

Physician
Workforce,
Primary Care
and
Life
Expectancy at
40

V.K.Chetty,
Benjamin
Petrie
and Larry
Culpepper

Physician Workforce, Primary Care and Life Expectancy at 40

V.K.Chetty, Benjamin Petrie
and Larry Culpepper

February,2018

Raj Chetty,...David Cutler JAMA study

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- Major Conclusions using 14 billion observations
 - 1 Gap in life expectancy (LE) between the richest 1% and poorest 1% of individuals was 14.6 years

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- Major Conclusions using 14 billion observations
 - 1 Gap in life expectancy (LE) between the richest 1% and poorest 1% of individuals was 14.6 years
 - 2 Geographic differences in LE for individuals in the lowest income quartile significantly correlated with health behaviors such as smoking ($r=0.69$, $P.001$), but **not significantly correlated with access to medical care**

Major Conclusions Contd.

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- 3 Measures of health insurance coverage and spending (the fraction of uninsured and risk-adjusted Medicare spending per enrollee) **not significantly associated** with LE for individuals in the **bottom income quartile**.

Father and Son Controversies

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- Are Physicians services really uncorrelated with patients health ?
- Health Insurance coverage does not affect life expectancy ?
- or **are these due to some statistical problems ?**
- This study already quoted by opponents of Obama Care!

A Simple Model

The production relation is

$$LE = \beta_1 (M) + \beta_2 (F) + \beta_3 (Z) \quad (1)$$

Choose M and F to minimize cost of LE , i.e., the last dollars spent on a specialist and a PCP must increase LE by the same amount.

Then,

$$F^* = 1 + \frac{1}{r} + M \frac{\frac{\partial \beta_1}{\partial M}}{\frac{\partial \beta_2}{\partial F}} \quad (2)$$

where

- LE : Expected Life Expectancy
- M : MDs per 10,000 population
- F : fraction of PCPs
- $1 + r$: ratio of fee for services of specialists to PCPs

Practical Decision Rule

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Rule depends on four observable variables

- 1 Physician density : M
- 2 Marginal effects of increasing physicians without changing the proportion of PCPs: $\beta_1 (M)$
- 3 Marginal effects of substituting PCPs by specialists: $\beta_2 (F)$ and
- 4 Ratio of fees for services of specialists to PCPs: $(1+r)$

How to estimate $\beta_1 (M)$ & $\beta_2 (F)$?

Big Data: Benefits and Problems

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- **Three errors** in empirical studies: (1) Sampling Errors- small samples; (2) Measurement Errors (3) Specification Errors - selection of variables and specifying functional forms.
- With millions and billions of observations, sampling errors will disappear; t-values will be 200 or 300 !
- Many variables may be statistically significant, but are they **clinically** significant?
- No need to specify any functional form such as linear, quadratic etc.
- choice of functional forms could be completely data driven! No need for prior restrictions
- **Main Problem:** Sound knowledge of subject needed to measure well, assess clinical significance & use the results!

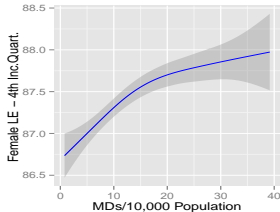
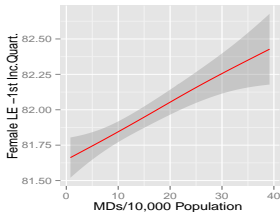
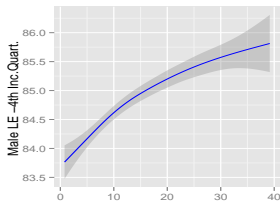
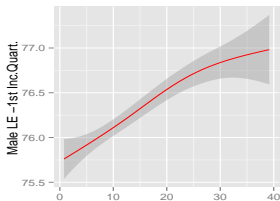
Variables

- 1 unit of observation: County
- 2 Average Life Expectancy at age 40 for 1st and 4th income quartiles for men and women
- 3 Physician Supply: Non-federal MDs/ 10 K Population, seeing patients, 75 years or less excluding DOs.
- 4 PCP: GP, FP, GIM, Peds., ObGyn and DOs excluding PA & NP
- 5 Proportion Currently Smoking
- 6 Rate of self-reported exercise during the past month
- 7 Proportion of Medicare recipients admitted at least once in a year
- 8 Number of immigrants per 10 K individuals.

Life Expectancy, Income and Total MDs 10,000 Population - a

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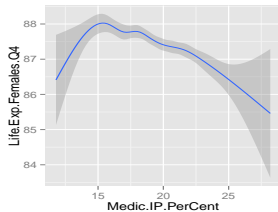
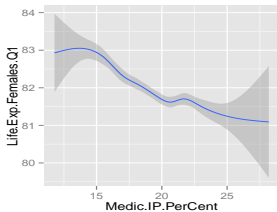
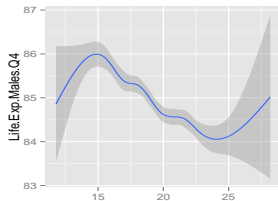
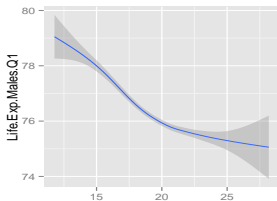
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Life Expectancy, Income and Total MDs /10,000 Population - b

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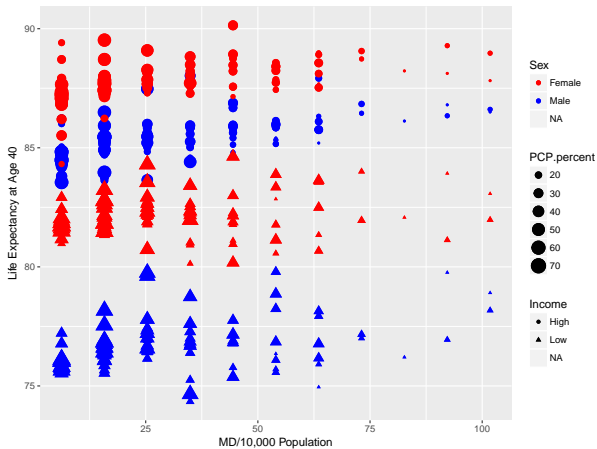
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Life Expectancy, MD Density & Specialty Distribution, Income and Sex

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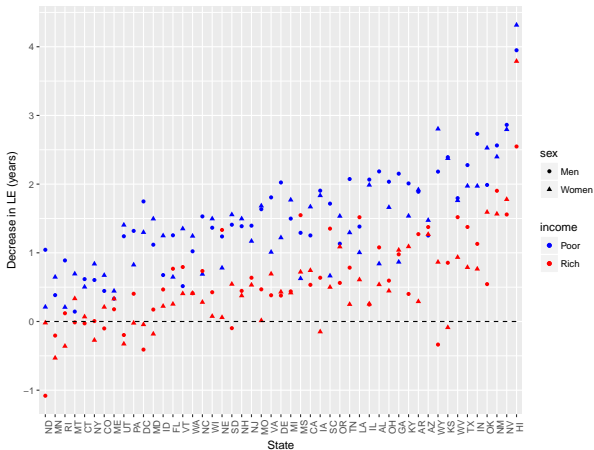


Adjusted State Effects on Life Expectancies

Referent: Massachusetts

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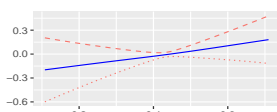
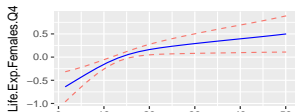
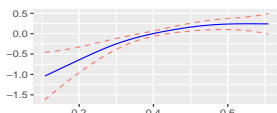
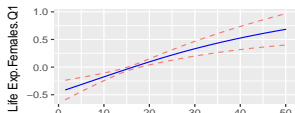
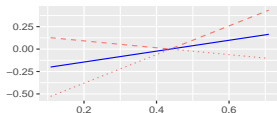
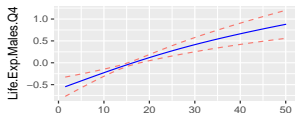
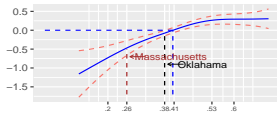
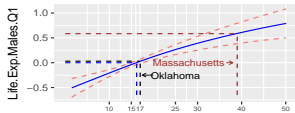
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Change in Life Expectancy Years (Adjusted) Physician Supply and Specialty Distribution

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Life Expectancy (Adjusted) and % Immigrants

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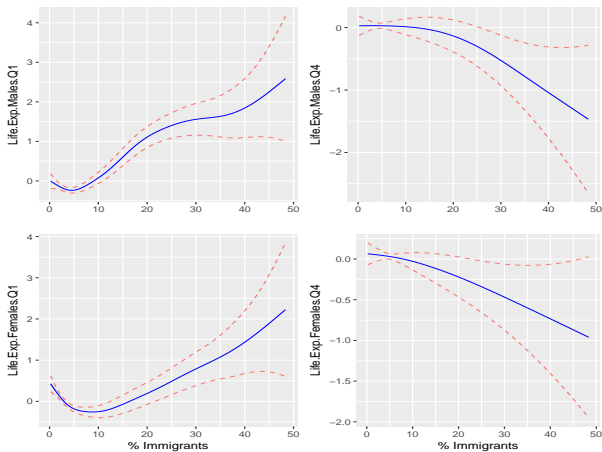


Figure: 4

GAM Model: Medical Care, Health Behavior And Life Expectancy

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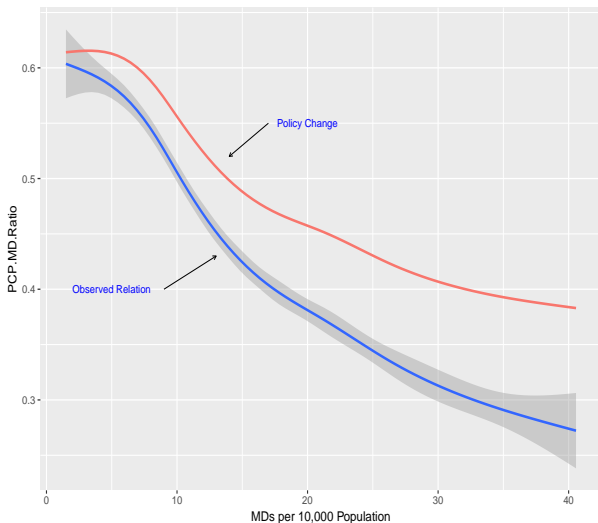
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Dep. Var.	LE-Males(Q1)	
Ind.Var.	edf	p-value
s(TotMDPop)	2.874	1.02e-07 ***
s(PCP.MD)	2.989	1.22e-05 ***
s(cur.smoke.q1)	2.989	7.56e-06 ***
s(exercise.any.q1)	6.268	0.021 *
s(lmigPop)	5.249	< 2e-16 ***
s(Medic.IP.%)	2.886	< 2e-16 ***
R-sq.(adj) 0.549	Dev. Exp 57.4%	
GCV = 1.05	Scale est. = 0.99	n = 1,359

Physician Density & PCP-MD Ratios

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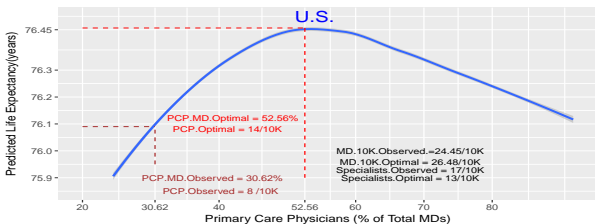
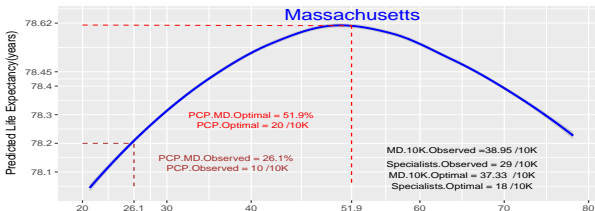
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Efficient Physician Workforce and Specialty Mix: Massachusetts and U.S.A.

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Conclusions and Extensions

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Conclusions

- 1 Life Expectancy of Poor is significantly correlated with supply of physicians especially PCPs.
- 2 In almost all counties, there is shortage of PCPs and surplus of specialists

Extensions

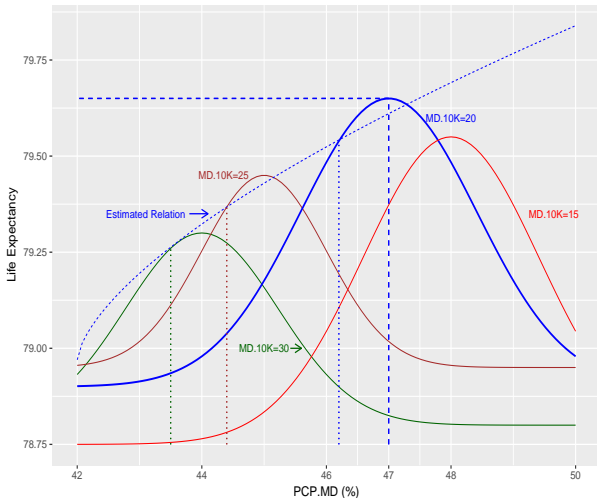
- 1 Primary care Service Area and Hospital Referral Regions
- 2 Include State specific policies such as Medicaid and local government expenditures

Small Area Variations & Short Run Relations

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Life Expectancy and PCP.MD (%) in 4 Hypothetical States



Our Approach

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- **Hi Chetty,**

I woke up in the middle of the night thinking about what was bothering me about the papers conclusions.....

Larry

- **Hi Larry,** I am glad and sorry at the same time-

I disturbed your sleep but also provided some intriguing questions!

This is precisely where I was quite certain that it should be the call of an expert, and not a statistician and I was looking forward to your input.