Measuring NHS Productivity

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Methods

\[
\text{productivity} = \frac{\text{output}}{\text{input}}
\]

\[
\text{productivity change} = \frac{\text{output}_{yr2} - \text{output}_{yr1}}{\text{input}_{yr2} - \text{input}_{yr1}}
\]
Methods: Challenges

- What is the output of the health system?
- What is the quality of this output?
- What inputs are used in producing these outputs?
Most price or output indices are representative of the sector.

As far as possible the NHS output index is:
- comprehensive
- precise
Defining Output index - 1

\[
I^{cq} = \sum_j x_{jt+1} c_{jt} \left[ v_j \frac{q_{jt+1}}{q_{jt}} \right]
\]

\[
\sum_j x_{jt} c_{jt}
\]
Quality adjustment for hospital output

\[
\frac{q_{jt+1}}{q_{jt}} = \frac{(a_{jt+1} - k_j)}{(a_{jt} - k_j)} \left[ \frac{(1 - e^{-r_{L,j+1}})}{r_L} - \frac{(e^{r_{W,j+1}} - 1)}{r_W} \right]
\]

NHS Output increases if …

- Volume increases
- Shift to more complex activities
- Shift to emergency activity
- Improvements in hospital survival
- Shift to treatments with better health outcomes
- Reductions in waiting times
- Improved disease management in primary care
NHS staff
Agency staff
All ‘intermediate’ inputs – drugs, clinical supplies, catering, energy, administration, etc
Capital – equipment, premises
\[ Z^D = \frac{\sum z_{nt+1} \omega_{nt}}{\sum z_{nt} \omega_{nt}} \]

\[ Z^{ind} = \frac{\gamma_n E_{nt+1}}{E_{nt}} \]

\[ Z^{ind} = \frac{\sum z_{nt+1} \gamma_n \omega_{nt+1}}{E_{nt}} = \frac{\sum z_{nt+1} \omega_{nt}}{\sum z_{nt} \omega_{nt}} \]

\[ Z^D = Z^{ind} \]
NHS Input decreases if …

- Fewer staff, whether NHS or agency
- Fewer staff in higher pay bands
- Shift to emergency activity
- Spend less on intermediate goods and services
- Have lower levels of capital expenditure
Data Sources

- Outputs
  1. Hospital Episode Statistics
  2. Reference Costs
  3. QResearch
  4. Prescription Pricing Authority

- Inputs
  1. NHS Staff Data – Workforce Census and iView
  2. Financial Returns
Hospital and PC consultations
Outpatient, Mental health, Community care and Other activity
Survival rates

30 day survival rates

- Elective and day cases
- Non-electives
Waiting times
Output growth - 1° & 2° care
Output growth - NHS
NHS Staff, Agency Staff, Intermediate inputs and Capital inputs
Input growth - 1° & 2° care
Input growth - NHS
SHA productivity

- **Output/Input** in each SHA relative to national average
- Output: all health care services provided to NHS patients in the acute and community care sectors.
- Input: all staff, intermediate goods and services, and capital resources.
- Adjust expenditure by market forces factor.
- Match outputs to inputs provided to resident population by accounting for movement of patients between SHAs.
SHA productivity

- **Output higher if:**
  - Higher volumes of activity
  - More complex or costly activities
  - Higher rates of hospital survival
  - Lower inpatient and outpatient waiting times

- **Input will be lower in SHAs with:**
  - Fewer staff, whether NHS or agency
  - Fewer staff in higher pay bands
  - Spend less on intermediate goods and services
  - Have lower levels of capital expenditure
Variation in elective survival rates
Variation in non-elective survival rates
Variation in waiting times
Variation in medical/non-medical staff ratios
Variation in SHA productivity
Conclusions

- We are getting out what we put into NHS
- Savings should be targeted where there is evidence of inefficient practice
- Productivity ratios vary across SHAs from +8% to - 6% of the national average
A new measure of quality: the case of avoidable mortality

Hospital productivity analysis

Patient Reported Outcomes Measures (PROMs)

Explore the quality dimensions such as rates of MRSA, C-difficil infections, re-admission rates, etc


Publications


## Output categories

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<thead>
<tr>
<th>Category</th>
<th>2003/4</th>
<th>2007/8</th>
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<tbody>
<tr>
<td>Hospital</td>
<td>1,273</td>
<td>3,456</td>
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<tr>
<td>Mental Health</td>
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<td>Outpatient</td>
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<tr>
<td>Community Care</td>
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<td>Other</td>
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<td>1,388</td>
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<td>Primary Care</td>
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<tr>
<td>Prescribing</td>
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<td>199</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>3,035</strong></td>
<td><strong>6,779</strong></td>
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