



# The Trade-off between Productivity and Quality of Care in Primary Care Services

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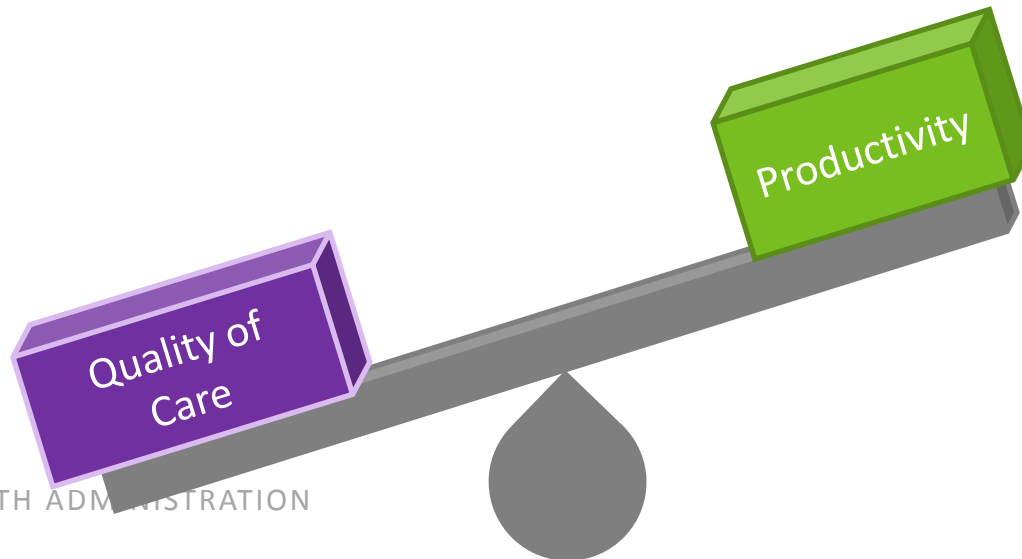
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# Motivation

- Primary care services → physicians and nurses shortage
- Veterans Health Administration is a public healthcare system with fixed budget
- VHA management → increase access to care
- What if VHA tighten its productivity standard for providers
- When you increase productivity of providers, quality of care could decrease → How much?



# Economic Theory



Feldman (2009) Quality of Care in Single-Payer and Mutipayer Health Systems

In a public healthcare system where resources are scarce

*“Patients can have **more** health care, or **higher**-quality health care, but not both at the same time”*

## Poll Question #1



Are you familiar with a supply and demand theory where price is in the y-axis and quantity is on the x-axis?

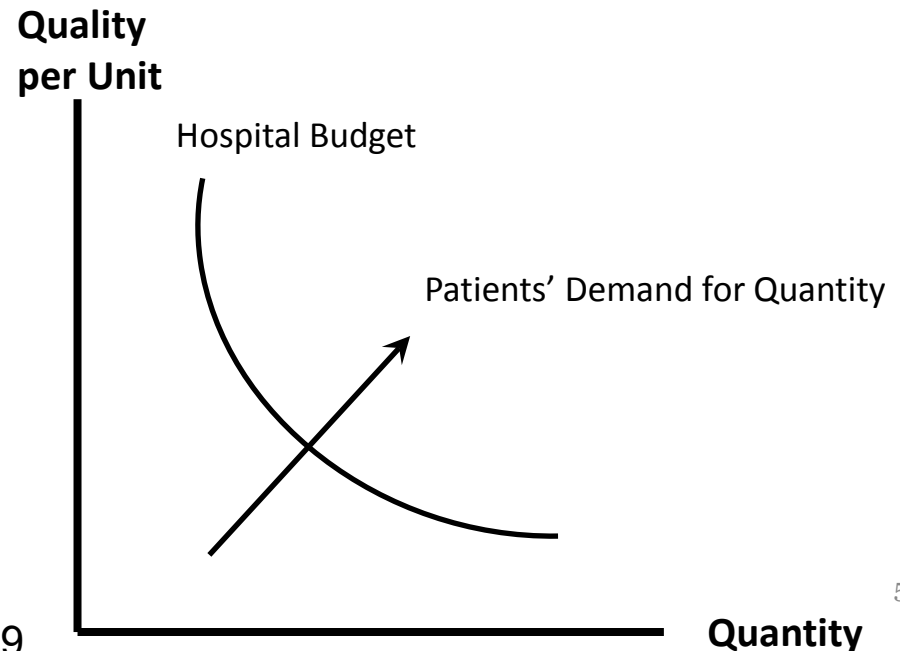
- Yes
- No

Feldman (2009) Quality of Care in Single-Payer and Mutipayer Health Systems

In a public healthcare system where resources are scarce

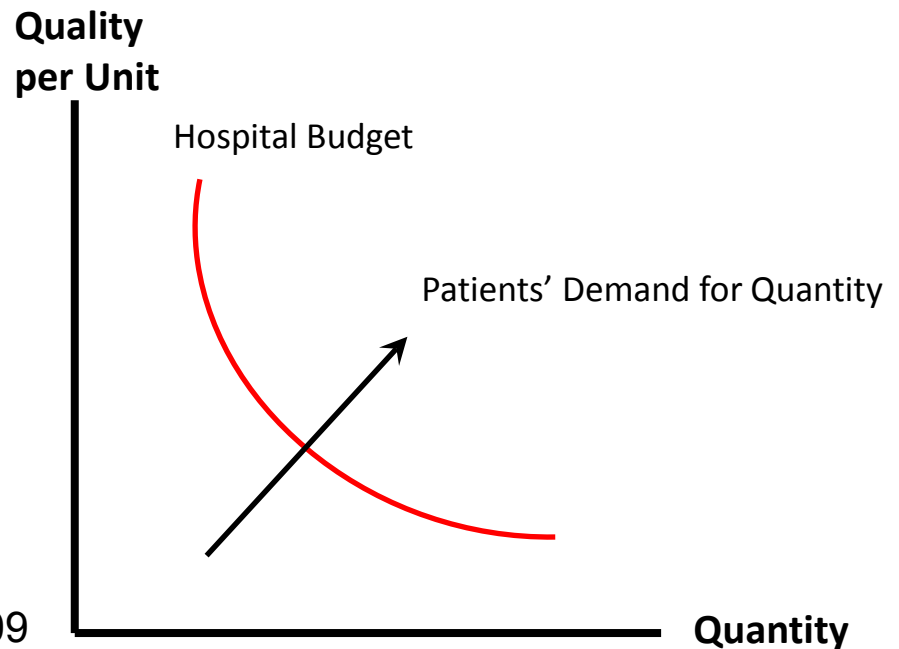
*“Patients can have **more** health care, or **higher**-quality health care, but not both at the same time”*

- Supply Demand framework for public healthcare systems
  - Y-axis = Quality of Care
  - X-axis = Number of visits



# Challenge

- Quantity and Quality of Care are simultaneously determined
- What is the supply elasticity of Quality with respect to Visits?



# Demand for VA Care



- You cannot measure demand with individual data points
- Demand for VA care at each medical center is influenced by changes in:
  - Number of enrollees
  - Sickness of patients (Nosos score)
  - Proportion of Veterans with high priority status
  - Medicare eligibility (age)
  - Employment status
  - Private health insurance coverage
  - Income
  - Others
- Many of these variables are exogenous to the VA supply

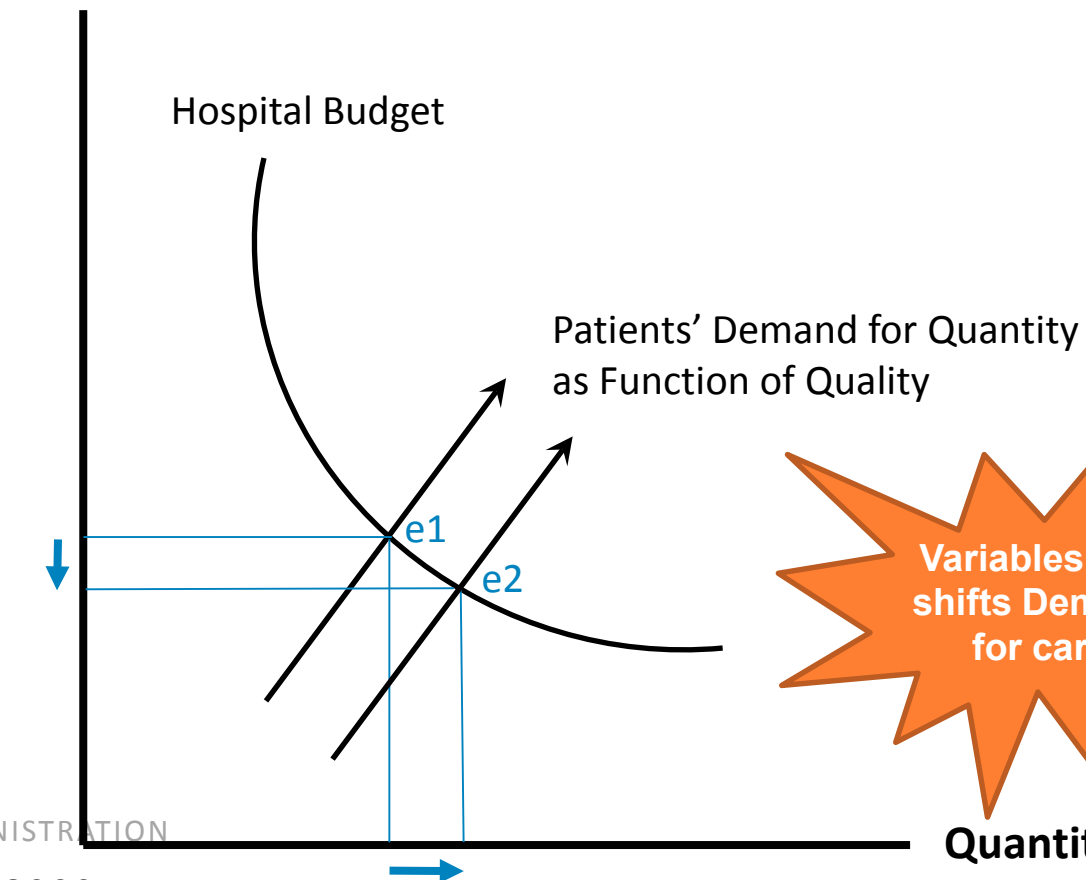


# Conceptual Model

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Quality  
per Unit



VETERANS HEALTH ADMINISTRATION

Adapted from Feldman, 2009



# Instrumental Variable Analysis



- 1<sup>st</sup> Stage: Predict the **quality of care** using exogenous variables that affects patients demand for VA care
- 2<sup>nd</sup> Stage: Measure the trade-off between **quality of care** and **quantity** (# visits). Supply elasticity of quality of care with respect to number of visits

# Quality of Care Measures at Primary Care Services



- **Patient's experience with their providers: Verbal and non-verbal communications**
- Prevention Quality Indicators: Patients receive all necessary care during their appointments and prevent unnecessary care (inpatient admission)
- Access to care: longer wait-times

## Poll Question #2



Which of the quality of care measures matter to you and/or to your research the most?

- 1) Patient experience
- 2) Patient's clinical outcome
- 3) Access to care
- 4) All of the above

# Patient Experience

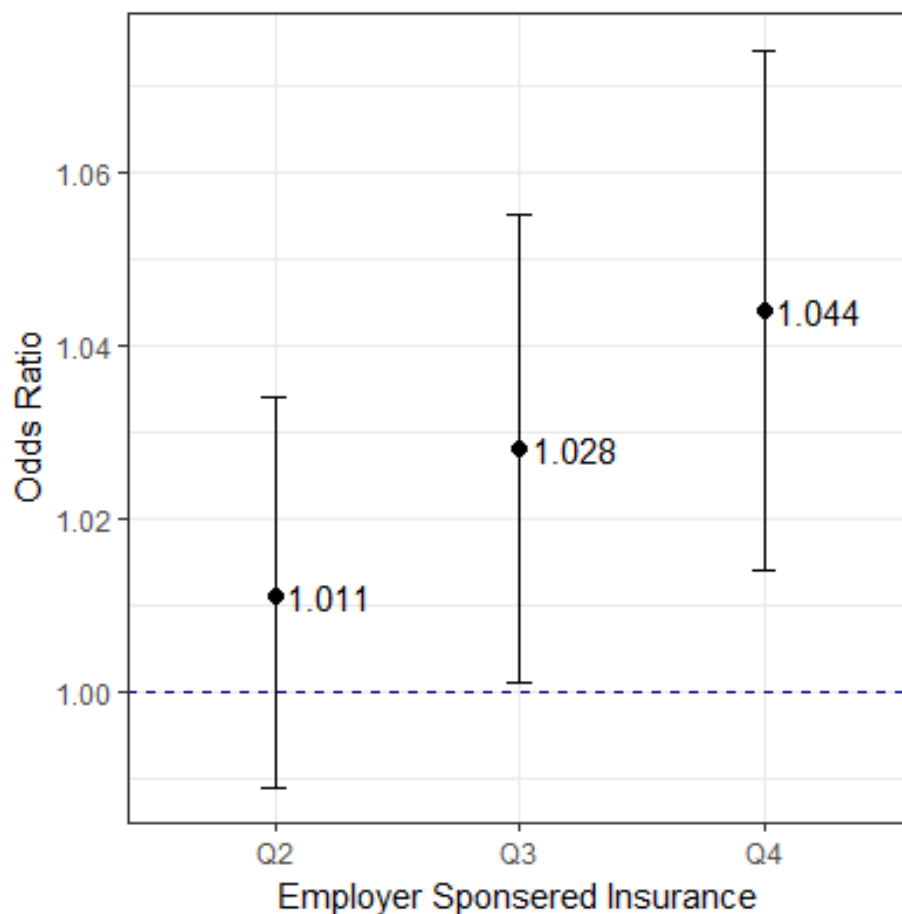


- Survey of Healthcare Experiences of Patients (SHEP)
  - Random sample of primary care patients
  - 727,000 survey responses between FY13-FY15 (35 months) over 127 VHA medical centers
- When demand for care is high, providers are rushed and have less time with their patients
- “In the last 12 months how often did this provider...”
  - 1) explain things in a way that was easy to understand,
  - 2) listen carefully to you,
  - 3) show respect for what you had to say,
  - 4) spend enough time with you, and
  - 5) seem to know the important information about your medical history
- Composite measure where patients answered “usually” or “always” to all 5 questions was coded as 1. All other response patterns were coded as 0.

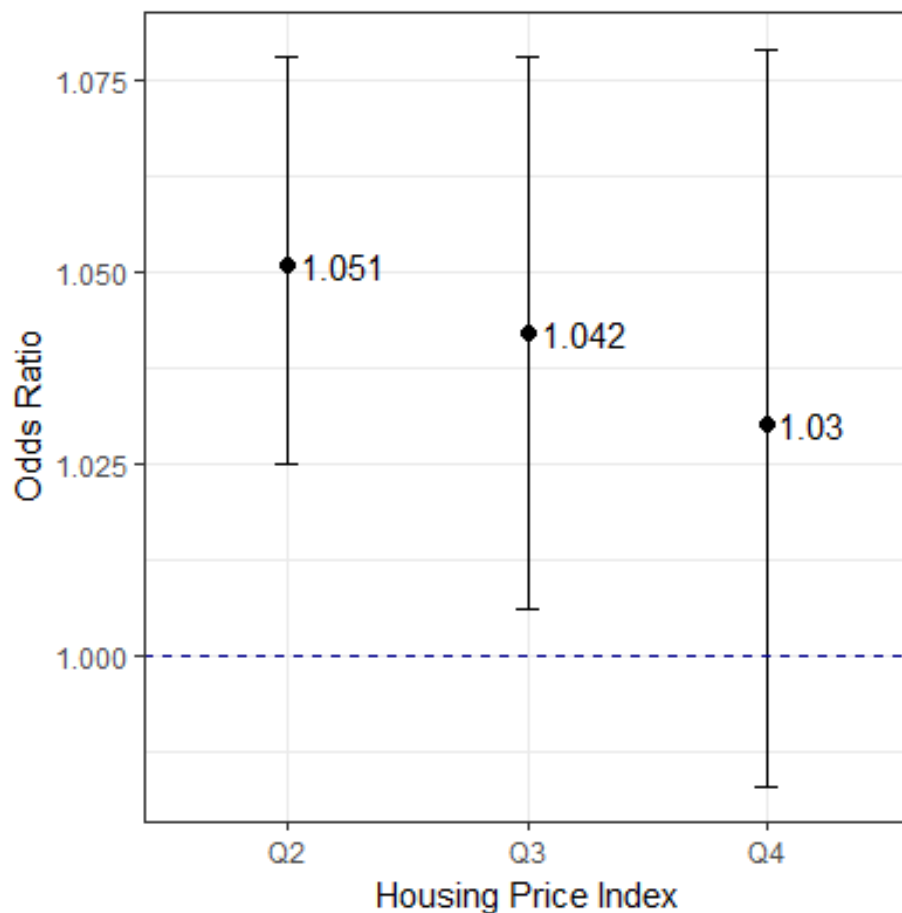
# Market Factors on Patient Experience

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# Market Factors on Patient Experience



# Instrumental Variable Analysis



- 1<sup>st</sup> Stage: Predict the **quality of care** using exogenous variables that affects patients demand for VA care
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# Quantity Measures at Primary Care Services



The production function describes the relationship between the quantity of inputs and the quantity of outputs that the hospital produces.

## Outputs

- Number of visits
- Relative Value Units (RVUs)

## Inputs

- Number of full-time employees
- Exogenously identified quality of care
- Capital (budget or structure)

# Production Function using 2 SLS

*First Stage:*

$$\text{Log}(\text{Quality}_{kt}) = \alpha_0 + \alpha_1 \text{Log}(\text{Instruments}_{kt}) + \alpha_2 \text{Log}(\text{Input}_{kt}) + \alpha_3 t + \gamma_k + e_{kt}$$

*Second Stage:*

$$\text{Log}(\text{Quantity}_{kt}) = \beta_0 + \beta_1 \text{Log}(\text{Inputs}_{kt}) + \beta_2 \text{Log}(\widehat{\text{Quality}}_{kt}) + \beta_3 t + \gamma_k + \varepsilon_{kt}$$

t    fiscal year and month dummies

k    127 VHA medical centers

- Expect a negative sign on  $\beta_2$
- Normalized to mean and log-transformed → coefficients can be interpreted as elasticity



## Second Stage: Between VA Medical Centers

	(1) Naïve Coef. [Std. Err.]	(2) IV Coef. [Std. Err.]
<b>Log (Visits)</b>		
Log (Primary Care Physician FTEs)	1.021 ** [ 0.010 ]	1.017 ** [ 0.010 ]
Log (Quality)	-1.233 ** [ 0.094 ]	-1.886 ** [ 0.114 ]
FY (ref=13)		
14	-0.008 [ 0.151 ]	-0.013 [ 0.015 ]
15	0.101 ** [ 0.015 ]	0.089 ** [ 0.015 ]
Months	yes	yes
127 VHA Medical Center Fixed Effects	no	no
F	738.18	760.43
Adj. R-square	0.709	0.714

\*\*p < 0.01, \*p < 0.05

# Second Stage: Within VA Medical Centers

	(1) Naïve Coef. [Std. Err.]	(2) IV Coef. [Std. Err.]	(3) Naïve Coef. [Std. Err.]	(4) IV Coef. [Std. Err.]	(5) IV Coef. [Std. Err.]
<b>Log (Visits)</b>					
Log (Primary Care Physician FTEs)	1.021 ** [ 0.010 ]	1.017 ** [ 0.010 ]	0.314 ** [ 0.021 ]	0.385 ** [ 0.023 ]	0.326 ** [ 0.022 ]
Log (Quality)			-0.059 [ 0.052 ]	-4.053 ** [ 0.192 ]	-0.776 ** [ 0.259 ]
FY (ref=13)					
14			0.042 ** [ 0.005 ]	—	0.033 ** [ 0.006 ]
15	0.101 ** [ 0.015 ]	0.089 ** [ 0.015 ]	0.142 ** [ 0.005 ]	—	0.126 ** [ 0.007 ]
Months			yes	no	yes
127 VHA Medical Center Fixed Effects	no	no	yes	yes	yes
F			980.75	874.09	982.51
Adj. R-square			0.969	0.961	0.968

\*\*p < 0.01, \*p < 0.05

- First Stage
  - Variation of employer sponsored insurance rate, number of enrollees, patient risk scores, patient age, and self-reported health status are good instruments to predict patient experience in primary care services
- Between medical center analysis
  - Return to scale → 1% increase in staff = 1% increase in output (i.e. visits)
  - 1% increase in visits would result in reduction of 1.9% reduction in patient experience. Larger VA medical centers (i.e. more number of visits) have lower patient experience.
- Within medical center analysis
  - 1% increase in physicians will result in 0.3% increase in production.
  - 1% increase in quality of care reduce the production by 0.78%.
  - Primary care patient experience are highly correlated with fiscal year

# Limitations and Next Steps



- Try alternative market factor variables as instruments
  - Falsification test?
- Production function
  - Capital is missing
  - Considering alternative workforce: nurses
  - Alternative specification and interpretation of results
- Efficiency is not explicitly included but is controlled by time (i.e. FY and months dummies)
- Only 1 dimension of quality of care, use alternative quality of care measure that is tied to clinical outcomes





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