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## **Maryland Health Care Reform Simulation Model: Detailed Analysis and Methodology**

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## **Maryland Health Care Reform Simulation Model: Detailed Analysis and Methodology**

The Hilltop Institute at the University of Maryland, Baltimore County (UMBC), under agreement with the Maryland Health Benefit Exchange of the Maryland Department of Health and Mental Hygiene, has developed a Health Care Reform Simulation Model. The simulation model projects enrollment in the various health care coverage programs mandated by the Patient Protection and Affordable Care Act (ACA). It also projects increases in health care expenditures and estimates the economic impact of implementing the ACA on the state of Maryland through fiscal year (FY) 2020.

The simulation model projects the flow of new funds through the state economy resulting from the provision of health care coverage to newly insured individuals. Furthermore, the simulation model uses a standard economic analysis technique to forecast additional economic activity that will be generated from implementing the ACA.

### **Introduction**

The federal health care reform law and the states' implementation of its mandates will have a significant impact on health care expenditures in both the public and private sectors. Any current and future projections regarding additional expenditures and economic impact necessarily will be fluid and dependent on the various decisions that the state makes in implementing the ACA, as well as how various components of the delivery system—from the insurance markets to providers and consumers—respond to the reforms as they evolve.

Consequently, the goal in developing the health care reform simulation model was to build a dynamic simulation model that can be updated so its projections are revised as data become available, conditions and factors change over time, and decisions are made by policymakers, employers, and consumers. The simulation model focuses on the new enrollments, expenditures, and economic activity resulting from health care reform. As such, the basic approach was to compare the new expenditures associated with health care reform with a baseline assumption of what those expenditures would have been in the absence of reform.

In reviewing this methodology document, consider the following information:

- The simulation model should be updated as actual data and decisions emerge.
- The simulation model does not address the state's baseline budget, including possible short-term challenges related to growth in Medicaid enrollment and other factors. Because these factors are independent of health care reform and are not an implication of the ACA itself, they are not included in the simulation model.



## **Overview of the Maryland Health Care Reform Simulation Model**

The Maryland health care reform simulation model consists of four major component models that determine the impact of implementing the ACA on Maryland’s health care expenditures and economy: the population, employment, health care expenditure, and economic impact models.

### **Population Model**

The population model uses projections of Maryland’s total population by age group, and number of uninsured individuals, by age group and federal poverty level (FPL), to both estimate the number of people who will be eligible for Medicaid expansion and project the number of individuals who are currently eligible yet not enrolled in Medicaid, but who are likely to enroll with implementation of the health care reform law (described as the “woodwork effect”). The model also projects the number of uninsured people who are candidates for coverage through the Maryland Health Benefit Exchange (the Exchange). It uses population projection data from the Maryland Department of Planning, as well as estimates of the number of uninsured individuals, by age group and FPL, derived from the 2011 Current Population Survey, which is conducted by the U.S. Census Bureau.

### **Employment Model**

The employment model projects total employment and employer-sponsored insurance coverage in the state. This model uses data from Medical Expenditure Panel Survey (MEPS), conducted by the federal Agency for Healthcare Research and Quality (AHRQ), and employment data from the Maryland Department of Labor, Licensing, and Regulation. In addition, the model uses the long-term economic forecast published by the U.S. Congressional Budget Office (CBO), entitled “The Budget and Economic Outlook: Fiscal Years 2012 to 2022,” which forecasts the national unemployment rate. The employment model contains three simulation sub-models, which are based on the publicly available literature:

- Employer offer of insurance
- Employee take-up of insurance
- Direct purchase of insurance

### **Health Care Expenditure Model**

The Health Care Expenditure Model forecasts summaries of new health care expenditures, including state expenditures and out-of-pocket expenditures of individuals with new health care coverage, to estimate total new health care expenditures. The estimates of health care expenditures are based on projections of the population and employment models that are specific to Maryland, as well as detailed calculations based on the ACA. The expenditure model projects expenditures for:



1. Medicaid coverage expansion to individuals below 139 percent of the FPL<sup>1</sup>
2. Transfer of Primary Adult Care (PAC) program enrollees to Medicaid expansion
3. Medicaid "woodwork" effect
4. Medicaid and Maryland Children's Health Program (MCHP) administration expenditures
5. Total health care expenditures through the Exchange
6. Expenditures for increasing payments to primary care physicians to 100 percent of Medicare fees
7. State Employees and Retirees Health Insurance

The expenditure model also forecasts new expenditures from individuals for copayments and deductibles, and new federal funds that will flow into the state economy, including subsidies (tax credits) paid to individuals with incomes between 133 and 400 percent of the FPL for purchasing health insurance coverage through the Exchange, and payments for Medicaid expansion.

### **Economic Impact Model**

To estimate the economic impact of the ACA on the state of Maryland, the simulation model uses projections of the flow of new funds through the state economy, resulting from the provision of health care coverage for newly insured individuals. We used IMPLAN<sup>2</sup> economic modeling software to estimate additional economic activity that will be generated from increased expenditures in the health care sector. IMPLAN uses Maryland-specific data for its projection of new economic activities. The software employs a standard mathematical economic technique called input-output model<sup>3</sup> to project additional economic activity that will be generated from implementing the ACA.

The sub-models of the Maryland health care reform simulation model are explained in more detail below.

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<sup>1</sup> The Affordable Care Act expands Medicaid eligibility to people with income up to 133 percent of the FPL. It also allows 5 percent income disregard for determining eligibility for Medicaid, effectively raising Medicaid eligibility income level to 138 percent of the FPL.

<sup>2</sup> Additional information regarding IMPLAN software is available at: <http://implan.com/V4/Index.php>

<sup>3</sup> The input-output model was developed by Wassily Leontief in 1941, who won the Nobel Prize in 1973 for developing the model. Further information about the input-output model is available at: [http://en.wikipedia.org/wiki/Input-output\\_model](http://en.wikipedia.org/wiki/Input-output_model)



## Detailed Description of the Maryland Health Care Reform Simulation Model

### Population Model

To determine the number of individuals who are eligible for the current Medicaid and PAC programs, we used the following methodology and data sources to estimate Maryland population by age group, disability status, and FPL status:

The U.S. Census Bureau released the 2010 Census data for Maryland's population by age group. The Maryland Department of Planning provided population projections by age group through the year 2020. We used rates of growth implicit in the population projections by age group to project Maryland's population through 2020. Table 1 shows population projections in five-year increments.

**Table 1. Maryland Population Projections by Age Group**

Age Group	2010	2015	2020
0-4	364,488	374,765	384,736
5-20	1,230,877	1,222,078	1,251,775
21-44	1,872,572	1,873,512	1,941,528
45-64	1,597,972	1,651,143	1,637,289
65+	707,642	840,515	1,000,827
<b>Total</b>	<b>5,773,551</b>	<b>5,962,013</b>	<b>6,216,155</b>

Source: Maryland Department of Planning, March 2012 Forecast

The U.S. Census Bureau publishes data from the Current Population Survey (CPS) (U.S. Census Bureau, 2011). The CPS data for Maryland provided estimates of population distribution by age group, disability, and FPL status. Tables 2 and 3 show the CPS data for 2010.



**Table 2. Maryland Disabled Population  
by Percentage of Federal Poverty Level and Age, 2010**

Percentage of Federal Poverty Level (FPL)	Age Group			Total
	0-20	21-64	65 and older	
<b>Under 50%</b>	5,355	31,633	10,248	47,236
<b>50 - 99 %</b>	857	44,167	29,003	74,027
<b>100 - 124%</b>	1,090	13,932	16,141	31,163
<b>125 - 199%</b>	1,957	37,948	52,024	91,929
<b>200 - 299%</b>	3,024	36,369	52,582	91,975
<b>300 - 399%</b>	3,188	40,395	41,271	84,854
<b>400% +</b>	8,270	82,329	71,304	161,903
<b>Total</b>	<b>23,741</b>	<b>286,773</b>	<b>272,573</b>	<b>583,087</b>

Source: U.S. Census Bureau. Current Population Survey, 2011



**Table 3. Maryland Non-Disabled Population  
by Percentage of Federal Poverty Level and Age, 2010**

Percentage of Federal Poverty Level (FPL)	Age Group			Total
	0-20	21-64	65 and older	
<b>Under 50%</b>	29,877	146,256	15,714	191,847
<b>50 - 99 %</b>	28,204	155,302	27,880	211,386
<b>100 - 124%</b>	16,457	92,246	27,006	135,709
<b>125 - 199%</b>	71,774	371,495	76,037	519,306
<b>200 - 299%</b>	78,840	503,257	102,927	685,024
<b>300 - 399%</b>	73,268	515,893	75,848	665,009
<b>400% +</b>	291,287	2,246,555	250,160	2,788,002
<b>Total</b>	<b>589,707</b>	<b>4,031,004</b>	<b>575,572</b>	<b>5,196,283</b>
<b>Total Disabled and Non-Disabled (sum of Tables 2 and 3)</b>	<b>613,448</b>	<b>4,317,777</b>	<b>848,145</b>	<b>5,779,370</b>

Source: U.S. Census Bureau. Current Population Survey, 2011

We then estimated an econometric model that forecasted Maryland’s unemployment rate as a function of the national unemployment rate. The R-squared<sup>4</sup> for the model is approximately 99 percent. The econometric model is a linear regression of Maryland’s unemployment rate as a function of the national unemployment rate. Monthly data for 2005 through 2010 were used for estimation of the econometric model. Although a small amount of auto-correlation was present in the data, because the estimated model was applied to annual unemployment rates, it was not problematic for forecasting purposes.

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<sup>4</sup> R-squared shows the goodness of fit and level of accuracy of the estimated model. A perfect fit of the estimated model to the data has an R-squared equal to 100 percent.



Next, we used the long-term economic forecast published by the CBO, entitled “The Budget and Economic Outlook: Fiscal Years 2012 to 2022,” which forecasts the national unemployment rate. Using the CBO’s forecast and the estimated econometric model of the relationship between Maryland’s unemployment rate and that of the nation, we forecasted Maryland’s unemployment rate through 2020. Table 4 shows the unemployment rate projections for the nation and for Maryland through 2020.

**Table 4. Unemployment Rate Projections for the United States and Maryland, 2012-2020**

Unemployment Rate	2012	2013	2014	2015	2016	2017	2018	2019	2020
<b>United States</b>	8.8%	9.1%	8.7%	7.4%	6.3%	5.7%	5.5%	5.5%	5.4%
<b>Maryland</b>	6.9%	7.0%	6.9%	5.8%	5.0%	4.5%	4.3%	4.3%	4.3%

The population projection data were used in conjunction with the CPS data in Tables 2 and 3 to derive estimates of population by age group, disability, and poverty status for the 2010 to 2020 period. For this projection, we also utilized research demonstrating that changes in the distribution of population by FPL status are related to the unemployment rate (Gruber & Levitt, 2002). Then, we derived estimates of projected population below 138 percent of the FPL, based on the number of people below 125 percent of the FPL, plus a portion of the number of people between 125 and 199 percent of the FPL.

In the next step, we used actual Medicaid enrollment data to derive take-up (i.e., participation) rates for the population with disability and the population with no disability. To establish a baseline, we projected Medicaid enrollment by disability status without health care reform. Then, we derived projections of Medicaid enrollment by disability status, age group, and poverty status under current laws, in which changes in Medicaid enrollment primarily reflect changes in economic conditions and increases in Maryland’s overall population. We also used actual enrollment data for the PAC program to derive the take-up rate in this program and project PAC enrollment through the forecast period.

Subsequently, we assumed that, to implement health care reform in Maryland, the state will employ aggressive outreach programs to enroll currently eligible individuals who have not participated in the Medicaid program. To project the woodwork effect, we considered the increase in Medicaid enrollment in currently eligible individuals, beginning in 2014, based on health care reform effects such as Medicaid expansion, the individual mandate, and creation of the insurance Exchange. Based on an Urban Institute study (Holahan, Kenney, & Pelletier 2010), we assumed that individuals who enroll due to the woodwork effect would have better health status than existing Medicaid enrollees with disability. In other words, take-up is related to health status (i.e., selection bias) (The Henry J. Kaiser Family Foundation, 2010), such that individuals who enroll due to the woodwork effect will be less disabled, and their health status will be similar to the current Medicaid expansion enrollees. Consequently, we assumed that most eligible individuals with a disability will have enrolled in the Medicaid program by 2014, and



that there will be minor increases in take-up rates for people with disabilities in 2015 and 2016. We also assumed modest increases in take-up rates for the population with no disability.

We assumed that enrollment in the PAC program of childless adults with incomes below 116 percent of the FPL will increase substantially in 2014, 2015, and 2016, as the benefit package available to these individuals becomes the comprehensive Medicaid benefits, which fulfills many of their unmet needs (Mathematica Policy Research, Inc., 2009). These projections were used as part of the enrollment projections for Medicaid expansion (up to 138 percent of the FPL).

Because childless adults who are enrolled in PAC do not have full Medicaid coverage, these individuals will be considered as part of the Medicaid expansion population beginning in January 2014. As such, this population’s projected enrollment is included in the Medicaid expansion enrollment.

### Eligibility for Medicaid Expansion and Coverage through the Exchange

We used CPS data regarding the total number of uninsured individuals and the number of non-citizen uninsured individuals in Maryland by age group and income as a percentage of the FPL status. Based on these data, we estimated the number of uninsured U.S. citizens in Maryland who would be eligible for Medicaid expansion coverage or for coverage through the Exchange (Tables 5 and 6).

**Table 5. Total Number of Uninsured Individuals in Maryland by Percentage of Federal Poverty Level in 2009 and 2010**

Age Group	Percentage of Federal Poverty Level (FPL)						Total
	Below 50%	50% to below 125%	125% to below 150%	150% to below 200%	200% to below 400%	400% and above	
<b>0-20</b>	16,494	28,148	18,267	27,038	36,608	13,949	140,504
<b>21-64</b>	72,196	92,286	48,626	88,316	189,177	105,635	596,236
<b>65 and older</b>	2,216	2,240	1,353	634	4,362	1,795	12,600
<b>Total</b>	<b>90,906</b>	<b>122,674</b>	<b>68,246</b>	<b>115,988</b>	<b>230,147</b>	<b>121,380</b>	<b>749,340</b>

Source: U.S. Census Bureau, Current Population Survey, 2011.



**Table 6. Number of Uninsured U.S. Citizens in Maryland by Percentage of Federal Poverty Level in 2009 and 2010**

Age Group	Percentage of the Federal Poverty Level (FPL)						Total
	Below 50%	50% to below 125%	125% to below 150%	150% to below 200%	200% to below 400%	400% and above	
<b>0-20</b>	15,739	23,610	15,897	23,253	34,855	13,450	126,804
<b>21-64</b>	53,349	61,742	27,398	54,471	137,706	95,736	430,402
<b>65 and older</b>	2,216	1,709	344	634	2,336	977	8,216
<b>Total</b>	<b>71,304</b>	<b>87,061</b>	<b>43,639</b>	<b>78,358</b>	<b>174,897</b>	<b>110,163</b>	<b>565,422</b>

Source: U.S. Census Bureau, Current Population Survey, 2011.

To derive the number of U.S. citizens in Maryland who are eligible for Medicaid expansion (up to 138 percent of the FPL) and subsidized coverage through the Exchange (between 138 and 400 percent of the FPL), the following analysis was performed:

We divided the estimated number of uninsured people in each age group and FPL status category by the total population in the same age group to derive the percentage of individuals in each age group who are uninsured and living below certain FPL levels. To project the uninsured population, we first used the estimated econometric model for forecasting Maryland’s unemployment rate as a function of the national unemployment rate. We used the CBO’s long-term economic forecast of the national unemployment rate through 2020, as well as an analysis prepared by Jonathan Gruber of the Massachusetts Institute of Technology and the National Bureau of Economic Research (NBER) and Larry Levitt of the Henry J. Kaiser Family Foundation (Gruber & Levitt, 2002). The analysis uses alternative statistical approaches to estimate the percentage point change in the uninsured rate for each percentage point change in the unemployment rate. The results range from 0.43 to 0.57. We used a midpoint estimate between the respective approaches of 0.50 for analysis of the effects of changes in the unemployment rate on the number of uninsured individuals. The statistical model shows that as the unemployment rate increases, the number of people with employer-sponsored insurance (ESI) falls, and the number of people with public coverage (e.g., Medicaid) rises, although not enough to fully absorb the impact of the decline in employer coverage. This dynamic helps to explain the rapid growth in Medicaid enrollment in recent years, which primarily has been caused by the economic recession. This method also addresses the so-called “crowd-out effect” or “substitution effect,” whereby people formerly covered by ESI enroll in Medicaid and the Maryland’s Children Health Insurance Program (MCHP).

We projected that, with the economic recovery, increases in employment would likely be found in the retail and service sectors, which are less likely to offer insurance coverage to their employees. To predict the number of uninsured individuals by age group and FPL status that will be eligible for coverage under Medicaid expansion, population projections were multiplied by



the percentage of people in each age group who are predicted to be uninsured and below certain FPL levels. This estimate provided projections of the uninsured population by age group and FPL status for 2012 through 2020.

In subsequent steps, we estimated the number of people who would be eligible for Medicaid expansion and insurance coverage through the Maryland Health Benefit Exchange, with or without federal subsidies. Then, we used take-up rates by FPL status to project the number of people, by disability and FPL status that would enroll in Medicaid expansion.

The information above describes the methodology and data sources used in the population model of the Maryland health care reform simulation model.

### **Employment Model**

The sources of most of the data used for the employment model are the Maryland Department of Labor, Licensing, and Regulation (DLLR) and the U.S. Bureau of Labor Statistics. As described above, the employment model projects total employment and employer-sponsored insurance coverage in the state of Maryland.

To project total employment through 2020, we used population projections for individuals aged 21 to 64. Then, using projections of labor force participation rates, we estimated the Maryland civilian labor force through the year 2020. Next, we applied projections of Maryland's unemployment rates, using the econometric model described above, to estimate total civilian employment in Maryland through 2020. Subsequently, we subtracted employment by government and educational institutions to derive projections of employment by private firms.

The U.S. Bureau of Labor Statistics publishes data from the Quarterly Census of Employment and Wages program, which was used to estimate Maryland's 2010 employment by firms in three categories: those with less than 50 employees, 50 to 100 employees, and more than 100 employees.

We conducted an extensive review of literature on employers' decisions to offer health care insurance, employees' decisions to take up their employers' offers of insurance, and direct purchase of insurance (Blumberg, Nichols, & Banthin, 2001; Hadley & Reschovsky, 2002; Gruber & Lettaub, 2004; Gruber & Washington, 2005; Liu & Chollet, 2006; Heim & Lurie, 2009). A summary of the literature is included in Appendix A of this report.

The three sub-models of the employment model that were used to project the numbers of people with health care coverage through ESI and direct purchase of insurance are: employer offer of insurance, employee take-up of insurance and direct purchase of insurance. Variables that affect these sub-models include the state unemployment rate, price of medical care, insurance premiums, employee premiums, employer penalty under the ACA for individuals not enrolled, percentage of premium costs covered by employer, state income tax rate, average workers'



income, and percentage of workers in firms of different sizes (i.e., less than 50, 50-100, and more than 100 employees).

### **Employer Offer of Insurance**

The Medical Expenditure Panel Survey, Insurance Component (MEPS-IC)<sup>5</sup> provides estimates of the percentage of Maryland firms of different sizes that offered health care coverage to their employees in 2010. We used these estimates to calibrate the econometric model that projects the number of employers that will offer insurance coverage to their employees—with and without federal health care reform—through 2020. The baseline model shows a decline in the percentage of some firms that offer health care insurance without federal reform. This decline reflects the assumption that the country's economic recovery will primarily occur through expansion of employers in the retail and service sectors, which are less likely to offer health care insurance coverage to their employees. Under federal health care reform, the percentage of employers that offer health insurance to employees shows a slightly greater decline than that in the baseline (without health care reform). This phenomenon primarily is due to the effects of variables that influence employers' decisions to offer health care coverage to their employees. For example, some employers may decide to pay penalties to the federal government and stop offering insurance coverage to their employees.

### **Employee Take-Up of Insurance**

The MEPS data described above also report the percentage of employees who take up their employers' offer of health care coverage. As described above, econometric models project the employees' take-up of insurance through 2020 for firms of different sizes. Because of the ACA's individual mandate, it is expected that the employees' take-up rate will increase in 2014 and the subsequent years after implementation of federal health care reform.

By multiplying the projected numbers of employees in different-sized firms (i.e., less than 50, 50 to 100, and more than 100 employees) by the corresponding percentages of firms that offer health care insurance coverage to their employees and the percentages of employees who take up insurance, we forecasted the numbers of employees, by different-sized firms, who will have ESI coverage. Then, we multiplied the number of employees with ESI coverage by their average family size to project the total number of people with ESI coverage. The MEPS data on number of people with ESI coverage in Maryland were used to calibrate the models that project the number of people with ESI through 2020.

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<sup>5</sup> The federal Agency for Healthcare Research and Quality (AHRQ) sponsors the various components of MEPS.



## **Direct Purchase of Insurance**

To estimate the number of people who would purchase insurance coverage through the Exchange, first we estimated the number of employed individuals without ESI coverage, by subtracting the total number of employees that take up insurance coverage from the projected total number of employees of private firms. Then the number of employed individuals without ESI coverage was multiplied by the projected probability of direct purchase of insurance coverage, which is generated by an econometric model, to project the number of people who would purchase insurance coverage through the Exchange.

## **Expenditure Model Output Spreadsheet**

In the following section of this methodology document, we explain the specific components of estimates in each row of the Expenditure model output spreadsheet, which summarizes the expenditures related to implementing the ACA in Maryland. The numbers in the following sections correspond to the categories and rows in the Expenditure model output spreadsheet.

### ***I. Total New Health Care Expenditures***

#### **1. Expenditure for Medicaid Expansion**

One of the sources consulted for estimating the size of new Medicaid enrollment in Maryland, including Medicaid expansion and the Medicaid woodwork effect, was a report produced by the Henry J. Kaiser Family Foundation and authored by researchers of the Urban Institute (Holahan & Headen, 2010).

To derive the number of individuals who would become eligible for Medicaid expansion in 2014, we conducted the following analysis:

First, the numbers of uninsured U.S. citizens aged 21 to 64 years, by disability status, who are under 139 percent of the FPL, were estimated for the Medicaid expansion population. Next, the resulting numbers were multiplied by Medicaid take-up rates to project the number of new enrollees. We consulted studies by King, Slifkin, and Holmes (2009) and Selden, Banthin, and Cohen (1998) regarding Medicaid take-up rates. Based on recent evidence from health care reform in Massachusetts, only minimal effects of the crowd-out of private insurance coverage were included beyond the economic and unemployment factors to avoid double counting the effects of crowd-out of ESI (Long & Stockley, 2010).

We used the following formula to derive the expenditures for Medicaid expansion for each year of the 2014 to 2020 period.



Expenditure for Medicaid expansion in year i =  
(Number of new Medicaid enrollees from Medicaid expansion in year i)  
Multiplied by  
(Average health care costs per Medicaid enrollee in year i)

To project the average health care cost per Medicaid enrollee, we used Maryland’s managed care capitation rates, by age group for the base year. For the projected new Medicaid-eligible individuals with and without a disability, we used weighted average capitation rates, plus fee-for-service wraparound costs, derived from payments to managed care organizations (MCOs) for these Medicaid enrollees. On a weighted average basis, Maryland’s per member per year cost for Families and Children Medicaid enrollees in FY 2012 was \$4,163; for individuals with disability, the cost was \$18,137.

Next, we trended these per capita costs into each of the future fiscal years. The Centers for Medicare & Medicaid Services (CMS) published *National Health Expenditure Projections, 2011-2021*, which includes forecasts of change in “Health Expenditures per Capita” and other health care expenditures. This source was used to project the costs associated with implementing health care reform in Maryland for the period of 2011 to 2020 (Centers for Medicare & Medicaid Services, 2012). We used the forecasts of change in “Health Expenditures per Capita” to trend the base year (2012) capitation rates to 2014 and subsequent years to reflect the projected increase in medical costs, on a per capita basis, during the period. As shown in the formula above, by multiplying the projected number of new Medicaid enrollees from Medicaid expansion in each year by the corresponding projection of health care costs, by disability status, the total expenditure for Medicaid expansion in each year was estimated.

Based on these methods and our data sources, as of July 12, 2012, the estimated expenditures for Medicaid expansion enrollees (excluding PAC program enrollees) for FY 2014 through FY 2020 are \$2,649 million. This figure is reflected as the midpoint cost on the Expenditure model output spreadsheet.

## **2. Transfer of PAC Program Enrollees to Medicaid Expansion**

The PAC program enrollees currently receive a limited health care benefits package, which excludes hospital services. After implementation of Medicaid expansion in January 2014, PAC program enrollees will be considered part of the Medicaid expansion population. They will be enrolled in Medicaid and receive the full Medicaid benefits package, and the state will receive enhanced federal medical assistance percentage (FMAP) rates for their entire benefits. FMAP is the percentage that the federal government pays toward Medicaid costs. The cost of PAC



program enrollees that is currently matched at the FMAP rates of 50 percent will be matched at the enhanced Medicaid expansion FMAP levels beginning January 2014.<sup>6</sup>

The current PAC capitation rates were projected through FY 2020 using the forecasts of change in “Health Expenditures per Capita” from CMS, as if federal health care reform did not occur. We multiplied the projected number of PAC enrollees through 2020 by the projected annual capitation rates for the limited benefits package in PAC to estimate the baseline costs in the absence of health care reform, against which the effects of the ACA will be measured.

Next, to estimate the cost of PAC enrollees under the ACA, we multiplied the projected number of PAC enrollees by the projected full-benefit annual payments for current Medicaid expansion enrollees, and added 10 percent costs to account for the sicker population of PAC enrollees compared with current Medicaid expansion enrollees.

As of July 12, 2012, the estimated total additional expenditures for transferring PAC enrollees to the Medicaid expansion program for FY 2014 through FY 2020 are \$2,165 million. This figure is reflected as the midpoint cost on the Expenditure model output spreadsheet.

### **3. Expenditures for the Medicaid Woodwork Effect**

Previously published research demonstrates that knowledge gaps among parents partially explain the reason for children of low-income families that remain without health insurance. For example, one study (Kenney, Haley, & Tebay, 2003) showed that nearly 30 percent of low-income parents had not heard of SCHIP, and 40 percent did not understand that their children could be eligible for health care coverage, even if they were not enrolled in welfare. Additionally, an estimated 7 percent of uninsured children lack coverage because their parents do not think that they need it (Hill, Stockdale, Evert, & Gifford, 2006).

We estimated the expenditures for the Medicaid “woodwork effects” using the same methodology that was used for Medicaid expansion, as described above. We included the uninsured population in the 0-20 and 21-64 age categories as potential new enrollees. Furthermore, we assumed that Maryland will seek to enroll a relatively high percentage of the currently eligible population and projected a woodwork effect enrollment of 44,069 individuals at the point of full implementation of health care reform in FY 2020. As of July 12, 2012, the estimated expenditures for the Medicaid woodwork effect for FY 2014 through FY 2020 are \$2,033 million. This figure is reflected as the midpoint cost on the Expenditure model output spreadsheet.

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<sup>6</sup> The FMAP for Medicaid expansion enrollees will be 100 percent in federal fiscal year (FFY) 2014 through FFY 2016; it will decrease to 95 percent in FFY 2017, 94 percent in FFY 2018, 93 percent in FFY 2019, and 90 percent in FFY 2020 and subsequent years.



#### **4. Medicaid and the Maryland Children’s Health Insurance Program Administration Costs**

To estimate the increased cost of Medicaid and MCHP administration, we added the projected total expenditures of Medicaid expansion (including the PAC program’s new expenditures) to the projected total expenditures of the Medicaid woodwork effect and multiplied that sum by the estimated administrative cost percentage of 5 percent, which is a historic average administrative (overhead) cost. Overhead costs finance the outreach, enrollment, and eligibility determinations related to the substantial increase in Medicaid enrollment, as well as various programmatic oversight activities.

To develop the necessary eligibility systems with which to comply with the eligibility determination requirements of the ACA, we included \$20 million in additional administrative costs in FY 2012, \$40 million in FY 2013, and \$40 million in FY 2014, for a total of \$100 million in total funds. As of July 12, 2012, the estimated expenditures for Medicaid and MCHP administration for FY 2014 through FY 2020 are \$442 million. This figure is reflected as the midpoint cost on the Expenditure model output spreadsheet.

#### **5. Expenditures for Health Care Coverage through the Exchange**

We estimated total health care expenditures for coverage of individuals who obtain insurance through the Exchange by multiplying the average per capita health care expenditures by the projected number of Exchange enrollees.

America’s Health Insurance Plans (AHIP) conducted surveys of small group insurance plans in 2009 and 2011, and a survey of individual health insurance plans in 2009. These surveys provided estimates of premiums for insurance coverage through small group and individual markets. AHIP member companies responding to the survey were asked to include only individual comprehensive or major medical coverage that was guaranteed renewable and met the Health Insurance Portability and Accountability Act of 1996 (HIPAA) definitions of “creditable coverage.” For individual market annual cost estimate of \$5,112, we added \$2,756 for co-payments and deductibles for an annual total cost estimate per individual of \$7,868. Then we multiplied this number by 70 percent to derive the premium costs of \$5,508 for a silver plan<sup>7</sup>. Next, we added a trend estimate to arrive at the total cost estimate of \$5,746 for FY 2011. Based on our methodology and these cost estimates, as of July 12, 2012, the estimated expenditures for insurance coverage through the Exchange for FY 2014 through FY 2020 are \$10.8 billion. This figure is reflected as the midpoint cost on the Expenditure model output spreadsheet.

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<sup>7</sup> According to the ACA: “A plan in the silver level shall provide a level of coverage that is designed to provide benefits that are actuarially equivalent to 70 percent of the full actuarial value of the benefits provided under the plan.”



## **6. Insurance Exchange Administrative Costs**

Administrative costs will be incurred in operating the Exchange. The federal government will fund 100 percent of these costs through December 31, 2014. After federal funds are discontinued, the Exchange must become self-sustaining through user fees and/or assessments on carriers. For the purposes of this model, we used a reasonable administrative cost assumption of \$15 million in FY 2013 and \$30 million in FY 2014, with a 2 percent annual increase of administrative cost in subsequent years, for a total of \$238 million for the FY 2013 through FY 2020 period. This figure is reflected as the midpoint cost on the Expenditure model output spreadsheet. This section of the Expenditure model should be updated as decisions are made and new cost estimates become available.

## **7. Expenditures for Increasing Medicaid Primary Care Physician Fees to 100 Percent of Medicare**

Under the health care reform law, the federal government will pay for increasing Medicaid reimbursement rates for Evaluation and Management (E&M) procedures and immunization administration services provided by primary care physicians (PCPs, defined as physicians specializing in family medicine, general internal medicine, and pediatric medicine) to 100 percent of the Medicare payment rates for calendar years (CYs) 2013 and 2014. For services furnished on or after January 1, 2013, and before January 1, 2015, states will receive 100 percent federal financing for increasing PCP payment rates from the rates in effect on July 1, 2009. The increase will apply to both fee-for-service and managed care services.

We developed a physician fee payment model to determine the amount of increase in Maryland's Medicaid reimbursement rates for PCPs. CYs 2013 and 2014 fall into three separate state fiscal years, FY 2013, FY 2014, and FY 2015. To estimate the total increase in payments for the three fiscal years, the physician fee payment model was used to determine the cost of increasing PCP fees to 100 percent of Medicare fees. Based on the physician fee payment model, after accounting for utilization and enrollment increases between the base year and the fee increase fiscal year, it would cost \$75 million to increase physician fees for E&M and immunization administration procedures to 100 percent of Medicare fees in FY 2013. The increase in payments would be approximately \$166 million in FY 2014 and \$91 million in FY 2015, for total payments of \$332 million. This figure is reflected as the midpoint cost on the Expenditure model output spreadsheet.

## **8. State Employees and Retirees Health Insurance**

The state of Maryland will incur new costs as an employer and as a provider of health insurance to retired state employees. The overall net new costs are a function of seven separate factors, some of which result in net savings or new revenue for the state, and some of which result in net new costs for the state. The seven independent factors are: the early retiree reinsurance program, the comparative effectiveness tax, the cost of extending dependent coverage to age 26, insurance



costs related to contractual employees, the tax on high-cost health plans, automatic enrollment and subsidies, and related administrative costs. The figures found in the Expenditure model output reflect the annual and aggregate effects of these seven factors. Overall, through the period of FY 2012 to FY 2020, the costs of state employee and retiree health insurance are projected to increase. The data were prepared by the state's Department of Budget and Management (DBM) and incorporated into the model without any adjustment. The estimated additional expenditures for active and retired state employees through FY 2020 are \$173 million. This figure represents the midpoint cost estimate.

## **9. Administrative Costs for Other State Agencies**

This line represents a marginal increase in administrative costs at agencies such as the Maryland Insurance Administration (MIA) and the DBM, as well as general state outreach activities. For the purposes of this model, we used a reasonable administrative assumption of \$2 million in additional expenditures per year for FY 2012 and FY 2013, and \$4 million in additional expenditures per year for FY 2014 and subsequent years for these new marginal costs, which add-up to \$32 for the forecast period.

## **II. Federal Assessments, Subsidies, and Cost Sharing**

### **1. Federal Assessment of Employers**

Under the ACA, employers with fewer than 50 employees will be exempt from penalties for not providing health insurance coverage to their employees. However, the ACA will assess penalties to employers with 50 or more employees that do not offer coverage. Employers with 50 or more employees, whose employees receive premium tax credits, will be assessed a penalty of \$2,000 per employee, excluding the first 30 employees.

The law also requires employers that offer insurance coverage to provide a voucher to employees with incomes less than 400 percent of the FPL, whose shares of the premium exceed 8 percent but are less than 9.8 percent of their incomes and who choose to enroll in a plan in the Exchange. Employers that provide vouchers will not be subject to penalties for employees who receive premium credits in the insurance Exchange.

We predicted the amount of assessment per employee using the increase in medical cost inflation, as estimated by CMS. We also assumed that 50 percent of employers with 50 to 99 employees and 20 percent of employers with 100 or more employees will either pay the assessments and not provide insurance coverage, or provide a free choice voucher to their employees (these assumptions can be changed in the Simulation Model input data). Based on these assumptions, the estimated total assessment of penalties to employers between FY 2014 to FY 2020 is \$2.4 billion.



## 2. Federal Subsidy Payments for Individuals

The federal premium subsidy is not meant to cover the full premium amount; there is an individual financial responsibility that is capped based on income levels. According to the ACA, the amount that individuals with incomes less than 400 percent of the FPL will pay for purchasing insurance coverage is capped based on a sliding scale of income, as shown in Table 7.

**Table 7. Maximum Payment from Individuals as a Percentage of Income**

Income as a Percentage of the FPL	Maximum Payment as a Percentage of Income
Up to 133%	2.00%
134% to 150%	4.00%
151% to 200%	6.30%
201% to 250%	8.05%
251% to 400%	9.50%

We predicted the number of individuals who will purchase insurance coverage through the insurance Exchange by their income as a percentage of the FPL. We then used the maximum percentages corresponding to each income tier to predict the amounts of federal income tax credits that individuals will receive for purchasing insurance coverage through the Exchange. Based on our methods and data sources, as of July 12, 2012, the projected FY 2014 to FY 2020 total federal subsidies in the form of tax credits is \$5.1 billion.

## 3. Federal Cost-Sharing Payments for Individuals

Cost-sharing subsidies are payments by the federal government to offset the copayments of low-income enrollees in the Exchange. We estimated cost sharing payments using a silver plan. Based on our methods and data sources, as of July 12, 2012, the projected FY 2014 to FY 2020 total federal cost-sharing payment is \$648 million. Like any federal program, Congress may choose to reduce the scope of cost-sharing subsidies; in fact, they have already been targeted by the federal government as a source of deficit reduction by the Budget Control Act (BCA) of 2011 (Redhead, 2011).



### **III. Flow of New Funds through the State Economy and Impact on Providers from Additional Health Care Expenditures**

Analysis of the impact of the ACA on the state budget and finances shows that, because of such factors as savings in the MCHP program due to higher FMAP rates,<sup>8</sup> extension of manufacturers' drug rebates to Medicaid MCOs, and transfer of current PAC program enrollees to Medicaid expansion, the benefits to the state's budget of ACA implementation exceed its costs through 2020. Therefore, we have considered all additional health care expenditures related to implementation of the ACA, excluding out-of-pocket expenditures of individuals with new insurance coverage, as new funds that will flow through the state economy and will generate additional economic activity.

The results of this section of the Expenditure model output are used as input to the IMPLAN input-output model, described above, to evaluate the impact of implementing the ACA on the state economy and to quantify the impact on total output generated throughout the state, the total number of new jobs created, and the unemployment rate.

The Expenditure model predicts additional spending in the health care sector. However, the IMPLAN model uses health care spending in health provider industry categories, mainly: physician services, hospital care, pharmaceutical drugs, other health services including diagnostic services, and administrative costs. Therefore, the outputs of the Maryland Expenditure model are mapped to the IMPLAN industry categories to enable IMPLAN to estimate the broader economic impacts of changes in health care spending.

To estimate the total impact of additional health care expenditures on various health care providers due to implementation of the ACA in Maryland, we first projected the total increase in health care expenditures related to all of the detailed items described above. Then, we examined various data sources for a breakdown of total health care expenditures into broad categories of providers (see Appendix B for details). Maryland's Medicaid MCOs make periodic Health Finance Management Reports (HFMRs) to the state that provide more detailed allocations of health care expenditures by the provider types that render services to MCO enrollees. Furthermore, we compared percent expenditures by provider types over time, and took into account the effect of the projected reduction in uncompensated care on hospital costs to derive the related shares of all providers through FY 2020.

Based on these sources, data in Table 8 were used to allocate the total new health care expenditures by type of provider. In the Expenditure model, administrative costs are estimated

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<sup>8</sup> Under the ACA, states will receive a 23 percent increase in the match rate for SCHIP, up to a maximum of 100 percent, for FFY 2016 through FFY 2019.



separately from Medical costs, and IMPLAN has a separate input category for them. Hence, they are not included in Table 8.

**Table 8. Percent Allocation of Health Care Expenditures to Providers**

Provider Type	FY 14	FY 15	FY 16	FY 17	FY 18	FY 19	FY 20
Total, All Professionals	22.6%	22.6%	22.6%	22.6%	22.6%	22.6%	22.6%
Hospital Services	59.1%	58.1%	57.1%	56.1%	55.1%	54.1%	53.1%
Pharmacy	10.0%	10.2%	10.4%	10.6%	10.8%	11.0%	11.2%
Other Health Services	8.3%	9.1%	9.9%	10.7%	11.5%	12.3%	13.1%
<b>Total</b>	<b>100.0%</b>						

Based on these percentage allocations, the total impact on providers due to the implementation of the ACA in Maryland were estimated, as described below.

### 1. All Professional Services

We estimated the total increase in payments for professional services, including those provided by physicians, dentists, and other health care professionals such as nurse practitioners. Based on these methods and our data sources, as of July 12, 2012, the projected total additional expenditures for all professional services for FY 2014 through FY 2020 is approximately \$3.2 billion. This amount includes additional expenditures for increasing Medicaid PCP fees to 100 percent of Medicare fees. This figure is reflected as the midpoint of expenditures on the model output.

### 2. Total Additional Expenditures for Hospital Services

We also estimated the total increase in payments for hospitals services. Based on our methods and data sources, the projected total additional expenditures for hospital services for FY 2014 through FY 2020 is approximately \$4.9 billion. This number reflects a \$3.1 billion reduction in hospital costs that will benefit all payers due to a reduction in uncompensated care for hospital services.

### 3. Total Pharmacy and Other Health Services

Similarly, we estimated the total increase in payments for pharmacy and other health services, such as laboratory tests and health clinic visits. Based on our methods and data sources, as of July 12, 2012, the projected FY 2014 to FY 2020 total additional expenditures for pharmaceutical drugs and services is \$1.0 billion. Additional expenditures for other health services are projected to be \$1.4 billion.



#### **4. Administrative Costs**

The administrative costs shown here represent state administrative costs for Medicaid and MCHP programs, plus administrative costs for the Health Benefit Exchange, which are not accounted for in payments to health care service providers, but are new funds that will flow through the state economy and should be included as input to the input-output model. The projected total additional administrative costs through FY 2020 are approximately \$596 million.

The projected total additional funds for the FY 2014 to FY 2020 period are approximately \$11.1 billion, which will flow through Maryland's economy.

#### ***IV. Additional Health Care Expenditures by Individuals***

The health care reform simulation model calculates the out-of-pocket expenditures of individuals who purchase insurance coverage through the Exchange, based on the ACA law that specifies maximum out-of-pocket expenditures based on a person's income as a percentage of the FPL (see Table 7). As of July 12, 2012, based on our methodology and data sources, the estimated total additional out-of-pocket expenditures of individuals for FY 2014 through FY 2020 are \$5.1 billion. This figure is reflected as the midpoint cost on the Expenditure model output spreadsheet.

#### ***V. Additional Economic Activity Generated from Implementing the ACA: Impact on the State of Maryland Economy***

The Maryland Health Care Reform Simulation Model forecasts new expenditures in the health care sector following implementation of the ACA. To analyze the impact of the new expenditures on the state's economy, we used IMPLAN economic modeling software to estimate how new expenditures in the health care sector flow through other sectors of the economy to generate further economic activity.

##### **Input-Output Model**

The IMPLAN input-output model uses standardized data on how various industries transact with other industries for goods and services, that is, how the output of one industry becomes input to each of the other industries, adding to the final demand for consumption.<sup>9</sup> The model also takes into account the taxing of these transactions by the local, state, and federal governments. Furthermore, it determines the gross outputs of different industries that are required for a given increase in the final demand of one sector—the health care sector in this context.

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<sup>9</sup>The coefficients of input-output models for the U.S. economy are estimated by the Bureau of Economic Analysis of the U.S. Department of Commerce.



The IMPLAN input-output model measures the impact of new spending in three ways: direct, indirect, and induced spending. *Direct spending* relates to newly purchased goods and services, such as health care services produced by medical practices, hospitals, pharmacies, and other ancillary health services (e.g., diagnostic labs and medical equipment suppliers) to meet increased demand. *Indirect spending* results when the producers of health services hire more staff, purchase equipment, and construct new facilities in which to supply direct services. This action in turn causes construction companies and medical suppliers to hire more staff, expand their own facilities, and increase capital equipment purchases. Finally, *induced spending* occurs when individuals who are compensated for their provision of direct or indirect services purchase goods and services for personal consumption, such as new durable goods (e.g., housing and automobiles) and/or non-durable goods and services (e.g., food and clothing expenses). The IMPLAN model uses data on new spending flowing through direct, indirect, and induced expenditures to estimate the ratio of additional spending to the initial spending inputs. This ratio is usually greater than 1.0 and is referred to as an economic multiplier.

The Maryland Health Care Reform Simulation Model takes into account the effects of implementing the ACA on the state economy through a change in state unemployment rate. The economic impact of implementing the ACA is captured within the simulation model in an iterative process, as follows:

1. The flow of new funds data (described in Section III, above) from the Expenditure model are entered into the IMPLAN model to determine the economic impact, which includes estimates of the number of new jobs created in each year.
2. The numbers of new jobs created in each of the forecast years are entered into a spreadsheet to calculate the projected change in unemployment rate in each year, assuming that two-thirds of the jobs will be filled from the Maryland labor force, and one-third will come from outside labor markets.
3. The projected change in the unemployment rate for each year is entered into the simulation model to produce the flow of new funds data for another round of input in the IMPLAN model. This process continues until the Expenditure model outputs and the changes in the unemployment rates are identical to their corresponding numbers in the previous iteration.

### **Economic Activities Generated from Implementing the ACA in Maryland**

The following tables show forecasts of economic variables that will be affected by the implementation of the ACA in Maryland. Table 9 presents forecasts of federal subsidies and cost-sharing payments to individuals, increases in total health care expenditures, additional output generated throughout the state economy, and the associated additional state and local taxes that will be generated from implementing the ACA.



**Table 9. Additional Economic Activity Generated  
from Implementing the ACA (Million \$), FYs 2014 - 2020**

Economic Activity	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020
Federal Subsidies to Individuals (Tax Credits)	\$224	\$535	\$607	\$716	\$849	\$987	\$1,153
Federal Cost-Sharing Payments to Individuals	\$30	\$72	\$80	\$92	\$108	\$124	\$142
<b>Total Federal Payments for Cost Sharing and Subsidies (Tax Credits)</b>	<b>\$254</b>	<b>\$607</b>	<b>\$687</b>	<b>\$808</b>	<b>\$957</b>	<b>\$1,111</b>	<b>\$1,295</b>
Increase in Total Health Care Expenditures	\$1,057	\$2,085	\$2,321	\$2,719	\$3,111	\$3,497	\$3,930
<b>Additional Output Generated</b>	<b>\$1,174</b>	<b>\$2,020</b>	<b>\$2,123</b>	<b>\$2,421</b>	<b>\$2,693</b>	<b>\$2,965</b>	<b>\$3,283</b>
Total Additional State and Local Taxes Generated (Including Premium Assessments)	\$61	\$140	\$147	\$169	\$191	\$212	\$237

Table 10 presents the total number of uninsured individuals with and without ACA, the decrease in the number of uninsured with the ACA, the number of uninsured individuals as a percentage of the total population, the number of new jobs created following implementation of the ACA, and the reduction in the state unemployment rate.

**Table 10. Percent Population Uninsured, Number of New Jobs, and Unemployment Rate,  
CYs 2014 - 2020**

	CY 2014	CY 2015	CY 2016	CY 2017	CY 2018	CY 2019	CY 2020
Total Uninsured without ACA	746,337	735,620	727,950	719,148	718,664	722,369	723,957
Total Uninsured with ACA	599,003	514,388	488,539	472,749	439,614	415,441	390,352
<b>Decrease in Number of Uninsured with ACA</b>	<b>147,334</b>	<b>221,232</b>	<b>239,411</b>	<b>246,399</b>	<b>279,050</b>	<b>306,928</b>	<b>333,605</b>
Uninsured as % of Total Population (without ACA)	12.6%	12.3%	12.1%	11.9%	11.8%	11.7%	11.6%
Uninsured as % of Total Population (with ACA)	10.1%	8.6%	8.1%	7.8%	7.2%	6.7%	6.3%
<b>New Employment due to ACA</b>	<b>9,122</b>	<b>16,117</b>	<b>17,065</b>	<b>19,582</b>	<b>21,895</b>	<b>24,238</b>	<b>26,970</b>
Unemployment Rate without ACA	6.9%	5.8%	5.0%	4.5%	4.3%	4.3%	4.3%
Unemployment Rate with ACA	6.7%	5.5%	4.6%	4.1%	3.9%	3.8%	3.7%
<b>Change in Unemployment Rate</b>	<b>-0.2%</b>	<b>-0.4%</b>	<b>-0.4%</b>	<b>-0.4%</b>	<b>-0.5%</b>	<b>-0.5%</b>	<b>-0.6%</b>



## **VI. Total Additional Federal Health Expenditures by Provider Type**

For informational purposes, we estimated additional federal health care expenditures for implementing the ACA in Maryland. Then, using the data in Table 8, we allocated these expenditures to different provider types. These data are not used as input for the IMPAN input-output model.

## **VII. Enrollment Projections**

Enrollment projections are captured on a separate output spreadsheet, entitled “Enrollment Projections.”

### **A. Insurance Coverage Status of the Maryland Population**

Section A of the Enrollment Projections spreadsheet shows the insurance coverage status of Maryland’s population from CY 2014 through CY 2020, by major source of coverage, including the uninsured. Please note the following:

1. There is some overlap in insurance coverage. Coverage by Medicaid and Medicare includes individuals who are dually eligible for these programs. Also, commercial insurance coverage includes Medicare gap coverage.
2. The “Number of Uninsured” in Sections A and E reflect an overall picture of insurance coverage in Maryland. They take into account the number of uninsured over age 65 and changes in coverage from employer sponsored insurance, Medicare, etc.

**A Note on Commercial Insurance Coverage:** As described above in the Employment Model section, with the implementation of health care reform, some employers (e.g., those with more than 50 employees) may decide to pay penalties to the federal government rather than provide insurance coverage to their employees. Recent studies by The Henry J. Kaiser Family Foundation, the Congressional Budget Office, and Mercer predict some decline in ESI after implementation of health care reform. Accordingly, the employer sub-model predicts a decline in the percentage of firms that offer health insurance coverage to their employees. In part, the projected decline reflects the fact that the national economic recovery will likely occur through expansion of employers in the retail and service sectors, which are less likely to offer insurance coverage. Furthermore the availability of coverage through the public sector may increase the likelihood that some employers will pay penalties to the federal government and stop providing insurance coverage to their employees. However, the employees’ take-up of insurance is projected to increase with the ACA’s individual mandate.

Overall, during the forecast period, total employment in Maryland is projected to increase by approximately 126,000, whereas total coverage in commercial insurance, which includes ESI, will increase by approximately 40,000.



## B. Medicaid Enrollment

Section B presents a summary of Medicaid enrollment with and without health care reform, including the Medicaid take-up rate with health care reform. Row B.2, entitled “Total Increase in Medicaid,” shows the sum of Medicaid expansion and Medicaid woodwork effect enrollees (rows D.1 and D.2). The “new Medicaid take-up rate” reflect increases in PAC program enrollees (who are not currently counted as having insurance coverage), plus Medicaid expansion and woodwork effect enrollees, compared with the total number of uninsured individuals with income up to 138 percent of the FPL. The “total Medicaid take-up rate” represent participation rates of all Medicaid eligible individuals, including current Medicaid enrollees.

## C. Exchange Enrollment

Section C depicts the number of individuals who would obtain health insurance coverage through the Exchange. This section also shows potential Exchange enrollment (remaining U.S. citizens with income greater than 138 percent of the FPL, without insurance coverage). The Exchange take-up rates compare number of individuals with insurance coverage through the Exchange with the total number of uninsured individuals above 138 percent of the FPL.

## D. Health Care Reform Components

Section D presents the components of health care reform:

**D.1. Medicaid Expansion:** Row D.1 includes new expansion enrollees, plus PAC program enrollees who will transition to Medicaid expansion.

**D.2. Medicaid Woodwork Effect:** The numbers in row D.2 are explained in section I.A.3 above, which explains the woodwork effect.

**D.3. Exchange (133-200 percent of the FPL) with Subsidy:** All of the Exchange enrollment projections are based on the Employment model, which itself is based on several econometric sub-models. The numbers in row D.3 reflect individuals with incomes between 138 and 200 percent of the FPL who would receive federal subsidies (tax credits) to purchase coverage through the insurance Exchange.

**D.4. Exchange (200-400 percent of the FPL) with Subsidy:** The numbers in row D.4 are also based on the Employment model. They reflect individuals with incomes between 200 and 400 percent of the FPL, who would receive federal subsidies (tax credits) to purchase coverage through the insurance Exchange.

**D.5. Exchange (Above 400 percent of the FPL) without Subsidy:** The numbers in row D.5 are also based on the Employment model and represent individuals with incomes above 400



percent of the FPL who would purchase coverage through the insurance Exchange without using a federal subsidy. The model projects that, by CY 2020, approximately 75,000 people will purchase coverage through the Exchange without receiving federal subsidies.

**D.6. Small Business Health Options Program (SHOP):** Row D.6 shows the projection of insurance coverage by small businesses that purchase coverage for their employees through the health insurance Exchange.

**Total New Coverage:** This row shows the sum of rows D.1 through D.6, described above.

## E. Uninsured

This section shows the number of uninsured individuals with and without health care reform, and their percentages of the total Maryland population. It also shows U.S. citizens who will remain uninsured after implementation of health care reform.



## Appendix A. Summary of Literature Review on Employment-Based Insurance

In developing the simulation model, we reviewed literature related to workers responsiveness to premiums and out-of-pocket costs, the premium elasticity of the demand for health insurance, and health insurance take-up rates. This appendix provides a detailed summary of the four key articles reviewed:

- Blumberg, L. J., Nichols, L. M., & Banthin, J. S. (2001, Sept. - Dec.). Worker decisions to purchase health insurance. *International Journal of Health Care Finance and Economics*, 1(3/4), 305-325.
- Hadley, J., & Reschovsky, J. D. (2002, June). Small firms' demand for health insurance: The decision to offer insurance. *Inquiry*, 39(2), 118-137.
- Heim, B. T., & Lurie, I. Z. (2009). Do increased premium subsidies affect how much health insurance is purchased? Evidence from the self-employed. *Journal of Health Economics*, 28(6), 1197-1210.
- Liu, S., & Chollet, D. (2006, March 24). *Price and income elasticity of the demand for health insurance and health care services: A critical review of the literature*. Washington, DC: Mathematica Policy Research, Inc. Retrieved from <http://www.mathematica-mpr.com/publications/pdfs/priceincome.pdf>

### Blumberg, Nichols, & Banthin Article

#### Study Objective

This study measured the responsiveness of workers to premium prices. It addressed whether workers respond to out-of-pocket costs or to the total premium and how income and health status affect employee responses to premiums.

#### Data and Methods

The authors used the 1996 Medical Expenditure Panel Survey Household Component (MEPS-HC) and Insurance Component (MEPS-IC) linked data. This data set offers substantial advantages because it contains employer information on workers who do and do not receive offers of employer-sponsored insurance (ESI), whether the worker accepts or declines the offer, and information on the total and out-of-pocket premiums for up to four plan choices.

The study used three methodological approaches. The first was a pure approach using a probit model that estimated the probability of taking up an insurance offer (i.e., whether or not the worker accepts the offer). This model controlled for age, race/ethnicity, gender, marital status, presence of children, whether the spouse has an offer, highest education level, fair or poor general or mental health or an activity limitation of some kind, the presence of a serious medical



condition (at least one from a specific list), whether the worker is full-time, whether the worker is white collar, whether the worker lives in a metropolitan statistical area region, whether any children in the household are eligible for Medicaid, and income.

The second methodology was an imputed approach that used an imputation process to assign premiums to all workers. First, the authors estimated the probability of taking up an ESI offer for all workers who had an offer. In addition to the explanatory variables used in the first approach, they also included establishment size, union, industry (including public administration), and whether the firm had multiple locations. This equation yields estimates of take-up probability and values of the density function of take-up that reflect the "selection" probability of being a taking-up worker. Second, they estimated the dollar premium of individuals who took up the ESI offer. Third, the authors estimated the probability of taking up an ESI offer by using the imputed premiums.

## Findings

- ESI take-up elasticities were low: -0.0026 for single workers, -0.0324 for family candidates with single premium, and -0.0443 for family candidates with family premium.
- Single workers were less responsive to premium prices than family candidates.
- Although the linked sample is not completely representative of workers, it produced estimates of price elasticity that are indistinguishable from those adjusted for potential non-response bias.
- Elasticities with imputed premiums were higher than they were under the direct estimation approach, but still quite low.
- Workers were more responsive to out-of-pocket premiums than to total premiums.

## Hadley & Reschovsky Article

### Study Objective

This study estimated the premium elasticity of demand for health insurance for small firms (i.e., responsiveness of offer of insurance coverage to premium variations). The study also examined how this elasticity varies across firms with different characteristics.

### Data and Methods

The authors used data from the 1997 Robert Wood Johnson Foundation Employer Health Insurance Survey (Community Tracking Study) and other sources. The Community Tracking Study Household Survey and Insurance Follow Back Survey were linked and used to create new variables, including the availability of public insurance, health care through safety net, the price



of non-group insurance, average worker income, workers' family health status, local market concentration, each household survey respondent's insurance coverage, and hospital costs.

The Insurance Survey sampled 11,613 small, private firms, and the Household Survey sampled 54,000 individuals. Both samples were drawn as representatives of 60 randomly selected local health care markets, defined as Metropolitan Statistical Areas or groups of nonmetropolitan counties.

The authors made three theoretical assumptions:

1. Firms will offer insurance if their employees' collective reservation price is greater than the price at which the employer can make insurance available.
2. Employees will compare expected utilities across discrete insurance choices and select ESI if its expected utility is greater than the other options.
3. Firms offer insurance when the demand price just equals (or exceeds) the supply price.

The authors used three equations and sensitivity analyses. Noting that premiums are not observed for firms that do not offer insurance, the authors used the two-stage Heckman procedure (reduced-form probit offer equation and selection-corrected premium equation) to account for the fact that premiums are observed only for establishments that offer insurance. The reduced-form offer model (probit regression) estimated the predicted probability of offering insurance. After adjusting for selection bias, the premium model (log-transformed ordinary least square) estimated the selection-corrected premium. Two equations were estimated jointly, using maximum likelihood estimation. Then, the selection-corrected ESI premium was plugged into the structural offer equation as an instrumental variable. The third equation estimated the predicted probability of offering insurance. Additionally, the study re-estimated the structural offer equation using interaction variables to allow the premium coefficient to vary by establishment size, the percentage of workers who receive low wages, and the estimated average family income per worker.

## Findings

- Adjusting for selection bias, the predicted average single monthly premium for firms that did not offer insurance was greater than the predicted monthly premium for firms that did offer insurance.
- The correlation between the reduced-form offer and the premium equations was negative and statistically significant ( $p = .01$ ). The negative correlation suggests that firms that do not offer insurance face higher premiums than firms that do offer insurance, and that the unobservable factors influencing both the offer decision and the premium are correlated between the two equations.



- In the structural offer equation, the premium for ESI was negative and highly significant, but moderate in magnitude. The corresponding elasticity, -0.54, suggests that a 10 percent decrease in the average monthly premium is predicted to increase the probability of offering insurance by approximately 5.4 percent.
- In general, firms' responsiveness to changes in premiums varied by firm characteristics. The smallest establishments (those with less than 10 employees) had the lowest offer rate, faced the highest average premium, and were most responsive to a reduction in premium, with an elasticity estimate of 2.63.
- Establishments with a high proportion (> 75 percent) of low-wage workers or low average income per worker showed higher price elasticities, ranging from -0.88 to -1.18.

## **Heim & Lurie Article**

### **Study Objective**

This study examined amendments made to the 1986 Tax Reform Act (TRA86), which increased the deductibility of health insurance premiums from 60 percent in 1999 to 70 percent in 2002, and to 100 percent in 2003 for the self-employed. Using a panel of tax returns, the authors investigated how these changes affected the probability of taking up health insurance and the level of health insurance purchased. The following research questions guided the study:

- Does a change in the after-tax price of health insurance relative to medical expenditures affect the probability of purchasing health insurance?
- Does a change in the after-tax price of insurance affect the quantity of health insurance purchased?

### **Data and Methods**

The authors used a six-year panel of data for any taxpayer sampled in 1999 who filed a tax return over the five subsequent years. The authors drew a stratified, random sample of taxpayers in 1999 and included tax returns from any member of this sample over the next five years. More than 65,000 taxpayers were observed in the sample across all six years. The final sample for the take-up specification included 14,354 individuals, and the sample for the amount specification contained 1,692 individuals.

The authors used two estimation strategies, introduced by Gruber and Poterba (2004): 1) a linear probability model for all observations and 2) a linear fixed effect model conditional on observations for individuals who purchased health insurance. Dependent variables included the fraction of tax returns claiming self-employed health insurance deductions and the amount of self-employed health insurance deductions. Independent variables included relative price, age squared, number of children on the tax return, income, filing status, and year. Out of those independent variables, the main covariate of interest was the after-tax price of health care. The



relative price was defined as the after-tax price of purchasing health care through an insurance plan relative to the after-tax price of purchasing health care directly if uninsured, expressed as a ratio.

## Findings

Heim and Lurie found evidence that a decline in the after-tax price of health insurance for the self-employed increases the likelihood of taking up health insurance and the amount of health insurance purchased.

- In the take-up specification, they found an overall elasticity of approximately -0.3 (statistically significant). A decrease in the price of insurance led to a higher insurance take-up rate, with an estimated elasticity of  $-0.316$ . It was noted that elasticity was higher for single taxpayers compared with married couples.
- In the amount specification, the authors found a highly significant elasticity of approximately 0.7 for self-employed taxpayers.

In conclusion, the study results suggested that changing the price of health insurance through a deduction had moderate effects on both the number of self-employed taxpayers purchasing health insurance and the amount of insurance purchased.

## *Liu & Chollet Article*

### Study Objective

Elasticity of demand is defined as “a measure of consumer response to a change in the price of a product, the price of related products, or personal income” (Liu & Chollet, 2006). Generally, the demand for health insurance and health care services is not sensitive to changes in price (price-inelastic), and variation in the estimated elasticities is large. This study reviewed more than 80 studies on estimates of the elasticity of demand for health insurance and health care services, summarized the key findings from these studies, and identified methodological challenges and gaps in the literature.

### Findings on Elasticity of Demand for Health Insurance

The authors found that the literature on the elasticity of the demand for health insurance indicates a range of elasticity estimates, including:

- Estimates of the price elasticity of employer offers of health insurance range from -0.14 to -5.8, but most of them approximate around -0.6. Small firms are less likely to offer insurance, and their price elasticity of demand is greater than that of larger firms.



- Among workers who are offered insurance by their employers, the price elasticity of take-up is relatively low, with most estimates falling below -0.1.
- Depending on how many alternative insurance options are presented to an employee, the price elasticity of demand among insured workers for any one option may be relatively high, but its absolute value is still less than 0.1.
- In the non-group market, estimates of the price elasticity of demand usually range from -0.2 to -0.6.
- A few studies suggest that elderly beneficiaries are less responsive than nonelderly consumers to the price of insurance.
- Limited evidence implies that lower-income consumers are more price sensitive than higher-income consumers.
- There is no evidence to suggest that employers as a whole are less likely to offer coverage when a greater proportion of their employees or dependents are eligible for Medicaid, although small, low-wage employers may be less likely to do so.

The few observational studies estimating the income elasticity of demand consistently indicate that the demand for health insurance is inelastic with respect to differences in consumer income. These studies typically report that the income elasticity of demand for health insurance is less than 0.1.

### **Findings on Elasticity of Demand for Health Care Services**

The authors reported that research shows that the demand for insured health care services is price-inelastic. Most estimates of the price elasticity of demand for health care services in general (or total spending) are approximately -0.2. Estimated price elasticities differ by type of service, but the differences are not generally significant. Key findings include:

- Insured consumers may decrease their overall health spending by 2 percent in response to a 10 percent increase in the price of health care (net of insurance coverage). Price-induced changes in demand have been attributed more to changes in the probability of using any care than to changes in the amount of care used once it is accessed.
- Low-income consumers are more sensitive to changes in the price of care. Consequently, they may be more likely to experience adverse consequences from higher cost sharing.

Recent studies have found that there are service-specific differences in the price elasticity of demand, for example:

- Estimates of the price elasticity of the demand for prescription drugs are usually in the range of -0.1 to -0.6. The introduction of multi-tier formularies reduces drug



expenditures. However, direct-to-consumer advertising may significantly reduce the price elasticity of demand for at least some prescription drugs.

- Compared with the demand for inpatient services, the demand for outpatient services may be more price-sensitive. However, the evidence suggests that greater use of inpatient care is consistently associated with greater use of outpatient care.
- The limited evidence suggests that the demand for mental health care, dental services and long-term care services among insured consumers may be more price elastic than the demand for other types of care.

Estimates of the income elasticity of demand for health care services based on observational studies consistently range from 0.0 to 0.2, suggesting that consumers do not use more health care as their income rises. However, some studies that have estimated income elasticity by using time-series or aggregated state- or country-level data have produced higher estimates of income elasticity—in the range of 0.2 to 1.5.

### **Methodological Challenges**

The authors note that there are methodological challenges to estimating the elasticity of demand for health insurance or health care services, including:

- Price is unobservable for people who do not have insurance or do not use health care services. Many researchers use a Heckman two-stage procedure (first estimating the probability of firms offering insurance and then the price) to impute the unobserved price offered to those who decline coverage. However, it is critical to select explanatory variables that should be included in the imputation of unobserved price. Moreover, using imputed premiums for group coverage provided larger elasticity estimates with respect to employees' take-up of coverage.
- Price may be endogenous to factors that are correlated with demand. It is difficult to specify a model that adequately controls for these factors in estimating the elasticity of demand. In most observational studies, researchers have developed complex statistical models, including instrumental-variable estimations that address endogenous outcome variables. An instrumental variable must be correlated with the endogenous variable itself (in this case, price), but uncorrelated with the outcome variable (i.e., demand), except through the endogenous variable. However, it is extremely difficult to find such instruments. In contrast, studies with a natural experimental design usually carry little risk of endogeneity. Specifically for panel data, researchers can use a difference-in-difference method to compare pre- and post-treatment periods and control for any time trend as well as any permanent average difference between the treatment and control groups. Difference-in-difference estimation assumes that a parallel trend would have occurred for the treatment and control groups in the absence of the treatment, all else being equal. It yields a biased estimate of demand elasticity if this assumption fails.



- Unobserved factors of demand can cause underspecified models and yield biased estimates of demand. The most common source of data used to estimate elasticity is the U.S. Census Bureau’s Current Population Survey (CPS). This survey includes multiple years of data and a large number of observations in each year. However, most of the population sample changes from year to year. Furthermore, the CPS offers information only about whether household members are covered by health insurance, not information about the cost or design of their coverage. However, the Medical Expenditure Panel Survey (MEPS) does provide panel data, although it contains a much smaller sample than CPS. MEPS includes information about employees’ insurance options and coverage (such as premiums and coinsurance rates), as well as personal information (such as income and assets, health status, and health care utilization and expenditures). Many researchers have tried to link CPS data across years or statistically match CPS to MEPS to create data sets adequate to their research needs.
- Research information about provider-induced demand or supply-side behavioral changes in response to price changes is very limited. No studies have considered supply-side factors in their models.

### **Gaps in the Literature**

The authors described numerous gaps in the literature on estimating and applying elasticity estimates, including:

- Because observations on the options available to consumers and time-variant behaviors are lacking, an omitted variable bias, or endogeneity bias, in estimating elasticity occurs.
- Many statistical models have been used to address methodological challenges due to limited data. At the same time, there is ongoing demand to link multiple sources of data to estimate consumer response in complex markets over time.
- There are few analyses of the potential demand for high-deductible insurance products by the general public or the change in their use of care once enrolled.
- Consumer responses to improved coverage for mental health, long-term care, and other types of care – such as preventive services or specific types of prescription drugs – merit further research to support improvements in the design of public and private health care coverage.



## Appendix B. Simulation Model Crosswalk to the Economic Impact Model

The Maryland Health Care Reform Simulation Model estimates new expenditures in the health care sector due to implementation of the ACA. The IMPLAN economic input-output model takes output from the simulation model, in aggregate dollars, as input with which to estimate the potential impact of health care spending on the Maryland economy. The simulation model predicts aggregate spending in all segments of the health care sector combined. However, the IMPLAN model uses health care spending in related industry categories, mainly: physician services, hospital care, pharmaceutical drugs, and other health services including diagnostic services. Therefore, outputs of the Maryland simulation model are mapped to the IMPLAN industry categories to enable IMPLAN to estimate the broader economic impacts of changes in health care spending.

We consulted several sources to facilitate the mapping of health care spending categories and estimate the shares of health care spending for newly insured individuals in Maryland. Maryland's Medicaid MCOs make periodic Health Finance Management Reports (HFMRs) to the state that provide detailed allocations of health care expenditures by the provider types that render services to MCO enrollees. The Centers for Medicare & Medicaid Services (CMS) provided another source of data in its National Health Expenditure (NHE) accounts, which permit a comparison of the HFMRs estimates with nationwide health care spending by provider type. In addition, the Milliman Medical Index from the actuarial consulting firm Milliman provided a source for estimates of spending by provider group for families covered under employment-based insurance.

Table B.1 outlines the estimated shares of total health care spending for each provider type from each of the data sources presented. The last column shows an estimate of predicted shares of new spending used for the Maryland model, based on HFMRs of the Medicaid MCOs. These percentages are used to allocate estimates of total new health care expenditures by provider type, which are then used as input to the IMPLAN model. In the Expenditure model, administrative costs are estimated separately from Medical costs, and IMPLAN has a separate input category for them. Hence, they are not included in Table B.1.



**Table B.1. Expenditures by Provider Type as a Percentage of Total Health Care Expenditures**

Provider	Data Source		
	Milliman	CMS NHE	Maryland HFMR
Physician	32.6%	28.4%	22.8%
Dentist	N/A	5.8%	0.3%
Other Professions	N/A	3.8%	N/A
<b>Total, All Professional Services</b>	<b>32.6%</b>	<b>37.9%</b>	<b>23.1%</b>
Inpatient Hospital	31.3%	41.1%	38.9%
Outpatient Hospital	17.6%	N/A	22.6%
Prepaid Inpatient Health Plan	N/A	N/A	N/A
<b>Total, Hospital Services</b>	<b>48.8%</b>	<b>41.1%</b>	<b>61.5%</b>
<b>Total Pharmacy</b>	<b>14.7%</b>	<b>13.4%</b>	<b>9.6%</b>
<b>Total, Other Health Services</b>	<b>3.8%</b>	<b>7.6%</b>	<b>5.8%</b>
<b>Total</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>



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