



EUROPEAN HEALTH CARE OUTCOMES,
PERFORMANCE AND EFFICIENCY

Regional level differences - How much do regional level factors explain performance variation?

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Rationale for investigating regional variation

- Strong evidence of regional variations
- Strong evidence of unwarranted variation in
 - Outcomes
 - Supply and costs
 - Quality and safety
- Causes and consequences of variation not well understood
- Large unexplained variation in overall health systems performance

The “regional entities” in EuroHOPE



- In Finland, Italy, Norway, Scotland and Sweden local health authorities
- In social health insurance countries regional governmental or sub-national authorities
- Wide variation in size of «regional» entities as well as in the number of entities per country

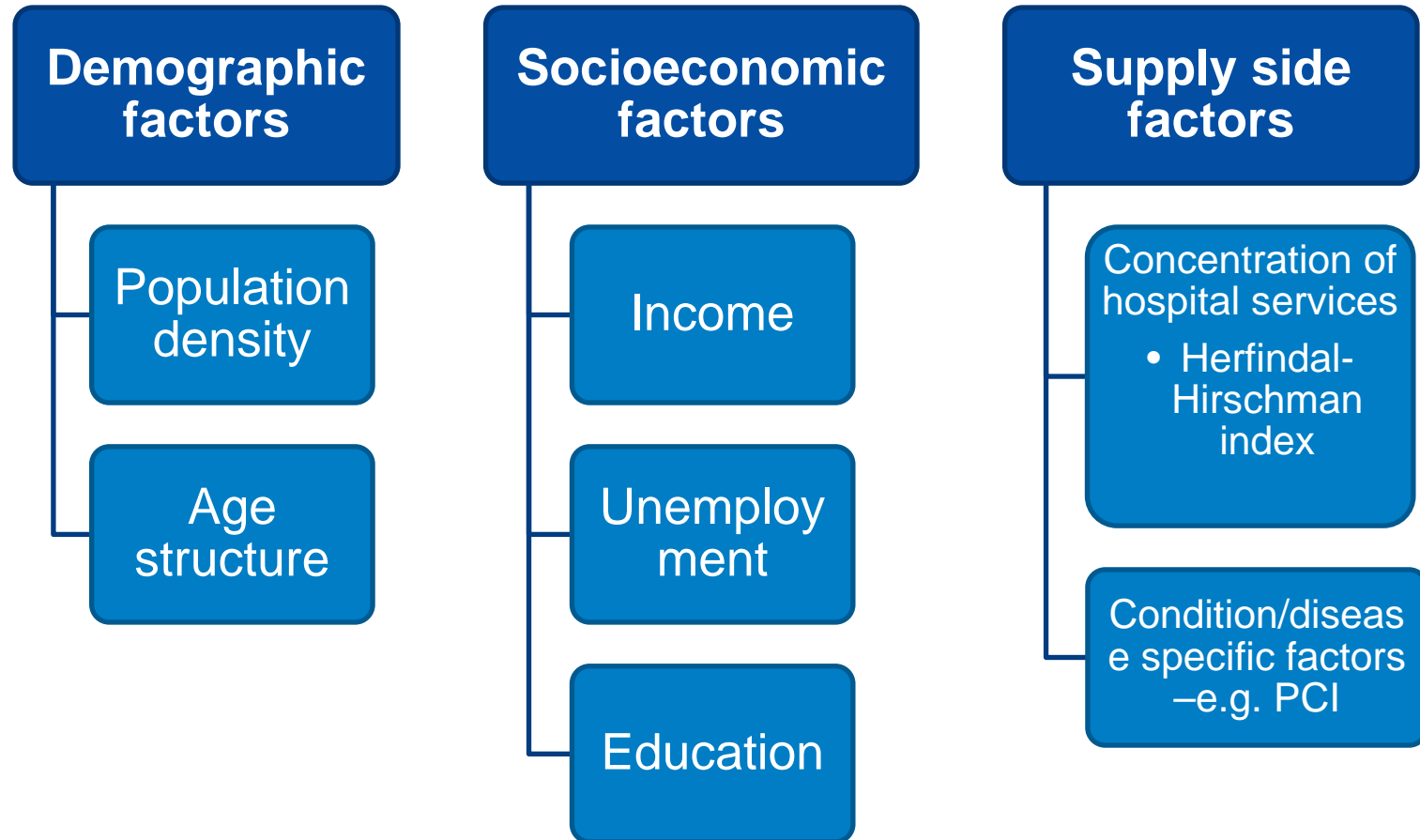
Regional level analysis

- Regional level analysis carried out with pooled regional level data and risk adjusted indicators of all countries
 - Risk adjusted 30-day, 90-day, and 1-year mortality
 - Risk adjusted first LOS, LOS in one year
 - Risk adjusted cost of first hospital stay, cost of first year

Regional level analyses

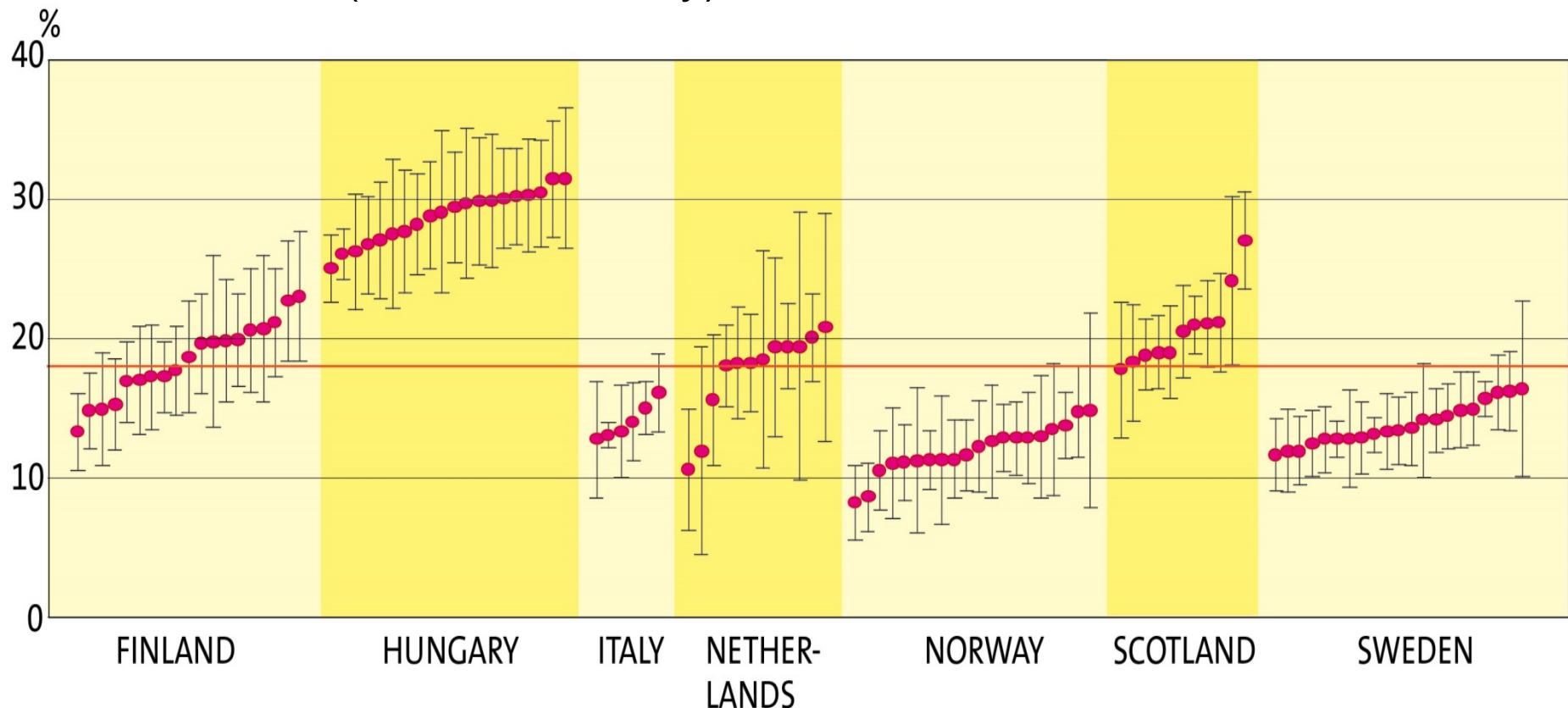
- Regression analyses to investigate determinants of variation in risk adjusted indicators
 - One-way random effect analysis of variance (ANOVA) model to determine the portion of variance that was due to cross-country differences as compared to regional differences
 - Random intercept models (mixed-effects maximum likelihood regression)
 - Logistic regression for mortality, and negative binomial regression for length of stay

Regional level factors considered



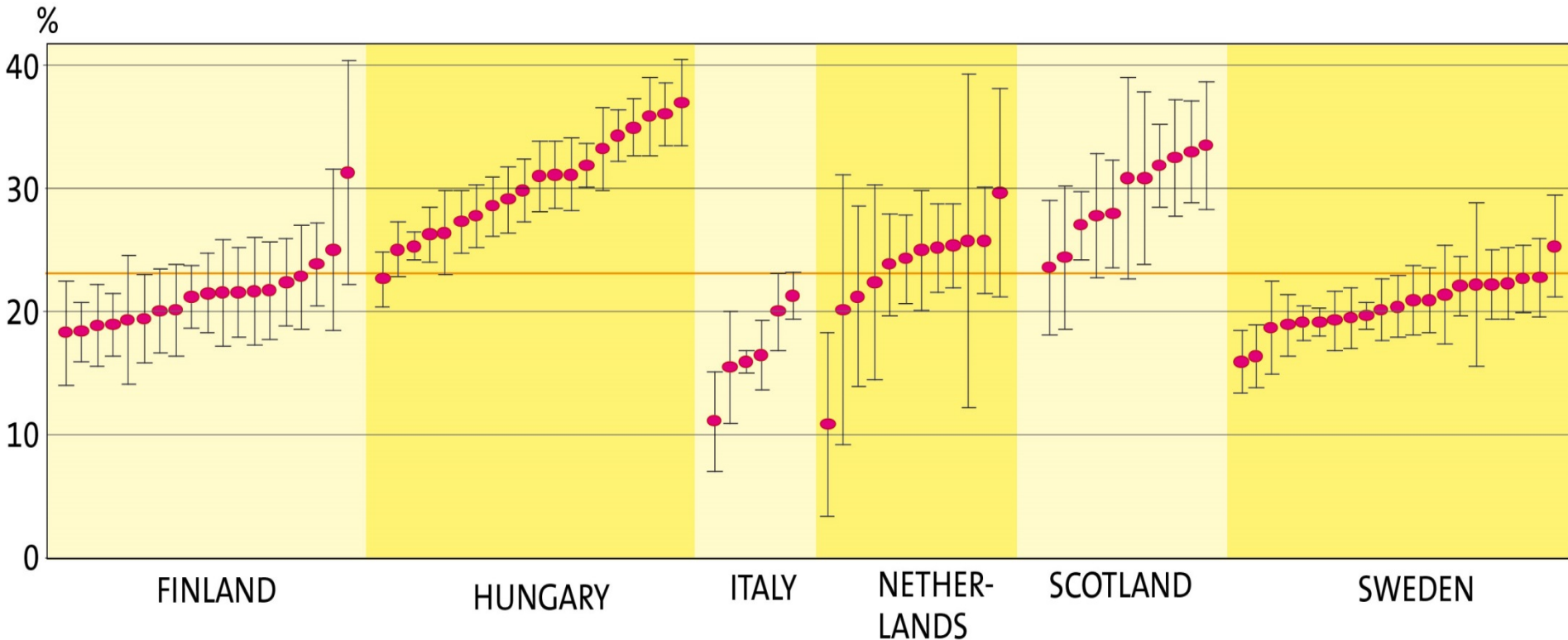
Regional variation in mortality, AMI

- Age- and sex-adjusted one-year mortality by regions, AMI in 2008 (2009 in Norway).



Regional variation in mortality, stroke

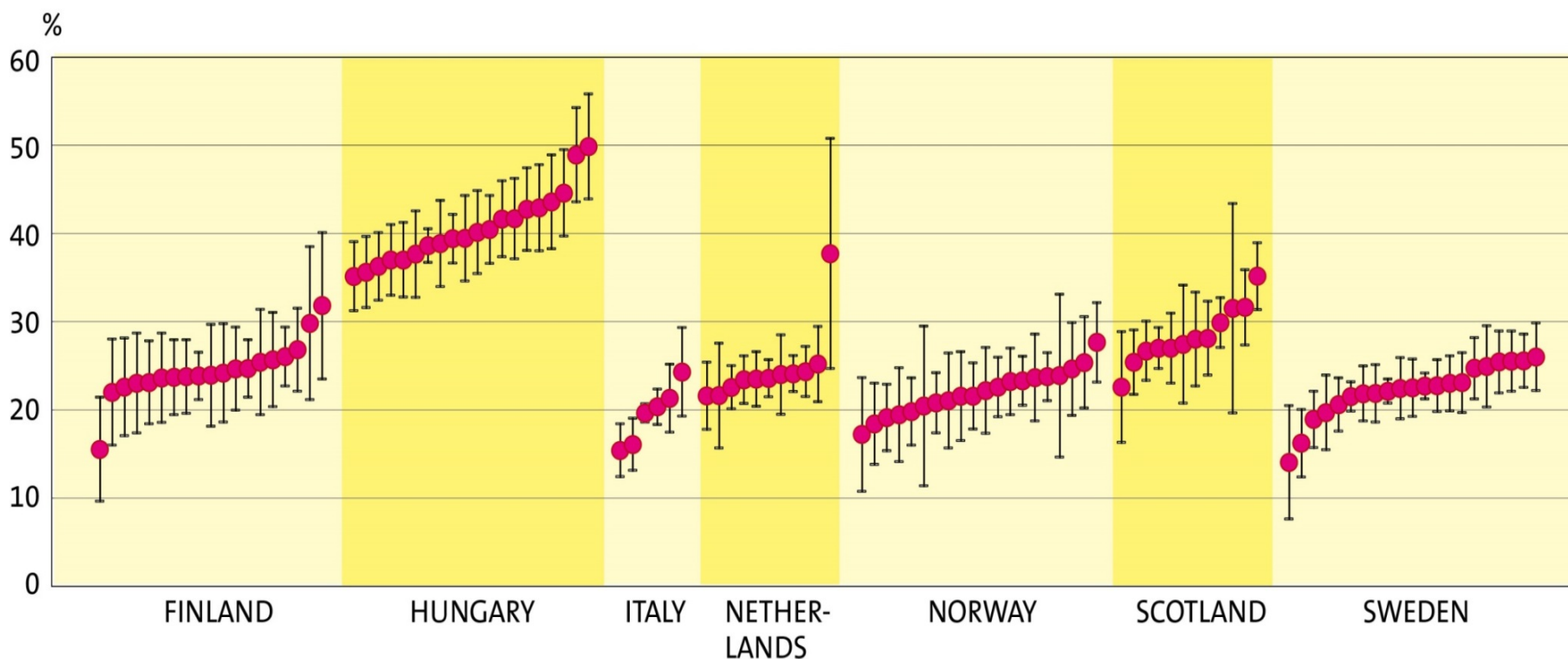
- Age- and sex-adjusted one-year mortality by regions, ischaemic stroke in 2008





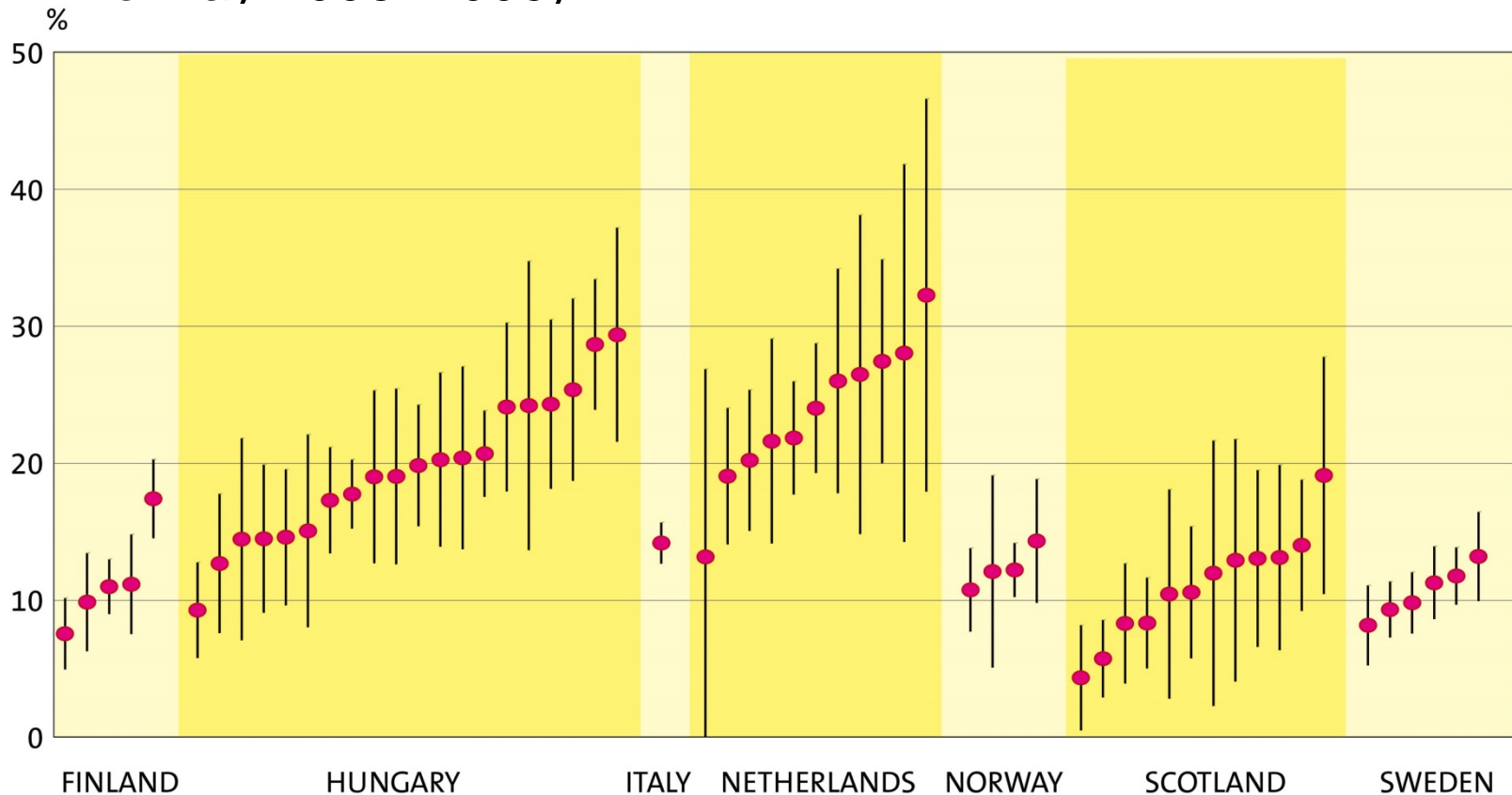
Regional variation in mortality, hip fracture

- Age- and sex-adjusted one-year mortality by regions, hip fracture in 2008 (Norway 2009)



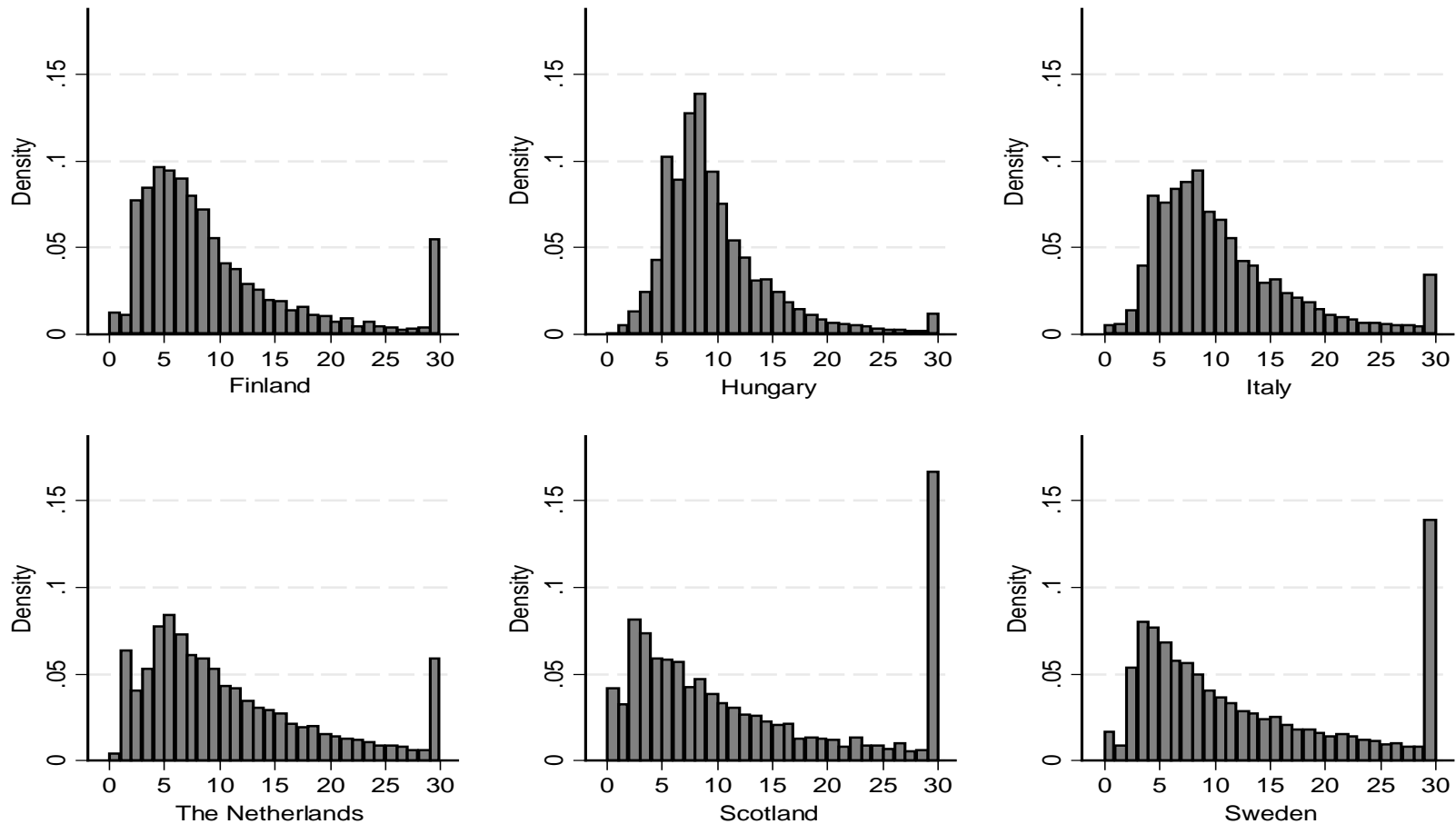
Regional variation in mortality, VLBW

- Risk-adjusted one-year mortality by regions, VLBW and VLGA infants in 2006–2008 (Netherlands 2005–2007, Norway 2008–2009)



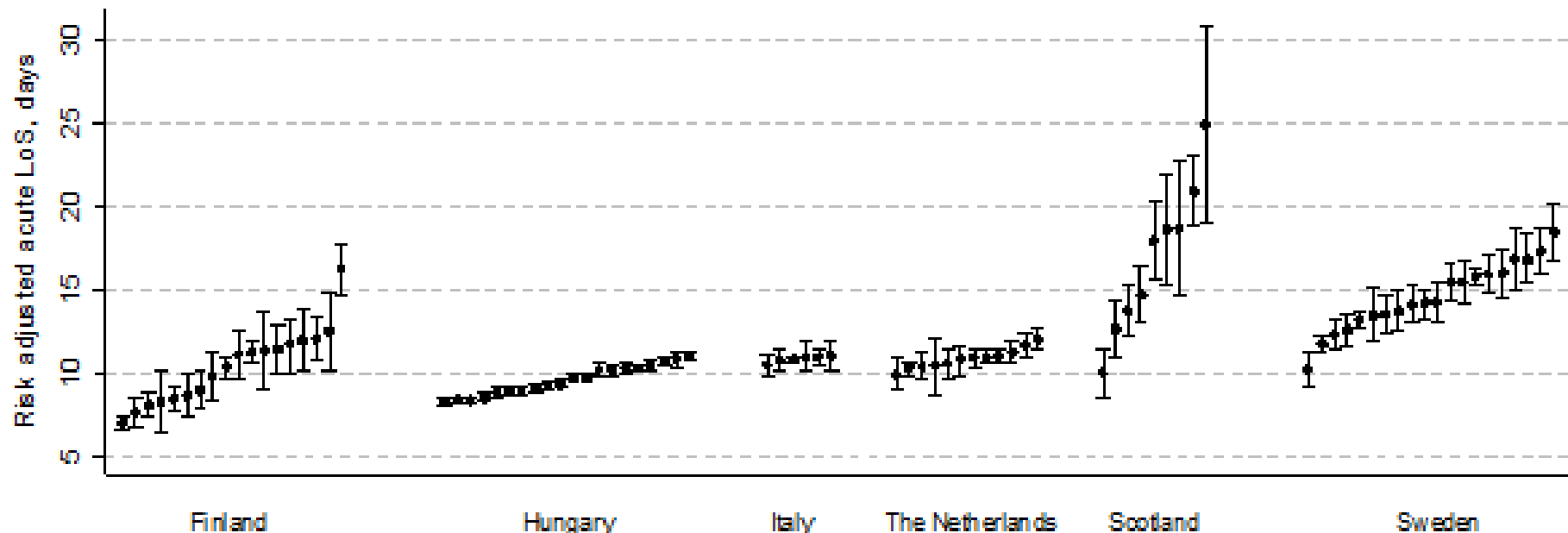
Individual level distribution of LOS, stroke

- Distribution of length of stay in acute hospital treatment after ischaemic stroke in six European countries

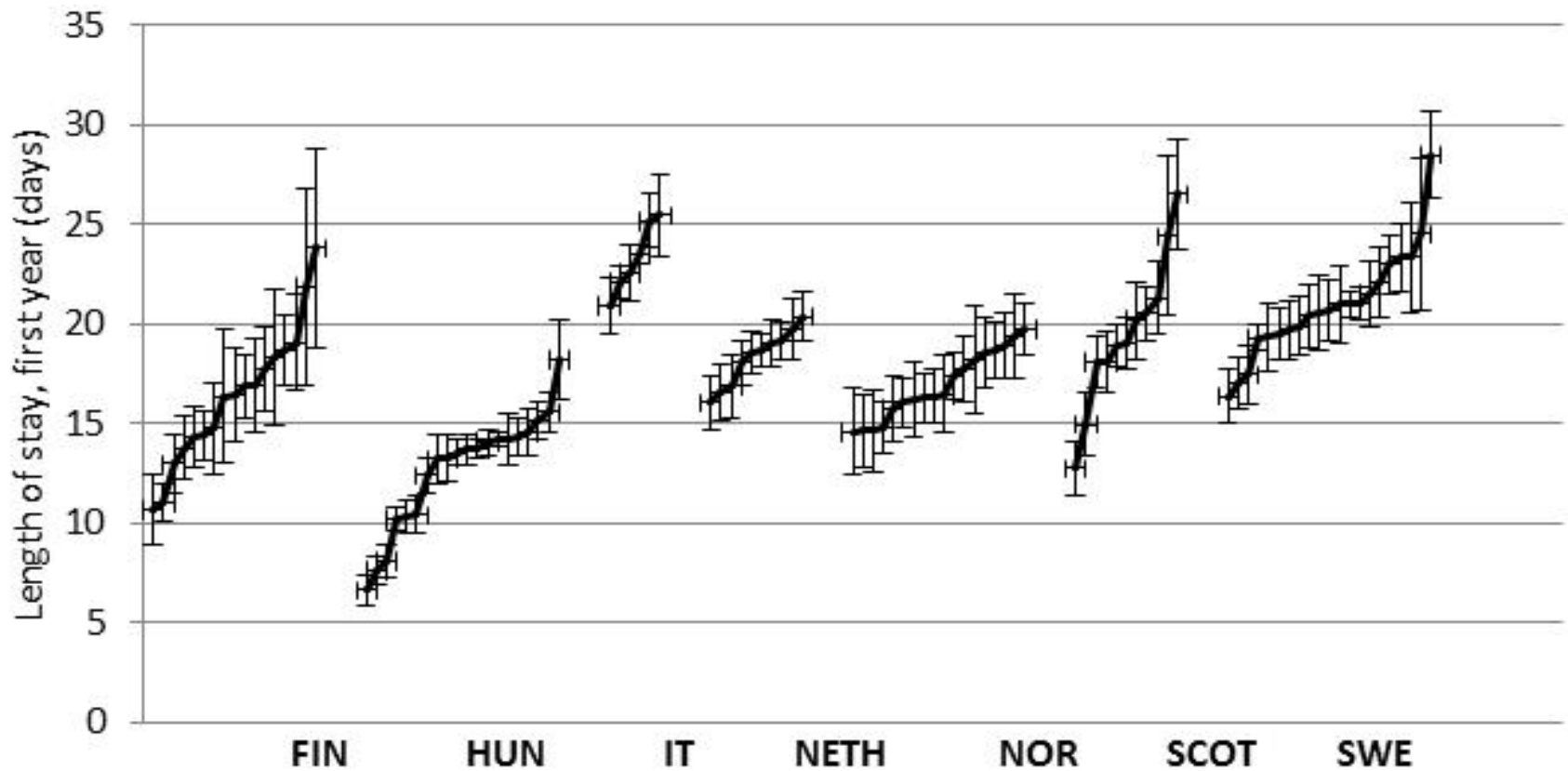


Regional variation in LOS, stroke

- Regional variation in length of stay (risk adjusted, with 95% confidence intervals) after ischaemic stroke



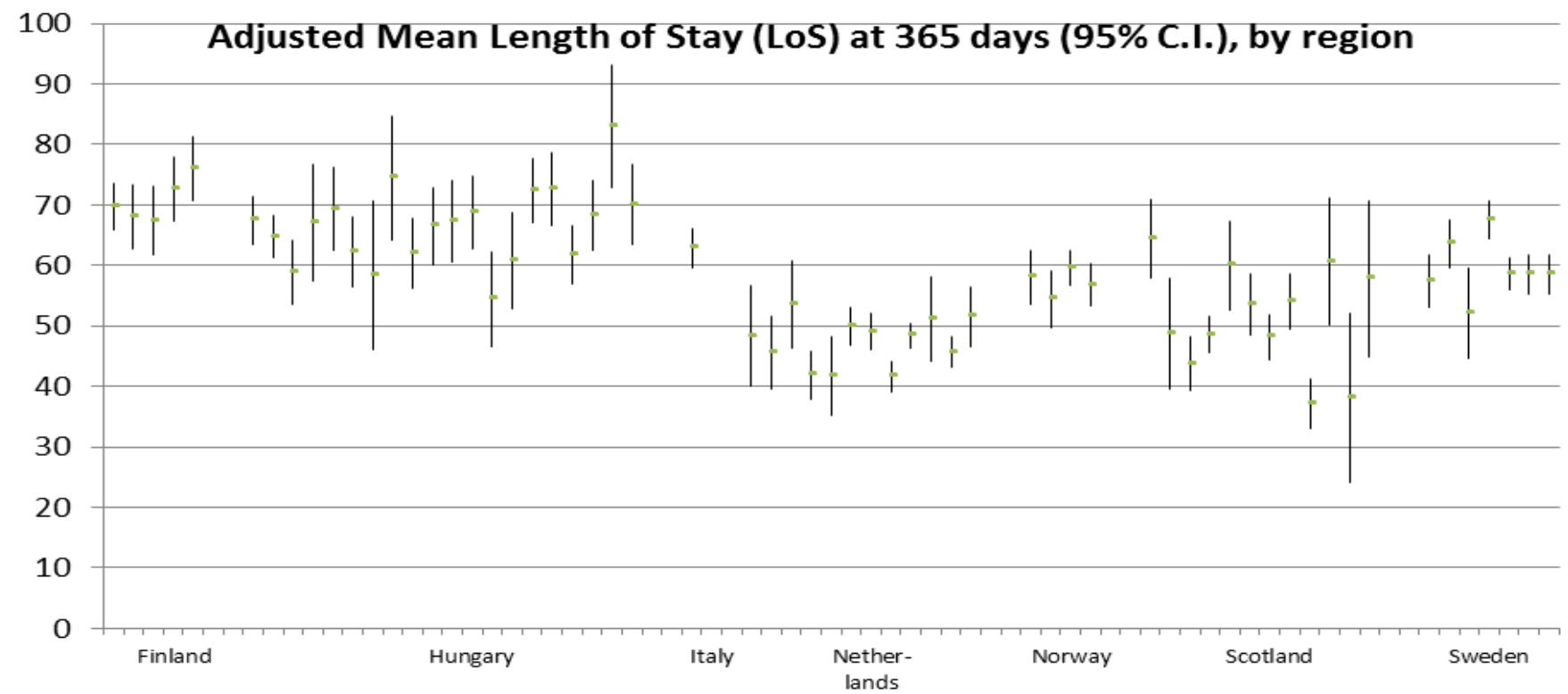
Regional variation in LOS, hip fracture





Regional variation in LOS, VLBW

- Adjusted for gestational age (GA), sex, intrauterine growth (small for gestational age), Apgar score at five minutes, parity and multiple births



Explaining variation: main results of regressions

- AMI
 - Effect of reimbursement system on PCI intensity: use of PCI 17% higher in countries and areas with activity based reimbursement systems
 - GDP per capita negatively associated with 30-day mortality
 - Use of PCI had negative but not statistically significant effect on regional level on mortality
 - More detailed analyses of data from Finland and Norway suggested small effects of socio-economic factors on mortality

Explaining variation: main results of regressions

- Stroke and hip fracture
 - Regional differences in mortality and LOS not related to regional factors
 - Only GDP per capita positively associated with lower mortality in stroke patients

Explaining variation: main results of regressions

- VLBW and VLGA
 - Socio-economic variables at regional level had impact on mortality in Hungary only
 - Concentration of services in neonatal care and level of delivery hospital had no impact on mortality or LOS when data of four countries were combined
 - In Hungary and Finland being born in tertiary-level hospitals was associated with lower mortality
 - LOS tended to be longer for infants born in tertiary-level hospitals in Scotland, Italy and Hungary

Conclusion

- Regional level differences were larger than between country variation, although region by region comparisons (within countries) had overlapping confidence intervals in most areas
- Analyses showed that various demand and supply factors could not explain much of the regional level variation in mortality, LOS or utilisation of procedures

Conclusion

- Consistent with evidence from other studies
 - Relatively large unexplained variation
 - Differences in institutional factors do not explain variation as much as theory would suggest
- Limitations in the information included in the analysis
 - e.g. adoption of technology, quality of care, physician attitudes towards treatment effectiveness etc.
- Variation in outcomes and use of resources indicate room for improvement