Exclusive contracts in health insurance

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15 December 2010

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December, 2010

Abstract

Competition between insurance companies for employees of a firm often increases the prices and reduces the availability of high-quality health plans offered to employees. An insurance company can reduce competition by signing an exclusive contract, which guarantees that the company is the only insurance provider. The study assesses whether exclusive contracts can alleviate the negative consequences of competition. Using the nation-wide survey of employers, I find that exclusive insurers charged 39-42% less for a unit of insurance quality than non-exclusive insurers. Furthermore, I find that the pattern of insurance quality dispersion is consistent with the exclusive insurers offering more high quality plans.

1 Introduction

Employers provide health insurance to the majority of Americans. When deciding on health coverage, employers must choose the number and quality of insurance plans to offer and whether to contract with one or multiple insurance companies. Economists often argue that competition between health plans or insurance providers is a way to increase the value of insurance. The competition may lead to lower prices (Ma and Browne, 2005; Bundorf, 2010; Vistnes et al., 2001) and to overall welfare gains (Bundorf et al., 2008; Ma and Browne, 2005). The downside of the competition is that the high-quality plans tend to be provided at a much higher price or not provided at all (Jack, 2001; Cutler and Reber, 1998; Frank et al., 2000; Ellis and Aragao, 2001). Insurance companies often compete to attract healthier employees (Ellis, 1998). Thus, they are less likely to offer high quality plans where less healthy employees

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are concentrated (Frank et al., 2000). I am interested in whether a barrier to competition would induce insurance companies to offer higher quality plans that could increase welfare.

Employers can construct a barrier to competition by signing exclusive contracts with insurance companies. An exclusive contract guarantees that a single company will be the only insurance provider for the employees in the firm. This paper is the first to study the application of these contracts to health insurance. Exclusive insurers may be more likely to offer high-quality plans because they are less likely to face entrants that may attract away the healthier employees. Also, exclusive insurers can subsidize high-quality plans if this subsidy is welfare enhancing (Jack, 2001; Barros, 2003; Glazer and McGuire, 2000).

I present a simple model of competition between health insurance plans offered in a firm. The model shows when subsidizing of a high quality plan increases total consumer surplus. The model predicts that firms with exclusive contracts are more likely to offer high-quality plans, and these high-quality plans may be subsidized by the insurance company, – resulting in lower premiums. The 1997 nation-wide survey of employers by the Robert Wood Johnson Foundation provides data for studying the quality and price of health plans offered by exclusive and non-exclusive insurers. The survey collected information on the exclusivity of insurance contracts, along with extensive information on the quality of the health plans offered by employers. I construct an index that measures the quality of health plans in order to test whether the price of a unit of quality differs among the firms with and without exclusive contracts. Using this index I test the proposition that firms with exclusive health insurance contracts are more likely to offer high-quality plans by comparing the range of the quality of plans offered in these firms.

Empirical results support the model's predictions. For the firms with exclusive contracts, the price of a unit of quality is 39-42 percent lower than for firms with non-exclusive contracts. This result is consistent with the hypothesis that exclusive insurers charge lower prices for high-quality plans. Furthermore, the quality of plans offered to firms with exclusive contracts is more diverse indicating that these firms may offer more high quality plans.

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These results suggest that employers and administrators of Medicare Advantage programs can use exclusive contracts to reduce prices for high-quality plans. The results also indicate that antitrust authorities need to exercise caution when they investigate exclusive contracts in health insurance because these contracts may be increasing welfare.

2 Background

Prices for employer-provided health insurance are set at the plan level. Insurance companies are forbidden by law from setting different prices for individual employees enrolled in the same plan. There are two factors that determine the price of a plan: the plan's quality (the amount of insurance the plan provides) and the health expenditures of the enrolled employees.

A concentration of high-cost employees in high-quality plans increases the premiums for these plans and creates inefficiency by pricing out the medium-cost employees out of these plans in the process of adverse selection (Frank et al., 2000). Even more troubling is the case in which the distribution of medical expenditures is so skewed to the right that most employees in the firm may be priced out of the high-quality plan by a very few high-cost employees.[1] As a result, the consumer surplus of the employees who were priced out of the high-quality plans is reduced. Research of employee welfare losses from adverse selection produced mixed results. Cutler and Reber (1998) found significant welfare losses, while Einav et al. (2008) and Carlin and Town (2007) found that the losses were small.

A subsidy of a high-quality plan can attract healthier employees to the plan and increase the total consumer surplus if the gain in the consumer surplus of the employees enrolled in the high-quality plan will exceed the loss of the employees enrolled in the low-quality plan. This subsidy is not possible if a competitor can enter the market and undercut the price of the subsidizing plan.[2] Even if there is no cross-subsidization of the health plans, entrance of a new

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[1]Medical costs in the US population are well approximated by a log-normal distribution that is skewed to the right (Cardon and Hendel, 2001; Duan, 1983; de Ven and Praag, 1981; Diehr et al., 1999).

[2]In the telephone interview a sales representative of an insurance company said that his company demands

insurer can lead to a very unstable market and to losses of the incumbent insurance company (Sutton et al., 2004) because healthier employees have higher price elasticity of demand for health insurance (Royalty and Solomon, 1999; Stromborn et al., 2002; Buchmueller and Feldstein, 1997). Exclusive contracts designed to protect insurance companies from new entrants can induce them to decrease the prices of high-quality plans.

Exclusive contracts cannot completely prevent competition because an insurance contract can be dissolved at any time and an exclusive clause is not legally enforceable. Exclusive contracts state that the insurance company will offer specific coverage at a specific price as long as the company remains the sole provider of insurance. The acceptance of exclusive contract is a credible signal from employers that they are interested in an exclusive relationship with the insurance company. This signal is not without risk for the employer; if the employer decides to add another insurer, the incumbent insurer will rescind the contract, imposing the costs on employees and the employer. Handel (2010) and Cebul et al. (2008) find large costs associated with switching insurance companies. Exclusive contacts may not eliminate the probability of entry, but they should decrease the probability.

3   Model

3.1   Set Up

The model needs to show how competition among insurance companies, or a lack thereof, affects consumer surplus and the sorting of employees into health plans. In the model, a firm offers two health plans: one that provides basic coverage (low quality) and a second one that provides comprehensive coverage (high quality). Let θ denote the expected medical expenditures of an employee, where θ is uniformly distributed between 0 and 1. The benefits employees derive from the plans are linear functions of θ. The cost to insurance companies

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exclusive contract because the company is afraid that the plan they offer will be adversely selected against and exclusivity allows them to have sufficient participation rate (telephone interview, June 15, 2009).

to provide the plans is a linear function of the average θ of the employees enrolled in the plans $(\overline{\theta_h}, \overline{\theta_l})$. I assume that the increase in the benefit from a higher quality plan is due to the marginal increase in θ is higher than the costs associated with this increase (b>d).

$$
\begin{aligned}
Benefit(High) &= a + b\theta \\
Cost(High) &= c + d\overline{\theta_h} \\
Benefit(Low) &= e\theta \\
Cost(Low) &= f\overline{\theta_l}.
\end{aligned}
\tag{1}
$$

The willingness to pay for the high-quality plan is an increasing function of θ. At a given price for a high-quality plan, there exists a $\hat{\theta}$ such that all employees with $\theta > \hat{\theta}$ choose the high-quality plan and all employees with $\theta < \hat{\theta}$ choose the low-quality plan. The price of the high-quality plan reflects the average expenditures of the employees in the plan in the following way:

$$
P(\hat{\theta}) = c + d \, E(\theta|\theta > \hat{\theta}) = c + d(1 + \hat{\theta})/2,
\tag{2}
$$

provided $0 < \hat{\theta} < 1$. If the employee with $\theta = \hat{\theta}$ is indifferent between the choice the two plans, we can explicitly find $\hat{\theta}$:

$$
\begin{aligned}
Benefit(\hat{\theta})_H - Price(\hat{\theta})_H &= Benefit(\hat{\theta})_L - Price(\hat{\theta})_L \\
a + b\hat{\theta} - c - d(1 + \hat{\theta})/2 &= e\hat{\theta} - 0.5f\hat{\theta} \\
\hat{\theta} &= (c - a + d/2)/(b - e + 0.5f - 0.5d).
\end{aligned}
\tag{3}
$$

3.2 Subsidy and Equilibrium

Prices under exclusive contracts may be different from the prices under non-exclusive arrangements (equation 2) when the entry of a new insurer is possible. With an exclusive contract, employees in the low-quality plan can subsidize the employees in the high-quality

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plan. Let S be the total amount of subsidy for all employees enrolled in the high-quality plan. The subsidy under the exclusive contract makes the high-quality plan more attractive, and some employees from the low-quality plan will switch to the high-quality plan. Then there will be a new employee $\hat{\theta}^e$ indifferent to a choice between the two plans. The employees have smaller expected medical expenditures than the indifferent employees without the subsidy, i.e., $\hat{\theta}^e < \hat{\theta}^c$ (figure 1). The new indifferent employee is determined by:

$$a + b\hat{\theta}^e - c - d(1 + \hat{\theta}^e)/2 + S/(1 - \hat{\theta}^e) = e\hat{\theta}^e - 0.5f\hat{\theta}^e - S/\hat{\theta}^e. \tag{4}$$

The subsidy also increases the price of the low-quality plan by $S/\hat{\theta}^e$, and it decreases the price of the high-quality plan by $S/(1 - \hat{\theta}^e)$ (figure 1). The subsidy S may increase the total consumer surplus if the gain of the employees in the high-quality plan exceeds the loss to the employees in the low-quality plan because of wider participation in the high-quality plan.

3.3   Consumer Surplus

The consumer surplus from the two plans is equal to the sum of benefits minus the price employees pay:

$$CS = \int_{\hat{\theta}}^{1} (a + b\theta + S/(1 - \hat{\theta})) - \int_{\hat{\theta}}^{1} (c + d\theta) + \int_{0}^{\hat{\theta}} ((e - f)\theta - S/\hat{\theta}) \tag{5}$$

$$CS = 0.5\hat{\theta}^2(d - b + e - f) + \hat{\theta}(c - a) + a - c + 0.5b - 0.5d$$

$$\frac{\partial CS}{\partial S} = \frac{\partial CS}{\partial \hat{\theta}} \frac{\partial \hat{\theta}}{\partial S} = (c - a + \hat{\theta}(d - b + e - f)) \frac{\partial \hat{\theta}}{\partial S}. \tag{6}$$

A proposition follows from this calculation.

Proposition 1. *There exist parameters a, b, c, d, e, f such that the firm has a separating equilibrium and the subsidy of the high-quality plan increases the consumer surplus (for the proof, see the Appendix).*

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$$(e\hat{\theta} - f\hat{\theta} - (a + b\hat{\theta} - c - d\hat{\theta}) = (Benefit(\hat{\theta})_L - Cost(\hat{\theta})_L) - (Benefit(\hat{\theta})_H - Cost(\hat{\theta})_H) < 0. \quad (7)$$

This result is shown in the figure 1. Let R_h (R_l) be the differences between the benefit an employee derives from high-quality (low-quality) plan the costs of providing the plan to the employee. The subsidy increases welfare if R_h is larger than R_l for the employee with $\theta = \hat{\theta}$.

The reason the employee cannot obtain a higher surplus from the high-quality plan is that the price of the plan exceeds the benefits the employee derives from a high-quality plan. A firm maximizes the total consumer surplus if it subsidizes the high-quality plan while $R_h > R_l$. The subsidy equalizes the difference between marginal net benefits of the two plans, which results in a gain in the consumer surplus (figure 2.

3.4 Infeasibility of the High-Quality Plan

Employers may not be able to offer the high quality plan without a subsidy if employees are not willing to pay for the average medical expenditures of high-quality plan (figure 3).

Proposition 2. *There exist parameters a, b, c, d, e and f such that the subsidy of the high-quality plan increases the consumer surplus if no employee chooses the high-quality plan without a subsidy. The sufficient conditions for this results are:*

$$a - c > b - d + f - e2b - 1.5d < 2e - 1.5f. \quad (8)$$

A subsidy of the otherwise infeasible high-quality plan may increase the consumer surplus if the employees with medium or low medical expenditures have a sufficiently high consumer surplus from the high-quality plan. The employees with high expenditures cannot pay for their own expenditures in the high-quality plan – this is the root of its infeasibility. However,

if a subsidy increases participation of the healthier employees, they bring the average expenditures and premiums down making the high-quality plan feasible. I model the subsidy as a transfer from the employees in the low-quality plan to the employees in the high-quality plan. The subsidy has to be small enough to ensure sufficient participation in the low-quality plan.

The subsidy decreases the price of the high-quality plan and increases the price of the low-quality plan. In addition, the subsidy attracts healthier employees to the high-quality plan that further decreases its price (figure 1). The subsidy is not possible without an exclusive contract, because a competitor could offer the low-quality plan at a lower price and lure away the healthier employees.

3.5 Empirical Predictions

The model makes two empirical predictions: (1) The relative price of the high-quality plan in firms with exclusive contracts is lower than in firms with non-exclusive contracts; (2) firms with exclusive contracts are more likely to offer high-quality plans.

4 Data

The Robert Wood Johnson Foundation conducted a survey of employers in the 48 contiguous states and the District of Columbia. This 1997 survey was based on geographical and firm-size strata with random selection within each stratum. The survey asked employers about the health plans they offered. When an employer said the firm was offering more than one health plan, the survey asked whether the employer had an exclusive contract with an insurance company. There were 3,203 firms (with 15,468 plans) who provided information as to whether they had an exclusive contract with their health insurance company.

My econometric specification requires each firm to have a complete set of plan control variables (deductibles, copayments, etc.) for at least two plans. After I dropped observations

that had missing control variables, 1,913 firms (with 10,257 plans) remained in the sample. Out of these firms, 299 (with 1,126 plans) are self-insured.[3] I dropped these firms because I consider an entry barrier necessary to protect an incumbent insurance company, and in the self-insured firms there is no incumbent insurance company to protect. My final sample for the estimation consisted of 1,604 firms (with 9,335 plans).

4.1 Firms

Table 1 presents the descriptive statistics of the firms with exclusive and non-exclusive insurers. The table provides information on 1,235 firms, that is less than 1,635 firms used in estimation. The discrepancy is a result of the missing firm-level variables presented in the descriptive statistics, although these variables are not used in estimations that features firm fixed effects. Firms with exclusive providers tended to have a slightly larger total number of employees, but a significantly smaller sized of establishments, than the firms with non-exclusive providers. The employees in the firms with non-exclusive providers were more likely to be females. However, the distributions of employees' wage, age and hours of work were similar. Firms with non-exclusive insurers offered a larger number of plans than firms with exclusive insurers.

4.2 Plans

Table 2 presents the descriptive statistics of the plan-level variables for firms with and without exclusive contracts. The premium is the total monthly amount that insurance companies charge the employer. Health plans offered in the firms with exclusive contracts covered slightly fewer services than the ones offered in the firms with non-exclusive providers. The exclusive plans have longer waiting periods for the coverage of pre-existing conditions and also higher deductables – the dollar amount of the yearly claims that is not covered by the

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[3]Self-insured firms take on the risk of providing insurance to their employees, although they may hire an insurance company to administer the insurance policies.

insurance company – along with higher copayments and coinsurance rates. The copayment is a fixed dollar payment employees need to make each time they use a medical provider. Coinsurance is the percent of medical claim that is not covered by insurers. Plans with exclusive contracts are more likely to an annual out-of-pocket maximum that protects the insured against very large claims.

There are four major types of health plans offered to employees in the survey data set: Indemnity Plan, Health Maintenance Organization (HMO), Point of Service Plan (POS), and Preferred Provider Organization (PPO). These types vary in whether they restrict the choice of medical providers and utilization of medical services (see Bundorf (2002) for further discussion).

Actuarial value of a plan is a primary measure of insurance, which is the share of the expected medical expenditures covered by the insurance. This value was calculated by the designers of the survey in the following manner. First, they estimated the expected medical expenditures of employees using demographic information and geographical location. Then they estimated the share of the expenditures covered by insurance linking expected medical expenditures with the insurance contract information. The actuarial value is bounded between 0 and 1. For example, if an actuarial value is 0.77, then 77% of the expected medical expenditures will be covered by the insurance. The actuarial values of the plans offered by exclusive and non-exclusive providers are similar. The last two lines of table 2 provide descriptive statistics for the plan's quality predicted by using the firm fixed effects. Exclusive providers tend to offer higher quality plans than those offered by non-exclusive providers, for both single and family coverage.

5   Estimating the Price of Quality

The quality of a plan has many parameters such as amount of the deductible, choice of providers, etc. The first step in determining a plan's quality is to estimate the how these

parameters contribute to its price by regressing the premium on the plan characteristics presented in table 2. The model shows that in the firms with exclusive contracts this relationship can be distorted by subsidies. Therefore, at this point firms with exclusive contracts are omitted, because the goal of the first step is to measure how quality is related to price [4]

The premium predicted by using the coefficients estimated in this regression is an index of the plan's quality. There are some unobserved firm characteristics correlated with the premium, such as distribution of health expenditures in the firm, administrative costs, prior health claims, etc. I control for an unobserved firm heterogeneity using firm fixed effects. The regression equation is

$$Premium_{jk} = \sum_{i=1}^{N} \hat{\delta} Q_{ijk} + u_k + e_{jk} \tag{9}$$

where u_k is a firm fixed effect. I use the coefficients estimated in equation (9) to estimate the quality of plans for all firms:

$$\hat{Quality} = \sum_{i=1}^{N} \hat{\delta} Q_{ijk}. \tag{10}$$

The model predicts that in the firms with exclusive contracts, employees in low-quality plans subsidize employees in the high-quality plans. This subsidy increases the price of low quality plans and decreases the price of high-quality plans in these firms. The model does not make explicit predictions about the firms that offer more than two plans, but I expect to see a lower price per unit of quality in the firms with exclusive contracts. To measure the price of a unit of quality, I regress the price of the plans on the predicted quality with firm fixed effects. I use a bootstrap procedure to estimate standard errors because $\hat{Quality}$ is a

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[4]The omitted variables are indicators of whether a plan covers physicians, hospital use, and mental health treatments, indicator for a gatekeeper physician, squared coinsurance, squared copayment, squared deductible, and a third-degree polynomial of actuarial value.

generated regressor:

$$Premium_{jk} = \alpha_1 + \beta_1 \, \hat{Quality}_{jk} + \beta_2 \, \hat{Quality}_{jk} \times \text{Exclusive Provider}_k$$

$$+v_k + e_{jk}.$$

(11)

The coefficient β_2 shows how much lower the price per unit of quality is in the firms with exclusive contracts. If I find a lower price per unit of quality in the firms with exclusive contracts, it does not necessarily imply the existence of subsidies. Subsidies result in a higher price for low-quality plans, but the use of the firm fixed effects prevents me from estimating the difference in the prices of low-quality plans.

5.1 Who Offers High-Quality Plans?

I test the proposition that the firms with exclusive contracts are more likely to offer high-quality plans by comparing the quality of the plans in the survey. The comparison of quality across firms is problematic because different firms are often charged different prices for the same plans (Cutler, 1994); a good quality plan for one firm may be of bad quality for another. However, if firms with exclusive contracts can offer high-quality plans and the firms without these contracts cannot, then the firms with exclusive contracts should have higher range of a quality levels in the plans they offer. The range of quality is the difference between the plans with highest and lowest quality levels.

6 Results

In this section, I test the hypotheses that in the firms with exclusive contracts, high-quality plans have lower premiums than similar plans in the firms without such contracts. In addition, I test whether the range of quality is higher than in the firms without exclusive contracts.

6.1 The Price of Quality

Table 3 presents the estimated coefficients from linear regressions of price on predicted quality. In the firms with exclusive insurers, the price of quality for single coverage is 42 percentage points less than the price in the firms with non-exclusive insurers (coefficient is statistically significant at 5% level) for single coverage. For the family coverage, the firms with exclusive contracts shows a price for quality that is 39 percentage points lower than in the firms with non-exclusive contracts, although the coefficient is not statistically significant.

6.2 The Range of Quality

I constructed quality measures using firm fixed effects; thus the means of predicted quality are not influenced by firm characteristics. However, the number of plans a firm carries is likely to be positively correlated with the range in quality of the firms, although the exact nature of this relationship is difficult to predict.[5]

Table 4 presents ranges of quality offered by firms and the coverage rates in the firms with two to five plans. Among the firms that offer two health plans, the range of quality in the firms with exclusive contracts is higher (a statistically significant difference at the 5% level) than in the firms with no exclusive contracts. For the single coverage, the difference in the range of quality is $4.2 (23% of one s.d. for the group), and for the family coverage the difference is $9.2 (25% of one s.d. for the group). Among the firms that offer more than two plans, the difference between the ranges of quality is not significant. The model predicts that exclusive contracts increase the range of quality only for the firms with two plans and for the single coverage plans in the firms with four plans. The effects of the exclusive contracts on the firms with more than two plans depends on the market segmentation of these plans. The difference in the coverage rate between the firms with and without exclusive contracts is insignificant.

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[5]To understand the exact relationship between the range in quality and the number of plans offered in a firm, one needs to model competition between multiple plans, which is beyond the scope of this paper.

7   Robustness Checks

The model considers the firms that offer only two health plans, so it is important to make sure that the results from these firms support the model's predictions. Table 5 shows the regression results for the two-plan firms. The magnitudes of the estimated coefficients are similar to those in the table 3. The standard errors of the estimated coefficients are larger, as expected, because of the smaller sample size.

The model predicts that the subsidy provided by insurance companies lowers the price of quality in firms with exclusive contracts. However, a similar effect can be achieved if employers rather than insurers subsidize the high-quality plans. These subsidies can attract healthier employees and lower the costs of providing these plans. The lower costs can be transmitted to the employers as lower prices for high-quality plans. Average payments of the employers are shown in table 6. To ensure that my results are not driven by employers subsidies, I regress the premium that employers pay on the quality of the plans and on the interaction of the quality with the indicator of exclusive contract. Table 7 shows the results.

Employers with exclusive contracts subsidize high-quality plans slightly more than employers with no such contracts, although the estimates are very imprecise. Even if we assume that these estimates are correct, they are still very small to be considered drivers of the results. Employers with exclusive contracts subsidize a unit of quality in family and single plans by 9 and 18 percent more than employers without these contracts. This small subsidy is not likely to account for the whole 39-42 percent discount for a unit of quality that firms with exclusive contracts receive from insurance companies.

Self-insured firms were dropped from the primary estimation because the model considered the competition between insurance companies. However, these self-insured firms are interesting because they have more control over the design of insurance plans then firms purchasing insurance from the market. Self-insured firms can decrease the prices of the high quality plans if they consider this move to be beneficial. In table 8, self-insured firms are considered as a separate category, in order to see if the price of a unit of quality is differ-

ent than in firms without exclusive contracts. I find the price of a unit of quality in the self-insured firms to be 3 percentage points lower than in the fully insured firms with no exclusive contracts. This is a very small difference relative to estimated 30 percentage points difference in the firms with exclusive contracts.

8 Conclusions

This paper is the first to analyze the characteristics and effects of exclusive contracts between employers and insurance companies. Even though exclusive contracts are legally unenforceable, they have significant effect on the price of insurance. I find that, in firms with exclusive contracts, the relative prices for high-quality plans are lower than in firms with no such contracts. I also find that the firms with exclusive contracts and two health plans have a larger range of quality, indicating that these firms offer more higher quality plans.

Much of related economic research has focused on the costs and benefits of allowing competition between health insurance plans. Researchers found that competition is a good tool for employers to lower the costs of insurance, but that competition is also associated with a decrease in the quality of the plans. In this analysis, I show that there is a tool for employers who want to lower the price of high-quality plans: An exclusive contract with a health insurance company. In addition, exclusive contracts can be used by administrators of Medicare Advantage programs who contract with private health plans to provide services to more than 10 million Americans (Berenson and Dowd, 2009).

The results of the paper are also important for the ongoing discussion on welfare implications of exclusive contracts. The attitudes of antitrust authorities toward exclusive contracts have varied over time, but they have generally been more lenient toward these contracts than the academic economists (Lafontaine and Slade, 2005; Segal and Whinston, 2000). I show that exclusive contracts between health insurance companies and employers can increase welfare, supporting the more lenient attitude of antitrust authorities.

The major limitation of the article is that I cannot identify the exact mechanism that drives the variation in prices of high- and low-quality plans. The lower prices for high-quality plans in the firms with exclusive contracts can be driven by a cross-subsidy, where employees in low quality plans subsidize employees in high-quality plans. Alternatively, exclusive contracts can lower the probability of rival insurance company entry and decrease the expected costs of exclusive insurance companies. The lower costs can be transmitted to employers via lower prices. In this article, I broadly define when the subsidization of the high-quality plan increases consumer surplus and makes it optimal for a firm to sign an exclusive contract with an insurer. The question of why exclusive contracts increase consumer surplus for some firms and not for others requires a more specific answer.

9 Appendix

Proof of Proposition 1.

$$\frac{\partial CS}{\partial S} = \frac{\partial CS}{\partial \hat{\theta}} \frac{\partial \hat{\theta}}{\partial S} = (c - a + \hat{\theta}(d - b + e - f))\frac{\partial \hat{\theta}}{\partial S} \tag{12}$$

The subsidy of the high-quality plan increases enrollment in the plan; hence $\frac{\partial \hat{\theta}}{\partial S} < 0$. There are two possible cases for this in a separating equilibrium:
Case I:

$$a - c - 0.5d > 0$$
$$e - 0.5f - b + 0.5d > 0 \tag{13}$$
$$e + 0.5d - 0.5f - b > a - c - 0.5d$$

The change in the consumer surplus increases in b. Maximum b, subject to the constraints in 13, approaches $c - a + d - e - 0.5f$. Then:

$$\begin{aligned}
\frac{\partial \hat{\theta}}{\partial S} &= (c - a + \hat{\theta}(d - b + e - f)) \\
&= (c - a + \hat{\theta}(a - c - 0.5f)) \\
&< (\hat{\theta} - 1)(a - c) \\
&< 0.
\end{aligned} \tag{14}$$

If $\frac{\partial \hat{\theta}}{\partial S} < 0$ then $\frac{\partial CS}{\partial S} > 0$.

Case II

$$a - c - 0.5d < 0$$
$$e - 0.5f - b + 0.5d < 0 \quad (15)$$
$$e + 0.5d - 0.5f - b < a - c - 0.5d.$$

The change in the consumer surplus decreases in c. Minimum c, subject to the constraints 15, approaches $a - d + b - e + 0.5f$. Then:

$$
\begin{aligned}
\frac{\partial \hat{\theta}}{\partial S} &= (c - a + \hat{\theta}(d - b + e - f)) \\
&= (-d + b - e + 0.5f + \hat{\theta}(d - b + e - f)) \\
&< (-0.5d + b - e + 0.5f + \hat{\theta}(0.5d - b + e - 0.5f)) \\
&< (\hat{\theta} - 1)(0.5d - b + e - 0.5f) \\
&< 0.
\end{aligned}
\quad (16)
$$

Therefore for both cases there exist parameters a, b, c, d, e, and f such that $\frac{\partial CS}{\partial S} > 0$.

Proof of Proposition 2. If the high quality plan is infeasible, then even the sickest employee would choose to purchase the low-quality plan:

$$a + b - c - 0.5d < e - 0.5f$$
$$e - 0.5f > 0. \quad (17)$$

The difference in the total consumer surplus if both plans are offered versus only the low-quality plan is:

$$
\begin{aligned}
\Delta CS &= CS(\text{two plans}) - CS(\text{one plan}) \\
&= 0.5\hat{\theta}^2(d - b + e - f) + \hat{\theta}(c - a) + a - c + 0.5b - 0.5d - 0.5e + 0.5f \quad (18) \\
&= (1 - \hat{\theta})(a - c) + 0.5(1 - \hat{\theta}^2)(b - d + f - e).
\end{aligned}
$$

ΔCS is positive if

$$a - c > b - d + f - e. \quad (19)$$

Plugging constraint leads to the following constraints:

$$a - c > b - d + f - e2b - 1.5d < 2e - 1.5f. \quad (20)$$

There exist parameters that satisfy the constraints above if (a - c) is sufficiently larger (b - d). For example, the values a = 0.5, c = 0.1, d = 0.1, d = 0.3, f = 0.2 and e = 0.3 will fit the constraints.

10   Figures and Tables

$P(x)_b$

Figure 1: Insurance Market

Consumer Surplus gained

Consumer Surplus lost

$\hat{P}^L(\beta)$ $P_i^H(\beta)$

Figure 2: Change in Total Consumer Surplus

Consumer Plus adjusted cost

Figure 3: Subsidy with Infeasible High Quality Plan

Table 1: Descriptive Statistics of Firm Level Variables

	Non-Exclusive	Exclusive
Number of employees in establishment	401.15*	164.43
	(1,505.8)	(257.8)
Number of employees nationwide	2,619.5	3,456.8
	(6,079.3)	(7,374.6)
Temporary employees, %	4.74	5.92
	(12.74)	(14.87)
Full time workers, %	79.13	81.99
	(31.34)	(29.55)
35-39 hr/wk workers, %	11.29	11.21
	(25.48)	(25.16)
20-34 hr/wk workers, %	6.66**	4.30
	(13.72)	(9.33)
Less than 20 hr/wk workers, %	2.93	2.51
	(9.57)	(10.31)
Female workers, %	48.53***	43.03
	(28.34)	(29.11)
Less than $5/hr workers, %	2.17	2.64
	(9.92)	(10.22)
$5-7/hr workers, %	11.07	12.01
	(20.97)	(21.63)
$7-10/hr workers, %	20.40	23.31
	(22.98)	(24.94)
$10-15/hr workers, %	28.73	29.77
	(24.38)	(27.18)
More than $15/hr workers, %	37.69***	32.32
	(30.99)	(29.41)
Less than 30 y.o workers, %	30.21	30.43
	(22.98)	(20.95)
30-39 y.o workers, %	29.93	30.30
	(19.94)	(18.62)
40-49 y.o workers, %	24.43	23.95
	(19.11)	(18.54)
More than 50 y.o. workers, %	15.46	15.39
	(17.77)	(18.17)
Union indicator	0.11	0.12
	(0.32)	(0.32)
Age of the firm, years	40.91	41.68
	(36.98)	(38.01)
Turnover rate per year	0.40	0.45
	(0.63)	(0.55)
Number of plans offered	3.15***	2.7

Continued

	(1.8)	(1.29)
N	1,090	145

Note: *, ** and *** indicate statistically significant difference in the means.
Numbers in the brackets are standard errors of the means.

Table 2: Descriptive Statistics of Health Plans

	Non-Exclusive	Exclusive
Premium for single coverage, $	165.78**	161.64
	(41.34)	(49.57)
Premium for family coverage, $	423.94	418.04
	(90.79)	(128.31)
Vision care covered, %	0.58**	0.53
	(0.49)	(0.50)
Dental care covered, %	0.34***	0.20
	(0.47)	(0.40)
Number of employees in a plan	677.62	332.44
	(5840.83)	(2450.12)
Number of active employees in a plan	490.11	271.56
	(3570.34)	(1766.09)
Waiting period, days	15.86***	53.06
	(68.26)	(118.20)
Deductable, $	26.21***	88.11
	(97.48)	(204.89)
Copayment, $	7.91***	9.37
	(3.82)	(3.64)
Coinsurance rate, %	15.81***	18.73
	(7.65)	(7.30)
Indicator that coinsurance rates vary	.85***	.45
	(0.36)	(0.50)
Indicator of maximum out of pocket expense	0.64***	0.72
	(0.48)	(0.45)
HMO plan	0.72***	0.65
	(0.45)	(0.48)
POS plan	0.11	0.11
	(0.31)	(0.32)
PPO Plan	0.16**	0.20
	(0.37)	(0.40)
Indemnity plan	0.01***	0.04
	(0.10)	(0.19)
Actuarial value of a plan	0.80	0.80
	0.08	0.07
N	8,922	413

Note: *, ** and *** indicate statistically significant difference in the means. Numbers in the brackets are standard errors of the means.

Table 3: Price of Quality Estimation

	Single	Family
$Qu\hat{a}lity$	1***	1***
	(.01)	(.02)
Exclusive Provider $\times$ $Qu\hat{a}lity$	-.42**	-.39
	(.2)	(.29)
Constant	2.7	5.86
	(2.64)	(9.11)
R^2	.33	.21
N	9335	9316

Note: *, ** and *** indicate statistical significance at 10%, 5% and 1% level. Standard errors are robust to heteroscedasticity. The standard errors are estimated using a bootstrap procedure with 1000 replications.

Table 4: Means of the Range of Quality

	Range, $ Single	Range, $ Family	Coverage rate, %
Firms with two plans			
Non-Exclusive	22.3	39.2	67.6
Exclusive	26**	48.4**	70.0
N	770	770	578
Firms with three plans			
Non-Exclusive	22.8	43.3	71.3
Exclusive	18	35.2	70.1
N	394	394	293
Firms with four plans			
Non-Exclusive	23.5	45.1	70.5
Exclusive	27.8	53.2	72.4
N	197	197	151
Firms with five plans			
Non-Exclusive	23.9	49.2	73.9
Exclusive	22	42.3	73.1
N	124	124	85

Note: *, ** and *** indicate statistical significance difference between means at 10%, 5% and 1% level. Standard errors are estimated using a bootstrap procedure with 1000 replications robust to heteroscedasticity.

Table 5: Price of Quality for Firms with Two Plans

	Single	Family
$Qu\hat{a}lity$	1.00***	1.00***
	(.13)	(.18)
Exclusive Provider $\times$ $Qu\hat{a}lity$	-.31	-.55
	(.34)	(.61)
Constant	3.2	26.4
	(19.2)	(74.4)
R^2	.18	.09
N	1,259	1,245

Note: *, ** and *** indicate statistical significance at 10%, 5% and 1% level. Standard errors are robust to heteroscedasticity. The standard errors are estimated using a bootstrap procedure with 1000 replications. In the estimation, all firms with more than 2 plans were dropped.

Table 6: Employers Payments for Insurance

	Exclusive		Non-Exclusive	
	Share[a]	Dollars	Share[a]	Dollars
Single Coverage:				
Low-quality plans	.95	153.2	.85	134.1
Average-quality plans	.83	132.5	.83	133.0
High-quality plans	.85	142.4	.76	145.5
Family Coverage:				
Low-quality plans	.71	290.1	.73	307.6
Average-quality plans	.65	270.6	.71	296.8
High-quality plans	.65	295.2	.62	295.9

[*] Share of total premium paid by employers.
A plan that is less than one s.d. below the mean is denoted as low quality; a plan that is more than one s.d. above the mean is denoted as high quality.

Table 7: Employers Payments and Quality of Plans

	Single	Family
$Qu\hat{a}lity$	0.24***	0.13***
	(.01)	(.02)
Exclusive Provider $\times$ $Qu\hat{a}lity$	.09	0.18
	(.15)	(0.31)
Constant	94.85***	237.77***
	(2.36)	(8.32)
R^2	.05	.01
N	9,335	9,316

Note: *, ** and *** indicate statistical significance at 10%, 5% and 1% level. Standard errors are robust to heteroscedasticity. The standard errors are estimated using a bootstrap procedure with 1000 replications.

Table 8: Self-Insured Firms and Exclusive Contracts

	Single	Coverage
$Qu\hat{a}lity$	.96***	.91***
	(.02)	(.04)
Exclusive Provider $\times$ $Qu\hat{a}lity$	-.28*	-.30
	(.17)	(.25)
Self-Insured $\times$ $Qu\hat{a}lity$	-.03	-.03*
	(.02)	(.02)
Const.	8.8***	44.2**
	(2.9)	(17.8)
R^2	.28	.16
N	10,257	10,238

Note: *, ** and *** indicate statistical significance at 10%, 5% and 1% level. Standard errors are robust to heteroscedasticity. The standard errors are estimated using a bootstrap procedure with 1000 replications.

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