Another Look at the Impacts of Health Reform in Massachusetts: Evidence Using New Data and a Stronger Model

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Session: Public Economics and the Low Income Population
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Discussant for this paper: Thomas Buchmueller, University of Michigan
Other session discussants: Bill Evans, University of Notre Dame; Hilary Hoynes, University of California, Davis; Kosali Simon, Cornell University

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In April 2006, Massachusetts enacted a comprehensive health care reform bill that seeks to move the state to near universal health insurance coverage. The state moved quickly to implement the provisions of the new bill, which included expansions in eligibility for public coverage, subsidized insurance coverage, market reforms, requirements for employers, and, most controversial, an individual mandate for insurance coverage (Table 1). A study of the early impacts of the state's reform initiative found evidence of a substantial drop in uninsurance—from 13 to 7 percent for non-elderly adults (Sharon Long 2008). Because that study relied on a simple pre-post comparison to estimate the impact of health reform, there is the possibility that the estimates of the impact of health reform captured factors beyond health reform that changed over the same period. Such confounding changes, if they affected insurance coverage, would bias the early study's estimates of the impacts of the reform initiatives (Lawrence Mohr 1995).

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This study expands on that earlier work to estimate the impacts of health reform in Massachusetts using new data and a stronger research design. Specifically, we rely on data over time for Massachusetts and other states from the Current Population Survey (CPS) to estimate difference-in-differences models (Jeffrey Wooldridge 2002). These models use changes over time in other states to control for the underlying trends in insurance coverage in Massachusetts that are not related to health reform. This evaluation design was not possible in the earlier study, which was based on data from a survey conducted only in Massachusetts.

I. Study Design, Data and Methods

A. Study Design. We take advantage of the "natural experiment" that occurred in Massachusetts to compare health insurance coverage before and after the state implemented its health reform initiative. As noted above, to control for underlying trends in insurance coverage not related to health reform, we subtract changes in health insurance coverage over the same time period for comparison groups from other states using a difference-in-differences model.

The difference-in-differences model can be written as:

$$(1) \qquad Y_{it} = \beta_0 + \beta_1 MA_{it} + \beta_2 Post_{it} + \beta_3 MA_{it}*Post_{it} + \beta_4 X_{it} + \varepsilon_{it}$$

The variable Y is insurance coverage for individual i in period t. The variable MA identifies individuals who reside in Massachusetts (with individuals residing in other states the omitted category). *Post* is a dummy variable taking the value of 1 if the observation is in the post-reform period and 0 otherwise. The interaction variable *MA*Post* identifies individuals in Massachusetts in the post-expansion period. Finally, the variable X captures individual and family characteristics. The β's are parameters to be estimated, with the coefficient on the interaction term, β_3, providing the estimate of the impact of Massachusetts' health reform initiative.

Given the complexity of Massachusetts' health reform initiative, we estimate the impacts of reform for the overall adult population and for lower-income (defined as having family income of 300 percent of the federal poverty level (FPL) or below) and higher-income residents (defined as family income higher than 300 percent of FPL). Although the reform initiative contains elements that affect all residents, many reform components, including the expansion of the state's Medicaid program (called MassHealth) and the new Commonwealth Care program (which provides subsidized insurance coverage) target lower-income residents in the state.

B. Data. We rely on data for 2004 to 2007 for non-elderly adults (19 to 64) from the 2005 to 2008 CPS. The CPS is a nationally representative household survey of the U.S. civilian, non-institutionalized population. The primary objective of the CPS is to collect information on labor market characteristics; however, each March the Annual Social and Economic Supplement (ASEC) collects detailed information about income and health insurance coverage. With a sample size of about 50,000 households each year, the CPS ASEC provides relatively large samples for many states, including Massachusetts.

Defining health insurance status. CPS respondents are asked in March to report on the health insurance of household members over the previous calendar year through a sequence of questions asking about potential sources of coverage. Although it is believed that most people accurately report in surveys whether they have insurance coverage, there is evidence of some misreporting of coverage type (Kathleen Call et al. 2001/2002). This is likely to be a particular problem in Massachusetts, where several of the public programs and the new program for subsidized coverage have similar names. Survey data from Massachusetts suggests that there is considerable confusion around program names in the state, with survey respondents reporting that they have both non-group and various types of public coverage (Long 2008). As this raises

concerns about the accuracy of the reporting of coverage type, the analysis of source of coverage is limited to ESI coverage and all other types of insurance.[1] The latter is largely comprised of public coverage for lower-income households and non-group coverage for higher-income households. In our framework, an individual reporting both public coverage and ESI coverage (perhaps because they have coverage through a premium assistance program) would be assigned to ESI coverage.

In the CPS, individuals are classified as uninsured only if they report having no coverage at any point over the previous calendar year. Although the CPS asks about coverage last year, the estimate of the uninsurance rate aligns more closely to a point-in-time estimate than a full-year estimate (Carmen DeNavas-Walt et al. 2007).

We exclude individuals from households that did not respond to the CPS ASEC's questions pertaining to insurance coverage but had insurance status imputed by the Census Bureau since that imputation procedure does not consider state of residence.[2] The remaining sample of ASEC responders is reweighted to be representative of the population in Massachusetts in each year.

*Defining the pre- and post-reform periods***.** Since the CPS asks about health insurance coverage over the prior calendar year, we are limited in our ability to align the pre- and post-reform periods with the exact timing of the implementation of the changes in Massachusetts. We

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[1] Defining public coverage narrowly as those who reported MassHealth or other state coverage yields qualitatively similar estimates to those reported here.

[2] The CPS imputation process tends to overstate (understate) the number of uninsured (insured) residents in states with a low uninsurance rate relative to the national average, such as Massachusetts (Michael Davern et al. 2007).

define the pre- and post-reform periods based on the year, rather than the month, the state implemented reform. Thus, although some of the initial reform efforts for adults in Massachusetts went into effect in October 2006, our post-reform period based on the CPS begins in 2007. In this study, we compare health insurance coverage in 2007 in Massachusetts, to coverage in the 2004-2006 pre-reform period.[3] We estimate the model including and excluding 2006 to assess the sensitivity of our estimates to including that year, which captures some elements of reform, and find no major difference between the two sets of results. We focus here on the estimates that include 2006 as they are most comparable to the time period of the earlier work. Like the earlier work, we are examining the early impacts of health reform.

Defining the comparison groups. Because health reform affects everyone in Massachusetts, there are no within-state comparison groups unaffected by reform. Consequently, we rely on comparison groups drawn from other states. Since the period of the study is one in which many states were making changes in their public programs (sometimes expanding and sometimes cutting back eligibility), we rely on higher-income populations, who were not affected by those changes, as our comparison groups.[4] We estimated models using different income groups for the comparison populations (e.g., family income greater than 300 percent of the FPL, between 300 and 400 percent of the FPL, and between 300 and 500 percent

[3] Limiting the pre-period to 2006, as in the earlier work, yields findings that are similar to those reported here, particularly for uninsurance; however, the 2006 data in the CPS are more likely to capture the early impacts of health reform than are the 2006 data used in the earlier study.

[4] Higher-income populations have been used as comparison groups in other studies of health reform, including, for example, Amy Davidoff, Genevieve Kenney and Lisa Dubay (2005) and Sharon Long, Stephen Zuckerman and John Graves (2006).

of the FPL) and found that there was little change in the basic findings. We focus here on the comparison group that is defined as adults with family income above 300 percent of the FPL.

In addition to considering different definitions of high income for the comparison groups, we also estimated models based on different groups of states. Our first group of states was based on the 23 largest states in the CPS that had not implemented any health reform changes for higher income populations, including Alabama, Arizona, California, Colorado, Florida, Georgia, Indiana, Louisiana, Maryland, Michigan, Minnesota, Missouri, New Jersey, New York, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, Texas, Virginia, Washington, and Wisconsin. Our second comparison group is drawn from the three Northeastern states among those states—New Jersey, New York, and Pennsylvania. Since our estimates are quite similar using the higher income adult comparison groups in both groups of states, we focus here on the findings based on the comparison group using the Northeastern states.

C. Methods. We isolate the effects of health reform on insurance coverage through difference-in-difference multivariate regression methods. The regression models include a rich set of variables to control for differences between the Massachusetts sample and the comparison groups (beyond state of residence) and differences within each group over time that could affect our outcomes of interest, including age, race/ethnicity, sex, citizenship, educational attainment, marital status, health status, employment, and residence in an urban area.

We use propensity score weights to insure that the samples from the comparison states match the samples in Massachusetts on observable demographic characteristics (Donald Rubin 1997). Since the comparison groups consist of higher income adults from other states, we cannot match on income-related characteristics. We estimate separate propensity score models for each population group (all adults, lower-income adults and higher-income adults) and for each of the

comparison groups used (i.e., the different income groups in all large states and in the large Northeastern states). As the basic findings are consistent across models with and without the propensity score weights, we report the results from models with the propensity score weights. To compare our results to previous estimates, we also estimate pre-post models.

For all of the analyses, we estimate linear probability models for ease of computation and to facilitate comparisons across alternative models. We use the method developed by Michael Davern et al. (2007) to approximate the survey-design adjustment for the CPS to obtain correct variance estimates. The approximation of the survey-design adjustments is needed since the CPS does not release the information needed for those adjustments on the public use files.

Limitations of our methods. Although we use a strong quasi-experimental design and control for a wide array of individual and family characteristics in the regression analysis, it is always possible with quasi-experimental methods that unmeasured differences between the Massachusetts samples before and after health reform, or between the Massachusetts sample and the samples from the comparison states may confound the impact estimates. By estimating the models using multiple comparison groups and across different populations, we obtain some evidence on the sensitivity of the findings to alternative models. The findings reported here are robust to those alternative model specifications.

II. Findings

We present the estimates of the impacts of health reform on insurance status from the regression models using the pre-post and difference-in-differences models based on the CPS in Table 2, along with the pre-post estimates from the earlier study (Long 2008). Detailed tables providing the full difference-in-differences estimation results for all adults are provided in

Appendix Table 2. In presenting our findings, we focus first on the findings from the CPS-based analysis.

In 2004 to 2006, the years just prior to health reform in Massachusetts, the uninsurance rate for non-elderly adults in the state averaged about 12 percent based on the CPS. As shown in Table 2, we find a significant drop in uninsurance for non-elderly adults in the first year of health reform using the more rigorous difference-in-differences model, with uninsurance dropping 6.6 percentage points. This decline was accompanied by a 3.5 percentage point increase in public or other coverage and a 3.1 percentage point increase in ESI coverage among all adults. Thus, there was no evidence that the expansion of public coverage under Massachusetts' health reform effort lead to the "crowding out" of private coverage.

The changes in insurance status among the adults were driven by the impacts of health reform on lower-income adults in the state. For this population, the average uninsurance rate during the pre-reform period (2004-2006) was 25 percent. In the first year after health reform was implemented, uninsurance decreased by 17.3 percentage points for lower-income adults. At the same time, public or other coverage and ESI coverage increased by 11.8 percentage points and 5.5 percentage points, respectively.[5] We find no substantive changes in insurance coverage for higher-income adults in Massachusetts under health reform based on the CPS.

[5] As a further check on our findings, we estimated the models for non-elderly adults with family income below 150 percent of the FPL, the income eligibility cut-off for a full subsidy in the Commonwealth Care program. As would be expected, we found a larger reduction in uninsurance for that population group, due to a significant increase in enrollment in public or other coverage.

As shown in Table 2, the difference-in-difference results are quite similar to the estimates from the pre-post models. They are also generally consistent with the earlier findings based on the pre-post models used by Long (2008), which found that uninsurance decreased by 5.6 percentage points for all adults in 2007, with both public or other coverage and ESI coverage increasing by 2.9 percentage points.

For lower-income adults, the CPS estimates suggest somewhat greater gains in insurance coverage under health reform than those reported in the earlier study. Long (2008) found a drop in uninsurance of 10.5 percentage points, accompanied by increases in public or other coverage and ESI coverage of 5.9 and 4.9 percentage points, respectively, The earlier work also found a small, statistically significant gain in ESI coverage among higher-income adults, which we do not find in the CPS.

These differences in the estimates for the lower-income population may reflect differences in the measures of income across the two surveys, as we expect the CPS, with its more detailed income questions, to capture family income more accurately than does the survey used in the earlier study. The CPS constructs income by summing categories of earned and unearned income obtained for a series of questions for each individual, while the survey used by Long (2008) asks about total family income. The latter is likely to understate family income relative to the CPS (Michael Davern et al. 2005), leading to a greater share of Massachusetts residents classified as lower-income in the earlier study than in the CPS.

III. Discussion

Evaluations of comprehensive state reform efforts are challenging. Simple pre-post comparisons run the risk of attributing the impacts of contemporaneous factors to the reform

efforts, while stronger evaluation designs have more significant data requirements. Early work examining the impact of health reform in Massachusetts relied on survey data for Massachusetts alone since national data were not yet available. In this study, we expand on that work to estimate the impacts of health reform in Massachusetts using a strong quasi-experimental design—a difference-in-differences model with propensity score weighting—and national data.

The findings from our difference-in-differences models are generally consistent with results from pre-post models estimated with CPS data and with results from Long (2008), in that they show that adults in Massachusetts experienced substantial declines in uninsurance, with no crowding out of private insurance coverage. We also find the strongest effect of health reform for lower-income adults, the target population for many of the state's reform efforts.

The findings reported in both the earlier work and in this study reflect the response of Massachusetts' residents prior to the full-implementation of the health reform initiative and, thus, provide an interim assessment of the impacts of health reform in the state. The similarity between the difference-in-differences and the pre-post models for this interim period suggests that underlying trends had little impact on insurance changes in Massachusetts between 2004 and 2007. However, given the significant economic changes that have occurred in Massachusetts and the nation as a whole since 2007, it is likely that contemporaneous changes unrelated to health reform will have more of an effect on pre-post estimates of the longer term effects of health reform in Massachusetts.

As the new administration in Washington begins to address health care reform at the national level, it will be important to learn from innovative state initiatives like those of Massachusetts. The findings for Massachusetts, which show strong gains in health insurance coverage (particularly for the lower-income adults who are targeted for public support for

coverage) without the crowding-out of private coverage, highlight the potential gains from broad and comprehensive reform initiatives.

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Table 1: Key Components of Chapter 58 (*An Act Providing Access to Affordable, Quality and Accountable Health Care)* and the Populations Targeted by the Policy Change

Key Components	Children	Adults		
		<150% FPL	150-300% FPL	>300% FPL
Expansion of MassHealth to children up to 300% FPL	X			
Expansion of MassHealth Insurance Partnership Program, which provides insurance subsidies and employer tax credits to workers in small firms to 300% FPL		X	X	
Increase in enrollment caps for MassHealth programs for long-term unemployed adults (eligible up to 100% FPL), disabled working adults (eligible at any income level) and persons with HIV (eligible up to 200% FPL)		X	X	X (limited)
Restoration of dental, vision and other MassHealth benefits to adults		X	X	X (limited)
Creation of new MassHealth wellness benefit/incentive program	X	X	X	X (limited)
Increase in hospital and phyisican rates under MassHealth	X	X	X	X (limited)
Creation of new Commonwealth Care Health Insurance Program which provides subsidized insurance for adults up to 300% FPL who are not eligible for Masshealth and do not have access to employer-sponsored insurance coverage		X	X	
Creation of new Commonwealth Health Insurance Connector Authority, which provides purchasing vehicle for individuals without access to employer-sponsored insurance and small employers via Commonwealth Choice (<51)				X
Creation of new Young Adult products for 19 up to 26 year olds who do not have access to employer-sponsored insurance		X	X	X
Extend dependent coverage rules up to 26 years of age or two years after loss of IRS dependent status, whichever is earlier		X	X	X
Requirement that employers with 11+ employees offer access to Section 125 plan or face potential of a "free rider surcharge" if employees use substantial amounts of care through the Health Care Safety Net Trust Fund (formerly that Uncompensated Care Pool)		X	X	X
Requirement that employers must make a "fair and reasonable" contribution towards the cost of health insurance or pay a "fair share" assessment of $295/employee		X	X	X
Merger of non-group and small group markets	X	X	X	X
Requirement that all adults 18 and older to have health insurance if it is affordable ("individual mandate")		X	X	X
Creation of new standards for Minimum Credible Coverage for health plans in the state	X	X	X	X

Source: Exhibit 1 in Long, SK "On the Road to Universal Coverage: Impacts of Reform in Massachusetts at One Year" *Health Affairs* , Web Exclusive, June 3, 2008.

Table 2: Impact of Health Reform on the Health Insurance Status of Adults (18 to 64) in Massachusetts as of 2007

	Pre-Post Estimates				Regression-Adjusted Difference-in-Differences Estimate
	Simple Difference			Regression-Adjusted Estimate	
	Pre-Reform	Post-Reform	Post-Reform - Pre-Reform Difference		
Estimates Based on the CPS					
All Adults					
ESI coverage	74.3%	76.2%	1.9	1.7	3.1 *
Public or other coverage	14.0%	18.5%	4.5 ***	4.8 ***	3.5 **
Uninsured	11.7%	5.3%	-6.4 ***	-6.6 ***	-6.6 ***
Sample size	6,210				27,481
Lower-income Adults					
ESI coverage	45.4%	47.2%	1.8	3.8	5.5 *
Public or other coverage	29.7%	43.7%	14.0 ***	13.3 ***	11.8 ***
Uninsured	24.9%	9.1%	-15.8 ***	-17.1 ***	-17.3 ***
Sample size	2,228				23,499
Higher-income Adults					
ESI coverage	92.0%	91.6%	-0.4	-0.6	0.4
Public or other coverage	4.4%	5.1%	0.7	0.8	-0.1
Uninsured	3.6%	3.3%	-0.3	-0.2	-0.2
Sample size	3,982				25,253
Estimates from the Earlier Study (Long 2008)					
All Adults					
ESI coverage	66.6%	69.3%	2.6 *	2.9 **	
Public or other coverage	20.4%	23.6%	3.2 **	2.9 **	
Uninsured	13.0%	7.1%	-5.8 ***	-5.6 ***	
Sample size	5,835				
Lower-income Adults					
ESI coverage	37.7%	42.3%	4.7	4.9 **	
Public or other coverage	38.5%	44.8%	6.3 **	5.9 ***	
Uninsured	23.8%	12.9%	-10.9 ***	-10.5 ***	
Sample size	2,702				
Higher-income Adults					
ESI coverage	87.3%	89.3%	2.0	0.9	
Public or other coverage	7.4%	7.8%	0.4	1.0	
Uninsured	5.2%	2.9%	-2.3 ***	-1.8 ***	
Sample size	3,133				

* (**) (***) Significantly different from zero at the .10 (.05) (.01) level, two-tailed test.

Appendix Table 1: Regression Results for All Adults, with Original Weights and Propensity Score Weights

Variable	Uninsured		ESI		Public or Other coverage	
	Original Weights	Propensity Score Weights	Original Weights	Propensity Score Weights	Original Weights	Propensity Score Weights
Treatment*Post	-0.066***	-0.066***	0.030*	0.031*	0.037**	0.035**
Treatment	0.040***	0.041***	-0.099***	-0.100***	0.059***	0.059***
Post	0.003	0.002	-0.012**	-0.013*	0.009**	0.011*
Age	0.001	0.002	-0.001	-0.004*	-0.001	0.002
Age^2	-0.000***	-0.000**	0.000**	0.000***	0.000	-0.000**
Female	-0.029***	-0.036***	0.025***	0.027***	0.005*	0.010**
Black, non-Hispanic	0.032***	0.022	-0.043***	-0.051***	0.011	0.029*
Hispanic,	0.089***	0.103***	-0.144***	-0.201***	0.056***	0.098***
Other race, non-Hispanic	-0.012	-0.019	-0.010	-0.026	0.022**	0.045***
Non-citizen	0.110***	0.110***	-0.123***	-0.118***	0.013	0.008
Naturalized citizen	0.023***	0.019*	-0.026***	-0.022	0.004	0.003
Never married	0.027***	0.030***	-0.062***	-0.085***	0.034***	0.055***
Widowed, separated, or divorced	0.014**	0.017*	-0.067***	-0.104***	0.052***	0.087***
HIU size	-0.022***	-0.029***	0.018***	0.019***	0.005**	0.009***
Fair/poor health	0.009	0.014	-0.021*	-0.018	0.012	0.004
Disabled	-0.030**	-0.038**	-0.075***	-0.087***	0.105***	0.125***
Other HIU member in fair/poor health	0.001	-0.001	0.003	-0.012	-0.004	0.013
High school graduate	-0.092***	-0.069***	0.150***	0.144***	-0.059***	-0.076***
Part-time worker	0.019***	0.022***	-0.069***	-0.098***	0.051***	0.077***
Spouse part-time worker	-0.002	0.004	0.011	0.016	-0.009	-0.020*
Firm size 0-9	0.050***	0.049**	0.066***	0.144***	-0.116***	-0.192***
Firm size 10-24	0.000	-0.008	0.243***	0.325***	-0.243***	-0.317***
Firm size 25-499	-0.050***	-0.062***	0.328***	0.413***	-0.278***	-0.351***
Firm size 500+	-0.073***	-0.082***	0.359***	0.442***	-0.286***	-0.359***
Government worker	-0.016***	-0.019***	0.021***	0.025***	-0.005**	-0.006
Live in MSA	-0.017**	0.000	0.030***	0.003	-0.013	-0.004
Constant	0.267***	0.252***	0.373***	0.397***	0.360***	0.351***
N	27,481	27,481	27,481	27,481	27,481	27,481

Note: Firm size reflects largest firm size between HIU head or spouse (if present)

* (**) (***) Significantly different from zero at the .10 (.05) (.01) level, two-tailed test.