SOCIETY OF ACTUARIES

Health Spring Meeting
June 2009

Session # 18 PD: Understanding the RAND COMPARE Microsimulation Model

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RAND HEALTH

Understanding the RAND COMPARE Microsimulation Model

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&

COMPARE Modeling Team

Prepared for the Health Spring Meeting of the Society of Actuaries, June 2009

Plan of the Talk

- Overview of COMPARE project
  - COMPARE website
- Details on COMPARE microsimulation

COMPARE Analyses Are Available On-Line

http://randcompare.org/

Overview of the microsimulation model at:

http://randcompare.org/downloads/COMPARE_Model_Overview.pdf

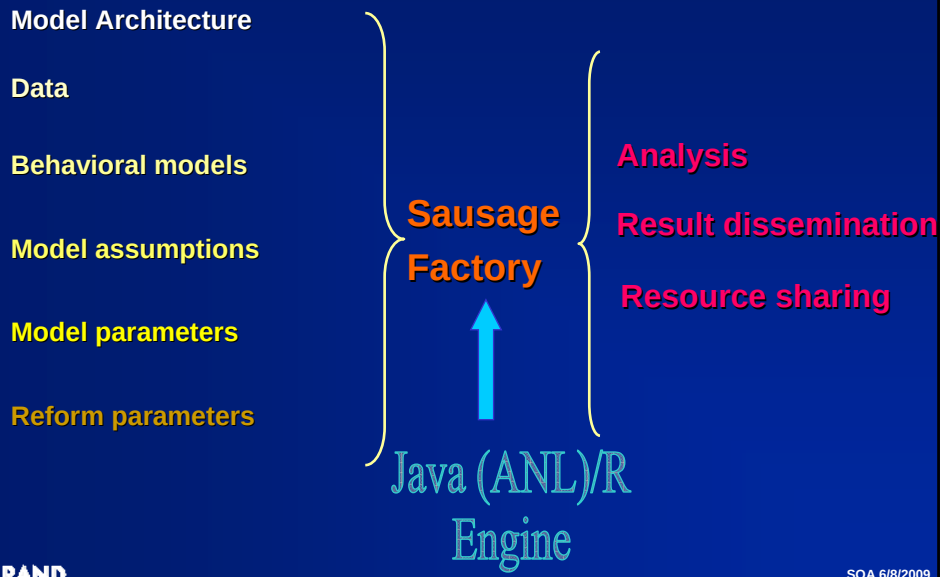
COMPARE Microsimulation Is Geared Toward Health Insurance Expansions

- **Tax Subsidy (Credit/Deduction ...)**
- **Employer mandate**
- **Individual mandate with purchasing pools**
- **Medicaid expansion**
- **Changes in tax treatment of health benefits**
- **... any combinations of the above**

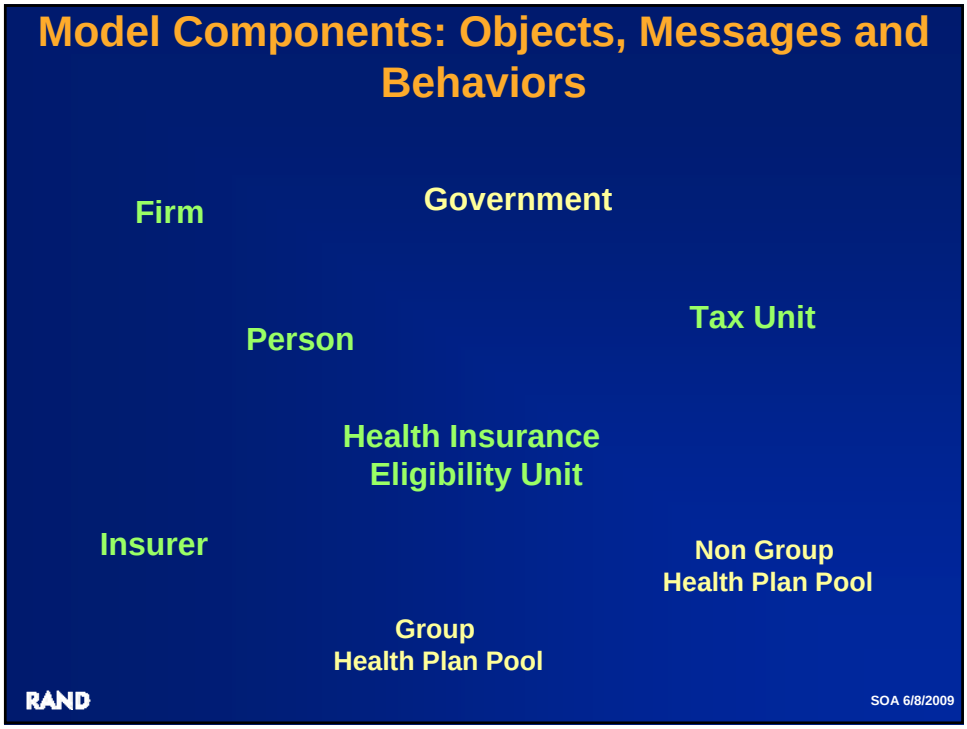
Scope of the Model

- Model results are intended to apply in the near future
- Employment variables are static:
  - people do not switch jobs or are laid off in the course of the simulation
  - economic downturns can only be modeled by starting from a status quo that reflects current conditions
- Analysis is performed at national level:
  - state level analysis can be performed by re-weighting current data to resemble state of interest
  - state level analysis requires additional state-specific data

The Sausage Factory



Model Components: Objects, Messages and Behaviors



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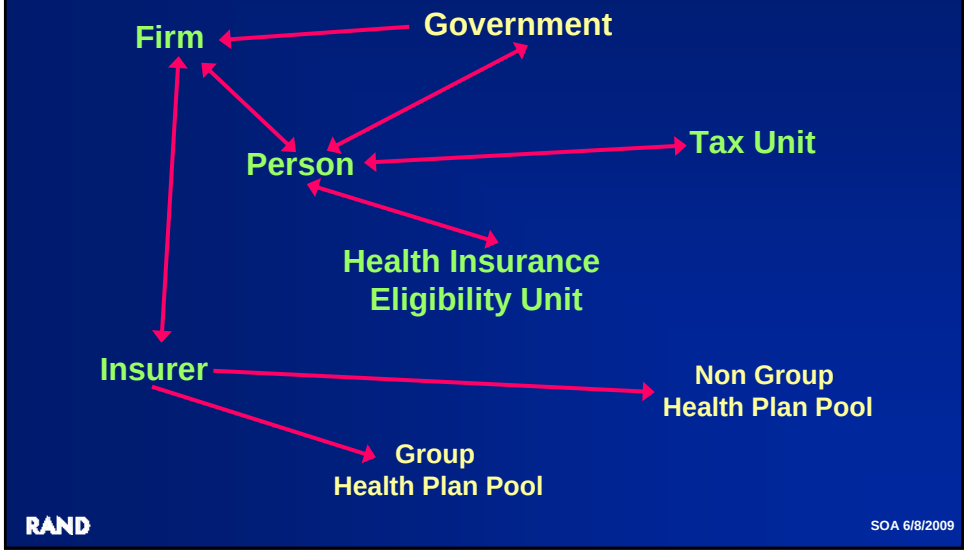

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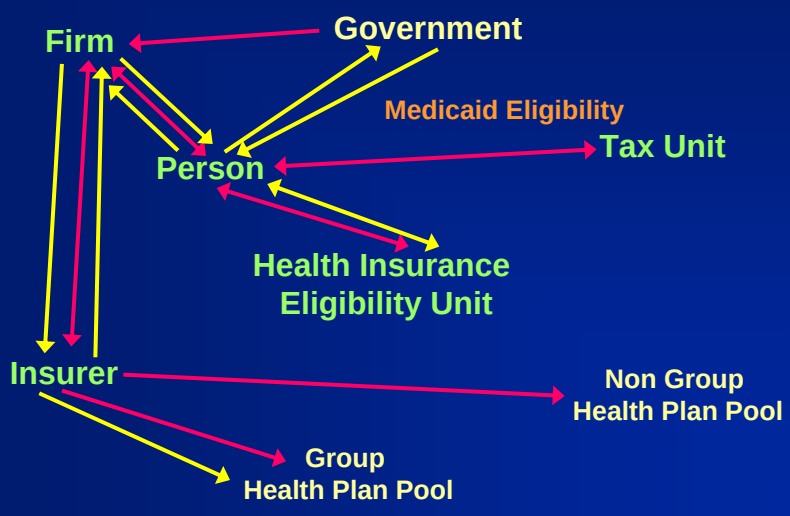

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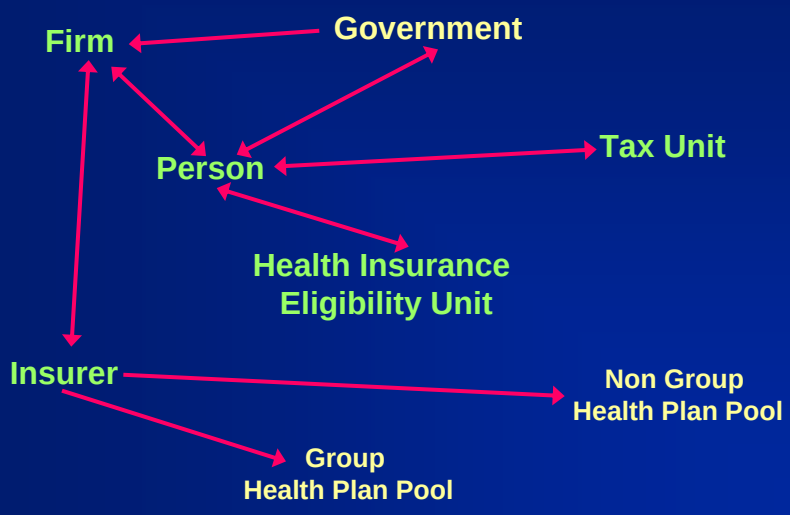
Premiums and Insurance Status in the Status Quo Are Endogenous



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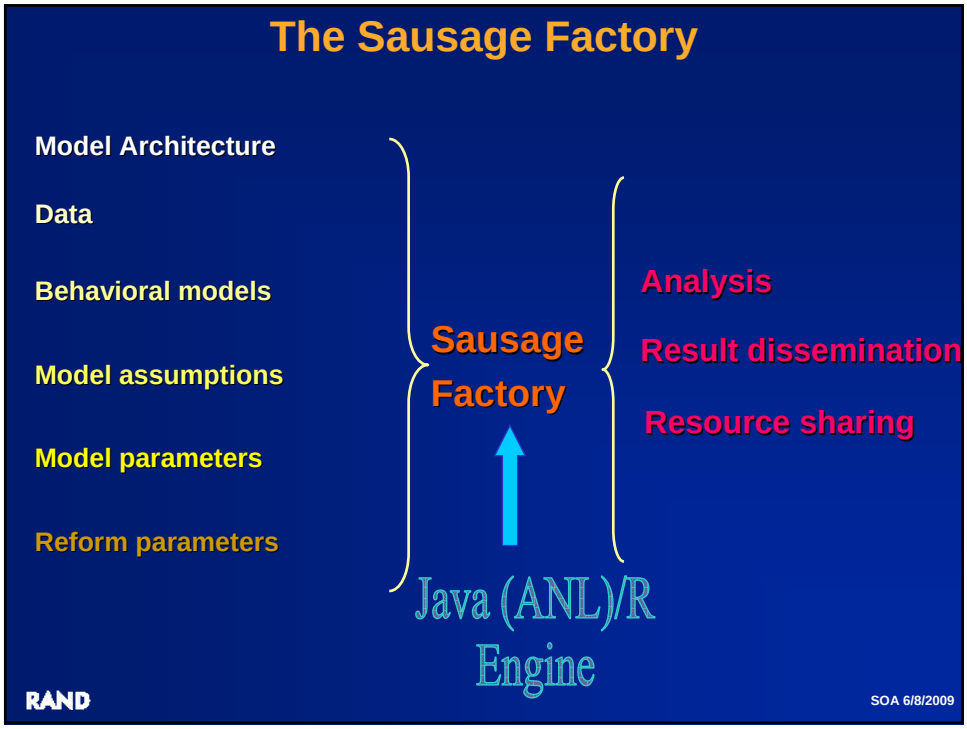

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Core Data Come from Three Sources

HRET

- Firm characteristics
- Health Benefits

SIPP

- Demographics
- SES
- Jobs
- HI status
- …

MEPS

- Medical expenditures
- Health care utilization
- Health status

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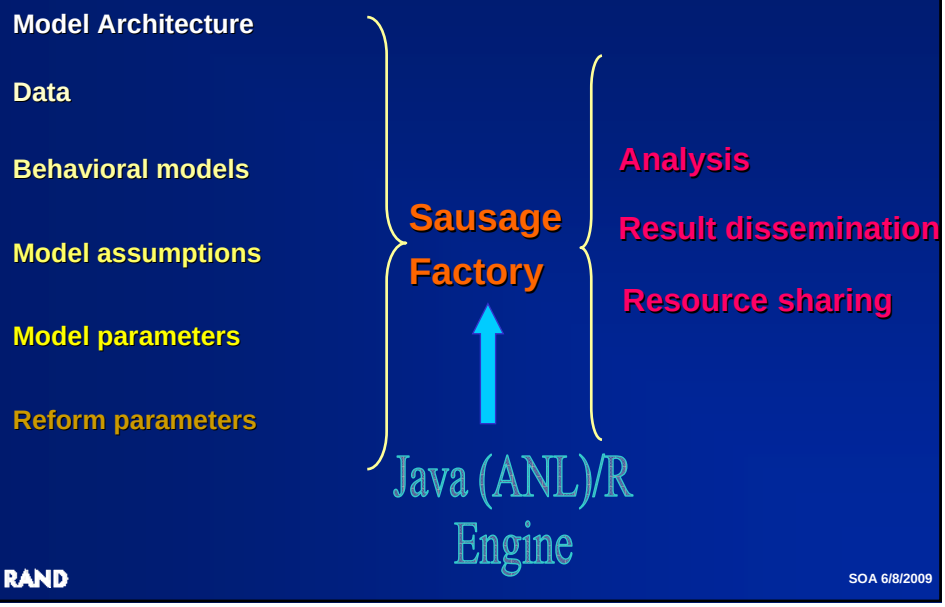
Building the Data Set Is Challenging

- SIPP people must be matched to HRET firms based on their characteristics, in order to build synthetic firms
- SIPP people must be matched to MEPS people in order to assign them health care utilization
- SIPP medicaid eligibility is imputed using most recent eligibility rules
- SIPP marginal tax rates estimated using NBER TAXSIM
- MEPS must be adjusted to match marginals, by payer and type of service, from National Health Accounts
- MEPS expenditure tails are too short: adjusted using 1997-1999 SOA Medical Large Claims Experience Study data set

The Sausage Factory



Individual Behaviors Are Key Ingredient

- Unit of analysis is the Health Insurance Eligibility Unit (HIEU), not the individual
- Response to changes in availability and price:
  - Employer Sponsored Insurance (ESI)
  - Medicaid/SCHIP
  - Individual insurance
  - Purchasing pool (Connector-like)
- Response to individual mandate penalties

Two Different Approaches to Modeling Individual Behaviors

- Econometric Regressions:
  - Standard approach
  - Works well with "small" reforms
  - Amenable to the Lucas' critique
- Utility Maximization:
  - Less conventional
  - Wide range of applications
  - Very rough approximation of utility function
  - Requires extensive calibration

Components of the Individual Utility

$$U = -\mathrm{E}[OOP] - \text{premium} - \frac{1}{2} r \,\mathrm{Var}[OOP] + \mathrm{u}(H)$$

OOP: out-of-pocket expenditures

***r* : coefficient of risk aversion**

u(H): utility of health services

Firms Have Behaviors Too

- **Firm decision to offer ESI in the status quo**
- **Firm decision to "pay" or "play" in response to an employer mandate**
- **Firm decision to drop ESI offer in response to Medicaid expansion or tax credits**

Firm Offering Behavior is Based on One Key Assumption

- A firm offers ESI if the cost of doing so is smaller than the value of ESI to its employees
  - The value of ESI to the employees is estimated within the simulation model using a regression
- This has been used to model status offer and the "pay or play" decision
  - Response to Medicaid expansion and tax modeled along work of J. Gruber

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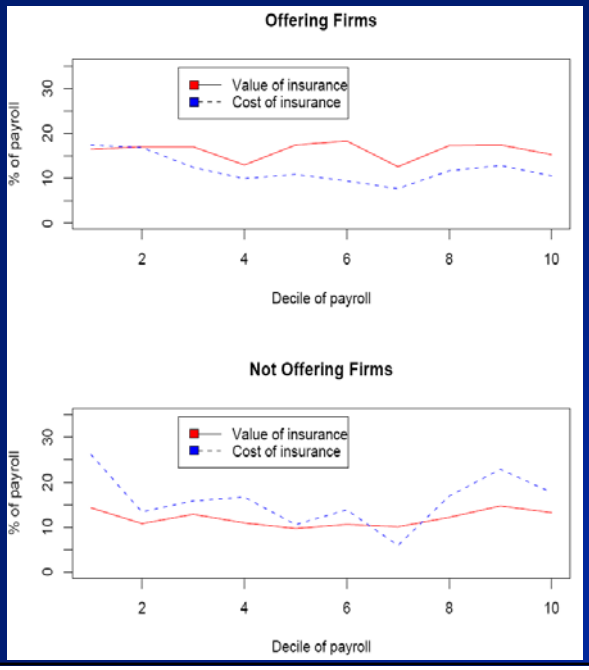
Firms Offer If Cost < Value of Insurance



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The Only Insurer's Behavior Is The Setting Of The Premiums

- Insured people are grouped in insurance pools
  - 12 ESI pools (by region and firm size)
  - 8 non-group pool (age/health staus)
- Premiums are computed as:

$$P = E[m] \times AV \times (1 + \delta)$$

$E[m] =$ average medical expenditure in the pool

$AV =$ actuarial value of plan

$\delta =$ administrative loading

Non-Group Premiums Require Special Treatment

- Premiums in the individual market must satisfy regulatory constraints
  - implemented community rating in the appropriate states
  - implemented revenue neutral premium smoothing across risk groups
- When simulating creation of multiple purchasing pools we introduced risk equalization and reinsurance (to avoid death spirals)

Where Are We Now?

- January release:
  - only Individual Mandate uses utility maximization
  - no analysis on tax treatment of tax benefits
  - "pure" reforms only
  - only one purchasing pool
- Next release:
  - utility maximization for all individual behaviors
  - mixed reforms (e.g. Baucus plan)
  - multiple purchasing pools (with risk equalization/reinsurance)
  - uses TAXSIM in the analysis of tax treatment of health benefits
  - fuller scale sensitivity analysis

We Are Currently Developing a Provider Module

- Focus will be on behavioral responses of physicians and hospitals to changes in:
  - Payment policies
  - Health service delivery interventions (public reporting, disease management, medical home)
- Initially module will operate independently
  - Over time, it will interact with main COMPARE microsimulation

Concluding Remarks

- COMPARE is a long-term project
  - what we have discussed is only the beginning
- COMPARE is committed to transparency
  - please ask us questions!
- COMPARE strives to be a "public utility"
  - open to sharing and collaborating