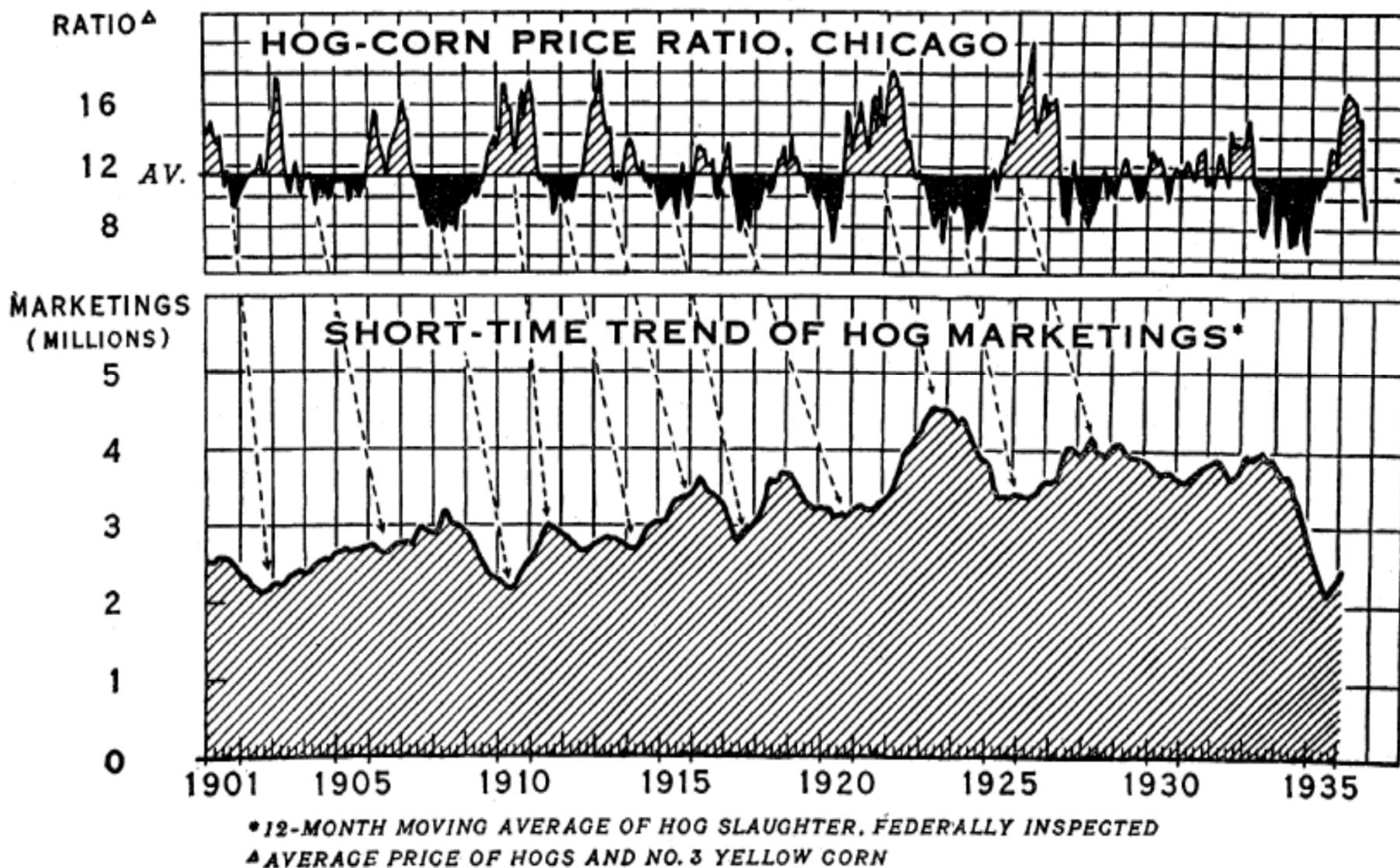


# Is there a “Pig Cycle” in the labour supply of doctors? How training and immigration policies respond to physician shortages

*4<sup>th</sup> International Conference on Nursing and Healthcare  
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# HOG-CORN PRICE RATIOS AND HOG MARKETINGS



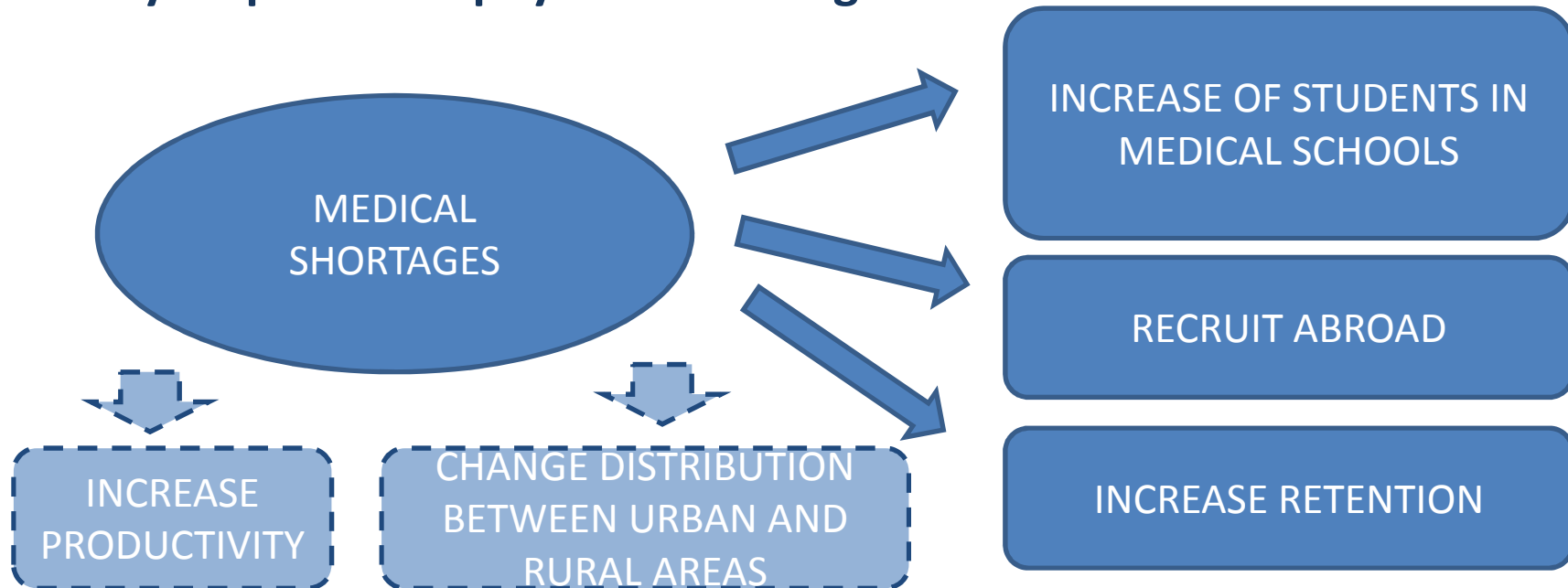
Ezekiel (1938), "The Cobweb Theory" Quarterly Journal of Economics

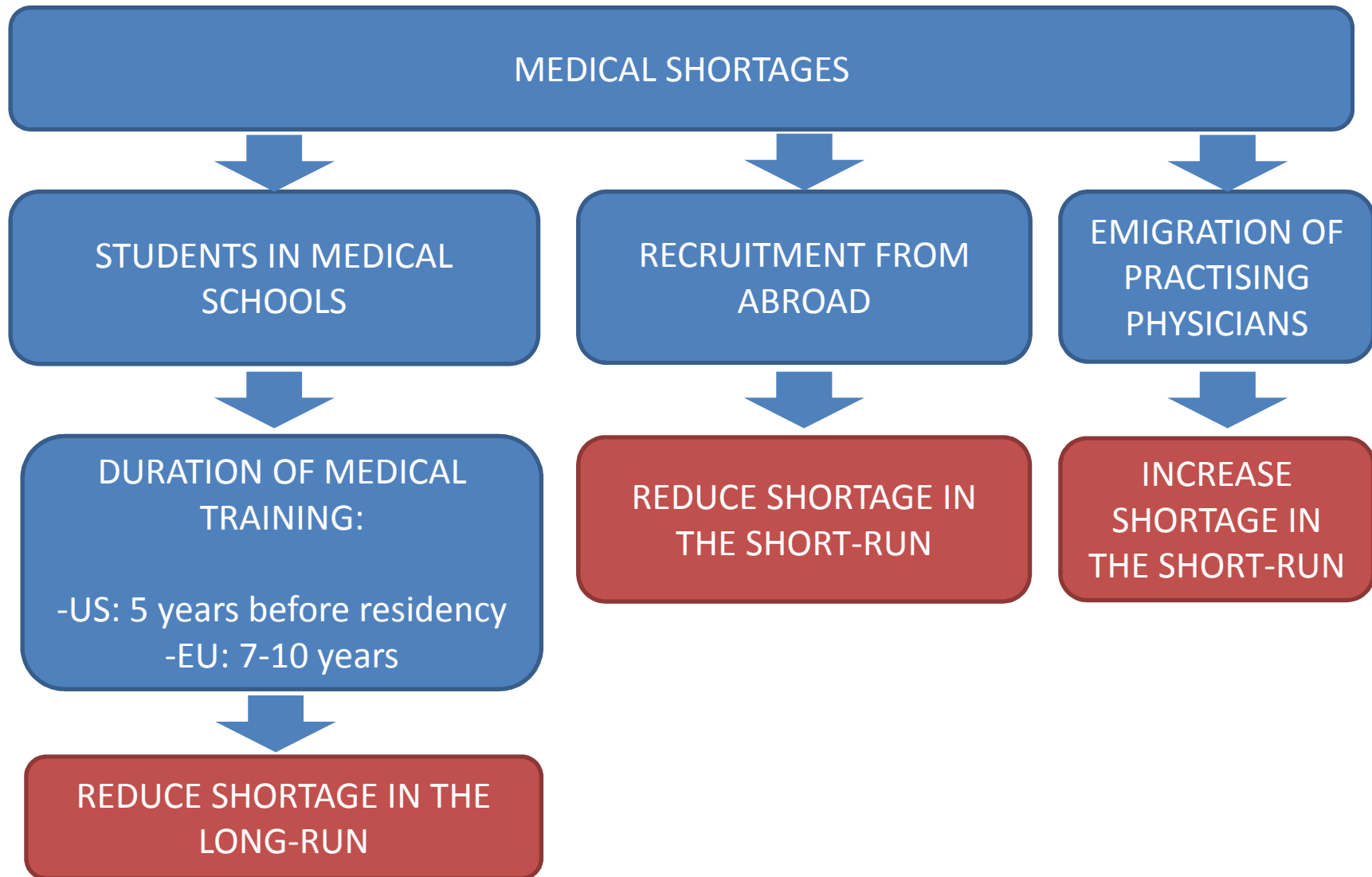
# What about medical doctors?

## 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





- 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**

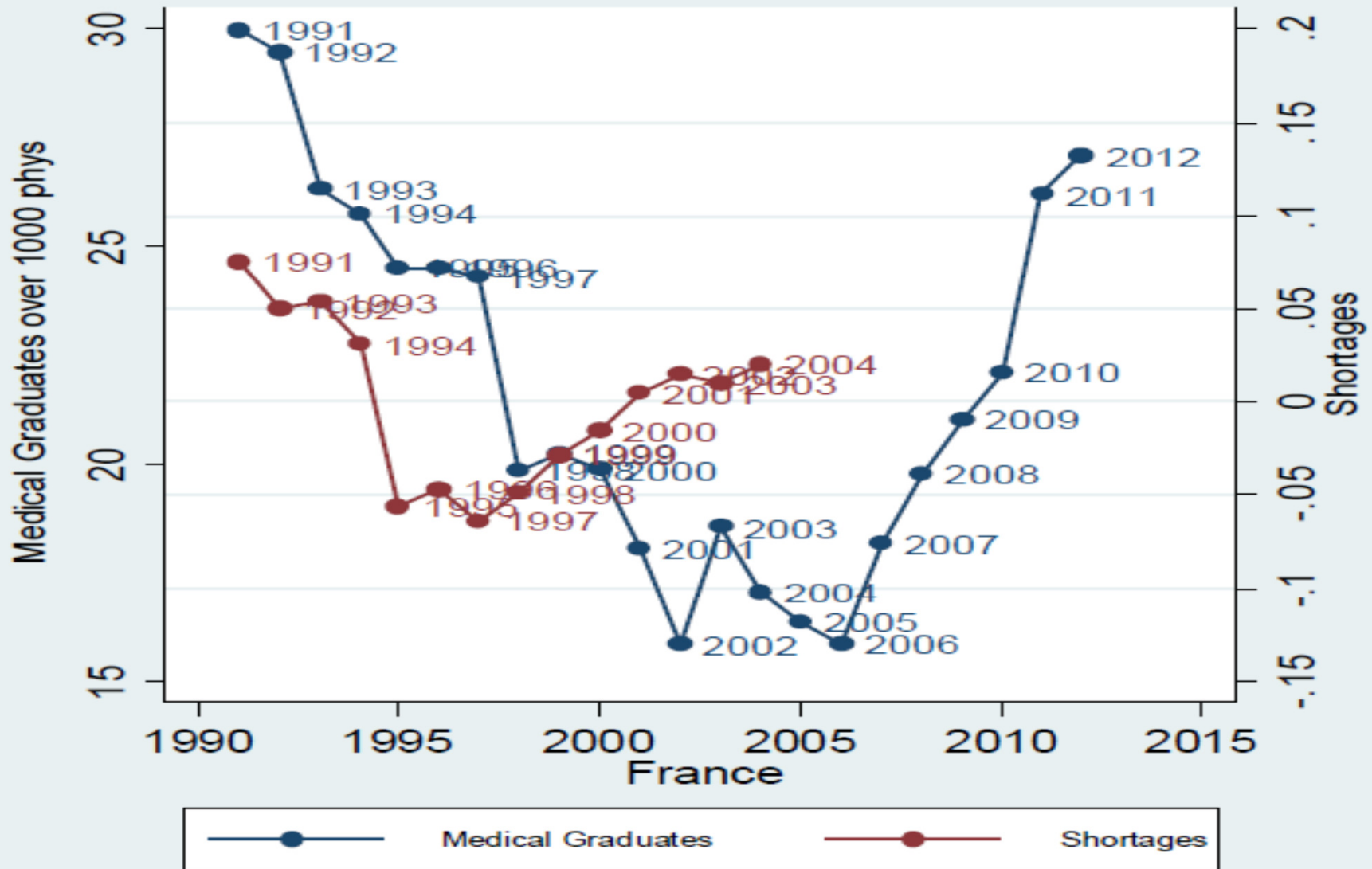
## Definition

- Demand of physicians is the best predictor of the GDP per capita (Cooper et al 2003, Scheffler et al 2008)

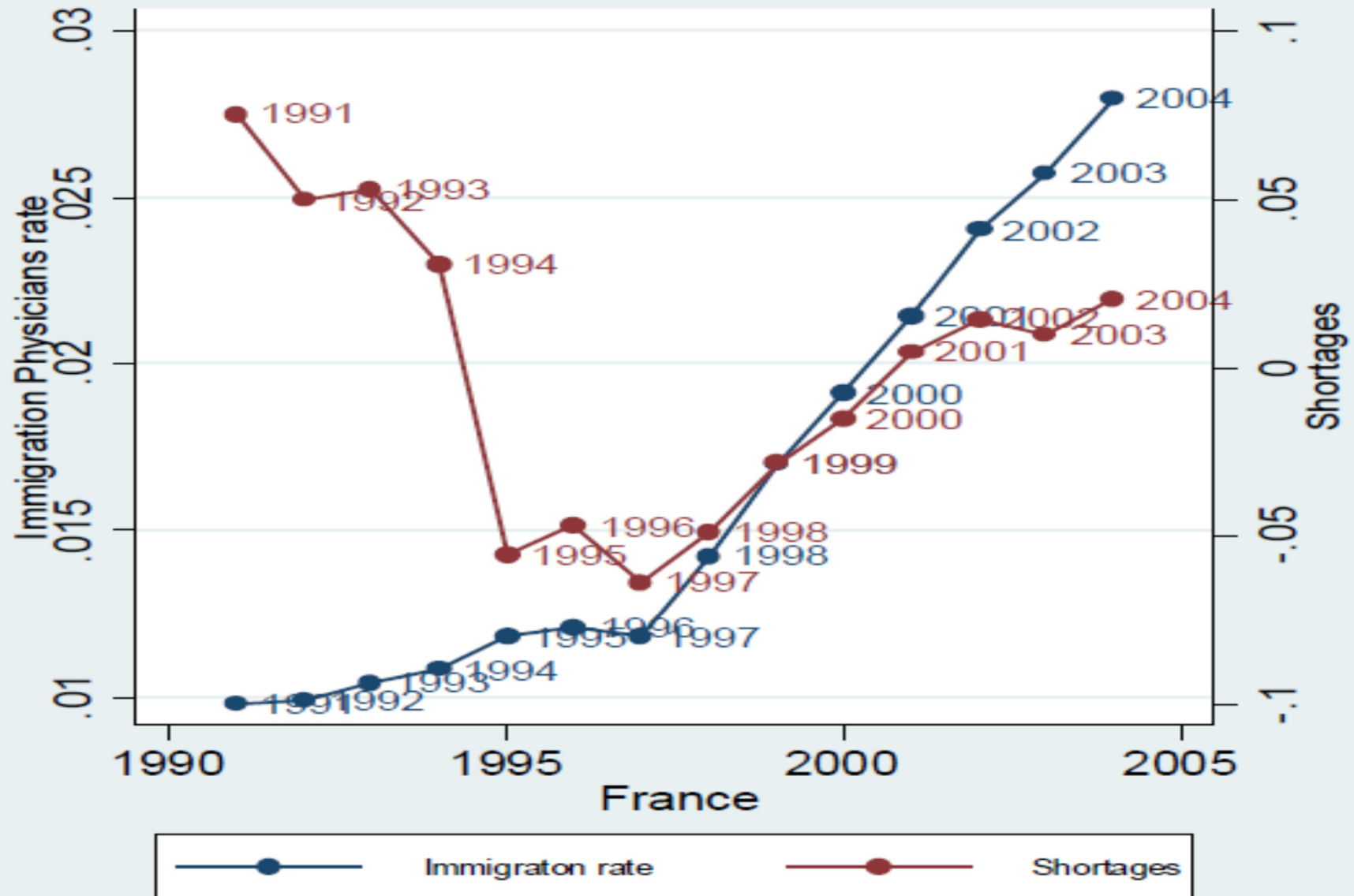
## Measurement

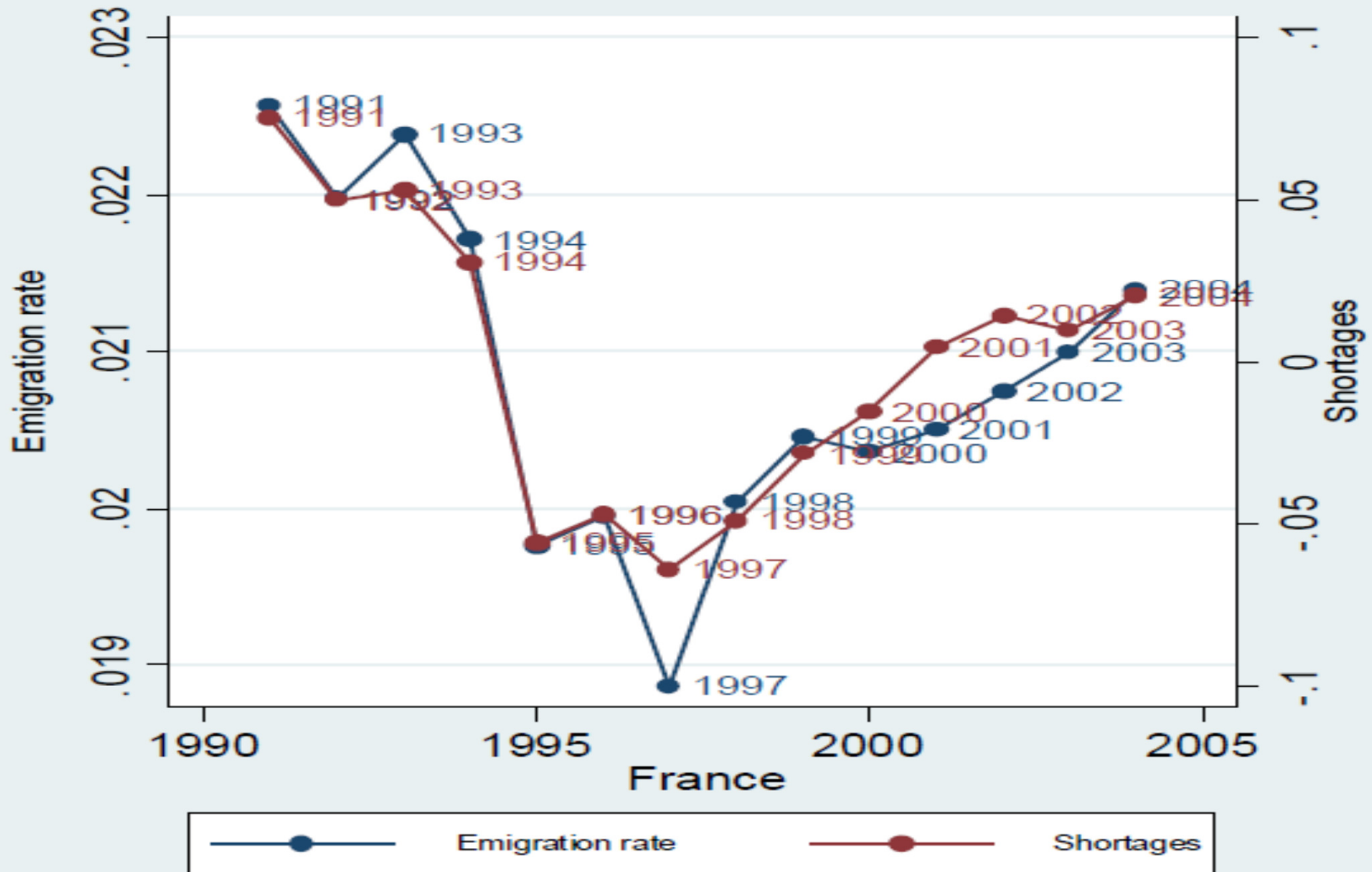
- $Ln(\text{Actual Physicians per } 1000_{j,t}) = \alpha_0 + \alpha_1 Ln(\text{GDP per capita}_{j,t}) + \varphi_j + \varepsilon_{j,t}$   
 $\text{Shortage}_{j,t} = Ln(\text{Predicted Physicians per } 1000_{j,t}) - Ln(\text{Actual Physicians per } 1000_{j,t})$

	Average predicted density of physicians per 1,000 people	Average density of physicians per 1,000 people	Shortage in level= predicted density-observed density
1991	2,610	2,554	0,057
1992	2,636	2,620	0,016
1993	2,655	2,668	-0,013
1994	2,700	2,717	-0,018
1995	2,742	2,749	-0,007
1996	2,778	2,810	-0,032
1997	2,824	2,789	0,035
1998	2,861	2,844	0,017
1999	2,906	2,966	-0,060
2000	2,972	3,041	-0,069
2001	3,006	3,085	-0,079
2002	3,040	3,021	0,018
2003	3,062	3,021	0,040
2004	3,111	3,021	0,090









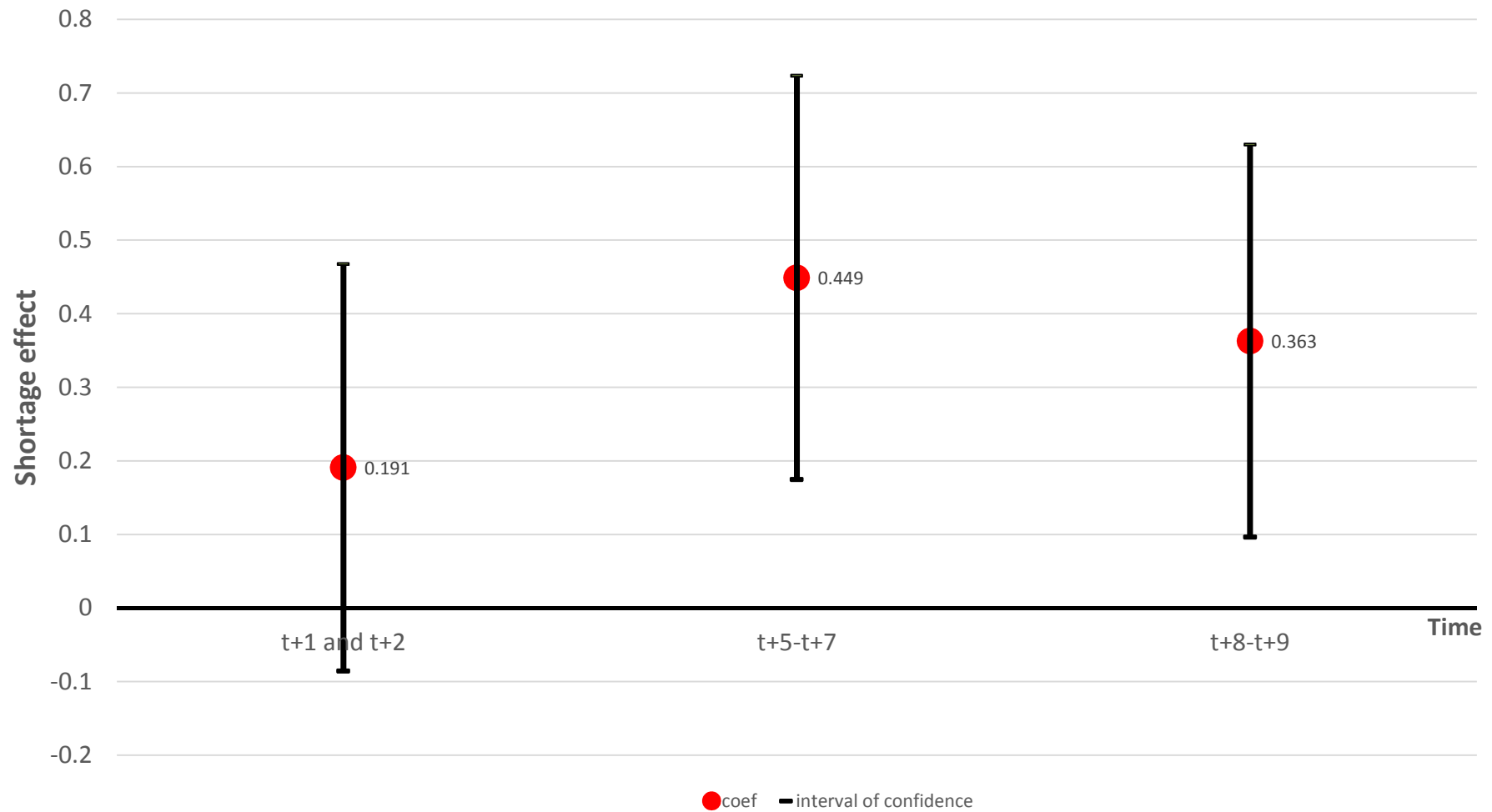
$$\left\{ \begin{array}{l} \text{Ln} \left[ \left( \frac{\text{Medical graduates}}{\text{Physicians}} * 1,000 \right)_{j,t+\gamma} \right] = \beta_0 + \beta_1 \text{Shortages}_{j,t} + \beta_2 \text{Ln}(X_{j,t}) + \text{FE}_j + \text{FE}_t + \nu_{j,t} \\ \text{Ln} (\text{Immigration rate}_{j,t}) = \beta_0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

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

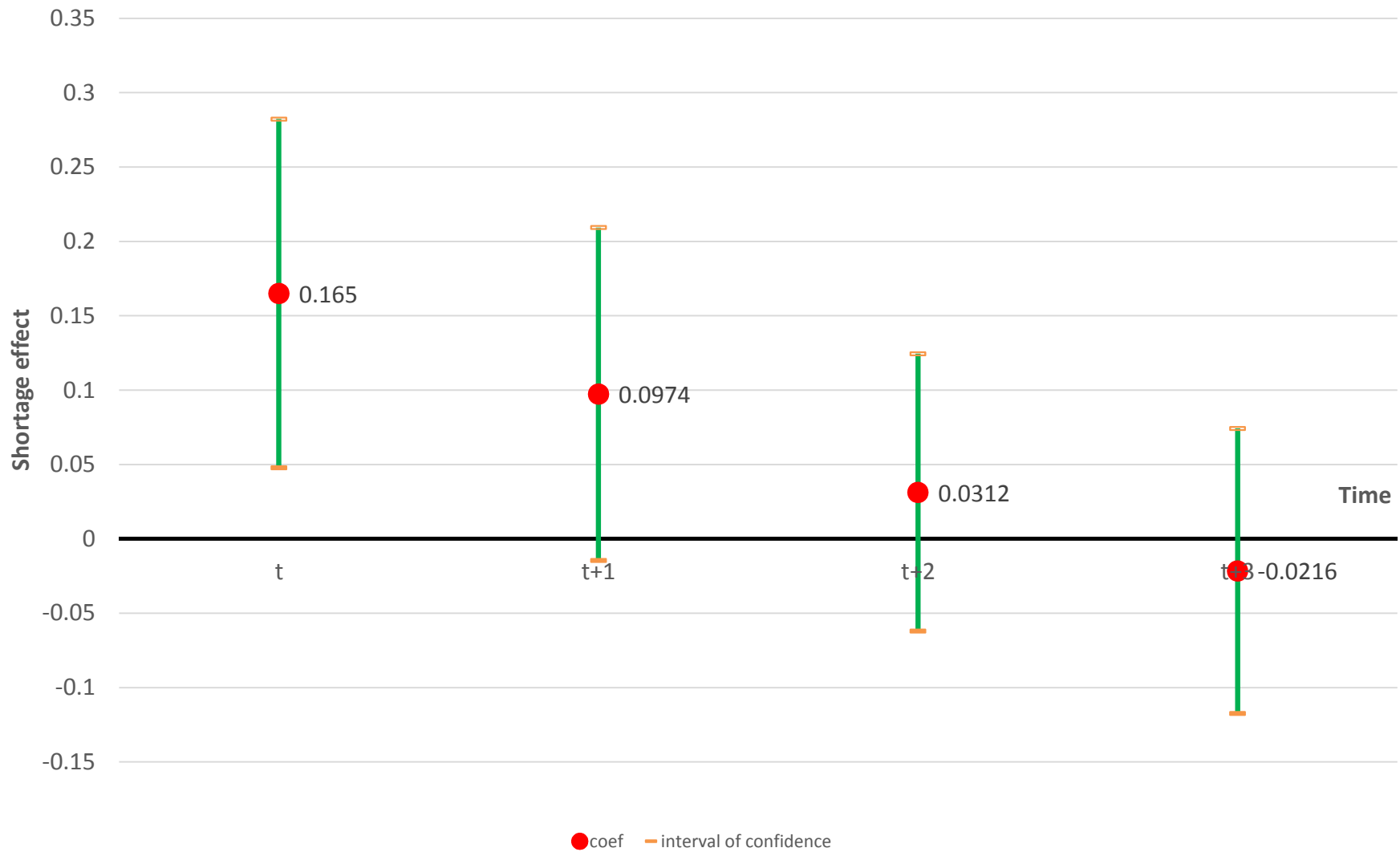
## • Methodology

- 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

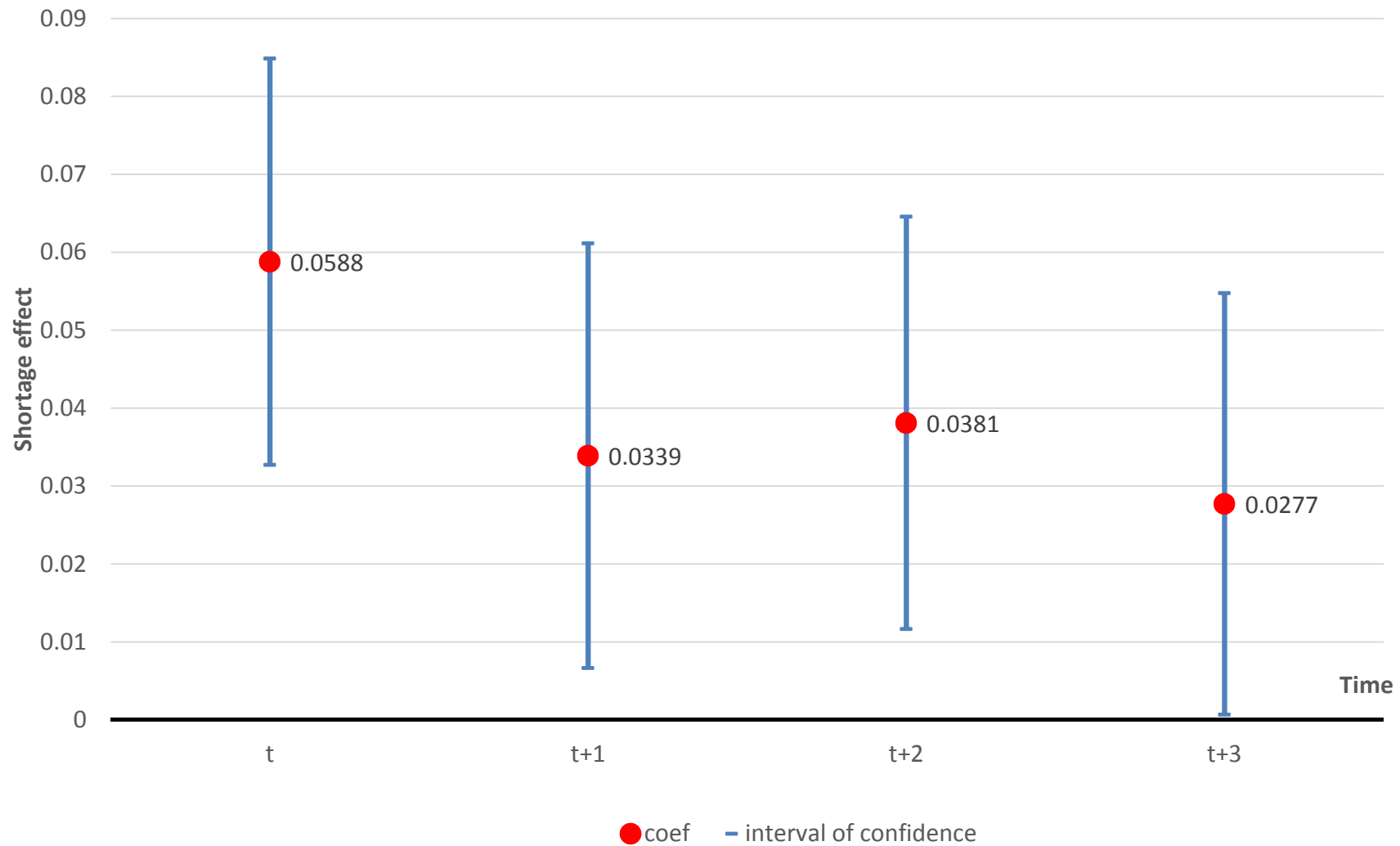
# Medical Graduates Results

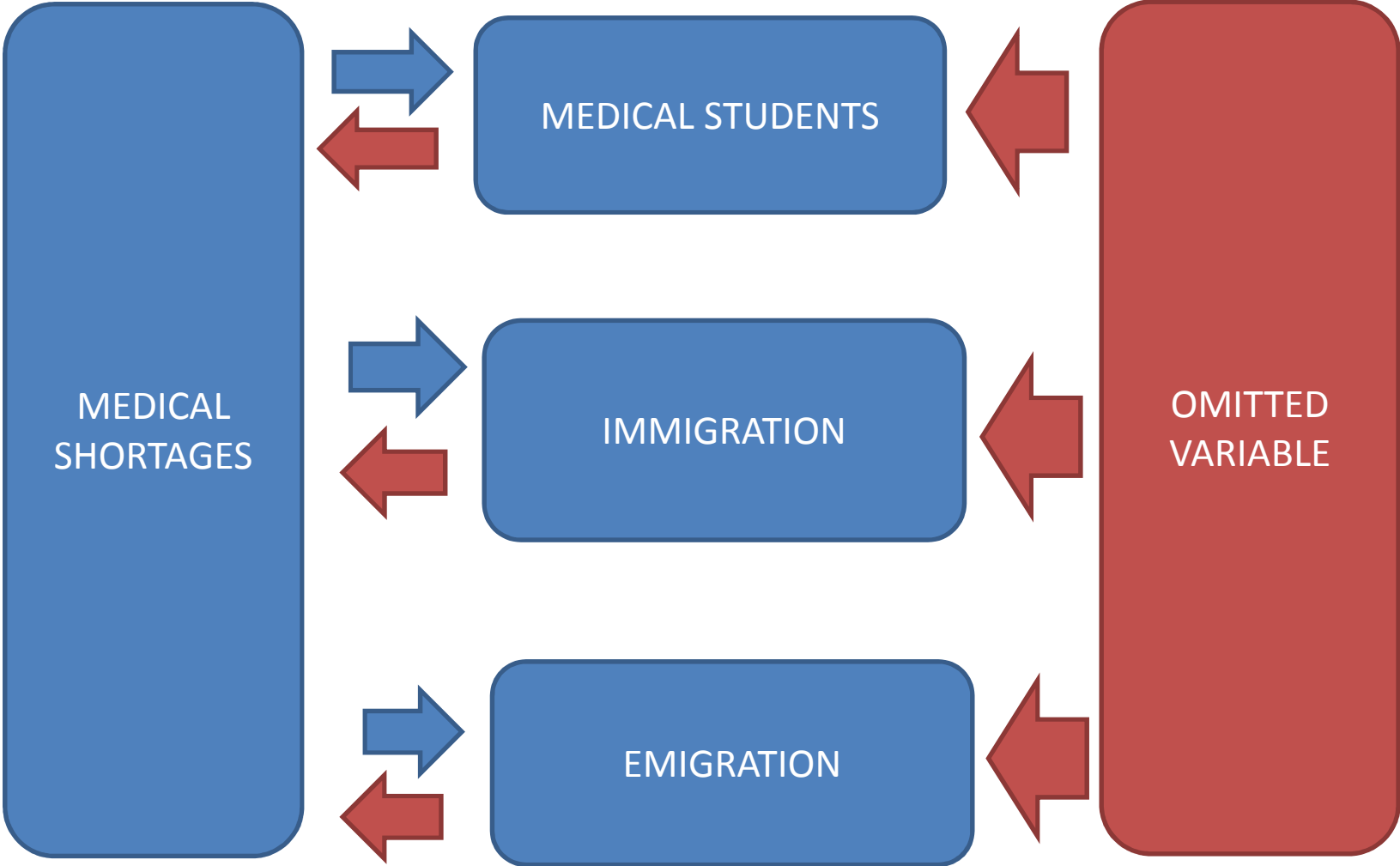


# Immigration rate



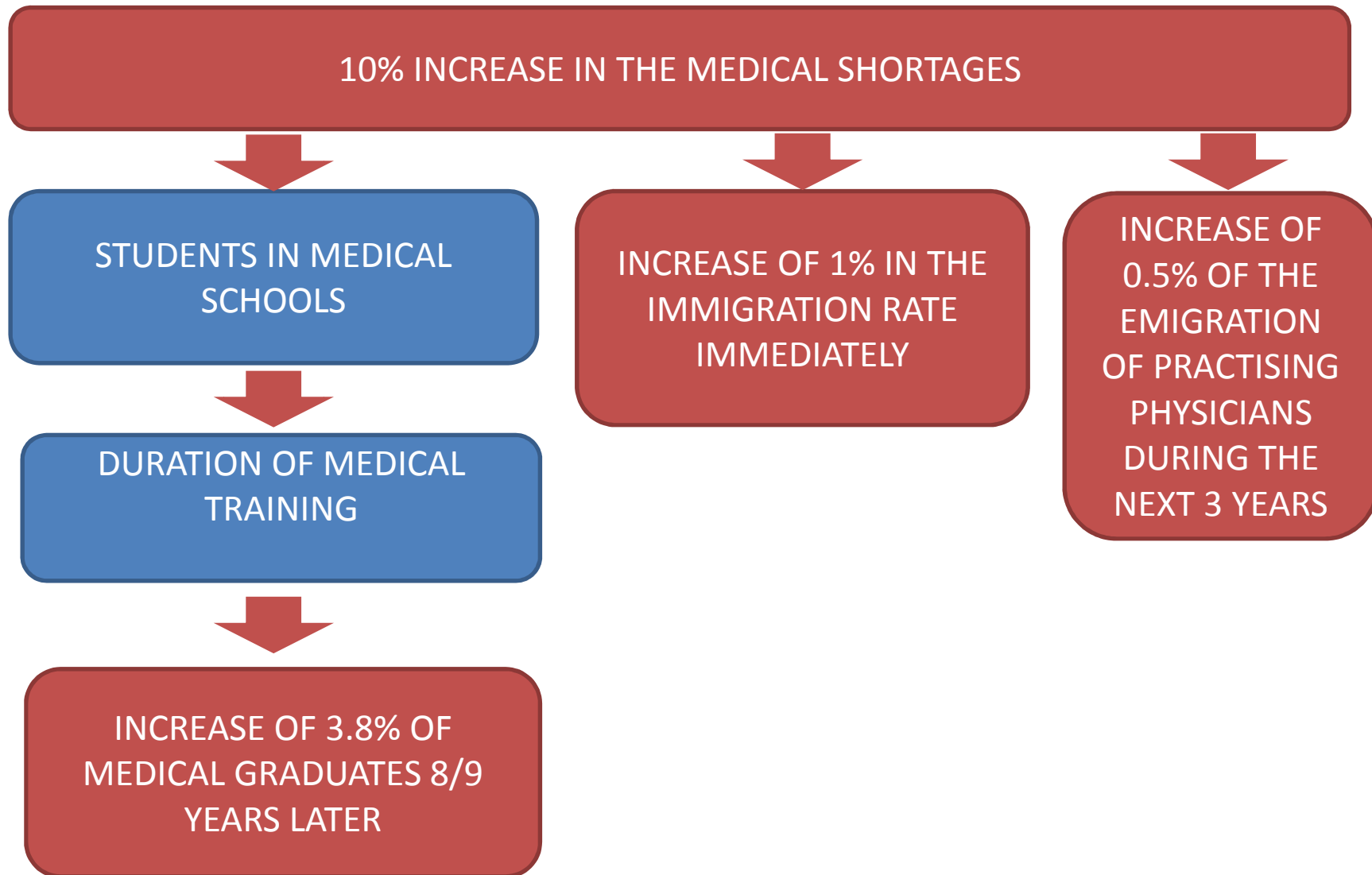
# Emigration rate





- 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





### 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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