This product is part of the RAND Corporation technical report series. Reports may include research findings on a specific topic that is limited in scope; present discussions of the methodology employed in research; provide literature reviews, survey instruments, modeling exercises, guidelines for practitioners and research professionals, and supporting documentation; or deliver preliminary findings. All RAND reports undergo rigorous peer review to ensure that they meet high standards for research quality and objectivity.

TECHNICAL REPORT

Establishing State Health Insurance Exchanges

Implications for Health Insurance Enrollment, Spending, and Small Businesses

Christine Eibner, Federico Girosi, Carter C. Price, Amado Cordova, Peter S. Hussey, Alice Beckman, Elizabeth A. McGlynn

Sponsored by the U.S. Department of Labor

RAND HEALTH

This work was sponsored by the U.S. Department of Labor. The research was conducted in RAND Health, a division of the RAND Corporation.

Published 2010 by the RAND Corporation
1776 Main Street, P.O. Box 2138, Santa Monica, CA 90407-2138
1200 South Hayes Street, Arlington, VA 22202-5050
4570 Fifth Avenue, Suite 600, Pittsburgh, PA 15213-2665
RAND URL: http://www.rand.org
To order RAND documents or to obtain additional information, contact
Distribution Services: Telephone: (310) 451-7002;
Fax: (310) 451-6915; Email: order@rand.org

Preface

This report summarizes findings from a microsimulation analysis of the effects of a health care policy change similar to the Patient Protection and Affordable Care Act (PPACA) on employers and enrollees in employer-sponsored health insurance. Although we consider a variety of outcomes related to health insurance coverage and costs, we focus attention on outcomes relevant for small businesses and enrollees in health insurance exchanges. In addition to considering the effects of a health care policy reform relative to the status quo, we also consider how specific design features within the health insurance exchanges, as well as key modeling assumptions, influence outcomes. Some of the primary outcomes considered in this analysis include employer health insurance offer rates, health insurance offer rates for firms with 100 or fewer workers, enrollment in traditional employer-sponsored insurance (ESI) policies, and enrollment in employer health insurance policies offered through health insurance exchanges. Policies that we varied in sensitivity analyses included employer eligibility to offer coverage in the exchanges, decisions regarding risk pooling in the exchanges, and the availability of tax credits for small businesses.

The study was funded by the Department of Labor. This report should be of interest to state and federal policymakers, small businesses, and individuals and organizations concerned with the future of the health care system and the role that small businesses play in providing coverage. The views, opinions, and/or findings contained in this report are those of the authors and should not be construed as an official government position, policy, or decision, unless so designated by other documentation.

Questions may be addressed to Christine Eibner (eibner@rand.org, (703) 413-1100, ext. 5913). A profile of RAND Health, abstracts of its publications, and ordering information can be found at www.rand.org/health.

Contents

Figures

Tables

Summary

Overview

On March 23, 2010, President Barack Obama signed PPACA into law, a policy designed to expand health insurance coverage for U.S. citizens through expanding eligibility for Medicaid, developing new marketplaces for purchasing insurance that are subject to regulatory changes, requiring individuals to have insurance coverage (with subsidies to offset costs for low-income individuals and penalties for those who fail to comply), and imposing fines on employers who do not offer coverage and whose employees obtain government subsidies. This study evaluates the likely effects of the law, with a focus on small businesses and businesses offering coverage through health insurance exchanges. Outcomes assessed include the proportion of nonelderly Americans who have insurance coverage, the number of employers who choose to offer health insurance, premium prices, total employer spending, and total government spending relative to what we would have observed in the absence of the policy change.

We used RAND's Comprehensive Assessment of Reform Efforts (COMPARE) microsimulation model, which was updated and refined to analyze how people and firms would respond to a health care reform that would allow businesses to offer health insurance coverage through health insurance exchanges. Behavioral responses to new requirements and the availability of new options in our model are based on utility maximization, in which people and firms weigh economic benefits against economic costs to make choices. The baseline reform considered in our analysis was designed to reflect the main provisions of PPACA, and in scenario testing we analyzed the sensitivity of results to key design features and model assumptions. We also considered the effect of exchange implementation choices that must be made by states, including whether to permit large businesses to offer coverage on the exchanges, and whether to segregate the nongroup and small group markets (risk pools) within the exchanges.

Key Findings

We predict that PPACA will increase insurance offer rates among small businesses. According to model projections, by 2016, offer rates would increase from 53 to 77 percent for firms with ten or fewer workers, from 71 to 90 percent for firms with 11 to 25 workers, and from 90 percent to nearly 100 percent for firms with 26 to 100 workers. Offer rates would also increase at the largest firms (those with more than 100 workers), rising from 93 percent to close to 100 percent. Simultaneously, 35 million people would obtain health insurance, and the uninsurance rate in the United States would fall from 19 to 6 percent of the nonelderly population. The increase in employer offer rates is driven by workers' demand for insurance, which increases

due to an individual mandate requiring all people to obtain insurance policies. The presence or absence of employer penalties incentivizing businesses to offer coverage does not have a meaningful impact on outcomes, such as the total number insured or employer offer rates. Employer penalties have little effect because many firms that would not otherwise offer coverage are induced to offer following the reform solely because of the individual mandate. Firms that do not offer coverage after the reform are primarily small businesses (≤50 workers), which are exempt from employer penalties.

In contrast to the employer penalty results, the total number of people insured following the reform is sensitive to the presence of an individual mandate. Without the individual mandate, the number of newly insured would fall from 35 million to 22 million. Other policies, such as employer eligibility to offer coverage in the exchanges and tax credits for small businesses, have little impact on the number of people who become newly insured. Instead, these policies serve mainly to shift costs between employers and the federal government. For example, federal government spending increases when tax credits are available to small businesses, and federal government revenue increases when employer penalties associated with not offering coverage are high.

Under our baseline assumptions, approximately 60 percent of all businesses opt to offer coverage in the exchange following the reform. A total of 68 million people enroll in the exchanges in the baseline reform, of whom 35 million receive exchange-based coverage through an employer. However, there is significant uncertainty regarding the degree of "inertia" bias that will be present in firm decisionmaking. Inertia bias could lead firms to maintain traditional ESI coverage even if standard utility theory would predict a move into the exchanges. Although inertia bias has been documented in other studies, most prior studies focus on individual rather than firm decisionmaking and are not specific to health care.

Implications for Policy

We analyzed two policies that will be relevant for states as they begin to implement health insurance exchanges. First, we considered the effects of opening health insurance exchanges to all businesses, in comparison with limiting exchange eligibility to businesses with 100 or fewer workers (the eligibility cutoff required by law). Although opening the exchange to large businesses has no effect on overall coverage, our model predicts that this policy will have a significant impact on the number of people enrolled in exchange-based coverage. When the exchanges are open to all, we predict that 139 million people will be enrolled in exchange-based coverage, compared to 68 million when the exchanges are restricted to businesses with 100 or fewer workers. These results, however, are highly sensitive to assumptions about inertia bias in firm decisionmaking.

Opening the exchange to a wider group of employers could have a secondary effect of increasing Medicaid enrollment. Differences in cost-sharing requirements between exchange plans and traditional employer plans may cause some workers who are eligible for both employer coverage and Medicaid to take Medicaid if their firms switch to low actuarial value plans in the exchange. This possibility would have the effect of reducing spending for employers, while increasing spending for states and the federal government.

Second, we analyzed the effect of segregating the nongroup and small group markets within the exchange for the purpose of risk pooling. When these markets are segregated, pre-

miums for small group enrollees fall, while premiums for nongroup enrollees increase. This finding reflects that fact that individual exchange policyholders tend to be less healthy than policyholders enrolled through an employer. Since individual policyholders in the exchanges also tend to be eligible for government subsidies, splitting the exchange market raises the cost to the federal government while lowering the cost to small businesses and their enrollees.

In addition to inertia bias in decisionmaking, another potential source of uncertainty is the administrative cost associated with exchange-based health insurance plans. Estimates from existing literature suggest that these costs could range from 8 to 18 percent of premiums and may vary significantly by state. In sensitivity analyses, we considered the implications of changing assumptions about administrative costs in the exchanges. Although fewer people enroll in exchange-based coverage when administrative costs are high, this effect is secondary to the effect of opening the exchanges to larger employers and the effect of inertia bias. Research to quantify the extent of employer bias toward the status quo could be useful in developing more precise estimates of exchange enrollment.

Acknowledgments

This report has benefited from the input of numerous colleagues. We are grateful to Phil Ellis, David Auerbach, Paul Jacobs, and Chapin White from the Congressional Budget Office for a particularly helpful discussion related to model assumptions. Colleagues at the Department of Labor, including Anja Decressin, Matt Swartz, and Elaine Zimmerman, provided very helpful comments on our approach to modeling firm behavior. We also thank Brad Herring of Johns Hopkins University and Jeanne Ringel of RAND for their thorough and very thoughtful reviews of an earlier draft of this report. John Bertko provided valuable insights regarding insurer behavior. We also benefited from input provided by several RAND colleagues, including Raffaele Vardavas, Emmett Keeler, Jim Broyles, and Sarah Nowak. Adam Buzzacco and Taria Francois provided outstanding administrative assistance. Finally, we are indebted to Melinda Beeuwkes Buntin for advice during the early stages of this analysis.

This work was funded by a contract from the U.S. Department of Labor (DOLJ089327414), as part of a master contract awarded in June 2008. The analysis built on earlier work developed through RAND's COMPARE project, which receives funding from a consortium of sources, including RAND's corporate endowment and contributions from individual donors, corporations, foundations, and other organizations.

Abbreviations

AUC	area under the ROC curve
AV	actuarial value
CBO	Congressional Budget Office
COMPARE	Comprehensive Assessment of Reform Efforts
ESI	employer-sponsored insurance
FPL	federal poverty level
FTE	full-time equivalent
HI	health insurance
HIEU	health insurance eligibility unit
HR	human resources
HRET	Health Research and Educational Trust
MEPS-HC	Medical Expenditure Panel Survey, Household Component
NHEA	National Health Expenditure Accounts
PPACA	Patient Protection and Affordable Care Act
QHP	qualified health plan
ROC	receiver operating characteristic
SCHIP	State Children's Health Insurance Program
SIPP	Survey of Income and Program Participation
SUSB	Statistics of U.S. Businesses

CHAPTER ONE

Background

The Patient Protection and Affordable Care Act (Public Law 111-148, or PPACA), signed into law by President Obama on March 23, 2010, could have significant implications for small businesses and their workers. With few exceptions, PPACA requires all individuals to obtain health insurance coverage, either through an employer, Medicaid, or newly created health insurance exchanges. The health insurance exchanges established through PPACA would typically be state-based, although states would have the option to form regional exchanges or to allow the federal government to operate the exchange within the state. Health insurance exchanges would provide a risk-pooling mechanism for the individual and small group markets, subject to guaranteed issue, guaranteed renewal, rating regulations, and regulations regarding plan generosity. Low-income individuals obtaining coverage through the exchanges would be eligible for subsidies if they did not have coverage offers through their employers. While employers will not be required to offer health insurance coverage, employers with more than 50 workers will be penalized if any of their workers obtain subsidized coverage from the exchange. Initially, businesses with 50 or fewer workers will have the option to offer coverage through the exchanges. Over time, exchanges will be open to businesses with 100 or fewer workers, and, eventually, states will have the option to open the exchanges to all businesses, regardless of size.

Mandates requiring individuals to obtain health insurance coverage would likely increase demand for health insurance among workers at small businesses, who are currently less likely than other workers to receive health insurance offers from their employers. Penalties designed to induce firms to provide coverage could also affect small businesses' propensity to offer insurance, although businesses with 50 or fewer workers will be exempt from these penalties. Another facet of health reform that could influence small businesses' health insurance offering behavior is the design of health insurance exchanges. Health insurance exchanges create a mechanism for pooling risk across a large number of individuals, which reduces year-to-year variability in premiums. Exchanges also offer a mechanism by which regulation in the nongroup health insurance market can be strengthened to prevent insurers from denying coverage based on preexisting conditions and to limit the factors that can be used to determine price variation across enrollees. In addition, allowing a larger number of individuals to participate in a single risk pool can reduce per capita administrative costs. PPACA allows small businesses access to health care coverage through the exchanges, an idea that has appeal because small businesses' risk pools are small and because they have limited staff to deal with the managerial challenges associated with offering insurance. The law also provides subsidies for lower-income individuals who purchase health insurance coverage from the exchanges, a policy that could affect the relative attractiveness of receiving employer-sponsored coverage. Subsidies are generally available only for individuals without an insurance offer from their employer (regardless

of whether the employer offers traditional or exchange-based coverage), although there is an exception if the individual's employee premium contribution exceeds 9.5 percent of income.

We have limited information on how PPACA will affect small businesses and their workers. For example, it is unclear how many firms will choose to offer coverage from the exchanges and how many workers and dependents will enroll in exchange plans offered by small businesses. Moreover, many details regarding the inclusion of small businesses in the exchanges, and the design of the exchanges in general, are left to the states and implementing agencies, such as state insurance departments and the U.S. Department of Health and Human Services. Details that will need to be determined include how to implement risk equalization in the exchanges and whether to combine small businesses and individual exchange enrollees in a single risk pool.[1] States will also have to make decisions regarding the size of businesses that can offer coverage through the exchange. Initially states can limit the exchange to businesses with 50 or fewer workers, but over time they must open the exchange to businesses with 100 or fewer workers. Eventually, states will have the option to permit all businesses—regardless of size—to offer coverage in the exchanges.

All of these design choices have the potential to affect employer participation, worker enrollment, premium prices, employer costs, and government spending. However, to date there is little experience to draw from to determine how the design of health insurance exchanges could affect key outcomes. The most salient experience for evaluating the likely effects of health insurance exchanges comes from Massachusetts, which implemented a major health care reform in 2006. The Massachusetts law incorporates a mandate requiring individuals to purchase health insurance, a mandate requiring employers to offer health insurance, subsidies for low-income individuals, and a health insurance exchange called the Commonwealth Connector. Initially, employers were not permitted to offer coverage in the Commonwealth Connector. However, between February and September of 2009, Massachusetts conducted a small pilot program with the goal of recruiting 100 businesses with 50 or fewer workers to offer coverage through the exchange. The program enrolled only 65 businesses and was discontinued (Donnelly, 2010). Effective April 1, 2010, Massachusetts launched a new program called Business Express, which enables businesses with fewer than 50 workers to offer coverage through the exchange (Kingsdale, 2010). However, as of this writing there are no published studies evaluating the Business Express program or its pilot predecessor, most likely because both programs are so new.

Other reforms to the small group market have been more limited in scope than PPACA and therefore offer limited insight regarding the current law. Prior reforms have included rating regulations, guaranteed issue and guaranteed renewal requirements, and purchasing pools (Kapur et al., 2006). There are many variations of purchasing pools, such as purchasing alliances, cooperatives, and multiple employer welfare arrangements (MEWAs), but they all essentially serve the same purpose: They bring together a number of small firms to create a larger risk pool, enable greater bargaining power, and reduce administrative costs. Despite the fact that many states have passed legislation to facilitate the formation of these groups over the past 20 years, there has been little success in increasing health insurance offer rates or reducing premiums (Long and Marquis, 2001; Kofman, Bangit, and Lucia, 2004; Wicks, 2002; Wicks,

[1] Risk equalization is necessary because sicker people may gravitate toward higher actuarial exchange plans, causing these plans to become unsustainably expensive. Risk equalization policies attempt to adjust for this type of selection, for example, by redistributing revenue from lower actuarial value to higher actuarial value plans.

2009). Some of the alliances that originally looked promising later became insolvent, such as the Health Insurance Plan of California (later known as PacAdvantage), or their participation rate fell dramatically after a few years, as was the case with the Council of Small Enterprises in Cleveland, Ohio.

Sources of failure are numerous and are somewhat circumstantial, but there are some major trends: not spreading risk across a large-enough population and the inability to reach participation levels high enough to attract insurers and wield substantial negotiating power. As a consequence, premiums have remained high. Smaller purchasing units are not representative of the population at large, and a single expensive episode of care (e.g., breast cancer treatment, heart attack care, pneumonia hospitalization) can dramatically alter a group's total health care spending (i.e., experience) and thus alter premiums in subsequent years. Another issue has been a higher level of regulation within the purchasing pool than in the individual market. Because rates of firm and employee participation in these pools have been low, an insurer cannot significantly increase market share, and, combined with stricter rating regulations, limits on underwriting, and other regulatory restrictions, there is little incentive for insurers to participate. Consequently, there is less competition among insurers, prices increase, and healthier individuals leave the pool. This cycle continues until the market enters a "death spiral"—that is, it ceases to exist.

Past experiences have limited value in guiding the design options for state-based health insurance exchanges, with respect to small firms participating. Exchanges implemented through PPACA would combine multiple regulatory policies, including rate banding, risk equalization, guaranteed issue and renewal, and limits on the range of plans' actuarial values that can be offered. States would also have the option to combine the small group and the individual market in the exchanges. Prior experience suggests that some of these regulations could have the effect of increasing premiums for the healthiest individuals, which could lead to death spirals (Gates, Kapur, and Karaca-Mandic, 2007). However, the current proposals would combine the health insurance exchanges with an individual mandate requiring everyone to obtain health insurance coverage and subsidies for low-income individuals who purchase coverage on the exchanges. Together, these two policies could counteract adverse selection that might otherwise reduce insurance enrollment in the exchanges. A second type of adverse selection might cause healthier people to sort into the lowest actuarial value plans offered in the exchanges, leading the higher actuarial value plans to become prohibitively expensive. Risk equalization provisions included in PPACA could mitigate this effect, although many details regarding risk equalization will need to be clarified as the law is implemented.

Because it is difficult to draw conclusions about the effects of health insurance exchanges based on existing literature and experience, we use simulation modeling to predict how health insurance exchanges, combined with other health reform polices, will affect outcomes. In this study, we use the RAND-developed Comprehensive Assessment of Reform Efforts (COMPARE) microsimulation model to estimate the effects of PPACA on outcomes such as health insurance coverage and health care costs, with a focus on small businesses and businesses offering coverage in the exchanges. We predict the overall effect of PPACA on small businesses, workers, and their dependents, given the parameters of the law and reasonable assumptions about design choices that have not yet been made. We then consider the sensitivity of our results to design choices, including firm size requirements for offering coverage in the exchanges, whether the individual and small group markets are included in a single risk pool within an exchange, and the availability of tax credits for small businesses that offer

health insurance coverage. We also examine the sensitivity of PPACA's penalty for nonoffering employers, as well as the individual mandate penalty. Finally, we evaluate how modeling assumptions about administrative costs and inertia in firm decisionmaking affect predictions.

CHAPTER TWO

Methods

Health Reform Scenarios

We modeled a baseline scenario designed to reflect PPACA but excluding provisions related to tax credits for small businesses. Tax credits were excluded from the baseline scenario because the law offers tax credits only on a temporary basis, and our goal was to model an equilibrium effect. We then conducted analyses to test the sensitivity of results to design choices that have yet to be fully determined, to estimate the degree of uncertainty stemming from modeling assumptions, and to assess the importance of key components of the law, including employer penalties and individual mandates. In sensitivity analyses, we also considered the implications of tax credits. Although the coverage expansion provisions in PPACA take effect in 2014, both RAND and the Congressional Budget Office (CBO) assume that it will take two years before they achieve their full impact. As a result, we evaluate the reform in 2016. The year 2016 can be considered the first "equilibrium" year in that, subsequently, outcomes related to cost and coverage are stable, with any fluctuations stemming primarily from changes in population demographics.

Baseline and Alternative Reform Scenarios

In our baseline scenario, we assumed that penalties are adopted for all firms with more than 50 workers that do not offer health insurance coverage, individuals are required to purchase health insurance unless their income is under 100 percent of the federal poverty level (FPL) or their premiums would exceed 8 percent of household income, Medicaid eligibility is extended to all individuals with incomes below 133 percent of FPL, and health insurance exchanges are implemented. The penalty for noncompliance with the employer mandate is $2,061 per worker in 2016 dollars (exempting the first 30 workers from the penalty);[1] penalties for the individual mandate are either $695 per uninsured adult and $347.50 per uninsured child in 2016 or 2.5 percent of income, whichever is higher.[2] Individuals and families purchasing health insurance coverage in the exchanges are eligible for sliding-scale subsidies if their incomes fall between 100 and 400 percent of FPL. Specifically, individuals and families with incomes below 133 percent of FPL need only contribute a maximum of 2 percent of income to health insurance premiums, rising to 9.5 percent of income at 400 percent of FPL. (However, those who would be required to contribute more than 8 percent of income to health insurance are exempt from

[1] We obtain a figure of $2,061 per worker by inflating the $2,000 penalty, which is given in the law in 2014 dollars, to 2016 dollars.

[2] In the law, the individual mandate penalty is $95 per adult in 2014, $325 per adult in 2015, $695 per adult in 2016, and $695 in 2016 dollars, indexed to inflation, in subsequent years. Penalties for children are half the adult penalties.

the individual mandate.) Premium costs in excess of the established limits are paid by the federal government. Premium-assistance credits are also available when contribution rates for employer-provided coverage exceed 9.5 percent of family income.

In addition to the premium subsidy, the law also contains a provision to reduce out-of-pocket expenditures for low-income families. Under this provision, individuals who purchase an exchange silver plan and have a family income between 100 and 400 percent of FPL are eligible to have the out-of-pocket limits of their health plan reduced by an amount that is inversely proportional to their income, on a sliding scale.[3] The effect of this provision is to make the silver plan look like a more generous plan for those eligible for this subsidy.

In our baseline reform scenario, businesses with 100 or fewer workers may offer plans through the exchanges, although their workers are not eligible for government subsidies unless their employee premium contributions exceed 9.5 percent of income. We assumed that employer premium contribution rates for plans offered in the exchange are similar to contribution rates for traditional employer-sponsored insurance (ESI) plans. Plans offered in the exchanges are subject to guaranteed issue and guaranteed renewal,[4] and they must have actuarial values of 0.60, 0.70, 0.80, or 0.90. Premium prices in the exchange can differ by a ratio of no more than 3:1 between the oldest and youngest age groups. Premiums can also vary based on family size. Table B.1 describes the baseline reform as modeled, compared to PPACA.

We predicted outcomes under the baseline reform scenario and then altered specific design features to determine how these changes would affect offering, coverage, and cost-related outcomes. These sensitivity analyses, which are described in more detail in Table 2.1, changed the size threshold at which firms are able to offer coverage through the exchanges, assessed the sensitivity of results to the presence of tax credits, eliminated penalties associated with the individual and employer mandates, tested the sensitivity of results to assumptions about administrative load in the exchanges, considered the possibility that inertia bias would lead firms to prefer traditional ESI even if our model predicted a move to the exchanges, and changed assumptions about risk pooling in the exchanges.

Outcomes Measured

To evaluate the baseline and other scenarios, we considered the number of employers offering coverage, the number of employers offering coverage through the exchanges, the proportion of workers employed by offering firms, the number of employers that dropped traditional ESI plans and began offering insurance coverage in the exchanges, total employer spending on health insurance, total population under age 65 with insurance, premium prices, and the change in government spending. In analyzing outcomes related to employers, we disaggregated results to consider all employers, as well as businesses with ten or fewer workers, 11 to 25 workers, 26 to 50 workers, 51 to 100 workers, and more than 100 workers. We also considered sources of coverage for insured individuals (ESI, exchange, or Medicaid), as well as sources of government spending (subsidies to small businesses, subsidies to individuals, and Medicaid

[3] The exchanges will offer four plan tiers: bronze, silver, gold, and platinum.

[4] In fact, all plans would be subject to these provisions, with exceptions for plans that are "grandfathered" in the nongroup and small group markets. After the reform, traditional small employer plans in our model are equivalent to grandfathered plans in that they are not subject to the rating rules required by PPACA. We do not currently take grandfathering in the individual market into account in our model.

Table 2.1
Parameters Varied for Sensitivity Analyses

Design Option or Assumption	Baseline Parameter	Alternative Parameter(s)
Maximum firm size allowed to participate in the exchanges	100 or fewer workers	50 or fewer workers, no limit (all firms eligible)
Eligibility and generosity of tax credits for small businesses	No tax credit	Firms with ≤25 employees are eligible for tax credits of up to 25% (scenario 1) or up to 50% (scenario 2) of employer premium contribution
Firm penalty for not offering health insurance	Flat fee of $2,061 per full-time worker in 2016 dollars ($1,919 in 2010 dollars), multiplied by the number of workers minus 30	Eliminate employer penalty
Individual mandate penalty	$695 per adult and $347.50 per child in 2016 dollars ($647 and $323.50 in 2010 dollars), or 2.5% of income	Eliminate individual mandate penalty
Administrative load in the exchanges	12% of premium	8% of premium, 18% of premium
Status quo bias in decisionmaking	No status quo bias	Moderate and large status quo bias assumptions
Risk pooling in the exchanges	Small group and individual market are combined	Small group and individual market are segregated

spending). Although we evaluated model outcomes in 2016, we converted all dollar values (e.g., premiums, employer and government spending) to 2010 dollars for reporting purposes.

Options Not Modeled

There are several PPACA provisions that we did not incorporate into the model. We did not consider the impact of auto-enrollment provisions that would require businesses to enroll workers in health plans unless workers proactively opted out. We also did not model the effect of the excise tax on high-premium plans—a provision that does not go into effect until 2018. Other provisions that we did not incorporate into the model include provisions that would allow adult children to remain on parents' insurance policies and provisions not directly related to the expansion of insurance coverage (e.g., payment reform, excise taxes, creating of an Independent Medicare Advisory Board).

The COMPARE Microsimulation Model

RAND Health researchers developed the COMPARE microsimulation model to project how individuals, households, and firms would respond to health care policy changes. Microsimulation models use data, economic theory, and computer programming to predict how individuals, firms, and other "agents" (the general term given to entities that can take actions) will respond to policy changes, given the responses of others. An advantage of microsimulation models is that they can account for the dynamic responses of agents to changes that occur following a new policy. For example, a Medicaid expansion might cause some newly Medicaid-eligible workers to drop employer-sponsored health insurance in favor of public coverage. Employers in our model can respond to this behavior by reassessing the benefit of providing health insurance

to workers. If a substantial share of workers becomes newly eligible for Medicaid, then the firm may decide to stop offering insurance. Similarly, penalties levied on nonoffering businesses whose workers received government subsidies may cause some businesses to begin offering health insurance. In response, some workers in these firms might opt to take employer coverage even if they previously had insurance through another source, such as Medicaid. Microsimulation models are useful for predicting the effects of laws, such as PPACA, that involve multiple policies affecting a variety of agents. In fact, CBO used a microsimulation model to score the budgetary and coverage effects of the House and Senate bills that were under consideration prior to the passage of the final health reform law.

The COMPARE model uses a synthetic U.S. population made up of individuals, families, firms, and government. Individuals and firms in the model make decisions based on utility maximization—that is, they make choices by weighing the benefits of an option (e.g., reduced out-of-pocket expenditure, lower risk) against the costs (e.g., higher premiums). Most of the policy options under consideration affect the type of health insurance options that are available to individuals and firms and the price of these options. The model works by allowing individuals and firms to respond to these changes in prices and choices and then predicting outcomes, such as firm offer rates, individual enrollment decisions, premium prices, and total spending on health care. We calibrated the model so that it accurately reproduces the status quo. For example, the demographic characteristics of people and firms in the model reflect the distribution of the current U.S. population and businesses. Additionally, the behavioral responses of individuals and firms to changes in insurance premiums reproduce elasticities that have been previously reported in the literature.

In prior analysis, we have shown that results from the COMPARE model are consistent with aggregate estimates from CBO (McGlynn et al., 2010a). However, the COMPARE model differs from CBO's microsimulation model in that we use a utility-maximization approach—as opposed to an elasticity-based approach—to estimate behavioral changes. Elasticity-based models predict choices using empirical evidence from past experience. We chose the utility-maximization framework for COMPARE because elasticities based on prior experience may provide limited information when the policy choices being considered differ significantly from policies observed in the past. Another key difference between the COMPARE model and the CBO model is that we compute premiums endogenously based on the observed spending of individuals enrolled in each insurance option; in contrast, CBO computes premiums using expected spending given the age, sex, health status, experience, and regional composition of the group (CBO, 2007). In Chapter Three, we present a comparison of our results to those of CBO. Below, we briefly describe the data sources used to populate the model and our methodologies for predicting behavioral responses.

Data Sources and Model Architecture

Individuals. The population of individuals in the COMPARE model comes from the 2001 Survey of Income and Program Participation (SIPP), a longitudinal study of households conducted by the U.S. Census Bureau that contains data on demographics, household composition, health insurance status, income, assets, and labor force participation. Our data come from a snapshot of the SIPP taken in the spring of 2002 and reweighted to reflect age, sex, and

racial composition estimates projected by the U.S. Census for 2010 and beyond.[5] The model currently has the capability to project the population through 2050, but we typically focus on years ranging from 2010 to 2019. We use data from the SIPP to define health insurance eligibility units (HIEUs), which are groups of family members who tend to be eligible for health insurance coverage through ESI plans.[6] Specifically, HIEUs in our data consist of adults, their spouses, and dependent children under the age of 18; we also allow for exceptions whereby children older than 18 may be covered through parents.

Medical Expenditure. Because the SIPP does not include data on medical expenditures, spending estimates in our model come from the Medical Expenditure Panel Survey, Household Component (MEPS-HC). Model estimates exclude spending on vision and dental care. To increase sample size, we pooled MEPS data from the years 2002 and 2003. MEPS-HC expenditures are known to underestimate national health spending because the MEPS does not capture individuals with unusually high expenditures and also generally undercounts expenditures (Sing et al., 2006; Selden and Sing, 2008). We used two adjustments to address these issues. First, we recalibrated the top 1 percent of the MEPS expenditure distribution to reflect high expenditures found in the Group Medical Insurance Large Claims Data Base (Society of Actuaries, 2002). Second, we inflated the recalibrated MEPS-HC spending estimates to match the National Health Expenditure Accounts (NHEA), using the detailed procedure found in Sing et al. (2006). We converted all monetary figures to 2010 constant dollars using factors derived from the NHEA (the factors inflate health spending by approximately 6 percent in each year).

To link the adjusted MEPS expenditures to individuals in the SIPP, we used semiconstrained statistical matching. First, we stratified both the MEPS-HC and the SIPP into demographic cells based on age, insurance status, health status, region, and income.[7] We then randomly assigned expenditure data to each person in the SIPP using information from a demographically matched individual in the MEPS-HC. Next, we computed weighted expenditures in each MEPS-HC demographic cell and in each matching SIPP demographic cell. If weighted expenditures differed by more than 0.5 percent, we repeated the procedure until expenditures differed by less than 0.5 percent. We checked that, overall and for both adults and children, this methodology preserved the distribution of health care expenditure in the United States.

Firms. Firms in our model are based on data from the 2006 Kaiser Family Foundation and Health Research and Educational Trust (Kaiser/HRET) Employer Health Benefits Annual Survey. We matched firms in the Kaiser/HRET data to workers in the SIPP based on census region, firm size, industry, and whether or not the firm offers health insurance (in the SIPP data, we know if the worker was offered insurance, though we do not know whether the worker accepted it).

Total premiums for a single person were determined endogenously using expenditure data from the MEPS-HC. To calculate premiums, we used 12 pools defined by a combination of

---

[5] We used the 2001 SIPP rather than the more recent 2004 panel because the 2004 data were released after the model had been built.

[6] Unlike the choice to enroll in ESI, the choice to enroll in Medicaid or nongroup coverage is made at the individual, rather than the HIEU, level.

[7] Using additional variables, such as race and education, did not improve the matching process significantly, so we did not use them.

four census regions (Northeast, Midwest, South, and West) and three firm sizes (fewer than 25, 25 to 99, and 100 or more workers).[8] Since most self-insured firms are large and likely to provide health insurance, they are grouped with firms with 100 or more employees for the purposes of the model. Premiums reflect the expected expenditure of the pooled group adjusted for the actuarial value of the plan and a loading factor that represents the percentage of the total premium used for administration and profits. Although the Kaiser/HRET data contain rich information about health plans, the details of such plans are not currently used in the model. Instead, we made the assumption that all HIEUs receiving insurance offers are offered the same "average" plan and that the actuarial values of the offered plans are 0.75 for firms with fewer than 25 employees, 0.80 for firms with 25 to 99 employees, and 0.85 for firms with 100 or more employees. The differences in actuarial values across firm sizes in our model are slightly more pronounced than differences reported by Gabel et al. (2006), who found that firms with 3 to 9 workers offered plans with an average actuarial value of 0.81, while firms with 1,000 or more workers offered plans with an average actuarial value of 0.84. However, actuarial values for large employers in our model are similar to those reported by Buntin et al. (2003). Following the Urban Institute (Blumberg et al., 2003), loading factors are set at 20 percent for firms with fewer than 25 workers, 13 percent for firms with 25 to 99 workers, and 8.3 percent for firms with 100 or more workers. To calculate family premiums, we multiplied the premiums for a single person by 2.7, a factor derived from the Kaiser/HRET data.

To estimate employer premium contributions, we developed a regression model using the 2008 Kaiser/HRET data to predict each employer's rank within the distribution of contribution rates. We then mapped employers in the model to a contribution rate value from the Kaiser/HRET data, based on the rank order of the employer within the distribution. This approach allowed us to closely approximate the distribution of contribution rates found in the Kaiser/HRET data and proved to be more accurate than simply predicting contribution rates using a regression. More details related to this process, including output from the regression model, are reported in Appendix A.

Because the SIPP provides only coarse information on firm size (3 to 25 workers, 26 to 99 workers, and 100 or more workers), we augmented our data with information from the Statistics of U.S. Businesses (SUSB), which provides a more detailed breakdown of smaller businesses than the SIPP. Specifically, we clustered firms into finer groupings to match the firm size and payroll distributions from the SUSB, using an imputed employee count and a reweighting.

The Exchanges. We modeled a health insurance exchange with four tiers of plans—bronze, silver, gold, and platinum—with corresponding actuarial values of 0.6, 0.7, 0.8, and 0.9. Because of sample-size limitations in the SIPP, we modeled a single risk pool for the exchanges rather than modeling 50 state-specific risk pools. Individuals sort into exchange plans based on maximizing their utility, which is described in more detail below. All individuals may purchase coverage in the exchange, but those who are Medicaid eligible or who have employer-sponsored offers are ineligible for exchange subsidies (although we allow an exception if contributions to employer-sponsored coverage would exceed 9.5 percent of income). We included risk equalization in the exchange such that premiums are based on expected expenditures for a standard population, given the actuarial value of the plan. Since healthier people will tend to select lower actuarial value plans, risk-adjusted premiums for the lower actuarial

[8] We limited our analysis to no more than 12 pools because sample sizes became too small in certain cells when we attempted to further stratify the data.

value plans will tend to exceed actual expenditure, and risk-adjusted premiums for the higher actuarial value plans will tend to fall below actual expenditure. We assumed that excess revenue from the lower actuarial value plans is redistributed to the higher actuarial value plans. If risk adjustment were perfectly implemented, the ratio of premiums across plan tiers would exactly replicate the ratio of actuarial values. For example, the premium for the bronze plan would be 0.6/0.9, or two-thirds of the premium for the platinum plan. Instead, we allow slippage of 2 percent per tier. As a result, the ratio of premiums between the bronze and silver plans is 0.6/(0.7*1.02), the ratio of premiums between the bronze and gold plans is $0.6/(0.8*(1.02^2))$, and the ratio of premiums between the bronze and platinum plans is $0.6/(0.9*(1.02^3))$.

Buntin and Cutler (2009) argue that health insurance exchanges could cut administrative expenses to the level seen in the large group market, which in our model is 8 percent. However, in Massachusetts, the exchange itself has created administrative expenses on the order of 4 percent *in addition* to the administrative costs charged by insurers (Lischko et al., 2009). In light of this evidence, we set administrative loads in the exchange at 12 percent; in sensitivity analysis, we considered how changing this loading factor affects outcomes. We assume that employer premium contribution rates for firms offering coverage in the exchanges would be comparable to employer premium contribution rates currently observed in the status quo. A description of our methodology for assigning employer premium contribution rates can be found in Appendix A.

We modeled the exchanges at the national level because the number of observations in the SIPP is too small to support state-level analyses. Our results therefore shed light on how the exchanges are likely to affect outcomes for large states with populations similar to the United States overall. Regulations in the exchanges include guaranteed issue, guaranteed renewal, and rate banding; more detail on the exact policy scenarios modeled is provided in the Health Reform Scenarios section at the beginning of this chapter. Since exchange regulations would apply to all nongroup plans, we assume that the traditional nongroup market disappears after the exchanges are enacted. Simulations in which we maintain both the traditional nongroup market and the exchanges have consistently shown that the nongroup market disappears. We assume that firm health insurance offers provided through the exchanges are subject to the same tax treatment as traditional ESI.

HIEU Behavior

The COMPARE model uses a utility-maximization framework to determine how HIEUs will make choices about health insurance enrollment. We use a utility formulation previously justified in Goldman, Buchanan, and Keeler (2000), which has the following functional form:

$$U_{ij} = -E(OOP_{ij}) - premium_{ij} - \frac{1}{2} rVAR(OOP_{ij}) + u(H_{ij}), \quad (1)$$

where *OOP* is out-of-pocket health expenditures, r is the Pratt risk aversion coefficient (Pratt, 1964),[9] and $u(H)$ is the utility associated with consuming health services. For each individual, we calculate the utility associated with six options: no insurance, a standard employer plan, and each of the bronze, silver, gold, and platinum plans in the exchanges. Utilities in the

[9] The value of the coefficient of risk aversion was 0.000464 in 2010 dollars and was obtained by averaging inflation-adjusted values reported in Pauly and Herring (2000) and Manning and Marquis (1996).

silver plan are adjusted to take cost-sharing subsidies into account (when people are eligible). In equation 1, the index *i* refers to the individual and the index *j* to the choice. The utilities of individuals in a household are aggregated to generate the corresponding HIEU utility. An HIEU then considers a large variety of insurance options for its members; for example, it could cover everybody with the family plan offered by an employer or in the exchanges, or use any combination of single ESI plans, Medicaid, exchange plans, or no insurance for its members. The choice is made by selecting the configuration with maximum utility for the HIEU. Two members of the same HIEU may have different sources of coverage. However, one limitation of the approach is that it does not allow the same individual to have more than one source of insurance. For example, HIEUs cannot select two family plans, and individuals on Medicaid cannot also be enrolled in another form of insurance.

There are two challenges associated with calculating the utility in equation 1. First, *OOP* must reflect not only the actuarial value of the plan but also any changes in the overall level of health care consumption that might occur in response to changes in plan generosity (compared to prior coverage). We used the inverse demand curve for medical care generated by the RAND Health Insurance Experiment to estimate how total expenditure will change as plan generosity changes. Second, we must estimate the utility of health care services under plan *j*, or $u(H_{ij})$. We assumed that $u(H_{ij})$ is proportional to the expected value of total expenditures for health care services (Pauly, Herring, and Song, 2002), with a ratio of 0.3. The ratio of 0.3 was derived from a calibration of the HIEU insurance selections with respect to the status quo. The expected value of the total expenditures of health care services, as well as the expected value and variance terms that appear in equation 1, are computed over a sufficiently large set of individuals with similar set of demographic attributes. Averaging ensures that the assigned utilities are representative for that set of individuals and capture their typical yearly expenditures.

Calibration of Utilities

The utilities predicted by economic theory and estimated in our analyses capture several dimensions of insurance choice, such as people's desire for consumption of both health care services and other goods and the aversion to financial risk. However, utilities computed only using these criteria will not fully explain the pattern of insurance observed in the status quo. For example, they will not explain why many people who are Medicaid-eligible have not enrolled, or why certain people remain uninsured despite having significant income. These dimensions can be captured only through a "calibration" process in which the utilities are adjusted so that they reproduce the status quo. While the procedure itself is complex, the idea is very simple: Using the unadjusted utilities, we predict insurance choices, compare them with the choices actually made in the status quo, and, based on the type of error made (there will be both false positives and false negatives), adjust the utilities to improve the predictions. As a result, all the utilities in the model receive an adjustment that represents a disutility or an extra utility that is idiosyncratic to people with certain characteristics. The procedure is iterative, since several attempts are usually necessary to reproduce the distribution of insurance status, premiums, take-up rates, and elasticities that characterize the status quo.

Firm Behavior

After the new law is implemented, firms that currently offer coverage will have to decide whether to continue offering traditional ESI, offer coverage in the exchanges (if eligible to do so), or drop coverage. Although firms that drop coverage may face penalties, it might be

rational for firms with many workers who are newly eligible for Medicaid or other subsidized policies to drop coverage following the reform. Firms that do not currently offer coverage must decide whether to offer following the reform and—if they wish to offer and are eligible—whether to offer traditional ESI or offer policies through the exchange. To predict firm behavior following the reform, we use a group choice model in which firms choose from up to six possible options: do not offer coverage, offer traditional ESI, offer the exchange bronze plan, offer the exchange silver plan, offer the exchange gold plan, or offer the exchange platinum plan. Firms are permitted to offer exchange-based plans only if they fall within the appropriate size limits. Further, firms may offer only a single plan in the exchanges, and workers must take the plan offered by the employer (that is, they cannot apply the firm's premium contribution to another tier of coverage). The group choice model aggregates worker utility associated with each possible policy and subtracts aggregate costs. Specifically, the firm's utility function is

$$U^{\alpha} = \lambda V^{\alpha} - C^{\alpha}, \tag{2}$$

where V^{α} is aggregate worker utility, C^{α} is the cost of offering insurance, and λ represents the weight firms place on workers' utility. The firm maximizes utility by choosing α, where α represents the choice set of: no offer, offer traditional ESI, offer exchange plan 1, offer exchange plan 2 . . . offer exchange plan N. Employer costs associated with offering insurance (C) include employer premium contributions and money spent on plan administration, such as time spent by human resources personnel. We assumed that if firms choose not to offer insurance, a fraction of costs would be passed back to workers as wages. We also allowed for the possibility that some workers might rather not receive an insurance offer, as would be the case if the worker preferred the extra wages to the offer of ESI. The worker utility calculation is described in the HIEU Behaviors section above. Finally, we assumed that spending on employer-sponsored health plans is not taxed, and we allowed this tax advantage to enter into the utility calculation. A more thorough discussion of the firm decision model, including equations describing V^{α} and C^{α}, can be found in Appendix A.

In order to estimate U^{α}, we need to know the weight firms place on workers' utility (λ), the fraction of costs that is passed back to workers in the event that the firm does not offer health insurance, and employer spending on managerial costs related to insurance provision. Rather than attempting to estimate these structural parameters directly, we estimated a reduced form offer equation in which we fixed the structural parameters based on theoretical expectations. We validated the reduced form equation by determining whether elasticities of firm offerings with respect to premium price produced by the model met with theoretical expectations. A more detailed discussion of this approach, along with the structural and reduced form equations and sensitivity analyses related to the structural parameters, can be found in Appendix A. Ultimately, we set λ equal to 1, the wage passback at 80 percent, and the managerial cost at $12,000 per firm, for all firms. With these structural parameters, we found elasticities ranging from –0.54 for firms with fewer than ten employees to –0.07 for firms with more than 100 employees, with an average elasticity of –0.48 for all firms. These estimates are well within the range of elasticities reported in prior studies, and they adhere to the expectation that small firms have more-elastic demand for health insurance than larger firms.

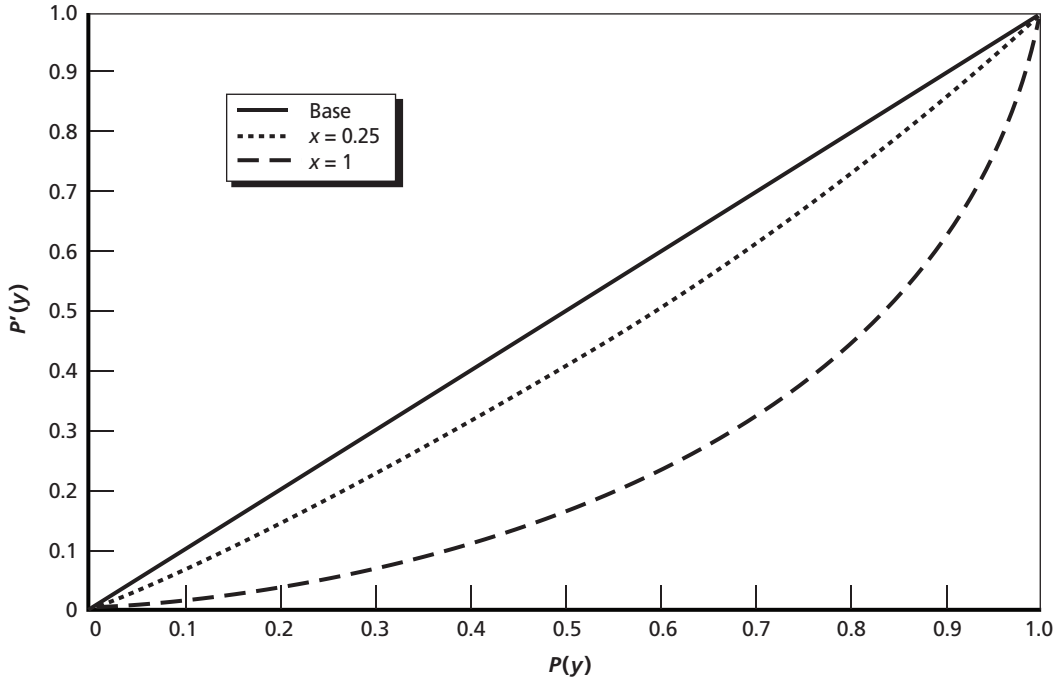
Inertia in Firm Behavior

Several studies have documented inertia in individual decisionmaking, in which people have a preference for the status quo even if standard utility theory predicts that it is rational to make a change (Samuelson and Zeckhauser, 1988; Marquis and Holmer, 1996; Madrian and Shea, 2001). It is possible that firms will exhibit inertia following PPACA, which would lead previously offering firms to favor traditional ESI over the exchanges. Because there is no empirical evidence about how firms will behave following a reform like PPACA, and because there is limited theory about the role of inertia in firm decisionmaking, the baseline results in this report assume no inertia. However, in a sensitivity analysis, we consider how inertia could affect decisionmaking. To model inertia, we used a functional transformation to reduce the firms' probability of offering in the exchanges, given the prediction of our model. We did this by shifting the probability of offering from the exchanges by some value x. So, if $P(y)$ is the probability density function of offering in the exchanges derived from the firm behavior model described in Appendix A, $P'(y)$ is the probability density function with inertia, and s is the standard deviation of the density function (which is 1, assuming the distribution is normal), then:

$$P'(y) = P(y + (s * x)). \tag{3}$$

We used two values of x: 0.25 and 1. A value of x equal to 0.25 reproduces the inertia predicted by Samuelson and Zeckhauser (1988), and a value of x equal to 1 brings our simulation results in line with CBO. Figure 2.1 shows the transformation graphically. With x equal to 0.25, a firm that has a 50 percent probability of offering in the exchanges in the base scenario will have a 40 percent probability of offering in the exchanges after the transformation. With

Figure 2.1
Probability Transformation



RAND *TR825-2.1*

x equal to 1, the same firm would have a 15 percent probability of offering in the exchanges after the transformation.

Additional Assumptions

Our model is designed to estimate changes in behavior related to individual health insurance take-up and firm health insurance offering. We do not consider possible macroeconomic effects of health care reform, such as firms going out of business, workers becoming unemployed, workers transitioning between part-time and full-time status, workers exiting the labor force, or firms changing size to avoid being subject to penalties. Similarly, we do not account for changes in productivity that might result from increased access to health insurance coverage.

CHAPTER THREE

Results and Discussion

We first modeled the status quo as projected in 2016 without any health care reform policies. In our status quo projection, we predict that there would be 6 million firms in the economy, and that 3.5 million firms (59 percent) would offer health insurance coverage. We estimate that 82 percent of nonelderly Americans would have health insurance coverage, leaving 52 million people (18 percent of the nonelderly population) uninsured. The majority of nonelderly individuals with coverage (69 percent) have ESI. Among the 136 million workers in the economy, 115 million (85 percent) would be employed by firms that offered health insurance. Table 3.1 shows some basic characteristics of the population, as projected for 2016.

After modeling the status quo, we project changes in coverage and spending resulting from the baseline reform described above. The next two sections present these results in detail.

Estimated Effects on Coverage

Table 3.2 shows the predicted change in firm offering behavior in response to the suite of policies included in our baseline reform scenario. Overall, the number of firms offering coverage increases following the baseline reform from 3.5 million (59 percent) to 4.8 million (81 percent). The majority of this increase is driven by firms with ten or fewer employees, which encompass 87 percent of net newly offering firms. After the reform, the majority of offering firms (2.9 million firms, or 60 percent of offerers) offer coverage in the exchanges. Again, this

Table 3.1
Projected 2016 Status Quo Without Health Care Reform (in millions)

Variable	Projected Number
Total population	320.0
Total nonelderly population	277.0
Total nonelderly population with insurance	224.0
Total nonelderly population with ESI	154.0
Total firms	6.0
Total firms offering insurance	3.5
Total workers	136.0
Total workers at offering firms	115.0

Table 3.2
Firm Offers in the Status Quo Compared with After the Reform

	Total Number of Employers (in millions)	Employers Offering Health Insurance (in millions)	Share of Employers Offering Health Insurance (%)	Employers Offering Traditional ESI (in millions)	Employers Offering in the Exchanges (in millions)
Status quo					
All employers	6.0	3.5	58.8	3.5	0.0
≤10 workers	4.7	2.5	53.3	2.5	0.0
11–25 workers	0.7	0.5	70.9	0.5	0.0
26–50 workers	0.3	0.2	90.6	0.2	0.0
51–100 workers	0.2	0.2	90.3	0.2	0.0
101+ workers	0.1	0.1	93.2	0.1	0.0
Baseline reform					
All employers	6.0	4.8	80.5	1.9	2.9
≤10 workers	4.7	3.7	77.1	1.5	2.2
11–25 workers	0.7	0.6	89.5	0.2	0.4
26–50 workers	0.3	0.3	99.2	0.1	0.2
51–100 workers	0.2	0.2	97.8	0.1	0.1
101+ workers	0.1	0.1	97.6	0.1	0.0

shift toward the exchanges is dominated by the smallest firms (ten or fewer employees), which represent 75 percent of firms offering insurance in the exchanges. Firms with more than 100 workers are not eligible to offer in the exchanges in our base case.

The distribution of firms and workers in the United States is skewed so that most firms are small (e.g., 4.7 million out of 6 million firms have fewer than ten workers), but most workers are employed by large firms. Since the skewed distribution may make firm-level results less relevant, in Table 3.3 we reweight the analysis from Table 3.2 to show the number of workers employed by firms that offer health insurance coverage. In the status quo, nearly 85 percent of workers are at firms that offer health insurance, rising to almost 95 percent of workers after the reform. As above, the effect is most pronounced for workers at businesses with ten or fewer workers, for whom the probability of working for an offering firm increases from 45 to 78 percent. Although the majority of firms offer coverage in the exchanges following the reform, the majority of workers are employed by firms offering traditional ESI (76 percent of workers at offering firms are at businesses with a traditional ESI offer).

Firms newly offering coverage in the exchanges include both newly offering firms and previously offering firms that dropped traditional ESI and moved to the exchanges. In addition, some firms that previously offered coverage opt to drop health insurance after the reform. Table 3.4 shows that, among the 2.9 million firms offering coverage in the exchanges after the reform, 1.9 million (66 percent, column 1) previously offered traditional ESI, while 1.0 million (44 percent, column 3) are new offerers. The introduction of the exchanges has the larg-

Table 3.3
Workers at Offering Firms in the Status Quo Compared with After the Reform

	Total Number of Workers (in millions)	Workers at Offering Firms (in millions)	Share of Workers at Offering Firms (%)	Workers at Firms Offering Traditional ESI (in millions)	Workers at Firms Offering in the Exchanges (in millions)
Status quo					
All employers	136	115	84.6	115	0
≤10 workers	18	8	45.3	8	0
11–25 workers	15	10	62.6	10	0
26–50 workers	8	7	88.4	7	0
51–100 workers	8	8	90.7	8	0
101+ workers	86	83	95.6	85	0
Baseline reform					
All employers	136	129	94.6	97	31
≤10 workers	18	14	77.7	3	11
11–25 workers	15	13	87.9	4	10
26–50 workers	8	8	98.3	3	5
51–100 workers	8	8	98.1	2	6
101+ workers	86	85	98.6	85	0

Table 3.4
Changes in Firm Offers (in millions)

Baseline Reform	(1) Previously Offering Firms Now Offering in the Exchanges	(2) Previously Offering Firms Dropping Coverage	(3) Previously Nonoffering Firms Now Offering in the Exchanges	(4) Previously Nonoffering Firms Now Offering Traditional ESI
All employers	1.9	0.45	1.0	0.8
≤10 workers	1.3	0.42	0.9	0.7
11–25 workers	0.3	0.03	0.1	0.1
26–50 workers	0.2	0.00	0.01	0.01
51–100 workers	0.1	0.00	0.01	0.00
101+ workers	0.0	0.00	0.00	0.01

NOTE: Adding columns 3 and 4 and subtracting column 2 yields the net number of newly offering firms shown in Table 3.2. Numbers may not total due to rounding.

est effect on offering behavior among the smallest firms (ten or fewer workers), for which 0.9 million (39 percent) of those in the exchanges are new offerers. Among firms with 51 to 100 workers, only about 10,000 (10 percent) of those offering in the exchanges are new offerers, while 100,000 (90 percent) of those offering in the exchanges switched from previously offering traditional ESI.

Table 3.4 also shows that a nontrivial number of firms drop coverage as a result of the reform. Overall, 450,000 firms (13 percent of previously offering businesses) drop coverage following the reform because their employees are now eligible for alternative sources of coverage, including Medicaid and subsidized coverage in the individual exchanges. The majority of firms dropping coverage (93 percent) have ten or fewer workers, and, therefore, a relatively small number of workers (less than 3 percent) are affected by this behavior. The firms that drop coverage all have fewer than 50 workers, so they are not subject to penalties if workers take subsidized coverage in the health insurance exchanges.

Table 3.5 shows the total number of people covered, by source of coverage, before and after the reform. Relative to the status quo, the reform increases the number of nonelderly people with insurance by 35 million, or 16 percent. Postreform, approximately 12 million people are newly enrolled in Medicaid, and 68 million people are newly enrolled in the exchanges (either through an individual plan or through an employer). Simultaneously, a net 28 million people lose coverage in the traditional employer market, and 17 million people lose traditional nongroup coverage after the reform.[1] Most individuals losing coverage from one source enroll in

Table 3.5
Distribution of Insurance Coverage Among the Nonelderly, by Source (in millions)

	Status Quo	Baseline Reform
Total insured	224	259
Medicaid/SCHIP	37	49
Traditional ESI	154	126
Nongroup	17	0
Other	16	16
Exchanges	0	68
Bronze	0	17
Silver	0	24
Gold	0	11
Platinum	0	16
Uninsured	52	18

NOTE: SCHIP = State Children's Health Insurance Program.

[1] The number enrolled in the exchanges and the number enrolled in traditional employer coverage differ from figures reported in a previous analysis of President Barack Obama's health care proposal based on the COMPARE model (McGlynn et al., 2010b). That analysis did not permit employers to offer coverage in the exchanges, so exchange enrollment was lower than reported here. However, the total insured is similar in both analyses (257 million in the prior analysis versus 259 million here).

new coverage from an alternative source (these transitions are shown in Table 3.6). Among the 68 million people newly enrolled in the exchanges, 24 million (35 percent) enroll in the silver plan. The preference for the silver plan is driven by the subsidy schedule in PPACA, which pegs individual premium subsidies to the price of the silver plan and permits cost-sharing subsidies only for individuals enrolled in the silver plan. A total of 18 million people (6.3 percent of the nonelderly population) remain uninsured after the reform.

The net changes shown in Table 3.5 cannot be used to infer how people transition from one source of coverage to another following the reform. These transitions are shown in Table 3.6. Out of the 154 million people insured through traditional ESI in the status quo, 118 million (77 percent) remain on traditional ESI after the baseline reform, while 25 million (16 percent) transition to ESI in the exchanges. The remaining 7 percent of individuals previously insured through an employer transition to the individual exchanges, Medicaid, or no insurance. Transitions to no insurance occur primarily because an individual's firm opts to drop coverage following the reform.

Among those uninsured in the status quo, 16 million (31 percent) remain uninsured following the baseline reform, 14 million (27 percent) enroll in the individual exchanges, 10 million (19 percent) enroll in Medicaid, and 12 million (23 percent) enroll in employer coverage, either through traditional ESI or exchange-based plans. The majority of individuals enrolled in Medicaid in the status quo remain on Medicaid after the reform, and most people previously enrolled in nongroup coverage move to the individual exchanges. Some people move from Medicaid to ESI after the reform, typically because their employer begins to offer ESI. Those enrolled in "other" coverage—such as TriCare or care provided by the Indian Health Service—do not change their enrollment decisions as a result of the reform (this is an assumption of the model).

Table 3.7 shows how individuals newly enrolled in the exchanges are split between individual and employer plans. Overall, 52 percent of those with exchange plans are enrolled through an employer. The majority of individuals enrolling in the exchanges independently choose the silver plan (16 million individuals, or 49 percent of the independently enrolled population), while those enrolling through an employer are more likely to take platinum cov-

Table 3.6
Transitions from Status Quo Insurance Status to Post-Reform Insurance Status (in millions)

	Post-Reform Insurance Status					
Insurance in the Status Quo (N)	ESI: Traditional	ESI: Exchanges	Individual Exchanges	Medicaid	Uninsured	Other
Employer (154)	118	25	4	5	2	0
Medicaid (37)	1	2	0	34	0	0
Nongroup (18)	1	3	14	0	0	0
Other (16)	0	0	0	0	0	16
Uninsured (52)	6	6	14	10	16	0
Total (277)	126	36	33	49	18	16

NOTE: Numbers may not total due to rounding.

Table 3.7
Sources of Exchange Coverage, by Plan Type

	Independently Enrolled (in millions)	Employer Enrolled (in millions)	Share Enrolled Through Employer (%)
Overall	33	35	52
Bronze	10	7	39
Silver	16	8	33
Gold	1	10	87
Platinum	5	11	68

NOTE: Numbers may not total due to rounding.

erage. As described above, most independent exchange enrollees choose the silver plan due to the subsidy structure in PPACA. In contrast, those enrolled in the exchanges through an employer are not eligible for subsidies. As a result, the platinum plan is an attractive option for a small segment of employers whose workers have a preference for generous coverage. The tax treatment of employer-sponsored coverage, which incentivizes firms to offer generous plans, contributes to this result.

Estimated Effects on Spending

We now turn to the estimated effects of the reform on spending, starting with the predicted change in premium prices. Table 3.8 shows premium prices for traditional ESI, exchange plans, and plans offered through the nongroup market before and after the reform. Traditional ESI premiums for single coverage are projected to average $5,754 (in 2010 dollars) before the reform, and fall slightly to $5,655 after the reform is enacted. Single premiums in the bronze and silver plans are lower than single ESI premiums, reflecting the lower actuarial value of these plans. The premium for the platinum plan is higher than premiums for traditional ESI plans because the platinum plan has a higher actuarial value than traditional ESI plans. Differences in administrative loading factors between large and small firms and between exchange

Table 3.8
Premium Prices for Single Coverage in the Status Quo Compared with After the Reform (in 2010 dollars)

	Status Quo	Baseline Reform
ESI	$5,754	$5,655
Exchange, bronze	N/A	$3,769
Exchange, silver	N/A	$4,485
Exchange, gold	N/A	$5,228
Exchange, platinum	N/A	$6,000
Nongroup	$6,085	N/A

plans and traditional ESI plans, as well as differences in the composition of enrollees, also contribute to the differences in premiums.

Table 3.9 shows the change in aggregate employer spending before and after the reform. In the status quo, employers spend $722 billion annually on health insurance, and after the reform spending falls slightly to $705 billion (a decrease of 2 percent). The last two columns of Table 3.9 show that spending increases among newly offering firms but falls for firms that previously offered coverage. The decline in spending for previously offering firms is driven partly by the fact that some previously offering firms switch to cheaper, lower actuarial value plans after the reform. Firms are also able to achieve savings due to the lower administrative costs of plans offered in the exchanges and due to risk equalization (which lowers the price of high actuarial value plans). In addition, some firms drop coverage after the reform.

Although newly offering firms spend substantially more on health insurance following the reform, in our baseline reform scenario, there is neither an employer mandate nor penalties associated with not offering coverage for firms with 50 or fewer employees. This assumption implies that in the baseline reform scenario small firms are opting to offer coverage because they view offering coverage as responsive to worker preferences.

In Table 3.10, we show that net government spending on health care increases by $137 billion after the reform. Premium subsidies offered through the exchanges account for 42 percent of this spending ($58 billion), and the Medicaid expansion accounts for 54 percent of new spending. The cost-sharing subsidy accounts for only 4 percent of new spending.

The government also collects new revenue after the reform, due to penalties associated with the individual mandate, as well as penalties levied on firms that do not offer coverage and have employees taking subsidies on the exchange. Combined, these penalties lead to $14 billion in new revenue, enough to offset 10 percent of new spending. After accounting for the revenue from the penalty, net costs of the reform to government are $123 billion. However, we do not model other potential sources of revenue included in the bills, such as excise taxes on medical devices or fees imposed on insurance providers.

Table 3.9
Employer Spending in the Status Quo Compared with After the Reform, by Firm Size (in billions, 2010 dollars)

	Status Quo	Baseline Reform	Total New Spending	Change in Spending, New Offerers	Change in Spending, Previous Offerers
All employers	$722	$705	–$17	$76	–$92
≤10 workers	$45	$55	$10	$25	–$15
11–25 workers[a]	$70	$68	–$2	$22	–$24
26–50 workers	$49	$45	–$4	$4	–$9
51–100 workers	$46	$41	–$5	$3	–$9
101+ workers	$511	$496	–$15	$21	–$36

[a] Spending is higher in the 11–25 group than in the 26–50 group because there are 33 percent more workers in the 11–25 group.

Table 3.10
New Government Spending Due to the Reform (in billions, 2010 dollars)

	Baseline Reform
Total government spending on reform-related policies	$137
Small business subsidies	$0
Premium subsidies in the exchanges	$58
Cost-sharing subsidies in the exchanges	$6
New Medicaid spending	$74
Revenue from penalties	–$14

Sensitivity Analysis Scenarios

We now consider the effect of selected changes to the baseline scenario, described previously in Table 2.2. These changes include changing the firm size eligibility criteria for participating in the exchanges, adding tax credits for small businesses, eliminating the individual mandate and employer penalties, changing assumptions about administrative load in the exchange, changing assumptions about inertia in firm offer decisions, and splitting the exchanges into two separate risk pools—one for individuals and one for small firms. In order to isolate the effect of each policy change, we change only one parameter at a time, enabling us to determine the sensitivity of the baseline reform to each policy component. Comprehensive results from the scenario testing are shown in Table 3.11.

Before discussing each policy change in detail, we note a general issue with the results shown in Table 3.11. The variation in firm offer rates (panel A) is relatively limited, ranging from 74 to 83 percent across policy options. In general, these differences are not large enough to be considered statistically significant. As with all simulation models, there is uncertainty in COMPARE due to imperfect information and data used to develop model assumptions, as well as due to the inherent unpredictability of human decisionmaking. To reflect this uncertainty, outcomes in COMPARE occur probabilistically rather than with certainty. For example, the model may predict that a certain individual accepts a health insurance offer with a probability of 75 percent. This 75 percent probability is constant across model runs, but the realization of the outcome can vary if we choose, so that—on average—the person will take coverage in three out of every four model runs. (We can also fix the realization of the outcome so that we can generate identical model results in alternative runs, if desired.) One way of quantifying uncertainty in the model is to run the model many times, allowing probabilistic outcomes to vary with each run. We can then use results from multiple model iterations to generate standard deviations and confidence intervals for model outcomes. In a sensitivity analysis described in Appendix C, we use this approach to quantify the uncertainty in the model. This analysis shows that firm offer rates are estimated with an error rate of plus or minus 6 percent. The inability to detect small changes in outcomes is particularly acute for firm-level analyses, since the Kaiser/HRET data used to populate firms in the model contain only 2,122 observations (Kaiser/HRET, 2006).

Table 3.11
Sensitivity of Results to Policy and Assumption Changes

		Exchange Eligibility		Tax Credit Amount		Presence of Penalties		Administrative Load in Exchange		Inertia		Risk Pooling
	Base Case	≤50 Workers	No Limit	25%	50%	No Employer Penalty	No Individual Mandate	8%	18%	60/40	85/15	Split Pools
	1	2	3	4	5	6	7	8	9	10	11	12
A. Firm offer rate												
All employers	80.5%	74.4%	76.9%	81.3%	83.2%	80.0%	77.4%	80.2%	78.9%	77.7%	82.4%	80.3%
≤10 workers	77.1%	69.8%	73.5%	77.7%	80.1%	76.7%	73.5%	76.7%	75.5%	74.0%	79.4%	77.0%
11–25 workers	89.5%	87.9%	83.2%	91.9%	92.6%	89.4%	88.1%	89.2%	87.1%	87.0%	90.1%	88.7%
26–50 workers	99.2%	98.8%	96.2%	98.8%	98.8%	99.1%	98.9%	99.1%	98.9%	98.8%	98.9%	99.1%
51–100 workers	97.8%	93.7%	100.0%	97.8%	97.8%	92.2%	94.7%	97.8%	95.8%	96.1%	98.3%	97.9%
101+ workers	97.6%	97.6%	99.3%	97.6%	97.6%	96.3%	97.5%	97.6%	97.6%	97.6%	97.6%	97.6%
B. Proportion of workers at offering firms												
All employers	94.6%	92.9%	94.0%	95.0%	95.6%	93.1%	92.7%	94.6%	94.2%	94.1%	94.6%	94.7%
≤10 workers	77.7%	71.6%	76.8%	78.6%	82.7%	77.1%	70.1%	78.6%	77.1%	75.8%	78.8%	77.4%
11–25 workers	87.9%	86.8%	80.3%	91.5%	92.0%	88.1%	85.7%	89.2%	85.5%	87.5%	88.2%	88.9%
26–50 workers	98.3%	97.7%	97.3%	98.2%	97.5%	97.6%	98.2%	97.6%	98.2%	97.5%	97.9%	97.6%
51–100 workers	98.1%	90.3%	99.4%	98.1%	98.1%	95.6%	96.6%	98.1%	97.2%	97.2%	97.8%	98.7%
101+ workers	98.6%	98.1%	99.0%	98.4%	98.4%	96.4%	97.7%	98.3%	98.6%	98.4%	98.4%	98.6%
C. Health insurance coverage, individuals under age 65 (in millions)												
Total insured	259	259	259	260	260	259	246	260	258	259	259	258
Medicaid/SCHIP	49	49	53	49	49	49	48	48	50	48	47	49
Traditional ESI	126	133	52	127	126	125	122	126	127	140	160	126

Table 3.11—Continued

		Exchange Eligibility		Tax Credit Amount		Presence of Penalties		Administrative Load in Exchange		Inertia		Risk Pooling
	Base Case	≤50 Workers	No Limit	25%	50%	No Employer Penalty	No Individual Mandate	8%	18%	60/40	85/15	Split Pools
	1	2	3	4	5	6	7	8	9	10	11	12
Other	16	16	16	16	16	16	16	16	16	16	16	16
Exchanges	68	61	139	68	69	68	60	70	65	55	36	67
Bronze	17	16	30	16	16	17	14	16	17	14	13	18
Silver	24	23	43	24	24	24	22	24	24	22	16	22
Gold	11	8	26	11	11	11	10	12	10	7	2	13
Platinum	16	14	40	17	18	16	14	18	15	11	4	15
Uninsured	18	18	18	17	17	18	31	17	19	18	18	19
D. Individuals under age 65 enrolled in exchange plans offered through an employer (in millions)												
Total	35	29	103	35	36	35	33	35	33	22	5	39
Bronze	7	5	19	6	6	7	6	6	6	3	1	7
Silver	8	7	26	8	8	8	7	8	8	6	1	8
Gold	10	7	24	9	9	9	9	10	8	5	1	11
Platinum	11	10	34	11	13	11	11	11	11	7	2	12
E. Premiums (in 2010 dollars)												
ESI	$5,655	$5,705	$5,437	$5,658	$5,637	$5,678	$5,671	$5,651	$5,676	$5,641	$5,667	$5,611
Exchange bronze	$3,769	$3,908	$3,659	$3,805	$3,776	$3,783	$3,807	$3,615	$4,008	$3,869	$4,239	$4,407
Exchange silver	$4,485	$4,651	$4,355	$4,528	$4,493	$4,501	$4,530	$4,302	$4,770	$4,605	$5,044	$5,245
Exchange gold	$5,228	$5,422	$5,076	$5,279	$5,238	$5,247	$5,281	$5,015	$5,560	$5,368	$5,880	$6,114
Exchange platinum	$6,000	$6,221	$5,825	$6,057	$6,011	$6,021	$6,060	$5,755	$6,380	$6,159	$6,748	$7,015

Table 3.11—Continued

		Exchange Eligibility		Tax Credit Amount		Presence of Penalties		Administrative Load in Exchange		Inertia		Risk Pooling
	Base Case	≤50 Workers	No Limit	25%	50%	No Employer Penalty	No Individual Mandate	8%	18%	60/40	85/15	Split Pools
	1	2	3	4	5	6	7	8	9	10	11	12
F. Employer spending (in billions, 2010 dollars)												
All employers	$705	$710	$608	$692	$689	$697	$693	$698	$714	$713	$734	$688
≤10 workers	$55	$52	$55	$47	$46	$54	$49	$53	$56	$54	$58	$49
11–25 workers	$68	$72	$67	$65	$63	$68	$68	$66	$70	$70	$78	$64
26–50 workers	$45	$44	$42	$45	$45	$45	$45	$44	$47	$49	$51	$41
51–100 workers	$41	$44	$39	$41	$41	$40	$40	$40	$42	$43	$47	$37
101+ workers	$496	$496	$405	$495	$494	$489	$492	$495	$499	$497	$499	$497
G. New government spending (in billions, 2010 dollars)												
New government spending	$137	$142	$152	$154	$160	$138	$132	$134	$145	$139	$140	$148
Small business subsidies	$0	$0	$0	$17	$24	$0	$0	$0	$0	$0	$0	$0
Premium subsidies	$58	$63	$58	$57	$57	$59	$54	$54	$64	$61	$70	$68
Cost-sharing subsidies	$6	$6	$6	$6	$6	$6	$5	$6	$6	$6	$6	$6
New Medicaid spending	$74	$73	$88	$74	$72	$74	$72	$75	$75	$73	$64	$74
Total government revenue	–$14	–$16	–$9	–$14	–$14	–$9	–$7	–$14	–$15	–$14	–$14	–$15

NOTE: SCHIP = State Children's Health Insurance Program.

Because of our inability to interpret the small changes in firm offer rates shown in Table 3.11 with confidence, we focus attention on insurance coverage and expenditure in the following discussion. However, one general message that can be gleaned from the firm offer results is that estimates of the share of firms that will offer health insurance after PPACA are relatively robust to modeling assumptions and design choices in the exchanges. This finding is supported by the results presented in panel B, which show the proportion of workers at offering firms under each scenario change. Because there are more workers than firms, analyses at the worker level are more stable than analyses at the firm level. In panel B, we show that fluctuations in the proportion of workers at offering firms are very small, ranging from 93 to 96 percent across the scenarios considered.

Changing Employer Eligibility for Participation in the Exchange

Columns 2 and 3 of Table 3.11 show the effects of changing the firm size limit for exchange participation. According to PPACA, states have the option of limiting the exchanges to businesses with 50 or fewer workers in 2014 and 2015, and—after 2016—can open the exchanges to all businesses, regardless of size. In columns 2 and 3, we consider two extreme cases regarding employer exchange eligibility. First, we consider a situation in which only businesses with 50 or fewer workers are permitted to offer exchange-based coverage. Second, we consider a situation in which all firms, regardless of size, are permitted to offer coverage from the exchanges. As shown in panel C, the number of people covered remains constant across the base case and the two alternative scenarios. However, the number of people enrolled in the exchanges varies considerably across the scenarios. In the base case, 68 million people have exchange-based coverage, with 35 million enrolled through an employer. When we restrict exchange eligibility to firms with 50 or fewer workers, the total number enrolled in the exchanges falls to 61 million, with 29 million enrolled in the exchanges through an employer. When we open the exchanges to all firms, the total enrolled in the exchanges increases to 139 million, with 103 million enrolled through an employer.

The total number insured remains constant in all three scenarios, a fact that is primarily explained by employers opting to offer traditional ESI when the exchanges are unavailable. However, when the exchanges are extended to all employers, there is also an increase in the number of individuals enrolled in Medicaid. This finding is due to the fact that low actuarial value plans on the exchange are less attractive to Medicaid-eligible workers than traditional ESI. As a result, when the employers offer coverage in the exchanges, some Medicaid-eligible workers shift into the Medicaid program. Related to this finding, Medicaid "crowd out" increases as the exchanges are opened to more firms. When only firms with 50 or fewer workers are permitted to offer in the exchanges, 56 percent of Medicaid enrollees have an ESI offer, rising to 57 percent in the baseline scenario, and 60 percent when the exchanges are opened to all firms. The change in Medicaid participation is not noticeable when comparing the base case to column 2 because relatively few Medicaid-eligible workers (5 million people, or 6 percent of Medicaid-eligible workers) are employed by firms with between 51 and 100 workers. In addition, the incentive to switch to Medicaid is less strong for workers at firms with 100 or fewer workers because ESI at these firms is assumed to have a relatively low actuarial value in the status quo (as a result, the difference in actuarial values before and after the reform is less stark for workers at small firms, so the probability of reacting to the change by switching to Medicaid is lower).

Employer spending (panel F) also falls dramatically when the exchanges are opened to all workers. Virtually all of this spending change is driven by firms with more than 100 workers, among which spending drops from $496 billion to $405 billion. This reflects the increase in Medicaid enrollment, which crowds out traditional ESI, as well as the increased ability for firms to offer inexpensive, low actuarial value plans in the exchanges. When the exchanges are opened to all businesses, 19 million people are enrolled in bronze plans offered by an employer, and 26 million people are enrolled in silver plans offered by an employer (panel D). Both the bronze and silver plans have lower actuarial values than traditional ESI plans. Compared to the base case, 30 million additional people are enrolled in bronze and silver plans offered by an employer when the exchanges are open to all businesses. More specifically, the enrollee-weighted average actuarial value of plans is 0.83 in the base case but only 0.79 when the exchanges are opened to all businesses. In summary, employer spending falls when the exchanges are opened to all businesses because (1) fewer people are enrolled in ESI, and (2) the average actuarial values of ESI plans falls.

Tax Credits for Small Businesses

Columns 4 and 5 consider adding tax credits for small businesses that offer coverage to their workers, regardless of whether they offer traditional ESI or exchange coverage. Tax credits are available for all firms with 25 or fewer workers, with tax credits declining on a sliding scale as firm size increases. Column 4 considers a maximum tax credit equal to 25 percent of the employer premium contribution, while column 5 considers a maximum tax credit of 50 percent of the employer premium. Surprisingly, the addition of tax credits has almost no effect on the number of people insured or on the distribution of coverage across plan types. The total number insured rises from 259 million in the base case reform scenario to 260 million after the addition of tax credits, an increase that may not be meaningful from a statistical standpoint. The reason for the limited effect of the tax credit on insurance coverage is twofold. First, the tax credits are targeted to small firms. Second, coverage becomes available to workers in these businesses regardless of whether tax credits are offered, and the individual mandate requires that they take this coverage. Instead of expanding coverage, the main effect of the tax credits is to decrease employer spending, which falls from $705 billion in the baseline scenario to $692 billion with a 25 percent tax credit, and to $689 billion with a 50 percent tax credit. Employer spending falls because the federal government now bears some of employers' costs. The change in spending is most pronounced for the smallest firms (ten or fewer workers), among which spending falls from $55 billion in the baseline case to $47 billion with a 25 percent tax credit (a decrease of 15 percent). Simultaneously, government spending increases, rising from $137 billion in the base case scenario to $154 billion with a 25 percent tax credit, and $160 billion with a 50 percent tax credit.

Employer Penalties and Individual Mandates

In columns 6 and 7 we consider eliminating penalties levied on employers that do not offer coverage (column 6) and eliminating penalties levied on individuals who do not take coverage (column 7). Penalties on employers are designed to increase offer rates, whereas penalties levied on individuals are designed to increase take-up rates. Column 6 shows that penalties levied on employers that do not offer coverage have essentially no effect on the number of people insured. This finding is driven by several factors. First, employer penalties are levied only on firms with more than 50 workers, a group that has relatively high offer rates in the status quo. Accord-

ing to the 2009 Kaiser/HRET survey of employer benefits, 95 percent of firms with 50 to 199 workers offered health insurance in 2009 (Kaiser/HRET, 2009). As a result, policies aimed at inducing these firms to offer coverage have little effect. Moreover, higher worker demand caused by the individual mandate penalty creates an incentive for smaller businesses to offer coverage even if they are not penalized for not offering. The influence of worker demand on employer offer behavior is borne out in experience from Massachusetts, where firm offer rates increased after health care reform went into effect even among firms that were exempt from employer mandate penalties (Gabel et al., 2008). Related to the higher demand, the individual mandate penalty has a substantial effect on the number of people insured. Column 7 shows that, without the individual mandate, the number insured post-reform falls from 259 million to 246 million, a decline of 5 percent.

With the elimination of either the employer penalty or the individual mandate penalty, government revenue falls because the government no longer collects revenue from noncomplying employers (column 6) or individuals (column 7).

Administrative Costs in the Exchanges

One source of uncertainty in our model is the administrative costs associated with offering coverage in the exchanges. In our base case reform scenario, we assume that the administrative load in the exchanges is 12 percent of premiums—less than status quo administrative costs for firms with fewer than 100 workers. CBO assumes that administrative costs in the exchanges will be somewhat higher, closer to 18 percent of premiums (CBO, 2009). In contrast, Buntin and Cutler (2009) predict that administrative costs in the exchanges could be even lower than 12 percent of premiums. In reality, administrative costs in the exchanges are likely to vary by state, with larger states likely to have lower administrative costs relative to premiums. We test the sensitivity of our results to assumptions about administrative costs in columns 8 and 9 of Table 3.11. Column 8 shows projections if administrative costs in the exchanges were 8 percent of premiums, and column 9 shows projections if administrative costs in the exchanges were 18 percent of premiums. Relative to the base case, slightly more people are enrolled in the health insurance exchanges when administrative costs are 8 percent of premiums (70 million versus 68 million exchange enrollees), and fewer people are enrolled in the exchanges when administrative costs are 18 percent of premiums (65 million versus 68 million exchange enrollees). When administrative costs are set at 18 percent of premiums, the number of people enrolled in employment-based exchange plans falls from 35 million to 33 million. While these results confirm our expectation that higher administrative costs should reduce exchange enrollment, they also suggest that assumptions about administrative costs have a limited effect on our results. That is, varying administrative costs within a reasonable range does not substantially change the predictions of the model.

Inertia

An additional source of uncertainty is the degree to which inertia, or bias toward the status quo in decisionmaking, will affect exchange enrollment. In our base case reform scenario we assume no inertia in decisionmaking and find a large shift toward the exchanges. These results may be unrealistic if employers and their workers have a strong preference for the status quo

that is not explained by standard utility theory. In column 10, we model inertia using results from a seminal paper by Samuelson and Zeckhauser (1988) that used students' responses to a series of hypothetical questions to assess the tendency to prefer the status quo. This analysis predicted that, if an individual has a 50 percent chance of preferring option A to option B in a neutral setting, inertia bias will lead the individual to choose option A 60 percent of the time if option A represents the status quo. With respect to the probability transformation formalized in equation 3, the inertia bias predicted by Samuelson and Zeckhauser can be approximated by setting x equal to 0.25. While inertia bias of this type has no effect on total health insurance enrollment, it leads to a reduction in the number of people enrolled in exchange-based coverage through an employer. Specifically, with inertia bias similar to that reported in Samuelson and Zeckhauser (1988), enrollment in exchange-based ESI falls from 35 to 22 million, and enrollment in traditional ESI increases from 126 to 140 million.

Our approach to modeling inertia appears to represent a major difference between RAND COMPARE and CBO's Health Insurance Simulation Model.[2] Although, in general, CBO has not reported detailed statistics related to enrollment in the employment-based exchange, in a letter to Speaker of the House Nancy Pelosi dated March 20, 2010, CBO predicts that only 5 million people will be enrolled in the exchanges through an employer. In column 11, we alter the inertia assumptions in our model so that we reproduce CBO's results. To arrive at CBO's prediction of 5 million employer-based exchange enrollees, we need to set x in equation 3 equal to 1. This corresponds to an assumption that, when an option is selected with 50 percent probability in a neutral setting, inertia bias would lead the status quo option to be selected 85 percent of the time.

Splitting Risk Pools in the Exchanges

Our baseline reform scenario assumes that the individual and small group markets within the exchanges are combined for the purposes of risk pooling. In reality, the decision to combine or separate the individual and small group markets is left to the states. In column 12, we explore the implications of splitting the individual and small group markets in the exchanges. Although this policy has very little effect on the total number of people covered, it leads to an increase in the number of people enrolled in employer-based exchange coverage and a decrease in the number of people enrolled in individual exchange coverage. Specifically, the number enrolled in employer-based exchange coverage increases from 35 million to 39 million, and the number of people enrolled in the individual exchange falls from 33 million to 28 million (as can be seen by subtracting the total enrolled in the exchanges through an employer reported in panel D from the total enrolled in the exchanges reported in panel C). This shift is driven by a change in premiums, which are reported in Table 3.12 (panel C of Table 3.11, which reports average premiums in the exchange, is not useful for understanding the difference between the individual and small group markets). Because people enrolled in the exchanges as individuals tend to be less healthy than those enrolled through an employer, the premiums for the individually enrolled population are about 40 percent higher than premiums for those enrolled in the small group market. Although fewer people are enrolled in the exchanges individually in this scenario, government spending on exchange subsidies increases relative to the base case, as a result of the higher premiums (see panel G of Table 3.11).

[2] We arrive at this conclusion based both on reports documenting CBO's approach (CBO, 2007; CBO, 2009) and on personal communication with CBO staff.

Table 3.12
Individual and Small Group Premiums in the Exchange When Groups Are Split

	Individual	Small Group
Bronze	$4,407	$3,159
Silver	$5,245	$3,759
Gold	$6,114	$4,382
Platinum	$7,015	$5,029

Summary

Table 3.13 provides a concise summary of the sensitivity analyses conducted in the previous section. In Table 3.13, we broadly characterize the impact of the assumptions and policy changes considered in sensitivity analysis on health insurance coverage, exchange enrollment, employer spending, and net new government spending. Net new government spending is the summation of new government spending and government revenue. Sensitivity analyses that led to a less than 2 percent change from the baseline reform scenario are considered to have no effect for the purposes of the summary table. Differences of between 2 and 5 percent relative to the baseline reform are considered to be small, and differences exceeding 20 percent are considered to be large.

Table 3.13
Summary of Results from Sensitivity Analyses, in Comparison with Baseline Reform Scenario

Policy or Assumption	Health Insurance Coverage	Exchange Enrollment	Total Employer Insurance Spending	Net New Government Spending[a]
Expanding employer eligibility to offer in exchanges	No effect	Large increase	Decrease	Increase
Providing tax credits for small businesses	No effect	No effect	Small decrease	Increase
Removing employer penalty for not offering insurance	No effect	No effect	No effect	Increase
Removing individual mandate	Decrease	Decrease	No effect	No effect
Assuming higher administrative load in the exchanges	No effect	Small decrease	No effect	Increase
Assuming greater inertia in firm decisionmaking	No effect	Large decrease	Small increase	No effect
Splitting nongroup and small group markets in the exchanges	No effect	Higher enrollment in small group market, lower enrollment in individual market	Small decrease	Increase

[a] Accounts for the combined effect of new outlays and new revenue.

Several of the summary results are particularly noteworthy. First, removing the individual mandate is the only policy that has a meaningful effect on insurance coverage. Second, the two biggest drivers of exchange enrollment are employers' eligibility to offer exchange-based coverage and model assumptions about inertia. Finally, the sensitivity analyses considered tend to have opposing effects on government and employer spending. That is, when employer spending falls, government spending typically increases. The latter finding is intuitive in some cases (e.g., tax credits shift spending from employers to government), but in other cases the results are surprising. Most notably, when more employers are eligible to offer coverage in the exchanges, employer spending falls while government spending increases. Here, the opposing effects are explained by the fact that some employers who move to the exchanges offer bronze and silver plans, which are less generous than traditional ESI. Although the switch to plans with lower actuarial values saves money for firms, it leads some Medicaid-eligible workers to enroll in Medicaid and therefore increases government spending.

We also find opposing effects on government and employer spending when the small group and nongroup markets are segmented in the exchanges for the purposes of risk pooling. Because workers enrolled in the exchanges tend to be healthier than those enrolled in the exchanges as individuals, segregating the markets increases nongroup premiums and decreases small group premiums. The federal government bears most of the extra nongroup premium costs, since the majority of nongroup exchange enrollees are eligible for subsidies.

Comparison to CBO

Policymakers and the general public are very familiar with CBO's score of PPACA, and CBO's results are often considered a "gold standard" for predicting the likely effects of the reform. In Table 3.14 we compare our results to CBO's. Panel A focuses on health insurance coverage. In general, our results are very similar to CBO's; we predict that a total of 259 million people will be insured in 2016, compared with 256 million predicted by CBO. There are two major differences in our coverage results. First, although we estimate that a similar number of people will be enrolled in coverage through an employer, RAND predicts that a much larger share of employment-based coverage will be offered through the exchanges. As described earlier, the differences in estimates regarding employment-based coverage in the exchanges stem largely from assumptions about inertia. CBO also assumes higher administrative costs in the exchanges, but, as shown in Table 3.11, changes in assumptions about administrative spending have a small effect on results. Second, relative to CBO, RAND predicts that a smaller share of people will be enrolled in nongroup and other coverage, and a larger share will be enrolled as individuals in the exchanges. This difference may stem from the fact that RAND does not account for grandfathering in the nongroup market, which causes the traditional nongroup market in the RAND analysis to disappear.

Panel B of Table 3.14 focuses on a comparison of government spending estimates produced by RAND and CBO. We limit this comparison to spending categories that both RAND and CBO modeled, including new spending on Medicaid, exchange subsidies, revenue from individual penalties, and revenue from employer penalties. We also report dollar amounts in 2016 rather than 2010 price levels to be consistent with CBO's reporting methodology. Overall, the aggregate RAND spending estimate is 4 percent higher than the CBO estimate. Differ-

Table 3.14
CBO and RAND Projections, 2016

	CBO	RAND
A. Coverage (in millions)		
Total insured	256	259
Medicaid	52	49
All ESI	159	161
Traditional ESI	154	126
Exchange ESI	5	35
Individual exchanges	21	33
Subsidized	17	18
Unsubsidized	4	15
Nongroup and other	24	16
Uninsured	22	18
B. Government spending (in billions, 2016 dollars)		
Premium and cost-sharing subsidies	59	68
New Medicaid spending	81	79
Individual penalties	–3	–9
Employer penalties	–10	–6
Total	127	132

NOTE: CBO's results are taken from a letter to Nancy Pelosi, dated March 20, 2010.

ences in individual spending categories, however, are more pronounced. The most noteworthy difference is that RAND predicts higher spending on exchange subsidies.

We emphasize that this comparison is not meant to suggest that either RAND or CBO is right or wrong. Rather, it highlights the effects of sources of uncertainty due to differences in model assumptions and data inputs on the results. Given that RAND and CBO have taken, in some cases, very different approaches to estimating the effects of health care reform, the general similarity in the results is reassuring.

Limitations

One limitation of this analysis is that we cannot calibrate exchange take-up rates to anything observed based on prior experience. While we use utility maximization to predict results, there is evidence that individuals might not always behave in a way that meets economic expectations. For example, Medicare Part D enrollees have incurred avoidable out-of-pocket costs due to a failure to reevaluate plan choice during open enrollment (Walberg and Patel, 2009). Related to this issue, we have no way to capture possible inertia in firms' decisions to offer

insurance, which might lead some firms to continue to offer ESI even if the model predicts that switching would maximize utility. Inertia could be caused by short-term switching costs, such as time spent by human resources personnel learning the new system. Workers might also have apprehensions about switching from traditional ESI to the exchanges, particularly if the move to the exchanges required a change in providers. CBO appears to build substantial inertia into its model. However, there is limited economic theory or evidence to predict how large the inertia effect will be in practice. We opt not to model inertia in our baseline reform scenario, and, as a result, our baseline scenario likely reflects an upper-bound estimate of the number of people who will be enrolled in exchange-based coverage through an employer.

An additional limitation stems from the fact that firms in our model are based on a relatively small sample from the Kaiser/HRET survey. To our knowledge, there are only two other large, nationally representative surveys of businesses that include health insurance information (the Medical Expenditure Panel Survey, Insurance Component and the National Compensation Survey), and these data sets are available for use only through data use agreements requiring on-site access. The restrictions associated with using these files make them impractical to incorporate into a simulation model. Unless larger data sets become available, modelers considering the behavioral response of small businesses will face challenges associated with small sample sizes.

Actuarial values for traditional employer-sponsored coverage in our model do not vary, except across broad firm-size categories. Prior work has shown that the range of actuarial values in the group market is relatively condensed, and that the average actuarial value for employer plans in the bottom half of total spending exceeds 60 percent (Gabel et al., 2006; McDevitt et al., 2010). However, it is possible that some firms in our model switch to the exchanges to take lower actuarial value plans, when in reality these firms could have offered similar coverage in the traditional market. We tested the sensitivity of our results to this possibility by running the scenario in which all firms were permitted to purchase coverage in the exchange six different times, each time assigning a different actuarial value to large firms. We chose the "no limit" exchange-eligibility scenario because it yielded the highest number of enrollees in the exchanges, most of whom are employees of large businesses. Table 3.15 highlights results from this sensitivity analysis. Although the total number enrolled in the exchanges falls as the actuarial value of the ESI plan falls, the overall impact on our results is small. Compared with the main scenario (in which the actuarial value for large firms offering traditional ESI is 0.85), the

Table 3.15
Enrollment in Exchange-Based ESI Under Alternative Assumptions About Actuarial Values in the Traditional Employer Market (in millions)

	Main Scenario (AV=0.85)	Actuarial Value for Firms with 100 or More Workers				
		0.9	0.8	0.75	0.7	0.65
Total exchange-based ESI	104	105	102	100	99	97
Bronze	19	20	19	19	18	18
Silver	26	26	26	25	25	25
Gold	24	25	25	24	24	24
Platinum	34	34	32	32	31	30

number of enrollees in exchange-based ESI falls by 7 percent when we set the actuarial value for large firms at 65 percent.

The analysis shown in Table 3.15 is limited in that it does not impute a full distribution of actuarial values to employers. However, it provides reassurance that our results are not driven by the choice of actuarial values for large employer plans.

Another limitation is that PPACA authorizes state exchanges, and it was outside the scope of this project to model separate exchanges for each state. In this respect, our model captures the general effects of the reform for a large state with typical characteristics. Results for smaller states might deviate from predictions due to higher administrative costs in the exchanges, although our sensitivity analysis suggests that assumptions about administrative load do not have a particularly large effect. Another concern is that small states might simply not have a large-enough population to sustain the full range of options offered in the exchanges. However, states have the option to form regional compacts, which could mitigate this effect. Finally, states that have very different underlying characteristics from the United States overall (e.g., in terms of income levels, employer offer rates, or employer size) might reach a different equilibrium than that predicted by the model. Future work will be needed to understand the implications of the exchanges for specific states.

Finally, we allow firms to offer only a single plan. In reality, firms may offer more than one plan, although the majority of employers choose to offer only one option. In the 2008 Kaiser/HRET survey, 87.7 percent of businesses with 50 or fewer workers offered only one plan type, and 64.7 percent of businesses with more than 50 workers offered a single type of plan.

Despite these limitations, our analysis provides insights into the likely effects of health reform policies, given behaviors predicted by economic theory. Should an exchange be enacted, future research will explore the empirical results, which in turn can enable refinements to our model and those of others.

Discussion

Our analysis suggests that the baseline reform, which is modeled after PPACA, will lead to substantial increases in both employer offer rates and the number of individuals with health insurance coverage. Specifically, we predict that the percentage of firms offering insurance will increase from 59 percent to 81 percent, and that 35 million additional people will gain insurance coverage due to the reform. Changes in insurance-offering behavior are particularly pronounced for the smallest businesses (ten or fewer workers), for which offer rates increase by almost 45 percent. In addition, a high proportion of eligible businesses opt to offer coverage through health insurance exchanges. In our baseline scenario, 60 percent of all firms offer coverage from exchanges after the reform; this figure includes firms that previously did not offer ESI, as well as those switching from ESI to the exchanges.

Because most firms are small, but large firms employ most workers, the large number of firms offering coverage in the exchanges does not necessarily translate into a large proportion of workers receiving exchange-based coverage. In our baseline scenario, in which only firms with 100 or fewer employees are eligible to offer insurance through the exchanges, 126 million people are enrolled in traditional ESI, while 35 million people are enrolled in exchange-based coverage from an employer. However, when all employers are eligible to offer coverage in the exchanges, we predict that as many as 103 million workers and their dependents could obtain

exchange-based coverage through an employer. These results imply that the availability of the exchanges could have significant effects on sources of coverage, particularly if states allow widespread access to the exchanges. Although there is no reason to believe that exchange-based coverage would be better or worse than traditional ESI, a large influx of people into the exchanges could pose administrative challenges for states. Moreover, our model suggests that Medicaid "crowd-out" increases as the exchanges become more widely available, since Medicaid-eligible workers tend to prefer Medicaid coverage to low actuarial value exchange plans. Relative to the base case scenario, new Medicaid expenditure increases by nearly 20 percent when the exchanges are available to all employers.

We also find that policies designed to increase employer offer rates, notably employer tax credits and penalties levied on nonoffering employers, have little effect on the total number of people with health insurance. In aggregate, these policies appear primarily to shift sources of spending. Specifically, increasing the employer mandate penalty increases government revenue, and enacting tax credits for small businesses increases government spending. In contrast, the individual mandate penalty has a large bearing on the number of individuals who become covered after the reform. Our baseline estimates suggest that, relative to the status quo, 35 million people will become newly covered due to the reform. However, if we eliminate the individual mandate penalty, only 22 million people will become newly insured.

It is noteworthy that employer penalties have little effect on offering behavior. In fact, many businesses with fewer than 50 workers opt to offer coverage following the baseline reform even though they are not subject to any penalties for not offering coverage. The decision to offer coverage is driven by the preferences of workers, who have a higher demand for insurance after the individual mandate is enacted. However, despite higher employer offer rates and an increase in the number of people enrolled in ESI, aggregate employer spending remains roughly constant before and after the reform. Spending remains roughly constant because increases in spending due to higher enrollment and higher offer rates are offset by several factors: (1) The individual mandate induces healthier workers to enroll in health insurance plans, leading to a decline in per capita premiums, (2) administrative costs for small businesses offering coverage in the exchanges are lower than current administrative costs, (3) the exchanges permit businesses to offer inexpensive, low actuarial value plans that (as modeled) were not available through traditional ESI, and (4) risk equalization in the exchanges reduces the price of high actuarial value plans for some firms. Although the smallest businesses (ten or fewer workers) experience a 22 percent increase in health insurance spending after the reform, this increase is driven entirely by newly offering firms. Among small firms that previously offered coverage, total spending falls. And, although newly offering firms spend more on health insurance after the reform, these firms are not subject to an employer mandate. This fact implies that the choice to offer coverage stems from considerations about worker preferences rather than from penalties associated with not offering coverage. The increase in offer rates even among firms exempt from employer penalties is consistent with evidence from Massachusetts (Gabel et al., 2008), a state that implemented similar policy changes in 2006.

Overall, our results imply that the employer penalties in PPACA impose little direct burden on firms, and that coverage offered in the exchanges may be preferable to traditional ESI for many businesses and their workers. New demand created by the individual mandate may induce some businesses to offer coverage, but this imposes a burden on workers rather than on firms. In fact, most economists would argue that even employer mandates create a

burden primarily for workers rather than firms, since mandate penalties will be passed onto workers through lower wages (Herring and Pauly, 2009).

There are at least two important sources of uncertainty in these model results. First, it is unclear how much, if any, administrative savings will be achieved for plans offered in the exchanges relative to current administrative costs in the small group market. Administrative costs associated with the exchanges may vary by state and may be higher in small states with fewer exchange enrollees. We tested the sensitivity of our results to changes in administrative loading in the exchanges within reasonable bounds. Although higher administrative loading costs are associated with lower exchange enrollment, the overall tenor and magnitude of our results is not highly sensitive to these assumptions.

A second and more important source of uncertainty is the degree to which inertia, or status quo bias, will affect exchange enrollment. Our baseline results, which do not incorporate inertia in firm offer decisions, imply a large shift toward offering coverage in the exchanges. While previous work has documented inertia bias in individual decisionmaking, this literature has focused primarily on retirement savings (CBO, 2008). Furthermore, the literature mainly addresses inertia in individual choices, not firm choices. Due to the lack of clearly applicable evidence, we do not include inertia in our baseline scenario. To the extent that inertia exists in firm decisionmaking, our results represent an upper-bound estimate of the degree of exchange take-up, at least in the short run. We expect that over time inertia bias will dissipate, as new firms enter the market and old firms gradually make transitions. However, we do not have a good basis for estimating the time horizon over which these adjustments will take place.

Our analysis can be helpful as states begin to consider implementing health insurance exchanges, both in terms of predicting the size of the exchange-enrolled population and in understanding how design features in the exchanges could affect outcomes. Our results suggest that expanding exchange eligibility to large firms could substantially alter the distribution of coverage, although these results are subject to significant uncertainty regarding the degree of inertia bias in firm choice. Our results also suggest that the decision to split risk pools in the exchanges could affect the distribution of coverage, as well as government spending. Specifically, when the small group and nongroup markets are segregated in the exchanges, nongroup premiums increase substantially, and enrollment in individual exchange plans falls. The higher costs of individual exchange premiums are borne primarily by the federal government, since people remaining in the individual exchange market when the individual and small group markets are split tend to be eligible for subsidies. In this sense, states could reduce exchange premiums for local businesses by splitting the small group and individual exchange markets, and excess spending in the individual market would be passed on to the federal government.

APPENDIX A

Modeling Firm Behavior

Statement of the Problem and Modeling Framework

We are interested in modeling the decision of a firm to offer health insurance (HI). In particular, we want to know whether a firm would offer HI through the traditional group market or whether it would offer any of the plans offered on the exchange market and how such decisions would be affected by reform features, such as individual or employer mandates.

Firms' preferences regarding HI are not well understood (Glied and Graff Zivin, 2004). One difficulty in studying firms' behavior is that the choice has multiple dimensions (whether to offer, which and how many plans to offer, the level of employer premium contribution). Another difficulty is that there is no data set that allows us to observe both firms and their workers in sufficient detail.

Our model of firm behavior is integrated in the more general COMPARE microsimulation model for the analysis of HI reform, and therefore uses synthetic firms built using the Kaiser/HRET firm survey, populated with workers from the SIPP survey.

Scope and Goal of the Model

A firm's choice has at least four dimensions: (1) whether to offer HI, (2) how many plans to offer, (3) what type of plans to offer, and (4) the level of employer premium contribution for each of the plans offered. A survey of the literature shows that none of these issues are well understood. While in principle all these decisions are made jointly, it is unrealistic to think that a model of the joint decision can actually be estimated and validated. Since we are mainly interested in the decision of offering HI, we assume that this decision is conditional on the decisions on the other dimensions. In other words, when the firm decides whether to offer HI, it already knows which plans it is going to offer and the level of employer premium contribution. We comment on these aspects of the choice in the subsections below.

Conditional on choice of plan and employer premium contribution, we are left to model the decision to offer HI. The following items underline what we ask of the model:

- We need a model for the decision to offer HI that is predictive: For each firm in our data set, it needs to reproduce the firm's decision with sufficient accuracy. Since the decision is binary, the accuracy of the decision can be measured as the area under the receiver operating characteristic (ROC) curve produced by the model (see the ROC Curve section for a definition of the ROC curve). In our experience, for the purposes of the microsimulation we need values of the area under the ROC curve (AUC) above 0.8.

- The model needs to be validated by reproducing the observed pattern of elasticities of firms' demand for HI. The elasticities must decrease with increasing firm size and must fall within the ranges of values found in the literature.
- Since the elasticities of firm offering with respect to premium price found in the literature vary in wide ranges, it is important to allow enough flexibility in the model to perform sensitivity analyses. While we use an elasticity of –0.5 for the analyses in this report, we wanted to have the capability to adjust the elasticity in future analyses.
- The model needs to reproduce qualitative behaviors observed in the real world, even if elasticities may not be known. In particular, it must predict that mandating an increase in employer contributions or expanding access to Medicaid and/or other nongroup insurance will lead to a decrease in the probability of offering HI, while levying penalties on nonoffering firms will lead to an increase in the probability of offering.
- We do *not* set as a goal of the model the identification of structural parameters from our data set.

Choice of Employer-Sponsored Insurance Plans. Most firms offer more than one HI plan. While these plans may differ along a number of characteristics, it appears that they all fall within a fairly narrow range of actuarial values. This is fortunate, since actuarial value is one the most important plan characteristics in the microsimulation, and the data used in the microsimulation do not allow us to distinguish among different ESI plans (this information is not available in the survey). Therefore, we are forced to assume that all those on ESI are on some "average" ESI plan, whose characteristics we estimate from the data using a (lengthy) set of procedures whose description goes beyond the scope of this document.

Employer Premium Contributions. We emphasize that models that explain and predict the current pattern of employer premium contribution, other than in reduced form, are currently not available.

It is commonly agreed that heterogeneity of worker preferences plays an important role in understanding the variation in employer contribution rates (Goldstein and Pauly, 1973; Dranove, Spier, and Baker, 2000; and Levy, 1998). It is also clear that the tax treatment of health benefits is an important determinant of contribution rates. If the tax treatment of both the employee and employer contributions were equivalent (as would be the case if all firms offered Section 125 plans), then, in theory, both the employer and employee should be indifferent between having the firm pay the full premium or having the individual pay the full premium. For firms not offering Section 125 plans, one would expect the employer to cover the entire premium.

In practice, the employer typically pays for the majority of the premium, but there is vast unexplained heterogeneity across firms in the amount paid by the employer. In the 2008 Kaiser/HRET survey, employer contribution rates for single coverage ranged from 0 to 100 percent, with a mean of 84 percent.

A standard regression approach to the prediction of contribution rates leads to a poor representation of the distribution of contribution rates across firms. This led us to use a more refined approach with much better distribution characteristics.

We know the distribution for contribution rates that we want: the distribution from the Kaiser Family Foundation and Health Research and Educational Trust (HRET) data. If we used a regression to directly assign the contribution rate to the synthetic firms, we would most likely not preserve the distribution. Therefore, instead of using the regression to assign the con-

tribution rate, we use the regression to order the firms by expected contribution rate and then match the synthetic firms to HRET firms by percentile. More specifically, for each firm in the synthetic data, we assign an actual contribution rate from the HRET based on the firm's rank order in the distribution of contribution rates. This allows us to nearly perfectly replicate the distribution of contribution rates from the HRET in the synthetic firms.

The first step of this approach is to run a logistic regression, shown in Table A.1, on the 2008 HRET to determine the probability of a generous offer (95 percent of premium or more). We selected this regression structure because we found that this regression did the best job of preserving the order of firms by contribution rates. Covariates in the model include firm size, region, industrial sector, unionization status, the percentage of workers earning low wages and high wages, the percentage of workers under age 26, and the percentage of workers employed part-time. These covariates were chosen based on prior literature that analyzed the relationship between employer characteristics and HI contribution rates.[1]

Essentially, we wanted to ensure that the firms, when sorted by the regression output, would be roughly in the same order as if they had been sorted by actual contribution rates. We measured the preservation of order using $\sum \mid a_i - r_i \mid$ and $\sqrt{\Sigma |a_i - r_i|^2}$, where a_i is the actual contribution rate of the ith firm and r_i is the contribution rate based on the value determined using the regression to determine the percentile.

We applied the regression to the synthetic firms and matched these firms with the appropriate HRET firms based on the percentiles determined by the regression results. So, for example, if the regression indicated that a firm was in the 70th percentile of contribution rates, we would look at the 70th percentile of the HRET distribution and find r_i (which is 0.85 in the HRET data). Thus the regression is used to sort the firms by expected contribution rate, not to directly predict the contribution rate. This allows us to very accurately replicate the contribution rate distribution from the HRET.

Next we determined the percentage of employees who accepted a firm's offer of insurance. We used this insurance take-up measure with the HRET regression to sort firms by their likelihood of having generous contribution rates.

Firms were then assigned a contribution share for single and family plans from the HRET using a weighted matching heuristic. The approach took the sorted firms and matched them with the correspondingly ranked HRET entries. After this procedure is completed, firms have an identical mean contribution rate to the HRET and a very similar distribution.

Modeling Strategy

We model firm behavior using a "group choice" utility maximization approach (as opposed to a "median voter" model or other methods). Our modeling strategy consists of two stages. In the first stage we build a structural model of firm behavior that combines the fact that, keeping everything else equal, firms prefer lower costs, but they also prefer higher levels of welfare for their workers. We combine these two preferences in one utility function and assume that firms make the choice that maximizes the utility. The model is simple and was built to capture the following aspects of the decision problem: cost of HI to the employer and workers, the tax treatment of health benefits, the presence of administrative costs associated with the HI offer, workers' value for ESI offer, and availability to workers of alternative options. These charac-

[1] E.g., Maxwell, Temin, and Zaman, 2002; Gabel et al., 2003; and Gabel et al., 2002.

Table A.1
Coefficients for the Logit Estimation of the Probability of Offering a High Employer Share of Premium

	Estimate	Std. Error	*z* Value
(Intercept)	–0.402	0.864	–0.465
Firm size 11–25	1.985	0.217	9.146
Firm size 26–50	1.557	0.218	7.135
Firm size 3–10	1.762	0.332	5.300
Firm size 51–100	1.041	0.230	4.533
Northeast	–0.258	0.177	–1.455
South	–0.034	0.159	–0.215
West	0.532	0.174	3.058
Mining	–0.067	0.847	–0.079
Construction	–1.446	0.840	–1.721
Manufacturing	–0.951	0.858	–1.109
Transportation	–1.287	0.864	–1.491
Wholesale	–1.442	0.867	–1.663
Retail	–0.490	0.838	–0.584
Financial	–0.607	0.822	–0.738
Service	0.331	0.823	0.402
Government	0.464	0.829	0.560
Health care	–0.401	0.826	–0.486
Unionized	–0.366	0.149	–2.453
Percent low income (< $21,000)	–0.002	0.003	–0.685
Percent higher income (> $50,000)	–0.003	0.003	–1.138
Percent part-time	0.007	0.003	2.090
Percent young (< 26)	0.004	–0.762	–0.003

teristics are chosen because they can be affected by the type of health reform in which we are interested. Among aspects not captured by the model are competition among firms, adverse selection, and productivity effects of HI. Generally speaking, we are not trying to model the firm's entire cost function.

We are not interested in the structural model per se; being fairly simple and having very few parameters, its predictive ability will be limited, and it seems unlikely that its structural parameters could be identified. The main purpose of the structural model is to provide input for the second stage of our approach. We use the structural model as a guide for a more powerful reduced form model that is capable of reproducing the status quo decisions of firms and that can be validated by reproducing observed elasticities of demand for firm insurance.

We emphasize that if we did not have the structural model to guide the functional form of the reduced form model, we would not know which terms to include in the reduced form and, most important, what to change in the reduced form model to simulate health reform (aside from obvious changes to variables like price).

We also emphasize that we have not put any effort into the direct identification of the parameters of the structural model. Rather, we found that since there are only three of them, and since we can reasonably easily bound their values, they provide an excellent way of parameterizing the final reduced form model so that we can produce a range of elasticities. Their values will be therefore calibrated, using the observed pattern of elasticities, rather than estimated using some identification strategy (such as a regression). This point will be discussed in more detail in the Reduced Form Model section.

Structural Model

We assume that firms have a utility function that includes both costs incurred by the firm and benefits that accrue to workers. Workers are assumed to have a utility function that depends on both wages and HI. The firm utility for offering option α is assumed to have the form

$$U^{\alpha} \equiv \lambda V^{\alpha} - C^{\alpha},$$

where V denotes the aggregate utility of workers and their dependents and C denotes the cost of the offer to the firm. The parameter λ serves several purposes:

- The worker's utility V is measured in dollars in the current version of the microsimulation. It is not obvious that these dollars are comparable to the dollars used in the computation of the cost, and so λ plays the role of conversion factor between units of measurements that might be different.
- Workers and firms have different preferences, and it is not clear how much weight the firm puts on the utility of the workers. Therefore, λ controls the tradeoff between cost and utility to workers.

Notice that while λ is a model parameter its value depends on the choice of V, and therefore it is not a real "structural" parameter that describes some economic quantity or that could, in principle, be measured. This does not mean that we are agnostic about the values it can take; we would certainly expect it to be on the order of 1, and certainly larger than 0.

The utility of a worker (or dependent) for being offered plan α has the following form:

$$v^{\alpha} = -\mathrm{E}[OOP^{\alpha}] - \text{premium}^{\alpha} - \tfrac{1}{2} r\mathrm{Var}[OOP^{\alpha}] + \text{Value}^{\alpha}, \quad (1)$$

where E[·] and Var[·] denote expectation and variance operations respectively, OOP^{α} is the out-of-pocket expenditures under plan α, r is the coefficient of risk aversion, and Value^{α} is the utility associated with the consumption of health care services under plan α (the area under the demand curve for HI).

The firm chooses the option with maximum utility, which formally means that the firm solves the following problem:

$$\max_{\alpha} (\lambda V^{\alpha} - C^{\alpha}).$$

In the status quo the plan being offered is an average ESI plan, while in the context of health care reform such plan could be any of the exchange plans (e.g., bronze, silver, or gold). Therefore, the offer options that we consider are as follows:

$$\alpha \in \{\text{no offer, average ESI plan, exchange plan 1, . . . , exchange plan n}\}.$$

In the status quo we assume that there are only two choices available to the firm: not offering ESI (α = No) and offering an average ESI plan (α = ESI).

We denote by N the total number of workers, and by N^{ESI} the number of workers who take up ESI (we do not need to specify single or family ESI at this point). We denote by $\overline{P}^{\text{ESI}}$ the total premium necessary to cover all the workers in the firm who take up ESI. We split $\overline{P}^{\text{ESI}}$ into an employer and worker contribution, which we denote by P_e^{ESI} and P_w^{ESI} respectively:

$$\overline{P}^{\text{ESI}} \equiv P_e^{\text{ESI}} + P_w^{\text{ESI}}. \tag{2}$$

In order to model the firm decision, we need to explicitly model the components of the firm utility.

Cost of Offering ESI

The cost of offering ESI is simply the employer contribution to premiums plus a managerial cost, K:

$$C^{\text{ESI}} = P_e^{\text{ESI}} + K. \tag{3}$$

We think of K as the wages of the person(s) in the human resources department who administer(s) HI. While this could be mildly size dependent, we assume that it takes approximately the same value across firms.[2]

We assume that if the firm does not offer ESI, a fraction δ of the amount that would have been spent in offering ESI is given to the employees as wages. Therefore, the cost of not offering ESI is

$$C^{\text{No}} \equiv \delta C^{\text{ESI}} = \delta(P_e^{\text{ESI}} + K). \tag{4}$$

Utility of ESI Offer to Worker

When a firm offers ESI, only a fraction of workers, N^{ESI}, take it. The utility of those taking ESI is $N^{\text{ESI}} v^{\text{ESI}} - P_w^{\text{ESI}}$, where v^{ESI} is the portion of individual utility for ESI that does not include the premium, and P_w^{ESI} is the aggregate workers' share of the premium. If the firm offers a Section 125 plan, the workers' share of the premium is not taxable. In this case the expression above is substituted with $N^{\text{ESI}} v^{\text{ESI}} - P_w^{\text{ESI}} (1 - t)$, where t is the average marginal income tax rate

[2] It would be fairly simple to model some size dependence; we have not done it because it seems that, empirically, this is not very important.

of the workers. Workers who do not take ESI receive a value equal to $(N - N^{\text{ESI}})v^{\text{No}}$, where v^{No} is the utility associated with not taking the ESI offer and includes premiums paid to private insurers (if any). Introducing a binary indicator variable S that is 1 if the firm offers a Section 125 plan, the utility to workers for being offered ESI is:

$$V^{\text{ESI}} = N^{\text{ESI}}v^{\text{ESI}} - P_w^{\text{ESI}}\ (1 - St) + (N - N^{\text{ESI}})v^{\text{No}}.$$

It is convenient to define $\Delta v^{\text{ESI}} \equiv v^{\text{ESI}} - v^{\text{No}}$ to rewrite the expression above as follows:

$$V^{\text{ESI}} = N^{\text{ESI}}\Delta v^{\text{ESI}} - P_w^{\text{ESI}}\ (1 - St) + Nv^{\text{No}}. \tag{5}$$

When the firm does not offer ESI, the workers receive an aggregate value equal to Nv^{No}, but they are partially compensated for the lack of ESI offer for an amount equal to δC^{ESI}, on which they have to pay taxes at marginal tax rate t:

$$V^{\text{No}} = Nv^{\text{No}} + \delta(1 - t)(P_e^{\text{ESI}} + K). \tag{6}$$

Firm Utilities

We can finally write the firm utilities for offering and not offering ESI:

$$U^{\text{ESI}} = \lambda[N^{\text{ESI}}\Delta v^{\text{ESI}} - P_w^{\text{ESI}}(1 - St) + Nv^{\text{No}}] - (P_e^{\text{ESI}} + K)$$

$$U^{\text{No}} = \lambda[\delta(1 - t)(P_e^{\text{ESI}} + K) + Nv^{\text{No}}] - \delta(P_e^{\text{ESI}} + K)\,,$$

where we can identify the terms multiplying λ with those coming from the workers' value.

The firm offers ESI if $\Delta U^{\text{ESI}} \equiv U^{\text{ESI}} - U^{\text{No}} > 0$. This condition is obviously unchanged if we effect the transformation

$$U^{\text{ESI, No}} \rightarrow \frac{1}{\lambda}\ U^{\text{ESI, No}}.$$

Some algebra shows that we can write ΔU^{ESI} as follows:

$$\Delta U^{\text{ESI}} = N^{\text{ESI}}\Delta v^{\text{ESI}} - P_w^{\text{ESI}}(1 - St) - (P_e^{\text{ESI}} + K)\left[\delta(1 - t) + \frac{1 - \delta}{\lambda}\right] \tag{7}$$

In the Analysis of Terms in Firm Utilities section, we provide more details about individual terms in equation 7. This section can be skipped in a first reading since it mostly deals with technical nuisances.

Let us interpret equation 7: This equation says that there is a certain linear combination of the firm-dependent variables $N^{\text{ESI}}\Delta v^{\text{ESI}}$, P_w^{ESI}, P_e^{ESI}, and t (and their interactions) whose sign predicts the firm's decision to offer HI. The linear combination involves three unknown parameters, δ, λ, and K. From an empirical point of view, this equation is not very useful: Even

if we could identify δ, λ, and K from our data (which seems unlikely), this model would have limited predictive power. This is because there are many other variables that enter the firm's decision and that need to be taken in account. The usefulness of equation 7 is that it shows a particular combination of variables that will enter the decision of the firm. Therefore, if we want a predictive model, the natural approach is to use the variable ΔU^{ESI} as one covariate in a reduced form model that involves other covariates that describe firm characteristics.

In other words, the structural model is used to constrain the specification of a reduced form model. *The value of the structural model is that equation 7 shows how variables that can be altered by a reform (v^{ESI}, prices, the tax rate t, fixed cost K) enter the firm's decision.*

Before moving to the reduced form model, however, we make an important modification to our variables. We notice that workers' utilities and prices are all summed over all the workers, and, therefore, they scale with firm size. This implies that variation across firm size gets confounded with variation in per capita prices. It is therefore convenient to normalize all the variables by some variable that also scales with size, such as payroll or number of employees. This leaves the meaning of equation 7 unaltered, since it is a scaling factor, but it makes a difference in the reduced form approach. Our default normalizing variable is total payroll, which means that total health care costs are expressed as a percentage of payroll. This was chosen because the percentage of payroll an employer spends on health care has been estimated in the literature, allowing us to validate some of our variables. Therefore, from now on the variables v^{ESI}, P_w^{ESI}, P_e^{ESI}, and K will be all expressed as a percentage of payroll.

Reduced Form Model

Our reduced form model is the standard logit, for which we define a latent variable

$$y^* = U^{\text{ESI}}(\delta, \lambda, K) + \beta \cdot \mathbf{x} + \varepsilon, \tag{8}$$

where ε has the standard logistic distribution and $\mathbf{x}$ is a vector of firm characteristics. Notice that U^{ESI} is a function of the free parameters δ, λ, and K. In other words, equation 8 defines a continuum of logit models, parameterized by δ, λ, and K. For each choice of the values of the free parameters, the estimation of the regression coefficients β does not present any difficulty, and once β has been estimated it is straightforward to compute a vector of elasticities $\mathbf{e}(\delta, \lambda, K)$ of demand for HI corresponding to different firm sizes.[3] Since elasticities of demand for HI have been estimated in the literature (we report 14 of them in Table A.3), the parameters δ, λ, and K are estimated a posteriori as those parameters that best reproduce the observed elasticities. This process is aided by the fact that we do have some strong priors on δ, λ, and K and that, as we will see momentarily, the elasticities are fairly insensitive to the choices of δ and λ.

The value of δ has to be positive and close to 1. Herring, Bundorf, and Pauly (2009) suggests that 0.7 could be a lower bound. The parameter λ is expected to be between 0 and 1. However, we would expect it to be close to 1, which corresponds to the assumption that the utilities of workers have the same weight of cost to firms and that they are measured in the same dollars. The parameter K is interpreted as the wages of the human resources (HR) person-

[3] Typically, results in the literature apply to specific firm sizes—e,g., all firms of fewer than 100 workers.

nel who deal with HI. This could be somewhat size dependent, but it is probably somewhere between $5,000 and $50,000. The values we have quoted here are useful for narrowing down some plausible values of the parameters. For the purpose of the empirical analysis, we have explored wider ranges for these parameters. In the following section, we show how the predictive power and the elasticities depend on the free parameters and some other features of the reduced form model (such as the regression specification).

We include three covariates in vector **x**: firm size, unionization status, and industrial sector. We believe that firm size should be included in the model because state regulatory policies differ for firms of different sizes, and—while these regulations will change after PPACA is implemented—there will still be differences in regulations affecting small and large groups. Additionally, large employers have the option to self-insure, which may cause them to behave differently from small firms for many reasons, including the fact that self-insured plans are subject to different regulatory requirements under the Employee Retirement Income Security Act.

We include unionization status in our model because decisionmaking processes are different at unionized and nonunionized firms. Specifically, unionized workers have a more direct and organized channel through which to negotiate benefits with their employers. Historically, unionized workers have tended to have a preference for generous benefits, a result that has not been fully explained by differences in wage rates and other worker characteristics. Although the preferences of union members may change following health reform, we have no way to predict how much differently these firms will behave. In the absence of other evidence, we assume that the union preference for generous benefits will persist after the reform, and therefore include a union dummy variable in the model. The fact that bargaining processes will continue to be different at unionized and nonunionized firms after PPACA is implemented supports the idea of treating these firms differently in the model.

We include the industrial sector in the model because firms in different industries may have differential preferences for offering insurance due to industry-specific differences in the relationship between health and productivity. For example, industrial sectors that rely heavily on manual labor may—all else equal—face a greater threat to productivity if workers become sick or injured and do not get appropriate medical care. We do not have strong prior expectations about which sectors will place a higher value on insurance from a productivity standpoint, since these preferences likely depend on many factors, including training and hiring costs, as well as the physical demands of jobs in the industry.

Empirical Results: Prediction Power, Elasticities, and Sensitivity Analysis

The approach we followed led us to a continuum of models, parameterized by K, δ, and λ, each with different predictive power and different elasticities of demand for HI. Other parameters that affect the model are the choice of the covariates in the reduced form approach and the assumption that all firms offer Section 125 plans. In this section we are interested in studying how the predictive power of the model and the estimated elasticities vary with all these parameters.

We start by fixing a regression specification and by assuming that all firms offer Section 125, and study the effect of varying K, δ, and λ. This is the most critical issue, since we have prior expectations on the values of the three free parameters, as discussed in the section above.

If the elasticities for our preferred values of the free parameters were off or if they were very sensitive to the choice of the free parameters, the entire approach would have to be reevaluated.

As we will see shortly, we find that it is very easy to plug in values of the free parameters that reproduce a reasonable set of elasticities, and the model is quite robust to variation in the free parameters. Once we are satisfied with this aspect, we will proceed to perform sensitivity analysis on other aspects of the model.

Sensitivity Analysis on Free Parameters

We fix a regression specification with a fairly small number of covariates that controls for firm size, industry sector, and presence of unions. In the base case we also make the assumption that all firms have a Section 125 plan. For each of the parameters we compute elasticities for a variety of firm sizes, chosen so that we can compare our results with results in the literature. All the elasticities have the same behavior as a function of the free parameters, so we report the results for only one: the elasticity for firms with fewer than 100 workers. The literature produces a very wide range for this elasticity. Our interpretation of the literature results suggests a value probably around –0.5. For simplicity in this section we will refer to the elasticity for firms with fewer than 100 workers simply as "the elasticity."

In order to compute the elasticity we first determine the offering probability predicted by the logit for each firm *i;* that is, $P_i = \text{logit}(U_i^{\text{ESI}}(\delta, \lambda, K) + \beta \cdot \mathbf{x}_i)$. Next we determine the total offer rate T by aggregating the individual firm elasticities with firm weights w, so that $T = \sum_i P_i w_i$, where the index i runs over all the firms with fewer than 100 workers. We then increase the price of HI (and therefore both employer and worker premium contributions) by 1 percent and recalculate the argument of the logit,[4] obtaining a new set of offering probabilities P'_i and a corresponding new total offer rate T'. The elasticity is then defined as

$$e = \frac{\frac{T' - T}{T}}{0.01}. \tag{9}$$

We studied the behavior of the elasticity for a wide range of values of the free parameters. The administrative cost K varies between $0 and $100,000, while both δ and λ vary in the interval [0.1, 1], although we point out that values of δ and λ less than 0.5 seem highly unlikely.

In Figure A.1 we plot the estimated value of the elasticity as a function of K for all the values of δ and λ in the range. The figure shows a very important fact: The elasticity is very insensitive to the choice of the values of δ and λ. Varying both parameters, we get a variation of about 5 percentage points (except at very low values of K). If we restricted the range of variation of δ and λ to the much more likely interval [0.5, 1], the variation would be reduced to 2.5 percentage points. So it seems that most of the variation in elasticity can be obtained by changing the value of K. The elasticity decreases as K increases because as K increases the contribution of employer premiums to total employer cost becomes relatively smaller.

In Figures A.2 and A.3 we show similar plots, in which we vary δ and λ instead. These figures reinforce the notion that the elasticity depends mildly on δ and λ (except for $K = 0$).

[4] The dependence on premium is in the term $U^{\text{ESI}}(\delta, \lambda, K)$, defined in equation 7.

So far we have concentrated on the elasticities, but the predictive power of the regression is obviously also very important, since our microsimulation must predict well the status quo. We find that the predicting power of the logistic regression for our base case specification is robust to changes in values of the free parameters. In Figure A.4 we report the AUC as a function of the elasticity for firms with fewer than 100 workers as the free parameters vary in their ranges. The AUC remains at a high level, varying in most cases between 0.82 and 0.86.

Base Case and Comparison with Empirical Literature

In order to compare with the empirical literature, we need to choose one particular estimate (base case). We do so by simply picking some defensible numbers for the free parameters and checking that they produce reasonable results.[5] The fact that the elasticities are insensitive to λ and δ simplifies this task significantly. Our base case choice for K is \$12,000, while we choose $\lambda = 1$ and $\delta = 0.8$. Assuming $\lambda = 1$ is equivalent to assuming that the worker's utilities are comparable to firm cost, while the value of δ can be justified by the fact that we expect it to be close to 1 and we have a lower bound of 0.7 from Herring, Bundorf, and Pauly (2009).

Fixing these values and the regression specification defines our base case for the estimation of the logit defined

Regression Specification. As described earlier, our empirical model includes dummy variables for industrial sector, firm size, and employer unionization status.[6] As shown in Table A.2, these variables are highly associated with firm offering behavior, and the model is highly predictive of firm offering behavior with an AUC equal to 0.85. We exclude several other characteristics commonly thought to predict firm offering decisions, including the percentage

Table A.2
Logit Coefficients for the Final Model of ESI Offer

	Estimate	Std. Error	*z* Value
(Intercept)	4.85	0.744	6.52
Delta utility	4.89	0.481	10.2
Firm size 25–99	0.61	0.177	3.44
Firm size 100+	1.37	0.157	8.7
Health/finance/government	0.891	0.208	4.28
Retail/wholesale	0.249	0.233	1.07
Service	0.638	0.228	2.8
Mining/agriculture/construction	–0.688	0.255	–2.7
No union	–3.57	0.717	–4.97

NOTE: The covariate "delta utility" is defined in equation 7. The excluded category in the industry sectors is Manufacturing/Transportation/Utilities/Communications.

[5] We could formalize this procedure and justify it by setting it up in the context of a Bayesian model. The process of finding K, λ, and δ could be seen as the process of maximizing their posterior distribution conditional on the values of the elasticities. However, the additional algebra required does not seem to provide a strategy that is significantly different, or better, from the one we use, and, therefore, we avoided it.

[6] These are the covariates $\mathbf{x}$ in equation 8.

of workers with low wages, region, and the percentage of workers with part-time employment status. Including these additional variables did not make a substantial difference in the model's predictive power, and there may be theoretical reasons for omitting these characteristics. For example, the association between wage and demand for insurance is likely captured in the utility term, and any association between region and firm offer decisions is likely related to premium price.

Base Case Elasticities. Given these values, we computed elasticities for firms of different sizes and compared these with the results in the literature. The results can be seen in Table A.3.

The most striking aspect of the table is the wide range of elasticities found in the literature. Predictably, our estimates are much more well behaved as a function of firm size. Some literature results suggest very high elasticities for very small firms. In order for us to reproduce those results, we would need to assume that the administrative cost is somewhat lower for smaller firms, which is not unreasonable. It would be very easy to modify our model to reflect this assumption. Overall, we have no reasons to believe that our base case is incorrect. What is very important to us is that we have a mechanism through which we can change some assumptions on the firm behavior (the free parameters) and obtain different elasticities, so that we can test the sensitivity of the microsimulation results to the elasticities.

Table A.3
Comparison of Literature Result (Elasticity column) to Our Estimate (COMPARE column)

Authors		Year	No. of Workers	Elasticity	COMPARE
1	Marquis and Long	2001	<100	–0.14	–0.49
2	Gruber and Lettau	2004	<100	–0.50	–0.49
3	Hadley and Reschovsky	2002	<100	–0.54	–0.49
4	Kronick, Olsen, and Gilmer	2008	2–50	–1.10	–0.51
5	Morrissey, Jensen, and Morlock	1994	<50	–0.92	–0.51
6	Hadley and Reschovsky	2002	<10	–0.64	–0.54
7	Blumberg et al.	2003	<10	–1.16	–0.54
8	Hadley and Reschovsky	2002	10 to 24	–0.30	–0.49
9	Blumberg et al.	2003	10 to 24	–0.45	–0.49
10	Hadley and Reschovsky	2002	25 to 49	–0.24	–0.19
11	Hadley and Reschovsky	2002	50 to 99	–0.03	–0.21
12	Gruber and Lettau	2004	100–999	–0.13	–0.07
13	Blumberg et al.	2003	100+	–0.21	–0.07
14	Gruber and Lettau	2004	All	–0.25	–0.48

Sensitivity Analysis on Regression Specification

Our base case regression specification has a fairly small number of covariates, which minimizes the risk that the coefficients of the regression may be impacted directly from a reform. We have altered our base case specification by adding and deleting covariates to test the effect that this may have on the elasticities and the AUC. We tried several modifications:

- Adding a set of three covariates that describe the age distribution within the firm has no significant effect on elasticities and AUC. This seems reasonable, since this aspect is implicitly taken into account in the utility of the workers.
- Controlling for the percentage of part-time workers and low-wage workers is the modification that has the greatest impact on the AUC, although the overall effect is rather small: The AUC grows only by 0.04, and the elasticities decrease by 2 percentage points for firms with fewer than 100 workers. The fact that when the AUC increases the elasticities decrease is a common pattern: By adding new covariates with predictive power, the effect of a change in other covariates is lessened.
- Controlling for region actually makes the prediction slightly worse (the AUC decreases by 0.01), while the elasticities increase by about 3 percentage points.
- The combined effect of controlling for region, part-time workers, and low-wage workers is additive, so the elasticities remain basically unchanged and the AUC grows by 0.03.
- Substituting the sector variable with a more-refined industry variable that takes 11 values does not improve the predictions, nor does it change the elasticities.
- Dropping the sector variables does not change the elasticities, although the AUC drops by about 0.01.
- Dropping the firm size covariates leads to a small decrease in the AUC and to an unrealistic pattern of high elasticities across the board, which also includes large firms. This signals that these covariates are really needed in the specification.

As a result of this analysis, we find that we have no reason to alter our base specification.

Sensitivity Analysis on the Role of Section 125

In our base case scenario we have assumed that all firms offer a Section 125 plan. In order to test the sensitivity of our results to this assumption we have proceeded as follows: For each value of the free parameters in the ranges specified in the Sensitivity Analysis on Free Parameters section in this chapter, we have produced a table of elasticities for all the firm sizes shown in the comparison, Table A.3, under two assumptions: All firms have Section 125, or no firm has Section 125. Then we compared pairwise the thousands of elasticities so obtained. If firms do not offer Section 125 the elasticities are somewhat higher, but the difference is always less than 5 percentage points, and most of the time around 2 or 3 percentage points. Therefore, we conclude that our results are not very sensitive to the presence of Section 125 (see Figures A.1, A.2, A.3, and A.4).

Figure A.1
Estimated Elasticity of Demand for HI for Firms with Fewer Than 100 Workers as a Function of the Administrative Cost *K*, for Values of δ and λ in the Range [0.1, 1]

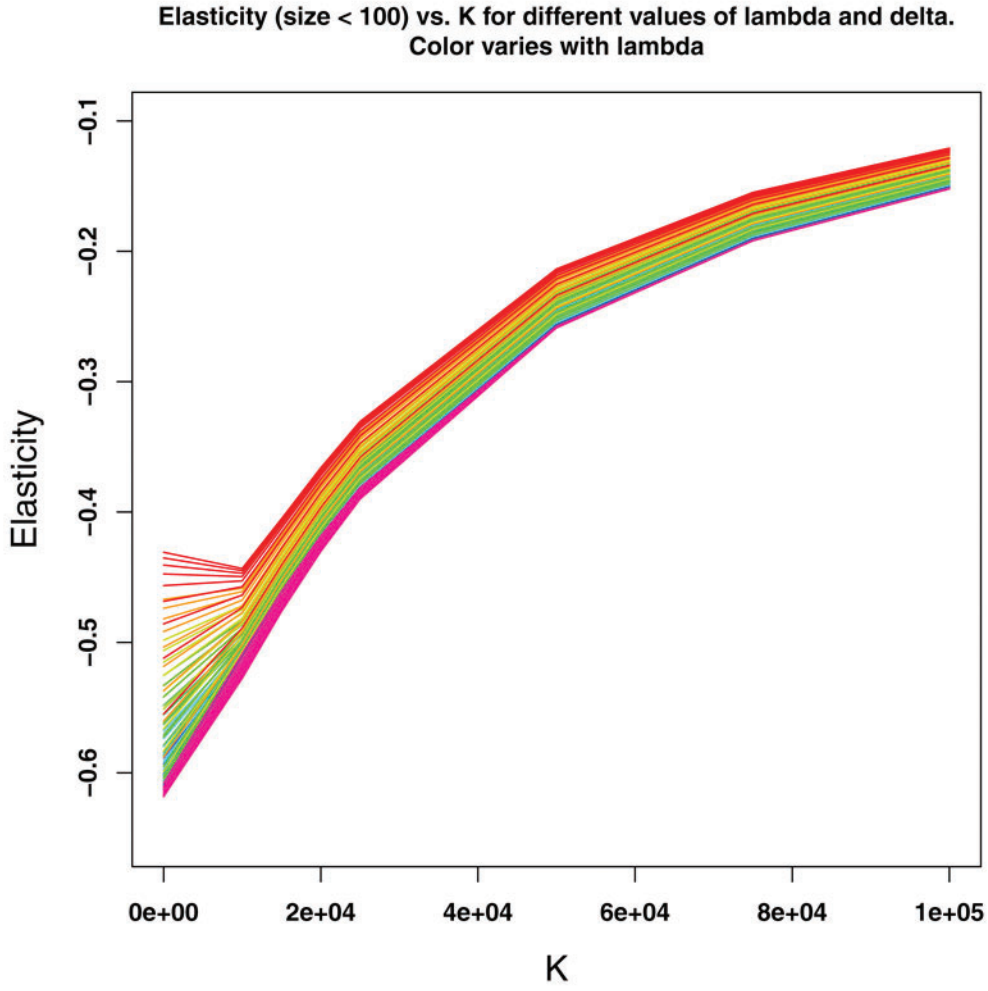
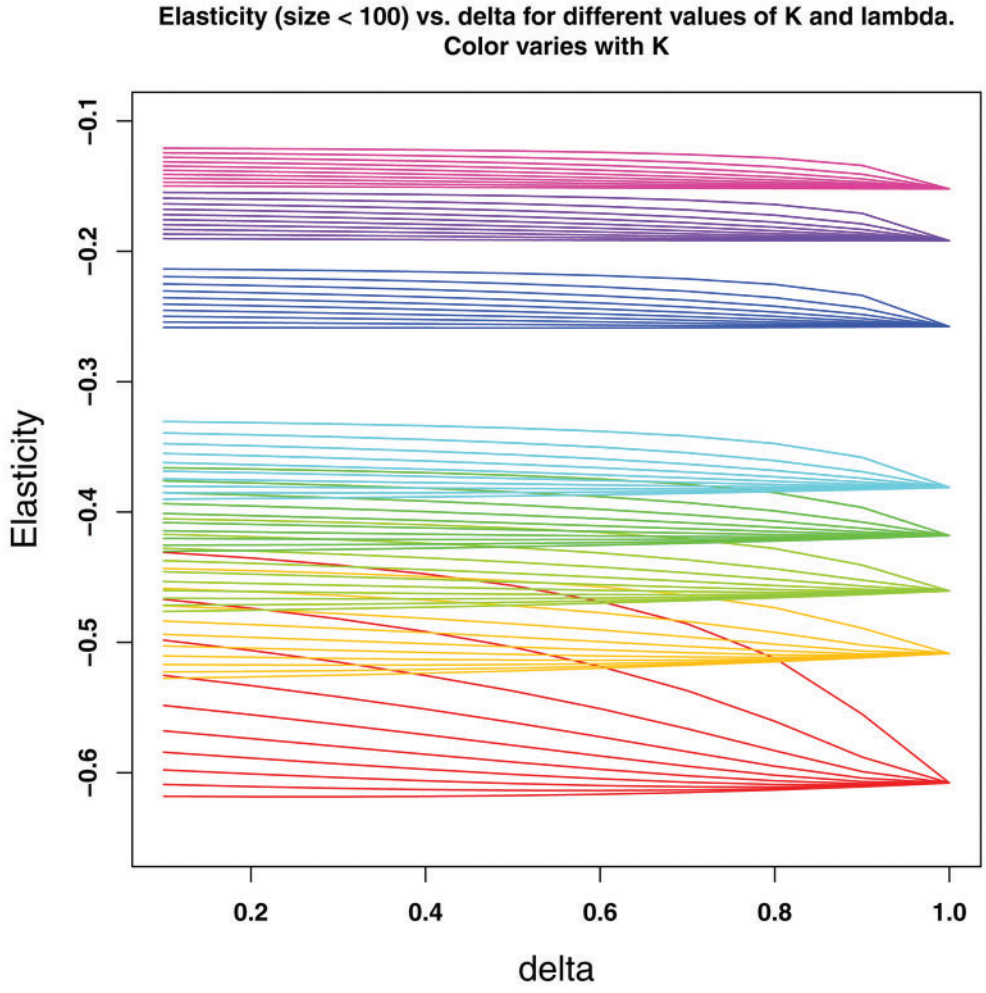
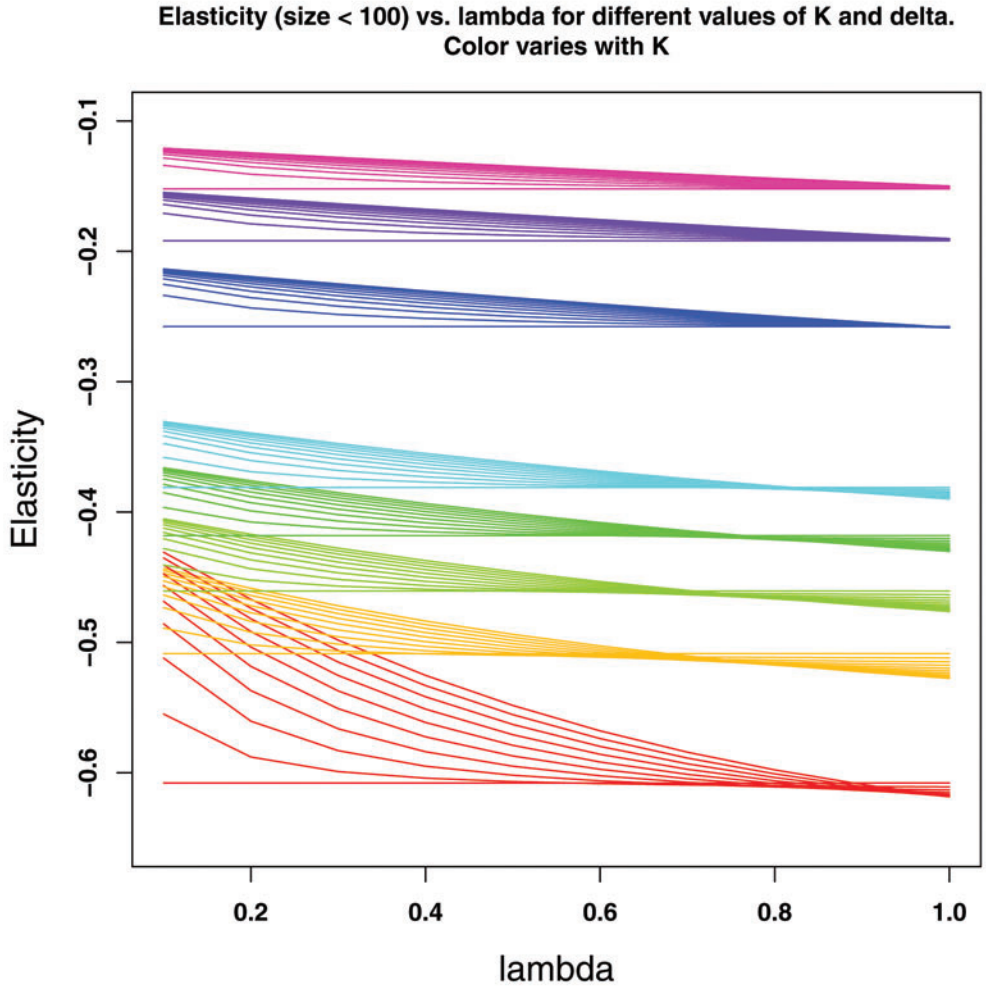


Figure A.2
Estimated Elasticity of Demand for HI for Firms with Fewer Than 100 Workers as a Function of δ, for Values of λ in the Range [0.1, 1] and *K* in the Range $[0, 100,000]



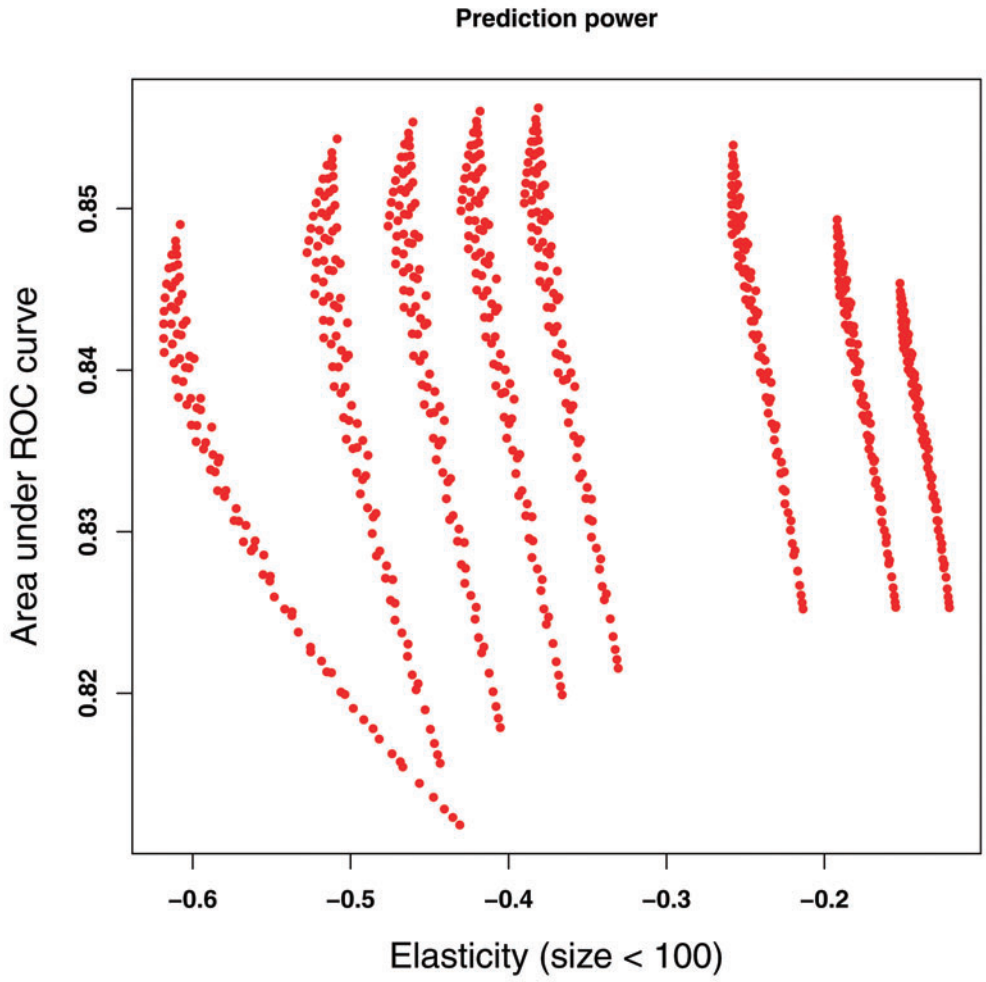
NOTE: Lines with the same color have the same value of *K*. High elasticities are associated with low values of *K*.

Figure A.3
Estimated Elasticity of Demand for HI for Firms with Fewer Than 100 Workers as a Function of λ, for Values of δ in the Range [0.1, 1] and *K* in the Range $[0, 100,000]



NOTE: Lines with the same color have the same value of *K*. High elasticities are associated with low values of *K*.

Figure A.4
Area Under the ROC Curve for Our Base Case Specification as a Function of the Estimated Elasticity for Firms with Fewer Than 100 Workers



Analysis of Terms in Firm Utilities

Let us study the individual terms in equation 7:

- $N^{\text{ESI}}v^{\text{ESI}}$: This term was defined as the aggregate utility that would accrue to the workers if the firm offered ESI at no cost. We can estimate this term within the COMPARE microsimulation framework because we do have the utility of ESI for workers and their families. In order to compute it, we need to take into account the fact that workers may take either single or family plans. We denote by ε_s and ε_f the proportion of workers taking single and family plans respectively, so that $N^{\text{ESI}} = N(\varepsilon_s + \varepsilon_f)$. Workers who take single (family) plans experience an average utility equal to $\overline{v}_s$ ($\overline{v}_f$), so that the aggregate utility is:

$$N^{\text{ESI}}v^{\text{ESI}} = N(\varepsilon_s\overline{v}_s + \varepsilon_f\overline{v}_f).$$

The computation of $\overline{v}_s$ is straightforward. In order to compute $\overline{v}_f$ we proceed in two steps: (1) For each worker we compute the total utility of ESI for the HIEU to which the worker belongs, and (2) we average this quantity over the workers within each firm. No parametric modeling is needed for this term, which will become an offset in the logit model.

- v^{No}: This is the workers' utility of not being offered ESI. This term, which we call "value of the outside options," depends on what other options are available to the workers and their families and on the choices they would make. We estimate it by assuming that the firm does not offer ESI and computing, for each worker, the utility of the best available option.
- P_w^{ESI}: This is the total workers' premium contribution. Using equation 2, we compute it as $P_w^{\text{ESI}} = \overline{P}^{\text{ESI}} - P_e^{\text{ESI}}$. Denoting by p_s and p_f the single and family premiums faced by the firm, we can write:

$$\overline{P}^{\text{ESI}} = N(\varepsilon_s p_s + \varepsilon_f p_f).$$

  All the quantities in the equation above are known at the firm level, so no parametric modeling is needed for this term.

- P_e^{ESI}: This is the employer portion of the total premium. This term can also be computed because in our model we can predict the single (family) employee share of premium $\gamma_s(\gamma_f)$ for both offering and nonoffering firms. This term is computed as

$$P_e^{\text{ESI}} = N[\varepsilon_s(1-\gamma_s)p_s + \varepsilon_f(1-\gamma_f)p_f].$$

- K: this term represents an administrative cost for setting up ESI, and it is not known within the model. It will be of the order of the wages of an HR person and will scale very mildly with firm size. Since this term always appears together with the total employer premium contribution, its variation with firm size is negligible compared with its companion term. Therefore, we assume that it is a constant, and we will estimate it by selecting the value that best reproduces elasticities of demand for HI.

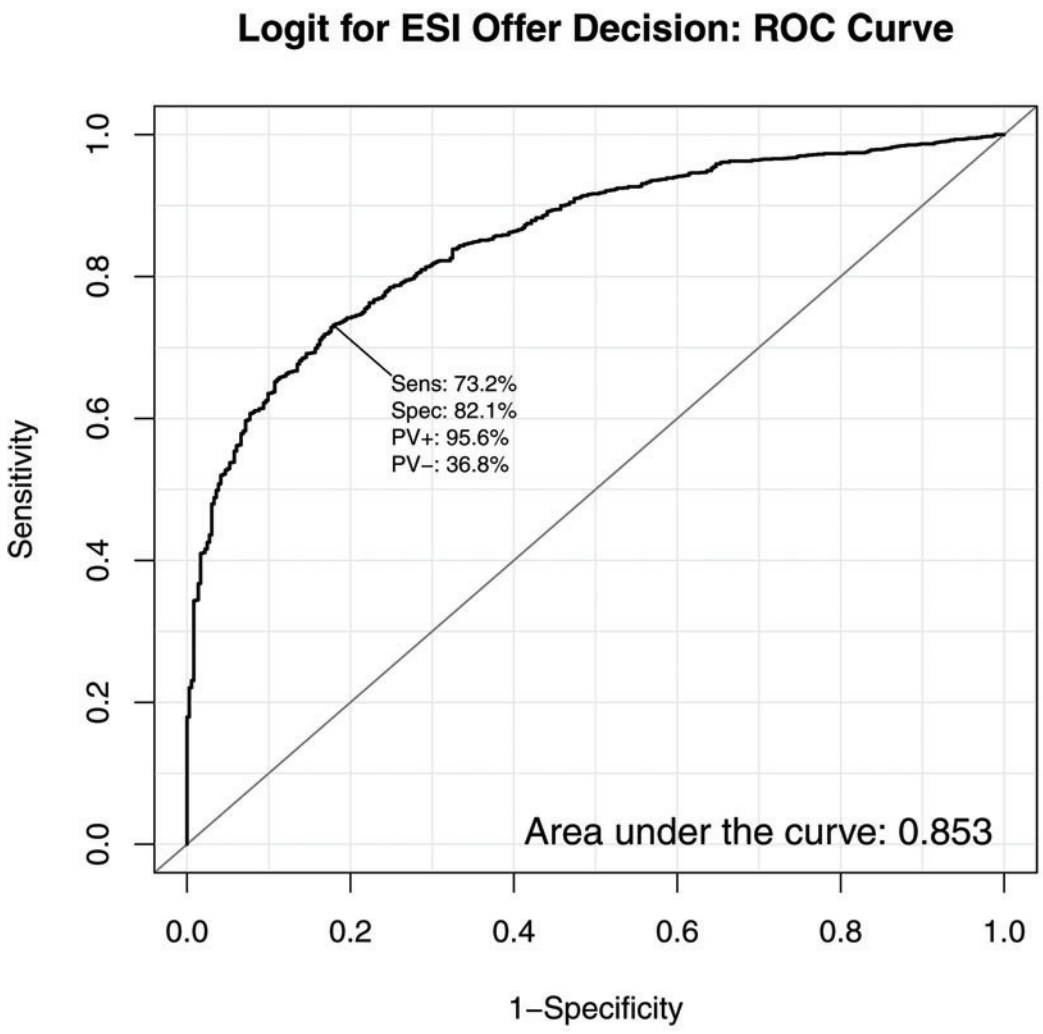
ROC Curve

An ROC curve is a plot of the true positive rate against the false positive rate as the criterion (the threshold for accepting a result as positive) changes (Witten and Frank, 2005). ROC curves are a standard tool for determining the fitness of a logistic regression or other classification models. The area under the ROC curve is an analogous measure to the R-squared value in least-squared regression.

When logistic regression is used as a classification tool, the interpretation of the results can be quite dependent on the criterion for accepting a result as positive. The ROC curve displays the tradeoff between the percentage of false positives and the percentage of true positives as the criterion for classifying a result as a positive change.

Figure A.5 has the ROC curve generated by the logit that we use to determine a firm's decision to offer insurance, whose coefficients are shown in Table A.2. In the figure, "Sens" stands for the sensitivity that is the portion of true positives which are correctly identified (if there are ten true positives and only eight are labeled as positive, the sensitivity is 0.8). Likewise, "Spec" is the specificity that is the percentage of correctly identified negatives. PV+ is the positive predictive value, and PV– is the negative predictive value. These are the portion of the positive or negative cases that are correctly identified (so if ten cases are labeled negative and only eight are negative, the PV– is 0.8). The PV+, PV–, sensitivity, and specificity results are for a single threshold, which can result in biasing (as seen in the low PV– value reported in Figure A.5). For the implementation of the model, instead of a single threshold, we used a probabilistic sampling, which results in an unbiased sample.

Figure A.5
ROC Curve for the Base Case Logit



Notation and Abbreviations

AUC	area under the ROC curve
α	A generic plan offered by the firm (including "no plan")
β	A vector of regression coefficients
γ	The average worker's share of premium: $\gamma \equiv \frac{P_w^{\mathrm{ESI}}}{\overline{P}^{\mathrm{ESI}}}$
C^{α}	A firm's total cost of offering plan α
δ	Fraction of the amount that would have been spent in offering ESI that is given to the employees as wages if the firm does not offer ESI
λ	A parameter that determines how much weight a firm puts on the utility of the workers when computing its own utility and that converts the units of measure of the workers' utility in dollars
K	The administrative cost associated with offering HI, or any portion of a firm's cost for offering (or not offering) HI that is not a premium contribution
N	Total number of workers
N^{α}	The number of people enrolling in plan α if offered
$\overline{P}^{\alpha}$	Total amount spent in premiums if firm offered plan α. It is the sum of worker and employer contributions: $\overline{P}^{\mathrm{ESI}} \equiv P_e^{\mathrm{ESI}} + P_w^{\mathrm{ESI}}$
P_w^{α}	The workers' contribution to total premiums in plan α
P_e^{α}	The employer's contribution to total premiums in plan α
ROC	receiver operating characteristic
t	Average tax marginal rate of workers
U^{α}	A firm's utility for offering plan α
v^{α}	An individual worker or dependent's utility for being offered plan α
V^{α}	Workers' aggregate utility for being offered plan α
$\mathbf{x}$	A vector of covariates that includes firm characteristics defined by equation 8

APPENDIX B

Comparison of the COMPARE Baseline Scenario and PPACA

Table B.1
Comparison of the COMPARE Baseline Scenario and PPACA

	COMPARE Baseline Scenario	PPACA with Reconciliation Changes
Maximum firm size allowed to participate in the exchanges	100 workers	100 workers, although before 2016 states can limit the size to 50. Beginning in 2017, states have the option to open the exchanges to large employers also (Sec. 1304, Sec. 1312 for the 2017 stipulation)
Minimum firm size subject to an employer mandate	≥50 workers	≥50 FTE (Sec. 1513)
Penalty for noncompliance with the employer mandate	Flat fee of $2,000 per worker after the first 30, adjusted for inflation (penalty is $2,061 in 2016)	If firm does not offer coverage and ≥1 FTE receives a premium assistance tax credit, then pay $2,000 per FTE after the first 30. Calculated on a monthly basis (Sec. 1513 and amended by Sec. 1003 of the Reconciliation Act)
Penalty for offering firms	Not modeled	If firm offers coverage but has at least one FTE receiving the premium assistance tax credit, then pay the lesser of $3,000 for each of those receiving a tax credit or $2,000 for each FTE (Sec. 1513 and amended by Sec. 1003 of the Reconciliation Act)
Eligibility and generosity of tax credits for small businesses	No tax credit	<25 employees and average annual wages of <$50,000, purchases health insurance for their employees, contributing at least 50%. Sliding scale with full credit available to employers with ≤10 employees and average annual wages <$25,000. 2010–2013, up to 35% of employer contribution, tax-exempt small businesses can receive the credit for up to 25% of their contribution. In 2014 onward, have to purchase coverage through the state exchange. Can receive tax credit for 2 years at up to 50% of contribution, for tax-exempt small business up to 35% of contribution (Sec. 45R of the Internal Revenue Code, as added by Sec. 1421 and then amended by Sec. 10105)
Individual eligibility for exchanges	Not Medicaid-eligible	Lawfully residing in a state and not incarcerated (Sec. 1312)
Individual mandate exemptions	If responsibility would be >8% of household income	Exempt from the mandate are religious objectors, individuals not lawfully present, and incarcerated individuals. Exempt from the penalty are those who cannot afford coverage (their contribution is >8% income), taxpayers with income below filing threshold, members of Indian tribes, those who have received a hardship waiver, and those not covered for a period of <3 months (Sec. 5000A of the Internal Revenue Code, as added by Sec. 1501 and amended by Sec. 10106)

Table B.1—Continued

	COMPARE Baseline Scenario	PPACA with Reconciliation Changes
Individual mandate penalty	Maximum of $695 for individuals ($347.50 for children) or 2.5 percent of income, up to $2,250 per family in 2016	The greater of the flat rate and percent of income. Flat rate: 2014 $95, 2015 $325, 2016 $695, and indexed thereafter. Percent of income: 2014 1.0%, 2015 2.0%, 2016 2.5%. For dependents <18 years old, applicable penalty will be 0.5 amounts listed above. For individual caps at the national average bronze premium plan, cap for entire family is $2,250 (Sec. 5000A(c) of the Internal Revenue Code as added by Sec. 1501, then amended by Sec. 10106, then amended by Sec. 1002 of the Reconciliation Act)
Eligibility and generosity of the premium subsidy for individuals in the exchanges	Individuals eligible between 133 and 400% of FPL. Also, employees offered ESI where premium is >9.5% of employee's income. Subsidy is on a sliding scale; people pay from 2 to 9.5% of their income	Those between ≥100–400% of FPL and also employees offered coverage by an employer under which the plan's share of the total allowed costs of benefits provided under the plan is <60% of such costs or premium is >9.5% of the employee's income. If ≤133% of FPL, percent of income must pay is 2.0%, for 133–150% of FPL pay 3–4%, for 150–200% of FPL pay 4–6.3%, for 200–250% of FPL pay 6.3–8.05%, for 250–300% of FPL pay 8.05–9.5%, and for 300–400% of FPL pay 9.5% (Sec. 36B of the Internal Revenue Code, as added by Sec. 1401 and amended by Sec. 1001 of the Reconciliation Act)
Medicaid expansion	Yes, those up to 133% of FPL	Yes, up to 133% of FPL (Sec. 2001 and amended by Sec. 10201)
Definition of minimum creditable coverage	Not modeled	Defined but not by AV; essential benefits package, which applies to the exchanges, has lowest AV of 60% (Sec. 5000A as added by Sec. 1501, and Sec. 1302)
Dimensions of choice when offering ESI coverage in exchanges	Firm selects a tier of coverage, and workers must enroll in that tier. (We do not currently model multiple plans within tiers.)	Firm selects qualified health plans within a tier of coverage, and workers must enroll in one of those plans (Sec. 1312)
Actuarial values in the exchanges	4 tiers: 60%, 70%, 80%, and 90% AV	4 main tiers: bronze 60%, silver 70%, gold 80%, platinum 90% (Sec. 1302)
Regulations in the exchanges	Age banding ratio (3:1), family structure	Family structure, geography, AV of benefit, age (3:1), tobacco use (1.5:1) (Sec. 2701 of the Public Health Services Act, as amended by Sec. 1201 and then amended again by Sec. 10103)
Risk equalization: risk adjustment	Yes, premiums in the exchanges pegged to AV for a standard population; excess revenue in low AV plans will be redistributed to higher AV plans	Yes, state will assess charges on health plan with enrollees of lower-than-average risk and will provide payments to health plans with enrollees with higher-than-average risk. Applies to plans in the individual and small group markets. In 2014–2016, for QHPs, secretary establishes risk corridor, and if a plan's costs (excluding administrative costs) exceed 103% of total premiums, secretary makes payments to plan to defray the excess. If a plan's costs are less than 97% of total premiums, plan makes payments to the secretary (Sec. 1342, Sec. 1343)
Risk equalization: reinsurance	No	2014–2016: States establish reinsurance entity that collects payments from insurers market and makes payments to insurers in the individual market that cover high-risk individuals. Contributions from insurers must total $25 billion over the 3 years (Sec. 1341)
Exchange regulations outside exchanges	Yes	Yes, except rating rules do not necessarily apply to self-insured plans (Sec. 2701 of Public Health Services Act, as amended by Sec. 1201 and Sec. 10103)

NOTES: FTE = full-time equivalent, AV = actuarial value, QHP = qualified health plan.

APPENDIX C

Estimation of Uncertainty in the COMPARE Simulation

In the COMPARE simulation, we use the Kaiser/HRET firm survey to build synthetic firms. Therefore, the distribution of firm weights in the simulation is inherited from this data set (subject to some adjustments described elsewhere in this document). The simulation is people-driven, and, while weights of individuals play an important role (for example, they are needed to compute the weighted average of medical expenditures and estimate premiums), weights of firms do not directly influence the dynamics of the simulation. They are needed, though, when we estimate the logit used in our firm behavior model, and they are also needed if we wish to report firm offer rates among other simulation outcomes. It is important to stress that, once the logit has been estimated, the firm weights are used only for reporting firm offer rates.

The annual Kaiser/HRET survey contains about 2,000 records and greatly oversamples large firms, since that is where most people work. This fact, combined with the fact that the distribution of firm sizes in the United States is extremely skewed, with the vast majority of workers in relatively few larger firms, implies that a relatively small number of data records end up representing a very large number of small firms and, therefore, have very large weights. In the 2009 data, the ten records with the ten largest weights (all representing small firms) are 0.5 percent of the records but represent 10 percent of all firms.

The implication of this observation is that, when computing firm offer rates, especially for small firms, the inclusion or exclusion of a few small firms in the numerator can cause large error in the firm offer rate. This comes into play because the simulation of firm behavior is probabilistic: At each iteration of the simulation each firm makes a choice by drawing from the choice set ("No offer," "Offer traditional ESI," "Offer exchange bronze," "Offer exchange silver," "Offer exchange gold," "Offer exchange platinum") with given probabilities, and, therefore, the set of firms included in the numerator of the firm offer rate may vary. In addition, some firms may be incorrectly included or excluded in the numerator of the firm offer rate just because the model is not perfectly precise, and this will cause some errors. It is important to note that this phenomenon simply reflects the nature of the U.S. firm distribution and is not a shortcoming of the Kaiser/HRET data.

The point that we wish to make is that uncertainty in the firm behavior will be amplified when looking at offer rates. Therefore, offer rates seem to be better suited to detecting relatively large changes (for example, comparing the status quo with the baseline reform scenario) rather than being used for a finer analysis (for example, comparing two scenarios with two different penalties or caps on the number of firms allowed in the exchange). However, since we report firm offer rates, it is important to quantify the size of the errors one could expect.

In order to establish a baseline, we looked at the original weighted logit regression used as a basis for the firm behavior. That regression assigns to each firm a probability of offering ESI

in the status quo. By sampling these probabilities we can obtain different random realizations of the binary firm choice, and by averaging them with firm weights we obtain random realization of offer rates. More generally, all outcomes in the COMPARE model occur with a probability that can vary from model run to model run. To insure that results are comparable, we typically seed the model so that we can reproduce an identical run every time we conduct an analysis. However, if we remove the seeding and run the analysis over and over again, we will get slightly different results that vary depending on the stability of underlying logit predictions that parameterize the model.

In Table C.1 we conduct an analysis of uncertainty (based on 300 model runs) for the key variables reported in the main text. The table reports the mean, 90 percent confidence interval, standard deviation, and margin of error for each outcome. As can be seen in the first row, offer rates are estimated with a degree of precision that can vary by plus or minus 6 percent. Many of the outcomes in Table C.1 are estimated more precisely than the firm offer rates. For example, in the base case reform, the model predicts that total Medicaid enrollment will be 49.8 million people, plus or minus 1 percent. One exception is enrollment in exchange plans provided by an insurer. Total enrollment in employer-sponsored exchange coverage is estimated to be 35.8 million people, with a 90 percent confidence interval ranging from 33.2 to 38.2 (7 percent margin of error). However, when we evaluate enrollment in specific employer-sponsored exchange plans (bronze, silver, gold, and platinum), margins of error are much higher—reaching approximately 20 percent. While a 20 percent margin of error seems high, this is not unexpected given that the number of people in the exchange plans (and therefore the number of corresponding records in the data set) is relatively small. In addition, utilities for exchange plans are noisier than those for plans that exist in the status quo, since they correspond to options that have never been observed, which makes them more difficult to calibrate. We also note that the confidence intervals do not seem inordinately large in absolute value. For example, enrollment in the employer-sponsored bronze plan (the least-precisely estimated outcome in our model), is predicted to be 7 million, with a 90 percent confidence interval ranging from 5.7 to 8.3 million.

Table C.1
Uncertainty in Model Estimates

Outcome	5th Percentile	Mean	95th Percentile	Standard Deviation	Margin of Error (±%)
Employer offer rates (%)					
All firms	74.5	79.9	84.0	3.0	6
Firm size ≤10	69.4	76.2	81.2	3.7	8
Firm size 11–25	87.5	91.0	94.5	2.2	4
Firm size 25–50	94.6	97.5	99.4	1.5	2
Firm size 51–100	95.9	98.4	100.0	1.3	2
Firm size 101+	95.4	97.2	98.4	0.9	2
Coverage (in millions)					
Total insured	258.2	258.9	259.6	0.4	0
Medicaid/SCHIP	49.2	49.8	50.4	0.4	1
Traditional ESI	121.9	124.6	127.1	1.7	2
Exchange, independent (total)	31.8	32.5	33.3	0.5	2
Bronze, independent	9.7	10.2	10.6	0.3	4
Silver, independent	15.7	16.1	16.5	0.2	2
Gold, independent	1.3	1.5	1.7	0.1	13
Platinum, independent	4.2	4.8	5.5	0.4	14
Exchange, employer (total)	33.2	35.8	38.2	1.6	7
Bronze, employer	5.7	7.0	8.3	0.8	19
Silver, employer	6.8	8.2	9.8	0.9	18
Gold, employer	7.8	9.5	11.2	1.0	17
Platinum, employer	9.1	11.1	13.2	1.2	19
Total uninsured	17.3	18.0	18.6	0.4	4
Premiums (in 2010 dollars)					
Traditional ESI	$5,599	$5,686	$5,769	$51	1
Exchange bronze	$3,460	$3,572	$3,680	$67	3
Exchange silver	$4,480	$4,612	$4,736	$79	3
Exchange gold	$4,532	$4,680	$4,828	$87	3
Exchange platinum	$4,932	$5,060	$5,205	$88	3
Employer spending (in billions of 2010 dollars)					
All firms	$695	$704	$712	$5	1
≤10 workers	$50	$54	$58	$2	7

Table C.1—Continued

Outcome	5th Percentile	Mean	95th Percentile	Standard Deviation	Margin of Error (± %)
11–25 workers	$68	$72	$77	$3	6
26–50 workers	$41	$43	$46	$1	6
51–100 workers	$39	$41	$43	$1	5
Government spending (in billions of 2010 dollars)					
Total Medicaid spending	$336	$340	$344	$3	1
Premium subsidies	$57	$60	$63	$2	4
Cost-sharing subsidy	$6	$6	$6	$0	2
Individual mandate revenue	$8	$8	$9	$0	6
Firm penalty revenue	$4	$6	$8	$1	35

References

Blumberg LJ, Shen YC, Nichols LM, Buettgens M, Dubay LC, and McMorrow S, *The Health Insurance Reform Simulation Model (HIRSM): Methodological Detail and Prototypical Simulation Results*, Washington, D.C.: The Urban Institute, July 2003. As of June 16, 2010: http://www.urban.org/UploadedPDF/410867_HIRSM_Report.pdf

Buntin MB, Escarce JJ, Kapur K, Yegian JM, and Marquis MS, "Trends and Variability in Individual Insurance Products in California," *Health Affairs,* Vol. 22, Supplemental Web Exclusives, July–December 2003, pp. w449–w459.

Buntin MB and Cutler D, *The Two Trillion Dollar Solution: Saving Money by Modernizing the Health Care System*, Washington, D.C.: Center for American Progress, June 2009. As of June 16, 2010: http://www.americanprogress.org/issues/2009/06/pdf/2trillion_solution.pdf

Congressional Budget Office, "CBO's Health Insurance Simulation Model: A Technical Description," October 2007. As of June 16, 2010: http://www.cbo.gov/ftpdocs/87xx/doc8712/10-31-HealthInsurModel.pdf

___, "Key Issues in Analyzing Major Health Insurance Proposals," December 2008. As of June 16, 2010: http://www.cbo.gov/ftpdocs/99xx/doc9924/12-18-KeyIssues.pdf

___, CBO Correspondence to Chairman Max Baucus, September 22, 2009.

___, CBO Correspondence to Speaker Nancy Pelosi, March 20, 2010.

Dranove D, Spier KE, and Baker L, "'Competition' Among Employers Offering Health Insurance," *Journal of Health Economics*, Vol. 19, No. 1, January 2000, pp. 121–140.

Donnelly JM, "Express Delivery: Connector Unveils Health Insurance," *Boston Business Journal Online*, March 12, 2010. As of June 16, 2010: http://boston.bizjournals.com/boston/stories/2010/03/15/story4.html

Gabel JR, Claxton G, Holve E, et al., "Health Benefits in 2003: Premiums Reach Thirteen-Year High As Employers Adopt New Forms of Cost Sharing," *Health Affairs*, Vol. 22, No. 5, 2003, pp. 117–126.

Gabel J, McDevitt R, Gandolfo L, Pickreign J, Hawkins S, and Fahlman C, "Generosity and Adjusted Premiums in Job-Based Insurance: Hawaii Is Up, Wyoming Is Down," *Health Affairs,* Vol. 25, No. 3, 2006, pp. 832–843.

Gabel JR, Pickreign JD, Whitmore HH, and Schoen C, "Embraceable You: How Employers Influence Health Plan Enrollment," *Health Affairs*, Vol. 20, No. 4, 2002, pp. 196–208.

Gabel JR, Whitmore H, Pickreign J, Sellheim W, Shova KC, and Bassett V, "After the Mandates: Massachusetts Employers Continue to Support Health Reform as More Firms Offer Coverage," *Health Affairs,* Vol. 27, No. 6, 2008, pp. w566–w575.

Gates SM, Kapur K, and Karaca-Mandic P, "State Health-Insurance Mandates, Consumer-Directed Health Plans, and Health Savings Accounts: Are They Panacea for Small Business?" in Gates SM and Leuschner KJ, eds., *In the Name of Entrepreneurship? The Logic and Effects of Special Regulatory Treatment for Small Business*, Santa Monica, Calif.: RAND Corporation, MG-663-EMKF, 2007. As of June 16, 2010: http://www.rand.org/pubs/monographs/MG663/

Glied S and Graff Zivin J, *Modeling Employer Decisions to Offer Health Insurance*, New York: Columbia University, August 2004. As of June 14, 2010:
http://www.rwjf.org/files/research/no7researchabstract.pdf

Goldman DP, Buchanan JL, and Keeler EB, "Issues in Employee Coverage and Use: Simulating the Impact of Medical Savings Accounts on Small Business," *Health Services Research*, Vol. 35, No. 1, 2000, pp. 53–75.

Goldstein GS and Pauly MV, "Group Health Insurance as a Local Public Good," in Rosett RN, ed., *The Role of Health Insurance in the Health Services Sector*, National Bureau of Economic Research, 1976.

Gruber J and Lettau M, "How Elastic Is the Firm's Demand for Health Insurance?" *Journal of Public Economics*, Vol. 88, 2004, pp. 1273–1293.

Hadley J and Reschovsky JD, "Small Firms' Demand for Health Insurance: The Decision to Offer Insurance," *Inquiry*, Vol. 39, No. 2, 2002, pp. 118–137.

Herring B, Bundorf MK, and Pauly MV, "Do Workers Bear the Cost of Rising Health Insurance Premiums Through Lower Wage Raises?" Academy Health Annual Research Meeting Presentation, June 28, 2009. As of June 16, 2010:
http://www.academyhealth.org/files/2009/Sunday/HerringB.pdf

Herring B and Pauly MV, "'Play-or-Play' Insurance Reforms for Employers—Confusion and Inequality," *New England Journal of Medicine Online*, December 30, 2009. As of June 16, 2010:
http://healthcarereform.nejm.org/?p=2626&query=home

The Kaiser Family Foundation and Health Research and Educational Trust, *Employer Health Benefits, Annual Survey 2006*. As of June 28, 2010:
http://www.kff.org/insurance/7527/upload/7527.pdf

___, *Employer Health Benefits, Annual Survey 2009*. As of June 28, 2010:
http://ehbs.kff.org/pdf/2009/7936.pdf

Kapur K, Karaca-Mandic P, Gates SM, and Fulton B, "Do Small Group Health Insurance Regulations Influence Small Business Size?" Santa Monica, Calif.: RAND Corporation, WR-351-ICJ, 2006. As of June 28, 2010:
http://www.rand.org/pubs/working_papers/WR351/

Kingsdale J, "Jon Kingsdale's Correspondence to Massachusetts Employers," 2010. As of June 28, 2010:
http://www.atlanticbenefitco.com/sitemanager/uploads/content/186file/2010_03_03_BusinessExpressLetter.pdf

Kofman M, Bangit E, and Lucia K, "MEWAs: The Threat of Plan Insolvency and Other Challenges," New York: The Commonwealth Fund, March 2004. As of June 28, 2010:
http://www.commonwealthfund.org/usr_doc/kofman_mewas.pdf

Kronick R, Olsen LC, and Gilmer TP, "The Response of Small Business to Variation in the Price of Insurance: Results from a Randomized Controlled Trial," *Medical Care Research and Review*, Vol. 65, No. 2, 2008, pp. 187–206.

Levy H, *Who Pays for Health Insurance? Employee Contributions to Health Insurance Premiums*, NCPR Working Paper 222-04-10-2001, 1998.

Lischko AM, Bachman SS, and Vangeli A, "The Massachusetts Commonwealth Health Insurance Connector: Structure and Functions," New York: The Commonwealth Fund, May 2009. As of June 28, 2010:
http://www.commonwealthfund.org/~/media/Files/Publications/Issue%20Brief/2009/May/Issue%20Brief.pdf

Long SH and MS Marquis, "Have Small Group Health Insurance Purchasing Alliances Increased Coverage?" *Health Affairs*, Vol. 20, No. 1, 2001, pp. 154–163.

Madrian BC and Shea DF, "The Power of Suggestion: Inertia in 401(k) Participation and Savings Behavior," *The Quarterly Journal of Economics,* Vol. 4, No. 116, 2001, pp. 1149–1187.

Manning W and Marquis S, "Health Insurance: The Tradeoff Between Risk Pooling and Moral Hazard," *Journal of Health Economics*, Vol. 15, No. 5, 1996, pp. 609–639.

Marquis MS and Holmer MR, "Alternative Models of Choice Under Uncertainty and Demand for Health Insurance," *The Review of Economics and Statistics,* Vol. 78, No. 3, 1996, pp. 421–427.

Marquis MS and Long SH, "To Offer or Not to Offer: The Role of Price in Employers' Health Insurance Decisions," *Health Services Research*, Vol. 36, No. 5, 2001, pp. 935–958.

Maxwell J, Temin P, and Zaman S, "The Benefits Divide: Health Care Purchasing in Retail Versus Other Sectors," *Health Affairs*, Vol. 21, No. 5, 2002, pp. 224–233.

McDevitt R, Gabel J, Lore R, Pickreign J, Whitmore H, and Brust T, "Group Insurance: A Better Deal for Most People Than Individual Plans," *Health Affairs,* Vol. 29, No. 1, 2010, pp. 156–164.

McGlynn EA, Ringel JS, Price CC, and Girosi F, "Analysis of the Affordable Health Care for America Act (H.R. 3962)," Santa Monica, Calif.: RAND Corporation, RB-9504, 2010a. As of June 28, 2010: http://www.rand.org/pubs/research_briefs/RB9504/

McGlynn EA, Cordova A, Ringel JS, Eibner C, and Girosi F, "RAND COMPARE Analysis of President Obama's Proposal for Health Reform," Santa Monica, Calif.: RAND Corporation, RB-9519, 2010b. As of June 28, 2010:
http://www.rand.org/pubs/research_briefs/RB9519/

Morrisey MA, Jensen GA, and Morlock RJ, "Small Employers and the Health Insurance Market," *Health Affairs*, Vol. 13, No. 5, 1994, pp. 149–161.

Pauly MV and Herring BJ, "An Efficient Employer Strategy for Dealing with Adverse Selection in Multiple-Plan Offerings: An MSA Example," *Journal of Health Economics*, Vol. 19, No. 4, 2000, pp. 513–528.

Pauly MV, Herring B, and Song D, "Tax Credits, the Distribution of Subsidized Health Insurance Premiums, and the Uninsured," *Forum for Health Economics & Policy*, Vol. 5, No. 5, 2002. As of June 28, 2010: http://www.bepress.com/cgi/viewcontent.cgi?article=1030&context=fhep

Pratt JW, "Risk Aversion in the Small and in the Large," *Econometrica,* Vol. 32, No. 1-2, 1964, pp. 122–136.

Samuelson W and Zeckhauser R, "Status Quo Bias in Decision Making," *Journal of Risk and Uncertainty,* Vol. 1, 1988, pp. 7–59.

Selden TM and Sing M, "Aligning the Medical Expenditure Panel Survey to Aggregate U.S. Benchmarks," Agency for Healthcare Research and Quality, Working Paper No. 08006, July 2008. As of June 28, 2010: http://gold.ahrq.gov/projectsearch/staff_summary.jsp?project=IM05209

Sing M, Banthin JS, Selden TM, Cowan CA, and Keehan SP, "Reconciling Medical Expenditure Estimates from the MEPS and NHEA, 2002," *Health Care Financing Revie*w, Vol. 28, No. 1, 2006, pp. 25–40.

Society of Actuaries, "Group Medical Insurance Large Claims Database Collection and Analysis," July 1, 2002. As of June 28, 2010:
http://www.soa.org/news-and-publications/publications/other-publications/monographs/m-hb97-1-toc.aspx

Walberg MP and Patel RA, "Potential Opportunity Cost of Neglecting to Annually Reassess Medicare Part D Standalone Prescription Drug Plan Offerings: The Price of Contentment?" *Journal of the American Pharmacists Association*, Vol. 49, No. 6, 2009, pp. 777–782.

Wicks EK, "Building a National Insurance Exchange: Lessons from California," Oakland, Calif.: California HealthCare Foundation, July 2009. As of June 16, 2010:
www.chcf.org/topics/healthinsurance/index.cfm?itemID=134010

___, "Health Insurance Purchasing Cooperatives," New York: The Commonwealth Fund, November 2002. As of June 28, 2010:
www.commonwealthfund.org/usr_doc/wicks_coops.pdf

Witten I and Frank E, *Data Mining: Practical Machine Learning Tools and Techniques*, 2nd Ed., San Francisco, Calif.: Morgan Kaufmann, 2005, pp. 168–171.