Institute
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IFoA Life Conference

Predictive power of postcodes

Evaluating the predictive power of postcodes and pension amounts in mortality analysis

Overview of the presentation

- Postcode profilers
- Introducing the L-Distribution
- Mortality modelling with L-Distribution
- Impact of mortality modelling by pension amount
- Improving the model
- Conclusions

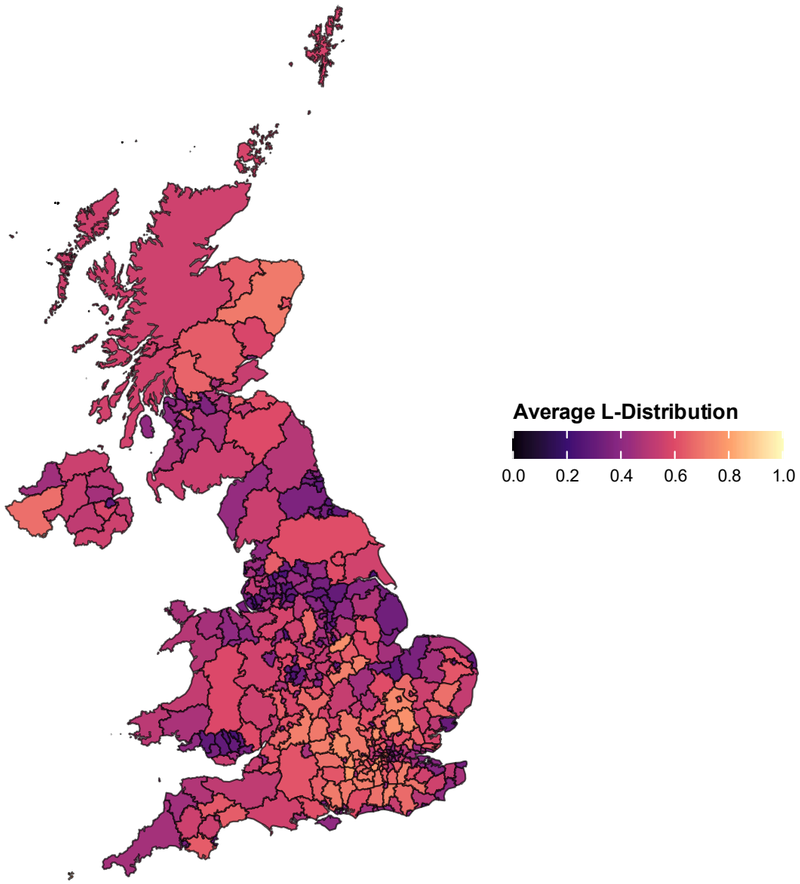
Postcode profilers in the market

- Several available in the market
- Uses a wide range of input data sources
- Wide reaching, for multiple purposes
- L-Distribution is created to assess mortality differences

The L-Distribution

A geo-demographic profiler tuned to mortality

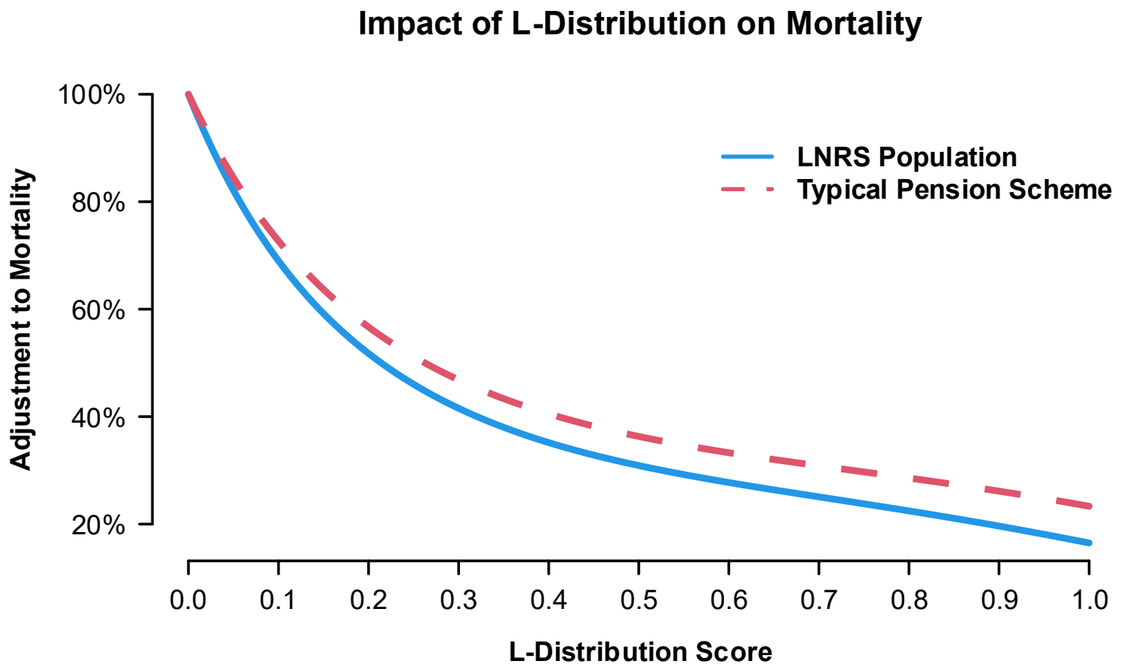
- Datasets maintained by LexisNexis Risk Solutions (LNRS) track virtually the **entire population** of UK adults
- LNRS datasets can be used to track **individual-level mortality experience** for the population
- Ad Res partnered with LNRS to harness the individual-level experience for longevity modelling
- The "**L-Distribution"** is a postcode-level geo-demographic profiler derived from the LNRS experience data



Applying the L-Distribution

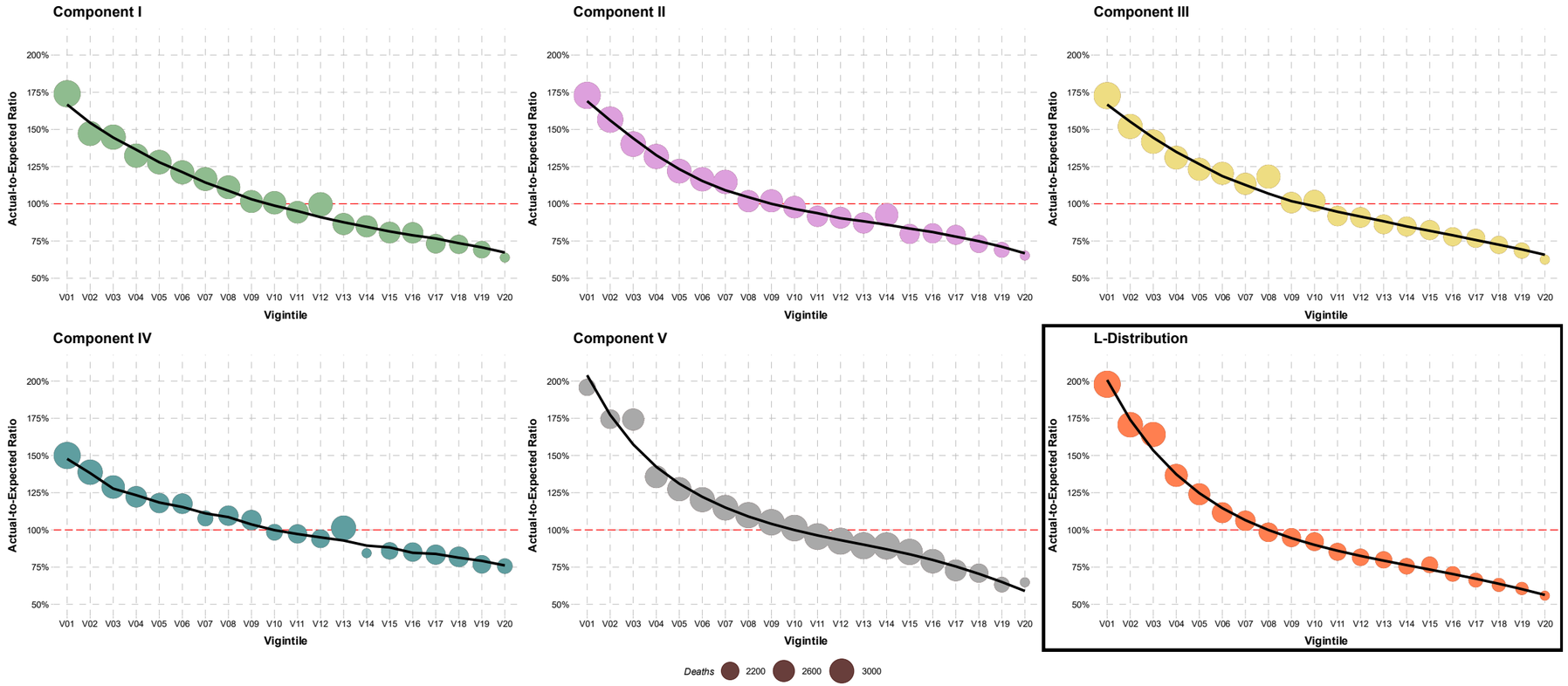
Capturing a wide mortality range with a stable measure

- The L-Distribution is **continuous** in [0,1], higher values suggest greater affluence and thus lower mortality
- Can be applied as continuous variable or bucketed (similar to pension amount bands)
- Derived using experience over particular 5-year age band and 5-year study period
- Tests suggest ordering of postcodes very similar across age bands and periods; range of impact is what changes



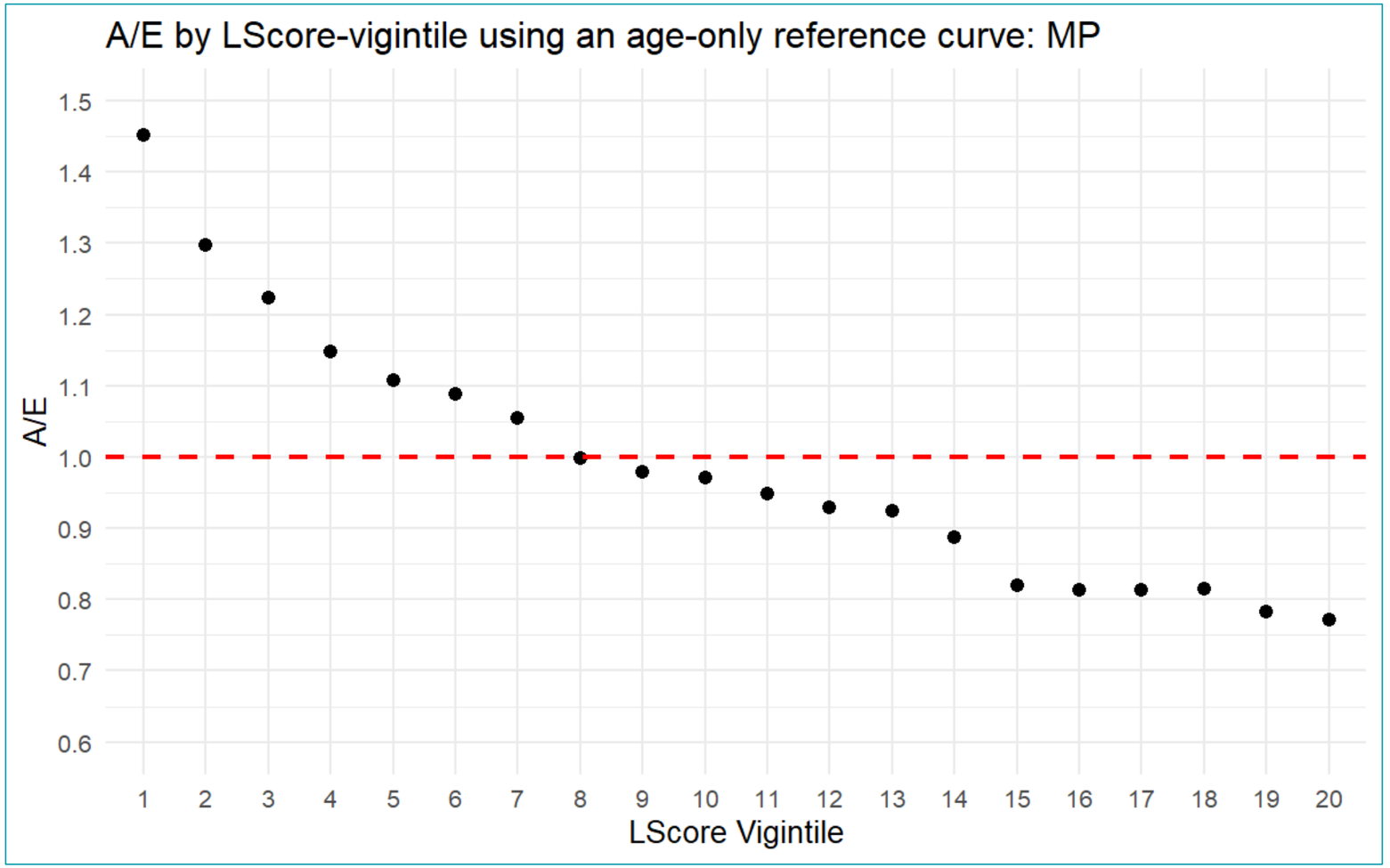
Deriving the L-Distribution

Capturing differences by combining multiple components



- **5 underlying components**, at LSOA or postcode level
- Bubbles are raw A/E ratios; black lines reflect model fit
- Each component continuous
- Combined based on the LNRS mortality experience

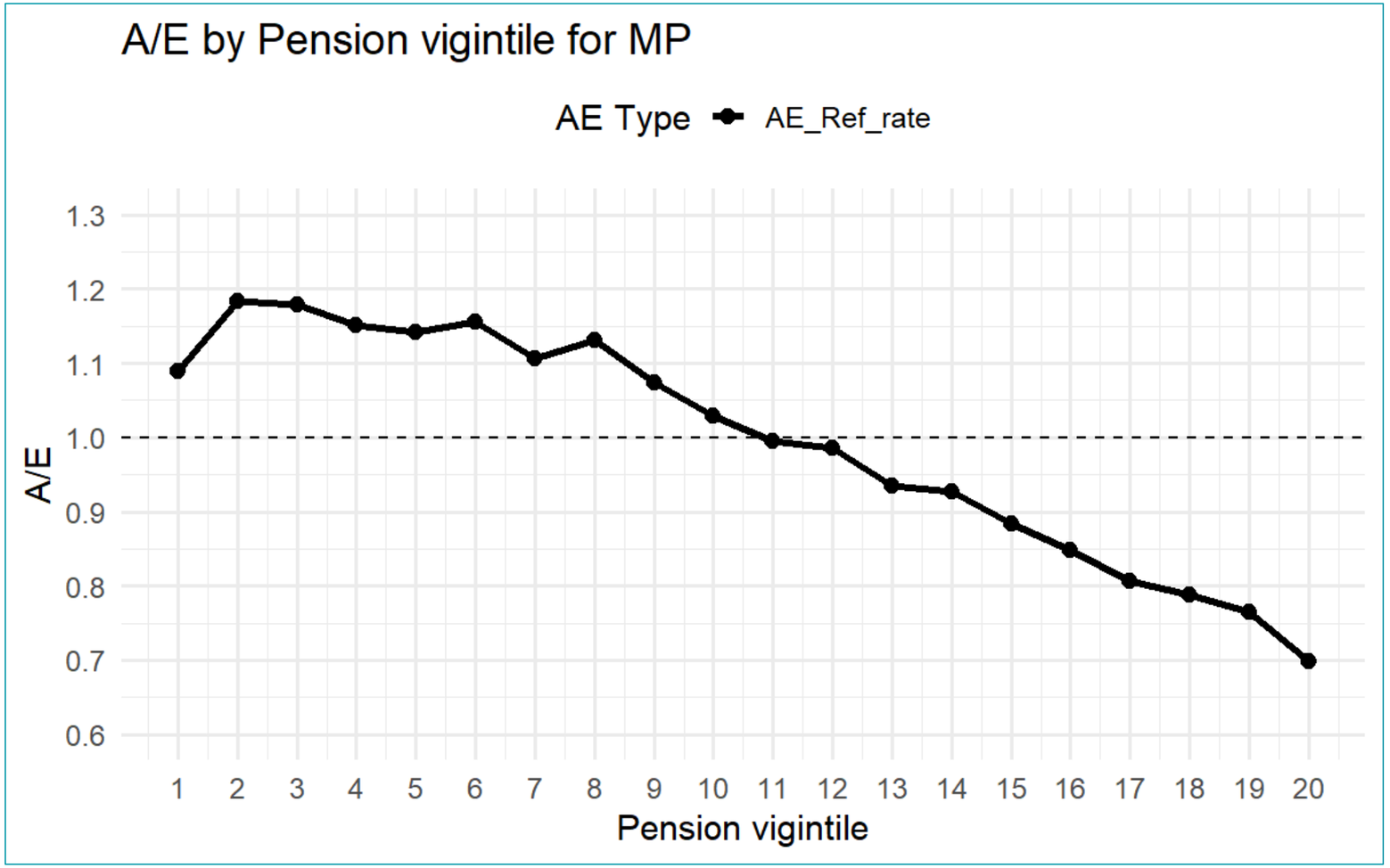
Mortality modelling with L-Distribution



- Applied an **age-only** reference rate
- Can create an LSpline to fit against the residuals
- Downward slope gives us the link between the L-Distribution and the mortality impact

Raw A/Es on an age-only reference curve

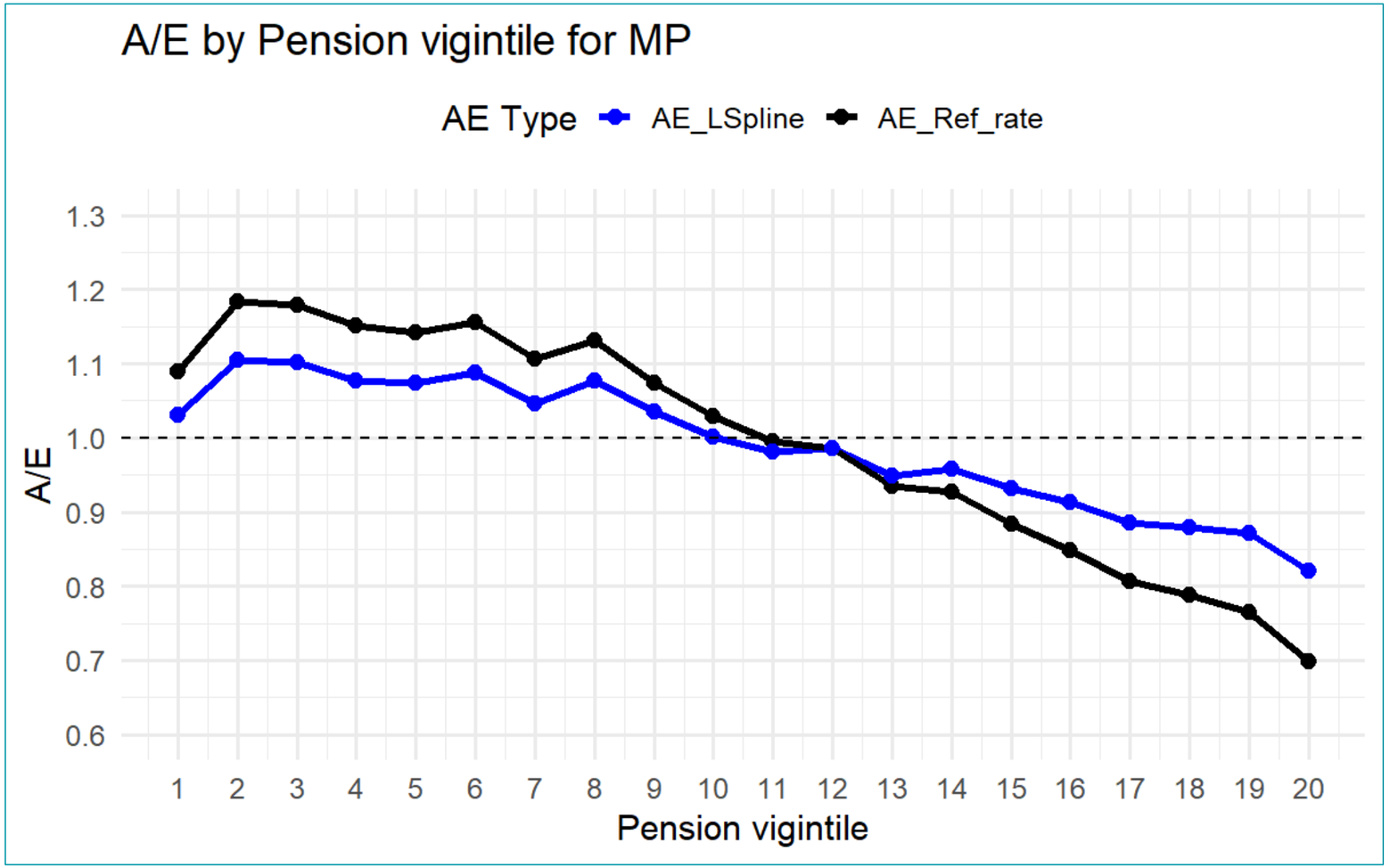
Male pensioners



- Pension amount a good predictor for mortality
- Typical shape observed

A/Es after including LSpline

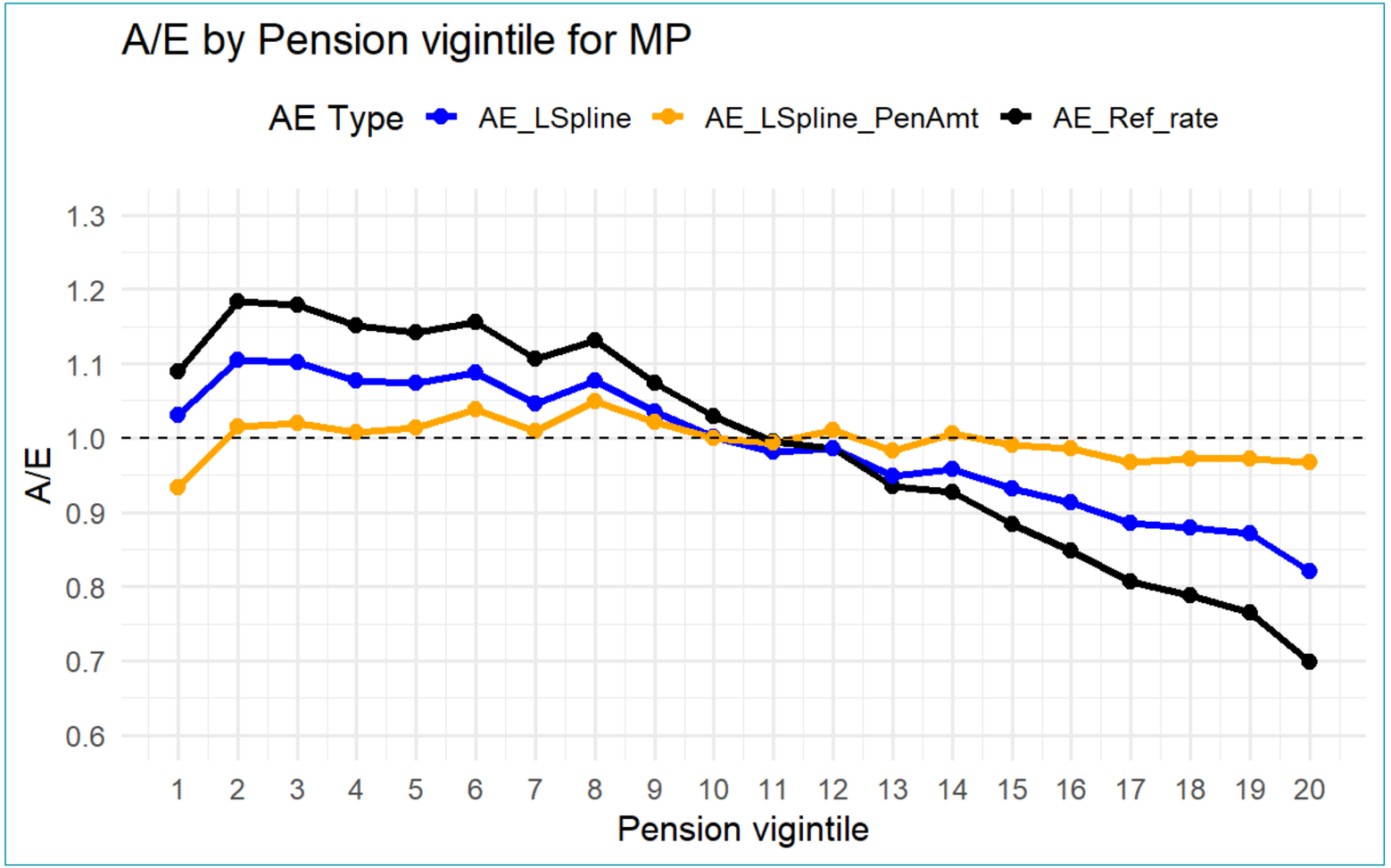
Male pensioners



- Incorporating LSpline improves the fit
- Explaining nearly half amounts-weighted A/E variance
- Remaining differences suggest mortality differentials within postcodes

A/Es after including LSpline and Pension amount

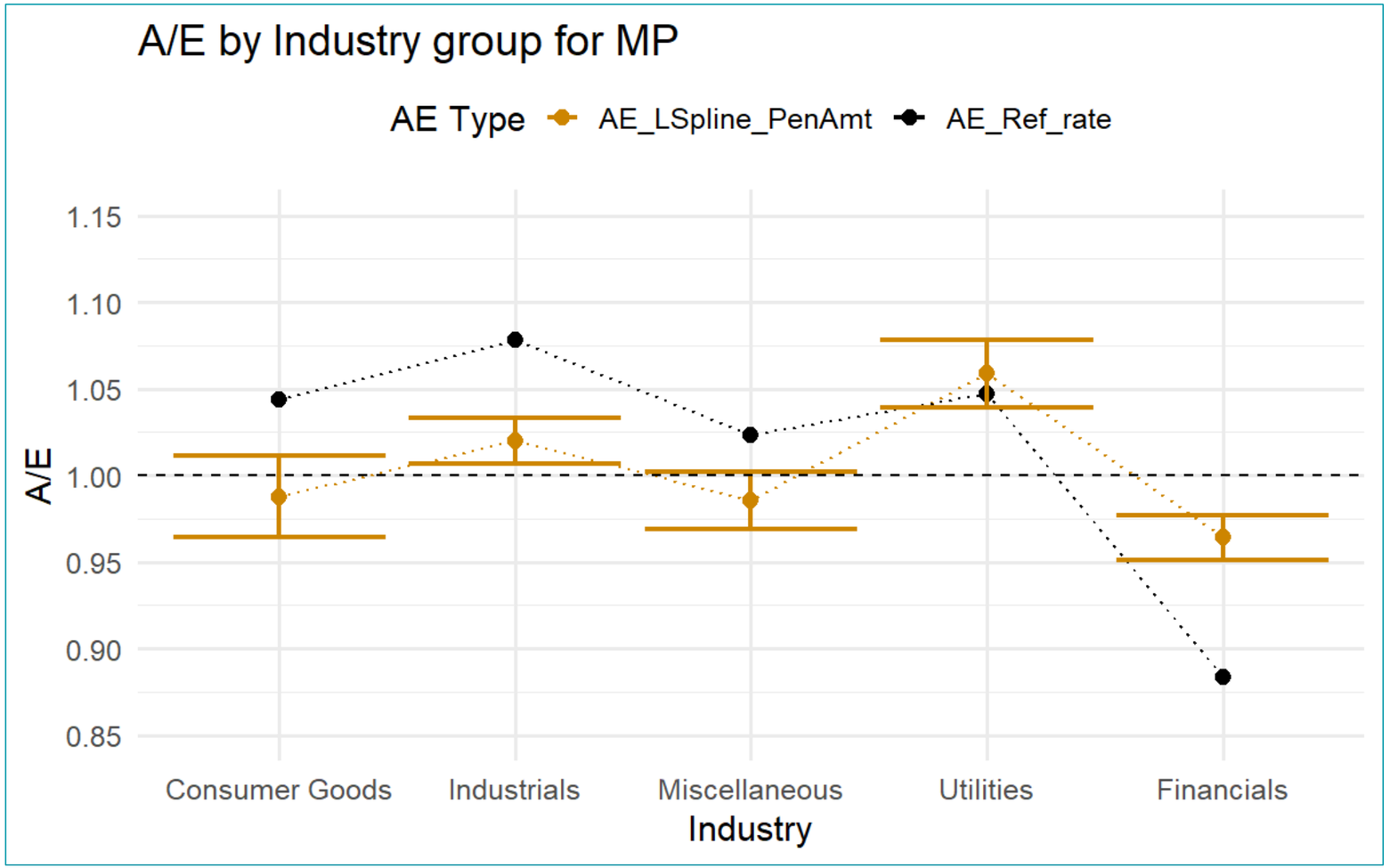
Male pensioners



- As expected, adding pension amount explains the pension A/Es better
- But do they explain all variability between pension schemes?

Could the model be improved?

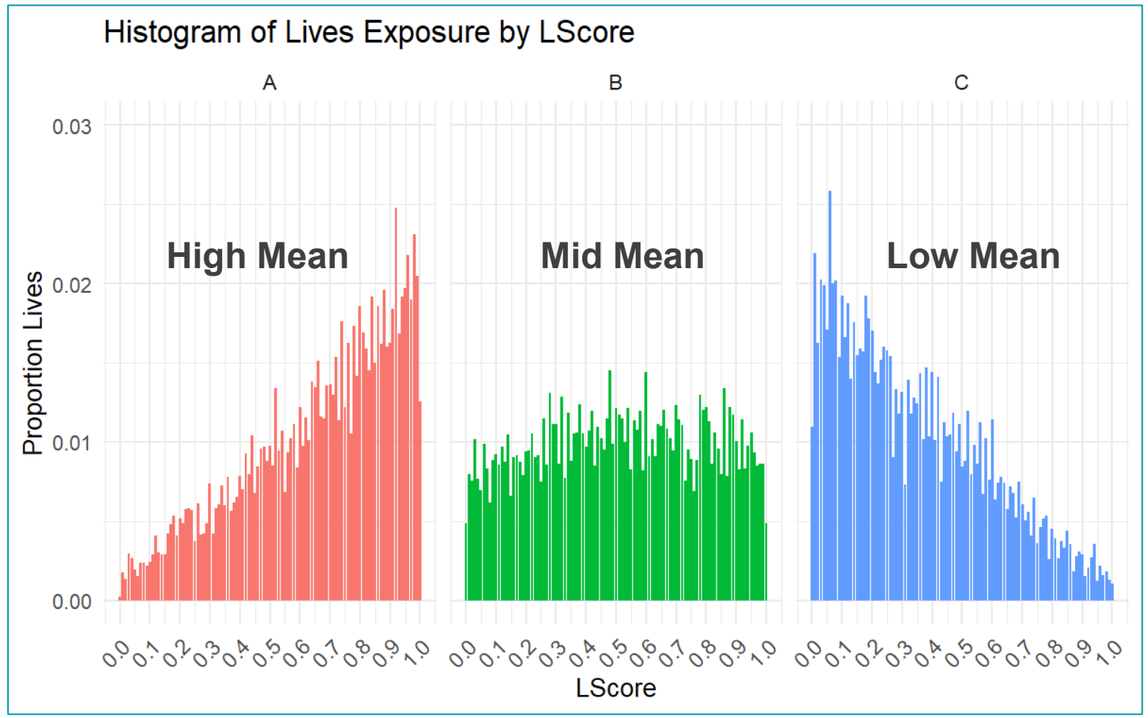
A/E by industry for male pensioners

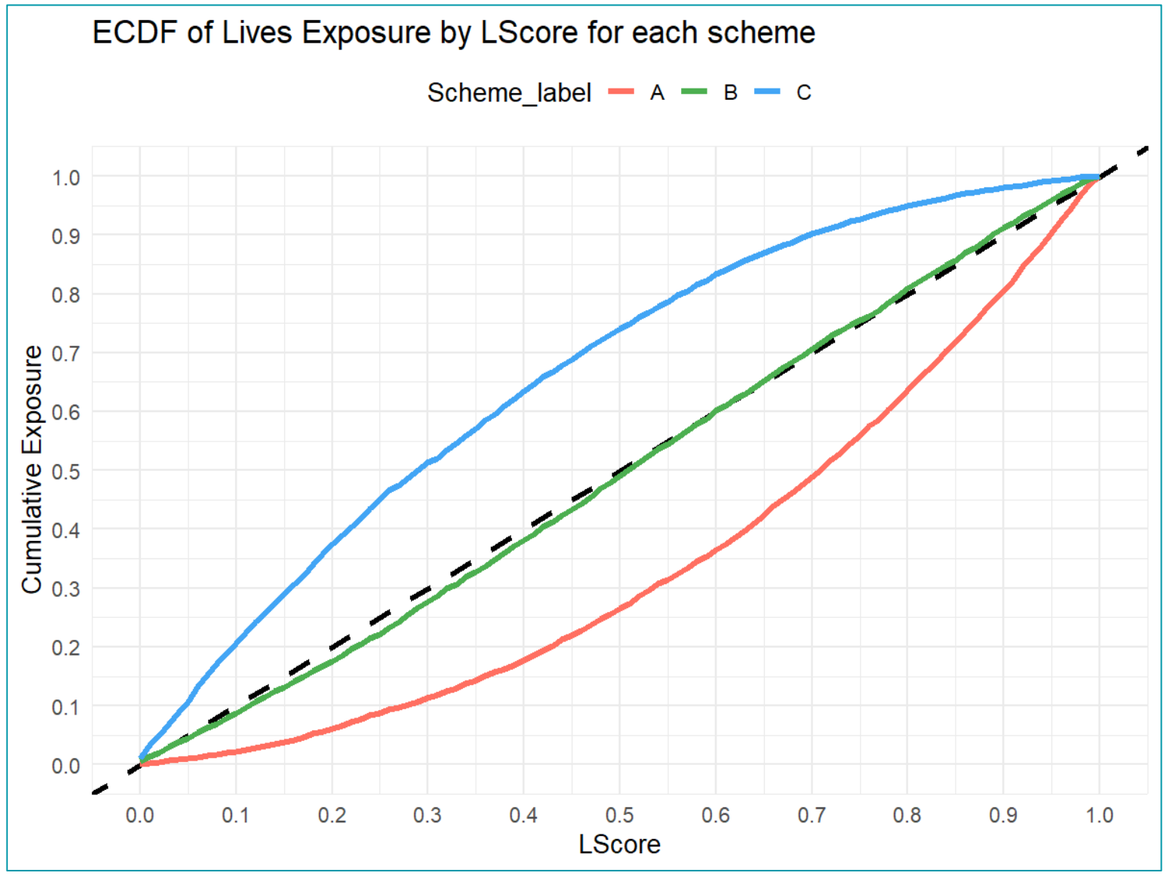


- LSpline and pension amount improves the fit for all industry groups other than Utilities
- But some are outside the confidence intervals

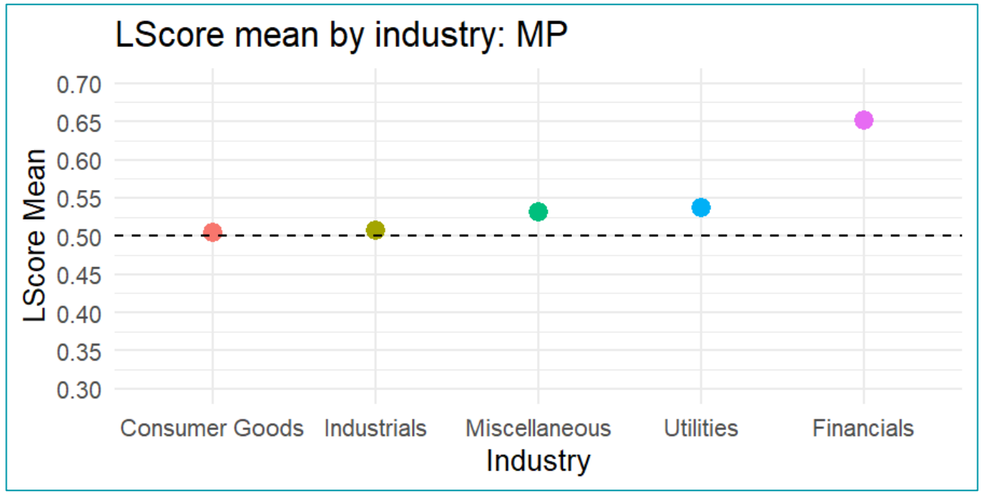
L-Mean

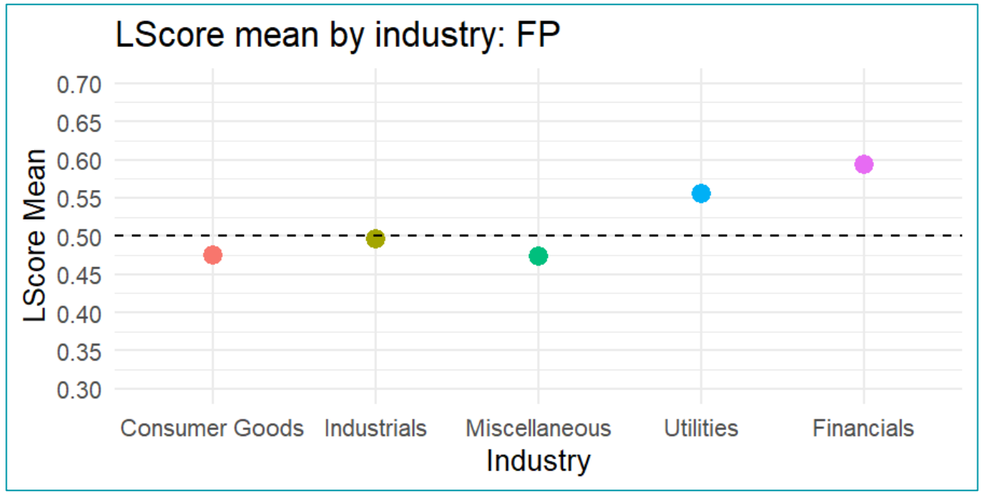
- Capture an average ‘Scheme LScore’

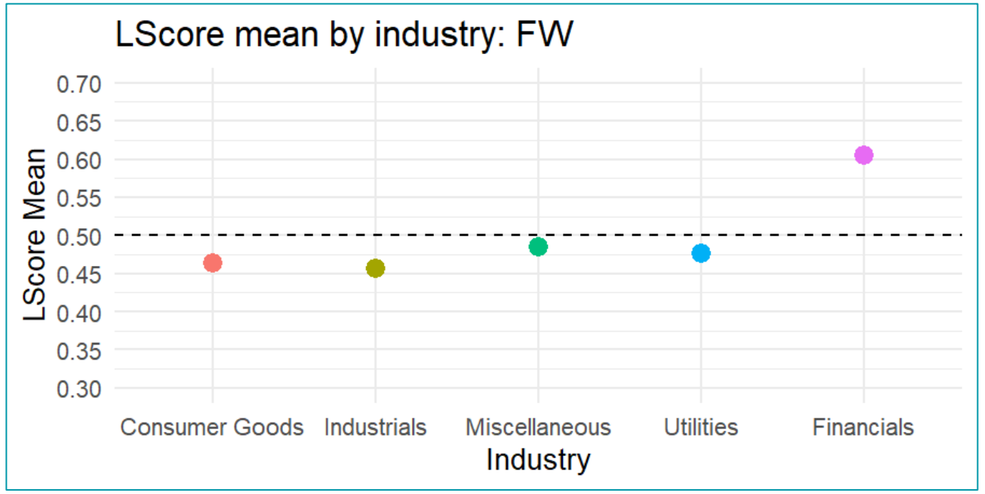




L-Mean by industry



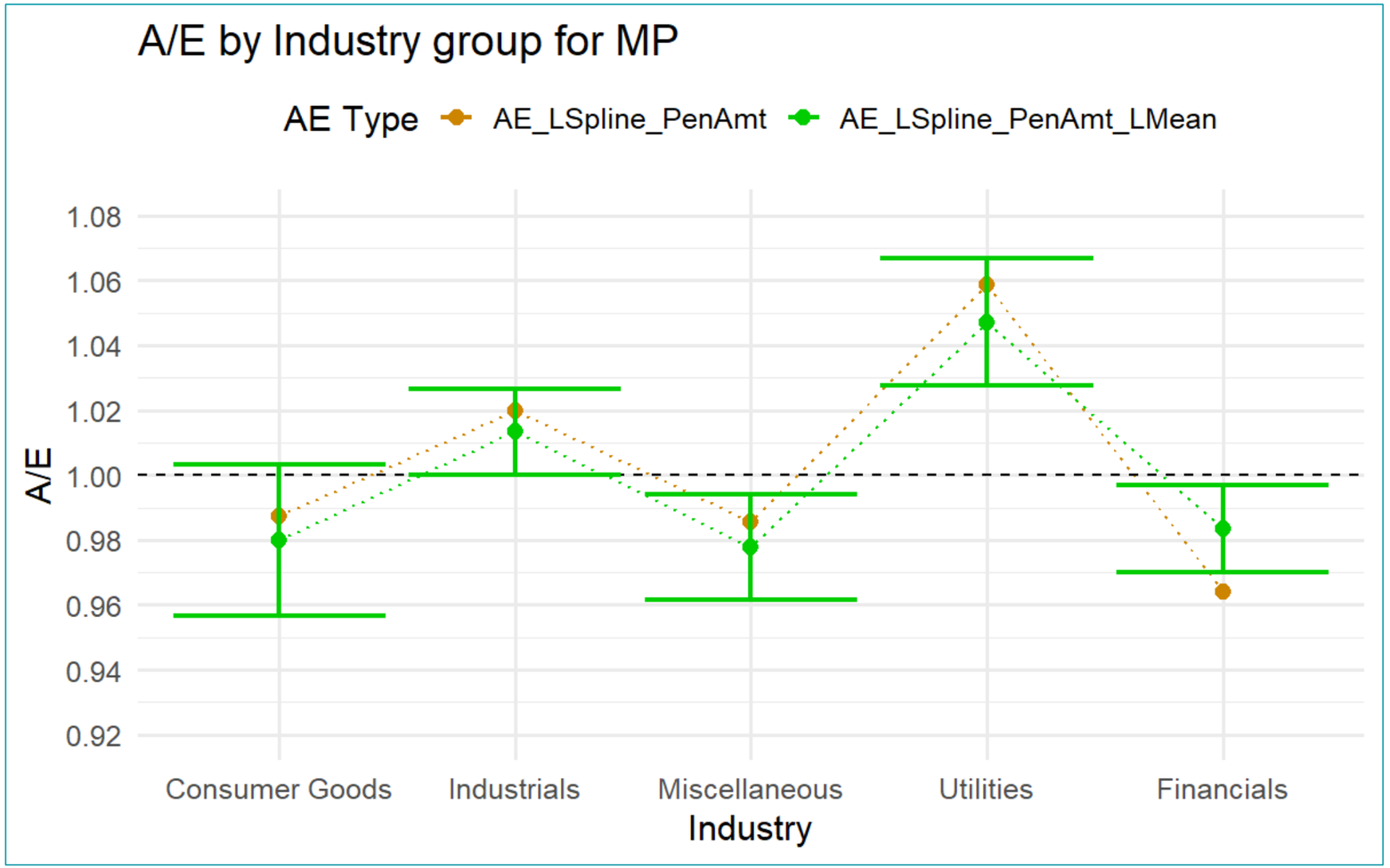




- L-Mean consistently high for financial schemes

A/Es after including clustered Means

Male pensioners



- Cluster schemes by mean L-Distribution
- Adds information because mean is taken at scheme level, while LSpline individual-level
- Improves prediction for Financials

Conclusions

- L-Distribution is a postcode-based geo-demographic profiler specifically **designed for predicting mortality**
- Mortality impact of the L-Distribution can be **modelled continuously** (LSpline). Even with LSpline as rating factor, models should include pension amount for predicting mortality
- Beyond use as individual-level risk factor, differences by pension scheme can be captured by L-Distribution; **clustering mean L-Distribution by scheme improves predictive power**
- L-Distribution lends itself to **comparing different schemes**, because it is a universally comparable, ordinal, continuous metric
- Further research could consider refinements to **clustering L-Distribution** and its application to **modelling socio-economic trends**

Q&A

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Thank you

For more information, please contact Nay or Stefan:

n.wynn@scor.com

Stefan.Ramonat@adreservices.com

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