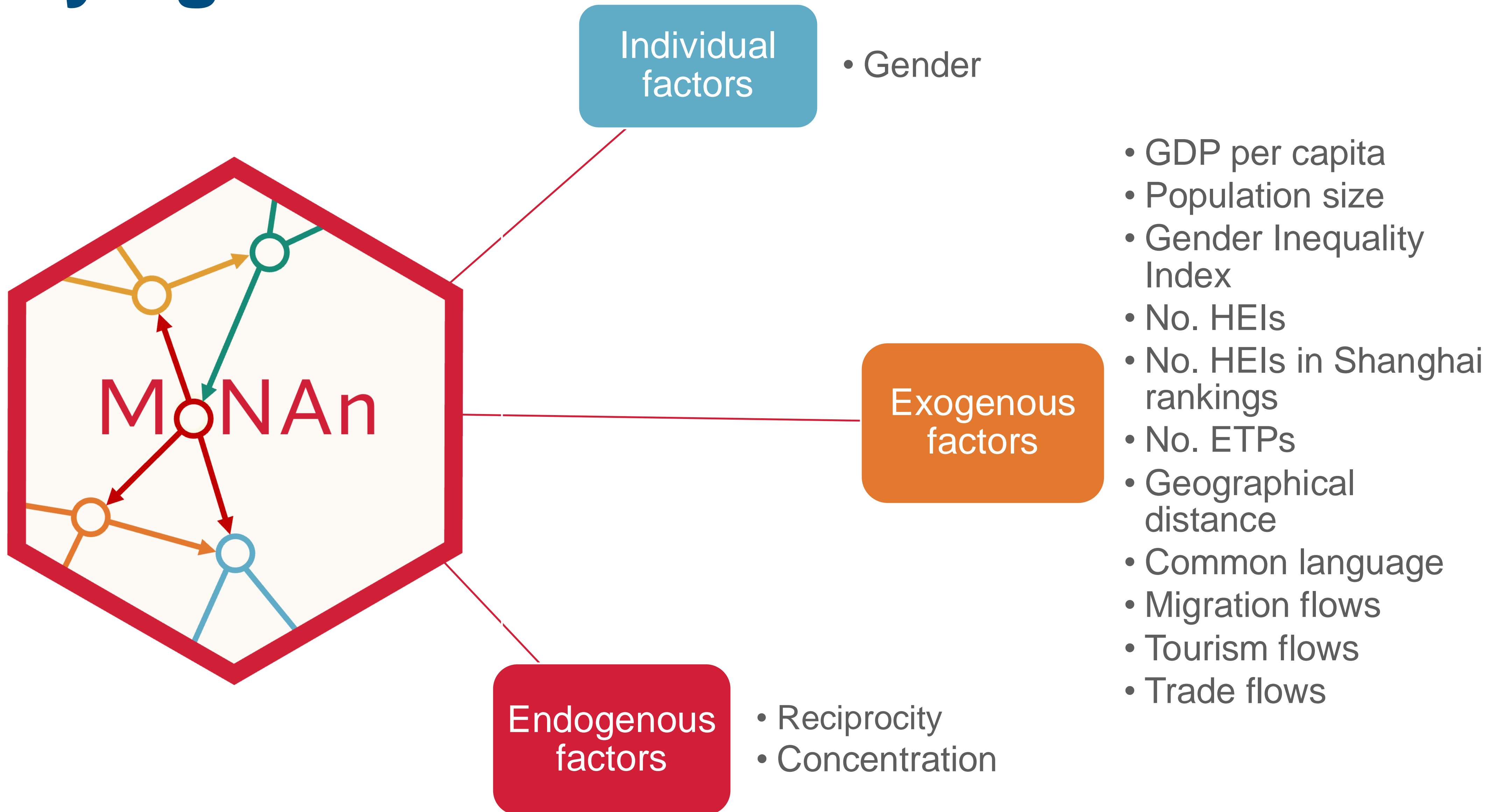


Erasmus

Migration flow (log)



Specifying effects



Full model

Table 4: Results of the MoNAn (M4) models with complete specification

Covariate	M4 Degree	M4 Erasmus
GDP per capita similarity	1.18*** (0.14)	1.55*** (0.15)
Population size similarity	0.17** (0.074)	0.727*** (0.087)
Gender Inequality Index similarity	-0.733*** (0.049)	0.184*** (0.054)
English-taught programs (ETPs) similarity	0.0707 (0.048)	-0.172*** (0.05)
Total HEIs similarity	-0.231*** (0.073)	-0.759*** (0.091)
HEIs in Shanghai ranking similarity	0.0266 (0.048)	-0.353*** (0.042)
Geographical distance	-0.18*** (0.024)	-0.0473* (0.023)
Common language	0.871*** (0.023)	-0.0594 (0.046)
Migration flows	0.0439*** (0.0093)	-0.082*** (0.0091)
Tourism flows	0.175*** (0.01)	0.0316*** (0.0083)
Trade flows	-0.131*** (0.012)	0.0102 (0.011)
Geographical distance * gender	-0.0859** (0.032)	0.0421 (0.027)
GDP per capita similarity * gender	0.201 (0.17)	-0.067 (0.14)
Reciprocity	0.0183*** (0.0023)	0.0212*** (0.0049)
Concentration	0.123*** (0.003)	0.0547*** (0.0037)
Reciprocity * GDP per capita similarity	-0.0159*** (0.0028)	-0.029*** (0.0059)
Concentration * gender	0.00487 (0.0075)	0.0284*** (0.0084)
Country fixed effects	YES	YES
Observations	20,000	20,000

Note: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$. Standard errors in parentheses.

Full model results I

Table 4: Results of the MoNAn (M4) models with complete specification

Covariate	M4 Degree	M4 Erasmus
GDP per capita similarity	1.18*** (0.14)	1.55*** (0.15)
Population size similarity	0.17** (0.074)	0.727*** (0.087)
Gender Inequality Index similarity	-0.733*** (0.049)	0.184*** (0.054)
English-taught programs (ETPs) similarity	0.0707 (0.048)	-0.172*** (0.05)
Total HEIs similarity	-0.231*** (0.073)	-0.759*** (0.091)
HEIs in Shanghai ranking similarity	0.0266 (0.048)	-0.353*** (0.042)
Geographical distance	-0.18*** (0.024)	-0.0473* (0.023)
Common language	0.871*** (0.023)	-0.0594 (0.046)
Migration flows	0.0439*** (0.0093)	-0.082*** (0.0091)
Tourism flows	0.175*** (0.01)	0.0316*** (0.0083)

Full model results II

Table 4: Results of the MoNAn (M4) models with complete specification

Covariate	M4 Degree	M4 Erasmus
Trade flows	-0.131*** (0.012)	0.0102 (0.011)
Geographical distance * gender	-0.0859** (0.032)	0.0421 (0.027)
GDP per capita similarity * gender	0.201 (0.17)	-0.067 (0.14)
Reciprocity	0.0183*** (0.0023)	0.0212*** (0.0049)
Concentration	0.123*** (0.003)	0.0547*** (0.0037)
Reciprocity * GDP per capita similarity	-0.0159*** (0.0028)	-0.029*** (0.0059)
Concentration * gender	0.00487 (0.0075)	0.0284*** (0.0084)
Country fixed effects	YES	YES
Observations	20,000	20,000

*Note: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$. Standard errors in parentheses.*

Results summary

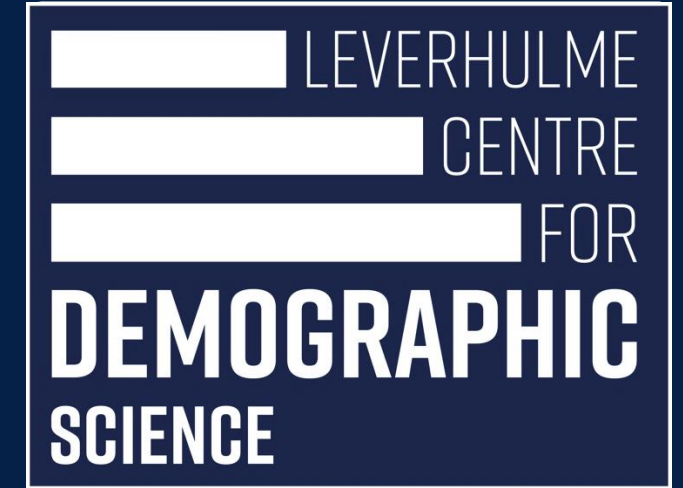
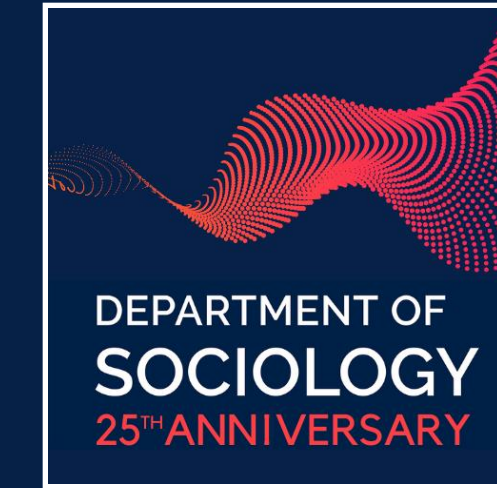
- The MoNAn models allow us to calculate the effect of endogenous institutions, beyond additional country-level and dyadic factors
- Main findings:
 - Even when accounting for endogenous factors, difference in the **quality of higher education** between origin and destination affects ISM flows
 - Other “traditional” factors such as distance may not hold for Erasmus
 - Erasmus network is **more reciprocal and less concentrated** compared to the degree mobility network
 - There are gender effects where women travel shorter distances in degree mobility and are more concentrated in their Erasmus moves

Conclusion

- Across all model specifications, the Erasmus network exhibits stronger reciprocity and lower concentration compared to the degree mobility network
- **The use of network effects to capture structural drivers appear promising**
- The institutional fabric that underpins the Erasmus programme may be helpful in “rebalancing” ISM flows and **countering asymmetric, core-periphery patterns**
- This has implications for **inequalities in ISM participation** and broader phenomena such as the **brain drain, even in highly developed countries**



**University of
Zurich** ^{UZH}



Thank you!

Micol Matilde Morellini

 **micol.morellini@nuffield.ox.ac.uk**
X/Bluesky: @micolmorellini

MoNAn Workshop, Zurich, 09.10.2024