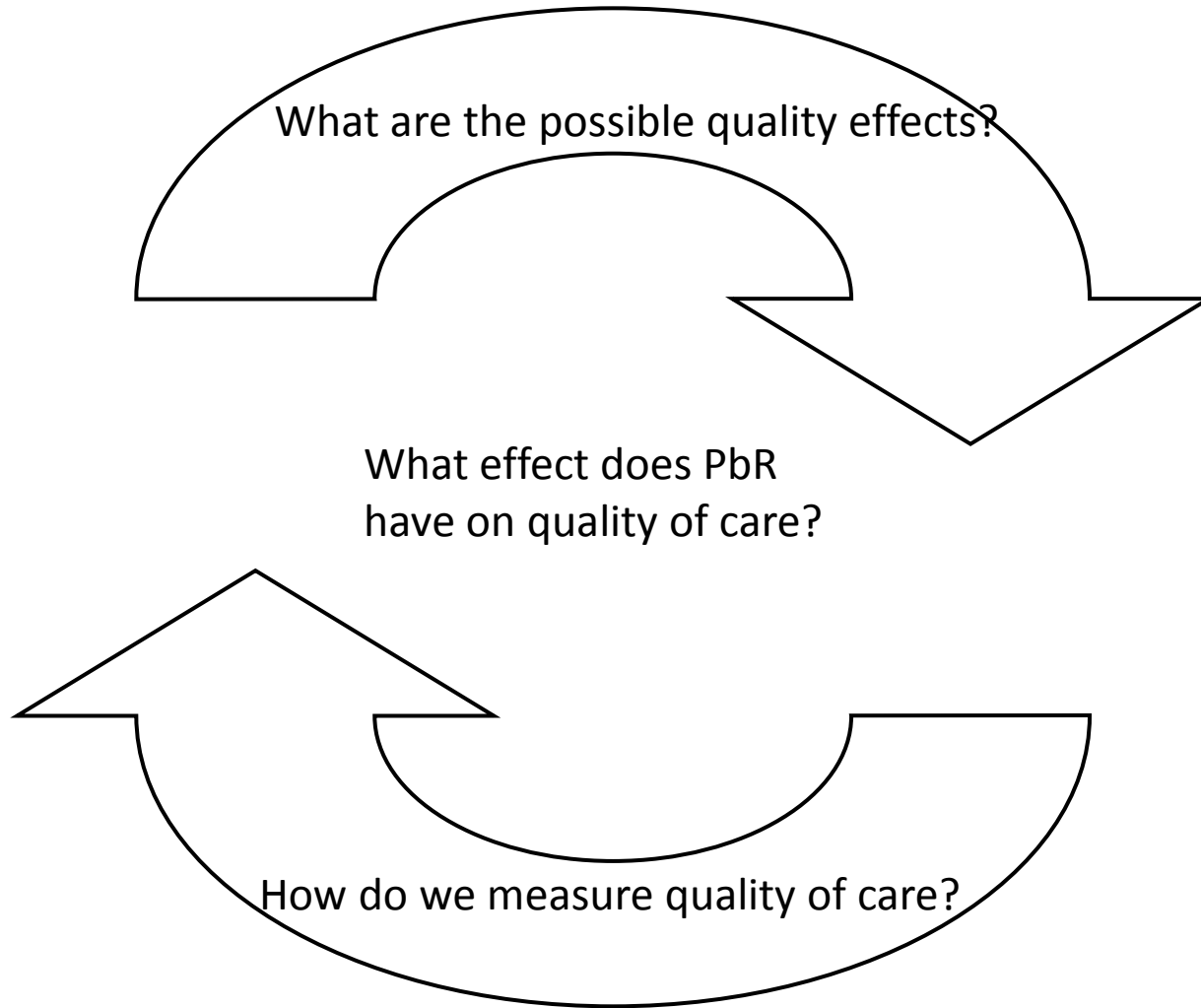


Payment by Results (PbR) and Quality in the English NHS

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Based on work done in collaboration with:
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Outline



PbR and Possible Quality Effects

Case payment incentives

Provider is paid a fixed amount per case, by a third party payer, regardless of the actual types and quantities of services provided.

- Positive incentives
 - Removes economic incentive to over-provide services for a single patient
 - Possibly increases quality
 - Easy to operate
 - Low administration costs (?)
 - Hospital specialisation (?)
- Negative incentives
 - Possible ‘DRG-creep’
 - Cost shifting
 - Cream-skimming
 - Increases unnecessary admissions (increases costs) and readmissions (decreases quality)
 - Quality skimping
 - Data fraud
 - Low payment may lead to slow adoption of useful technology
 - Hospital specialisation (?)

PbR: the evidence so far

Effect	Evidence for
Activity	<ul style="list-style-type: none">• Activity Increase: Audit Commission, 2005; Farrar et al., 2009; Sussex & Farrar, 2009; Rogers et al., 2005• No effect on Activity: Farrar et al. (2006)
LOS	<ul style="list-style-type: none">• Reductions in LOS: Audit Commission, 2008; Farrar et al., 2006;
Efficiency	<ul style="list-style-type: none">• Reductions in costs: Rogers et al., 2005 Farrar et al., 2009
Quality	<ul style="list-style-type: none">• Higher Readmissions: Audit Commission, 2008• Quality of care: <i>no evidence</i> Farrar et al., 2009
Gaming	<ul style="list-style-type: none">• Patient Selection: England no evidence• Upcoding: England no evidence• Cost Shifting: England no evidence

Measuring Quality

Measuring Quality

All quality measures were constructed for seven conditions: AMI, MI, IHD, Stroke, CCF, TIA and Hip Replacement for years 2000 – 2008 using 4 outcome measures: 30-day in hospital mortality, 365-day overall mortality, 28-day emergency readmissions and 365-day readmissions

- Simple Risk-Adjustment
 - Standard risk adjustment that controls for age, deprivation, co-morbidity, gender and type of admission

For every year in the sample:

$$Y_i^k = \beta q_h^k + \sum \phi X_{ih} + \varepsilon_{ih}$$

Where β is the hospital fixed effect
- or 'latent quality measure'.

- McClellan & Staiger (1999)
Method

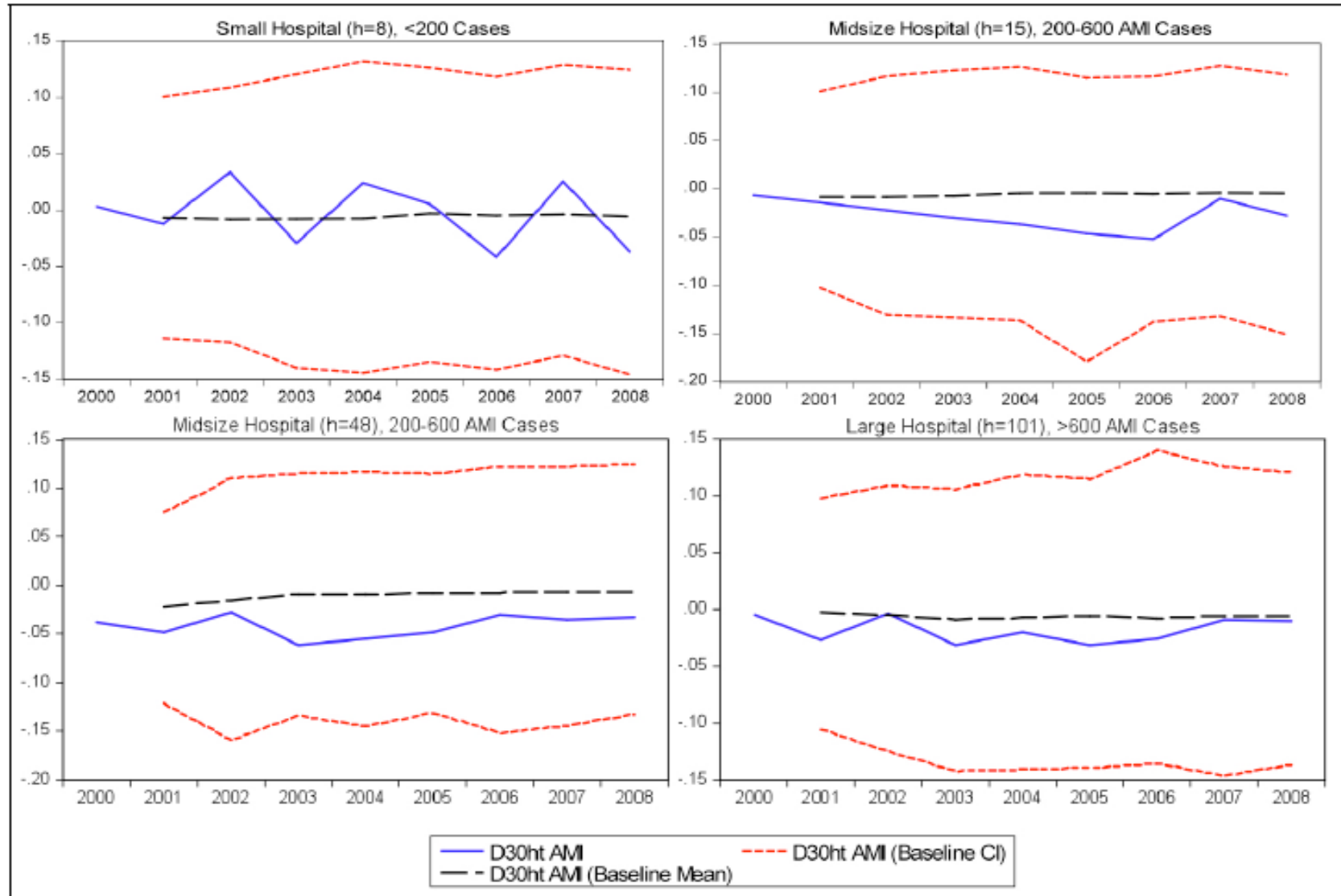
- Smoothing technique using a Vector Autoregression (VAR)

Calculated from a system of the latent measures:

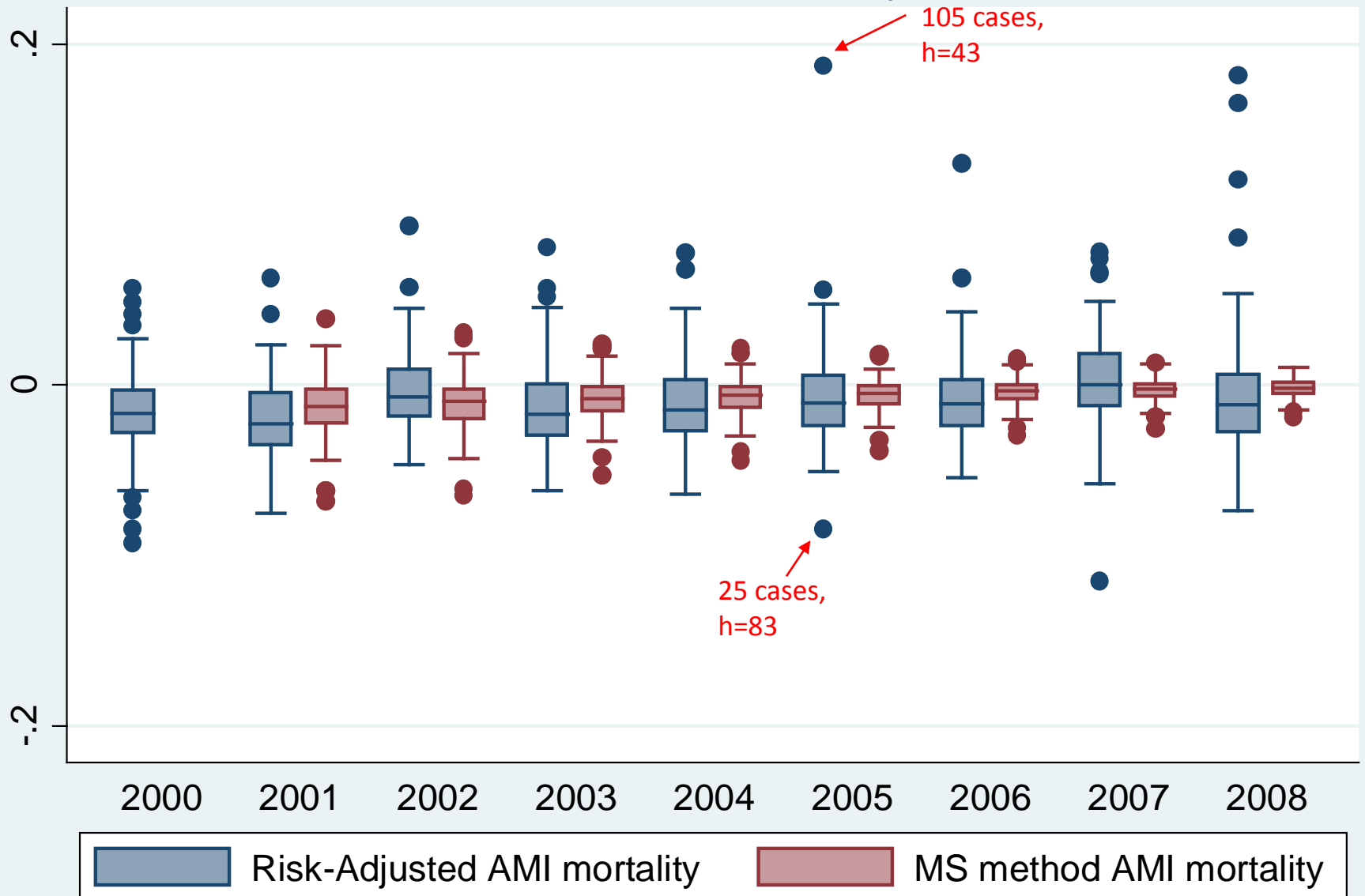
$$\begin{aligned} D30_{ht} &= \alpha + \beta_1 D30_{h(t-1)} + \beta_2 D365_{h(t-1)} + \beta_2 R28_{h(t-1)} + \beta_2 R365_{h(t-1)} + \varepsilon_{D30ht} \\ D365_{ht} &= \alpha + \beta_1 D365_{h(t-1)} + \beta_2 D30_{h(t-1)} + \beta_2 R28_{h(t-1)} + \beta_2 R365_{h(t-1)} + \varepsilon_{D365ht} \\ R28_{ht} &= \alpha + \beta_1 R28_{h(t-1)} + \beta_2 D30_{h(t-1)} + \beta_2 D365_{h(t-1)} + \beta_2 R365_{h(t-1)} + \varepsilon_{R28ht} \\ R365_{ht} &= \alpha + \beta_1 R365_{h(t-1)} + \beta_2 D30_{h(t-1)} + \beta_2 D365_{h(t-1)} + \beta_2 R28_{h(t-1)} + \varepsilon_{R365ht} \end{aligned}$$

Indicates persistence and correlation of quality measures. ex. For AMI – all mortality and readmission measures are negatively correlated.

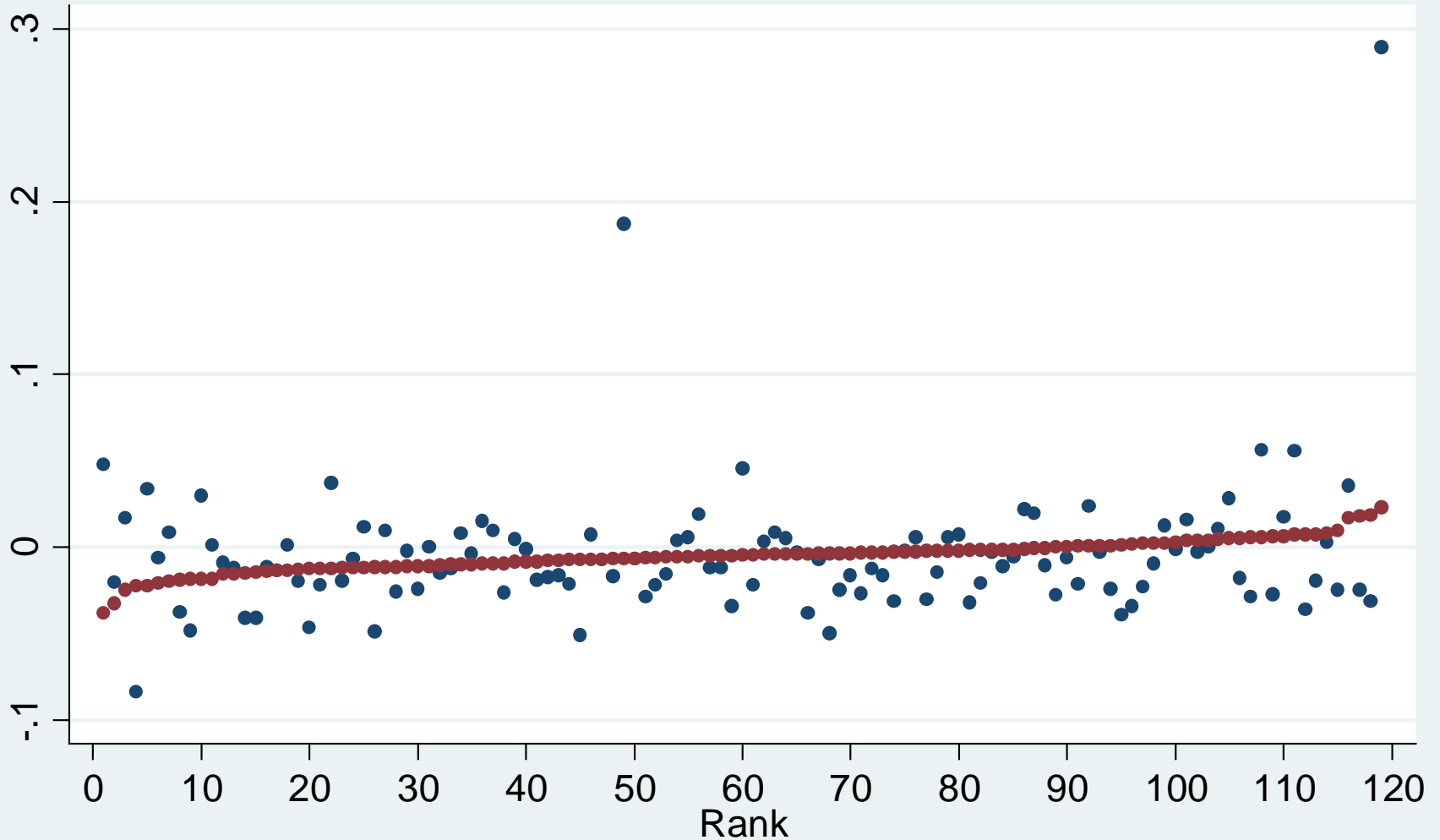
AMI 30-day mortality for a selection of different sized hospitals



Distribution of Mortality rates



2005 AMI Mortality Rankings by Hospital



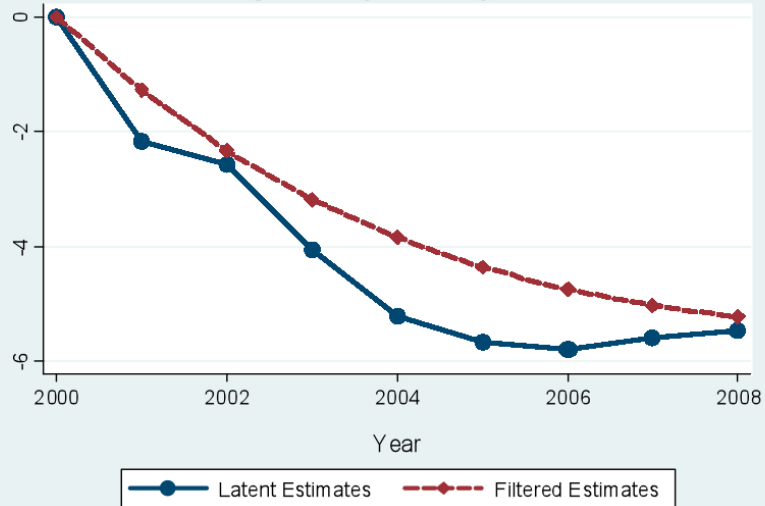
● Risk-Adjusted AMI mortality ● MS method AMI mortality



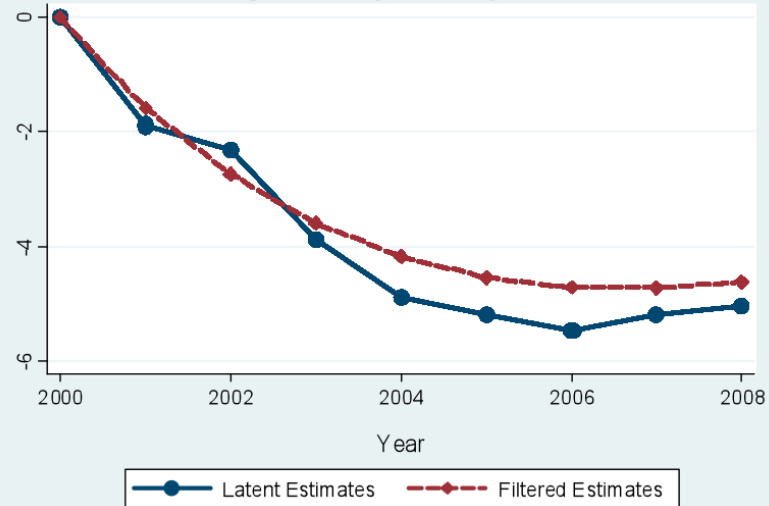
How does PbR influence Quality?

AMI quality over time

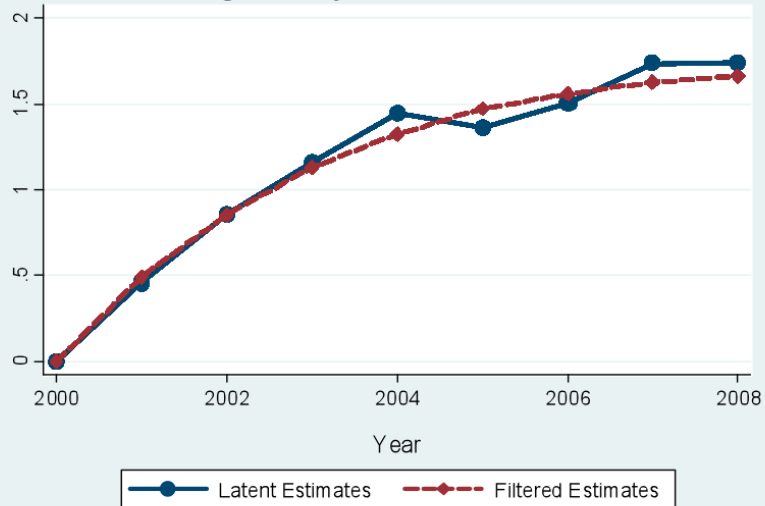
Average 30-day Mortality Estimates



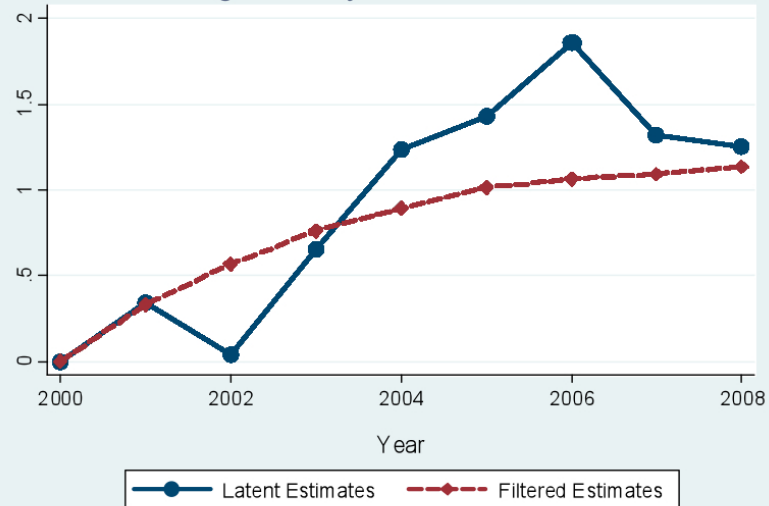
Average 365-day Mortality Estimates



Average 28-day Readmission Estimates



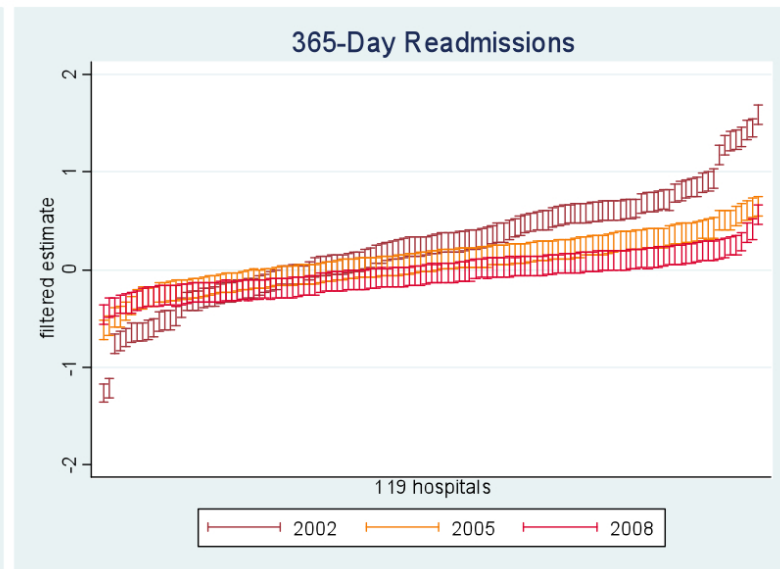
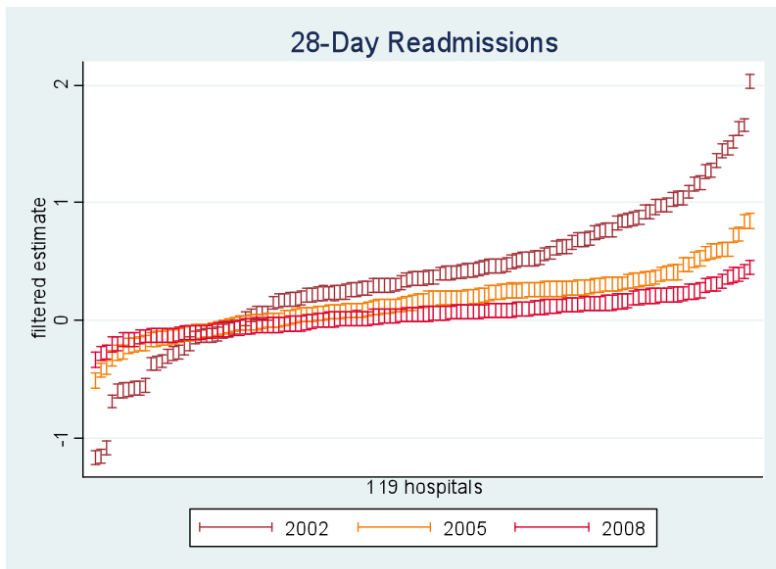
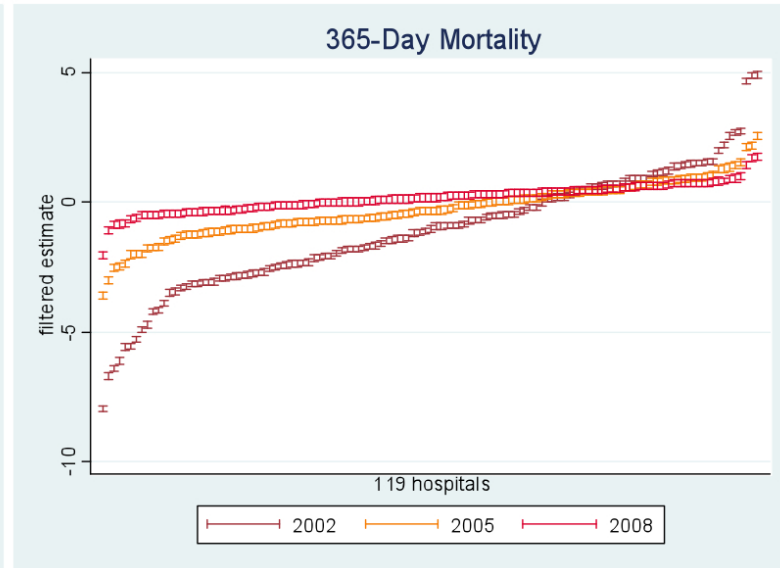
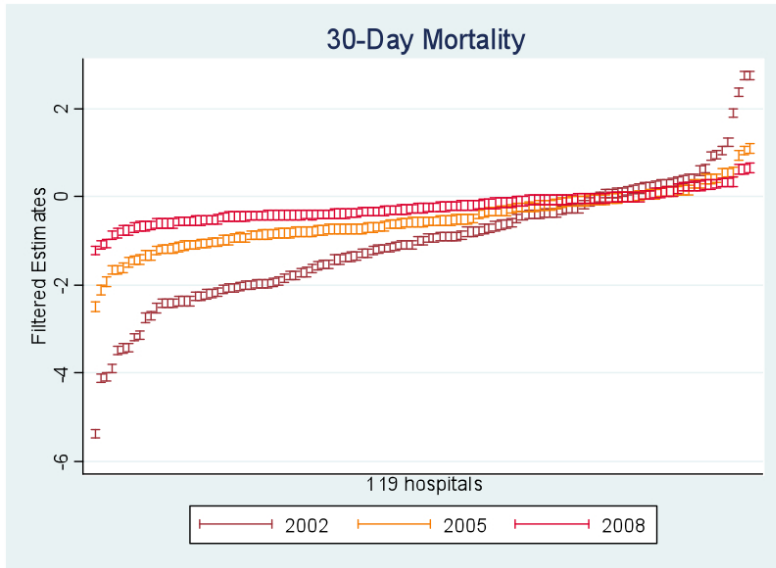
Average 365-day Readmission Estimates



Effect of PbR on levels of quality

[illegible]

Hospital variation over time (AMI)



Effect of PbR on variations in quality

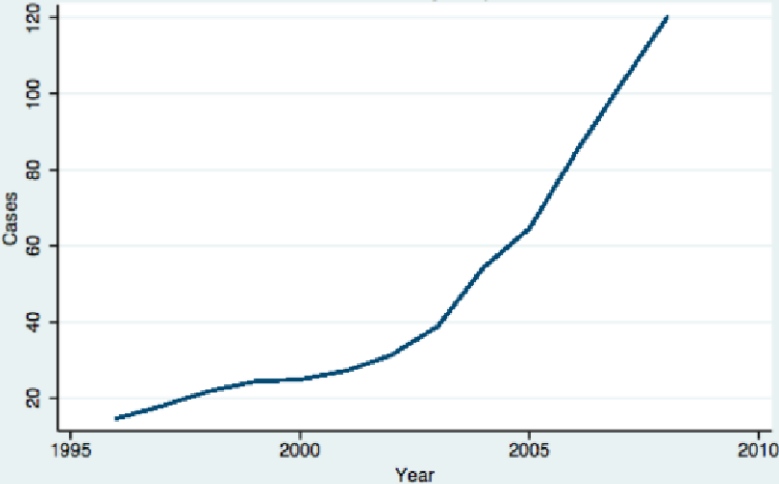
[illegible]

Results for other conditions

- Differences in significance, magnitude and direction between latent and filtered measures.
- PbR is associated with declining mortality:
 - 5-6% for IHD (and AMI)
 - 2-3% for Stroke, MI, TIA and CCF
 - 0.03% for Hip Replacement
- and mixed effects on readmissions:
 - 0.5-2% increase in 28-day readmissions for MI, Stroke and IHD (and AMI),
 - 0.5-2% decrease in 28-day readmissions for CCF, TIA and Hip replacement

Changes in Activity

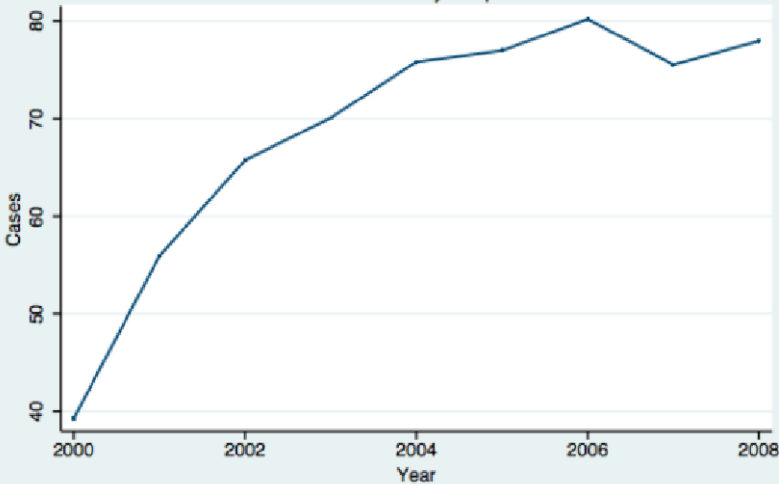
Average HRG H81 Cases 1996-2008
Breakdown by hospital



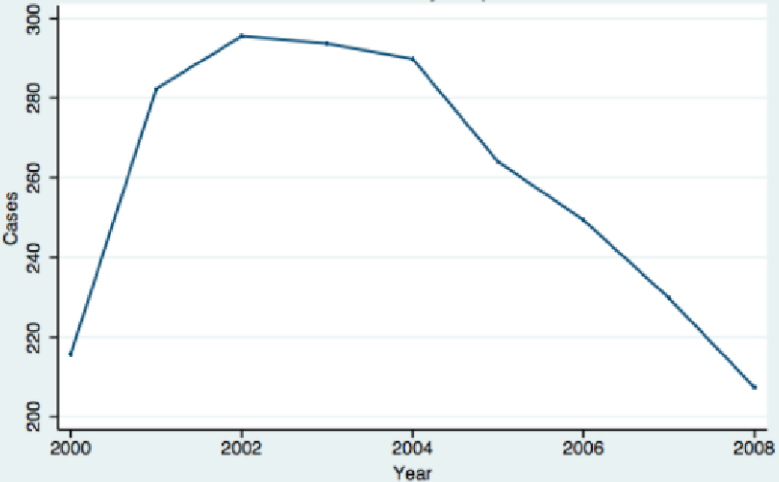
Average HRG H80 Cases 1996-2008
Breakdown by hospital



Average HRG E11 Cases 2000-2008
Breakdown by hospital



Average HRG E12 Cases 2000-2008
Breakdown by hospital



What is driving the activity change?

Variables		E11	$\Delta E11$	H81	$\Delta H81$
E12	$\Delta E12$	0.175***	0.158***	--	--
H81	$\Delta H81$	--	--	-0.285***	-0.116***
Tariff	ΔTariff	0.0167***	0.0155***	0.0169**	0.00340**
Age	ΔAge	1.807**	1.583***	0.0934	-1.485***
LOS	ΔLOS	-1.031**	-1.135**	-6.870***	-2133***
Deprivation	$\Delta \text{Deprivation}$	0.198	0.974	--1.481	0.968
Co-morbidity	$\Delta \text{co-morbidity}$	49.88***	34.54***	2.240	0.846
PbR		12.77**	5.992*	77.63***	11.37***
FT		-2.344	0.622	-20.21**	4.320
ISTC		--	--	102.7**	36.31**
H81elective	$\Delta H81 \text{ Elective}$	--	--	7.490***	1.538*
Year Dummies		Yes	Yes	Yes	Yes
Hospitals		119	119	126	126
R-squared		0.408	0.273	0.502	0.144

Quality effects?

- Quality model run for each of the HRG groups for AMI and Hip Replacement
- AMI:
 - Decline in mortality for both groups,
 - Increase in readmissions
- Hip Replacement (only latent measures):
 - Decline in mortality for both groups, but very small
 - Decline in year-long H80 readmissions

Conclusions

- Careful interpretation of quality measures
 - Risk adjusted indicators are noisy
 - Readmissions not straightforward to interpret
- Quality improvement as a result of PbR
 - Improved levels of quality across conditions
 - Less variation between hospitals
 - Better coding
- Differential effect of PbR on quality by condition

Thank you!

For more information see our working papers at the LSE Health website:

<http://www2.lse.ac.uk/LSEHealthAndSocialCare/LSEHealth/documents/LSEHealthWorkingPaperSeries.aspx>

WP21: Using a latent variable approach to measure the quality of English NHS hospitals

Irene Papanicolas and Alistair McGuire

WP22: Using a Vector Autoregression Framework to measure the quality of English NHS hospitals

Irene Papanicolas and Alistair McGuire