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Cost and Coverage Impacts of Five Proposals to Reform the Colorado Health Care System

Appendix H: Methodology and Key Assumptions

Prepared for:

The Colorado Blue Ribbon Commission for Health Care Reform

By:
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Summary Description of the Health Benefit Simulation Model (HBSM)

The purpose of this document is to provide a summary of the data and methods used in the Lewin Group Health Benefits Simulation Model (HBSM). We begin by summarizing the overall modeling approach used to simulate the cost and coverage impacts of programs to expand insurance coverage. We also provide a discussion of key components of the model that are most relevant to some of the policy proposals that have emerged in recent years. A more detailed documentation of the full model is available upon request.

We present our summary of HBSM in the following sections:

- Modeling Approach;
- Database;
- Medicaid Expansions;
- Employer and Employee Take-up;
- Insurance Markets Model; and
- Tax simulations.

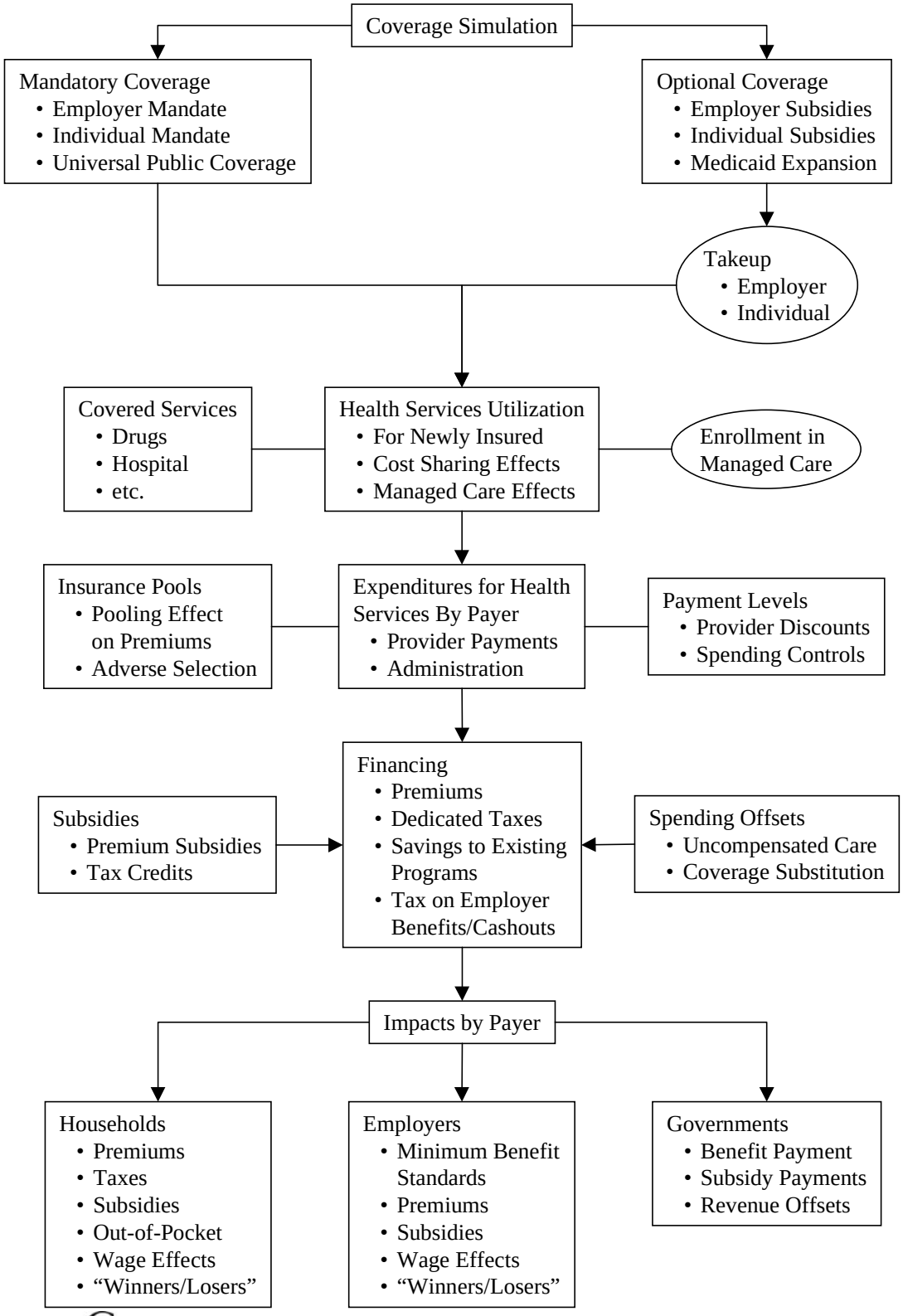
A. Modeling Approach

The Health Benefits Simulation Model (HBSM) is a micro-simulation model of the U.S. health care system. HBSM is a fully integrated platform for simulating policies ranging from narrowly defined Medicaid coverage expansions to broad-based reforms such as changes in the tax treatment of health benefits. The model is also designed to simulate the impact of numerous universal coverage proposals such as single-payer plans and employer mandates. The use of a single modeling system for these analyses helps assure that simulations of alternative proposals are executed with uniform and internally consistent methodologies.

HBSM was created to provide comparisons of the impact of alternative health reform models on coverage and expenditures for employers, governments and households. The key to its design is a "base case" scenario depicting the distribution of health services utilization and expenditures across a representative sample of households under current policy for a base year such as 2006. We developed this base case scenario based upon recent household and employer data on coverage and expenditures. We also "aged" these data to be representative of the population in 2006 based upon recent economic, demographic and health expenditure trends. The resulting database provides a detailed accounting of spending in the U.S. health care system for stakeholder groups. These base case data serve as the reference point for our simulations of alternative health reform proposals.

The model first simulates how these policies would affect sources of coverage, health services utilization and health expenditures by source of payment **(*Figure 1*)**. Mandatory coverage programs such as employer mandates or single-payer models can be simulated based upon the detailed employment and coverage data recorded in the database. The model also simulates enrollment in voluntary programs such as tax credits for employers and employees, based upon multivariate models of how coverage for these groups varies with the cost of coverage (i.e., modeled as the premium minus the tax credit). In addition, the model simulates enrollment in Medicaid and SCHIP expansions based upon a multivariate analysis of take-up rates under these programs, including a simulation of coverage substitution (i.e., "crowd out").

Figure 1
Flow Diagram of the Health Benefits Simulation Model (HBSM)



HBSM is designed to facilitate comparisons of alternative health reform initiatives using uniform data and assumptions. For example, take-up rates for Medicaid and various tax credit/premium voucher proposals are simulated using uniform take-up equations and modules. Uniform methods are also used to simulate changes in health services utilization attributed to changes in coverage status and cost-sharing parameters. The model uses a series of uniform table shells for reporting the impacts of these policies on households, employers and governments. This uniform approach assures that we can develop estimates of program impacts for very different policies using consistent assumptions and reporting formats. The use of uniform processes also enables us to simulate the impact of substantially different policy options in a short period of time.

Once changes in sources of coverage are modeled, HBSM simulates the amount of covered health spending for each affected individual, given the covered services and cost-sharing provisions of the health plan provided under the proposal. This includes simulating the increase in utilization among newly insured people and changes in utilization resulting from the cost sharing provisions of the plan. In general, we assume that utilization among newly insured people will increase to the level reported by insured people with similar characteristics. We also simulate the impact of changes in cost sharing provisions (i.e., co-payments, deductibles, etc.) on utilization.

HBSM is based upon a representative sample of households in the U.S., which includes information on the economic and demographic characteristics of these individuals as well as their utilization and expenditures for health care. The HBSM household data are based upon the 1999 through 2001 Medical Expenditures Panel Survey (MEPS) that we use together with the March 2005 Current Population Survey (CPS). We also used the Kaiser/HRET survey of employers for policy scenarios involving employer level decisions. We adjusted these data to show the amount of health spending by type of service and source of payment as estimated by the office of the Actuary of the Centers for Medicare and Medicaid Services (CMS) and various agencies. The methods used to develop these baseline data are discussed below.

Changes in employer costs are assumed to be passed-on to workers in the form of changes in wage growth over time. For example, policies that increase employer costs would result in a corresponding reduction in wages for affected workers, with a corresponding reduction in income and payroll tax revenues. Similarly, reductions in employer costs are assumed to be passed on to workers as wage increases. HBSM includes a tax module that simulates tax effects due to these changes in wages as well. The model will simulate wage pass-through under varying assumptions on how long it would take for the labor markets to adjust.

The model includes a simulation of health insurance premiums in the private small group and individual markets using the range of rating practices permitted in each state. This permits us to simulate the impact of options for implementing rate compressions proposals. It is also designed to simulate "adverse selection" that may result under policies that give employers and/or individuals a choice of alternative insurance pools with their own unique rating practices.

For example, some of the proposals analyzed in this study would give employers the option of enrolling in a public insurance pool at a community-rated premium. This would tend to attract

employers and individuals with high health care costs who find that the community-rated premium is less than the cost of an experience-rated plan for that group in the private market. The HBSM insurance market simulation is based upon a "synthetic firm" methodology, which we present below.

B. Baseline Database

The key to simulating changes in the health care system is to develop a baseline database that depicts the U.S. health care system in detail. Our HBSM baseline data is based upon the 1999 through 2001 Medical Expenditures Panel Survey (MEPS) data, which provide information on sources of coverage and health expenditures for a representative sample of the population. These data are adjusted to reflect the population and coverage levels reported in the 2005 Current Population Survey (CPS) data (with adjustments for under-reporting discussed below). We also statistically match workers in these data to the Kaiser/HRET survey of employers which provides additional detail on coverage provided through work.

The creation of the baseline data for the model is presented in the following sections:

- Household data;
- Employer data; and
- Benchmarking data.

1. Household Database

The HBSM baseline data is derived from a sample of households that is representative of the economic, demographic and health sector characteristics of the population. HBSM uses the 1999 through 2001 MEPS data to provide the underlying distribution of health care utilization and expenditures across individuals by age, sex, income, source of coverage and employment status. The use of data for three years substantially increases sample size, thus permitting us to develop more stable estimates of narrowly defined policy options.

We re-weighted the MEPS household data to reflect population control totals reported in the 2005 March CPS data. These weight adjustments were performed with an iterative proportional-fitting model, which adjusts the data to match approximately 250 separate classifications of individuals by socioeconomic status, sources of coverage and job characteristics in the CPS.[1] Iterative proportional fitting is a process where the sample weights for each individual in the sample are repeatedly adjusted in a stepwise fashion until the database simultaneously replicates the distribution of people across each of these variables in the state.[2]

This approach permits us to simultaneously replicate the distribution of people across a large number of variables while preserving the underlying distribution of people by level of healthcare utilization and expenditures as reported in MEPS. These data can be further "tuned"

[1] To bolster sample size for state level analyses, we have pooled the CPS data for 1998 through 2001. This is important when using the model to develop state-level analyses.

[2] The process used is similar to that used by the Bureau of the Census to establish final family weights in the March CPS.

in the re-weighting process to reflect changes in health service utilization levels (e.g., hospitalizations).[3] This approach implicitly assumes that the distribution of utilization and expenditures within each of the population groups controlled for in this re-weighting process are the same as reported in the MEPS data.

We also "aged" the health expenditure data reported in the MEPS database to reflect changes in the characteristics of the population through 2006. These data are adjusted to reflect projections of the health spending by type of service and source of payment in the base year (i.e., 2006). These spending estimates are based upon health spending data provided by CMS and detailed projections of expenditures for people in Medicare and Medicaid spending across various eligibility groups. The result is a database that is representative of the base year population by economic and demographic group, which also provides extensive information on the joint distribution of health expenditures and utilization across population groups.

2. Employer Database

We re-weighted the MEPS household data to reflect population control totals reported in the 2005 March CPS data. The model includes a database of employers for use in simulating policies that affect employer decisions to offer health insurance. We used the survey of employers conducted by the Kaiser Family Foundation and the Health Research and Educational Trust (HRET). These data include about 2,000 randomly selected public and private employers with 3 or more workers, which provide information on whether they sponsor coverage and the premiums and coverage characteristics of the plans that insuring employers offer.

We statistically match each MEPS worker with one of the firms in the Kaiser/HRET data. Experience has shown that it is important that the individuals assigned to each firm be consistent with the employer's workforce characteristics. The Kaiser/HRET data provide information on the distribution of workers by wage level. However, additional information such as age of worker and family/single status for insured people are not included in the database. To use these data in our analysis, we statistically matched the Kaiser/HRET data with employers surveyed in the 1991 Health Insurance Association of America (HIAA) employer survey data, which provides detailed information on the characteristics of each employer's workforce including number of workers by:[4]

Full-time/part-time status;

- Age;
- Gender;
- Coverage status (eligible enrolled, eligible not enrolled and ineligible);
- Policy type for covered people (i.e., single/family); and
- Wage level;

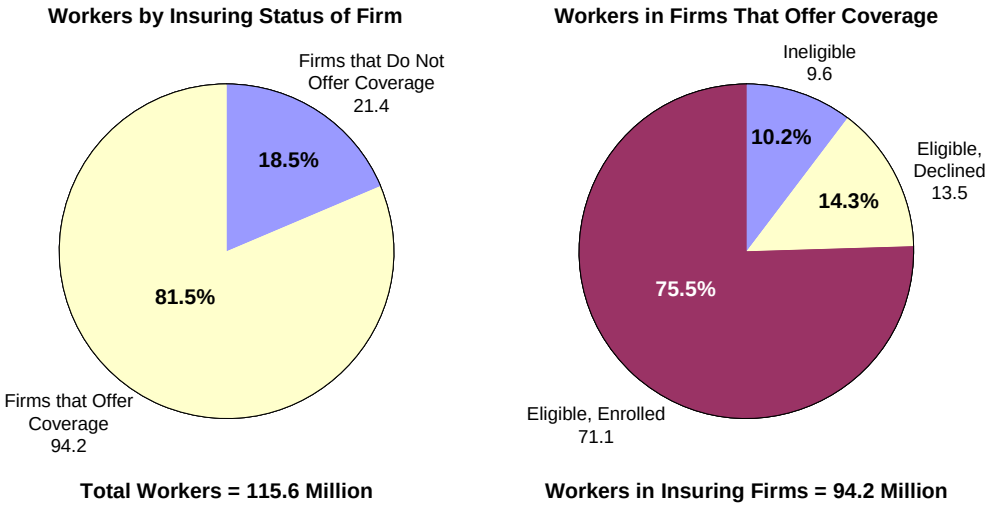
The employer health plan eligibility data in the database is important to simulations of policies affecting employers. One important consideration is that many of those who do not have employer coverage work for a firm that offers coverage to at least some of their workers. About

[3] Feature not used for RWJF study.

[4] We controlled for worker wage levels, industry, firm size and other characteristics when matching these firms.

81.5 percent of all workers are employed by a firm that covers at least some of their workers (***Figure* 2**). However, only about 75 percent of these people are eligible and enrolled. About 10.2 percent are ineligible and about 14.3 percent are eligible but have declined coverage.[5]

Figure 2
[6]Workers by Employer Insurance Status (in millions)



The model controls for the workforce characteristics for each firm in matching individuals to firms. While the firm data provide information on the number of people in the firm with these characteristics, they do not provide the "joint distribution" across these groups (e.g., by age, sex, income etc.). We estimate the joint distribution for each firm using a process called "iterative proportional fitting." In this approach, we begin with the joint distribution of workers across these variables as reported nationally in the CPS, and scale them in an iterative process so that in the aggregate they replicate the aggregate number of workers in the firm for each worker characteristic. Each non-zero cell of the joint distribution matrix for each firm is treated as an individual worker, who is matched to MEPS individuals based upon these individual characteristics.

Thus, if a firm reports that it employs mostly low-wage female workers, the firm tended to be matched to low-wage female workers in the MEPS data. This approach helps assure that Kaiser/HRET firms are matched to workers with health expenditure patterns that are generally consistent with the premiums reported by the firm. This feature is crucial to simulating the effects of employer coverage decisions that impact the health spending profiles of workers going into various insurance pools. Controlling for the joint distribution of workers within firms is crucial to simulations of program impacts because premiums and behavioral responses vary widely by age, wage level, part time/full-time status and the number of workers with dependents.

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5 HBSM baseline data based upon Lewin Group Analysis of the February and March CPS data for 1997.

6 For example, it tells us how many workers there are in each of four age groups and the number of workers who are male and female, but it does not tell us how many of the people in each age group are males and how many are females.

C. Medicaid Eligibility Expansion Simulations

HBSM simulates a wide variety of changes in Medicaid and SCHIP eligibility levels for children, parents, two-parent families, and childless adults. It models changes in: certification period rules, deprivation standards (i.e., hours worked limit for two-parent families), "deeming" of income from people outside the immediate family unit and other refinements in eligibility. As under the program, the model simulates eligibility on a month-by-month basis to estimate part-year eligibility.

The model estimates the number of people eligible for the current Medicaid program and under various eligibility expansions using the actual income eligibility rules used in each state for Medicaid and SCHIP. The model then simulates the decision to participate based upon a multivariate analysis of how program participation varies with income, availability of employer coverage, income and demographic characteristics and health status. As discussed above, the model estimates program costs based upon the per-member per-month (PMPM) costs in the existing program in each state by eligibility group, which we adjust to reflect the unique age and sex composition of the newly eligible population.

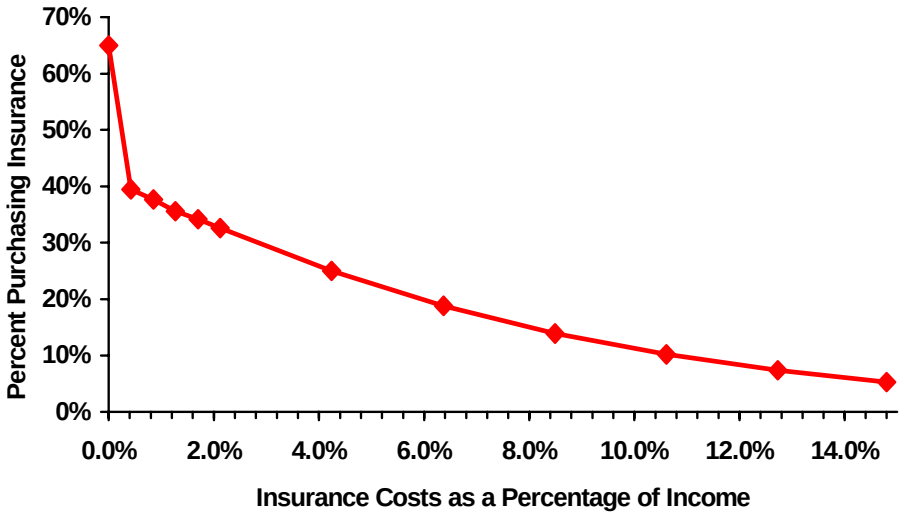
Our estimates indicate that only about 72 percent of people eligible for Medicaid enroll, although enrollment varies widely by eligibility group (e.g., children, parents, aged etc.). Thus, not all eligible people are expected to enroll in Medicaid when they become eligible. Based upon our multivariate participation analysis, we estimate the on average, Medicaid enrollment for non-disabled adults and children would average about 70 percent for uninsured people and about 39 percent for people with access to employer-sponsored insurance (ESI). Based upon a multivariate model of participation rates in programs requiring a premium, we estimate that premiums reduce participation by 37 percent or more, depending upon the amount of the premium (***Figure 3***).

Our estimates of "crowd-out" (i.e., people shifting from ESI to public coverage) are derived directly from our multivariate model of participation. As discussed above, we estimate that the participation rate for people with access to ESI is about 39 percent. We developed this estimate of take-up rates for people with access to ESI based upon coverage information on children who are eligible under the children's Medicaid eligibility expansions to the FPL implemented in the early 1990s. Using the 1997 March CPS data, we were able to identify children with a parent who was covered by ESI. Because virtually all employer plans provide family coverage as an option - although workers often pay up to the full cost – we assumed that all of these children were eligible for ESI. This provided a basis for estimating separate participation rates for children with and without access to ESI, thus enabling an estimate of "crowd-out" for each policy simulation.

Many eligibility expansion proposals would include a waiting period requirement, which means that individuals must be without employer coverage for at least 12 months to be eligible. The MEPS household data include the information required to simulate the impact of this provision, including exemption for people changing jobs. This approach provides an impact of potential crowd-out with and without the waiting period requirement.

Finally, we estimate an increase in enrollment among the currently eligible but not enrolled population resulting from expansions in eligibility for Medicaid and SCHIP, which has been called the "spill-over." This estimate is based upon evaluations of programs that expand coverage for children to higher income groups. One study of a coverage expansion for children in California indicated that for each newly eligible child enrolled, up 0.86 currently eligible but not enrolled children also enrolled. Similar results have been reported for SCHIP outreach programs around the country. These results are used as a basis for modeling the spill-over effect associated with Medicaid eligibility expansions.[7]

Figure 3
Estimated Percentage of People Who Will Take Subsidized Coverage by Premium Cost as a Percentage of Family Income



a/ Based upon percentage of people eligible to participate in Medicaid who enroll.
b/ Probabilities of enrollment initially based upon the percentage of people without insurance who purchased non-group coverage by family income as a percentage of income.
Source: Lewin Group Estimates.

D. Employer and Employee Take-up Simulations

HBSM models the effects of proposals designed to expand coverage by changing the cost of insurance to the employer and the employee. These include employer tax credits, premium subsidies and other programs that subsidize and/or reduce the cost of insurance to the employer. We assume that premium subsidies will be viewed by employers and employees as a reduction in the cost of insurance, resulting in a price response by both employers and workers. We estimate these price responses using Lewin Group multivariate analyses that measure how the likelihood of offering and taking coverage carries with the price of coverage.

[7] Christopher Trenholm and Sean Orzol,"The Impact of the Children's Health Initiative (CHI) of Santa Clara County on Medi-Cal and Healthy Families Enrollment," (report to the Davil and Lucile Packard Foundation), Mathematica Policy Research, inc., September 2004.

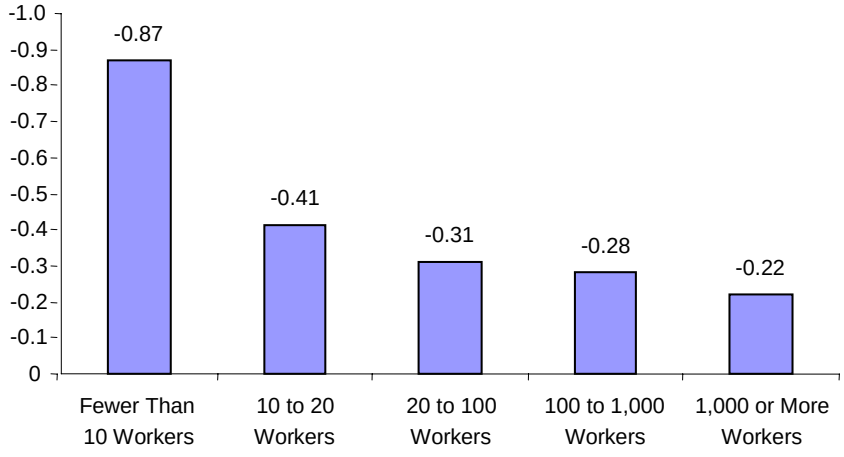
In this section, we explain how we simulate employer and employee take-up in proposals that provide premium subsidies, and present some illustrative results.

1. Employer Decisions to Provide Coverage

We developed a multivariate model of the employer decision to offer coverage which reflects the impact of price on the employer's purchase decision. We used the 1997 RWJF Survey of Employers which provides data on a representative sample of establishments. These data include information on the size of the firm, industry and workforce characteristics of establishments. Data include both firms that offer insurance and those that do not. It also provides information on the characteristics of the health plans offered by each employer including premium costs and the share of the premium paid by the employer. These data were used to estimate a multivariate model that shows how the likelihood that a firm will offer coverage varies with wage level, workforce composition, firm size, industry, other firm characteristics and the price of health insurance.[8]

The effect of price on the purchase of a good or service is typically summarized by what economists call "price elasticity." For example, the implicit price elasticity for firms with under ten employees is -.87. This means that for each 1.0 percent reduction in price, there is an increase of 0.87 percent in the number of firms offering insurance. The implicit price elasticity declines as firm size increases to -0.41 for firms with 10 to 20 workers, and -0.22 for firms with 1,000 or more workers (***Figure 4***).

Figure 4
Employer Health Insurance Price Elasticity Estimates by Firm Size [a/]



a/ Based upon multivariate analysis of the 1997 Robert Wood Johnson Foundation (RWJF) Survey of Employer Characteristics. "Health Benefits Simulation Model (HBSM)," The Lewin Group, August 2003.
Source: Lewin Group estimates using the Health Benefits Simulation Model (HBSM).

8 While the RWJF data includes premium information for employers that offer coverage, no data is provided on the premiums faced by firms that do not offer coverage. To model the price effect we imputed premiums to non-insuring firms with a multivariate model of how premium levels vary with the workforce and firm characteristics that we estimated from the RWJF data on insuring establishments.

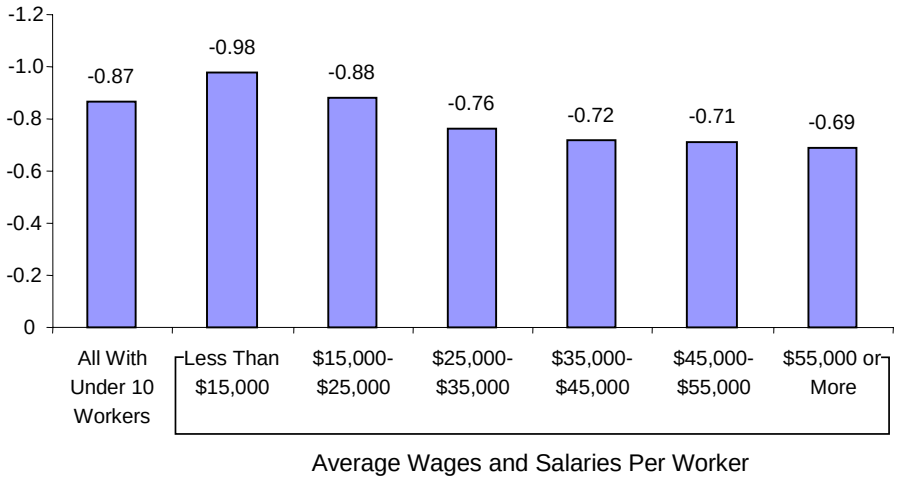
The model simulates the effect of employer premium subsidies using this multivariate model of the employer decision to offer coverage. For each non-insuring employer in the data, we estimate the change in the price of insurance resulting from the premium subsidies. The model then simulates the decisions to offer coverage based upon the predicted price elasticity for the employer.

The model reflects variations in firm price elasticity depending upon the characteristics of the firm. For example, the model shows that the firm price elasticity tends to decline as age and income rise, as shown in ***Figures 5*** and ***6***. This results in a lower estimated price elasticity among currently insuring firms -- averaging about -0.56 for firms with 10 or fewer workers -- because the employers that offer coverage tend to have older and more highly compensated workers.

In addition, we estimated multivariate models predicting the percentage of the premium paid by the worker using the RWJF employer data. These equations measure how premium shares vary with the characteristics of the firm, their workforce and the amount of the total premium. These amounts are used to estimate the cost of insurance for workers in each firm selected to offer coverage in response to the program.

Once firms are selected to offer coverage, we simulate enrollment among workers assigned to these plans. The enrollment decision is simulated with a multivariate model of the likelihood that eligible workers will take the coverage offered to them based upon data reported in the 1996 MEPS data for people offered coverage through an employer. The model measures how take-up varies with the characteristics of the individual as well as the employee premium contribution required by the employer.

Figure 5
Employer Health Insurance Price Elasticity Estimates for Firms with Under 10 Workers by Average Wages and Salaries per Worker [a/]



a/ Based upon multivariate analysis of the 1997 Robert Wood Johnson Foundation (RWJF) Survey of Employer Characteristics. "Health Benefits Simulation Model (HBSM)," The Lewin Group, August 2003.
Source: Lewin Group estimates using the Health Benefits Simulation Model (HBSM).

Figure 6
Employer Health Insurance Price Elasticity Estimates for Firms with Under 10 Workers by Age of Workers [a/]

a/ Based upon multivariate analysis of the 1997 Robert Wood Johnson Foundation (RWJF) Survey of Employer Characteristics. "Health Benefits Simulation Model (HBSM)," The Lewin Group, August 2003.
Source: Lewin Group estimates using the Health Benefits Simulation Model (HBSM).

2. Individual Take-up of Health Insurance

Also, some proposals provide tax credits to individuals for the purchase of private coverage, which can include employee contributions for ESI and premium payments for non-group coverage. We simulate the impact of these proposals based upon a multivariate analysis of how the likelihood that an individual will take coverage varies with the amount of the premium. This estimate is based upon a pooled time-series cross-section analysis of private employer coverage reported in the Current Population Survey for the 1987 through 1997 period.[9] These analyses indicate a price elasticity of -0.34 percent, which means that on average, a one percent real reduction (i.e., inflation adjusted) in private employer premiums, corresponds to an increase in the percentage of people with insurance of 0.34 percent.[10]

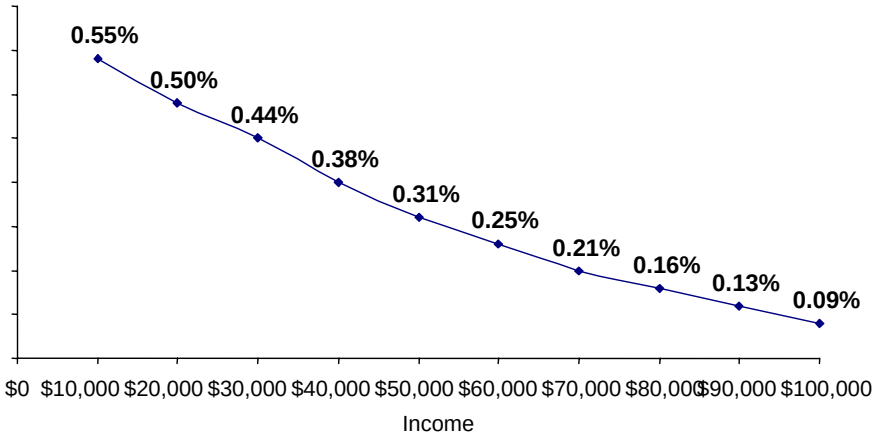
Our price elasticity estimates vary by age, income and other demographic characteristics. For example, the percentage increase in coverage resulting from a one percent reduction in premiums ranges from a high of 0.55 percent among people with incomes of $10,000 to 0.09 percent among people with incomes of $100,000 ***(Figure 7)*** (i.e. a price elasticity of –0.55 to –0.09). Similarly, the percentage increase in coverage resulting from a one percent reduction in premiums ranges from 0.46 percent for people age 20 to 0.30 percent among people age 60 ***(Figure 8)*** (i.e. a price elasticity of –0.46 to –0.30). Thus, the model shows that older people and

[9] This required imputing premiums based upon employer survey data developed by the Kaiser Family Foundation (KFF) and the Health Research and Education Trust.

[10] See Sheils, J., Haught, R., "Health Insurance and Taxes: The Impact of Proposed Changes in Current Federal Policy", (report to The National Coalition on Health Care), The Lewin Group, October 18, 1999.

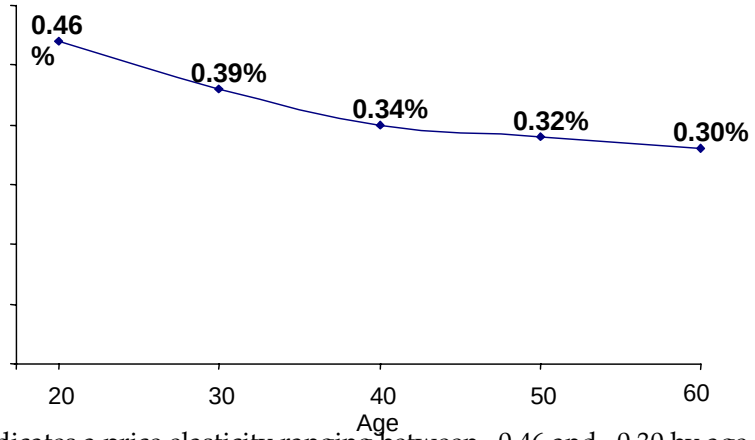
people in higher income groups are less sensitive to changes in price than other population groups.

Figure 7
Percentage Change in Coverage Resulting from a One-Percent Reduction in Premiums by Income Level (in percentages) a/



a/Indicates a price elasticity ranging between –0.55 to -0.09 by income.
Source: Lewin Group estimates.

Figure 8
Percentage Change in Coverage Resulting from a One-Percent Reduction in Premiums by Age (in percentages) a/



a/ Indicates a price elasticity ranging between –0.46 and –0.30 by age.
Source: Lewin Group estimates.

3. Reinsurance proposals

Some proposal would subsidize the cost of insurance for selected groups through reinsurance as under the "Healthy New York program." This program permits insurers to provide a streamlined benefits package that includes a government sponsored subsidy to reduce the cost of the benefits. Under the original Healthy New York program, the subsidy comes in the form of a reinsurance mechanism where the state reimburses insurers for 90 percent of costs over $30,000 up to the maximum of $100,000 ($100,000 is the maximum covered amount under the policy).[11]

To illustrate, ***Figure 9*** presents our estimates of the premiums by age for the health New York benefits package and a typical state worker benefits package with the reinsurance subsidy used in the Healthy New York program. We simulate take-up for employers based upon the amount of the reduction in the premium using the employer price response model discussed above.

Figure 9
Estimated Cost of Selected Health Benefits Plans [a/]

Age group	Percent of Population By Age	Projected PMPM Premiums With Reinsurance in 2006	
		State Worker PPO Plan (Coventry)	Healthy New York
Premiums by Age for Program Net of Reinsurance Subsidy			
<1	0.5%	$1,502.26	$1,236.79
01-04	4.6%	$200.47	$165.05
05-09	7.2%	$94.75	$78.01
10-14	9.6%	$88.06	$72.50
15-17	6.5%	$109.03	$89.77
18-19	4.4%	$129.09	$106.27
20-24	6.0%	$130.40	$107.36
25-29	3.3%	$220.93	$181.89
30-34	6.1%	$235.72	$194.08
35-39	7.9%	$235.42	$193.81
40-44	9.4%	$263.25	$216.72
45-49	10.6%	$313.22	$257.86
50-54	10.3%	$405.72	$334.02
55-59	8.2%	$469.40	$386.45
60-64	5.4%	$650.45	$535.50
Average Premium to Participant PMPM Single Family		**$266.04 $312.49 $784.26**	**$219.05 $257.54 $646.35**
State Subsidy PMPM		**$31.44**	**$27.45**
Total Cost PMPM		**$297.48**	**$246.50**

a/ Estimates include benefits and administrative costs.
Source: Lewin Group estimates.

[11] New York recently revised the reinsurance component of the program to cover 90 percent of costs over $5,000 per person up the $75,000.

4. Wage Effects

We assume that changes in employer costs for health benefits are passed-on to workers in the form of changes in wages. Thus, increases in employer costs are assumed to be passed-on to workers in the form of reduced wages while decreases in health benefits expenses are passed-back to employees in the form of increased wages. We assume that this wage adjustment would occur among government employers as well, assuming that government compensation packages over-time would be adjusted to remain competitive in the labor markets. Economists expect these wage adjustments will occur in both unionized and non-unionized workplaces.

Our pass-through assumption is based upon the economic principle that the total value of employee compensation, which includes wages, employer payroll taxes, health benefits and other benefits, is determined in the labor markets. Thus, for example, a reduction in the cost of one form of compensation would cause wages and other compensation to be bid up in the labor markets resulting in an eventual pass-through of these savings to the worker. Similarly, increases in compensation costs would lead to reductions in wage growth or other benefits to reflect the change in costs.

There is considerable agreement among economists that these wage adjustments would occur in response to changes in employer benefits costs. However, there is disagreement over the period of time over which these adjustments would occur. It is likely that these adjustments would often take the form of reduced wage growth over-time. However, the full amount of the wage pass-through could take two or more years to fully materialize. For illustrative purposes, we assume that these wage effects occur in the first full year of the program. We also present our wage change estimates on an after-tax basis.

We assume that changes in employer costs for retiree health benefits would not be passed-through to workers as changes in wages. This is because retiree benefits costs are related to prior employer commitments that have little impact on the current labor markets. Thus, savings in retiree benefits are assumed to accrue to the employer. While these changes in employer profits could affect investor incomes, we do not model these effects here.

5. Employer Price Elasticity Estimates Compared

Our firm price elasticity estimates are similar to those estimated by several researchers. For example, Hadley and Reschovsky estimated a price elasticity of -0.63 for firms with fewer than ten workers, and -0.30 for firms with between 10 and 24 workers.[12] They showed variations in firm price elasticity by age and income. Gruber estimated a firm price elasticity of between -0.66 to -0.99 for firms with fewer than 50 workers.[13] However, some studies show larger firm price elasticity estimates. For example, Feldman estimated a firm price elasticity of between -3.9 and -5.5.[14] Blumberg and Nichols recently estimated a firm price elasticity of up to -1.8 for firms with

[12] Hadley, J. and Reschovsky, J., "Small Firms' Demand for Health Insurance: The Decision to Offer Insurance," *Inquiry* 39:118-137, 2002.

[13] Gruber, J., Lettau, M., "How Elastic is the Firm's Demand for Health Insurance?," (report to the National Bureau of Economic Research), Working Paper 8021, November 2000.

[14] Feldman, R., et al., "The Effect of Premiums on the Small Firm's Decision to Offer Health Insurance," *Journal of Human Resources*, vol. 32, no. 4 (fall 1997), pp. 637-658.

fewer than 10 workers, dropping to -0.66 for firms with 10 to 24 workers and -0.25 for firms with 100 or more workers.[15]

However, all of these price elasticity estimates yield very little change in the number of people with coverage. In all of these studies, the estimated price elasticities are large only for the smallest firms. For example, a 25 percent reduction in premiums (e.g., in the form of a tax credit) for firms with under 50 workers would cover about 3.0 million workers using our price elasticity assumptions, which is only about 10.1 percent of workers without coverage in this firm size group (***Figure 10***). Results are similar under the various firm price elasticity estimates.

The estimated impact is small because the price elasticity yields a percentage increase in the number of people with coverage in each firm size group, which is already quite small. There are about 19.2 million workers in firms with under 50 workers who had insurance in 2003. In this example, the estimated percent increase for all with under 50 workers was 15.5 percent [i.e., the weighted average price elasticity for under 50 workers (-0.64) multiplied by the percent change in premiums (25 percent)]. This is then applied to the number of people in the affected group who now have coverage (about 19.2 million workers) to estimate the change in coverage, which we estimate to be about 3.0 million workers (i.e., 15.5 percent increase over 19.2 million covered workers).

[15] Blumberg, B., et al., "The Health Insurance Reform Simulation Model (HIRSM): Methodological Detail and Prototypical Simulation Results," (report to the U.S. Department of Labor), The Urban Institute, July 2003.

Figure 10
Comparison of Firm Price Elasticity Estimates

	Lewin [a/]	Gruber [b/]	Blumberg [c/]	Hadley & Reschousky [d/]
Estimated Price Elasticity				
Less than 10 Workers	-0.87	--	-1.8	-0.63
10-24 Workers	-0.41	--	-0.66	-0.30
25-100 Workers	-0.31	--	-0.25	-0.135 [e/]
Weighted Average for 1-50 Workers	-0.64	-0.66	-1.18	-0.45
Impact of a 25 Percent Reduction in Premiums for Firms With 50 or Fewer Workers				
Change in Number of Workers With ESI (thousands)	2,986	3,079	5,505	2,162
Percent of Workers in Non-insuring Firms Who Become Covered Under ESI	10.1%	10.4%	17.2%	7.3%

a/ John Sheils and Randall Haught, "Covering America: Cost and Coverage Analysis of Ten Proposals to Expand Health Coverage," Appendix A, (report to the Robert Wood Johnson Foundation (RWJF)), October 2003.
b/ Gruber, J., Lettau, M., "How Elastic is the Firm's Demand for Health Insurance?," (report to the National Bureau of Economic Research), Working Paper 8021, November 2000.
c/ Blumberg, B., et al.,"The Health Insurance Reform Simulation Model (HIRSM): Methodological Detail and Prototypical Simulation Results," (report to the U.S. Department of Labor), The Urban Institute, July 2003.
d/ Hadley, J. and Reschovsky, J., "Small Firms' Demand for Health Insurance: The Decision to Offer Insurance," *Inquiry* 39:118-137, 2002.
e/ Weighted average for the 25 to 50 worker and 50 to 100 worker firm size groups.
Source: Illustrative analysis by the Lewin Group.

E. Insurance Market Simulation Model

A number of proposals have emerged in recent years that would offer people a community rated alternative to private coverage, resulting in shifts in coverage and possibly adverse selection. Other proposals would alter the way in which insurance is regulated that would have differential impacts by age of policy-holder and other health risk groups. Examples of these policies include proposals to permit small employers to purchase coverage through the Federal Employees Health Benefits Program and creation of "association health plans (AHPs)" that are exempt from state insurance rating regulations.

We developed HBSM into a model of insurance markets. We did this by creating an employer database that holds information on both firm characteristics and the demographic and health spending information for each individual in those firms. Because no such database now exists, we matched firms in the KFF/HET data to individuals in the HBSM MEPS household data such that for each firm, there is one MEPS worker for each of the workers that each firm reported they employed. This type of database is typically referred to as a "Synthetic Firm" database.

Using these data, we can simulate the premiums each firm would be charged in their market based upon the rating practices and state regulations that apply in each state. The health expenditure data in the database permits us to simulate experience rating and medically underwritten premiums. These data provide a basis for estimating how employer premiums would be affected by changes in regulation of premiums. It also permits simulation of the

potential for adverse selection under proposals creating government sponsored insurance pools.

In this section, we describe the creation of the synthetic firm data and the methods used to simulate the effect of proposed health reforms. Our discussion is presented in the following sections:

- Creating Synthetic Firm Database;
- Rating methods for insurance pools;
- Take-up for non-insuring firms;
- Employer shift to less comprehensive coverage;
- Worker take-up; and
- Example policy simulation.

1. Synthetic Firms

To be able to simulate employer decisions under alternative health reform plans, it is necessary to develop a database of "synthetic firms" that include both detailed information on employer health plans and the health service use of each worker and dependent in each firm. We create one synthetic firm for each worker in the MEPS data. Once the worker is assigned to one of the KFF/HRET employers, we populate the firm by statistically matching each firm to a sample of workers randomly drawn from the MEPS data for 1999 through 2001, who match the workforce profiles estimated for each firm in the database.[16]

The model simulates health insurance premiums for each synthetic firm based upon the rating rules used in each state and reported health expenditures for workers and dependents assigned to each firm. Premiums are estimated for each firm based upon the rating rules that apply in the firm's state of residence. This includes the use of age rating and rating bands in the small group market where applicable, experience rating for larger firms and costs for self-funded plans. This simulation of the premiums employers face in the marketplace is crucial to analyses of proposals that would modify rating practices, or offer coverage alternatives such as small employer pools using their own rating methods.

Figure 11 presents the distribution of employers in the Lewin model by average benefits costs per-member-per-month (PMPM) under a standard benefits package. We estimate average premiums of about $283 PMPM in 2006, which includes benefits and administrative costs for employer health plans over the number of covered workers and dependents. There is wide variability in health plan costs due to differences in administrative costs, claims experience, health status rating and variations in rating practices across states.

Figure 12 illustrates that the variability in PMPM premium costs varies widely across employers by size of group. For example, among firms with fewer than 10 workers, PMPM premiums range from about $460 for firms in the 10 percent most costly firms compared with average costs of $157 for firms in the 10 percent least costly firms. By comparison, PMPM premiums in

[16] For example, an insuring firm with five low-wage females who work part-time would be matched to five low-wage females in MEPS who are working part-time and have employer coverage.

firms with 1,000 or more workers vary from $372 for the 10 percent most costly groups to $215 for the least costly 10 percent of firms.

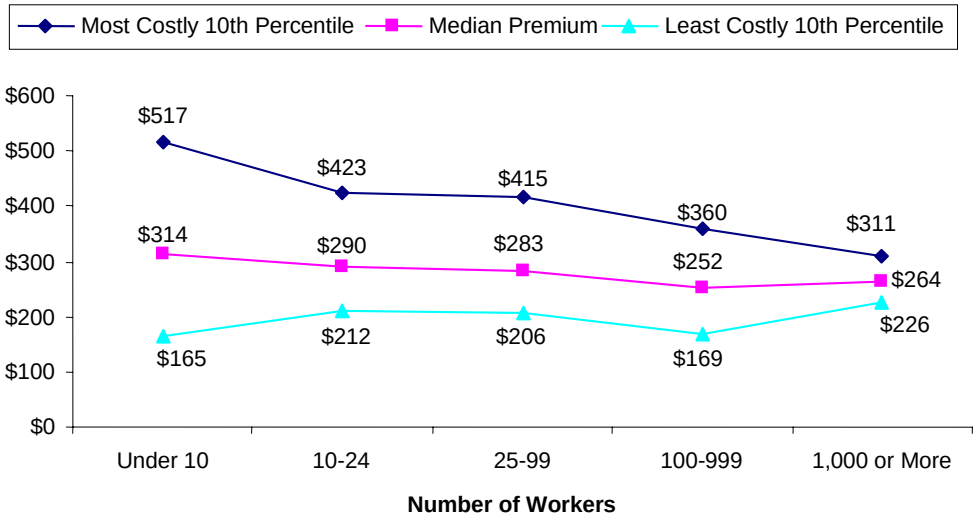
2. Modeling the Effect of Insurance Pools

One of the most crucial elements of insurance pooling models is the manner in which pool premiums are determined. As discussed above, group premiums in today's market typically vary with the age of the worker, health status and experience (i.e., claims history). Many proposals would use mechanisms for determining premiums in the pool that differ from those used in the insurance markets. This can have a dramatic effect on coverage and premiums in both the pool and the traditional insurance market. There are three ways in which premiums are set under most small group proposals. They include:

Figure 11
All Insuring Employers by Premium Cost PMPM in 2006:
Includes Benefits and Administration [a/]

a/ Estimates for a standard benefits package.
Source: Lewin Group estimates using the Health Benefits Simulation Model (HBSM).

Figure 12
Estimated Average Health Insurance Costs (PMPM) for Most Costly and Least Costly 10 Percent of Employer Groups in 2006: Includes Benefits and Administration [a/]



a/ Estimates for a standard benefits package.
Source: Lewin Group estimates using the Health Benefits Simulation Model (HBSM).

- **Uniform Pool Premium:** In this model, premiums in the pool are set at a single amount per enrollee regardless of age and risk factors. Some of those proposals that would extend FEHBP to small groups would permit plans to charge only a single uniform premium that varies only with family status (i.e., single vs. family etc.). This approach would tend to attract higher cost groups that find the premium in the pool to be less than what they are paying in the traditional insurance market.

- **Risk factor rating of pool premiums:** In this model, plans in the pool are free to set premiums according to any risk factors they choose. This means that pools can fully adjust for health status and age even in states that limit the use of health status and age ratings in the traditional market. Under this model, groups with younger and healthier members would tend to enroll in the pool because they can offer these groups lower premiums than can be charged in the traditional market. Premiums in the traditional market typically increase due to the migration of lower-cost people to the pool.

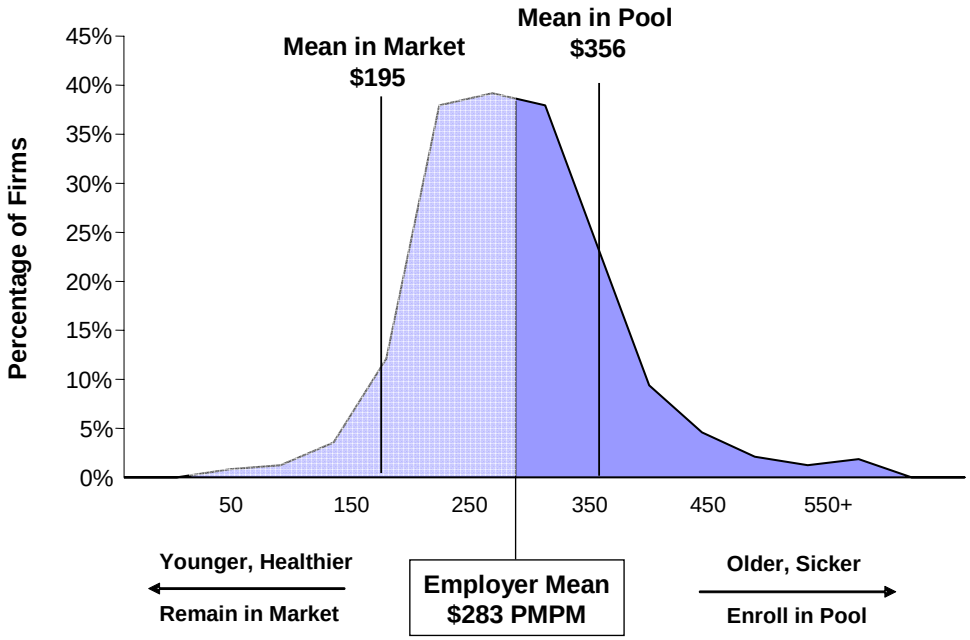
- **State rating laws apply in pool:** Under this approach, plans selling coverage in the pool must follow the same rating rules that apply to coverage sold in the traditional market, including limit on age and health status rating. Under this model, premiums in the pool are expected to be the same and in the insurance markets, except to the extent that the pool can achieve savings in administration and/or benefits costs.

Thus, if the pool is less able to vary premiums with risk factors than the insurers in the traditional market, the pool will tend to acquire a disproportionate share of high-cost groups, with lower cost people remaining in the traditional market. Conversely, if rating variation in the

pool is permitted to be greater than is required in the traditional insurance market, the pool will acquire lower-cost people that left the higher-cost population in the traditional insurance market. This phenomenon - known as "adverse selection" - can have significant implications for the distribution of groups across the pool and traditional insurance markets. This, in turn, will result in premium adjustments in the pool and the traditional insurance market, which will result in further shifts in coverage.

Figure 13 illustrates how the model would simulate a pool that is required to set its premiums based upon the average cost of people enrolled in the pool, regardless of risk characteristic. The figure shows the distribution of insuring firms based on the premiums the firms would pay per-member per-month (PMPM) under current insurer rating practices. If the pool were established with a uniform premium of $283 – which is our estimate of the average premium in the small group market in 2006 – firms with premiums in excess of that amount would enroll in the pool with the rest remaining in the traditional market. Under this example, the premium in the pool would need to be increased to $356 PMPM to collect premiums sufficient to meet pool costs.

Figure 13
All Insuring Employers by Premium Cost PMPM in 2006:
Includes Benefits and Administration [a/]



a/ Estimates for a standard benefits package.
Source: Lewin Group estimates using the Health Benefits Simulation Model (HBSM).

The model simulates these effects on the equilibrium price of insurance in an iterative process. For example, in this example the small pool premium is reset at $356 PMPM while the premium for those who remain in the traditional insurance market is adjusted to reflect the migration of more costly groups to the pool. Similarly, premiums in the traditional market are adjusted to reflect the accumulation of lower-cost people in the pool. Enrollment in the pool and the private

market is then re-simulated at these premium levels. This process is repeated multiple times to arrive at an equilibrium pool enrollment and premium estimate (equilibrium is defined to be the point where total costs are roughly equal to the cost of benefits and administration for the pool).

The model can also simulate the effect of permitting greater variation in premiums by risk factors than is permitted in the traditional market. Under this model, the pool would tend to accumulate lower-cost groups with higher-cost groups remaining in the traditional market. We simulate the resulting changes in premiums in the pool and the insurance markets using the iterative process described above; the pool and the insurance market are in equilibrium (i.e., premiums equal costs).

Pool premiums are affected by other factors as well. For example, some non-insuring employers are expected to enroll as coverage at a lower premium is made available to them. Also, some small group pool proposals permit the sale of coverage that is exempt from state regulations of insurance such as mandatory benefits and solvency standards. This would tend to attract lower-cost groups that are more willing to accept the reduction in benefits in exchange for the lower premium. Our approach to modeling these effects is summarized below.

3. Employer Decision to Shift to Lower Cost Plans

The impact of insurance pools on firms that already offer coverage is more complex in cases where benefits under the pool differ from those now offered by the employer. For example, the President has proposed the creation of small group insurance pools – called "Association Health Plans (AHPs)" – that would be exempt from state minimum benefits requirements. While the exemption from mandated benefits reduces the cost of insurance (estimated to be 5.0 percent to 7.5 percent), many employers will prefer to continue with their existing benefits.

We simulate the employer decision to shift to the less comprehensive coverage offered in the pool based upon studies of how people respond to changes in the price of insurance in employer groups offering a choice of health plans.[17] One study estimated that a 1.0 percent decrease in the price of an alternative source of coverage was associated with a 2.47 percent migration of enrollees to the alternative health plan (i.e., a cross-price elasticity of -2.47). However, these elasticity estimates vary by age and health status such that older and sicker people are less likely to switch plans in response to a given change in price (***Figure 14***).

These elasticity estimates are used to simulate the employer decision to shift into the pool. Using these assumptions, the model tends to shift younger and healthier groups into the pool, leaving higher cost groups in the private insurance market. This causes premiums to increase for those who remain in the traditional insurance markets. Costs for firms shifting into the pool are included when recalculating small group pool premiums.

[17] Stombom, B., Buchmueller, T., Feldstein, P. "Switching Costs, Price Sensitivity and Health Plan Choice," *Journal of Health Economics*, 21 (2002), 89-116.

Figure 14
Plan Switching Price Elasticity Estimates Used in HBSM

Age of Participant	Low Risk	High Risk a/
Under 31	-3.50	-2.78
31 to 45	-2.54	-2.54
Over 45	-2.07	-1.38

a/ People in the 90th percentile of health spending.
Source: Stombom, B., Buchmueller, T., Feldstein, P. "Switching Costs, Price Sensitivity and Health Plan Choice," *Journal of Health Economics*, 21 (2002), 89-116.

4. Employer Decision to Offer Insurance

Pooling proposals are typically designed to increase coverage among employers who do not currently offer insurance. However, if a significant portion of lower-cost groups migrate to the pool, premiums would increase for those left in the private market. This increase in private market premiums would result in a partially offsetting reduction in coverage among those with the highest costs.

The model simulates these changes in coverage for insuring and non-insuring firms. The model does this by calculating the difference between the premium they would pay for comparable coverage in today's insurance markets and the amount they would be charged under the rating methods used by the pool. Non-insuring firms are simulated to take the coverage based upon the change in price and our estimated firm price elasticity estimates presented above. Similarly, these price elasticity estimates are used to simulate the discontinuations of coverage among those facing premium increases in the private market.

5. Example Policy Simulation

President Bush has proposed the creation of AHPs which are essentially small group insurance pools. AHPs could be established to provide health insurance coverage to small employers (typically defined as firms with under 100 workers), within or across state boundaries. Costs within AHPs would be reduced by exempting these plans from state regulation of insurance, including mandatory benefits and solvency rules. Savings may also result from administrative efficiencies and large group purchases of health services. However, it is unclear whether the AHPs would be exempt from state regulations of rating practices.

We simulated the impact of this proposal under two alternative assumptions. In the first scenario, the AHPs are assumed to be required to rate policies in the same way they are rated in the private market under current law. This means that the primary cost advantage of the AHPs is that they are exempt from state mandated benefits and certain other regulations. In the second scenario, we assume that AHPs are exempt from state regulation and are permitted to set premiums for older and sicker groups at higher levels than are permitted under current state rating regulations. This means that the pool would have an additional cost advantage, in that they can charge younger and healthier groups a lower premium than is permitted in private insurance markets.

Under the first scenario (i.e., under current state rating laws), we estimated that AHP enrollment nationally would be about 6.0 million people. The number of uninsured would be reduced by about 400,000 people (***Figure 15***). We estimate that premiums in the AHPs would be about 5.2 percent lower than in the traditional insurance market resulting in about 490,000 uninsured people enrolling in the AHPs. However, premiums in the traditional market would actually increase by about 0.5 percent resulting in a partially offsetting reduction in coverage of about 90,000 people.

Figure 15
Summary Comparison of Alternative Estimates of AHP Impacts [a/]

	AHPs Subject to State Rating Regulations [b/]	AHPs Exempt from State Rating Regulations [c/]
Reduction (Increase) in Number of Uninsured (1,000s)	400	726
Uninsured Who Gain Coverage (1,000s)	490	924
Insured Who Lose Coverage (1,000s)	-90	198
Percent Changes in Premiums	-0.1%	1.0%
People Covered in AHP	-5.2%	-14.1%
People in Traditional Insurance Market	0.5%	2.5%
AHP Enrollment (1,000s)	5,990	13,388
Newly Insuring Firms (1,000s)	490	924
Firms Shifting to AHP (1,000s)	5,500	12,464

a/ The CBO and The Lewin Group studies assume that AHPs are open only to firms with fewer than 50 workers.
b/ Assumes AHPs are exempt from minimum benefits and reserve requirements but not exempt from state ratings regulations. See "Bush and Kerry Health Care Proposals: Cost and Coverage Compared," The Lewin Group, September 2004.
c/ The Lewin Group estimates of AHP impacts assuming that AHPs are exempt from state rating regulation.
Source: Compiled from published estimates.

In the second scenario, we permit AHPs to vary premium with risk factors beyond what is permitted under current state laws. Under this scenario, about 13.4 million people would be induced to take coverage through the AHPs. About 924,000 uninsured would obtain coverage. This would be partially offset by a reduction in coverage of about 198,000 people. These are people in firms facing an increase in premiums in the traditional market. There would be a net reduction in the number of uninsured of about 726,000 people under this scenario.

This example illustrates the model's ability to simulate the impacts of changes in the rating practices permitted under small group pools.

F. Tax Policy Simulations

The Current Population survey data provide information on tax payments and marginal income tax rates. These data are used to impute average and marginal tax rates for households in MEPS. These data are used to estimate the tax expenditure for health benefits and to estimate the value of tax deductions for health benefits.

Based upon an analysis of the CPS data on tax filings, we estimate that about 40 percent of all uninsured have no tax liability and are not required to file a tax return. However, about half of these people file even though not required to do so, presumably so that they can obtain any refund they are entitled to.

Figure 16
Distribution of Insured and Uninsured Tax Filers by Marginal Tax rate in 2004

	With Earnings	Without Earnings	Total	With Earnings	Without Earnings	Total
All Tax Filing Units in the US				**Uninsured Tax Filing units in US**		
Total Potential Filers	**119,981**	**39,367**	**159,348**	**23,004**	**5,016**	**28,020**
Non-Filers	**9,451**	**20,377**	**29,828**	**2,848**	**3,330**	**6,178**
All Filers by Marginal Tax Rate				**Uninsured Filers by Marginal Tax Rate**		
0	18,855	11,203	30,068	5,982	648	6,630
10	15,679	2,470	18,149	4,992	354	5,346
15	43,914	3,447	47,361	7,389	484	7,873
27	25,537	1,394	26,931	1,424	140	1,564
30	4,437	359	4,796	242	43	285
35	870	60	930	60	9	69
39	1,235	54	1,289	67	7	74
Total Filers	**110,530**	**18,990**	**129,520**	**20,156**	**1,686**	**21,842**

Source: Lewin Group Estimates Using the 2005 Current Population Survey (CPS) Data.