The Importance of Regional Variation in Patterns of Involuntary Non-Standard Employment across Europe

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Who Am I? What Do I Do?

- Neil H. Spencer
  - Reader in Applied Statistics
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- This Research Project
  - *The impact of regions and missing levels in analyses of Eurostat Microdata*
- Related Research Projects
  - *Digital Footprint (Surveys of crowdworking in Europe)*
  - *PLUS: Platform Labour in Urban Spaces (H2020 Project)*

Outline

- Region identifiers in the Labour Force Survey (LFS) and the aim of this research
- Measuring involuntary non-standard employment (INE)
- National and regional variation in rates of INE
- Multilevel modelling
  - Principles
    - Results of research on missing levels
    - Assumptions of i.i.d. random effects
  - Practical impact
    - Effects of different model specifications

Region identifiers in the LFS

- Microdata are available at different regional levels for different countries
  - The Netherlands does not report any regional information within the microdata that it provides
  - Several countries report at the national level throughout because NUTS 1, NUTS 2 (and sometimes NUTS 3) levels equate to the whole country
    - Cyprus
    - Estonia
    - Iceland
    - Lithuania
    - Luxembourg
    - Latvia
    - Malta

Region identifiers in the LFS

- The regional level at which microdata exist may even vary according to survey question
  - Austria reports at NUTS 1 level (groups of states) for region of household but NUTS 2 level (individual states) for place of work
    - Denmark also reports at this level
  - The UK reports NUTS 1 level regions throughout (so only England is divided with Northern Ireland, Scotland and Wales each being a NUTS 1 region)

The aim of this research

- To identify the impact of regional variation on the analysis of social science data

- More specifically here…
  - Regions and countries of Europe
    - NUTS 1 and NUTS 2 regions within countries
  - Eurostat Microdata
    - LFS data
    - Patterns of involuntary non-standard employment

Measuring involuntary non-standard employment (INE)

- Three measures of INE extracted from the LFS microdata
  - Not being able to find full-time work
    - (from question FTPTREAS – “I would like to ask you why you took a part-time rather than a full-time job. Was it because...”).
  - Not being able to find permanent work
    - (from question TEMPREAS – “Did you take that type of job rather than a permanent job because...”).
  - Having a fear of loss of current work
    - (from question LOOKREAS – “Why were you looking for another job?”).

Measuring involuntary non-standard employment (INE)

- An individual who has one, two or three of these characteristics is said to be in “involuntary non-standard employment” (INE)
  - Unable to find full-time work
  - Unable to find permanent work
  - Having fear of loss of current work

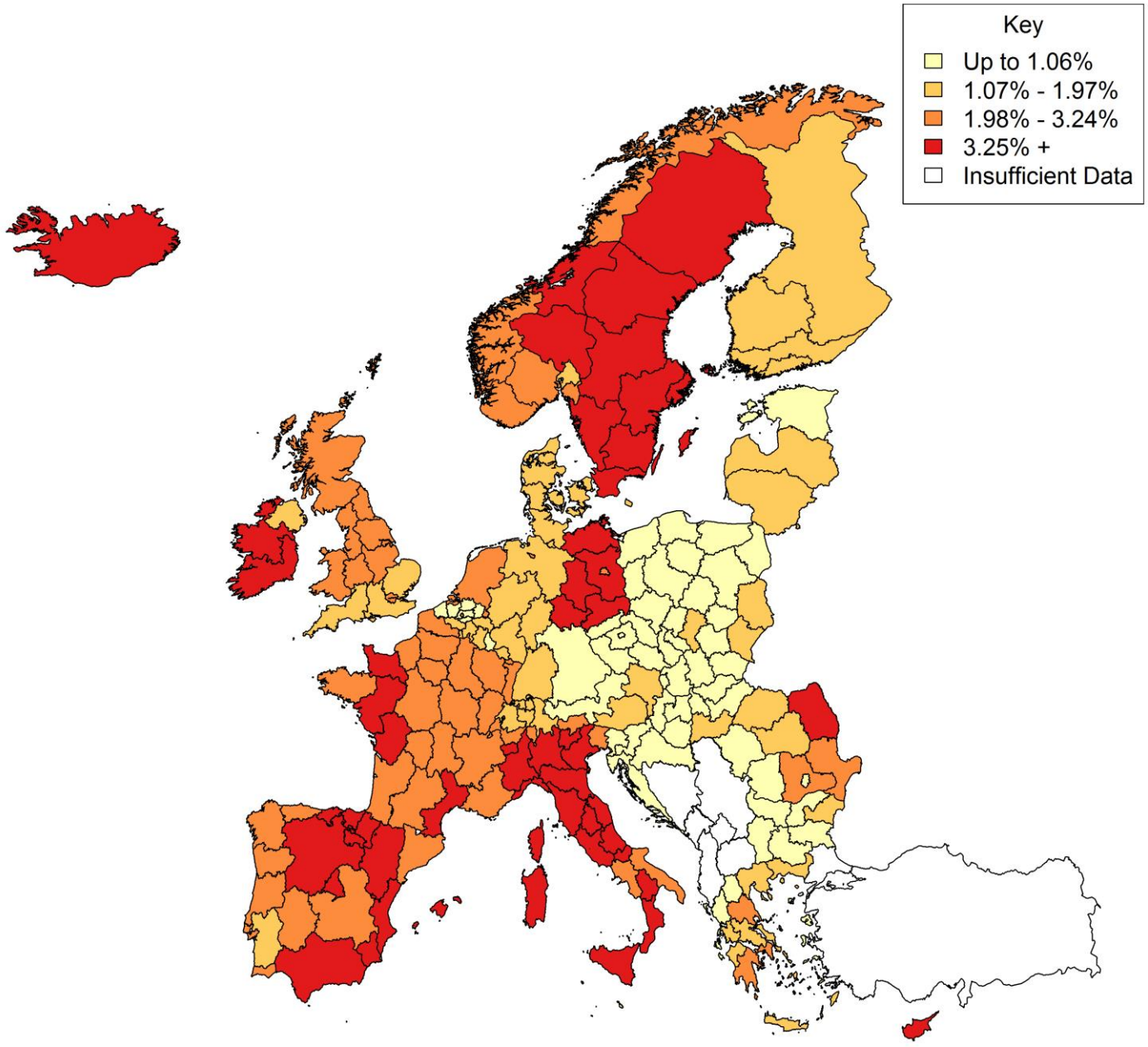
- E.g. Green, A.E. & Livanos, I. (2017) “Involuntary non-standard employment in Europe”, *European Urban and Regional Studies*, 24(2), pp175-192.

Mapping INE

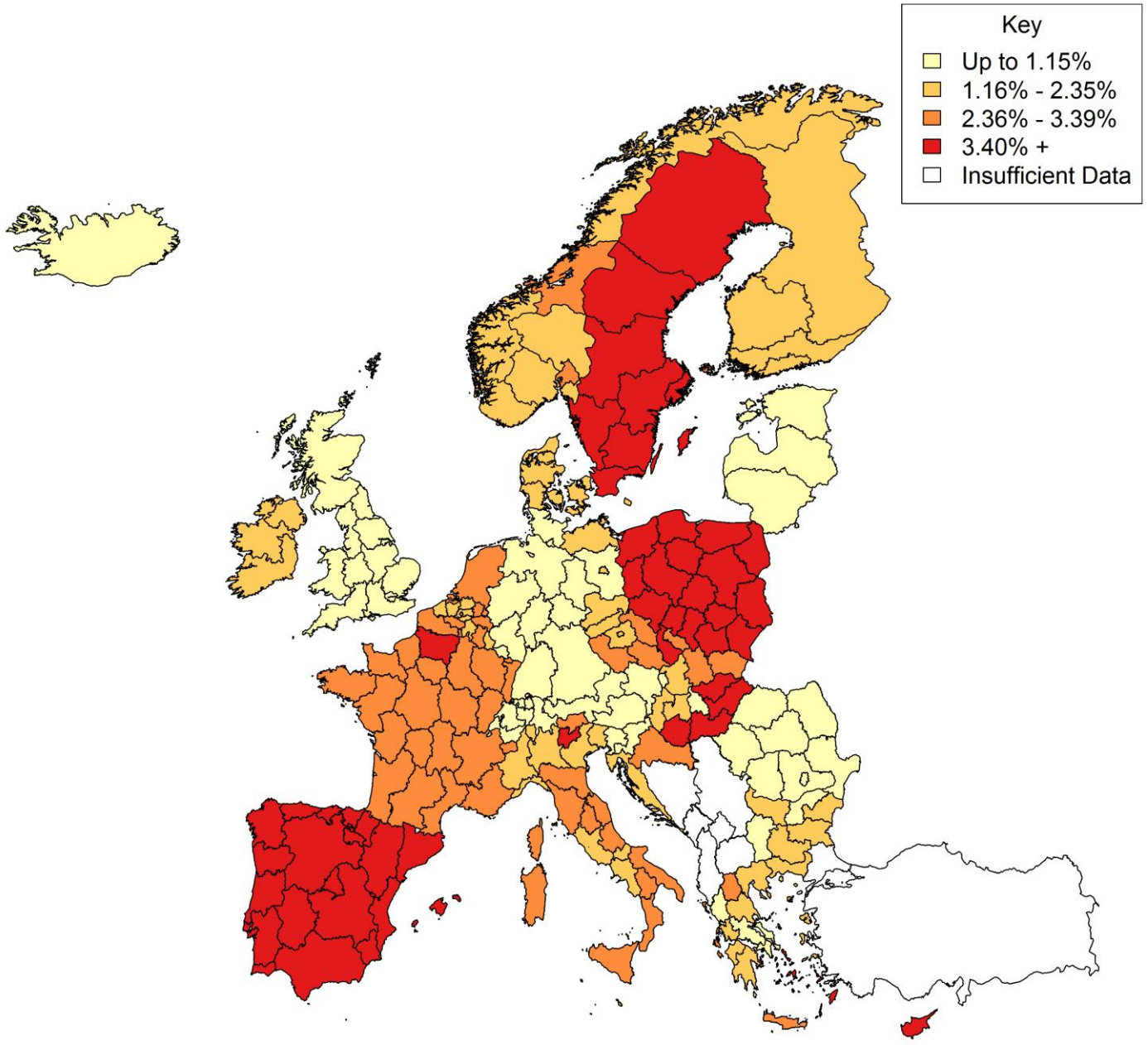
- Rates for components of INE and overall INE calculated
  - For each country
  - For the lowest level of geography available
  - Maps are produced to show the variation in INE rates

- Notes
  - LFS 2014 data used here for convenience
  - There is a literature concerning the ideal choice of colours and numbers of categories for maps but we do not pursue this further here

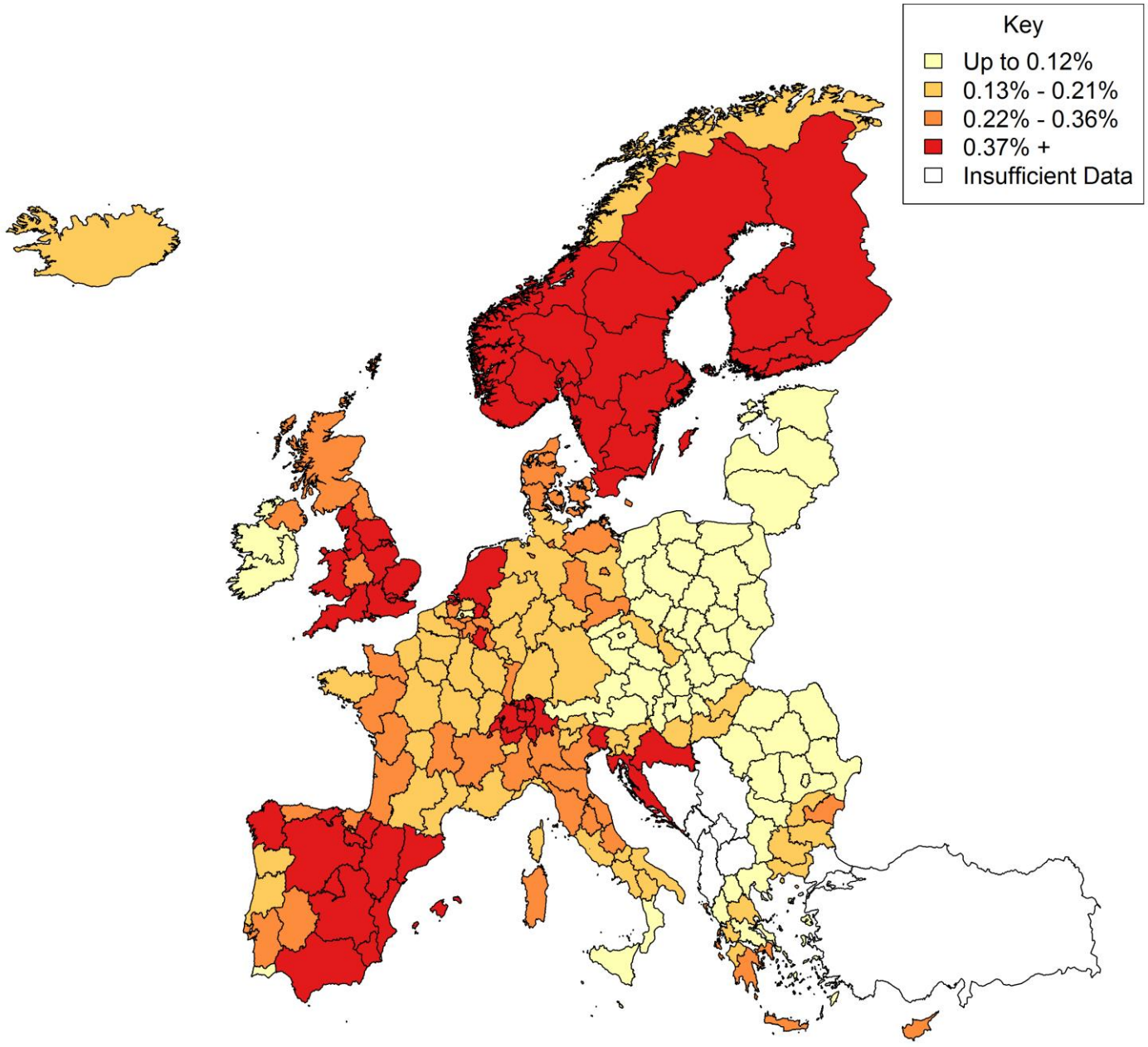
Unable to Find Full Time Work



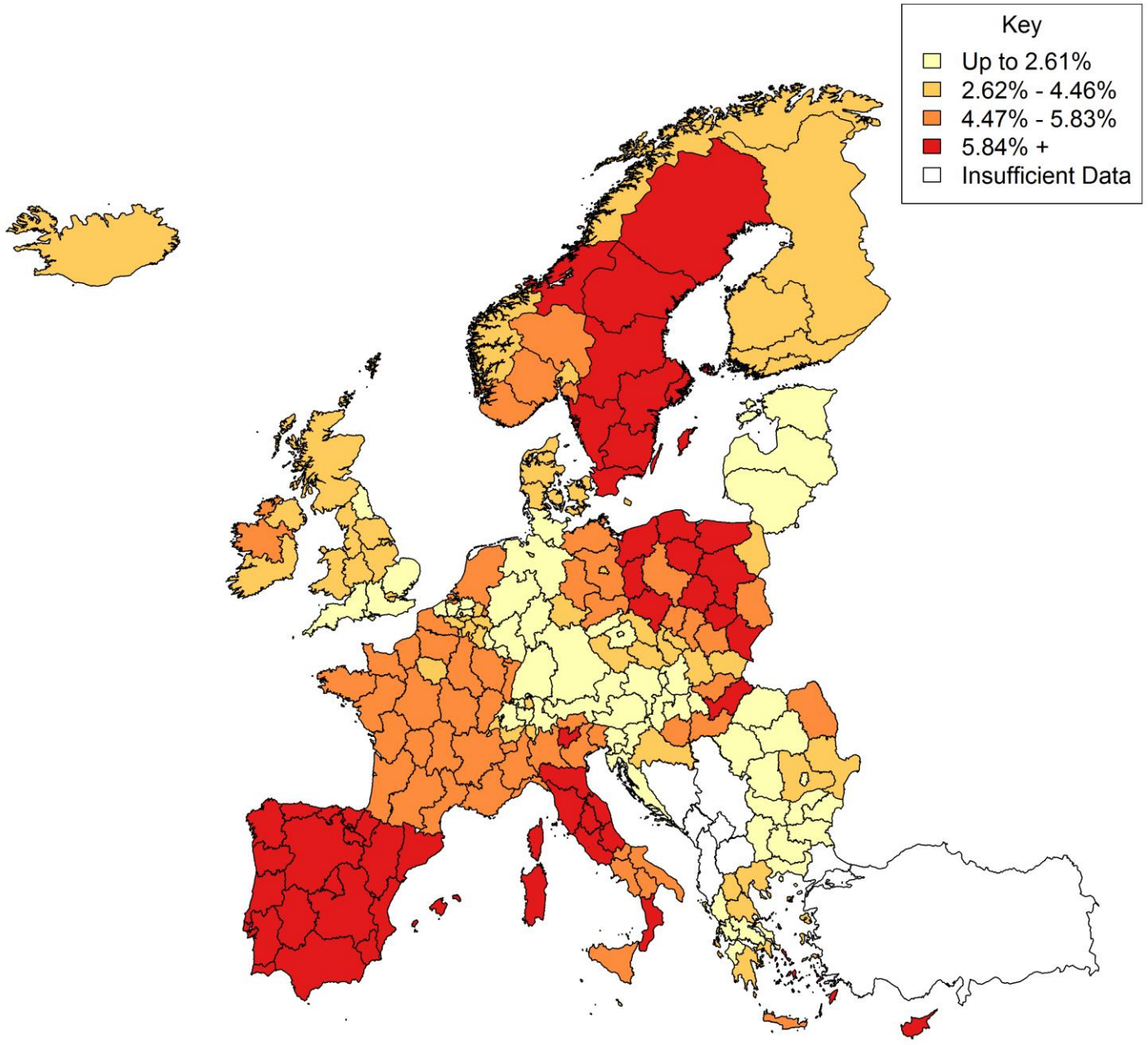
Unable to Find Permanent Work



Having Fear of Loss of Current Work



Overall INE

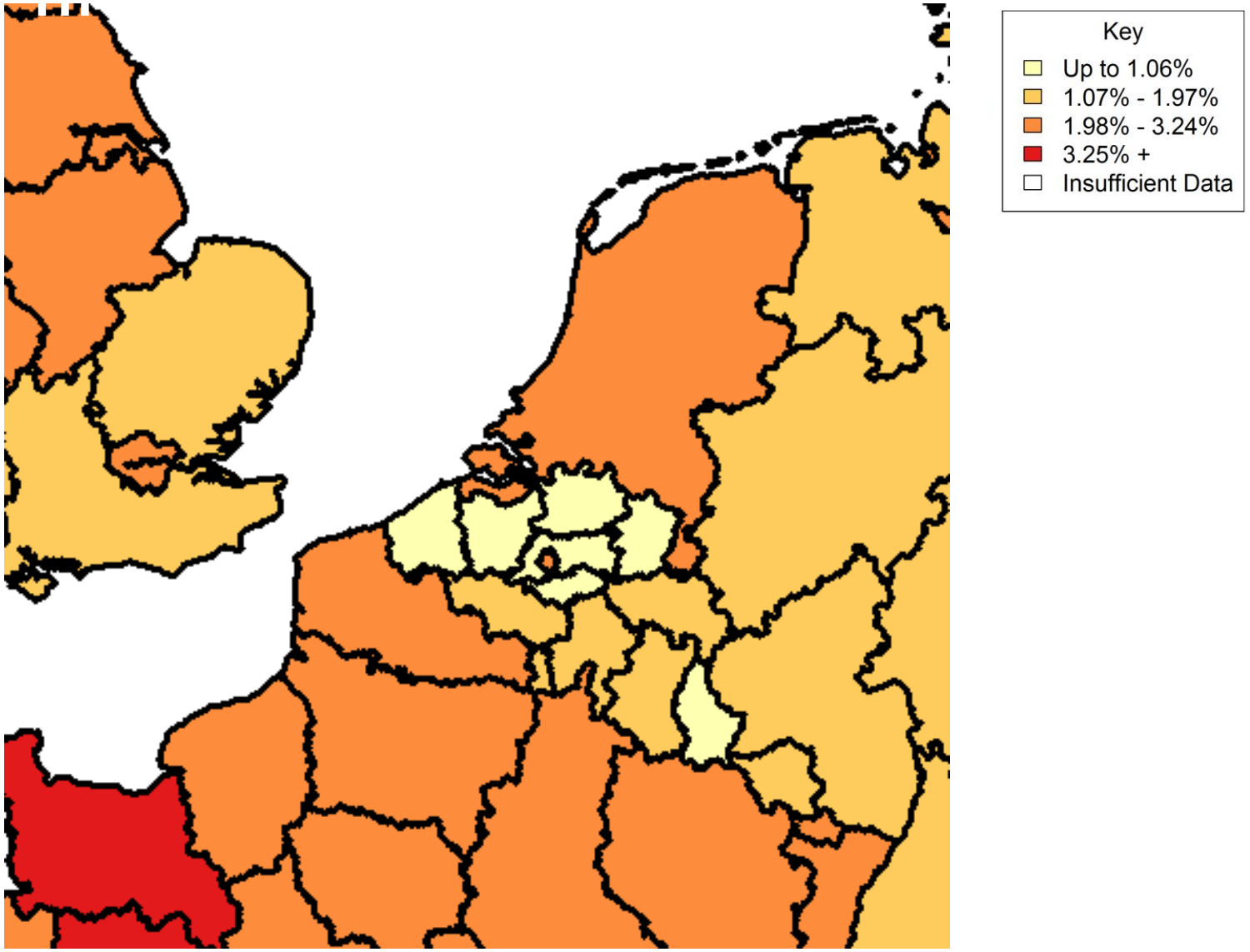


Mapping INE

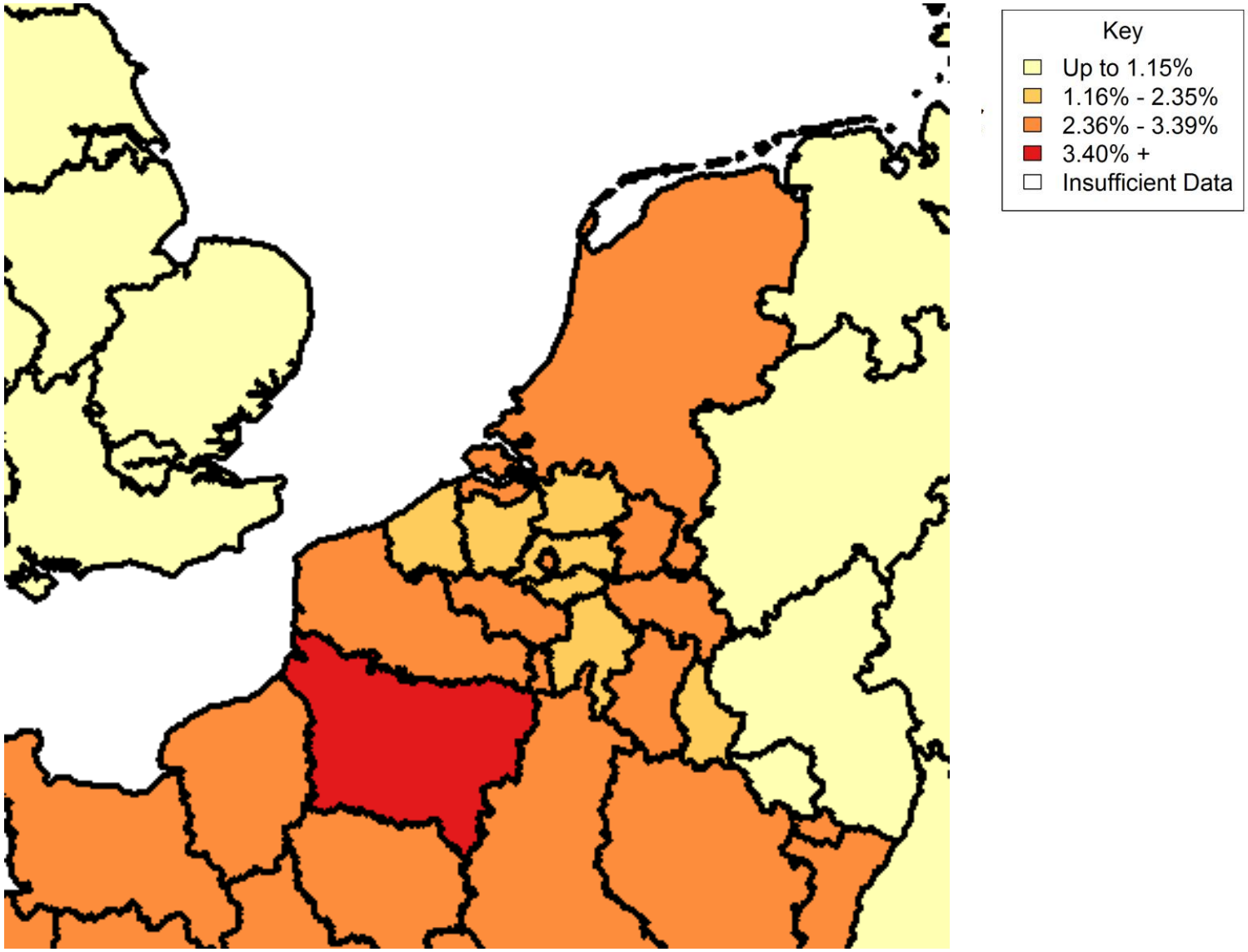
- Conclude that regional differences exist
  - Some countries have more differences between regions than other countries
  - Differences between regions depend on the variable being examined

- If we do not have data on regions then our understanding is compromised

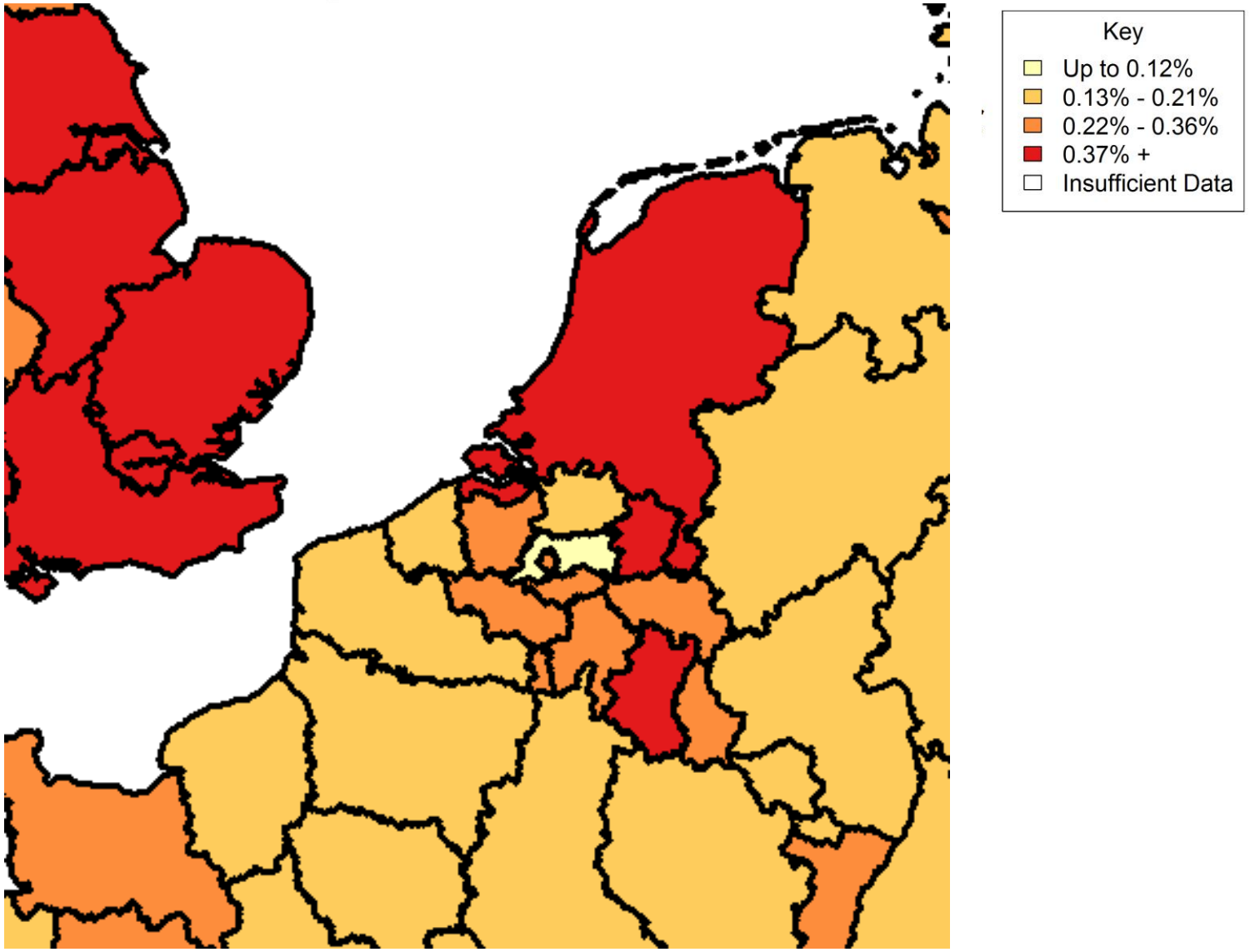
Unable to Find Full Time Work



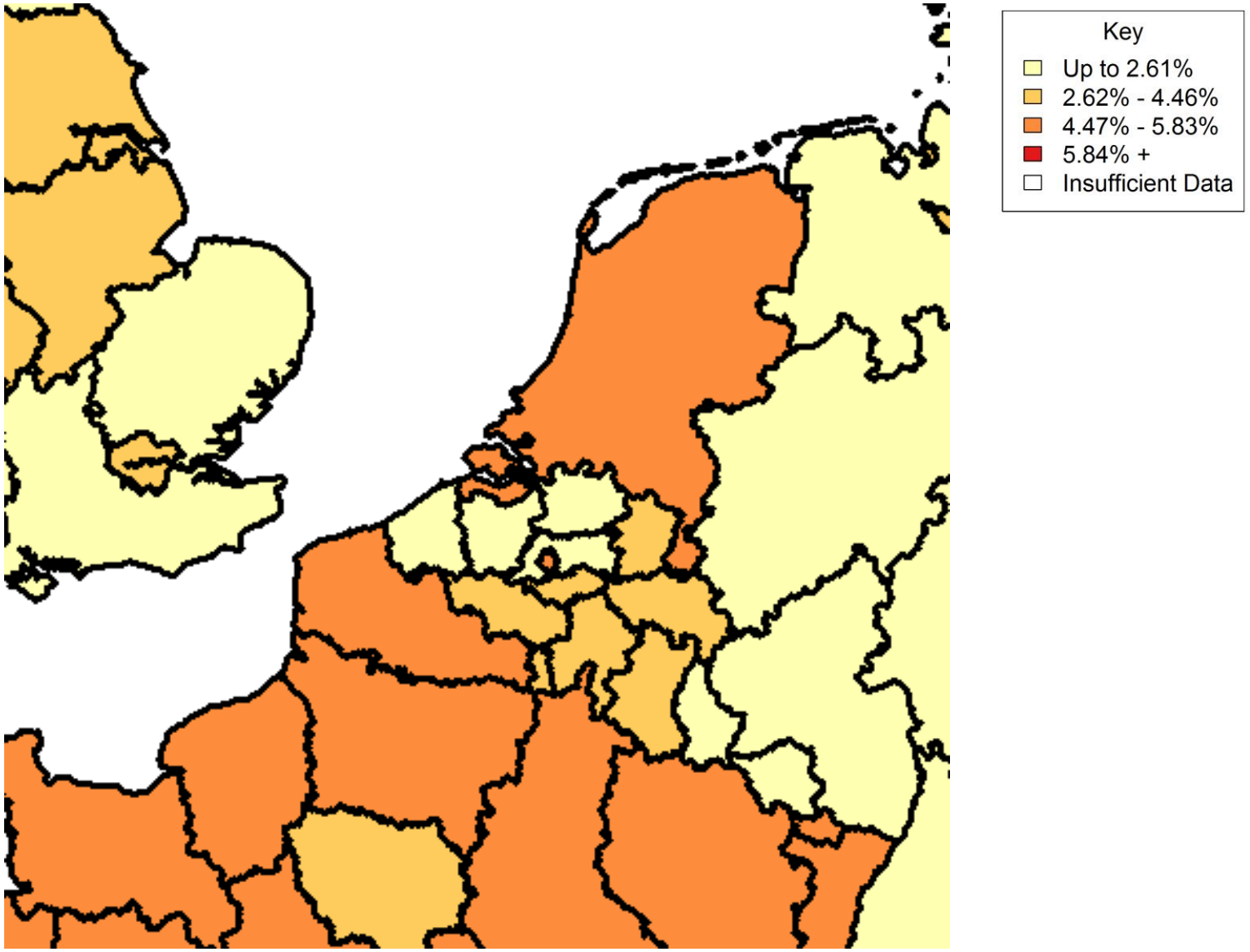
Unable to Find Permanent Work



Having Fear of Loss of Current Work



Overall INE



Regional variation

- The fact that there are differences between regions may be due to several factors including:
  - It is possible that individuals in particular regions have different characteristics from those in other regions and this predisposes them to have different outcomes
  - Certain regions may have different characteristics from other regions (e.g. proportions of businesses in different sectors) and this may lead to individuals in those regions having different outcomes

Effect of regions in modelling

- It is thus of interest to build models which will help understand the underlying processes

- Let us consider the modelling of the probability of being in involuntary non-standard employment (INE)
  - Logistic regression as binary outcome
  - Multilevel modelling
    - Respondents are grouped within countries
    - Respondents are grouped within regions within countries

Potential effects of ignoring regional level

- Effects shown by Moerbeek (2004)
  - Variation at ignored level is added to neighbouring levels
  - Standard errors of fixed effects below the level omitted are inflated, leading to loss of power for associated statistical tests
  - For unbalanced designs, estimates of fixed effects in the model are incorrect as well as their standard errors

Moerbeek, M. (2004) “The consequence of ignoring a level of nesting in multilevel analysis”, *Multivariate Behavioral Research*, 39, 1, pp129-149.

Model

- Outcome: Involuntary non-standard employment (INE)
- Basic demographic explanatory variables
  - Gender
  - Age-group
  - Educational level
- Explanatory variable hypothesised to have an effect
  - Place of birth being outside country of residence

Effect of ignoring region

	Country Only		Country and Region	
Effect	*Coefficient*	*s.e.*	*Coefficient*	*s.e.*
Intercept	-1.020	0.176	-1.017	0.176
Gender (female)	0.570	0.017	0.579	0.017
Not being born in country of residence	0.488	0.024	0.546	0.024
(Age-group effects)	…	…	…	…
(Educational level effects)	…	…	…	…

- For model including region, the contribution to the variation at the regional level is 2.8% (with 9.6% at country level and 87.7% at individual level)

Effect of ignoring region

- Coefficient for not being born in country of residence changes by more than 2 standard errors
  - Coefficient from model ignoring region (0.488) is outside 95% CI for the coefficient from model including region: (0.497, 0.594)
- This has occurred with even this low level of variation attributable to the regional level
  - For models where the missing level accounts for even more of the variation, the effects on the fixed effects are likely to be larger

Including contextual variables

- Outcome: Involuntary non-standard employment (INE)
- Basic demographic explanatory variables
  - Gender, Age-group, Educational level
- Contextual variable
  - Proportion of individuals in country/region whose place of birth is outside the country of residence
- Explanatory variable hypothesised to have an effect
  - Place of birth being outside country of residence
    - Now regarded as the effect of this solely due to the individual rather than the locality

Effect of ignoring region

	Country Only		**Country and Region**	
Effect	*Coefficient*	*s.e.*	*Coefficient*	*s.e.*
Intercept	-4.504	1.522	-2.528	0.499
Gender (female)	0.574	0.017	0.583	0.017
Not being born in country of residence	0.493	0.025	0.554	0.025
Proportion in country/region not born in country of residence	3.824	1.669	1.654	0.516
(Age-group effects)	…	…	…	…
(Educational level effects)	…	…	…	…

Effect of ignoring region

- For model including region, the contribution to the variation at the regional level is 2.5% (with 8.8% at country level and 88.7% at individual level)
- Contextual variable in the model which includes region has coefficient significantly different from zero
  - Coefficient is over three times the s.e.
  - If region had been ignored, this variable would not have been considered
  - Significant contextual variable at country level has different implications for policy making

Effect of ignoring region

- Coefficient for not being born in country of residence changes by more than 2 standard errors
  - Coefficient from model ignoring region (0.493) is outside 95% CI for the coefficient from model including region: (0.504, 0.604)
- This has occurred with even this low level of variation attributable to the regional level
  - For models where the missing level accounts for even more of the variation, the effects on the fixed effects are likely to be larger

Summary

- Maps of labour force data show that variation occurs not just between countries but also between regions within countries
  - *Where a lack of variation is seen, this may be due to the geographical level chosen rather than no variation existing*
  - *Researchers and policy makers need to be aware that lack of evidence for differences may be a function of data availability or reporting rather than the underlying truth*

Summary

- Even with a low level of variation attributable to a regional level, the results from fitting a statistical model may be affected by the region being ignored
  - *There is potential for substantive differences in results to be observed*
  - *It is possible that, if data included regional information from countries where it is currently limited or missing, results from modelling may be affected*

Thank You

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