



# Overview of Health Care Financing Projection Models

Model Development of Sustainable Health Care Financing  
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# Modeling objectives - I

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## Financial status

- Flows of funds – National health accounts
- Linkage between Universal Coverage (UC), Civil Service Medical Benefit Scheme (CSMBS), and Social Security Scheme (SSS)
- Short-term fiscal capacity
- Long-term sustainability



**Impact of policy or other exogenous changes**

# Modeling objectives - II

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## System performance

- Participation in Universal Coverage (UC) system
- Access to care/benefit coverage
- Delivery system adequacy and efficiency
- Quality of care
- Linkage between UC, CSMBS, and SSS



**Impact of policy or other exogenous changes**

# Model types - I

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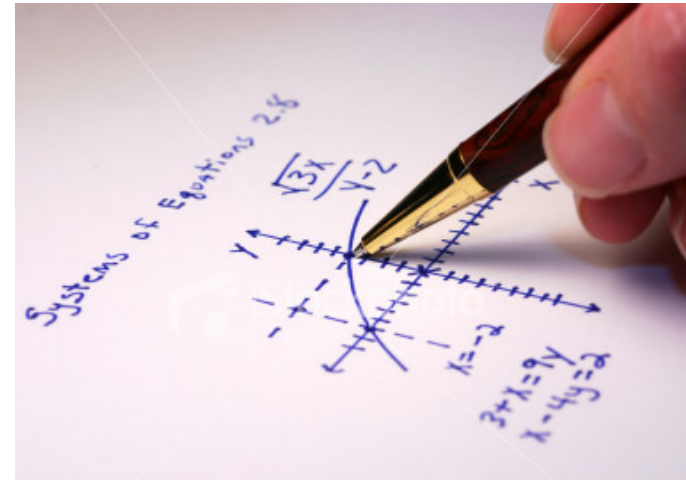
## Microsimulation models

- “Bottom-up” models
- Data on individual units (person, family, firm)
- Simulates detailed responses to policy changes

## Aggregate models

- “Top-down” models
- Data on collective units (GDP, total health spending)

Models may be static (constant behavior) or dynamic (behavior changes over time)



# Model types - II

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## **Cross-sectional models**

- Single point in time
- Used to identify relationships across subsets of the population (demand elasticities)
- Micro or aggregate data

## **Time-series models**

- Analysis/prediction of aggregate data over time

## **Longitudinal models**

- Cross-sectional analysis over time
- Panel data - same units (people, firms) over time
- Greater control over unobservable unit-specific variations
- Repeated cross-section data – sample is different over time

# What constitutes sustainability?

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**Long-term balance of spending and revenue**

**with**

**A well-functioning health system**

- Maintenance of (nearly) universal coverage
- Expanded benefits to cover necessary services, new medical technologies, higher demands of a richer and older society
- Promotion of adequate and efficient health care delivery
- Rewards for quality
- Appropriate capital investments (facilities, equipment, management systems)

**Fiscal and political sustainability are necessary**

# Modeling fiscal sustainability

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## **Model the major factors driving spending, revenue**

- Demographics – births, mortality, immigration
- Labor force participation
- Health status
- Health spending per beneficiary

## **Use simplifying assumptions**

- Baseline assumption: Current policy
- Develop behavioral assumptions on past experience in Thailand—avoid using assumptions from other countries
- Structure projections to reduce uncertainty of estimate
- Difficult to model L-T impact of changes in policy, exogenous threats to financing (medical technology, epidemic)

# A simple model

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## Spending

$$E_t = \sum_i (P_{it} \cdot Q_{it})$$

## Revenue

$$R_t = \sum_j (Y_{jt} \cdot \tau_{jt})$$

where  $i$  = enrollee in UC

$j$  = worker in the formal sector

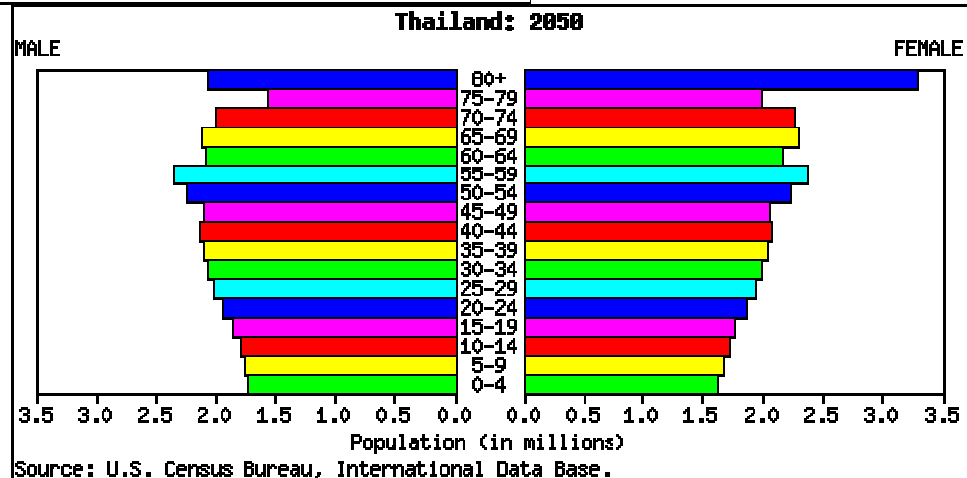
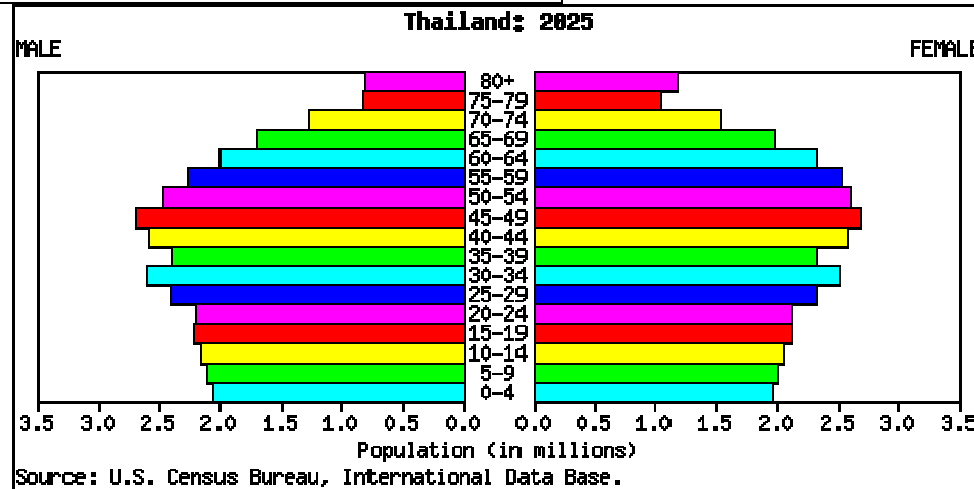
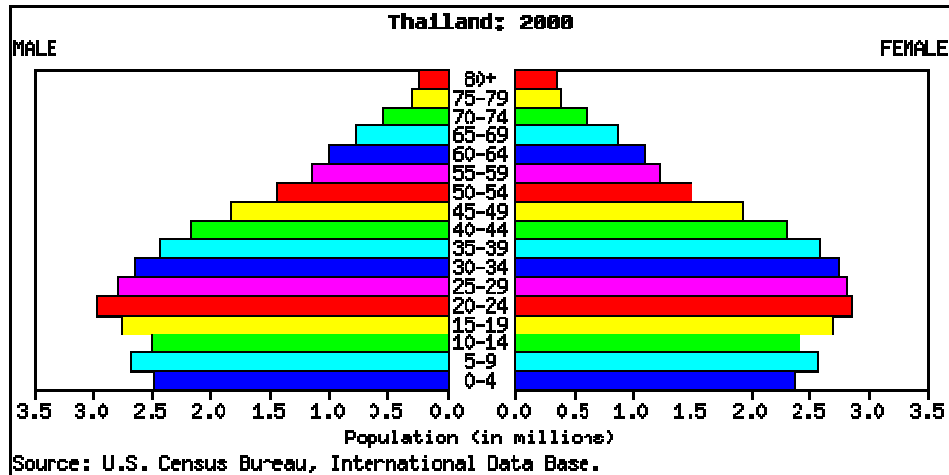
$P$  = price of service

$Q$  = quantity of service

$Y$  = worker income

$\tau$  = tax rate

# Demographic dangers



Development brings lower birth rate, longer life expectancy, increased demands on health system

# Key unknown: Health spending/capita

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## **Components of spending growth**

- Prices of services
- Volume of services
- Intensity (complexity) of services

## **Sources of spending growth**

- Medical progress
- Health status of population
- Economic growth
- Coverage, payment policies of UC

# Revenue

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**“Unsustainable” means revenue < spending necessary to maintain acceptable services**

- “Acceptability” depends on future circumstances
- What is the nature of the social contract?

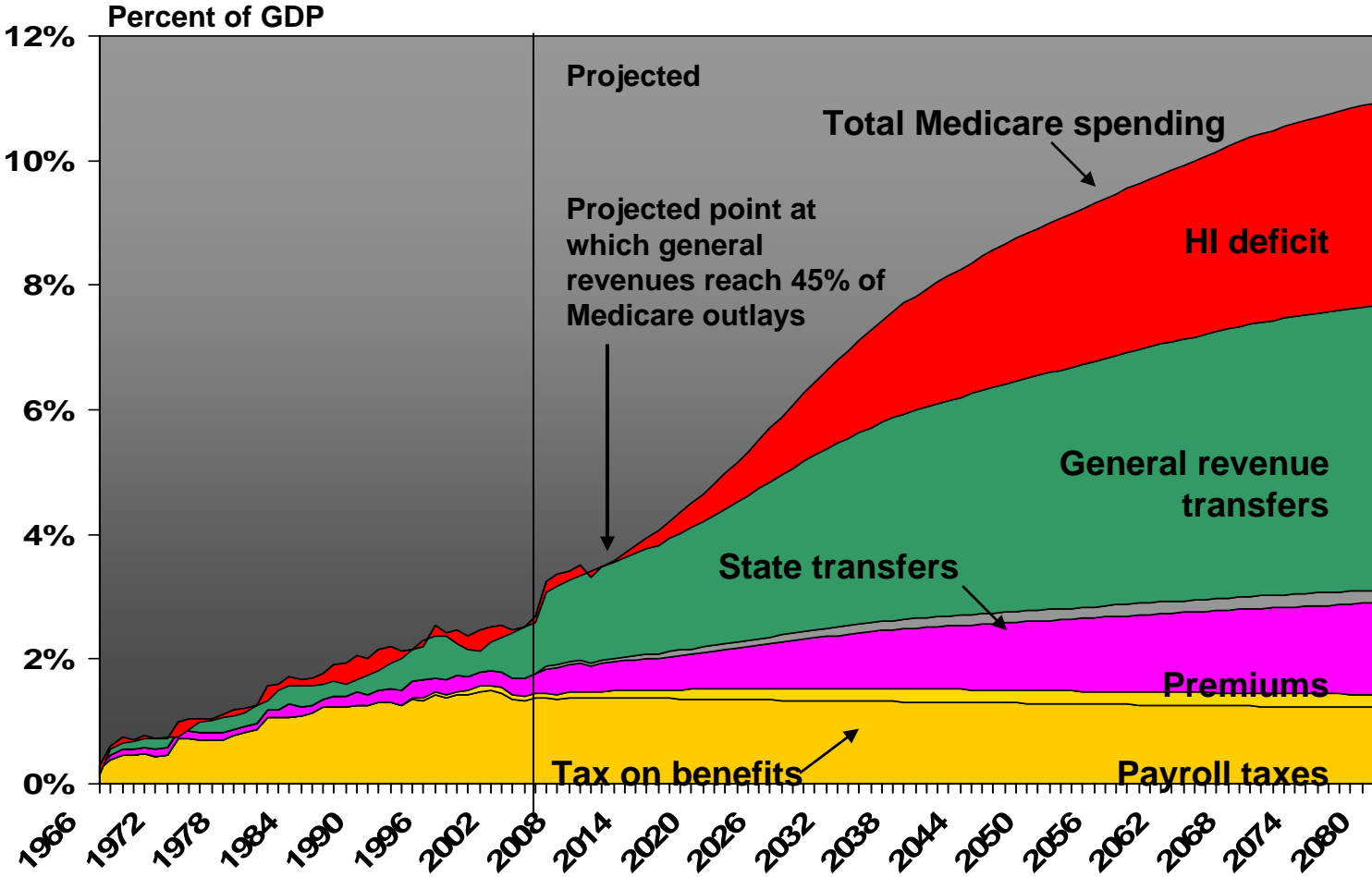
**At one level, revenue difficult to predict**

- UC does not have a dedicated source of revenue

**Dedicated UC fund not a permanent solution**

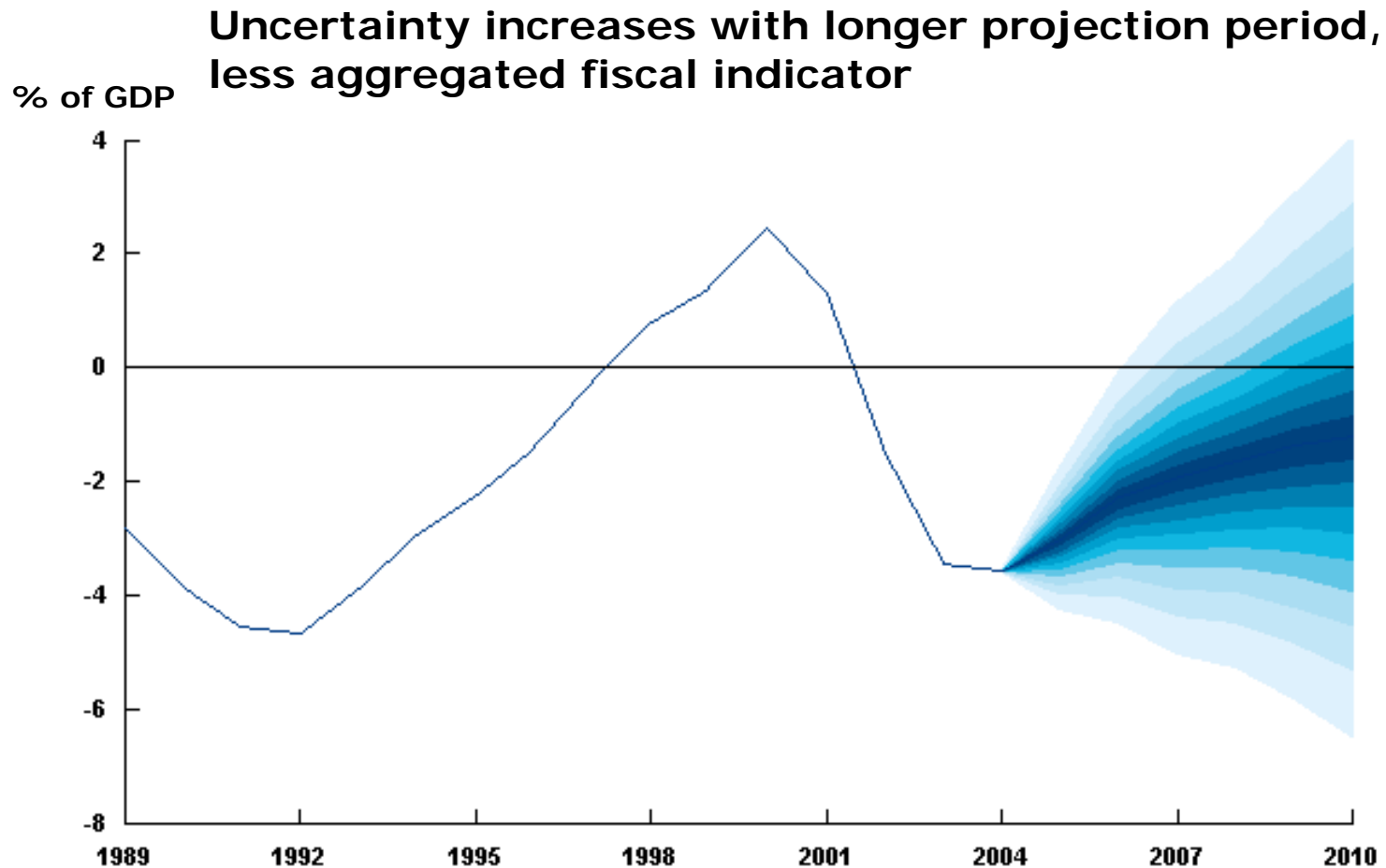
- U.S. Medicare operates through trust funds, but is clearly unsustainable at current levels of benefits

# Medicare's long-term fiscal crisis



Source: 2006 annual report of the Boards of Trustees of the Medicare trust funds.

# Accounting for uncertainty



CBO, "The Uncertainty of Budget Projections" (2005),  
<http://www.cbo.gov/ftpdocs/61xx/doc6119/02-25-Uncertainty.pdf>

# Stochastic vs. deterministic approaches

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## **Model to reduce uncertainty**

- Model health spending/GDP to remove effects of uncertainty in predicting future GDP

## **Forecast scenarios**

- High, medium, low trajectory scenarios
- Easy to explain, incorporates expert judgment
- No probabilistic confidence limits, implicit assumptions are implausible

## **Stochastic analysis**

- Assume a probability distribution for each input
- Repeated simulations generates distribution of outcomes

# Modeling short-term budget impacts

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## Cost estimates can drive policy

- Short-term models can assume stable institutional, behavioral relationships—**less uncertainty**
- Analysis of budget impact often includes **distributional** impact—to identify which groups are favorably or adversely affected
- Analysis may include **non-financial measures** of system performance (such as changes in the use of services)
- Methodological **consistency** across cost estimates is essential

# Budget scoring conventions

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## **Importance of the baseline**

- “Current law”
- Baseline “savings”

## **Behavioral response**

## **Interactions and unintended consequences**

- Interactions with other programs (CSMBS, SSS, public health programs)
- Unintended consequences caused by structure of capitation payment

## **Accountability**

# Case study: Promoting efficiency

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## **Numerous proposals, limited experience**

- Pay for performance, health information technology
- Ideas tried on a limited basis, no clear results
- Exaggerated claims based on optimistic studies

## **Modeling must be analytical, not political**

- Precisely what is the proposal? How would the policy work?
- What are the implementation requirements?
- Savings are incremental, improvements beyond what would have occurred without the new policy
- Behavioral response—how will the system react?
- Will the policy lead to efficiency gains, or must other system changes occur before savings are realized?
- What are the unintended consequences?

# Modeling informs policymaking

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## **Budget analysis has greater leverage**

- Cost estimate is tied to a specific policy to resolve a specific problem
- Long-term sustainability analysis provides a broader perspective and context, but less specificity

## **Modeling is stochastic, but policymakers want certainty**

- Budget process and national health accounts have accounting frameworks, but estimates are stochastic
- Failure of policymakers to recognize estimating uncertainty can lead to problems

# Improving communication

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## No single measure of sustainability is sufficient

- Gap between spending and revenue in a specific year
- Health spending as a % of domestic budget
- Discounted present value of funding shortfall
- Artificial limits (trust fund insolvency date, limit on certain types of spending)
- Graphs showing long-term spending and revenue trends



**Written narrative may be more important than the number**

# Case study: Medicare drug benefit

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## **S-T budget analysis dominates L-T analysis**

- Political focus exclusively on 10-year costs and benefits
- 75% of beneficiaries already had coverage
- Resources limited in budget window, but unlimited past that horizon

## **Budget target drove benefit design**

- \$400 B over 10 years
- Doughnut hole

## **Legislated despite huge out-year costs**

- \$8.4 T over 75 years
- \$17.1 T over infinite horizon
- Huge numbers have no meaning to politicians or the public

# Practical guidelines - I

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## **Beware of bad data**

- Invest in data collection (from operations of UC and other schemes, surveys of individuals and firms)



## **Test model assumptions**

- Keep current with changes in the health system and the economy

## **Avoid needless complexity**

- A more complex model requires better data, more assumptions and may yield less reliable estimates
- Tailor presentations to your audience

# Practical guidelines - II

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## **Modeling must be objective**

- An independent entity needed to avoid conflict of interest
- Possible locations: MOF, independent office of National Health Security Office, private think tank
- Methods must be transparent, data must be publicly available



## **Modeling must become a normal part of policymaking**

- “Real time” budget analysis to inform immediate policy decisions—budget rules are important
- Long-term modeling (including national health accounts) may be less frequent—changes are more gradual