Forecasting Health Workforce Supply: From the Survey to the Models

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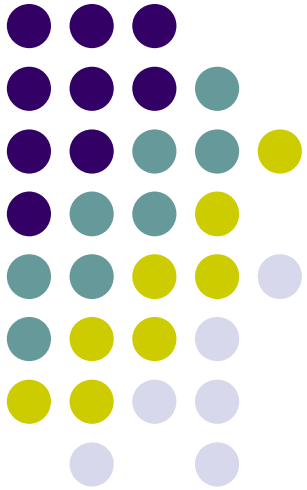

Why do we forecast the health workforce?

- To understand whether perceived shortages are real
- To learn whether a shortage is likely to persist
- To guide policy to educate and retain health workers

This presentation will…

- Discuss strategies for forecasting workforce supply and demand
- Present an example for RNs in California
- What next?

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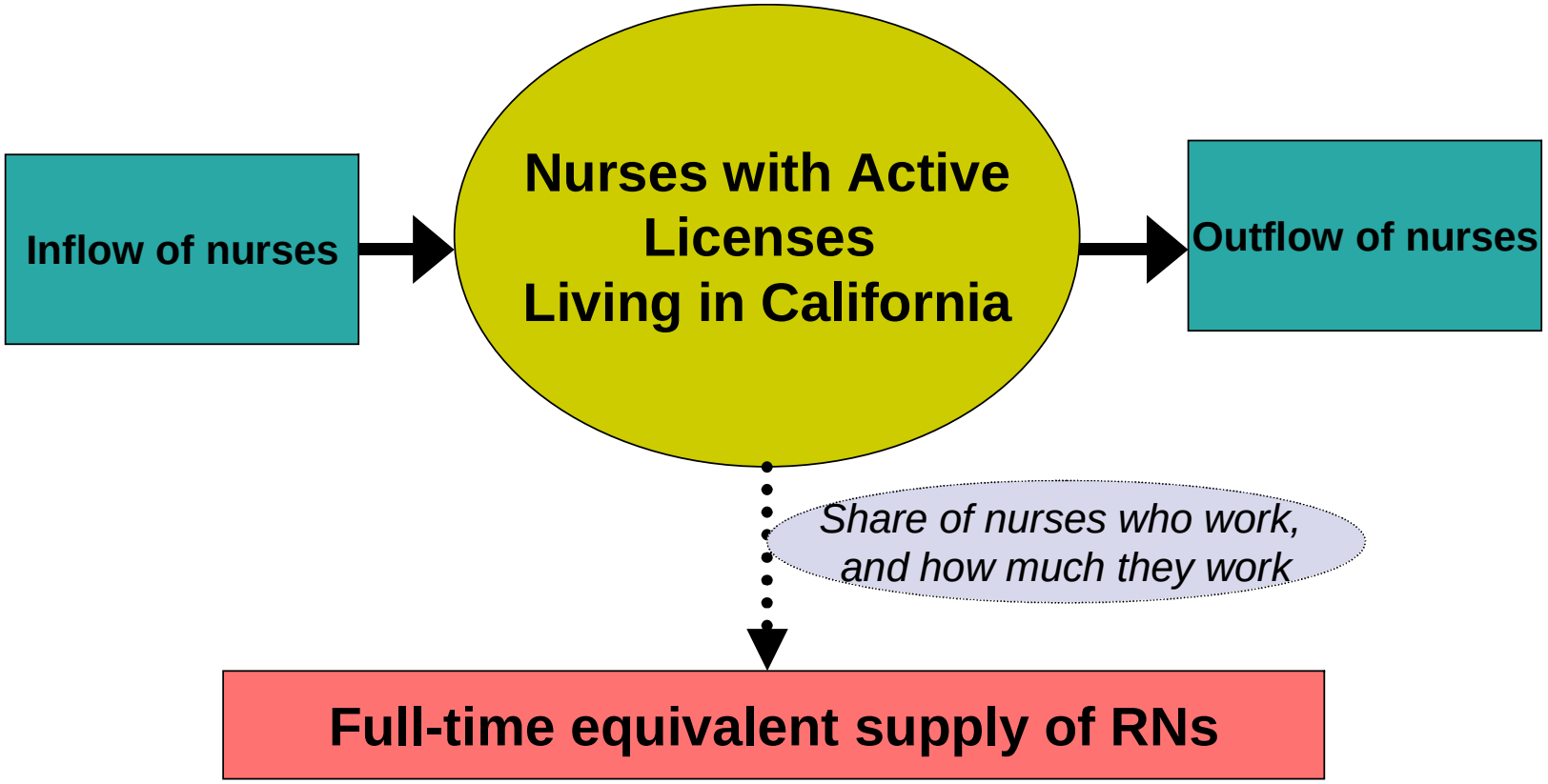
Forecasting supply is simple (mostly)

- Stock-and-flow models



What goes in the flow boxes?

- *Inflows*
  - New graduates from U.S. nursing programs
  - Graduates of international nursing programs who immigrate
  - Movements from inactive to active license status
- *Outflows*
  - Movements from active to inactive/expired license status
    - Death
    - Retirement
    - Emigration to another nation

Be careful about labor force participation data!

- Ideal: total hours worked in nursing jobs per year
- Reality:
  - 2004 NSSRN: Weeks per year and hours last week in primary job
    - Categories of hours per year for secondary jobs
  - 2000 NSSRN: weeks per year, hours last week in primary job
    - Hours per week and weeks per year in other jobs

A more complex supply approach

- Multivariate regression
  - $Supply_{t+1}$ = f($Supply_t$, demographics, graduations, wages? Federal immigration policy? Stock market performance?)
  - There are many endogenous factors
    - Wages is the most important
    - New graduations (also affected by wages)

- Most forecasts do not use this strategy

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Demand forecast method 1: Worker-to-population ratios

- Example: Our state should match the national average of 825 RNs per 100,000
- Benefits
  - Easy to calculate
  - Simple to explain to the public
- Drawbacks
  - Does not control for differences across states/regions
  - Does not change with population aging
  - Does not assess whether the benchmark is adequate

Demand forecast method 2: Historical staffing method

- Example: California forecasts (2005) used hospital data to compute RN hours worked per patient day in 2004
  - Patient days per 1000 population were computed for each age group using discharge data
  - Future patient days were forecasted based on age group population changes
  - Demand for nurses was forecasted by multiplying forecasted patient days by RN hours per patient day
  - Adjust to full nursing demand by assuming hospital employment will continue to be 60% of all RN demand

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Demand forecast method 2: Historical staffing method

- Benefits
  - Relatively easy to compute
  - Adjusts for aging of the population
  - Reflects true utilization of nurses, not just wishful thinking
- Drawbacks
  - Harder to explain
  - Is historical staffing adequate?
  - Does not include settings for which you don't have data – need to fudge for this

Demand forecast method 3: Budgeted vacancies method

- Example: California forecasts (2005) used budgeted positions from a hospital survey to compute demand for RNs per patient day
  - Patient days per 1000 population were computed for each age group
  - Patient days were forecasted based on age group population changes
  - Demand for nurses was forecasted by multiplying forecasted patient days by RNs budgeted per patient day
  - Adjust to full nursing demand by assuming hospital employment will continue to be 60% of all RN demand

Demand forecast method 3: Budgeted positions method

- Benefits
  - Relatively easy to compute
  - Allows demand for services to change with population aging
  - Reflects demand for nurses (including unfilled need)
- Drawbacks
  - Harder to explain
  - Requires data on budgeted vacancies or budgeted positions
  - Is demand truly reflective of need?
  - Does not include settings for which you don't have data – need to fudge for this

Demand forecast method 4: Multivariate method

- Example: Bureau of Health Professions RN models
  - Estimate demand for health services in 12 sectors
  - Estimate demand for RNs based on demand for services
- Benefits
  - Considers factors that affect demand, such as population demographics, health policy
  - Can develop simulations based on changes in factors
- Drawbacks
  - Try explaining this to a politician or policymaker!
  - Difficult to follow the methodology and replicate
  - Overly complex: couldn't we do a reduced-form model?
  - Demand is not the same thing as need

Demand forecast method 5: True need for services method

- No example: Estimate what the true need for health services will be, and then derive health worker demand
- Benefits
  - Encourages vision of ideal health services system
  - Allows for creative strategies for meeting population needs
- Drawbacks
  - Full of value judgments
  - Challenges historical precedent, power positions
  - Extremely hard to do in a convincing way

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California wanted forecasts in 2005

- Statewide surveys of RNs since 1990
  - 1990, 1993, 1997, 2004
- National forecasts were out-of-date (from 2000)
- National forecasts did not seem to predict California's situation well

California had extensive supply data from their surveys

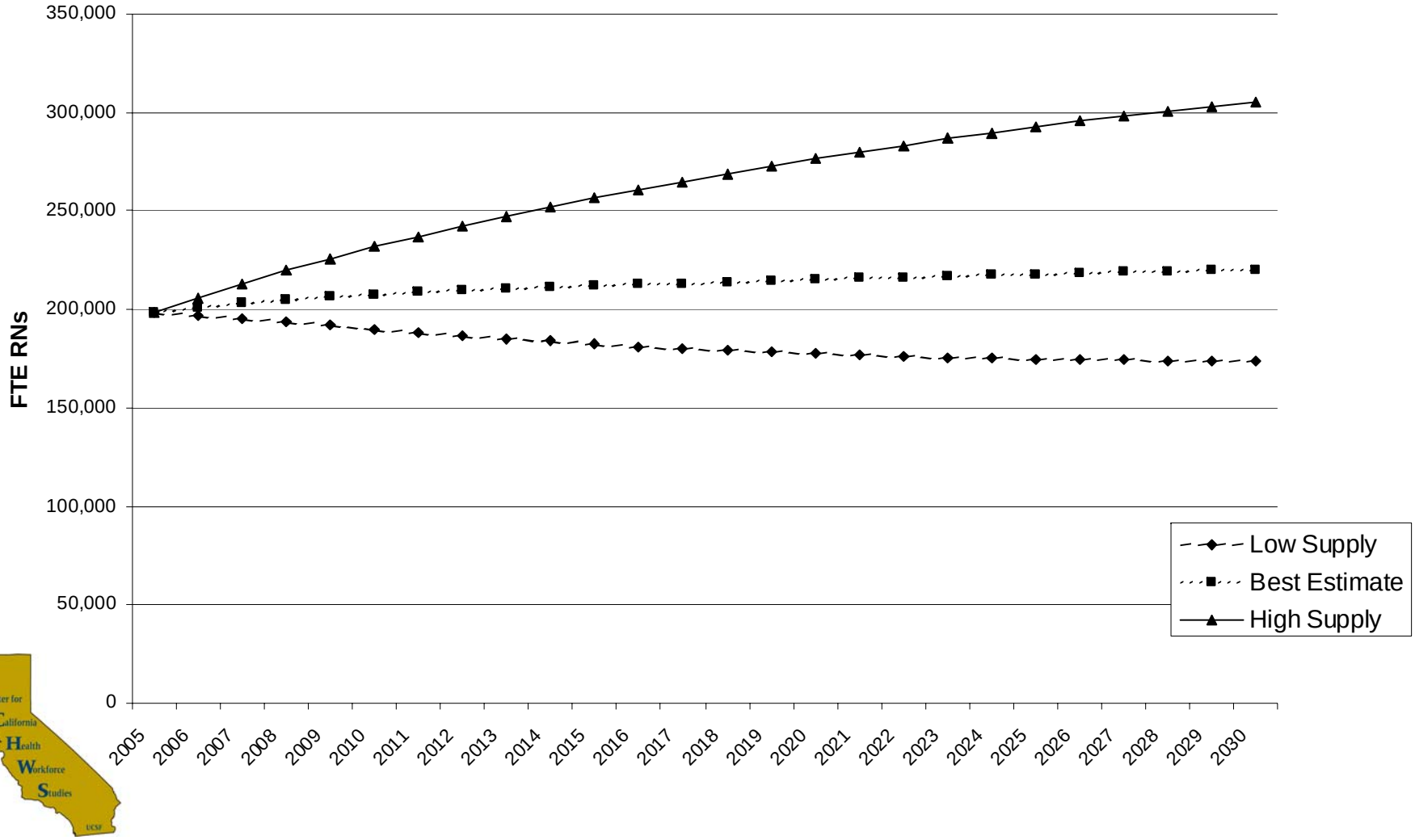
- 5,168 respondents with active licenses in 2004 survey (4,575 in-state residents)
  - 5,066 respondents from 2006 survey
- Data on:
  - Age, gender, marital status, children, etc.
  - Education, year of graduation
  - Employment status, hours per week
  - Out of state nurse work in California
    - Estimate supply of traveling nurses

Additional supply data obtained from BRN

- Number of nurses per county, by age group
- Number of foreign-educated nurses receiving licenses in CA, by age group
- Number of endorsements in and out of CA, by age group
- Conversion to inactive/active license status

Supply forecast ranges were offered

Figure 3: Low, High, and Best Estimates of FTE RN Supply, 2005-2030



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How to forecast demand?

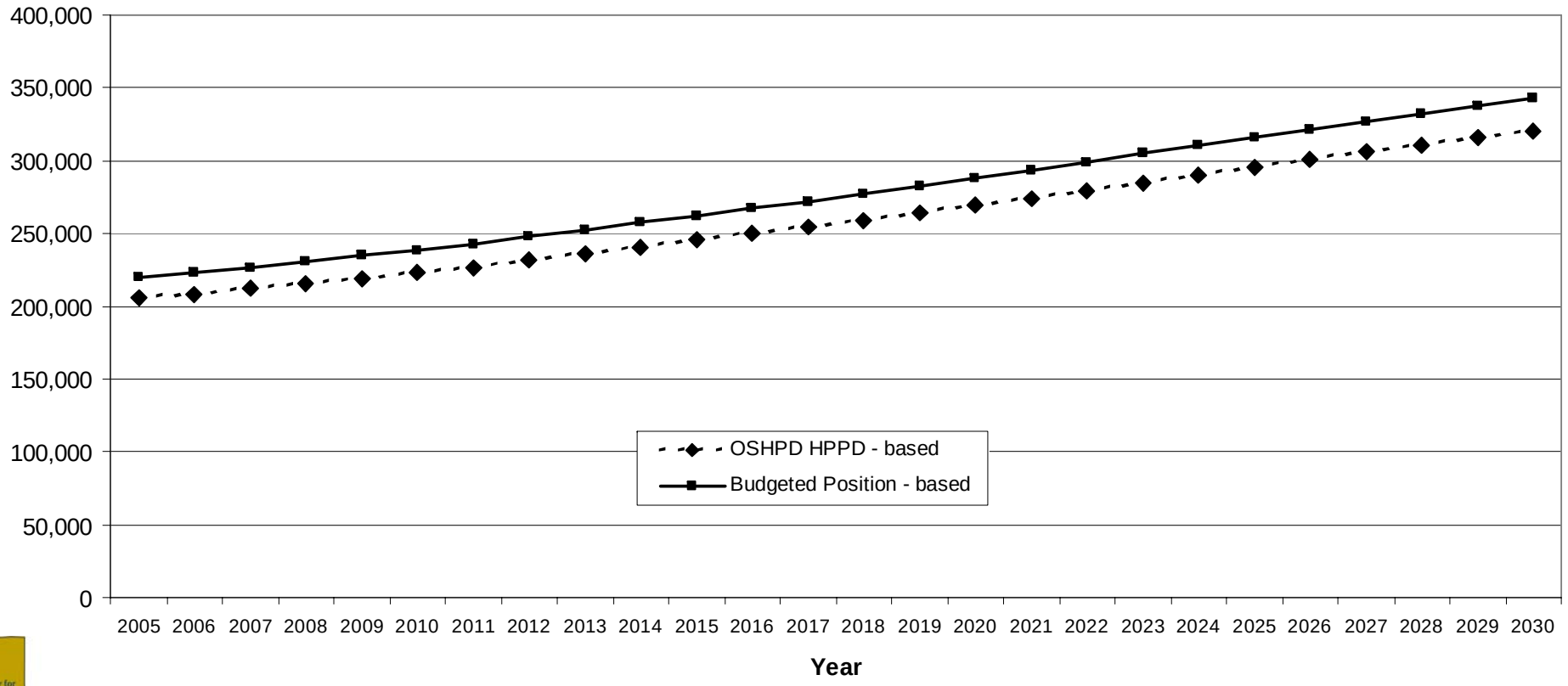
- Advocacy groups in California focus on RNs per capita
  - Target is related to national average
- Demand-based models are based in economic theory
  - Forecast based on hospital RN hours per patient day
  - Forecast based on hospital budgeted positions per patient day

Data sources for demand models

- California Department of Finance
  - Demographic forecasts
- Office of Statewide Health Planning and Development
  - Patient discharge data: patient days by age group
  - Annual hospital data: RN hours per patient day
- Hospital Association of Southern CA/ California Institute on Nursing and Health Care
  - Survey with data on budgeted FTEs (50% response rate)

Forecast strategies gave different results

Figure 5. Demand Forecasts of Full-time Equivalent Registered Nurses in California, 2005-2030



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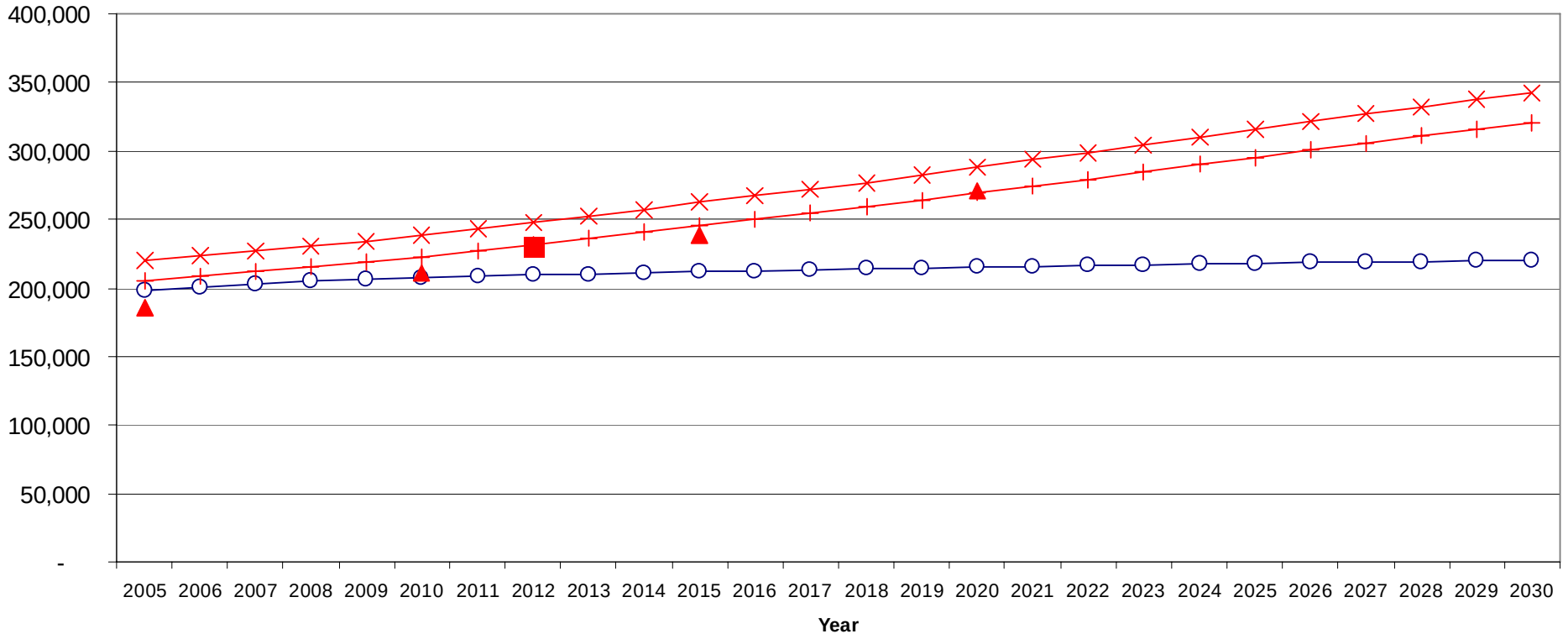
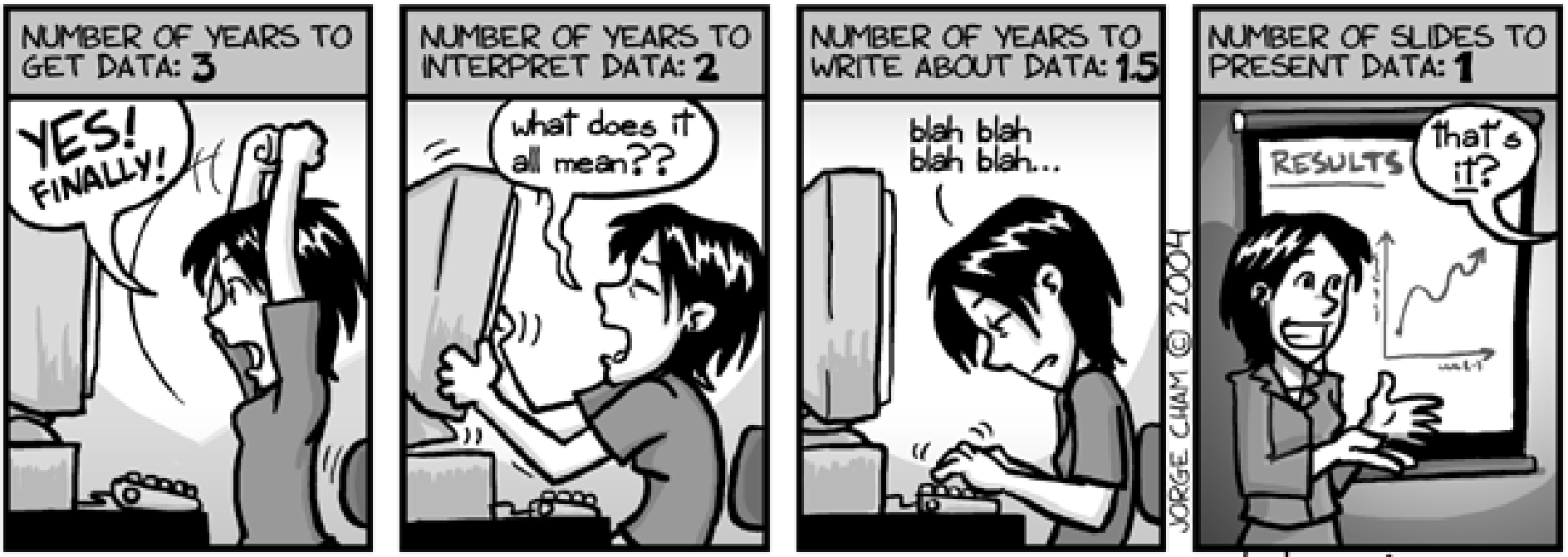
Put it all together and…

Figure 6. Projected Shortage of Registered Nurses (FTEs) in California, 2005-2030



DATA: BY THE NUMBERS



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Other publications

- Excel workbook in which people could modify supply assumptions (inflow/outflow)
- Regional forecasts

Forecasting Excel tool

Data Inputs

The user of this tool can enter their own parameters for the model. Scroll down this page to make your choices.

The user can change any items that are highlighted green.

Sources of New Nurses

New Graduates of U.S. Nursing Programs Who Obtain First RN License in California

	Actual	Best Estimate	Your choice
TOTAL	6,895	6,895	7,500

(Source: California Board of Registered Nursing 2004 Annual School Report. The number of new California graduates in fiscal year 2003/2004 was 6,158. The California Board of Registered Nursing also provided 2003/2004 data on the number of new graduates f

Age distribution of new graduates

	Actual	Best Estimate	Your choice
Under 30	42.6%	42.6%	45.0%
30-34	17.0%	17.0%	18.0%
35-39	17.0%	17.0%	18.0%
40-44	10.6%	10.6%	10.0%
45-49	8.5%	8.5%	9.0%
50-54	4.3%	4.3%	0.0%
55-59	0.0%	0.0%	0.0%
60-64	0.0%	0.0%	0.0%
Over 64	0.0%	0.0%	0.0%

(Source: Age distribution calculated from graduates of California nursing programs in 2003, from the California Board of Registered Nursing 2004 Survey of RNs)

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This presentation will…

- Discuss strategies for forecasting workforce supply and demand
- Identify data required for each forecasting strategy
- Present an example for RNs in California
- What next?

Forecasting methods are weak

- None of the demand methods are very satisfactory
  - “Per capita” approach is too crude
  - Market demand approaches aren’t normative
  - Health needs approaches are too difficult and subjective
- At least we can do supply pretty well
  - But supply changes with wages – how do we “close the loop” of the model?

Knowledge and politics get in the way

- Very few people used the forecasting tool
  - Most users asked me to do it for them
  - Legislative Analyst Office modified and extended it
- People did not like having two demand forecasts
- People did not understand the demand forecasts
  - Nursing advocacy group continues to push RNs per 100,000, and they have influence in the Governor's office
  - California's BRN wants the 2007 demand forecast to by RNs per 100,000
- Unions (sort-of) claimed the forecasts were erroneous

What next?

- Transparency in forecasting methods has high value
- BHPr forecasts are extremely influential
  - But the 2002 model didn't perform well for some states
- A normative demand model would be wonderful
- Analyses should not focus on one workforce group in isolation

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