# The Synthetic Control Method for Health-Care Programme Evaluation

S. Conti

Improvement Analytics Unit

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#### Context

The Improvement Analytics Unit first applied the Synthetic Control Method<sup>[1]</sup> (SCM) in 2017 to assess the impact on hospital activity of the re-designing of urgent and emergency care in the Northumberland CCG<sup>[2]</sup>

**Population:** individuals registered with a Northumberland CCG GP

the opening in June 2015 of the Northumbria Specialist Emergency Care

Intervention: Hospital and gradual conversion of 3 local A&E departments into urgent, non-

emergency care hubs

**Comparator:** individuals registered with a GP not under the remit of Northumberland CCG

A&E attendance rates

non-/elective admissions rates

% of A&E attendances lasting under 4hrs

Outcomes: % of A&E attendances converting into admissions

length of A&E waiting time

length of hospital stay for non- / elective admissions

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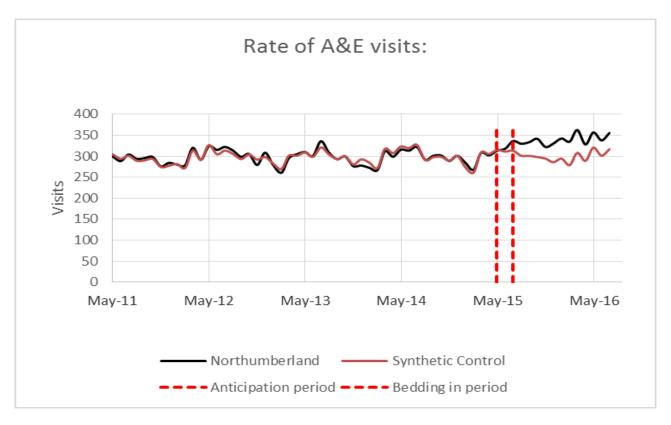
#### Method

- Forming a control group that is as similar as practical to that in receipt of the intervention is key to drawing meaningful and unbiased outcome comparisons
- Assume the case of a single treated unit (e.g. the Northumberland CCG)
- SCM weights available control units, so that their weighted average outcome trend (and any baseline covariates) before the intervention closely matches that shown by the treated unit
  - control units with more similar characteristics to the treated one will receive higher weight
- The impact of the intervention at any time after its embedding is estimated by subtracting the synthetic outcome (i.e. its weighted average across controls) from that observed from the treated unit





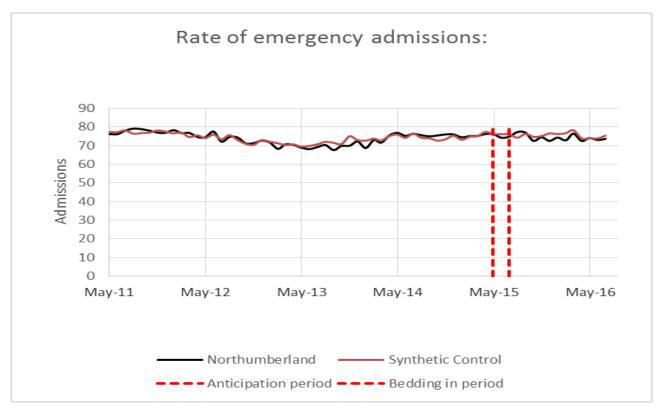
#### Results







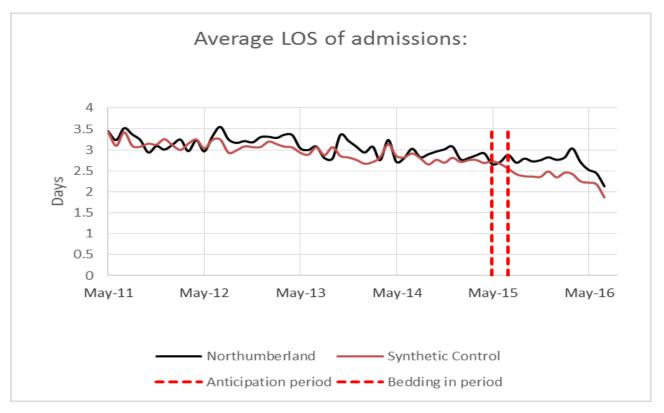
## Results (cont.)







## Results (cont.)







## Results (cont.)

- Following the intervention people under the Northumberland CCG remit, relative to those in the synthetic control CCG, saw a (plausibly) statistically significant
  - 13.6% increase in A&E attendance rates;
  - 10.5% reduction in average A&E waiting time;
  - 6.9% increase in the % of A&E attendances lasting under 4hrs
- Additional details can be found in the IAU case-study documentation<sup>[2]</sup>





#### Remarks

- SCM is well suited to geographically / administratively delimited units
- By not relying on parallel outcome trends SCM accounts for time-varying effects of confounders
- The accuracy of SCM can be assessed via placebo testing (if only informally)
- A poor match over the pre-intervention period will lead to biased SCM estimates
- SCM yields more dependable results the longer the pre-intervention period and the less volatile the outcome trends
- SCM is widely available in popular analytical platforms (e.g. R, Stata, ...)
- Recent extensions<sup>[3-5]</sup> have been proposed to accommodate multiple treated units as well as multiple (serially) correlated and / or over-dispersed outcomes





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## Thank you



