Forecasting the Nursing Shortage in California

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Goals of this project

- Forecast the supply of nurses
- Forecast the demand for nurses
- Compare the supply to projected demand

- Based on the projected shortage/surplus, we can…
  - Understand the short-term and long-term needs for nurses in California
  - Identify strategies to address future shortages

Changes to the model

- New data
  - Numbers of RNs
  - Employment patterns (2006 survey)
  - Graduations
  - Etc.
- Additional age groups added
  - 65-69, 70-74, 75-79, 80+
- Number of graduates from California RN programs can change
  - Year-to-year changes through 2010
  - Fixed rate of growth after 2010

Changes to the model

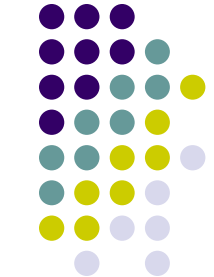
- Separate parameters for transitions from inactive to active, and lapsed to active license
- Inter-state migration is a rate based on the population of RNs
  - Previous model assumed that 5,224 RNs would move to California from other states per year
  - New model assumes that the number of RNs who move to California is a percentage of the estimated national RN workforce

What do these changes mean?

- Graduations have risen
- National RN workforce is growing, so inter-state migration will rise
- Changing employment of RNs near retirement age addressed properly

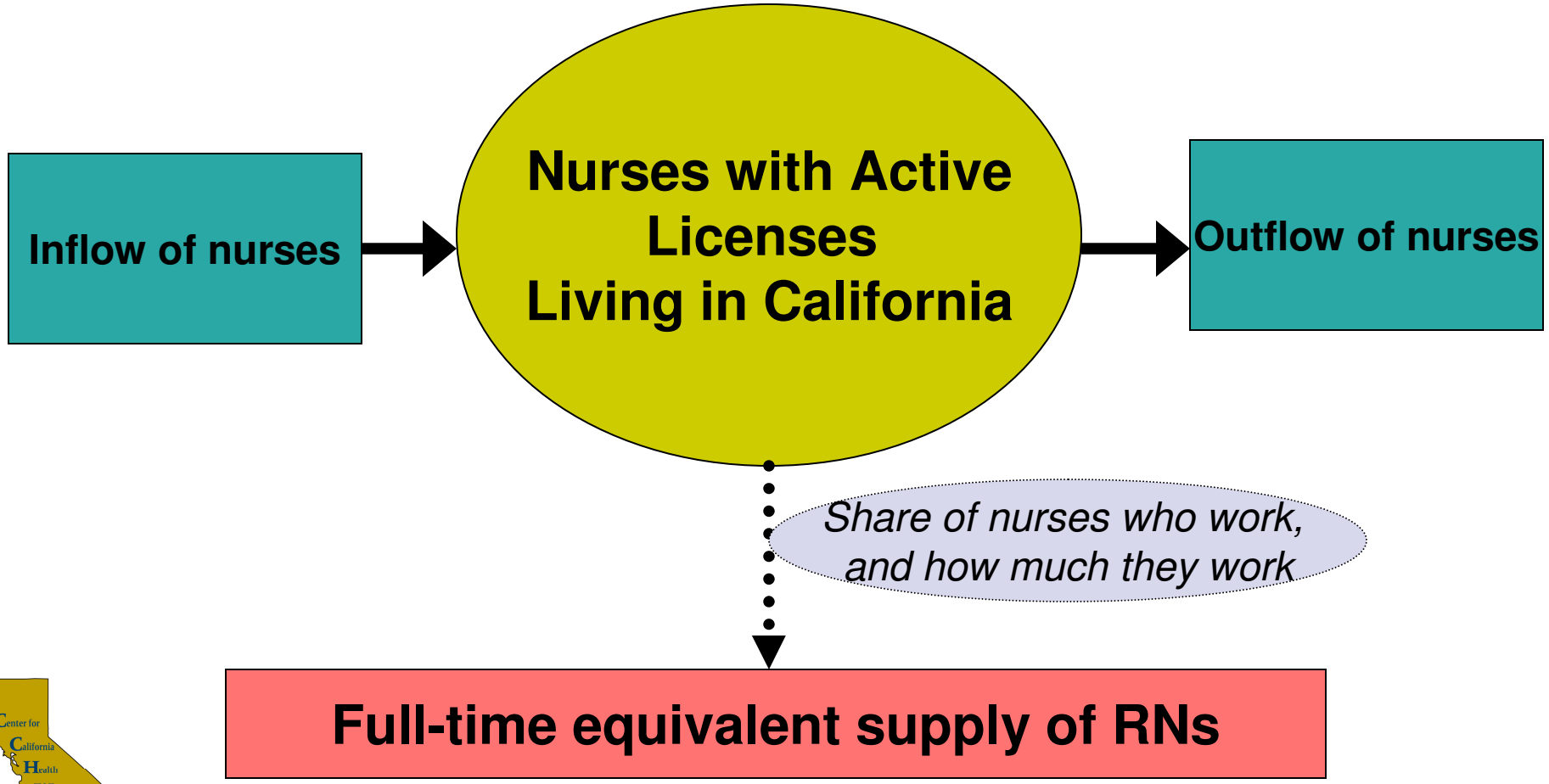
➔ Overall increase in projected supply

Basic structure of the model



- Supply: Stock-and-flow model
- Demand: Focus on RNs per capita, compared with national benchmarks

A model of the supply of RNs



Nurses with active licenses

- Number of nurses with active licenses and California addresses in 2007 provided by BRN
- 5-year age groups provided by BRN

Inflows of RNs

- Graduations from California nursing programs
- Immigration from other countries
- Migration from other states
- Transition from inactive license
- Transition from lapsed license

Graduations from California nursing programs

Survey year	Number of enrollments	Number of graduations
2001-2002	6,422	5,346
2002-2003	7,457	5,623
2003-2004	7,825	6,158
2004-2005	8,926	6,677
2005-2006	11,131	7,528
2006-2007		***8,332***
2007-2008		***10,391***

Estimates for 2006-07 and 2007-08 are 93.3% of the enrollments two years earlier. 2008-09 estimate is 15% growth; after that growth is 1% in "best" model.

Outflows of nurses

- Migration to other states
- Transition to inactive or lapsed license

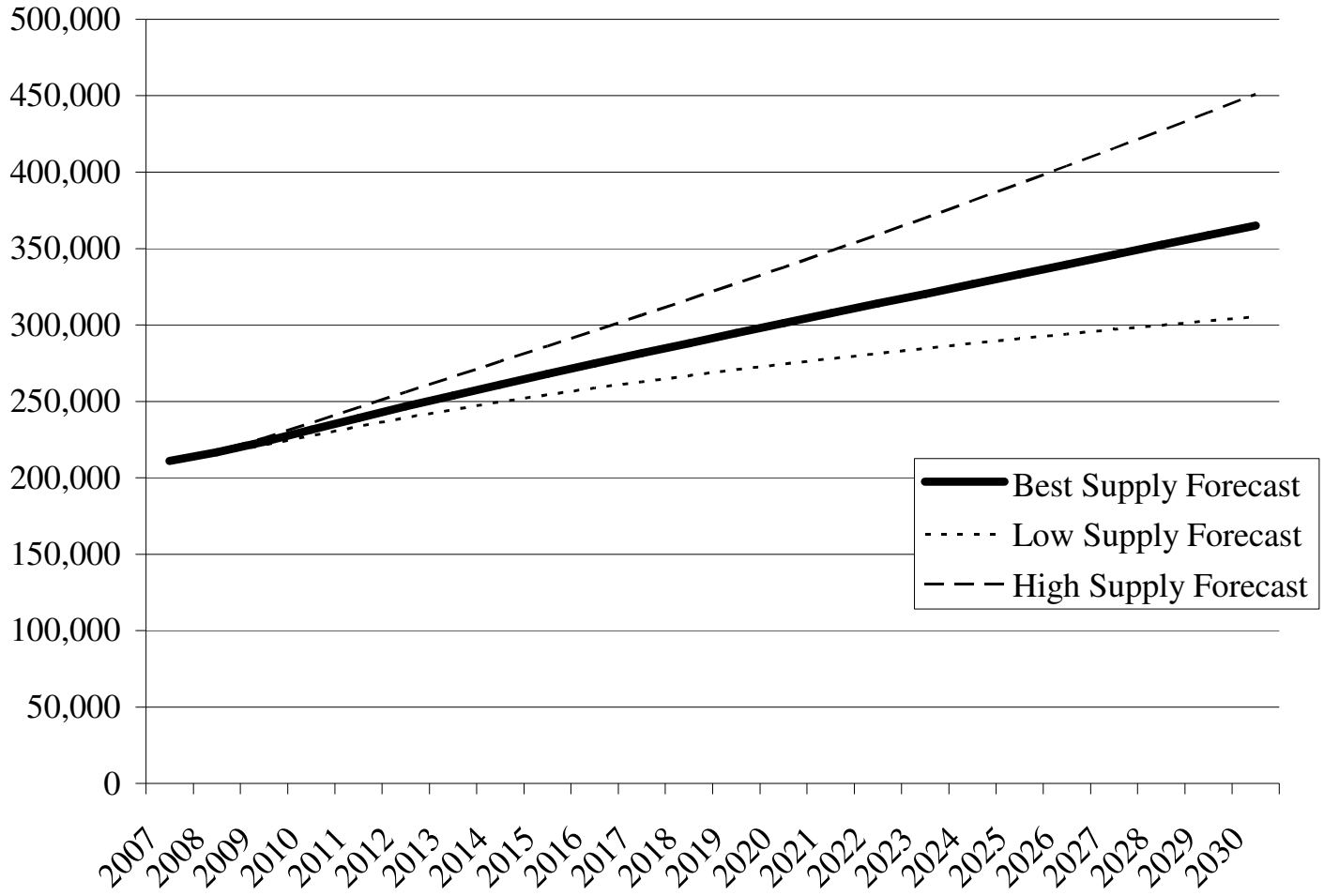
How does the supply forecast work?

- The supply of actively licensed RNs next year for an age group will equal….
  - 4/5 of the nurses in the age group (1/5 will "age up" to the next group)
  - 1/5 of the nurses from the younger age group
  - Inflow of nurses in the age group
  - Outflow of nurses in the age group
- Multiply the number of actively licensed RNs by the labor-force participation data to get **Full-Time Equivalent Supply**

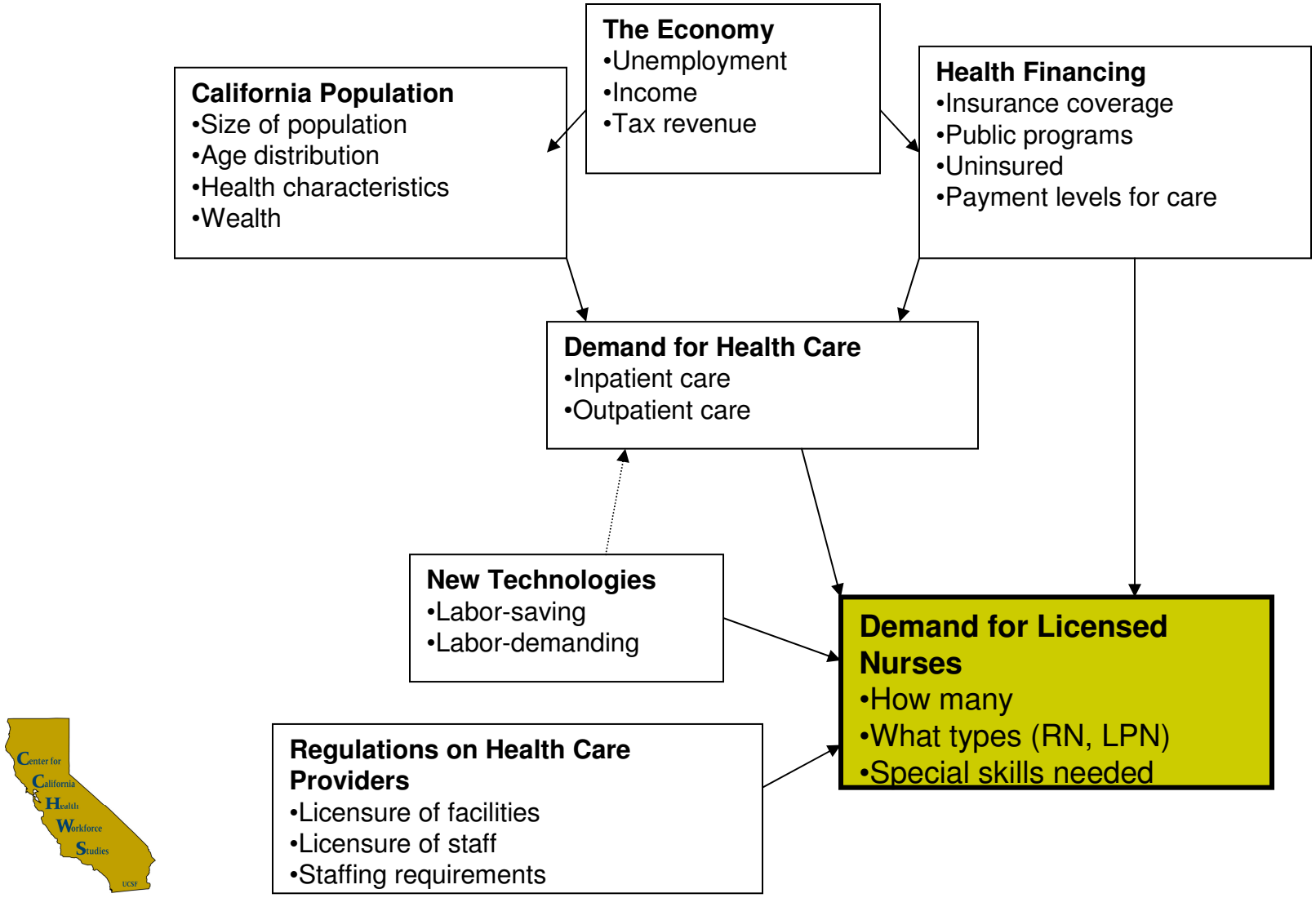
Employment of RNs, 2006

age group	% who work	hours/ week
<30	96.2%	36.9
30-34	93.3%	35.4
35-39	93.2%	35.4
40-44	90.8%	35.9
45-49	90.9%	35.2
50-54	90.9%	36.5
55-59	84.6%	36.2
60-64	72.7%	35.2
65-69	57.1%	29.0
70-74	41.2%	26.6
75-79	26.4%	11.4
80+	67.1%	9.9

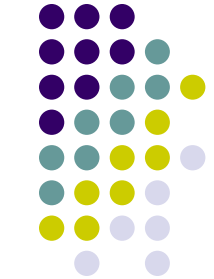
The range of supply forecasts



A model of the demand for RNs



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

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

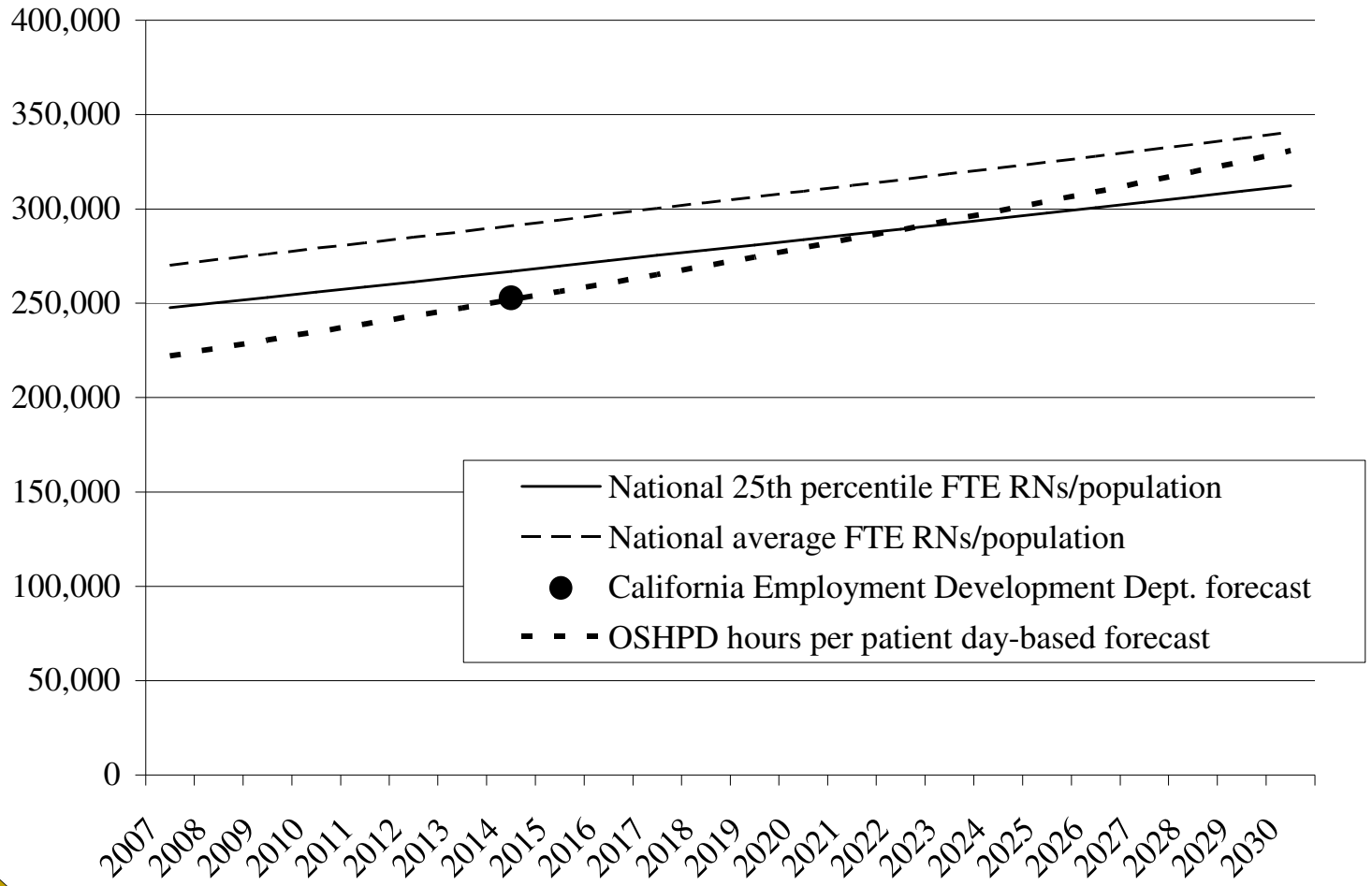
Forecasting methods are weak

- None of the demand methods are very satisfactory
  - "Per capita" approach might not reflect "demand"
  - Market demand approaches don't reflect "need"
  - Health needs approaches are 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?

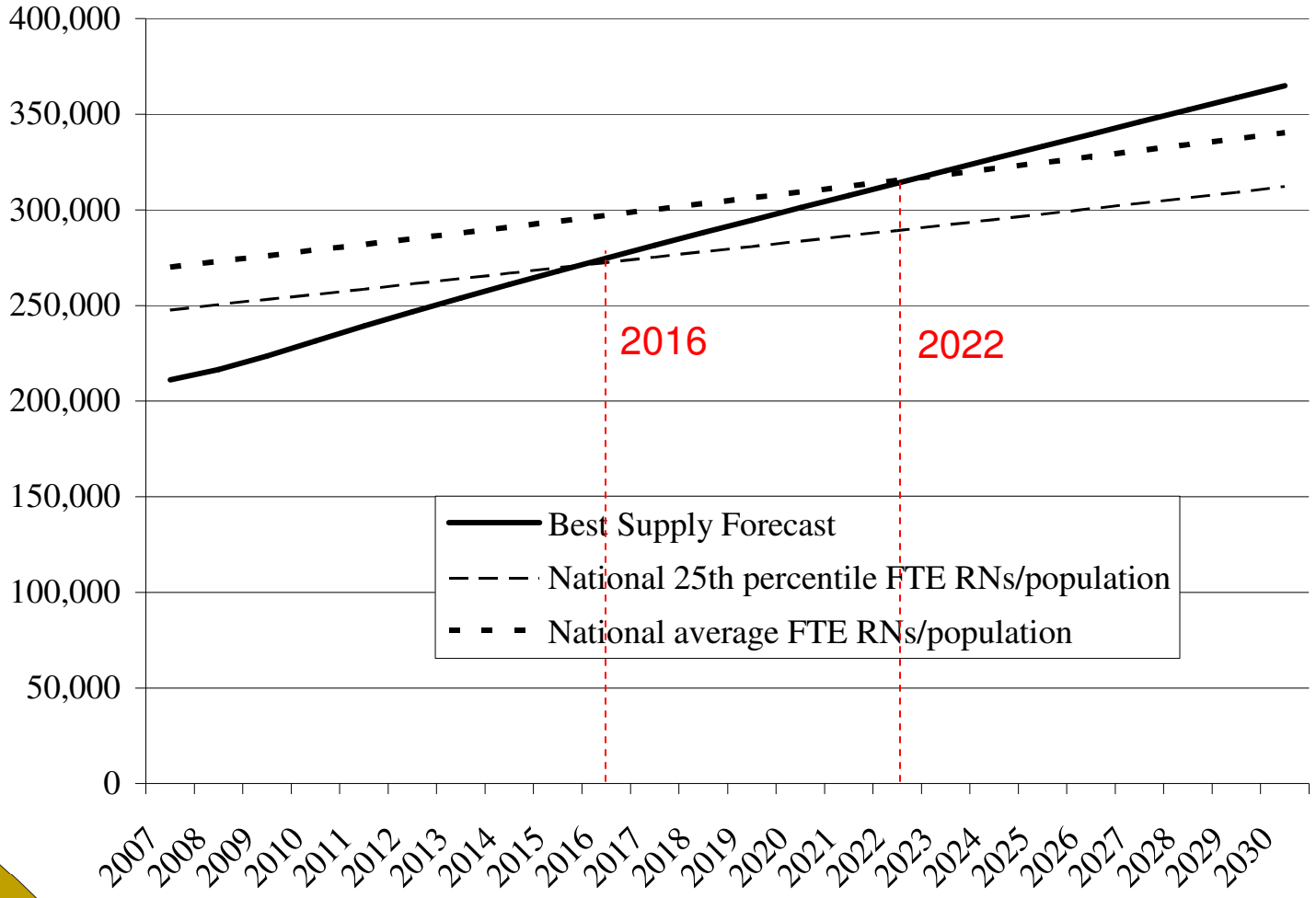
For the 2007 forecasts…

- National benchmarks: Employed RNs per 100,000
  - California is ranked 50th, 589 per 100,000
  - 25th percentile: 756.5 per 100,000
  - National average: 825 per 100,000
- Bureau of Labor Statistics, forecast of 2014 demand
  - 252,912 FTEs
- RNs per patient day, 2005-2006 fiscal year

Forecasts of RN demand



Best supply and demand forecasts for RNs, 2007-2030



Implications for policy

- We are on a trajectory to end the shortage ***if***
  - Key variables remain constant
  - Expanded educational capacity is sustained
  - Migration rates from other states do not drop
  - RNs-per-100,000 properly predict demand
- The good news: nursing leaders, policymakers, and students deserve kudos for expanding programs and opportunities, and taking those opportunities
- The concern: we cannot abate our efforts to address the nurse shortage

Making this regional

- Northern (N Sac Valley, north coast, way up north)
- Sacramento metro
- San Francisco Bay Area
- San Joaquin Valley/Sierra
- Central Coast
- Los Angeles
- Inland Empire
- Southern Border

What's different in the regional models?

- Inter-regional migration estimated from IRS data on county-to-county movements
- Demand forecasts based on budgeted RN-hours-per-patient day

WARNING: THESE ARE FROM THE OLD DATA!

Figure 3: RN Supply & Demand Forecasts for Northern California Region

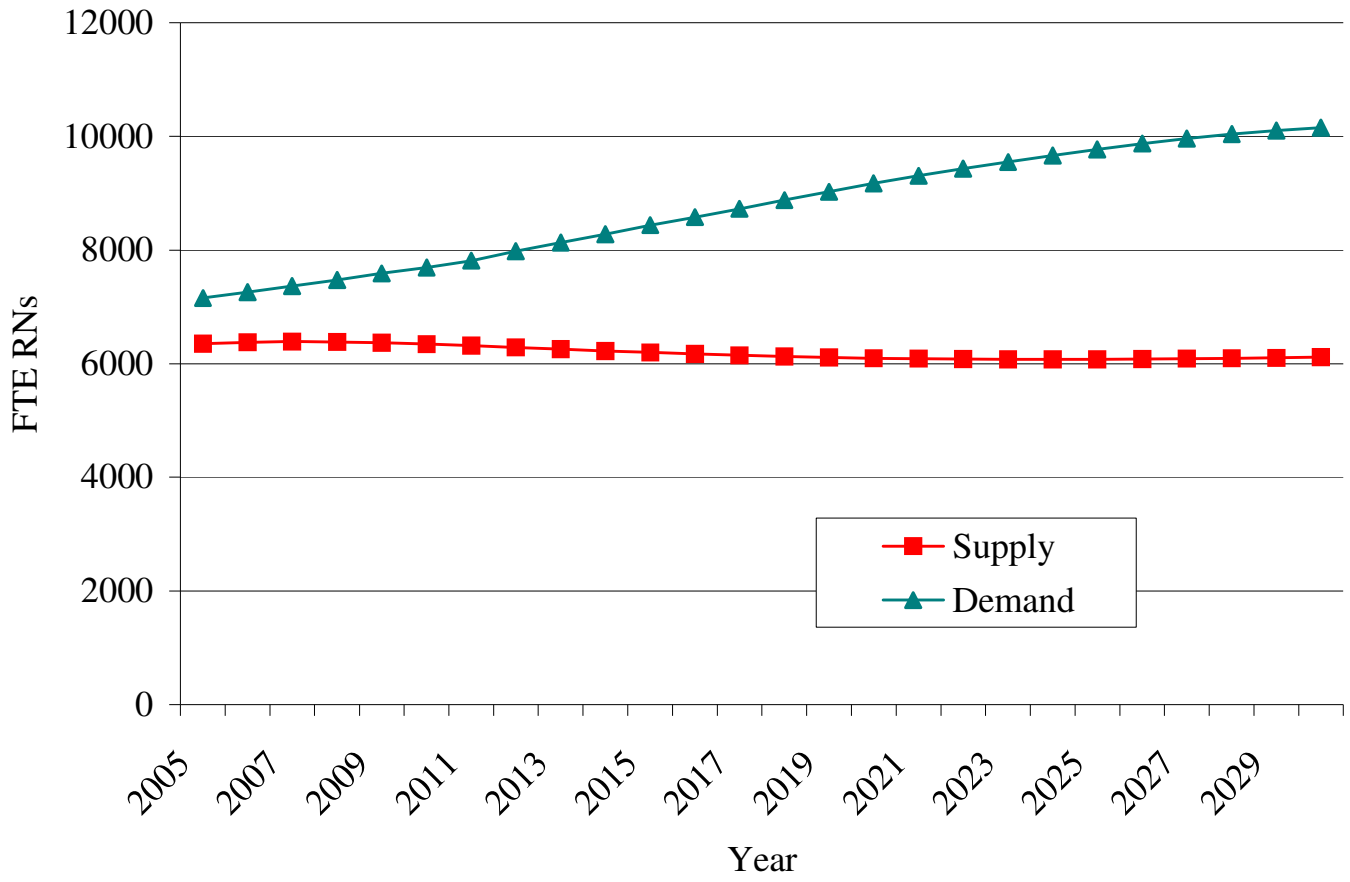


Figure 4: RN Supply & Demand Forecasts for Sacramento Region

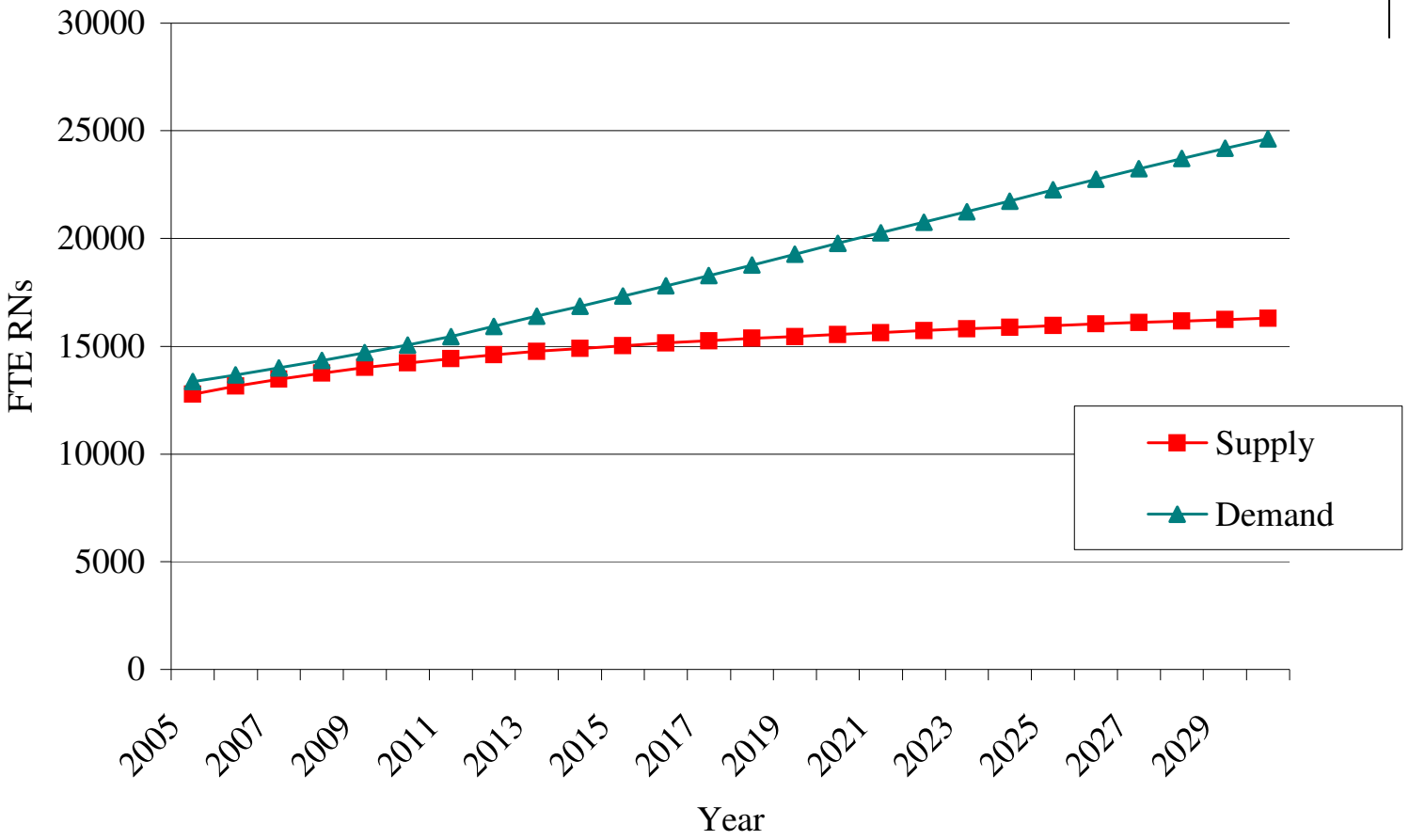


Figure 5: RN Supply & Demand Forecasts for San Francisco Bay Region

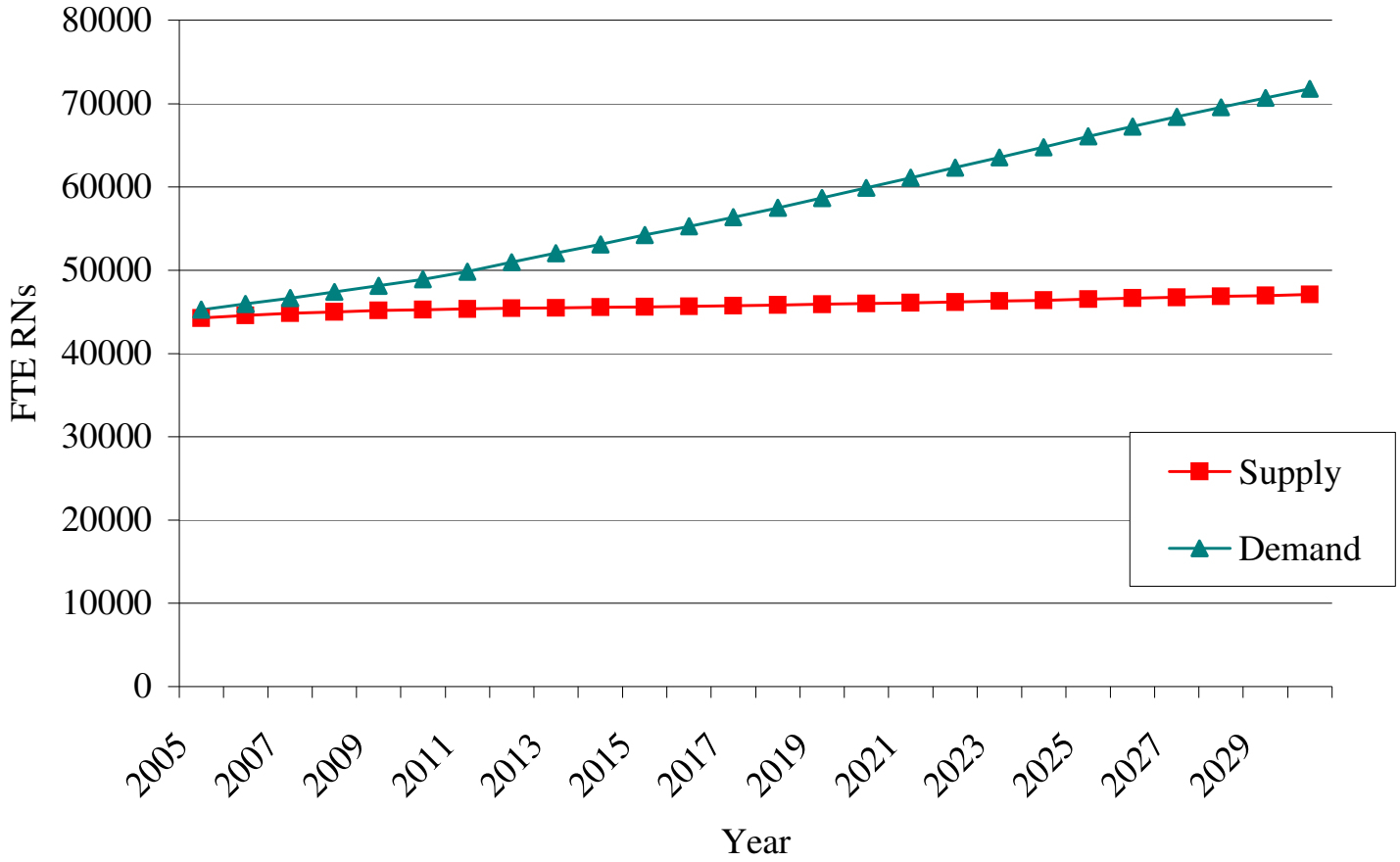


Figure 6: RN Supply & Demand Forecasts for Central Valley & Central Sierra Region

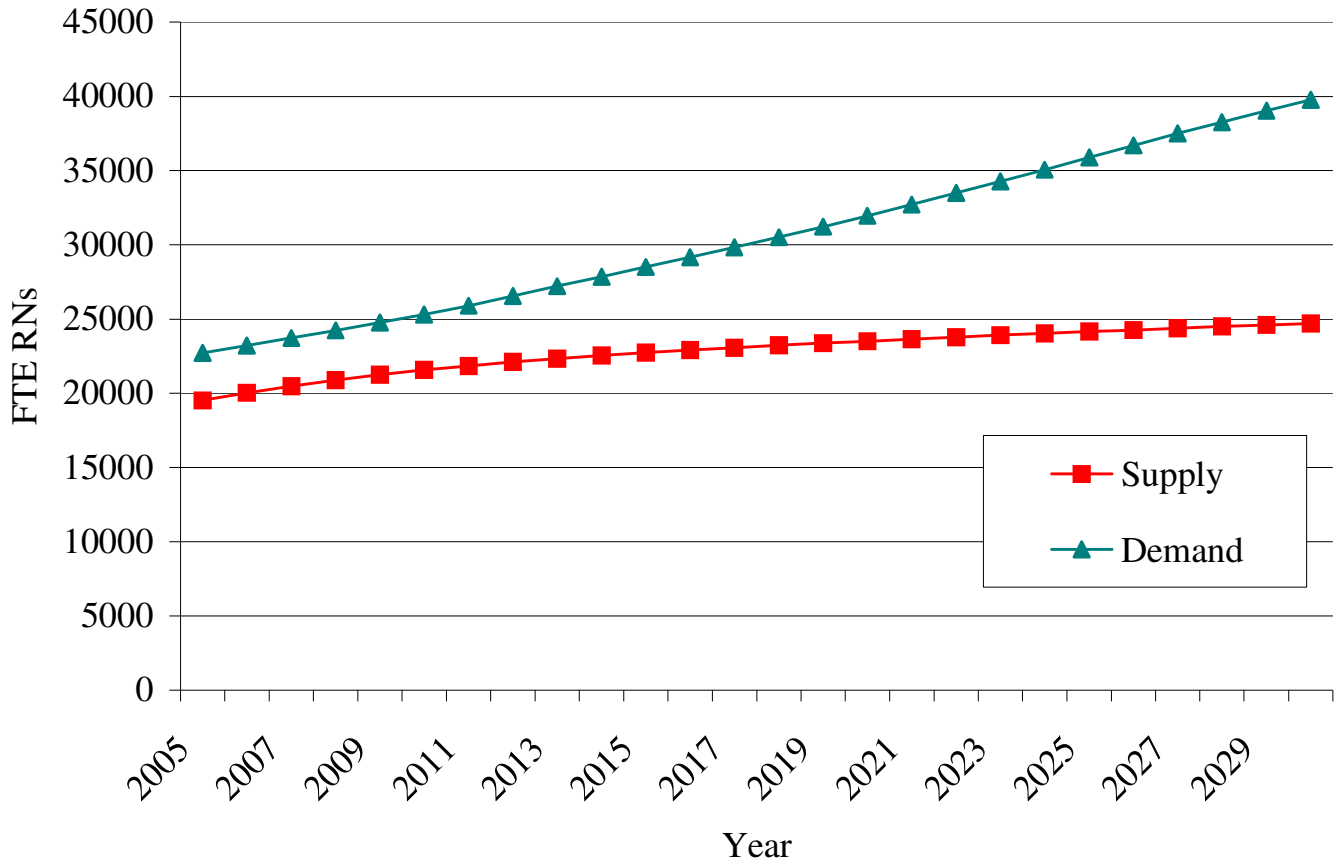


Figure 7: RN Supply & Demand Forecasts for Central Coast Region

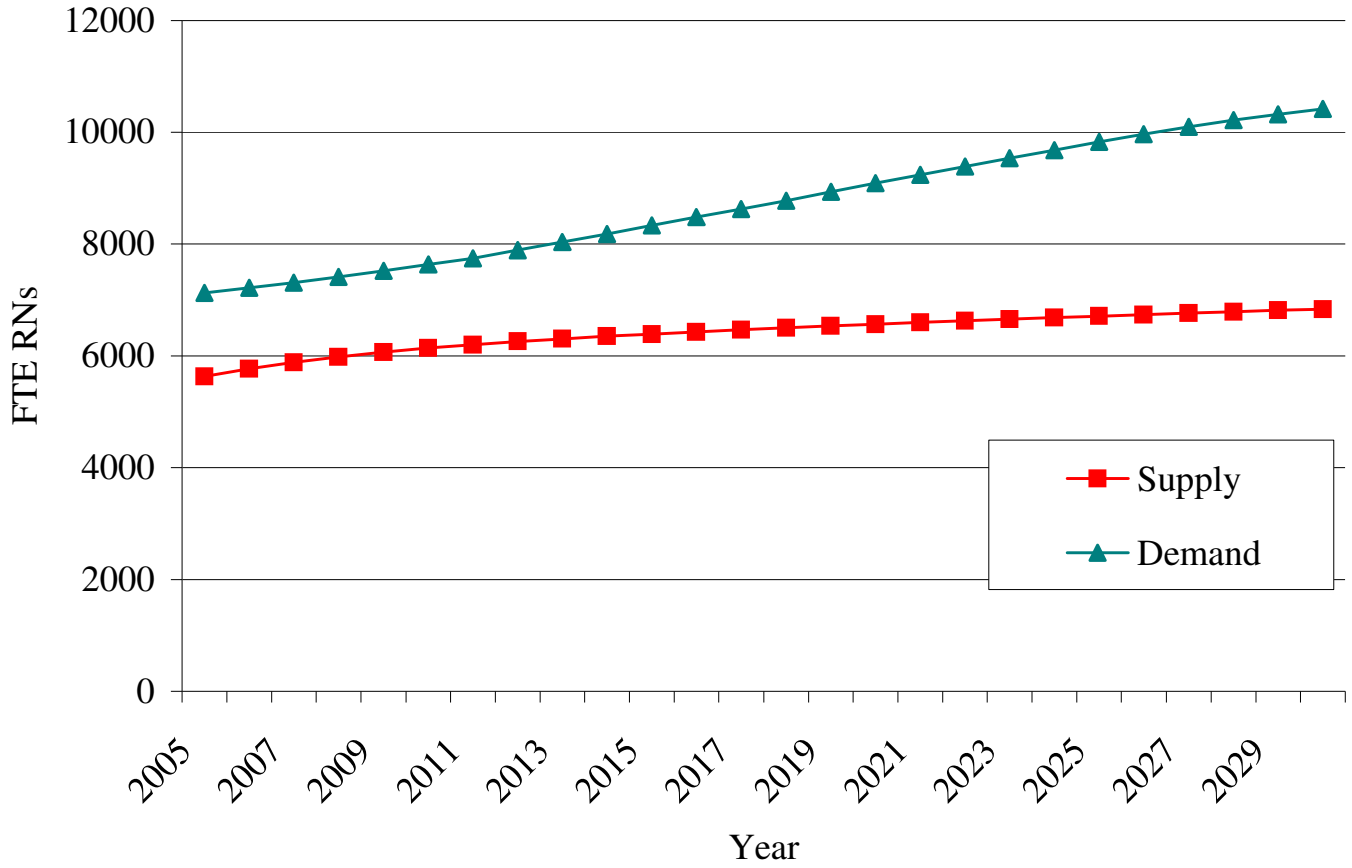


Figure 8: RN Supply & Demand Forecasts for Los Angeles Region

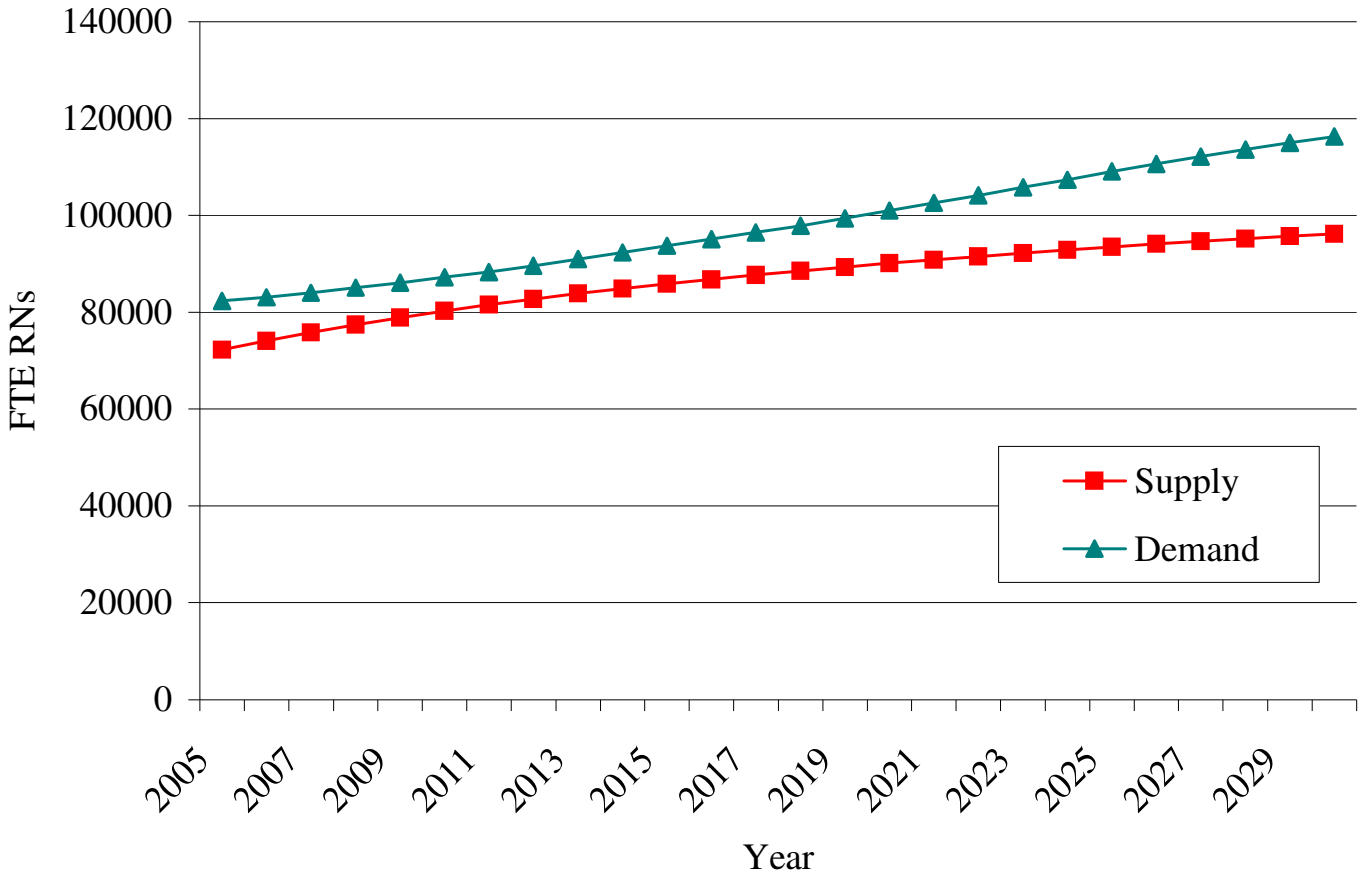


Figure 9: RN Supply & Demand Forecasts for Inland Empire Region

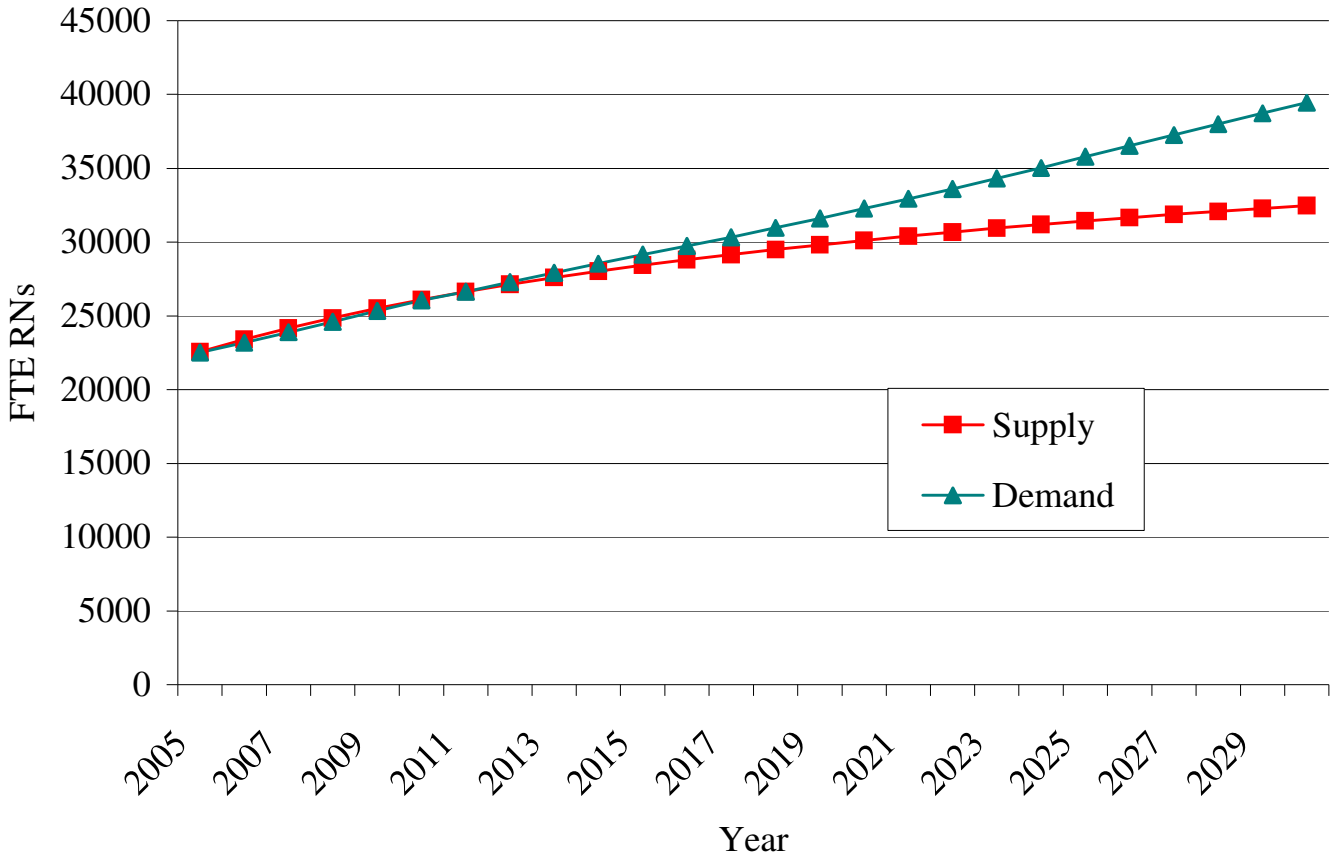
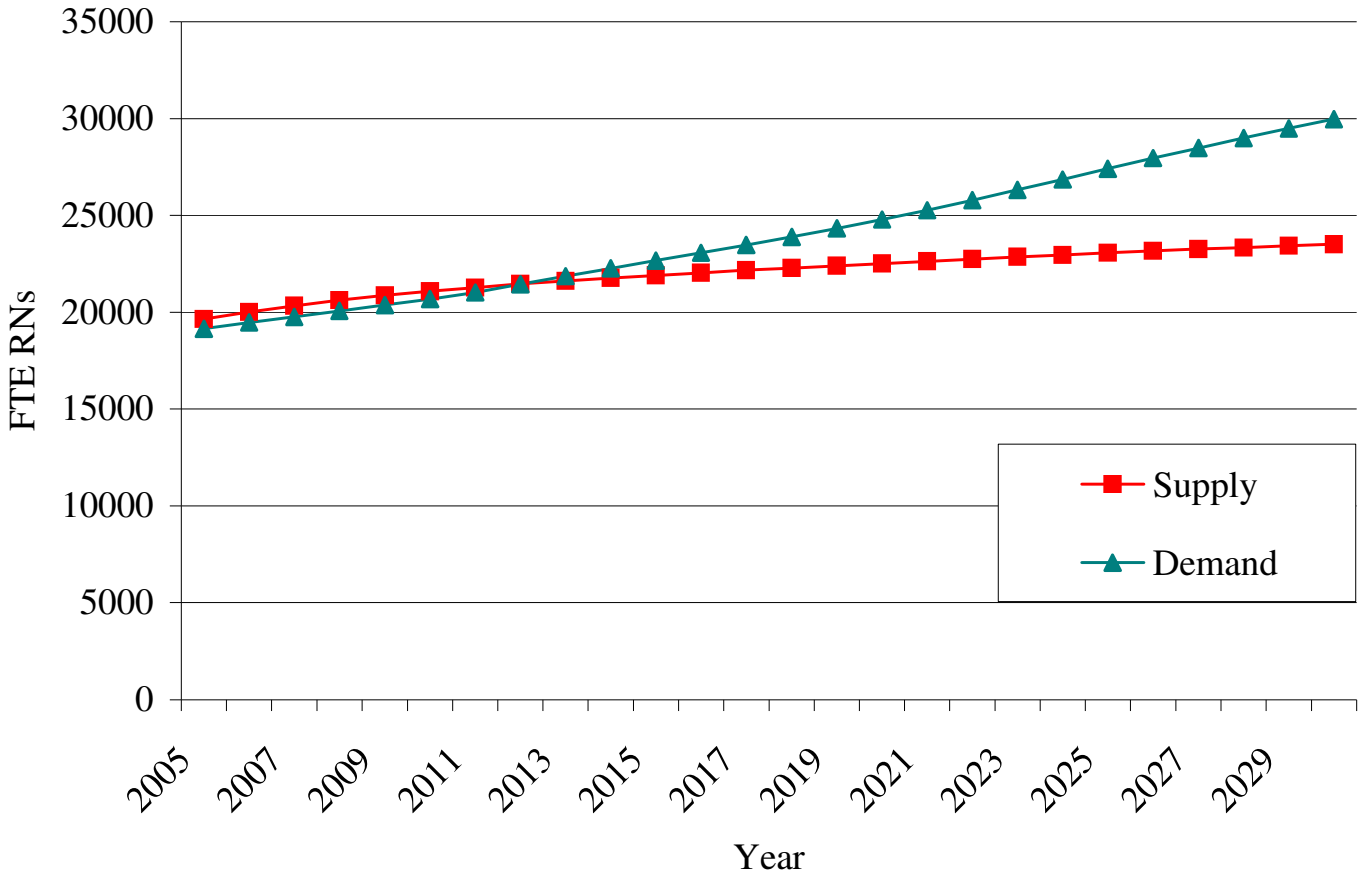


Figure 10: RN Supply & Demand Forecasts for San Diego Region



Regional conclusions

- Based on 2005 data:
  - Greatest number of nurses needed: Los Angeles region
  - Greatest rate of growth in RN supply needed: Central Coast
- Forecast for 2030:
  - Greatest share of unfilled RN positions: Northern Counties region
    - Also bad: Sacramento, Bay Area, Central Valley, and Central Coast
  - Greatest number of vacant positions: Los Angeles