2018 KERN ECONOMIC SUMMIT
HEALTH AND LABOR MARKETS

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HEALTHCARE EFFICIENCY

- Robert-Woods-Johnson Foundation creates county health rankings based on healthcare outcomes (population health) and factors (healthcare resources, demographics, socioeconomics).

- Out of 57 counties in California, Kern ranks:

  - 46/57 in length of life
  - 54/57 in quality of life (disease free).

HEALTHCARE EFFICIENCY

- 57/57 in health behaviors (obesity, smoking, …)
- 52/57 in healthcare resources (doctors, nurses, insurance coverage, …)
- 51/57 in socioeconomic factors (crime rate, unemployment, household income, …)
- 52/57 in physical environment (water quality, air quality)

County	HC Costs	HH Income	Obesity Rates	Actively Monitor Diabetes	No Physical Activity
KERN	9,709	49,516	30.3	80.04	23.8
Fresno	8,665	54,610	26.6	82.93	20.9
CA	7,993	56,025	24.0	82.13	17.7

HEALTHCARE EFFICIENCY

- OK, so there are some issues. BUT…

- Should we penalize a healthcare delivery system for factors that are, largely, outside of their own control?

- We can focus on how effective the healthcare system is in producing good health outcomes given their resources, and then look at how these other factors INFLUENCE healthcare effectiveness.

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HEALTHCARE EFFICIENCY

- Healthcare efficiency is how our healthcare resources (providers, treatments, facilities, spending) are turned into good health outcomes (life expectancy, infant survival).

- Gearhart and Michieka (2018), “A Comparison of the Robust Conditional Order-m Estimation and Two Stage DEA in Measuring Healthcare Efficiency Among California Counties”. *Economic Modelling*

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HEALTHCARE EFFICIENCY: How to Measure

- Equations utilized are:

$$\widehat{\lambda^{m,n}}(x_0, y_0) = sup\{\lambda > 0 \big| \widehat{S_{Y|X}}(\lambda y | X \leq x_0) > 0\}$$

$$\widehat{\lambda^{m,n}}(x_0, y_0 | z_0) = sup\{\lambda > 0 \big| \widehat{S_{Y|X,Z}}(\lambda y | X \leq x_0, Z = z_0) > 0\}$$

$$\frac{\widehat{\lambda^{m,n}}(x_0, y_0 | z_0)}{\widehat{\lambda^{m,n}}(x_0, y_0)} = \beta f(z_i) + \varepsilon_i$$

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[1] Using the original data in $\mathscr{S}_n$, compute $\widehat{\delta}_i = \widehat{\delta}(x_i, y_i|\widehat{\mathscr{P}})\ \forall\ i = 1, \ldots, n$ using (10).

[2] Use the method of maximum likelihood to obtain an estimate $\widehat{\boldsymbol{\beta}}$ of $\boldsymbol{\beta}$ as well as an estimate $\widehat{\sigma}_\varepsilon$ of σ_ε in the truncated regression of $\widehat{\delta}_i$ on $\boldsymbol{z}_i$ in (13) using the $m<n$ observations when $\widehat{\delta}_i > 1$.

[3] Loop over the next four steps ([3.1]–[3.4]) L_1 times to obtain n sets of bootstrap estimates $\mathscr{B}_i = \{\widehat{\delta}^*_{ib}\}_{b=1}^{L_1}$:

[3.1] For each $i = 1, \ldots, n$, draw ε_i from the $N(0, \widehat{\sigma}^2_\varepsilon)$distribution with left-truncation at $(1 - \boldsymbol{z}_i\widehat{\boldsymbol{\beta}})$.

[3.2] Again for each $i = 1, \ldots, n$, compute $\delta^*_i = \boldsymbol{z}_i\widehat{\boldsymbol{\beta}} + \varepsilon_i$.

[3.3] Set $\boldsymbol{x}^*_i = \boldsymbol{x}_i,\ \boldsymbol{y}^*_i = \boldsymbol{y}_i\widehat{\delta}_i/\delta^*_i$ for all $i = 1, \ldots, n$.

[3.4] Compute $\widehat{\delta}^*_i = \delta(\boldsymbol{x}_i, \boldsymbol{y}_i|\widehat{\mathscr{P}}^*)\forall i = 1, \ldots, n$, where $\widehat{\mathscr{P}}^*$ is obtained by replacing $\boldsymbol{Y}$, $\boldsymbol{X}$ in (9) with $\boldsymbol{Y}^* = [\boldsymbol{y}^*_1 \ldots \boldsymbol{y}^*_n]$, $\boldsymbol{X}^* = [\boldsymbol{x}^*_1 \ldots \boldsymbol{x}^*_n]$.

[4] For each $i = 1, \ldots, n$, compute the bias-corrected estimator $\widehat{\widehat{\delta}}_i$ defined by (19) using the bootstrap estimates in $\mathscr{B}_i$ obtained in step [3.4] and the original estimate$\widehat{\delta}_i$.

[5] Use the method of maximum likelihood to estimate the truncated regression of $\widehat{\widehat{\delta}}_i$ on $\boldsymbol{z}_i$, yielding estimates $(\widehat{\widehat{\boldsymbol{\beta}}}, \widehat{\widehat{\sigma}})$.

[6] Loop over the next three steps ([6.1]–[6.3]) L_2 times to obtain a set of bootstrap estimates $\mathscr{C} = \{(\widehat{\widehat{\boldsymbol{\beta}}}^*, \widehat{\widehat{\sigma}}^*_\varepsilon)_b\}_{b=1}^{L_2}$:

[6.1] For each $i = 1, \ldots, n$, draw ε_i from the $N(0, \widehat{\widehat{\sigma}})$ distribution with left-truncation at $(1 - \boldsymbol{z}_i\widehat{\widehat{\boldsymbol{\beta}}})$.

[6.2] Again for each $i = 1, \ldots, n$, compute$\delta^{**}_i = \boldsymbol{z}_i\widehat{\widehat{\boldsymbol{\beta}}} + \varepsilon_i$.

[6.3] Use the maximum likelihood method to estimate the truncated regression of δ^{**}_i on $\boldsymbol{z}_i$, yielding estimates $(\widehat{\widehat{\boldsymbol{\beta}}}^*, \widehat{\widehat{\sigma}}^*)$.

[7] Use the bootstrap values in $\mathscr{C}$ and the original estimates $\widehat{\widehat{\boldsymbol{\beta}}}, \widehat{\widehat{\sigma}}$ to construct estimated confidence intervals for each element of $\boldsymbol{\beta}$ and for σ_ε as described below.

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HEALTHCARE EFFICIENCY

- Or……magic.

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HEALTHCARE EFFICIENCY

- In layman's terms, we see how outside variables (obesity, smoking, unemployment, household income) impact healthcare effectiveness.

- Unconditional -> No outside measures taken into account
- Conditional -> Outside measures taken into account

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- Or…take into account population behavior, demographics, healthcare resources available to providers and patients, and our unique demographics.

- Once you do this, poor health outcomes (low life expectancy, high premature births) are nearly all explained.

HOW INEFFICIENT ARE WE?

		Conditional			
County	Uncond	Behav	Demog	HC Res	Socio
KERN	31.5%	0%	0%	0%	0.1%
Fresno	14.0%	0.15%	0%	0%	4.5%

- Kern and Fresno are ineffective at healthcare. Kern's shortcomings are explained using ALL factors.
- OR. Kern's life expectancy is about 3 years too short. However, if you take into account our behaviors, 3 years "shorter" is what we should expect.

INTERPRET THE NUMBERS

- Given our healthcare resources in Kern County:
    - If we had demographics, or socioeconomics, or health behaviors like that of Santa Barbara, county life expectancy would be 77.3 for males (currently 75.2; 78.6 CA) and 81.2 for females (currently 79.5; 83.0 CA).

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HEALTHCARE EFFICIENCY

- What matters?

- Health Behaviors: Obesity (less), Actively Treating Diabetes (more), Actively Seeking Mammograms (more)

- Demographics: Number of elderly (fewer)

- Socioeconomics: Household Income (more), Unemployment (less)

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- A downward sloping line represents more inefficiency as the variable increases.

HEALTHCARE EFFICIENCY

- It’s not the institutions in Kern County (providers, hospitals, facilities).
- It’s outside factors that need to be addressed.
- What can we do?

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HEALTHCARE. WHAT CAN WE DO?

- Reduce the costs of diabetes monitoring.
- Incentivize “healthy workplaces” and mid-day walks.
- Provide wearable exercise trackers.
- Small, micro level policies can have a large impact on healthcare outcomes.

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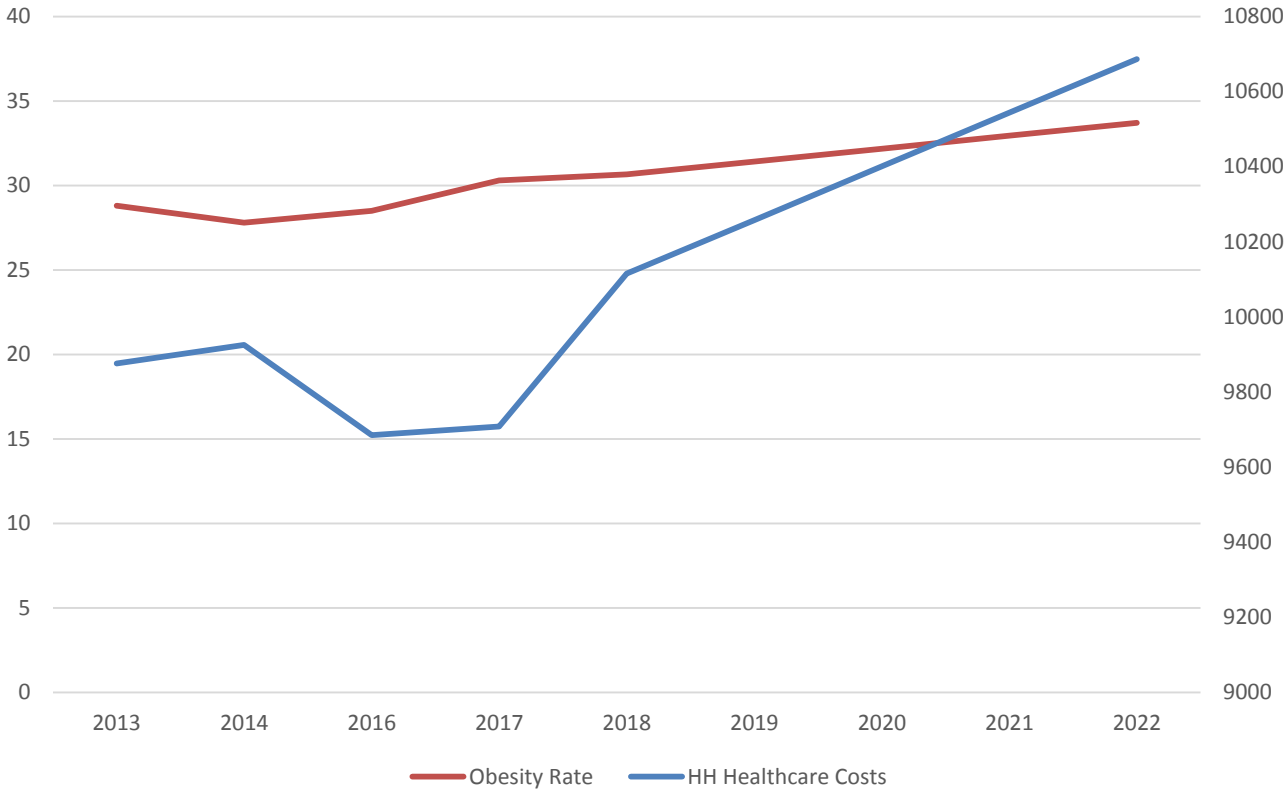
HEALTHCARE. WHY SHOULD WE CARE?

- Millenials (ages 17-35) will be MOST OBESE cohort in HISTORY.

- Nearly a 90% correlation between obesity rate and healthcare costs



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HEALTHCARE. WHY SHOULD WE CARE?

- If current trends continue, nearly 45% of Kern County residents will be obese in 2050.

- Cost of obesity annually is $3,500 higher in medical costs (about $170 in higher absentee costs).

- This imputes to $378,000,000 ADDITIONAL healthcare dollars spent in 2050 in Kern County.

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WAGE TRENDS

- Unemployment in Bakersfield (Kern County) is hitting lows not seen in nearly a decade.

  - Mojave: 13.10%
  - Bakersfield: 6.9%
  - Tehachapi: 5.9%
  - Arvin: 9.10%
  - California City: 16.4%
  - Frazier Park: 6.6%

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WAGE TRENDS

- At national level, we are reaching our NATURAL RATE OF UNEMPLOYMENT (remember your Principles of Macroeconomics class!).

    - HINT: This is the level of "full employment", where unemployment is largely frictional (temporarily out of work while looking for a new job, or waiting to take a new job) or structural (economy or technology perhaps phasing out some sector).

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WAGE TRENDS

- We may be reaching our natural rate of unemployment here in Kern County.

- What does this mean? Policies meant to spur employment only lead to inflation.

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WAGE TRENDS

- Importantly, with a large surplus of unemployed workers, firms have a large pool of laborers willing to work.

- When unemployment is low, firms have to poach employees from other businesses (or from out of the labor force).

    - Best ways to do this are through improved wages or non-wage benefits.

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WAGE TRENDS

- At natural rate of unemployment, we should start to see large wage increases, relative to the past.

- Limitation: Wages do not equal income. Income is wages plus benefits (other than males, most people value health insurance benefits; a $1 of health insurance coverage is worth close to a $1 of wages; again, except for males).

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WAGE TRENDS

Occupation	2002	2016	2017
Accountants	$23.84	$30.22	$30.17
Construction / Extractions Supervisors	$25.75	$30.80	$31.78
Farm Supervisors	$12.19	$19.01	18.89
RN’s	$27.56	$40.89	$42.74
Total (All)	$12.28	$16.68	$16.85

WAGE TRENDS

- For all occupations, we can impute a median annual income (working 40 hours per week) in 2017 of $33,700 per year.
    - Median working family (working 60 hours per week) would make $50,550 (actual number was $49,516).

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WAGE TRENDS

- Wages track VERY closely with labor supply and labor demand.
    - Except, of course, for many oil- and ag-related occupations, where it tracks other factors (oil prices, water availability, …).
        - In Kern County, 85% (74%; 82%) of wage increases explained by increased employment for accountants (nurses; all).

WAGE FORECAST

Occupation	2017	2019	2021	2022	% Change ('17 to '21)
RN's	$42.58	$46.14	$48.19	$49.22	15.6%
Construction / Extraction Supervisors	$31.78	$34.27	$35.11	$35.53	11.8%
Total (All)	$16.85	$17.84	$18.45	$18.76	11.3%

- We should expect to see large wage increases early that taper off.

WAGE TRENDS

- By 2022, the median wage should increase annual income by nearly $4,000 per FT working person.

- This means that households that work 60 hours per week should see family income increases of slightly under $6,000 per year.

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INCREASED WAGES?

- What do increased wages mean?
- Average household had $15,654 in credit card debt in America in 2017.
- Average household spends $12,428 on groceries per year.
    - Optimistically, can afford $25,000 more in home (very optimistically).

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