Is there a “Pig Cycle” in the labour supply of doctors? How training and immigration policies respond to physician shortages

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What about medical doctors?

Appearance of medical shortages in OECD countries

- US: Deficit of 200,000 physicians for 2020-2025 (Cooper, 2004)
- UK: Estimated shortage of 20% for 2020 (Wanless, 2002)
- France: Supply should decrease until 2025

Policy responses of physician shortages

- Increase of students in medical schools
- Recruit abroad
- Increase productivity
- Change distribution between urban and rural areas
- Increase retention
MEDICAL SHORTAGES

STUDENTS IN MEDICAL SCHOOLS

DURATION OF MEDICAL TRAINING:
- US: 5 years before residency
  - EU: 7-10 years

REDUCE SHORTAGE IN THE SHORT-RUN

RECRUITMENT FROM ABROAD

REDUCE SHORTAGE IN THE SHORT-RUN

EMIGRATION OF PRACTISING PHYSICIANS

INCREASE SHORTAGE IN THE SHORT-RUN
Research Questions

1. **How** do policy makers react to shortage of physicians?
   - Training investment in medical schools
   - Recruitment of foreign trained physicians
   - How about practising physician workforce?

2. **What** is the magnitude of these policy’s responses?

3. **When** do these policies effective in addressing medical shortages?
1. Medical Graduates from 1991 to 2012 (Health OECD data)
   - Number of medical graduates over 1,000 physicians

2. Immigration and emigration from 1991 to 2004 (Bhargava et al 2011)
   - Country of qualification as definition
   - Collection from OECD medical associations
   - Immigration = Foreign trained/Physicians
   - Emigration rate = Physicians abroad/(Physicians + physicians abroad)

3. Shortage of physicians from 1991 to 2004
   - Different definitions: Needs, Demand, Service
   - Different level: Country, Regional (urban/rural), City level
   - Measure: Number of physicians over 1,000 population (WHO, WDI data)

Our sample restricted to 17 OECD countries from 1991 to 2004
### Definition
- Demand of physicians is the best predictor of the GDP per capita (Cooper et al 2003, Scheffler et al 2008)

### Measurement
- \( \text{Shortage}_{j,t} = \ln(\text{Predicted Physicians per 1000}_j) - \ln(\text{Actual Physicians per 1000}_j) \)

<table>
<thead>
<tr>
<th>Year</th>
<th>Average predicted density of physicians per 1,000 people</th>
<th>Average density of physicians per 1,000 people</th>
<th>Shortage in level= predicted density-observed density</th>
</tr>
</thead>
<tbody>
<tr>
<td>1991</td>
<td>2,610</td>
<td>2,554</td>
<td>0.057</td>
</tr>
<tr>
<td>1992</td>
<td>2,636</td>
<td>2,620</td>
<td>0.016</td>
</tr>
<tr>
<td>1993</td>
<td>2,655</td>
<td>2,668</td>
<td>-0.013</td>
</tr>
<tr>
<td>1994</td>
<td>2,700</td>
<td>2,717</td>
<td>-0.018</td>
</tr>
<tr>
<td>1995</td>
<td>2,742</td>
<td>2,749</td>
<td>-0.007</td>
</tr>
<tr>
<td>1996</td>
<td>2,778</td>
<td>2,810</td>
<td>-0.032</td>
</tr>
<tr>
<td>1997</td>
<td>2,824</td>
<td>2,789</td>
<td>0.035</td>
</tr>
<tr>
<td>1998</td>
<td>2,861</td>
<td>2,844</td>
<td>0.017</td>
</tr>
<tr>
<td>1999</td>
<td>2,906</td>
<td>2,966</td>
<td>-0.060</td>
</tr>
<tr>
<td>2000</td>
<td>2,972</td>
<td>3,041</td>
<td>-0.069</td>
</tr>
<tr>
<td>2001</td>
<td>3,006</td>
<td>3,085</td>
<td>-0.079</td>
</tr>
<tr>
<td>2002</td>
<td>3,040</td>
<td>3,021</td>
<td>0.018</td>
</tr>
<tr>
<td>2003</td>
<td>3,062</td>
<td>3,021</td>
<td>0.040</td>
</tr>
<tr>
<td>2004</td>
<td>3,111</td>
<td>3,021</td>
<td>0.090</td>
</tr>
</tbody>
</table>
Empirical Model

\[
\begin{align*}
\ln \left( \frac{\text{Medical graduates}}{\text{Physicians}} \times 1,000 \right)_{j,t} &= \beta_0 + \beta_1 \text{Shortages}_{j,t} + \beta_2 \ln(X_{j,t}) + \text{FE}_j + \text{FE}_t + \nu_{j,t} \\
\ln (\text{Immigration rate}_{j,t}) &= \beta_0 + \beta_1 \text{Shortages}_{j,t} + \beta_2 \ln(X_{j,t}) + \text{FE}_j + \text{FE}_t + \eta_{j,t} \\
\ln (\text{Emigration rate}_{i,t}) &= \beta_0 + \beta_1 \text{Shortages}_{i,t} + \beta_2 \ln(X_{i,t}) + \text{FE}_i + \text{FE}_t + \mu_{i,t}
\end{align*}
\]

Controls = Age dependency ratio, social expenditure, GDP per capita, school enrolment, immigration policy

- **Methodology**
  - Panel Fixed effect analysis (Country and time FE)
  - Endogeneity bias: IV estimations where geographical density and ageing of physicians used as instruments
  - Simultaneity bias: SURE and 3SLS for tackling endogeneity
Medical Graduates Results

![Graph showing medical graduates results with indicated coefficients and intervals of confidence.](image-url)
Immigration rate

Shortage effect

<table>
<thead>
<tr>
<th>Time</th>
<th>Shortage effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>t</td>
<td>0.165</td>
</tr>
<tr>
<td>t+1</td>
<td>0.0974</td>
</tr>
<tr>
<td>t-2</td>
<td>0.0312</td>
</tr>
<tr>
<td>t-3</td>
<td>-0.0216</td>
</tr>
</tbody>
</table>

Coef vs. interval of confidence
Emigration rate

![Graph showing emigration rate over time with coefficient values: 0.0588 at t, 0.0339 at t+1, 0.0381 at t+2, 0.0277 at t+3.](image)
Bias

MEDICAL SHORTAGES

MEDICAL STUDENTS

IMMIGRATION

EMIGRATION

OMITTED VARIABLE
Robustness checks

• **Endogeneity**
  - Similar results except for the medical graduate model
  - Coefficient of shortage is higher for average graduates between t+8 and t+9 than those between t+5 and t+7
  - “Pig Cycle” appears with 8 and 9 years delay
  - Robustness of instruments
    - Local shortage explains national shortage
    - Ageing of physician population drives up the national shortage

• **Simultaneity**
  - Similar results and confirm the delay of 8/9 years
Findings

10% INCREASE IN THE MEDICAL SHORTAGES

STUDENTS IN MEDICAL SCHOOLS

DURATION OF MEDICAL TRAINING

INCREASE OF 1% IN THE IMMIGRATION RATE IMMEDIATELY

INCREASE OF 0.5% OF THE EMIGRATION OF PRACTISING PHYSICIANS DURING THE NEXT 3 YEARS

INCREASE OF 3.8% OF MEDICAL GRADUATES 8/9 YEARS LATER
Trade-off between education and development policy in OECD countries

- **Education**
  - Investing in medical school capacities
  - Only efficient in the long run
  - Financial cost of training

- **Development policy**
  - Recruitment of foreign-trained physicians from abroad
  - Risk of deprivation of origin countries of their human resources for health
  - Adoption of Code of Good Practice in WHO member states and Commonwealth area
THANK YOU FOR YOUR ATTENTION

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