The COMMONWEALTH FUND

TECHNICAL APPENDIX

Rethinking The Affordable Care Act's "Cadillac Tax": A More Equitable Way to Encourage "Chevy" Consumption

Our analysis addressed two main questions:

1. How much of the variation in health insurance premiums across states is explained by factors that can be controlled by enrollees and insurers (such as plan generosity or utilization management) relative to the share that is explained by factors outside of enrollees' control (such as age, sex, health status, price variation, competition)?
2. What is the year in which each state will have at least 10 percent and at least 50 percent of workers affected by the Cadillac tax? Workers are considered to be affected by the tax if they (or their employer) must pay the tax, or if their employer would have to alter its current benefits package to avoid the tax.

We did not assess the types of avoidance strategies that workers and firms might take, or the welfare consequences of this tax avoidance. In addition, we did not quantify which firms and workers are likely to avoid the tax, and which firms and workers are likely to pay the tax.

Approach for Question 1

To address the question of how much of the variability in employer-subsidized insurance (ESI) premiums can be explained by different factors, we modeled median premiums in each state using a linear regression model where the independent variables fell in the following categories: state medical prices; demographics of the ESI and overall population; ESI plan type and structure; and size of health care work force in the state. Table 1 shows the specific variables and data sources we used for each of these variables. In general, we used five years of data, from 2010 to 2014, to conduct these analyses. In a few cases, data were available only through 2013; in these cases, we imputed the 2014 data element based on the 2013 value.

Table 1. Variables Used in Regression Analyses

Variable Description	Variable Name	Years	Source
Medicare Price Index (ratio of actual total Medicare costs to standardized Medicare costs for each state), 2010–13	MPI	2010–13	Centers for Medicare & Medicaid Services 2015
Percent ESI population over age 50, from 2010–13 American Community Survey (ACS)	Percent ESI >age 50	2010–13	Minnesota Population Center University of Minnesota 2015
Percent ESI population under age 18, from 2010–13 ACS	Percent ESI <age 18	2010–13	Minnesota Population Center University of Minnesota 2015
Percent ESI population female, ages 18–50, from 2013 ACS	Percent ESI female ages 18–50	2010–13	Minnesota Population Center University of Minnesota 2015
Percent state's population reporting fair or poor health, 2010–14 Behavioral Risk Factor Surveillance System (BRFSS)	Percent fair or poor	2010–14	Centers for Disease Control 2014
HMO penetration rate. Data for July 2010–13, collected by Decision Resources, LLC, and compiled by Kaiser Family Foundation (KFF).	HMO penetration	2010–13	Kaiser Family Foundation 2015
Percent of private, single ESI plans with deductible in state (from MEPS–IC)	Percent with deductible	2010–14	Agency for Healthcare Research and Quality 2015
Average deductible for private, single ESI plans, given that they had any deductible	Average deductible	2010–14	Agency for Healthcare Research and Quality 2015
Average office visit copayment for private, single ESI plans	Average copayment	2010–14	Agency for Healthcare Research and Quality 2015
Health care workforce as share of state's total workforce; estimates from Bureau of Labor Statistics, compiled by KFF; data from May 2014	Health care workforce	2010–14	Agency for Healthcare Research and Quality 2015
Residual component of health care workforce as share of state's total population (not explained by demographics)	Health care workforce residual	2010–14	Authors' analysis
Percent of state's workforce by NAICS industry classification, from Bureau of Labor Statistics Occupational Employment Statistics, 2010–14	Percent Mining, Percent Hospitality	2010–14	Bureau of Labor Statistics 2015
Percent of state's workforce by union affiliation, from Bureau of Labor Statistics Economic News Release	Percent Union Membership	2010–14	Bureau of Labor Statistics 2015

Following Cubanski et al. (2015), we calculate the Medicare price index (MPI) using two total cost amounts that the Centers for Medicare and Medicaid Services calculates for each geographic area—"actual total costs" and "total standardized costs." The standardized costs are adjusted to reflect a limited degree of cost variation, netting out such factors as regional input prices, wages, teaching hospital status, and variation in DSH payments, while retaining cost variation due to practice patterns and patient differences in utilization. We create the MPI by dividing the total actual costs by the total standardized costs. This ratio captures the variation in costs that were netted out in the original,

standardized cost index, while netting out the sources of variation captured in the standardized index. This leaves us with regional costs that have been standardized to account for behaviors that reflect explicit choices on the part of providers and patients. The specific factors that are being captured in our index include:

1. Regional differences in labor costs.
2. Regional differences in practice costs as measured by hospital wage indices and geographic practice cost indices.
3. Differences in payments to providers that reflect differences in graduate medical education, indirect medical education, and disproportionate share payments.

Conversely, our approach nets out differences in costs due to differences in patients' choice of care setting, choices about who provides the service (e.g., nurse practitioner or physician's assistant vs. physician), patients' willingness and ability to use care, and providers' decisions regarding how to treat outlier cases.

Results

Table 2 shows the results of our final regression model. We tested whether adding the following variables gave us a more informative model: variables capturing competition in the large- or small-group markets;[i] the ratio of the number of hospital beds to the population in each state (Kaiser Family Foundation, 2015) or the ratio of the number of teaching hospitals to the population in each state (American Association of Medical Colleges, 2009); average office visit copayment; and the percentage of individuals in fair or poor health or the percentage of ESI enrollees under age 18 in each state. Using the Akaike information criterion (AIC), we found that the additional variables did not improve the model's descriptive capabilities.[ii] Note that because HMO plans tend to cost less than other types of ESI plans but tend to also have higher actuarial values, including being more likely to have no deductible, we interacted the HMO penetration variable with the "percent with deductible" and the "average deductible" variables in the regression model. In addition, we found that the size of the health care workforce was a significant predictor of median premiums, suggesting that it is a proxy measure for health care utilization in the state.

However, we wanted to try to isolate the degree to which the size of the health care workforce might be endogenous and reflect demand due to state-specific demographics from the degree to which a large health care workforce might induce demand and health care utilization. Indeed, we found that several of our demographic variables were significant predictors of the health care workforce (Table 3). Therefore, because of the collinearity between the demographic variables and the workforce variable, it is difficult to isolate demographic and workforce effects in a model including demographic variables and the workforce variable. To isolate demographic effects from the health care employment effects, we used a linear model to predict the health care workforce in each state as a function of our demographic variables and then included the workforce residuals in our premium

[i] We used the Herfindahl-Hirschman Index (HHI), which is the sum of the squares of market share of each insurer in the state, to measure competition Kaiser Family Foundation. *Large Group Insurance Market Competition*, from http://kff.org/other/state-indicator/large-group-insurance-market-competition/, Kaiser Family Foundation. (2015). "Small Group Insurance Market Competition." from http://kff.org/other/state-indicator/small-group-insurance-market-competition/.

[ii] We ran our analysis in R, using the stepAIC function from the MASS package https://stat.ethz.ch/R-manual/R-devel/library/MASS/html/stepAIC.html.

model, rather than the original workforce variable. The residual health care workforce variable (workforce size unexplained by available demographic information) is still significantly associated with median premiums, suggesting that larger health care workforces independently lead to higher levels of health care utilization in each state. This effect could be driven by patients or providers, or both. Larger per capita health care workforces likely mean that patients have shorter wait times to see a provider. They may also lead to providers offering a greater quantity of services per patient to achieve similar levels of revenue to states with lower provider-to-patient ratios.

We also found that the percentage of workers in the natural resources and mining industry and in the leisure and hospitality industry was significantly associated with median premiums. These are the two industries with the highest and lowest average ESI premiums, respectively. We tested whether adding additional industry variables yielded a more informative model, and we found that it did not.

Other variables, however, improved the model's ability to explain variance. We found that percentage of workers with union membership was marginally significant (at $p<0.1$). The percentage of plans with a deductible, average deductible given that the plan has a deductible, the HMO penetration rate, and interactions between deductible characteristics and HMO penetration were all significant. While only one demographic variable, the percentage of individuals in fair or poor health, was even marginally significant at the $p<0.1$ level, we note that the four demographic variables we considered—percentage ESI enrollees over age 50, percentage ESI enrollees under age 18, percentage of ESI enrollees who are women between ages 18 and 50, and percentage of individuals in fair or poor health—were jointly significant ($p=0.0011$). Medicare price index, HMO penetration, interaction between the HMO penetration and percentage of plans with a deductible, and health care workforce residual were all significant in this model.

Table 2 also shows the analysis of variance (ANOVA) for model 1. For the ANOVA calculations, we estimated the percent of variance explained by factors other than survey year, since our objective was to explain differences in premiums between geographic areas, not variances across years. We presented results from model 1 in our issue brief, *The Affordable Care Act's "Cadillac Tax": A More Equitable Way to Encourage "Chevy" Consumption* (Eibner and Nowak, 2015).[iii]

[iii] In the accompanying issue brief, we grouped percent ESI >age 50, percent ESI <age 18, and percent in fair or poor as "demographics," and we grouped percent with a deductible, average deductible, HMO penetration, and interactions between the HMO penetration rate and plan characteristics as "Plan Type and Structure" (See Figure 1). The variable "Industry" in the issue brief figure groups percent in the mining industry and percent in the hospitality industry.

Table 2. Results of Linear Regression Model to Predict the Log Median Single ESI Premiums, Including All Demographic Variables (Model 1)

	Model Regression Estimate	Sum of Squared Errors	Percentage of Variance Explained (Years excluded)
(Intercept)	7.99***		
Year 2011	0.05***	0.709	
Year 2012	0.07***		
Year 2013	0.12***		
Year 2014	0.15***		
Perc. Mining	1.05***	0.034	2.6%
Perc. Hospitality	-0.49***	0.065	4.8%
Perc. Union Membership	0.19 +	0.005	0.4%
Percent with deductible	-0.24***	0.072	5.4%
Average deductible (given has deductible)	0.000048**	0.009	0.6%
HMO penetration	-0.59***	0.023	1.7%
(HMO penetration)*(Percent with deductible)	0.83***	0.039	2.9%
(HMO penetration)*(Average deductible, given that plan has deductible)	-0.00012	0.005	0.4%
Percent ESI >age 50	0.50	0.043	3.2%
Percent ESI <age 18	-0.04	0.010	0.7%
Percent ESI female, ages 18–50	0.69	0.005	0.4%
Percent fair or poor health	-0.24 +	0.006	0.5%
Health Care Employment Residual	1.19**	0.079	5.9%
Medicare Price Index	0.388***	0.470	35.0%
Residuals		0.477	35.6%

+ p<0.1 * p<0.05, ** p<0.01, ***p<0.001

Table 3 shows the results of the linear regression that we used to predict health care workforce based on the demographic variables. In this model, all four demographic variables we considered were significant.

Table 3. Results of Linear Regression Model to Predict Health Care Workforce, Including All Demographic Variables

	Estimate
(Intercept)	-0.25***
Percent ESI >age 50	0.45***
Percent ESI <age 18	0.44***
Percent ESI female, age 18–50	0.37***
Percent fair or poor health	0.06***

* p<0.05, ** p<0.01, *** p<0.001

Approach for Question 2

To address the second question, we used 2014 data from the Medical Expenditures Panel Survey Insurance Component (MEPS-IC) on the 50th and 90th percentile (enrollee weighted) of single ESI premiums for private-sector firms that offer health insurance for each state (Agency for Healthcare Research and Quality 2015). We then inflated these premiums using medical cost growth assumptions from the Congressional Budget Office (CBO) to project how these premiums would increase in time (CBO 2015a). We also used CBO estimates of CPI growth rates to project how the Cadillac tax thresholds would increase through 2040 (CBO 2015a).

We used data from Branscome (2008) to estimate the proportion of workers who own single, employee plus one, and family plans; this report estimates that 48.9 percent of private-sector employees with ESI have single coverage, while 51.1 percent have non-single coverage. We assumed that firms were subject to the Cadillac tax if their single premium exceeded the single Cadillac threshold or if the weighted average of the employee plus one and family premiums exceeded the family premium threshold.[iv] Based on Branscome (2008), we assumed that one-third of employees with non-single plans had employee plus one plans, while the remaining two-thirds had family plans.
To determine the proportion of workers impacted by the Cadillac tax in each year, we fit the 50th and 90th percentile single and non-single (weighted average of employee+1 and family premiums) premiums to a normal distribution. We then estimated the percentage of plans that would fall above the single or family Cadillac thresholds in each year. In each year, we then assumed that the percent of employees impacted by the Cadillac tax was given by:

> Percent impacted by Cadillac tax = .489 * (percent single plans exceeding Cadillac threshold) + 0.511*(percent non-single plans exceeding Cadillac family threshold)

Based on this analysis, we find that it will take several years before a majority of states have a significant fraction of workers who are affected by the tax. The full results can be seen in Exhibits 2 and 3 in our issue brief *The Affordable Care Act's "Cadillac Tax": A More Equitable Way to Encourage "Chevy" Consumption* (Nowak and Eibner, 2015).

[iv] In IRS Notice 2015-16, the agency proposes to treat all employees enrolled in the same benefit package for one or more individuals in addition to the employee as being part of the same plan for determining the cost of applicable coverage. See https://www.irs.gov/pub/irs-drop/n-15-16.pdf.

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