

Generating 'Adjusted' Indicators from Social Care Survey Data

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Background

- Adult Social Care Outcomes Framework
 - Local authority (LA) level indicators
 - Indicators from Adult Social Care Survey (ASCS), incl. ASCOT
- Research shown outcomes dominated by individual needs-related characteristics (NRCs)
 - Sensitive to LA population characteristics
- Aim: better reflect service contribution, to enable fairer comparisons between LAs
 - Use 3 econometric approaches to modelling
 - Various approaches to generating adjusted indicators

General approach (1)

1. Risk adjustment approach

$$O_i = f(NRC_i, R_i, e_i)$$

- Covariates: needs-related characteristics (NRCs) & reporting-related factors (R)
- Ratio-based indicator

$$\tilde{O}_j = \bar{O} \cdot \bar{r}_j$$

- Average of individual ratios, $r_{i,j} = \frac{O_i}{\hat{O}_i}$, $\bar{r}_j = \frac{1}{n} \sum_{i=1}^n r_{i,j}$
- Ratio of individuals summed, $\bar{r}_j = \frac{\frac{1}{n} \sum_{i=1}^n O_{ij}}{\frac{1}{n} \sum_{i=1}^n \hat{O}_{ij}}$
- Ratio at LA 'average' individual

General approach (2)

2. Modified production function approach

$$O_i = f(NRC_i, R_i, I_i, e_i)$$

- Covariates: as before, but incl. intensity (I)
- Rationale: NRCs strongly correlated with services, estimated NRC effect biased
- Error-based indicator

$$\widetilde{O}_j = \frac{1}{n} \sum_{i=1}^n I_i + e_i$$

General approach (3)

3. Random-effects models

$$O_i = f(NRC_i, R_i, e_i, u_j)$$

- Covariates: NRCs and R
- Variance component indicator
 - u_j estimate of LA effect
 - Use Bayes estimates, shrunken to mean

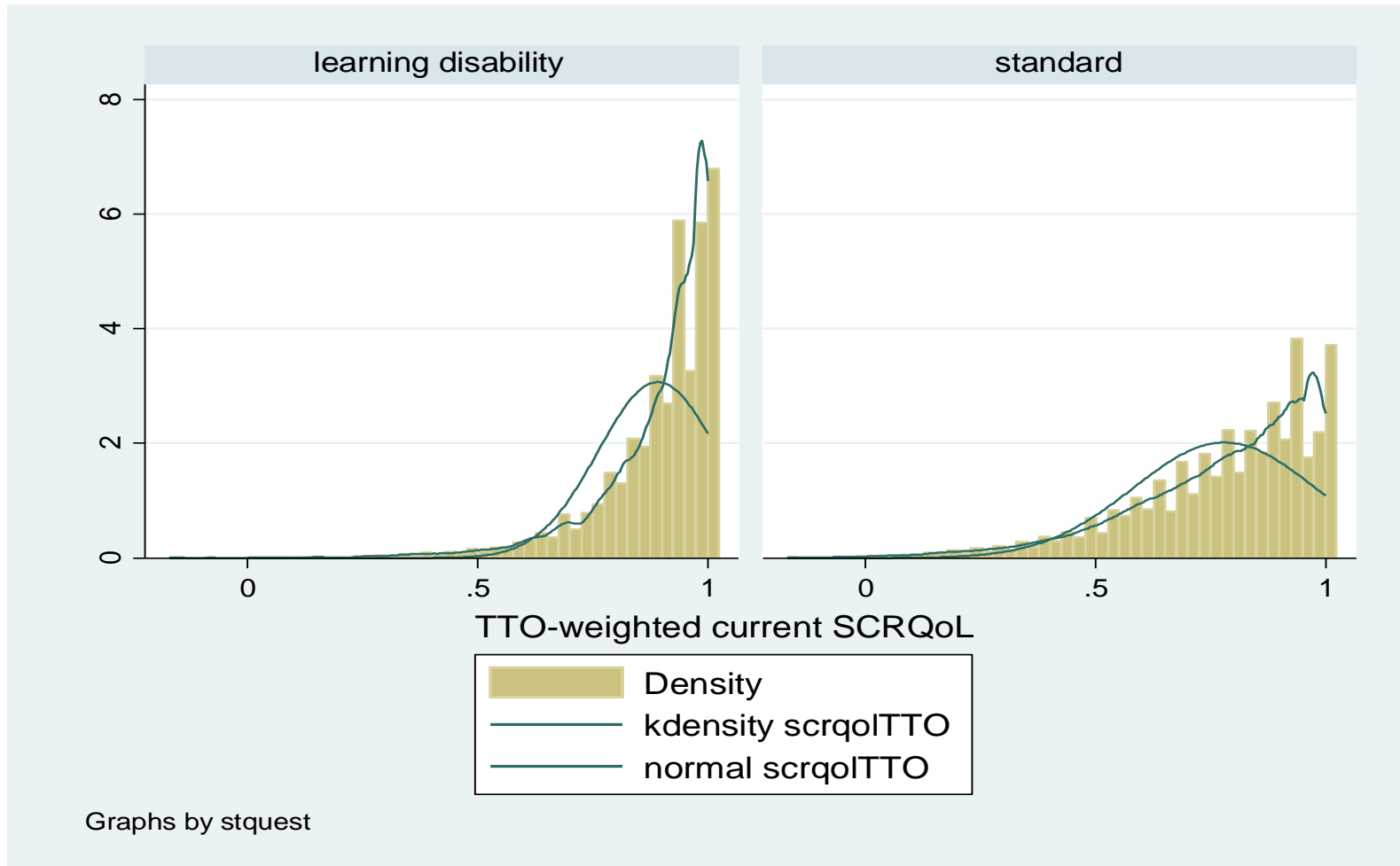
Data

- 2011 Adult Social Care Survey (ASCS)
 - Cross-sectional, random sampling within LAs
 - LAs manage sampling & data collection following centrally-set guidance, using standard questionnaire
 - Eligibility: all publicly-funded adult social care users
 - includes various client groups (physical disability, learning disability (LD), mental health, substance misuse, vulnerable)
 - Includes various care locations (home-based, community-based & residential)
 - Variants of questionnaire (standard, Easy Read, care home)
- 149/153 LAs participated
- 41% response rate: 61,105/150,676 returned

Outcome variable: ASCOT

- Measure of social care-related quality of life (SCRQoL)
- Eight domains:
 - personal cleanliness and comfort, food and drink, safety, accommodation cleanliness and comfort, social participation and involvement, control over daily life, occupation, dignity
- Utility weights
 - TTO, anchored to dead state (0)
 - Takes values from -0.17 to 1
 - 1 is perfect SCRQoL
- More details on ASCOT see Netten et al (2012) *Health Technology Assessment*

Distribution of ASCOT



Covariates

- Demographic: Age & Sex
- Disability: Count of ADLs & IADLs difficulty completing (adldiff)
- Health:
 - EQ-5D anxiety/depression (anxdep) & pain domains
 - Self-perceived health (sph)
- Informal care: Receipt of regular practical help (phin, phout)
- Environment: Self-perceived design of home
- Reporting-related:
 - Whether help was given to complete questionnaire (proxy, proxy assisted: proxyasstd)
 - Source of help if proxy assisted (care worker: cwhelp, someone living in home: helpin, someone living outside of home: helpout)
 - Type of help if proxy assisted (read, write, translate, discuss)
 - Purchasing additional private help (own money: privown, family money: privfam)
- Intensity: Total budget (adjusted for variation in prices) – poorly recorded

Estimation approach

- For diversity split into sub-groups (age, client group, care location)
 - NRCs different interpretations by client group e.g. ADLs
 - NRCs different interpretation by care location e.g. home design
 - Focus: physically disabled/vulnerable, <65, community/home-based services (N=7,491)
- Model building approach
 - Theoretical rather than stepwise – transparency & acceptability
 - OLS, but alternative functional forms to deal with skewed data (GLM, generalised gamma, two-part model)

RESULTS FROM ECONOMETRIC MODELS

Risk Adjustment Model

- Problems with model specification
- Specification statistics not improved by alternative functional forms
- Results for different functional forms very similar
- R^2 is high

Model statistics	
N	5648
ll	2063.497
F-test	151.16***
AIC	-4100
R^2	0.429

Outcome = SCRQoL-TTO	β
Sph	-0.053***
Design	-0.048***
Adldiff	0.004*
design*adldiff	-0.006***
Pain	0
Anxdep	-0.087***
Phin	0.035***
Phout	0.020***
Male	-0.010*
25-30 yrs†	0.012
31-39 yrs†	0.001
40-49 yrs†	-0.005
50-64 yrs†	0.017*
Vulp	-0.02
Proxy	-0.038**
Privown	-0.008
Privfam	0
Helpcw	0.032**
Helpin	0.002
Helpout	-0.005
Read	-0.004
Translate	0.013
Write	0.01
Discuss	-0.011*
Constant	1.140***

Comparing functional forms

	For all cases (N=5,648)	For regions where SCRQoL-TTO is...				
		<0.25 (N=230)	≥0.25, <0.5 (N=647)	≥0.5, <0.75 (N=1,917)	≥0.75, <0.9 (N=1,635)	≥0.9 (N=1,319)
<i>Observed mean</i>						
	0.718	0.114	0.398	0.635	0.824	0.962
<i>Predicted mean</i>						
OLS	0.718	0.473	0.584	0.680	0.755	0.832
GLM, log, gamma, rev1	0.717	0.423	0.573	0.686	0.761	0.826
GLM, sqrt, gamma, rev1	0.718	0.462	0.584	0.684	0.757	0.827
GLM, sqrt, poi, rev01	0.718	0.450	0.580	0.685	0.759	0.827
Generalised gamma, rev01	0.729	0.485	0.612	0.705	0.765	0.816
Generalised gamma, rev1	0.717	0.423	0.574	0.686	0.761	0.826
Two part	0.718	0.453	0.581	0.684	0.758	0.827
<i>Mean error (ME)</i>						
OLS	0.000	-0.359	-0.186	-0.044	0.069	0.130
GLM, log, gamma, rev1	0.001	-0.308	-0.176	-0.051	0.063	0.136
GLM, sqrt, gamma, rev1	0.000	-0.348	-0.186	-0.048	0.067	0.135
GLM, sqrt, poi, rev01	0.000	-0.335	-0.182	-0.049	0.065	0.135
Generalised gamma, rev01	-0.011	-0.371	-0.214	-0.070	0.059	0.146
Generalised gamma, rev1	0.001	-0.309	-0.176	-0.051	0.063	0.136
Two part	0.000	-0.338	-0.183	-0.049	0.066	0.135

Production function models

- Problems with model specification remain
- But budget variable poorly recorded & poor quality (N lower)
- Specification statistics not improved by alternative functional forms
- Results for different functional forms very similar
- R^2 is high

Model statistics	
N	2429
ll	857.402
F-test	55.16***
AIC	-1700
R^2	0.414

Linear model	β
Medwbudget	0.000**
Sph	-0.052***
Design	-0.042***
Adldiff	0.006*
design*adldiff	-0.007***
Pain	0.009
Anxdep	-0.087***
Phin	0.035***
Phout	0.017*
Male	-0.007
25-30 yrs†	0.032
31-39 yrs†	0.015
40-49 yrs†	0.02
50-64 yrs†	0.034*
Vulp	-0.014
Proxy	-0.064**
Privown	-0.007
Privfam	0.008
Helpcw	0.006
Helpin	-0.007
Helpout	-0.015
Read	0.005
Translate	0.016
Write	0.002
Discuss	-0.01
Constant	1.095***

legend: * $p < .1$; ** $p < .01$; *** $p < .001$, †Base category: 18-24

Random-effects models

- Rho is very small, rho=0.01 ($X^2= 5.44$, p= 0.0098)
- After controlling for covariates little outcome variation due to systematic differences between LAs
- Have not investigated alternative functional forms

Model statistics		
N	5648	5648
ll	2063.497	2066.218
F-test / X^2	151.16***	4187.435***
AIC	-4100	-4100
R ²	0.429	0.428

Outcome = SCRQoL-TTO	OLS robust	RE, identity
sph	-0.053***	-0.053***
design	-0.048***	-0.047***
adldiff	0.004*	0.004*
design*adldiff	-0.006***	-0.006***
pain	0	0
anxdep	-0.087***	-0.087***
phin	0.035***	0.035***
phout	0.020***	0.020***
male	-0.010*	-0.009*
25-30 yrs†	0.012	0.012
31-39 yrs†	0.001	0.002
40-49 yrs†	-0.005	-0.004
50-64 yrs†	0.017*	0.017
vulp	-0.02	-0.022
proxy	-0.038**	-0.039**
privown	-0.008	-0.008
privfam	0	0.001
helpcw	0.032**	0.033**
helpin	0.002	0.003
helpout	-0.005	-0.004
read	-0.004	-0.004
translate	0.013	0.013
write	0.01	0.01
discuss	-0.011*	-0.012*
_cons	1.140***	1.140***
<i>Random effects</i>		
sd e		0.167
sd u		0.014

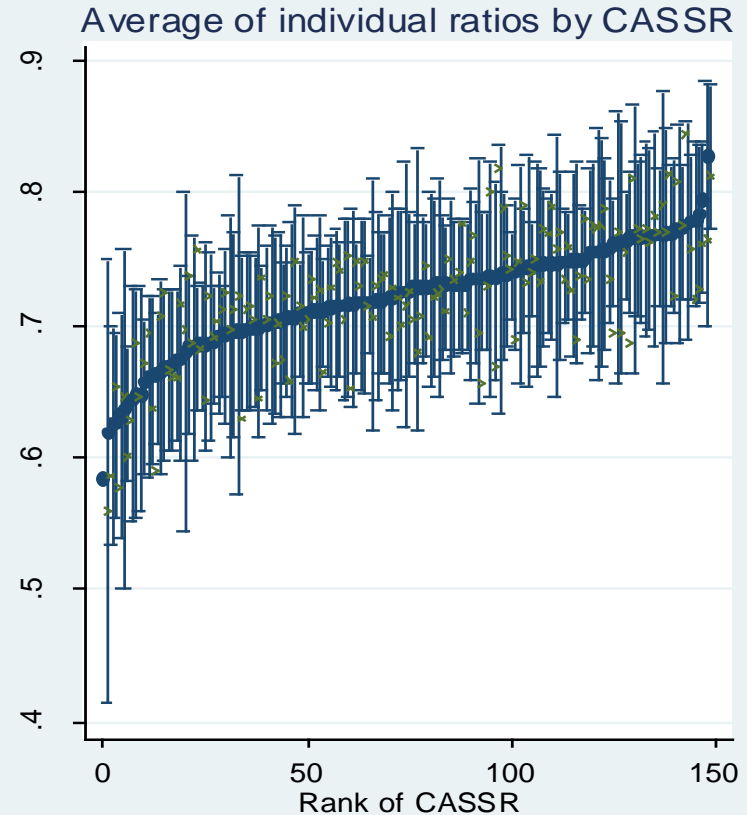
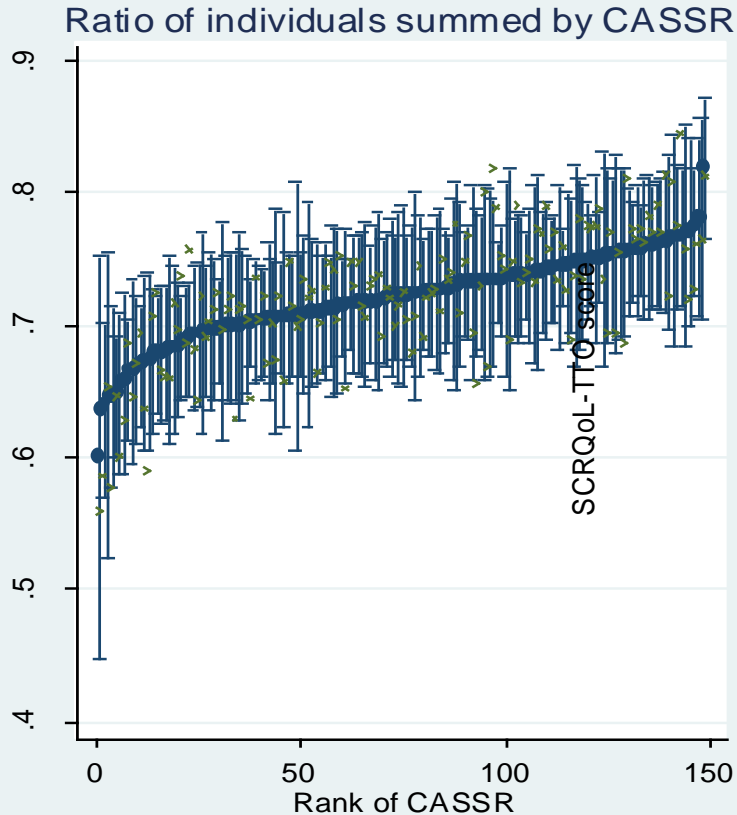
Summary of models

- Good R^2
- Very similar results across the functional forms & types of models in terms of covariates
- Model specification problems
 - Bad at predicting poor SCRQoL, although GLM better
 - Not solved by production function model (but poor quality budget data)
 - Omitted variables likely to be an issue
- Covariate considerations
 - Possible endogeneity with anxdep & pain – could instrument, tested this in a limited way & still significant
 - Not included ethnicity/religion/LA-level variables affect resourcing

ADJUSTED INDICATORS

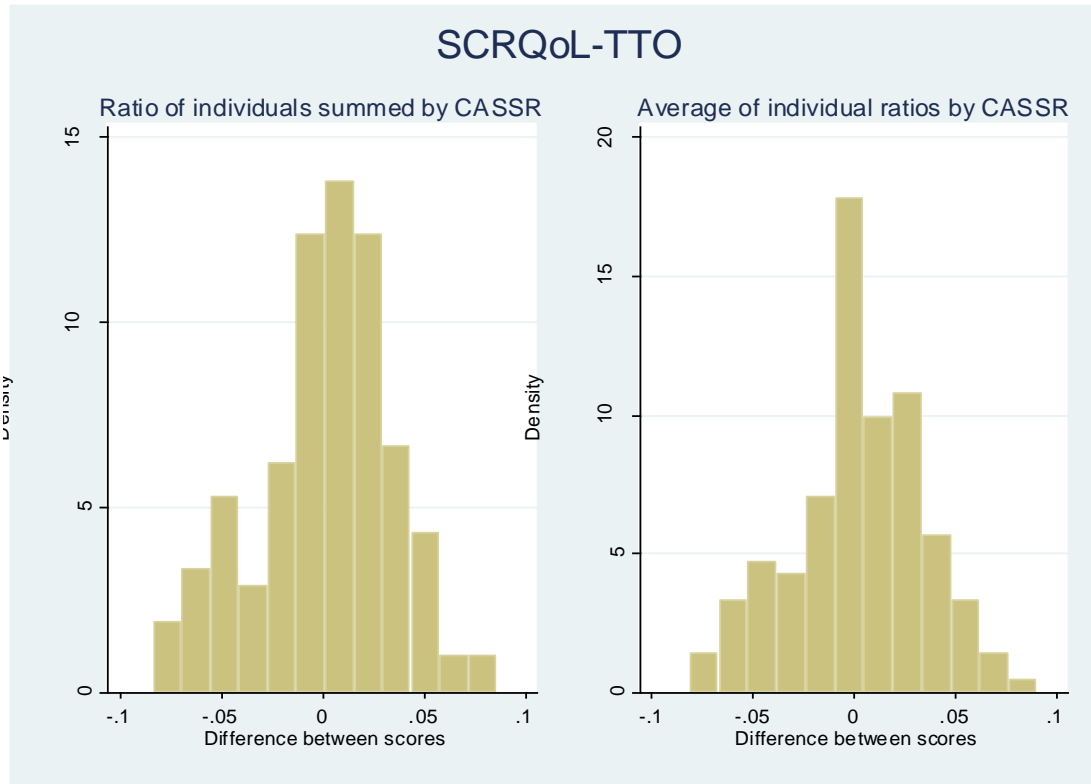
Ratio-based risk-adjusted indicators

SCRQoL-TTO



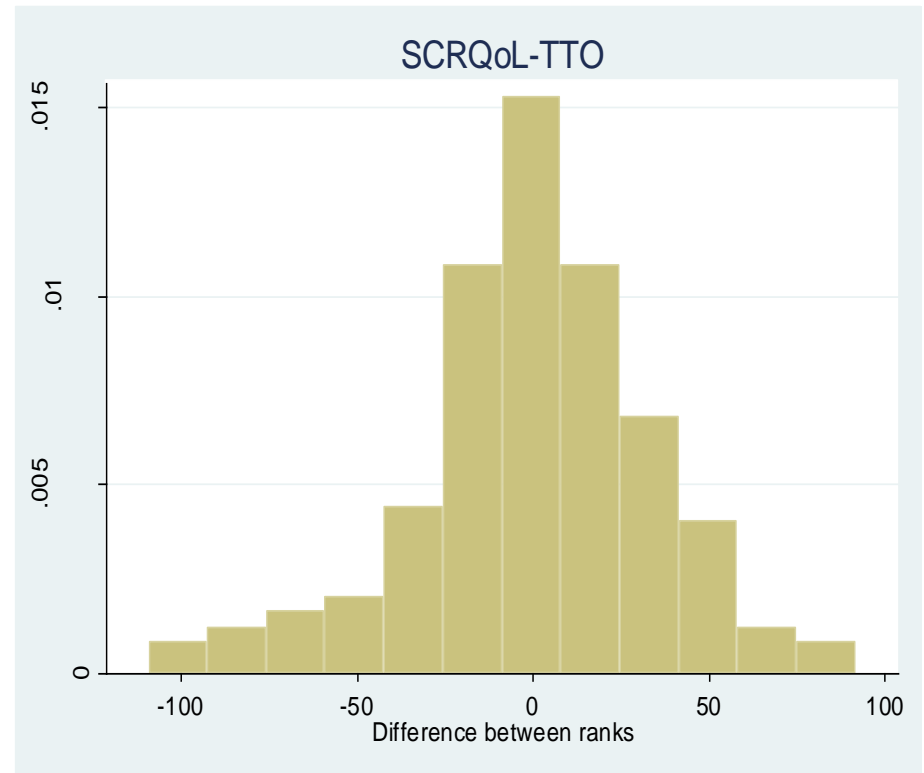
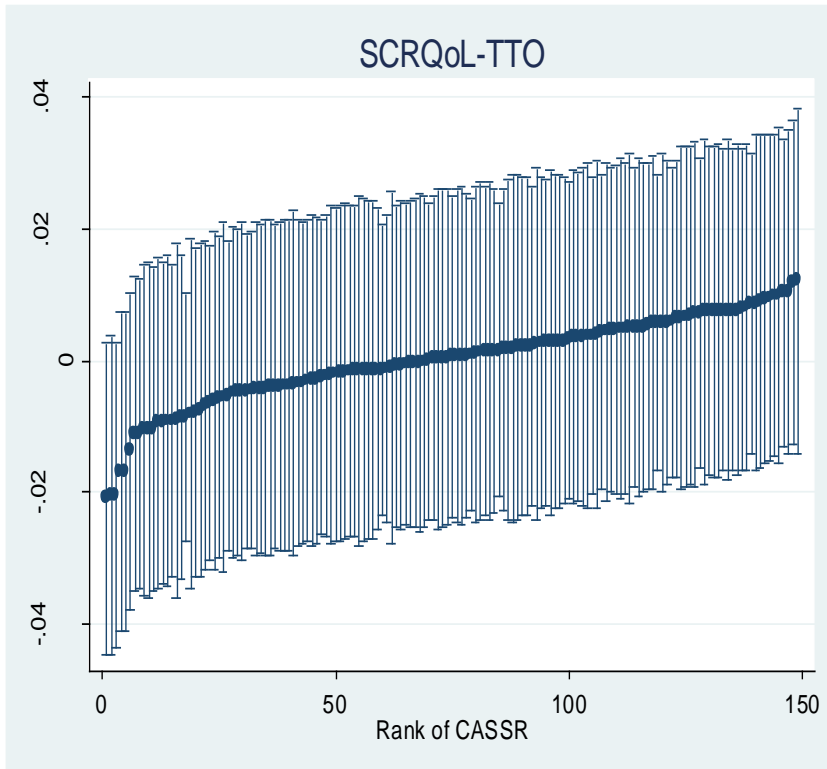
— 95% CI for risk-adjusted score ● risk-adjusted score × unadjusted score

Unadjusted – Adjusted differences



	Pearson's R^2	Rho	Tau (% pairs change order)
Average of individual ratios	0.749	0.696	0.513 (24)
Ratio of individuals summed	0.761	0.688	0.507 (25)

Random-effects model indicators



	Pearson's R^2	Rho	Tau (% pairs change order)
SCRQoL-TTO	0.706	0.688	0.501 (25)

Summary of effects of adjustment

- Adjustment makes a difference and significant difference in some cases ($>2SEs$)
 - Not looked at which LAs
 - Not compared adjusted indicators
- Very few differences across LAs in outcomes
 - Some differences using risk adjustment method
 - No differences using empirical Bayes, but shrinkage large (N small & rho small)
- May have different results for other subgroups

Discussion points / Next steps

- Consider modelling individual domains of ASCOT
- Index type indicator?
- Generate a single indicator across subgroups
 - Consider whether subgroups can be combined
- How can this information be used?
 - Transparency of modelling approach & complexity of generating adjusted indicators
 - Should ASCOF indicators be adjusted?
- ASCOT does not vary greatly by LA, is this the best level to assess performance?
 - How much leverage do LAs have/ will they have in the future?
 - What about the provider effect?

Identifying service contributions

