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DOI: 10.1111/1475-6773.12027

SIMULATION METHODS IN HEALTH SERVICES RESEARCH: APPLICATIONS FOR POLICY, MANAGEMENT, AND PRACTICE

Modeling Employer Self-Insurance Decisions after the Affordable Care Act

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Objective. To present a microsimulation model that addresses the methodological challenge of estimating the firm decision to self-insure.

Methodology. The model considers the risk that the firm bears when self-insuring and the opportunity to mitigate that risk by purchasing stop-loss insurance. The model makes use of a structural, utility maximization framework to account for numerous aspects of the firm decision, and a multinomial probit to reproduce the elasticity of the firm's demand for health insurance.

Findings and Conclusions. Our simulations provide three important conclusions. First, they project significant increases in self-insurance rates among small firms—presumably induced by the desire to avoid ACA's rate-banding and risk adjustment regulations—only if generous stop-loss policies become widely available. Second, they show that this increase would be due to this hypothetical adoption of widespread, generous reinsurance by the market and not by passage of the ACA. Third, even with a substantial increase of self-insurance rates among small firms, they project negligible adverse selection in the exchanges, as indicated by our finding that the increase in exchange premium is less than 0.5% when assuming very generous stop-loss policies after implementation of the ACA.

Key Words. Self-insured, stop loss, Affordable Care Act, multinomial probit

The Affordable Care Act (ACA) imposes new regulations in the individual and the small group health insurance markets, and creates the exchanges,¹ a new regulated market. The new regulations have the dual intent of assuring that qualified health plans meet specific minimum standards and of spreading risk among enrollees that have a wide range of expected expenditures. ACA mandates guarantee issue (no denial due to preexisting conditions) and renewability, premium variation based only on age (with a 3–1 rate-banding constraint), tobacco use (with a 1.5–1 rate-banding constraint), geographic rating area, and family size.² ACA also sets maximum out-of-pocket spending limits, allows for risk adjustment between plans,³ and requires that qualified health plans cover a yet-to-be-defined “essential

health benefits” (EHB) package for coverage of items and services in 10 general categories.⁴

Some ACA regulations—in particular rate banding and risk adjustment—may lead to higher premiums for lower risk groups (i.e., groups that tend to have lower claims costs), while reducing the prices faced by higher risk groups. Therefore, small firms with healthy employees and dependents may have an incentive to avoid these regulations. Self-insured plans will be exempt from many of the ACA’s regulations, notably rate banding and risk adjustment. Thus, firms with lower risk groups may have a stronger incentive to offer self-insured plans after the ACA takes full effect.

Under current law firms with fully insured plans pay a set premium to a commercial insurer or a health maintenance organization (HMO), which assumes full financial risk for the health insurance claims made by the firm’s employees. Firms with self-insured plans assume the risk for the claims made by their employees and pay a third-party administrator (TPA) to perform administrative functions such as claims adjudication, utilization review, premium collection, and customer service. Thus, while fully insured firms have predictable health care costs—the premiums they pay—self-insured firms face the uncertainty of the claims’ ultimate cost. This uncertainty is larger for smaller firms. However, self-insured employers can mitigate this risk by purchasing stop-loss insurance, a type of reinsurance that is not subject to the ACA’s regulations.

Under current law, the rate of self-insurance among small firms is low.⁵ However, the tension between the desire to self-insure, to avoid the ACA’s regulations, and the aversion to risk make it difficult to assess how small firms will behave vis-a-vis self-insurance after implementation of ACA. We need, therefore, a model capable of estimating the firm decision to self-insure both in the status quo (current law) and after passage of the ACA. This model must consider the risk associated with self-insurance as well as the opportunity to mitigate that risk by purchasing stop-loss insurance. To fully assess this choice, the model must include the different stop-loss alternatives available to the firm, the pricing of stop-loss coverage, and the effect of these policies on risk.

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In this study, we describe how we have modeled the firm decision to self-insure in the face of different stop-loss options after implementation of the ACA. Importantly, we address how the amount of risk born by the self-insuring firm, and the ability to mitigate this risk by obtaining stop-loss coverage, affects firm decisions. We focus on the small group market, which, with the passage of ACA, is defined to include all businesses with 100 or fewer workers.⁶ We also present selected results from our microsimulation model pertaining to the decision to self-insure in the presence of stop-loss coverage options, and we find no significant adverse selection in the Exchange market due to self-insurance after the passage of the ACA.

THE COMPARE MICROSIMULATION MODEL

Microsimulation models are powerful tools for analyzing the potential impacts of new policies.⁷

COMPARE (Comprehensive Assessment of Reform Efforts) is a microsimulation model that projects how households, individuals, and employers will respond under different policy scenarios. COMPARE has been used to simulate the effects of the ACA and its potential impact on government costs, employer insurance offer rates, private sector premiums, enrollment in public programs, overall uninsured rates, and individual and small-firm participation in the exchanges (see, for example, McGlynn et al. 2010).

COMPARE builds a synthetic representation of the United States using nationally representative data of individuals, households, and firms. The three key data sources are the Survey of Income and Program Participation (SIPP), the Medical Expenditure Panel Survey (MEPS), and the Kaiser Family Foundation/Health Research and Educational Trust Employer Survey (Kaiser/HRET). Additional data sources used in COMPARE are the Survey of U.S. Businesses (SUSB) and the Group Medical Insurance Large Claims Data Base (Society of Actuaries). The SIPP, the MEPS, and the Kaiser/HRET are linked together using statistical matching to create a synthetic representation of the United States. We use data from the SIPP to define health insurance eligibility units (HIEUs), which are groups of family members that tend to be eligible for health insurance coverage through the same policy. A typical HIEU consists of an adult, his or her spouse, and dependent children. COMPARE uses a utility-maximization approach to simulate HIEU's decision making process. Details on COMPARE and its utility maximization framework can be found in Eibner et al. (2010).

MODELING SELF-INSURANCE AND STOP-LOSS INSURANCE

How Stop-loss Insurance Works

The amount of risk a self-insured firm bears depends on the level of stop-loss insurance coverage that firm is willing and able to purchase. In general, stop loss can be of two types: individual-specific stop loss that covers claims for individual workers, and aggregate stop loss that covers claims for all the firm's employees. Individual-specific policies are defined by an attachment point, above which risk is transferred to the stop-loss insurer. For example, an attachment point for an individual-specific policy might be \$50,000 per employee per year. If an employee has annual expenditures exceeding \$50,000, the stop-loss policy covers the excess spending. Aggregate stop-loss policies limit the amount of aggregate claims. If a firm obtains both an individual-specific and an aggregate stop-loss policy, the individual-specific plan is the first payer. So, while the individual-specific policy insures against a single worker with high claims, the aggregate policy guards against the possibility that many workers have above average claims. Finally, stop-loss insurers may limit the amount of risk they are willing to bear by including in their policy a stop-loss spending cap, that is, the maximum claims level beyond which the firm reassumes the risk of claims.

Expert Discussion

To understand the stop-loss market, we gathered qualitative information from a series of 17 discussions held with over 25 experts on stop loss and self-insurance (some discussions included multiple respondents). We spoke with representatives from consumer groups, self-insured companies, TPAs, and stop-loss insurers, and with self-insurance experts and insurance regulators. Interviews were done by telephone by two interviewers with one note-taker. The interviews lasted about 45 minutes on average. We analyzed interview notes by summarizing and enumerating themes to establish areas of theme convergence. A full summary of the discussion and methods can be found in Eibner et al. (2011).

According to our interviews, it is common for small self-insured firms to purchase both an individual-specific and an aggregate stop-loss policy. Although there was widespread agreement that aggregate attachment points are typically set at 125 percent of expected claims, there was less consistency

in reports about individual-specific attachment points. Among our experts, the perceived range of individual-specific deductibles was \$20,000 to \$300,000. Most experts agreed that smaller firms were likely to have lower attachment points. We also learned that common stop-loss spending maximums are in the range of \$1 to \$2 million dollars. However, industry reports suggest that stop-loss insurers are tending to drop these limits in response to the ACA, which prohibits insurers and self-insuring firms from imposing lifetime and annual benefits maximums (Bell 2010; Aegis Risk 2011).

Based on these discussions, we developed a baseline set of assumptions about stop-loss policies available to firms, by size category. In addition, in response to the concern that small firms might be induced to obtain low-attachment point stop-loss policies in response to the ACA, we created an alternative scenario where low-attachment point policies were assumed to be widely available. Table 1 summarizes the stop-loss assumptions used in our analysis.

We note that these numbers are broadly consistent with recent, published estimates of stop-loss attachment points. For example, the 2011 Kaiser Family Foundation Survey reports attachment points of \$78,321 for self-insured firms with 3–199 workers, and \$208,280 for firms with 200 or more workers. Similarly, a survey of 106 self-insured employers conducted by Aegis Risk shows individual-specific attachment points clustering in the range of 50,000 to over \$400,000, and confirms that the aggregate attachment points are typically set at 125 percent of claims (Aegis Risk 2011).

Table 1: Stop-Loss Coverage Assumptions

<i>Attachment Points</i>	<i>Individual Attachments Points</i>		
	<i>Baseline Stop Loss (Scenarios 1 and 2)</i>	<i>Generous Stop Loss (Scenarios 3 and 4)</i>	<i>Aggregate Stop Loss (All Scenarios)</i>
Firms, ≤ 50 workers	\$35,000	\$10,000	125% of claims
Firms, 51–100 workers	\$45,000	\$10,000	125% of claims
Firms, 101–4,999 workers	\$125,000	\$125,000	125% of claims
Firms, 5,000 + workers	Inf	Inf	Inf
<i>Medical Loss Ratios (MLRs)</i>	<i>Employer</i>	<i>Individual Stop-Loss Insurer</i>	<i>Aggregate Stop-Loss Insurer</i>
Firms, ≤ 50 workers	0.80	0.75	0.40
Firms, 51–100 workers	0.87	0.80	0.46
Firms, 101–4,999 workers	0.91	0.85	0.55
Firms, 5,000 + workers	0.92	0.88	0.62

Note. All stop-loss payments are capped at \$2,000,000 (all scenarios).

The stop-loss market is regulated, and specific regulations vary by state. However, the COMPARE model currently can only simulate the typical or most likely policies at the national level.

Prior Literature

Few previous studies have attempted to model the firm's decision to self-insure. An important exception is Jensen, Cotter, and Morrissey (1995), which set forth a theoretical model of the firms' self-insurance decision that assumed a cost-minimization approach to making decisions, and that the risk associated with self-insurance is an implicit cost associated with offering self-insured plans. The authors consider two cases—one in which the firm is risk neutral but faces a cost of "financial ruin" that could occur if claims exceeded available assets. The second case assumed that firms were risk averse, an assumption that they argue is appropriate for smaller firms. Although we use a utility maximization rather than a cost-minimization model, our modeling approach (outlined below) follows from Jensen, Cotter, and Morrissey (1995) in that we permit the risk associated with self-insurance to influence decisions.⁸

Modeling Approach

We developed a model of the firm decision to self-insure, including the impact that stop-loss policies have on that decision, along four dimensions:

1. A structural model that accounts for the firm's preferences for lower costs and for higher levels of welfare for its workers. These two preferences are combined in one firm utility function. The model assumes that firms make the choice that maximizes firm utility.
2. A model for determining the contributions to claims payments (and the corresponding premiums) by the three entities that share the risk of self-insurance. These entities are the individual stop-loss insurer, the aggregate stop-loss insurer, and the firm itself.
3. A model for the firm's financial risk associated with the decision to self-insure in the presence of stop-loss coverage.
4. An econometric, reduced-form model capable of reproducing the firm status quo decision, which can be validated by reproducing observed elasticities of demand for firm insurance.

Our structural model captures the following aspects of the firm decision problem: employer and employee premium contributions; managerial costs

associated with offering insurance; workers' value for a health insurance offer; the availability to workers of options other than their firm's offer, such as eligibility for Medicaid or exchange subsidies, or eligibility to enroll in a spouse's plan; the favorable tax treatment of employer-sponsored insurance relative to compensation in the form of wages; the penalties some firms will face after 2014 if they do not offer insurance; the assumption that the firm's cost of insurance is fully passed on to workers in the form of wages if the firm drops coverage; the possibility that some workers might rather not receive an insurance offer, as would be the case if they prefer the extra wages instead.

To model the contributions to claims payment of the three risk-bearing entities, we proceed as follows: First, the insurer identifies all claims that exceed the individual attachment point I and computes the portion of claims C_I that lie between I and the individual spending cap $T_I + I$. The sum of these partial claims is fully reimbursed by the individual stop-loss policy, for which the firm has paid a premium P_I per worker. Second, the insurer compares the remainder of the total claims against the aggregate stop-loss attachment point A . The portion of that remainder that lies between A and the aggregate stop-loss spending cap $A + T_A$ (denoted by C_A) is fully reimbursed by the aggregate stop-loss policy, for which the firm has paid a premium P_A per worker. Finally, the insurer determines the remaining claims C_E , which is the amount for which the firm self-insures and for which it bears full financial risk. The premium associated with this third group is denoted by P_E . Premiums can be expressed as a function of claims C_i , number of employees N , and administrative cost factor δ_i by this equation:

$$P_i = C_i(1 + \delta_i)/N \quad (1)$$

where the index i refers to individual stop loss (I), aggregate stop loss (A), or employer (E). This formulation allows for different administrative cost factors for each one of the three contributions to the self-insured premium. In COM-PARE, we model the firm administrative cost factors and associated medical loss ratios (MLRs) in the status quo a function of firm size. Corresponding to the firm size-information available in the SIPP, these sizes are 1–24 employees, 25–99, and 100 or more. Blumberg et al. (2003) reports administrative cost factors corresponding to MLRs of 0.8 for firms from 1 to 24 workers, of 0.87 for firms between 25 and 99 employees, and 0.917 for firms with 100 or more workers. The administrative costs we used in our self-insurance premium equations were based on expert guidance and reflected two specific goals. First, we assumed that the administrative costs associated with the firms' day-to-day health insurance expenses would be lower than those associated with the

individual-specific stop-loss policy, which in turn would be lower than those associated with the aggregate policy. Second, we assumed that—for all types of policies—administrative costs would be lower for larger firms, due to economies of scale. The MLRs associated with the administrative cost factors used in our model are shown in Table 1. An important limitation of this analysis is that, because there are so little data on stop-loss policies, we have made relatively strong assumptions about stop-loss administrative costs based on expert input.

We estimate the risk that the firm bears when self-insuring by calculating the variance in enrollee health expenditures for firms of different sizes.⁹ Firm size x ranges from 4 to 500 in multiples of four. The maximum is limited to 500 workers because the MEPS-HC firm-size variable is top coded at this value.¹⁰ For each firm size, we sample x individuals from a pool of individuals with employer-sponsored insurance. Each pool consists of all individuals that report working for a firm of size between $x - \zeta_x$ and $x + \zeta_x$, where ζ_x is chosen such that the sample contains at least 2,000 records. Once the firm employees are sampled, we generate 5,000 hypothetical firms for each value x , and we obtain the records of their dependents. We then collect the total medical claims $M_j(x)$ for each hypothetical firm j of size x . Here, a firm's total claim is defined as the difference between the total and the out-of-pocket expenditures of its workers and their dependents. For each firm size x we obtain the sampled distribution of claims $M(x)$ over our set of hypothetical firms, out of which we compute the variance $\text{Var}[M(x)]$. The variance is a smooth function of firm size, which we extrapolate to firm sizes of more than 500 employees. We normalize the variance estimates as a percentage of payroll to assign to each firm in the simulation its financial risk. Our estimates are adjusted to reflect the effect of stop-loss coverage by repeating this process for each of the stop-loss scenarios of Table 1. An important limitation of this analysis is that, due to the scant information on stop-loss policies and contracting terms currently available, we cannot model the decision to purchase stop-loss coverage. Rather, we assume all self-insured firms with fewer than 5,000 workers obtain stop-loss insurance. The terms of stop-loss policies are assumed to vary with firm size, based on input provided by experts.

Our econometric model is a multinomial probit (MNP) with the following functional form:

$$\begin{aligned} P_{\text{full}} &= \gamma \Delta U_{\text{full}} + \beta_{\text{full}} x + \varphi \text{risk}_{\text{full}} + \varepsilon_{\text{full}} \\ P_{\text{self}} &= \gamma \Delta U_{\text{self}} + \beta_{\text{self}} x + \varphi \text{risk}_{\text{self}} + \varepsilon_{\text{self}} \\ P_{\text{no}} &= 0 \end{aligned} \quad (2)$$

The subscripts full, self, and no (also denoted by α in what follows) denote the three choices the firm faces in the status quo, namely, to fully insure, to self-insure, or to not offer coverage, respectively. The terms P_α are the latent variables that can be interpreted as random utilities. The two key variables are as follows:

- ΔU_α , the firm utility (aggregate workers utility minus aggregate cost) associated with receiving an offer of plan type α relative to the utility associated with having no insurance offer. This term captures the subtleties of the structural model summarized above.
- risk_α the financial risk associated with offering insurance if the firm offers a plan of type α . This term includes the mitigation of the risk faced by the firm due to purchasing stop-loss insurance. By definition, $\text{risk}_{\text{full}} = 0$.

The term x represents a set of firm covariates (firm size, unionization status, and industry sector) to control for determinants of choice not captured by the two key variables. We estimate the model using a sample of synthetic firms built by matching workers from the SIPP to firms in the Kaiser/HRET dataset—the latter provides information on self-insurance. The noise terms in the model are assumed to be correlated, otherwise the probability of offering a particular option would increase when adding to the set of choices replicas of that same option. The simulation coefficients are calculated as the mean of the posterior distribution generated by a Monte Carlo Markov chain algorithm. Table 2 shows the mean, standard deviation, and 10th and 90th percentiles of the posterior distribution. The MNP coefficients vary across choices with the exception of the coefficients for the utility and risk variables. As expected, the utility's coefficient is positive ($\gamma = 0.1$) and the risk's coefficient is negative ($\phi = -19.37$), indicating that the probability of offering increases with the firm's utility and that firms are risk averse. The area under the curve (AUC) of a receiver operating characteristic (ROC) can assess how well a binary-choice model predicts firm offer rates: a value of 1 corresponds to perfect prediction, while 0.5 corresponds to coin tossing. Ours is a three-choice MNP model; however, we take advantage of its nested structure. We construct ROC curves for each nest and report two AUCs: for the choice between not offering and offering any health insurance (AUC = 0.84), and for the choice between offering full and self-insured plans (AUC = 0.77).

The coefficients of the MNP also determine the elasticity of the firm's demand for health insurance. Our average elasticity for all firms is -0.5 , consistent with values reported in Gruber and Lettau (2004) and Hadley and

Table 2: Mean, Standard Deviation, and Tenth and Ninetieth Percentiles of the Posterior Distribution of the Coefficients of the Multinomial Probit Used in the Simulation

	Mean	Standard Deviation	10th Percentile	90th Percentile
Intercept, full	0.16	0.14	0.02	0.38
Intercept, self	-1.23	0.27	-1.56	-0.90
Delta utility	0.10	0.08	0.01	0.21
Risk	-19.37	5.31	-27.01	-12.81
Firm size 25-99, full	0.04	0.04	0.00	0.10
Firm size 25-99, self	0.22	0.25	-0.11	0.53
Firm size 100+, full	-0.06	0.04	-0.11	-0.01
Firm size 100+, self	2.29	0.23	2.01	2.58
Health/finance/government, full	0.06	0.05	0.01	0.14
Health/finance/government, self	-0.49	0.13	-0.65	-0.32
Retail/wholesale, full	0.01	0.02	-0.01	0.03
Retail/wholesale, self	-0.07	0.16	-0.27	0.13
Service, full	0.05	0.05	0.00	0.12
Service, self	-0.29	0.15	-0.49	-0.09
Mining/agriculture/construction, full	-0.03	0.03	-0.07	0.00
Mining/agriculture/construction, self	-0.72	0.23	-1.01	-0.44
No union, full	-0.16	0.13	-0.37	-0.02
No union, self	-0.63	0.16	-0.85	-0.44

Note. Regression output from a multinomial probit model used in the COMPARE microsimulation.

Reschovsky (2002). The elasticities are averaged using firm weights and show the expected result that larger firms have less elastic demand for health insurance.

To model the impact of the ACA, we introduce the new options available to small firms, namely, to offer a bronze, silver, gold, or platinum plan in the SHOP exchanges. We assume that after ACA takes full effect, fully insured plans not subject to ACA's rating regulations are only available to large firms (with 100 or more workers) and to grandfathered, small firms. We also assume erosion of the small-business grandfathered market—details on the effects due to grandfathering are provided elsewhere.¹¹ We do not distinguish between the SHOP and the regulated small group market for modeling purposes because, according to the law, they are to be considered a single risk pool. To predict firm decisions after the ACA takes full effect, we add the options that pertain to coverage on the SHOP exchanges, that is, four more equations similar to Equations (2). We assume that the coefficients on the vector of covariates x are the same for the exchanges and for fully insured plans. The new set of equations is not estimated empirically. Rather, for each type of plan available

to a firm, we calculate the utilities following our structural model (the new $\Delta U\alpha$'s) and use the same MNP coefficients estimated in the status quo. The firm then selects the option with the highest value of the latent variable; in other words, the firm maximizes the random utility P.

SIMULATION RESULTS

We simulated four scenarios as part of this study. The individual and aggregate attachment points and the maximum spending caps are shown in Table 1. All our estimates are for 2016, the year in which the exchanges are expected to be fully operational. The first scenario corresponds to our best estimate of the current status quo in stop-loss insurance prior to implementation of the ACA. Scenario two takes place post ACA and assumes that the terms of stop-loss insurance are unaffected by the law.

Table 3 shows our simulation results. In scenario one, 50 percent of all workers (including workers not offered insurance) are estimated to be employed by self-insured firms. This is consistent with information reported by other sources.¹²

There is considerable concern about the possibility that self-insurance and stop loss could lead to adverse selection post ACA (Jost 2010; Hall 2012).

Table 3: Self-Insurance Rates and Share of Workers at Self-Insured Firms. with and without ACA, under Different Stop-Loss Policies

<i>Scenario</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>
	<i>Baseline Stop-Loss No ACA</i>	<i>Baseline Stop-Loss ACA</i>	<i>Generous Stop-Loss ACA</i>	<i>Generous Stop-Loss No ACA</i>
Self-insurance rates				
All firms	0.05	0.05	0.16	0.16
Firms, ≤ 100 workers	0.03	0.03	0.15	0.15
Firms, 51–100 workers	0.13	0.13	0.15	0.15
Firms, ≤ 50 workers	0.02	0.02	0.15	0.15
Share of workers at self-insured firms				
All firms	0.50	0.50	0.52	0.52
Firms, ≤ 100 workers	0.05	0.05	0.10	0.10
Firms, 51–100 workers	0.10	0.10	0.13	0.13
Firms, ≤ 50 workers	0.04	0.04	0.09	0.09

Note. In this table, self-insurance rates and share of workers at self-insured firms are calculated with respect to total number of firms (irrespective of whether they offer) and total number of workers in all firms.

Even writers of the law seemed to anticipate this possibility in section 1254, which called for a study on the implications of self-insurance for small businesses. Scenarios one and two are meant to illustrate potential adverse selection effects under our best attempt to mimic the stop-loss market as it exists in the status quo. However, we find that the ACA alone will not lead to a significant increase in self-insurance; namely, in both scenarios our estimate of self-insurance rate is 5 percent and our estimate of the share of workers at self-insured firms is 50 percent (compare columns 1 and 2). Even with stop-loss coverage, small firms bear a substantial amount of risk when they self-insure, and our results suggest that new regulations will not provide enough motivation for small firms to self-insure.

Based on these results, we considered a third scenario, in which we assumed that ACA goes into effect, and, at the same time, low individual-specific attachment point policies become widely available to self-insured firms (they were set to \$10,000 for firms with up to 100 employees). This scenario attempts to model the hypothetical situation of stop-loss insurers trying to attract small firms that may wish to avoid ACA regulations. While the effects are uncertain, the complexities of the law could induce other changes in the stop-loss market as well. For example, increased demand for self-insurance due to the ACA could reduce stop-loss insurers' concerns about adverse selection (e.g., if, previously, only risky firms sought comprehensive stop loss), which might affect stop-loss premiums.

The fourth scenario helps to distinguish the effects due to more generous stop-loss policies alone to those due to the combined effect of ACA and generous reinsurance policies. In this scenario, we also assume that low-attachment point policies are widely available, but ACA is not implemented.

Simulation results for the third scenario indicate that the proportion of small firms that self-insure increases by a factor of five with respect to the status quo when generous stop-loss coverage becomes available after ACA goes into effect (column 3 of Table 3). However, the rate of self-insurance is identical in scenarios three and four. Our interpretation is that the large increase in self-insurance found in scenario three is brought about by the availability of generous stop-loss insurance, not by implementation of the ACA.

Even with this large increase in self-insurance estimated in scenario 3, the effect on premiums is not large. Table 4 shows single premiums in the platinum, gold, silver, and bronze plan tiers for scenarios 2 and 3. For each scenario, we performed 30 Monte Carlo runs. The table reveals that the change in premium has the direction that would be expected, namely, an increase—possibly due to adverse selection—when the stop-loss policies become more

Table 4: SHOP Exchange Premiums after ACA under Different Stop-Loss Policies

	<i>Scenario 2: Baseline Stop Loss</i>	<i>Scenario 3: Generous Stop Loss</i>
Bronze	3,834 (26)	3,851 (27)
Silver	4,473 (31)	4,493 (32)
Gold	5,112 (35)	5,135 (36)
Platinum	5,751 (40)	5,777 (41)
Percentage change relative to baseline		0.45%

Note. These premiums are computed over a standardized population. The numbers refer to the mean and standard deviation (the latter in parenthesis) of 30 Monte Carlo runs.

generous. However, the change is very small, less than ½ percent of the premium of the baseline scenario. We explain this result by observing that the size and composition of the exchange pool in our simulations for scenarios 2 and 3 are very similar, and that the increase in self-insurance in scenario 3 is mainly due to firms that did not previously offer insurance, and, thus, their employees were not part of the small-firm risk pools.

CONCLUSIONS

We have developed a microsimulation model that tackles the methodological challenge of estimating the firm decision to self-insure. The model considers the risk that the firm bears when it self-insures as well as the opportunity to mitigate risk by purchasing stop-loss coverage. It accounts for three entities sharing the risk for claims payments, namely, the individual and the aggregate stop-loss insurers and the firm itself. It captures numerous aspects of the firm decision problem such as its preference for lower costs and for higher welfare of its workers, the preferential tax treatment of employer-sponsored insurance, and the availability to workers of options other than the firm offer (access to Medicaid or exchange subsidies when eligible, and access to a spouse’s offer). Finally, it uses an econometric multinomial probit to reproduce the elasticity of the firm’s demand for health insurance.

We applied this model to project self-insurance rates, the share of workers in small self-insured firms, and SHOP exchange premiums after ACA takes full effect. We found that self-insurance rates increase only if generous stop-loss policies are offered to small firms after implementation of ACA. We modeled the hypothetical situation in which stop-loss insurers may want to

lure into their market small firms desiring to avoid ACA's rate banding and risk adjustment regulations. However, we showed that an increase in self-insurance rate is due to generous reinsurance policies adopted by the market and not due to ACA. Finally, we found only a very small increase in exchange premium (less than 0.5 percent of the baseline exchange premium) when very generous stop-loss policies are assumed after implementation of the ACA. The results are broadly consistent with previous empirical research analyzing the effects of state benefit mandates on self-insurance (Garfinkel 1995; Jensen, Cotter, and Morrisey 1995; Park 2000). While theoretically state benefits mandates were expected to increase self-insurance rates (since self-insured firms avoid these mandates), studies found little or no empirical relationship, perhaps because the risk associated with self-insurance remained a significant deterrent.

Our results should mitigate the concern that strong adverse selection may occur in the exchanges due to a large number of small firms self-insuring, for two reasons. First, few small firms opted to self-insure in our most realistic scenario. Second, even in a hypothetical scenario for which we assumed that stop-loss insurers adopt generous policies leading to a substantial increase in self-insurance rates, we found only a corresponding 0.5 percent increase in exchange premiums. However, as no model is capable of accurately predicting the future, close monitoring will be required to assess whether adverse selection actually occurs.

ACKNOWLEDGMENTS

Joint Acknowledgment/Disclosure Statement: This work was supported by a contract from the Department of Labor and through a gift from the RAND Board of Trustees. The views, opinions, and findings presented here are those of the authors and should not be construed as official government positions unless so designated by other documents.

Disclosures: None.

Disclaimers: None.

NOTES

1. By "Exchanges" we refer both to the American Health Benefit Exchanges available to individuals and families, and to the Small Business Health Options Program (SHOP) Exchanges available to small business, that is, those with up to 100

- employees. States will be allowed to open eligibility for SHOP Exchanges to firms with more than 100 employees starting in year 2017.
2. See sec. 1201 of the law.
 3. See sec. 1343.
 4. See sec. 1302.
 5. Current rates of self-insurance with respect to total number of firms are reported in Table 3.
 6. Before full implementation of the ACA, states will be allowed to limit the small group market to firms with 50 or fewer employees.
 7. Examples are provided in Blumberg et al. 2003; The Lewin Group 2007; Congressional Budget Office (CBO) 2007; and Gruber and Simon 2008.
 8. Paper size limitations preclude us to fully address the literature on self-insurance. For good reviews, please see Eibner et al. 2011.
 9. This calculation is performed using a merged 2002–2003 MEPS-HC database, which is adjusted to match the National Health Expenditure Accounts and to match the tails of expenditures distribution using the Society of Actuaries' Large Claims study. The data are inflated to year 2016 values using Centers for Medicare & Medicaid Services projections.
 10. The MEPS-HC provides establishment size, and we have used this as an indicator for the firm size.
 11. Paper submitted to Health Affairs.
 12. The 2011 Kaiser/HRET survey of employer benefits reported that 60 percent of workers offered insurance were in self-funded plans, among workers offered insurance. According to the Survey of Income and Program Participation data used in this analysis, 83 percent of all workers were at firms offering insurance. The product of these two numbers, 50 percent, agrees with our prediction of the total share of workers at self-insured firms.

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of this article:

Appendix SA1: Author Matrix.