

International Congress of Actuaries (ICA) 2014 Washington, DC

Presentation Proposal

Presentation title: Actuarial Aspects of Modeling Health Care Systems Around the World

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Type: This submission is for a presentation.

Abstract: This presentation will examine the actuarial aspects of measuring health and long-term care system costs, access, and quality. The presentation will cover what aspects of modeling are consistent across countries and what aspects vary based on various environmental, political, and policy characteristics. Various reform scenarios will be reviewed and discussion and examination of how those reforms are expected to impact overall system costs, access and quality.

The presentation will discuss important issues of selection and healthcare consumer behavior.

The presentation will draw on experience of the author's work around the works with respect to health and long-term care system modeling. The presentation will provide attendees with a general understanding of the basic building blocks of healthcare system modeling and an overview of various approaches that can be taken to perform that modeling.

Language: The presentation will be in English.

Prior Exposure: The presentation will build on previous work of the authors, but will not be based on any one specific piece of prior work.

Presentation: The presentation will use case studies and encourage audience participation throughout

Presentation Outline

Litow – Modeling Health Care Systems (10 min)

Schmitz – LTC Systems (10 min)

Preker – Health and LTC Financing and Risk Management (10 min)

Health System Modeling (Litow)

1. Purpose of Model

- i. Represent current system re markets/coverage, expenditures, treatment access, revenues
- ii. Reflect risk characteristics that are drivers of above
- iii. Reflect changes with modifications to system design/ provisions

2. Current System Illustration with Risk Characteristics

2012 Illustrative Chart for United States

3. Risk Characteristics

Starting Point: Reflects certain market averages. In US illustration, it is large group market for average labor force population (non-government) with \$1000 total out-of-pocket cost and loosely managed care.

Age/Gender: 3 to 4% on average per age-higher slope for males and less for females

Utilization by Income: Lower for low income and higher for high incomes, without benefit recognition

Or subsidies; subsidies to low income can increase utilization; how they are provided makes a difference

Benefit Level/Managed Care: The more third party payment the higher the utilization; the less coverage the lower the utilization

Health Status: Note relationship to coverage level and access to treatment

Reimbursement: Amount paid to providers- correlation to utilization and access to treatment important

Provider Access: What is access to treatment within markets and coverage level.

Cost per person per market is multiplication of all factors; Total market cost is population times cost per person (can add administrative load)

Premium if applicable is cost per person times cost sharing percentage divided by one minus administrative load as a percent of premium

Total cost /premiums are the sums across all markets as applicable.

4. Factors to reflect in reform scenario are the impact of

- i. Subsidies and corresponding utilization modifications
- ii. Mandates, including utilization and cost implications
- iii. Eligibility provisions-impact on participation and utilization
- iv. Coverage incentives or limitations (i.e. managed care, deductibles, HSAs, etc.)
- v. Rating limitations by age, health status, etc.-can impact on coverage participation and utilization
- vi. Provider restrictions and requirements
- vii. Provider reimbursements-impact availability of services, utilization, health status
- viii. Limitations on population access to providers/services
- ix. Taxes or revenue modifications: can impact premiums and costs and utilization to the extent services require direct payment

5. Outcomes

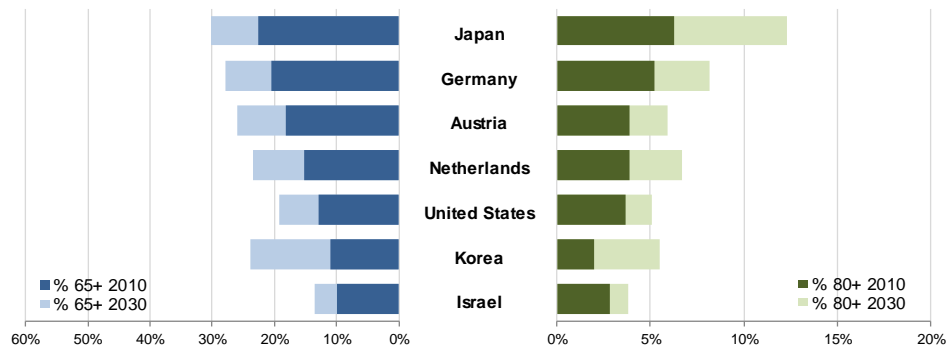
- i. Compare status quo and reform scenario re participation, cost and affordability, and access to treatment
- ii. Balance of variables is what is important: A low cost system with modest or little access to treatment may or may not be better than a high cost system with great access to treatment.
- iii. Countries with lower costs often have low reimbursements with limited access to treatment. But higher cost countries often have better access to treatment with affordability an issue.
- iv. High costs may arguably incent poor behavior re health status just as poor access to treatment may encourage better behavior or lifestyles.
- v. Other correlations/controversies-model is a tool to understand outcomes and identify areas for research

Long-Term Care – An International Perspective (Schmitz)

1. LTC Problem – Common Themes

- a. Demographics: Aging, Fertility, Life Expectancy,
- b. Social Change: Marriage Rates, Divorce Rates, Sandwich generation, Mobility, Retirement, Household size
- c. Economic and Political Environment: Funding sources, competing priorities, public vs private
- d. Provider Environment: Infrastructure, Availability, Institutional, Home Care, Abuse

Figure 1: Shares of Population Age 65 and Older and Age 80 and Older



Source: U.S. Census Bureau, International Data Base.

Examples of Care Integration in Selected Postindustrial Countries		
Country	National Strategic Framework	Integrated Delivery Structure
Australia	National Strategy for an Aging Australia	Care assessment teams; home- and community-care program
Canada	Collaborative strategy for home and community care (2002); Aging at home (Ontario-2010)	CHOICE (Alberta); SIPA (Montreal); Virtual Ward (Ontario)(interdisciplinary teams providing services when and where needed)
United Kingdom	National service framework for older people (2001)	Care management by local governments; single assessment process
Japan	Gold plan 2 (2000)	Coordination by care managers
United States	Demonstrations	<ul style="list-style-type: none"> Social Health Maintenance Organization; PACE (capitation); Medical Home (incentivized care requiring team approach)

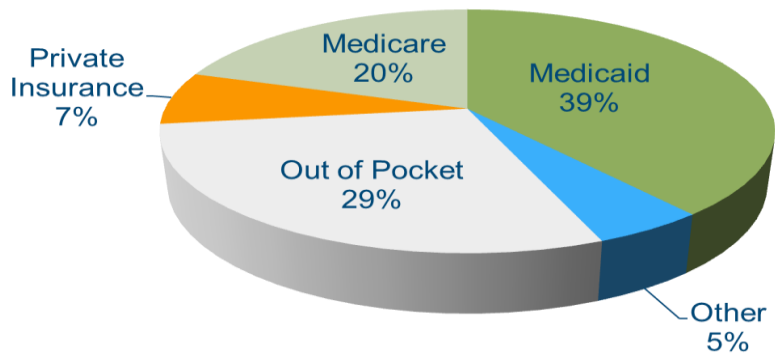
Source: “An International Perspective on Long Term Care: Focus on Nursing Homes”, Paul R. Katz, MD, CMD

2. LTC Systems

- a. Framework and Financing
- b. Benefits
- c. Eligibility and Participation

3. Selected Countries: US, Germany, France, Singapore

- US – Sources of Payment for LTC by Payer, 2008



Source: The SCAN Foundation 2011

NOTE: Numbers do not add up to 100% due to rounding. Private insurance payments include Medigap insurance as well as LTC insurance. Other sources include the Veterans Administration, individual state programs, and private philanthropy.

- **US – Benefits**
 - Vary by Program
 - Limited LTC Coverage from Medicare
 - Full Coverage if on Medicaid
 - Private Insurance Options

- **US – Eligibility and Participation**
 - Medicaid - Means Tested
 - Medicare – 65+ and work 10 years
 - Small Participation in Private LTCI

- **Germany Framework and Financing**
 - Was like US
 - Moved to Universal vs. Means Tested
 - Funded with Payroll Taxes
 - LTC Insurance → <10%

- **Germany – Benefits**
 - Cash Options
 - Encourage Informal Care
 - Three Levels of Benefits

- **Germany - Eligibility and Participation**
 - Universal LTC Program
 - Small Private Market
 - 9% as alternative cover
 - 3.5% as supplemental cover

- **France – Framework and Financing**
 - APA System (Allocation Personnalisée d'Autonomie)
 - Hybrid Social Model
 - Funded through General Revenue
 - Income-Related Coinsurance
 - LTC Insurance → 25% for those ages 60+

- France – Benefits
 - Cash Options
 - Private Coverage
 - 4 Levels based on ADLs and IADLs

- France – Eligibility and Participation
 - Universal Program
 - Income Related Benefits

- Singapore – Framework and Financing
 - Eldershield Program
 - Voluntary Opt-Out
 - High Participation
 - Public / Private Partnership
 - Supplementary LTC Insurance

- Singapore – Benefits
 - Small Cash Benefits
 - 3 of 6 ADLs or Cognitive Impairment

- Singapore – Eligibility and Participation
 - Negative Opt-out
 - 90% participation
 - Relatively Low Supplemental Cover

4. LTC Conversation

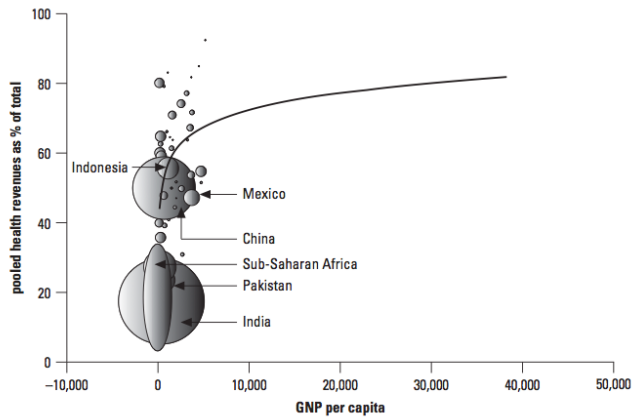
- System Criteria
 - a. Financial Soundness
 - b. Affordability
 - c. Coverage
 - d. Appropriate Incentives
 - e. Comprehensiveness of Benefits
 - f. Choice
 - g. Compatibility with Existing Systems

Risk Management and Health Insurance at Low-Income Levels (Preker)

The high out-of-pocket expenditure by low-income households in most developing countries and low-income populations in higher-income countries (including Europe and the US) provides a “prima facie” case that insurance is both desirable and “affordable” if it can be offered at relatively moderate *loading cost* (administrative costs, losses due to fraud and abuse, profit and transaction cost of meeting regulatory

requirements). Figure 1 shows that the share of out-of-pocket on health care is greater at low-income levels in every part of the world.

Figure 1: Out-of-pocket spending at low-income levels



Source: Preker and Carrin, 2004.

Note: The share of the world's 1.3 billion people living on less than US\$1 a day is indicated by the size of the bubbles.

Underlying Premise

Risk-averse populations that might, if uninsured, be forced to make large out-of-pocket payments would gain by protecting themselves from rare but very high medical expenses if such insurance was offered at affordable premiums (Pauly 2007). Lowering the number of people experiencing serious financial hardship and barriers to access at the time of illness would also confer aggregate societal welfare gains.

Demand for private voluntary health insurance is not only concentrated in the highest-income groups. It extends to lower-income groups as well (Pauly, Blavin, and Meghan 2008). Demand for health insurance among lower-income groups appears to exist for two reasons: first, the risk (even if small) of being exposed to high out-of-pocket payment poses a considerable threat to many households; second, the variance of potential out-of-pocket spending is sufficiently large that many households would be willing to pay more than the expected value of the benefits to avoid exposure to the upper extreme in expenditures. Insurance plans should therefore be able to charge premiums that would cover the cost of expected benefits and the loading cost.

In most countries, low-income populations account for the greatest share of out-of-pocket expenditure. Because the expected out-of-pocket expense varies with income, making such insurance affordable to low-income populations in a voluntary market will require market segmentation. In this way, lower-income people pay lower premiums based on their below-average spending and setting premiums in relation to average expense across all other income groups.

As an indicator of the feasibility of introducing such insurance in low- and middle-income contexts, Pauly, Blavin, and Meghan (2008) suggest using the amount people would be willing to pay for insurance beyond the expected value of benefits and comparing this "risk premium" (as part of the total premium) with the administrative expense share of insurance premiums. In many countries, this risk premium (expressed as a percentage of expected benefits for full coverage insurance) was in the range of the expected administrative expense that markets could generate. This formula is especially apt in the case of insurance that would pay for some care and comprehensive insurance covering hospital, physician, and

drug expenses. The authors also found that the risk premium for stand-alone drug insurance is relatively low, even though spending on drugs constitutes a large share of total out-of-pocket spending. These findings suggest that comprehensive insurance (rather than a hospitalization-only or a drugs-only policy) might be the most feasible way of achieving good financial protection.

Based on this research, it can be predicted that risk-averse households will voluntarily purchase health insurance if the associated expenses are smaller than the “risk premium” they would be willing to pay. That risk premium depends on the variance of the losses the insurance will cover and on the extent of a household’s risk aversion. If the variance of the losses is small or if the loading cost is high, there will be little demand for insurance.

The implication is that a voluntary health insurance market is most likely to emerge when three conditions hold: (1) there is a risk of high out-of-pocket payments relative to income or wealth; (2) insurance firms can offer different households premiums that are close to the individual household’s expected value of out-of-pocket medical spending; and (3) loading costs are moderate.

Multipillar Framework for Financing Health Care

Health systems are often stereotyped as belonging to either a U.K.-styled National Health Service model, German-styled “sickness fund” model, or U.S.-styled private health insurance model, this portrayal of health care financing is an oversimplification of the trade-off between competition and solidarity-based approaches (Chinitz, Warsem, and Preker 1997).

In reality most countries use a combination of voluntary and mandatory mechanisms through both public and private financing agents under a *multipillar* system for financing health care (see figure 2).

Figure 2. A multi pillar system of health care financing

Objective	Income smoothing	Equity pillars		Risk-management pillars		
	Household savings	Donor aid	General revenues	Public health insurance	Private health insurance	Community financing
Voluntary						
Mandatory						

Source: Adapted from Preker, Scheffler, and Bassett, eds. 2007.

Some combination of these four dimensions are better at smoothing income across the lifecycle. Others are better at achieving equity objectives. Still others are better at managing financial risk. More complex health financing systems combine these various dimensions to optimize achievement of the underlying policy objectives (Preker, Scheffler, and Bassett, eds. 2007).

Health care risks are complex, influenced in part by genetics and the lifestyle of individuals and household and in part by external factors such as diseases, environmental factors, and specific external events. Some health risks are predictable (pre-existing diseases or identified predisposition). Some health risks are less predictable (a biological event, accident, or access to effective care).

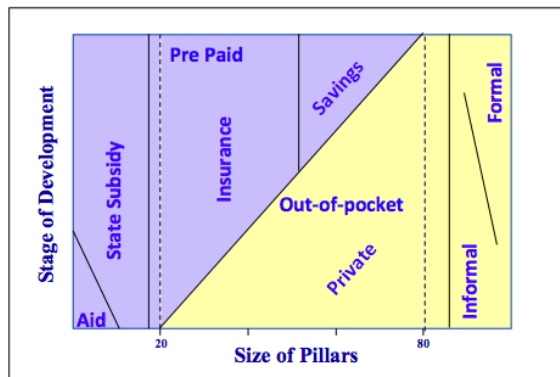
Insurance is a mechanism for financing health risks by combining sufficient loss-exposure units to make the loss predictable. Health insurance allows the cost of treating a health event to be spread over a group

of individuals or households.

Because insurance offers potentially large welfare gains, including protection against unexpected, large shocks to consumption or wealth, efforts to furnish it in low-income countries are well justified (Pauly et al. 2006).

As is evident from the high reliance on out-of-pocket expenditure, most donor- and government-funded programs in low- and middle-income countries have failed to achieve the risk-management and income-smoothing objectives through such a mechanism alone. Donor and government funding tend to be spent on mandatory program whereas the direct household and savings components tend to be voluntary. Insurance falls somewhere in between. The general trend observed in most low- and middle-income countries is to increase government spending and/or insurance coverage over the next few years parallel to a reduction in the relative share of out-of-pocket spending.

Figure 3. Moving from 20/80 to 80/20 in Pooling Risks through Insurance

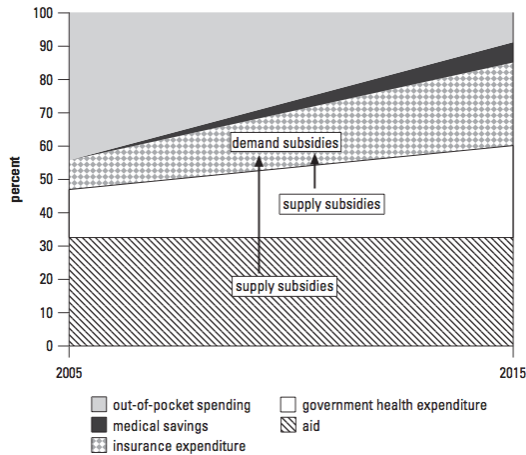


Demand-Side rather than Supply-Side Subsidies

Two alternative approaches underpin recent efforts to expand coverage through insurance-based mechanisms (Pauly et al. 2007). Under one approach, health insurance is introduced for a small part of the population that can afford to pay and from whom employers can easily collect payroll taxes at source, usually civil servants and formal sector workers. The poor and low-income informal sector workers continue to be covered through access to subsidized public hospitals and ambulatory clinics. Although at first sight this policy option would appear to be pro-rich, because only the formally employed who can afford to pay can join the program, in reality it frees up public money that can then be used to subsidize care for the poor and informal sector workers who may not have the means to pay themselves. It therefore allows indirect targeting of the limited government finances available to the Ministry of Health.

Under another approach, health insurance is introduced for a broader segment of the population by applying a demand-driven approach, involving paying for or subsidizing the premium of the poor and low-income informal sector workers (patient-based subsidization). This allows a more rapid expansion of coverage, by using resources that are freed up from the contributing part of the population to subsidize the premium of the poor and low-income informal sector workers rather than their service providers (Figure 4). This approach offers the advantage of allowing more direct targeting of poor households than the supply-side subsidies described in the previous example (Schellekens et al. 2007).

Figure 4. Shifting from Supply to Demand Side Subsidies



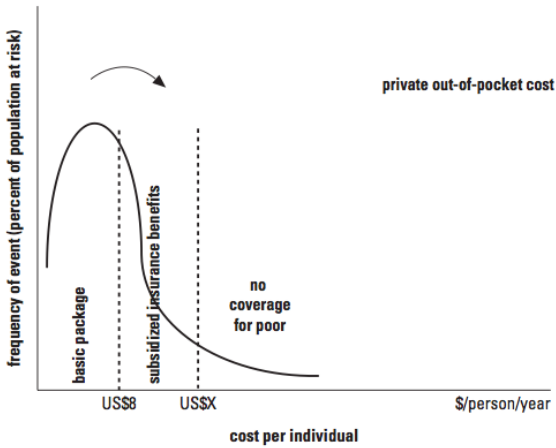
Under a *multipillar* approach, individual and household consumption of the basic package of services for high-frequency, low-cost care is close to the average cost per person of such services because everyone uses the services every year.

But since individual and household consumption of low-frequency, high-cost care will not happen every year, the insurance benefits package can be set to include health care that is much more expensive than the average cost of a car.

There is now good evidence that if subsidies were given to poor households rather than to providers, they would be used on health services that serve the poor rather than the rich. Such subsidy transfers could take the form of vouchers to buy care directly or premium subsidies so that the poor can have access to the same type of health insurance as the rich. A viable health insurance program requires that everyone pays an actuarially sound premium (Cichon et al. 1999). This does not necessarily exclude the poor if there is a partial or full subsidy for their premiums. The advantage of this approach is that the poor can then choose the services they feel meet their needs, and service providers will be paid accordingly, thereby achieving both equity and efficiency objectives.

Households—even the poor—are insurable. Health insurance involves some transfer of resources from rich to poor, healthy to sick, and gainfully employed to inactive. Households in low-income settings understand the nature of such transfers and are willing to contribute small amounts of money today if it secures benefits needed tomorrow. Current systems for financing health care in most low- and middle-income countries deprive the poor of such financial protection against the cost of illness beyond the basic package. Under the proposed new financing arrangements, the subsidies would be used to pay for insurance to cover health risks beyond the basic package leaving the latter to households themselves other than the poorest of the poor who could not afford even this level of care (see Figure 5).

Figure 5. Subsidies to Pay for Insurance Coverage Beyond the Basic Package



In summary, system for financing health care at all levels of income – low-, middle- and higher-income levels – would significantly improve if policies were introduced to match the mechanism of financing used with the underlying risk and variance. Singapore is the country in the world that has gone furthers in building such a multi-pillar system of financing for the health care of its citizens (Figure 6). We will provide a case study on how this is working today.

Figure 6. Matching Financing Mechanisms with Risk and Variance in Singapore

