The Effect of Narrow Networks of Healthcare Providers on Healthcare Expenditures and Provider Visits: The Role of Selective Contracting

Structured Abstract

The objective of this study was to understand whether narrow network insurance plans have reduced healthcare expenditures and to identify the mechanism by which that reduction occurred. Data were drawn from the 2013 Medical Expenditure Panel Survey. We used two-part models to estimate the effect of narrow networks on expenditures and negative binomial models for visit counts of provider visits and drugs dispensed. We found that enrollees of narrow network plans have $761 lower annual total expenditures than those in plans that cover care outside the network. An upper bound of proportion of the cost savings due to price reductions alone is $675, or 89% of the total cost savings. A lower bound would be $502, or 66% of total cost savings. Narrow network plans do have reduced healthcare expenditures and a substantial amount of that reduction is due to selective contracting practices, not by limiting access to care.

1. INTRODUCTION

Three years after the opening of the Affordable Care Act (ACA) Health Insurance exchanges, one of the first established trends is the re-emergence of restrictive managed care designs (McKinsey, 2014 ). Highly restrictive managed care designs were very popular in the late 1990s and early 2000s but faded in prominence over the past ten to fifteen years. The renewed popularity of restrictive plan designs on the exchange was unexpected and raises questions about the impact of the new incarnation of these designs on cost, access, and satisfaction. This trend has now begun to spread to employer sponsored plans as well. (Gregory, 2017; Japsen, 2017)

The impact of prior iterations of tightly managed plan designs on cost and access was researched extensively during the late 1990s and into the early part of the 2000s (Miller & Luft, 1994a, 1994b, 1997, 2002; Reschovsky, Kemper, & Tu, 2000). Results from a meta-analysis during that time showed comparable quality of care among different insurance types, with lower utilization of hospital and other expensive services (Miller & Luft, 2002). At the same time, managed care plan enrollees did report worse results on many measures of access to care and lower levels of satisfaction. Research into the effects of the recent managed care designs in the ACA exchanges on these same outcomes – costs, access, and satisfaction – is only now beginning.

One limitation of the older literature is that it typically sorted plans into broad categories: indemnity insurance, Preferred Provider Organizations (PPO), Health Maintenance Organizations (HMO), Point of Service (POS) plans. In more modern plan designs, the distinctions between these broad plan classifications have blurred. Thus, the more recent literature has looked attributes of insurance plans, like gatekeeper requirements or differences in cost sharing options, rather than typologies, to understand the impact of managed care on cost (Liang, Phillips, & Wang, 2004).

One attribute that has proven to be quite important in the ACA exchanges is the size and restrictiveness of the insurance plans’ provider network. This is because the ACA provides detailed consumer protections, including prohibitions on health status underwriting, increased standardization of benefits, a maximum limit on out-of-pocket spending, and the elimination of annual and lifetime limits on benefits. These approaches used to form the strategies that insurers used to keep costs under control. Now, insurers turn to provider network restrictions through selective contracting to control costs.

Selective contracting is often referred to as the process of contracting providers into a network. Insurance companies theoretically have a strong bargaining position which they use to negotiate lower prices with healthcare providers. If the providers accept to offer services at the negotiated rates, they will be “selected” into the insurance plans’ network of providers.

Selective contracting often plays a central role in insurance systems that aims to contain costs while maximizing value for consumers and employers, using rules for competition derived from microeconomic principles. Selective contracting has been criticized for a perceived imbalance between the cost savings it delivers -the impact of the primary focus on pushing down provider prices (White, 1999) - while reducing patient satisfaction due to the loss of consumer choice (Bes & van den Berg, 2013).

The process of selective contracting leads to restrictions on provider access for insurance plan enrollees. If enrollees only get reimbursed for providers within the contracted network, we refer to the insurance plans as a “narrow network plan”. If the plan also covers care outside the contracted network, we call them “open network plans”.

Since the opening of the ACA exchanges, the demand for health plans with the most freedom in choosing doctors and hospitals (i.e., open networks) has been declining. Consequently, consumers seeking open network plans find far fewer of those plans offered on the marketplace this year (KHN, 2015). The premium difference between open and narrow networks is substantial – it was $636 annually in 2015 for a single “silver plans”– and is widening rapidly. Insurers argue that the gap in premiums not only results from shifts in demand, but also by the fact the cost of providing coverage is substantially higher for open network plans. Indeed, carriers who discontinued their open network-plans have argued that the cost of the product makes it impossible to affordably price on the exchange (RWJFoundation, 2015).

Narrow network plans may offer value to consumers because lower premiums combined with a network that provides meaningful access might meet enrollee’s needs. Much of the discussion about narrow networks in the ACA exchanges has focused on how narrow the network is and whether it is “adequate” (D. Polsky, Cidav, & Swanson, 2016; D. Polsky, Weiner, J., Zhang, Y., 2017). Few studies have focused on estimating the exact financial effects if limiting provider access. It has been established that narrow network health plans lead to reductions in physician office visits, both for primary care and for specialist care and that spending under the narrow network plan was 25 percent lower (Atwood & Lo Sasso, 2016). But it is not known how much they save exactly in dollars and how this number relates to average premium differences between open and narrow network plans.

Further, little is known regarding how the cost savings are achieved (if there are indeed cost savings). Atwood and Lo Sasso (2016) found that selection of lower cost providers, who on average also tended to provide somewhat fewer services, accounted for 96 percent of the average savings. This is consistent with previous research which established that selective contracting resulted in lower prices (Melnick, Zwanziger, Bamezai, & Pattison, 1992; Wholey, Feldman, & Christianson, 1995; Wickizer & Feldstein, 1995).

Theoretically, there are two key mechanisms by which insurers could use selective contracting to reduce the cost of care. First, selective contracting can focus on prices and contract with providers and hospitals that offer the largest discounts (as discussed above). Second, insurance companies may also consider rewarding efficient “practice style” (Feinglass, Martin, & Sen, 1991; Flocke, Miller, & Crabtree, 2002; Komaromy et al., 1996; Wennberg, 1984). This suggest that insurance companies would not only contract doctors and hospitals that are cheaper, but they would also restrict the networks to providers who are cost conscious in their delivery of care. For example, prescribing cheaper drugs or referring less often to more expensive specialists.

The purpose of this paper is to understand whether narrow network plans have reduced healthcare expenditures and to identify the mechanism by which that reduction occurred.

1. METHODS
   1. Conceptual Model and Hypotheses

Our conceptual model is based on the Anderson Model of Health Care Utilization (Anderson, 1995) which suggests that spending should be a function of three dynamics: predisposing factors (characteristics such as race, age, and health beliefs), enabling factors (e.g. family support, access to health insurance, one's community), and need (representing perceived and actual need for health care services). We expect that individuals will select health plans, including restricted networks, based on expected spending, which should be a function of age, gender, health status, perception of need and value, attitude toward risk and other factors.

Our basic hypothesis is that for enrollees of narrow network plans, total medical care expenditures will be lower due to the plan design. Narrow network plans limit access to high cost providers but are not intended to prevent access to needed care. Thus, if the plans work as intended, spending for outpatient and inpatient services should be reduced by redirecting individuals to lower cost providers and by reducing the frequency of visits, but not reducing the likelihood of visiting any doctor. Therefore, we hypothesize that the effect of narrow networks on visits will be different in terms of having any care: narrow networks should not influence the probability of any visit, unless narrow network plans are restricting access to care. However, if health plans contract with doctors with a less conservative practice style, such as fewer follow-up visits, the number of visits should be reduced. We thus hypothesize that narrow network plans should have no effect on the probability of inpatient and outpatient care, should have a negative effect on the total number of visits, and should reduce total, outpatient, and inpatient expenditures. For prescription drugs, total spending should be reduced though switching patients onto lower cost drugs within a therapeutic class. However, if providers do aggressive medication reconciliation, both the probability any prescription drug and the number of drugs prescribed may be reduced.

In contrast, for emergency department (ED) services, expenditures and both the probability of any utilization and the number of visits should not be affected by the narrow network. ED utilization should be independent of network design and thus should not be significantly related to narrow or open network other than through selection. Therefore, we introduce ED expenditures as the counterfactual. This includes the probability of any expenditures for ED services, the amount of ED expenditures, and the number of visits to the Emergency department.

2.2 Data

Our data source is the Medical Expenditure Panel Survey (MEPS) Household Component, a nationally representative sample of families and individuals (Cardon & Hendel, 2001; J. W. Cohen et al., 1996; S. B. Cohen & Buchmueller, 2006). MEPS collects data on the specific health services that Americans use, how frequently they use them, the cost of those services, and how they are paid for, as well as data on the costs, scope and breadth of health insurance held by and available to U.S. workers (Politi et al., 2016).

We used the 2013 Full Year Consolidated file for our main analysis and the medical conditions file to create a Charlson Comorbidity Index for severity of disease. The MEPS sample included 36,940 observations. We excluded those under age 18 and older than 64 (14,627) and the early retired (483). We also excluded everyone with public insurance (5,881), and those who did not have any private insurance in 2013 (5,124). We also took out the self-employed and those who were self-insured (81). Thus, our sample included everyone between ages 18 and 65 in a private insurance plan (10,714). After deleting those observations for whom we did not have information about their insurance type, our final sample had 7,284 observations.

In our empirical model, our dependent variables are healthcare expenditures, including total expenditures, outpatient, inpatient, drugs, and ED expenditures. The main explanatory variable, “narrow network”, is a binary variable representing whether a plan has restrictions on provider access through limits on care outside the network of providers. The MEPS survey includes questions to determine the respondent’s plan type and whether the person was in a plan that pays for visits to non-plan doctors. Respondents were classified as being in a “narrow network plan” if the plan was:

* HMO used a gatekeeper or had a private plan with a book or list of doctors associated with the health plan.
* The plan did not pay for visits to a doctor who is not associated with the plan without a referral.

Plans that met both criteria were classified as “narrow network”.

The control variables in the empirical model include the “predisposing factors” gender, age and race, “enabling factors” income, education, marital status, and “need” including health status (self-rated and the Charlson Comorbidity index), smoking status (as a proxy for risky behaviors) and self-perceived need. Based on the literature, we expect females, sicker patients (both self-reported and based on the CCI), and those with more education to have significantly higher expenditures. Non-white patients are expected to have lower expenditures We also include covariates for staff-model HMO plans and gatekeeper plans to account for service type; we expect cost savings to be larger among enrollees of more tightly managed plans. We also include an attitudinal variable from MEPS about perceived need. Respondents were asked if they felt they do not need insurance. We expect those who agree to have significantly lower expenditure as they are less likely to incur any health events.

2.3 Analytic Approach

We estimated the effect of narrow networks on expenditures, both overall and within category. We then looked at the effect of narrow networks on the number of visits per expenditure category (or number of drugs dispensed). The regression equation follows:

Yi = β 0 + β1\*Narrow network + β2\*Female + β3\*Smoker + β4\*Married + β5\*CCI + β6\*Health status + β7\*Race + β8\*Region of the U.S. + β9\*Education level + β10\*Age + β6\*Family income + β11Staff-HMO + β12Gatekeeper plan + β13Need Insurance + ε

2.3.1 Expenditures

Our model for expenditures is a two-part model (TPM), since we expected that the probability of incurring any expenditure was independent of the amount of expenditure. In the two-part model, Yi  (above) first entails any expenditures: Pr(y > 0jx) = F(xδ) where x represents the explanatory variables and δ the corresponding parameters to be estimated. In the second part, the model is conditional E(y | y > 0, x) = g(xγ) where x, again, represents the explanatory variables γ represents the parameters to be estimated and g stands for the transformation function.

The second part of the TPM is estimated with a Generalized Linear Model (GLM) since expenditure models have an empirical distribution with positive values and a long tail to the right. For all the expenditures categories, we performed a Modified Park test to identify the distribution of the expenditure data and the coefficient of the conditional variance function to find the appropriate distributional family and link. The test supported the choice for GLM with Poisson family for outpatient, inpatient and drugs expenditure and a gamma family for total and ED expenditure and a log link for all models.

2.3.2 Visits

To estimate the effect of narrow networks on the number of visits, we use negative binomial regressions for all expenditures categories. The negative binomial distribution describes the probabilities of the occurrence of whole numbers greater than or equal to 0 just like the Poisson distribution for count data (Ford, 2016). But, unlike the Poisson distribution, the variance and the mean are not equivalent. The variance of a negative binomial distribution is a function of its mean and the dispersion parameter which is an additional parameter (Ford, 2016). When the data is over dispersed relative to the Poisson distribution, the incidence of zero counts is greater than expected for the Poisson distribution.

We identified the distribution of the counts data by testing a null hypothesis of equidispersion against the alternative of overdispersion and we found significant overdispersion for all expenditure categories: outpatient visits, inpatient visits, drugs count, emergency department visits. Considering the presence of overdispersion, we compared the results of negative binomial regressions with zero-inflated models. A Vuong test of negative binomial versus zero-inflated negative binomial models suggested that the zero-inflation model was not appropriate, and we thus used the negative binomial models to estimate the effect of narrow networks on visits.

3. RESULTS

3.1 Descriptive Statistics

The descriptive statistics are reported in Table 1. Chi squared tests were used to determine a significant difference in the groups for all variables with a significance level of 0.05. We found differences in some population characteristics between those enrolled in narrow network plans and those in open networks. These differences include smoking status, marital status, race, region in the country, years of education, age, and family income. Enrollees in narrow network plans were less likely to smoke and were slightly younger. However, the narrow network enrollees were also more likely to be non-white and were poorer. health status was not significantly related to plan type. This result was found using two different measures of health: self-assessed health status variable and the Charlson Comorbidity index. Directionally, both measures indicate the narrow network plans enrolled less healthy individuals than the open network plans, although neither effect was statistically significant.

3.2 Total Healthcare Expenditures

Table 2 presents the results of the TPM. The first column is the first part of the two-part model (probit) estimating the probability of any expenditure; the second column is the second part of the two-part model (GLM, gamma family, log link) and the third column presents the marginal effects on total cost savings combining the two parts.

As hypothesized, the estimated coefficient for having any expenditure indicated that people in narrow network are 10.3 percent less likely to have any expenditures (β= -.1035, p=.02). The second part of the model had the expected sign (β= -0.179) and was highly significant (p=.004)., Overall, enrollees of narrow network plans had significantly (p=.002) lower total expenditures than enrollees of open network plans. The model estimates individuals in narrow network plans had $761 lower total expenditures than those in open network plans.

Looking at the control variables in the model, as expected, we found that females had significantly higher total expenditures ($1,386, p<.001), as well as patients with worse health conditions (both self-reported and based on the Charlson-Comorbidity Index) and more educated enrollees. We found lower total expenditures for smokers ($749, p<.05). This finding is consistent with the literature that smokers cost less than nonsmokers because smokers die younger and more quickly than never smokers (Barendregt, Bonneux, & van der Maas, 1997; Leu & Schaub, 1983). Compared to whites, patients with any other racial/ethnical background had lower total expenditures.

3.3 Other Expenditures

Table 3 presents the results of our two-part models for the detailed expenditure categories: outpatient, inpatient, emergency department and prescription drugs. The first column is the result of the probit, while the second is the estimated total marginal effect.

There was no significant effect of narrow networks on the probability of any outpatient visit (β= -.0673, p=0.06), but enrollees of narrow network plans had $159 dollars (p <.001) lower expenditures for outpatient care. We also found cost savings for inpatient stays (β=$335 , p=.002) among enrollees of narrow network plans, but again there was no significant effect of narrow networks on the probability of incurring any inpatient stay (β= -.0561, p=0.33). For drugs, narrow networks saved $241 (p<.001) per enrollee and enrollees of those plans were also 9.6 percent less likely to use any drugs (p=0.006). As hypothesized, we found no effect at all on ED: being in a narrow network plan was not significantly associated with lower ED expenditures (-$43.80, p=0.09) and had no effect on the likelihood of any ED visit (β= -.0111, p=0.806).

3.4 Visits

Table 4 reports the results of the negative binomial model estimations of the effect of narrow networks on the number of visits. For outpatient visits, we found that enrollees of narrow network plan have 0.12 fewer visits than enrollees of open network plans (β=-0.1163, p<.01) and they have 0.14 fewer drugs dispensed (β=0.1387, p<.01). However, we found no effect of narrow networks on the number of inpatient stays (β= -.2319, p=0.173) or the number of emergency care visits (β= .0287, p=0.734). Other variables in the model had the expected signs; females consistently had more visits to outpatient doctors, more inpatient stays and used more drugs, as did the sicker enrollees and the higher educated. This is consistent with our hypotheses and the results from the other models.

1. LIMITATIONS

A potential concern in any study looking at the effect of insurance type on expenditures or utilization is the possibility that estimates of the effect of insurance are biased due to self-selection and unobserved heterogeneity—that is, the endogeneity of insurance coverage (T. C. Buchmueller, Grumbach, Kronick, & Kahn, 2005). Selection bias can be a problem for insurance models where individuals have a choice among health plans because a small proportion of enrollees typically account for a large portion of the costs and a sizable minority of enrollees incurs little or no costs (Hellinger & Wong, 2000).

Some previous studies used extensive health status controls and demographic variables to control for the nonrandom assignment of insurance status (De Ridder & De Graeve, 2011) or they compared patients with specific health conditions only (Cutler, McClellan, & Newhouse, 2000). Health status could indeed be expected to be one of the key factors predicting narrow network plan enrollment, however chi square tests showed that both the self-assessed health status variable and the Charlson index were independent of plan selection. Therefore, by controlling for health status, including a Charlson Comorbidity index based on enrollees’ medical conditions and a self-reported health status, plus the other covariates in the model, we have reduced the possibility of the results being due to endogeneity. It is notable that although the health status variables are insignificantly related to narrow network plans, the direction is consistent with adverse selection into the narrow network plan, rather than the converse.

We did try to address potential remaining endogeneity in the models. First, we tried to identify narrow network enrollment with an instrumental variable. Instruments that are correlated with insurance coverage but not with utilization are difficult to find (T. C. Buchmueller et al., 2005; Shen, 2013; Vera-Hernandez, 1999; Woolridge, 2002). Variables that were previously introduced as valid instruments include self-employment status (Meer, 2004), employer decision to offer a narrow network plan (Atwood & Lo Sasso, 2016) and firm size (Hadley & Waidmann, 2006; Pauly, Percy, & Herring, 1999). We tested employer-related instruments such as employer type, employer size, whether the employer offers health insurance, and whether the employer pays for the premium. We found that these candidate instruments did not statistically relate to the predictor of interest: being in a narrow insurance plan.

We then used two-part models to test for endogeneity. If endogeneity had a significant effect on the point estimates, we would expect this effect in both the first and second parts of the TPM. However, the results show significant negative effects in the second parts of the two-part models, but not in all the first parts. . Thus, if there is endogeneity, it would be of a form that doesn’t affect the probability of use of services – only the level – and is also unrelated to the need for emergency care. This seems unlikely.

We also looked at the effect of narrow provider networks on emergency department expenditures. Again, if there were significant unobserved variables associated with both the plan choice and expenditures, it should also be reflected in ED expenditures, where we found insignificant results.

The reason for the limited effect of endogeneity may be that we focus on employer-based insurance. Insurance coverage in this population is often incidental to the employment decision, which reduces the selection effect. Employed individuals are also a relatively homogeneous group, which excludes the very sick, older individuals and the very poor. Indeed, the literature on employer-based health insurance suggests that, conditional on commonly available proxies for health risk, endogeneity bias due to adverse selection within a commercially insured population seems to not be a major problem (Buchmueller, 2006; T. C. Buchmueller et al., 2005).

4. DISCUSSION

In this study, we looked at the effect of narrow networks in employer-based health insurance plans on healthcare expenditures. Our main hypothesis was that for enrollees of narrow network plans, total medical care expenditures would be lower due to the plan design. And indeed, we found that narrow network plans, on average, save $761 per enrollee.

Our first sub-hypothesis was that the effect of narrow network plan savings would be significant for outpatient and inpatient care. And indeed, we found significant cost savings for inpatient and outpatient care. These results were not significant for the first part of the two-part models, however, implying that reduced spending is a consequence of lower prices but not restricted access.

If there is reduced spending for outpatient providers, we would also expect reduced utilization of drugs both through prescribing decisions and tighter formularies associated with more tightly managed plans. Thus, the second sub-hypothesis was that we would find significant reductions in both the number of drugs dispensed and drugs expenditures resulting from a shift to cheaper drugs. The results show that narrow network plans both provide fewer drugs and save money on drugs. This implies that the drug formularies are different than in open network plans, and that they save money. The model for emergency care served as a falsification test. As expected, we found no significant cost savings for ED. This is consistent with the third sub-hypothesis that narrow networks would not influence ED spending because narrow networks should not apply to emergency services.

One remaining question is what proportion of the cost savings associated with narrow networks are due to price reductions versus reductions in utilization (i.e., discounts versus changes in practice style). For inpatient services, the answer is straightforward: all the cost savings are due to price reductions because narrow networks had no effect on either the probability of an inpatient stay or the number of inpatient stays. For outpatient services, the effect is more complicated. Narrow networks had no effect on the probability of a visit but did reduce the number of visits. The median cost of an outpatient visit is $102; a reduction in visits of 0.37 per capita (multiplying the marginal effect by the mean number of visits) suggests costs savings of $37 due to utilization reductions. This represents 23% of the total outpatient cost savings. The mean cost of an outpatient visit is $343, which suggests $127 cost savings due to utilization reductions, or 80% of total cost savings. Combined, this suggests a relatively large range for the proportion of outpatient cost savings due to utilization reductions versus price reductions.

For prescription drugs, the coefficients suggest a 1.04 per capita reduction in the number of drugs (calculated as above). At a median drug cost of $25, this suggests $26 in cost savings due to utilization reductions, or 11% of the total prescription drug savings. At a mean drug cost of $103, the proportion of total cost savings due to reduced utilization would be 44%.

Putting all these numbers together, price reductions were the cause of 100% of the cost savings due to inpatient care, 20%-77% for outpatient care and 56%-89% for prescription drugs. Combined, of the total cost savings $761, an upper bound of the cost savings due to price reductions alone would $675, or 89% of the total cost savings. A lower bound would be $502, or 66% of total cost savings. This suggests that cost savings due to narrow network plans are largely a result of price reductions rather than utilization reductions, although both play a role in cost savings. In other words: narrow network plans do have reduced healthcare expenditures and a substantial amount of that reduction is due to selective contracting practices.

The results suggest that selective contracting does not only focus on redirecting patients to lower cost providers, but it also aims at limiting the number of follow-up visits at those outpatient providers. This leads to the conclusion that providers with a more efficient practice style are more likely to be contracted by narrow network plans.

Looking at average premium differences across the country for narrow and open network plans, our estimate of mean cost savings in narrow plans of $761 per year also suggests that a large proportion of cost savings associated with narrow networks is passed on to consumers in the form of reduced premiums. It also suggests that there is more room for premium reductions in these plans, implying that the premium gap between open and narrow network plans is likely to grow larger over the next several years.

One area that needs further research is the (long-term) health effects resulting from this reduced spending among narrow network plans, as well as patients’ satisfaction with these plans. As mentioned in the introduction, selective contracting is key to any healthcare system reform aiming for cost effective solutions. However, insurance companies need to simultaneously guarantee good quality of care which may be a challenge when cost savings are the key determinant of success.

Future research should also further explore differences in plan attributes and the effect on expenditures. In this respect, the studies from the 1990s need to be updated. We need to understand how the type of provider arrangements provided by plans (exclusive- provider plan; any-provider plan; mixed-provider plan; managed care plan) as well as managed care provisions such as preadmission certification, preadmission testing, non-emergency weekend admission restriction, and second surgical opinion, influence healthcare expenditures as well as access to care and satisfaction of enrollees in more modern designs. Like in the 1990s we need to study what the effect is of growing market shares for narrow network plans on access to care and satisfaction. This way, we can assess if we can expect a similar “managed care backlash”, such as that in the ‘late 1990s.

The results of this study have implications for policymakers who are interested in the question of whether the ACA health insurance exchanges are delivering cost savings and lower premiums. If the policy were designed to stimulate price competition while not limiting access to care, the results of this study suggest that the program is operating in a way that is consistent with that aim.

References

Anderson, R. M. (1995). Revisiting the behavioral model and access to medical care: does it matter? *J Health and Soc Beh, 36*(1), 1-10.

Atwood, A., & Lo Sasso, A. T. (2016). The effect of narrow provider networks on health care use. *Journal of Health Economics, 50*, 86-98. doi:10.1016/j.jhealeco.2016.09.007

Barendregt, J. J., Bonneux, L., & van der Maas, P. J. (1997). The health care costs of smoking. *New England Journal of Medicine, 337*(15), 1052-1057. doi:10.1056/nejm199710093371506

Bes, R. E., & van den Berg, B. (2013). Ranking sources of hospital quality information for orthopedic surgery patients: consequences for the system of managed competition. *Patient, 6*(2), 75-80. doi:10.1007/s40271-013-0011-6

Buchmueller. (2006). Consumer demand for health insurance *NBER Reporter* (pp. 10-13): National Bureau of Economic Research, Inc.

Buchmueller, T. C., Grumbach, K., Kronick, R., & Kahn, J. G. (2005). The effect of health insurance on medical care utilization and implications for insurance expansion: a review of the literature. *Medical Care Research and Review, 62*(1), 3-30. doi:10.1177/1077558704271718

Cardon, J. H., & Hendel, I. (2001). Asymmetric information in health insurance: evidence from the National Medical Expenditure Survey. *Rand Journal of Economics, 32*(3), 408-427.

Cohen, J. W., Monheit, A. C., Beauregard, K. M., Cohen, S. B., Lefkowitz, D. C., Potter, D. E., . . . Arnett, R. H., 3rd. (1996). The Medical Expenditure Panel Survey: a national health information resource. *Inquiry, 33*(4), 373-389.

Cohen, S. B., & Buchmueller, T. (2006). Trends in medical care costs, coverage, use, and access: research findings from the Medical Expenditure Panel Survey. *Medical Care, 44*(5 Suppl), I1-3. doi:10.1097/01.mlr.0000208145.39467.6a

Cutler, D. M., McClellan, M., & Newhouse, J. P. (2000). How does managed care do it? *Rand Journal of Economics, 31*(3), 526-548.

De Ridder, A., & De Graeve, D. (2011). Can we account for selection bias? A comparison between bare metal and drug-eluting stents. *Value in Health, 14*(1), 3-14. doi:<https://doi.org/10.1016/j.jval.2010.10.014>

Feinglass, J., Martin, G., & Sen, A. (1991). The financial effect of physician practice style on hospital resource use. *Health Services Research, 26*(2), 183.

Flocke, S. A., Miller, W. L., & Crabtree, B. (2002). Relationships between physician practice style, patient satisfaction, and attributes of primary care. *Journal of Family Practice, 51*(10), 835-841.

Ford, C. (2016). Getting started with Negative Binomial Regression Modeling. Retrieved from <http://data.library.virginia.edu/getting-started-with-negative-binomial-regression-modeling/>

Gregory, J. (2017). Large employers increasingly turning to narrow networks. Retrieved from <http://www.healthexec.com/topics/care-delivery/large-employers-increasingly-turning-narrow-networks>

Hadley, J., & Waidmann, T. (2006). Health insurance and health at age 65: implications for medical care spending on new Medicare beneficiaries. *Health Services Research, 41*(2), 429-451. doi:10.1111/j.1475-6773.2005.00491.x

Hellinger, F. J., & Wong, H. S. (2000). Selection bias in HMOs: a review of the evidence. *Medical Care Research and Review, 57*(4), 405-439.

Japsen, B. (2017). Employer Plans Join Obamacare In Narrowing Doctor Networks For 2018. Retrieved from <https://www.forbes.com/sites/brucejapsen/2017/08/27/employer-plans-join-obamacare-in-narrowing-doctor-networks-for-2018/#1dc85a383de4>

KHN. (2015). “As HMOs Dominate, Alternatives Become More Expensive.” Retrieved from <http://khn.org/news/as-hmos-dominate-alternatives-become-more-expensive/>

Komaromy, M., Lurie, N., Osmond, D., Vranizan, K., Keane, D., & Bindman, A. B. (1996). Physician practice style and rates of hospitalization for chronic medical conditions. *Medical Care, 34*(6), 594-609.

Leu, R. E., & Schaub, T. (1983). Does smoking increase medical care expenditure? *Social Science and Medicine, 17*(23), 1907-1914.

Liang, S.-Y., Phillips, K. A., & Wang, H.-c. (2004). Selection Bias into Health Plans with Specific Characteristics: A Case Study of Endogeneity of Gatekeeper Requirements and Mammography Utilization. *Health Services and Outcomes Research Methodology, 5*(2), 103-118. doi:10.1007/s10742-005-4303-8

McKinsey. (2014 ). *Exchanges go live:*

*Early trends in exchange dynamics*. Retrieved from

Meer, J. a. R., H.J. (2004). Insurance, Health, and the Utilization of Medical Services. *Elsevier, 58*(9), 1623-1632.

Melnick, G. A., Zwanziger, J., Bamezai, A., & Pattison, R. (1992). The effects of market structure and bargaining position on hospital prices. *Journal of Health Economics, 11*(3), 217-233.

Miller, R. H., & Luft, H. S. (1994a). Managed care plan performance since 1980: a literature analysis. *JAMA, 271*(19), 1512-1519.

Miller, R. H., & Luft, H. S. (1994b). Managed care plans: characteristics, growth, and premium performance. *Annual Review of Public Health, 15*(1), 437-459.

Miller, R. H., & Luft, H. S. (1997). Does managed care lead to better or worse quality of care? *Health Affairs, 16*(5), 7-25.

Miller, R. H., & Luft, H. S. (2002). HMO plan performance update: an analysis of the literature, 1997–2001. *Health Affairs, 21*(4), 63-86.

Pauly, M., Percy, A., & Herring, B. (1999). Individual versus job-based health insurance: weighing the pros and cons. *Health Affairs, 18*(6), 28-44.

Politi, M. C., Barker, A. R., Kaphingst, K. A., McBride, T., Shacham, E., & Kebodeaux, C. S. (2016). Show Me My Health Plans: a study protocol of a randomized trial testing a decision support tool for the federal health insurance marketplace in Missouri. *BMC Health Services Research, 16*(1), 55. doi:10.1186/s12913-016-1314-9

Polsky, D., Cidav, Z., & Swanson, A. (2016). Marketplace Plans With Narrow Physician Networks Feature Lower Monthly Premiums Than Plans With Larger Networks. *Health Affairs, 35*(10), 1842-1848. doi:10.1377/hlthaff.2016.0693

Polsky, D., Weiner, J., Zhang, Y. (2017). Narrow Networks on the Individual Marketplace in 2017. Retrieved from <https://ldi.upenn.edu/brief/narrow-networks-individual-marketplace-2017>

Reschovsky, J. D., Kemper, P., & Tu, H. (2000). Does type of health insurance affect health care use and assessments of care among the privately insured? *Health Services Research, 35*(1 Pt 2), 219.

RWJFoundation. (2015). A new marketplace trend shows a reduced scope of coverage in PPOs that are currently offered

Shen, C. (2013). Determinants of Health Care Decisions: Insurance, Utilization, and Expenditures. *The Review of Economics and Statistics, 95*(1), 142-153.

Vera-Hernandez, A. M. (1999). Duplicate coverage and demand for health care. The case of Catalonia. *Health Economics, 8*(7), 579-598.

Wennberg, J. E. (1984). Dealing with medical practice variations: a proposal for action. *Health Affairs, 3*(2), 6-33.

White, J. (1999). Targets and systems of health care cost control. *Journal of Health Politics, Policy and Law, 24*(4), 653-696.

Wholey, D., Feldman, R., & Christianson, J. B. (1995). The effect of market structure on HMO premiums. *Journal of Health Economics, 14*(1), 81-105.

Wickizer, T. M., & Feldstein, P. J. (1995). The Impact of HMO Competition on Private Health Insurance Premiums, 1985—1992. *Inquiry*, 241-251.

Woolridge, J. M. (2002). Econometric Analysis of Cross Section and Panel Data. *MIT Press*.

Table 1: Summary Statistics

|  |  |  |  |
| --- | --- | --- | --- |
|  | Narrow  Network % (n) | Open  Network % (n) | Total sample (n=7,284) |
| Insurance type |  |  |  |
| Priv (Staff model) HMO | 66.5 (2,301) | 33.5 (1,161) | 47.5 (3,420) |
| Priv gatekeeper plan | 41.2 (446) | 58.8 (636) | 14.9 (1,082) |
| Priv plan with doc list | 24.6 (673) | 75.4 (2,067) | 37.6 (2,740) |
|  |  |  |  |
| Female | 46.5 (1,773) | 53.5 (2,042) | 52.4 (3,815) |
| Smoker \* | 42.6 (327) | 57.4 (440) | 10.5 (767) |
| Married \*\* | 44.9 (1,962) | 55.1 (2,413) | 60.1 (4,375) |
| CCI>0 | 47.6 (181) | 52.4 (199) | 5.2 (380) |
| Health Status |  |  |  |
| Excellent | 47.0 (968) | 53.0 (1,090) | 28.3 (2,058) |
| Very Good | 45.5 (1,262) | 54.5 (1,514) | 38.2 (2,776) |
| Good | 48.8 (932) | 51.2 (977) | 26.2 (1,909) |
| Fair | 47.8 (217) | 52.2 (237) | 6.2 (454) |
| Poor | 46.8 (37) | 53.2 (42) | 1.1 (79) |
| Race/Ethn \*\* |  |  |  |
| Caucasian | 39.1 (1,357) | 60.9 (2,115) | 47.7 (3,472) |
| African-American | 50.9 (584) | 49.1 (563) | 15.8 (1,147) |
| Asian | 52.8 (437) | 47.2 (390) | 11.4 (827) |
| Hispanic | 56.5 (919) | 43.5 (707) | 22.3 (1,626) |
| Other | 58.0 (123) | 42.0 (89) | 2.9 (212) |
| Region country (%) \*\* |  |  |  |
| Northeast | 50.6 (633) | 49.4 (619) | 17.2 (1,252) |
| Midwest | 37.5 (542) | 62.5 (905) | 19.9 (1,447) |
| South | 43.2 (972) | 56.8 (1,277) | 30.9 (2,249) |
| West | 54.5 (1,273) | 45.5 (1,063) | 32.1 (2,336) |
| Education (%) \*\* |  |  |  |
| Less than high school | 57.5 (615) | 42.5 (454) | 14.7 (1,069) |
| High school | 49.3 (597) | 50.7 (613) | 16.7 (1,210) |
| Some College | 44.6 (1.806) | 55.4 (2,245) | 55.8 (4,051) |
| Postgraduate | 41.6 (388) | 58.4 (544) | 12.8 (932) |
| Mean age y (se)\*\* | 40.5 (0.22) | 41.8 (0.20) | 41.2 (0.15) |
| Mean fam income $ (se)\*\* | 85,944 (1,036) | 93,649 (1,007) | 90,031 (724) |
| SAQ: More likely take risks |  |  |  |
| Strongly Disagree | 44.4 (1,140) | 55.6 (1,426) | 39.7 (2,566) |
| Disagree | 45.4 (735) | 54.6 (884) | 25.0 (1,619) |
| Uncertain | 51.2 (545) | 48.8 (519) | 16.4 (1,064) |
| Agree | 48.0 (468) | 52.0 (507) | 15.1 (975) |
| Strongly Agree | 52.2 (129) | 47.8 (118) | 3.8 (247) |
| SAQ: Don’t need insurance |  |  |  |
| Strongly Disagree | 45.7 (1,804) | 54.3 (2,143) | 54.2 (3,947) |
| Disagree | 46.7 (519) | 53.3 (592) | 15.2 (1,111) |
| Uncertain | 47.4 (250) | 52.6 (278) | 7.2 (528) |
| Agree | 49.7 (358) | 50.3 (363) | 9.9 (721) |
| Strongly agree | 52.5 (94) | 47.5 (85) | 2.5 (179) |
| Didn’t answer | 49.5 (395) | 50.5 (403) | 11.0 (798) |
|  |  |  |  |
|  |  |  |  |

\*p<.05 \*\*p<.01 We used two-sample t-tests to test the mean difference between the two groups. Χ2 tests were used to determine a significant difference

Table 2: Effect of Narrow Networks on Total Healthcare Expenditure

|  |  |  |  |
| --- | --- | --- | --- |
|  | Total Expenditure  1st Part probit Coef./stand.err | Total Expenditures 2nd Part GLM  Coef/stand.err. | Total Expenditure combined effect TPM marginal effects |
| Narrow Network plan (1/0) | -0.1035\* | -0.1787\*\* | -761.0431\*\* |
|  | (0.0432) | (0.0618) | (246.0763) |
| Female (1/0) | 0.4417\*\*\* | 0.2867\*\*\* | 1385.6482\*\*\* |
|  | (0.0407) | (0.0585) | (239.4480) |
| Smoker (1/0) | -0.1991\*\* | -0.1610 | -748.8823\* |
|  | (0.0632) | (0.0962) | (380.0398) |
| Married (1/0) | 0.0666 | -0.0873 | -301.6818 |
|  | (0.0451) | 0(.0657) | (258.8591) |
| CCI > 0 | 0.9911\*\*\* | 0.1252 | 1082.2498\* |
|  | (0.1665) | (0.1220) | (486.2127) |
| Health status, ref: Excellent |  |  |  |
| Very good | 0.2028\*\*\* | 0.1400\* | 669.0671\* |
|  | (0.0470) | (0.0721) | (284.8464) |
| Good | 0.3187\*\*\* | 0.6282\*\*\* | 2648.9182\*\*\* |
|  | (0.0546) | (0.0797) | (338.8677) |
| Fair | 0.7358\*\*\* | 1.1709\*\*\* | 5022.1005\*\*\* |
|  | (0.1162) | (0.1248) | (562.3563) |
| Poor | 1.3459\*\* | 2.2491\*\*\* | 9606.2895\*\*\* |
|  | (0.4333) | (0.2622) | (1247.9768) |
| Race/Ethnicity, ref: Caucasian |  |  |  |
| African-American | -0.3332\*\*\* | -0.2734\*\*\* | -1269.0612\*\*\* |
|  | (0.0597) | (0 .0869) | (347.3032) |
| Asian | -0.4136\*\*\* | -0.3732\*\*\* | -1707.6111\*\*\* |
|  | (0.0657) | (0 .0988) | (395.6407) |
| Hispanic | -0.3399\*\*\* | -0.2249\*\*\* | -1083.1954\*\*\* |
|  | (0.0536) | (0 .0792) | (314.6169) |
| Other | -0.0620 | 0.2687 | 1014.3945 |
|  | (0.1201) | (0.1741) | (687.5265) |
| Region, ref: Northeast |  |  |  |
| Midwest | 0.0945 | -.04786 | -130.8095 |
|  | (0.0683) | (0.0948) | (373.4758) |
| South | 0.0106 | -0.1266 | -489.0697 |
|  | (0.0601) | (0.0873) | (344.2492) |
| West | 0.0476 | -0.0715 | -251.2507 |
|  | (0.0606) | (0.0871) | (343.0264) |
| Education, ref: less than Highschool |  |  |  |
| Highschool | -0.0775 | 0.2449\*\* | 912.0654\* |
|  | (0.0653) | (0.1058) | (418.0444) |
| Some college | 0.2126\*\*\* | 0.3404\*\*\* | 1459.0478\*\*\* |
|  | (0.0564) | (0.0887) | (355.7884) |
| Graduate degree | 0.4565\*\*\* | 0.4092\*\*\* | 1874.1133\*\*\* |
|  | (0.0862) | (0.1160) | (464.5929) |
| Age | 0.0079\*\*\* | 0.0114\*\*\* | 49.2529\*\*\* |
|  | (0.0018) | (0.0024) | (9.7905) |
| Family Income | 0.0000 | 0.0000 | 0.0013 |
|  | (0.0000) | (0.000) | (0.0020) |
| Staff-HMO | -0.1480\*\* | -0.0190 | -162.6976 |
|  | (0.0478) | (0.0678) | (266.6433) |
| Gatekeeper plan | 0.0105 | -0.0776 | -297.4881 |
|  | (0.0644) | (0.0862) | (340.0354) |
| SAQ: “I don’t need insurance”, ref: Strongly disagree |  |  |  |
| Disagree | -0.2403\*\*\* | -0.4704\*\*\* | -1984.3463\*\*\* |
|  | (0.0575) | (0.0827) | (339.4299) |
| Uncertain | -0.2380\*\* | -0.2537\*\* | -1134.9725\* |
|  | (0.0739) | (0.1168) | (462.7343) |
| Agree | -0.4346\*\*\* | -0.5493\*\*\* | -2409.6801\*\*\* |
|  | (0.0625) | (0.1054) | (428.2321) |
| Strongly Agree | -0.5494\*\*\* | -0.7381\*\*\* | -3216.9122\*\*\* |
|  | (0.1080) | (0.2040) | (814.1036) |
| Didn’t answer | -0.4673\*\*\* | 0.0570 | -56.3236 |
|  | (0.0619) | (0.0986) | (385.8264) |
| Constant | 0.6136\*\*\* | 7.4397\*\*\* |  |
|  | (0.1108) | (0.1661) |  |
| No. of Obs. | 7255 | 7255 | 7255 |

Table 3: Effect of Narrow Networks on Outpatient, Inpatient, ED, and Drugs Expenditure

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | (2) | |  | (3) |  | (4) |  | (5) |  |
|  | Outpatient Expenditure  1stpart Probit | Outpatient Expenditure 2nd part GLM | | Inpatient Expenditure  1st part Probit | Inpatient Expenditure 2nd part GLM | ED Expenditure  1st part Probit | ED Expenditure  2nd part GLM | Drugs Expenditure 1st part Probit | Drugs  Expenditure 2nd part GLM |
|  |  | |  |  |  |  |  |  |  |
| Narrow | -0.0673 | | -159.1958\*\*\* | -0.0561 | -335.0260\*\* | -0.0111 | -43.8096 | -0.0957\*\* | -241.3487\*\*\* |
| Network | (0.0355) | | (13.9112) | (0.0574) | (108.7152) | (0.0454) | (25.8542) | (0.0346) | (11.1791) |
| Female (1/0) | 0.4599\*\*\* | | 353.4341\*\*\* | 0.4199\*\*\* | 630.5414\*\*\* | 0.0845\* | -0.5721 | 0.3684\*\*\* | -58.6044\*\*\* |
|  | (0.0329) | | (12.3741) | (0.0566) | (103.5934) | (0.0423) | (24.1305) | (0.0322) | (10.5796) |
| Smoker (1/0) | -0.1842\*\*\* | | -86.5988\*\*\* | -0.0280 | -297.3932 | 0.1909\*\* | -0.1609 | -0.0388 | -117.8768\*\*\* |
|  | (0.0538) | | (21.0273) | (0.0891) | (166.1377) | (0.0634) | (34.0220) | (0.0537) | (17.0625) |
| Married (1/0) | 0.0013 | | -23.9081 | 0.1552\*\* | -66.4697 | -0.0273 | -2.6466 | -0.0237 | -258.0001\*\*\* |
|  | (0.0373) | | (14.6125) | (0.0601) | (111.3835) | (0.0468) | (25.9161) | (0.0364) | (11.9496) |
| CCI > 0 | 0.4877\*\*\* | | -89.2804\*\* | 0.0604 | -38.0868 | 0.0972 | 42.6202 | 0.9645\*\*\* | 587.7577\*\*\* |
|  | (0.0873) | | (34.4944) | (0.1137) | (209.8345) | (0.0892) | (48.9978) | (0.0972) | (29.9109) |
| Health Status,  ref: Excellent |  | |  |  |  |  |  |  |  |
| Very Good | 0.2076\*\*\* | | 129.2874\*\*\* | 0.1353 | 98.7846 | 0.1469\*\* | 49.8554 | 0.2370\*\*\* | 181.5095\*\*\* |
|  | (0.0394) | | (15.3804) | (0.0748) | (137.7159) | (0.0567) | (33.7181) | (0.0385) | (12.1878) |
| Good | 0.3597\*\*\* | | 593.6426\*\*\* | 0.3854\*\*\* | 1101.4244\*\*\* | 0.3421\*\*\* | 128.8095\*\*\* | 0.4962\*\*\* | 655.6554\*\*\* |
|  | (0.0451) | | (17.6178) | (0.0771) | (155.9408) | (0.0596) | (35.6838) | (0.0441) | (14.3710) |
| Fair | 0.6886\*\*\* | | 1207.6070\*\*\* | 0.7783\*\*\* | 1781.4770\*\*\* | 0.6885\*\*\* | 234.2444\*\*\* | 0.8784\*\*\* | 1052.4581\*\*\* |
|  | (0.0837) | | (32.5523) | (0.1017) | (205.5953) | (0.0837) | (46.7011) | (0.0816) | (25.7888) |
| Poor | 1.6177\*\*\* | | 2541.5713\*\*\* | 1.5938\*\*\* | 3832.0397\*\*\* | 1.0473\*\*\* | 437.9439\*\*\* | 1.6679\*\*\* | 1804.5290\*\*\* |
|  | (0.3246) | | (125.1291) | (0.1618) | (348.3237) | (0.1553) | (78.4297) | (0.2786) | (86.9721) |
| Race, ref: Caucasian |  | |  |  |  |  |  |  |  |
| African-Amer | -0.3182\*\*\* | | -354.2187\*\*\* | -0.0176 | -63.4791 | -0.0018 | -8.1367 | -0.2799\*\*\* | -373.2224\*\*\* |
|  | (0.0495) | | (19.2033) | (0.0789) | (145.5509) | (0.0606) | (33.2844) | (0.0488) | (15.5557) |
| Asian | -0.2678\*\*\* | | -392.0115\*\*\* | -0.3038\*\* | -490.9204\* | -0.3437\*\*\* | -103.6825\* | -0.4322\*\*\* | -384.6806\*\*\* |
|  | (0.0546) | | (21.3020) | (0.1064) | (196.4686) | (0.0850) | (51.0857) | (0.0534) | (16.8034) |
| Hispanic | -0.1958\*\*\* | | -402.3283\*\*\* | -0.0145 | 41.2624 | -0.1079 | -6.4120 | -0.3088\*\*\* | -567.6527\*\*\* |
|  | (0.0447) | | (17.5598) | (0.0714) | (131.7496) | (0.0572) | (31.9479) | (0.0436) | (14.4355) |
| Other | -0.0136 | | 204.9618\*\*\* | 0.1039 | 853.2216\*\* | 0.0797 | 53.1591 | -0.0894 | -184.6361\*\*\* |
|  | (0.0985) | | (38.6189) | (0.1521) | (289.8716) | (0.1186) | (64.4146) | (0.0953) | (30.2673) |
| Region, ref: Northeast |  | |  |  |  |  |  |  |  |
| Midwest | -0.0337 | | 49.9736\* | 0.1137 | -55.4273 | 0.0271 | 19.0626 | 0.1877\*\*\* | 22.7086 |
|  | (0.0550) | | (21.5412) | (0.0874) | (161.6998) | (0.0688) | (38.3167) | (0.0530) | (16.7957) |
| South | -0.0149 | | -44.9320\* | 0.0772 | -286.6409 | 0.0618 | 43.4489 | 0.1800\*\*\* | -263.0672\*\*\* |
|  | (0.0499) | | (19.5482) | (0.0813) | (153.0460) | (0.0627) | (35.3104) | (0.0482) | (15.9556) |
| West | -0.0725 | | -65.3020\*\*\* | 0.0517 | -87.1894 | 0.0041 | 42.4474 | 0.1163\* | -256.0469\*\*\* |
|  | (0.0502) | | (19.6233) | (0.0833) | (154.0467) | (0.0650) | (37.2905) | (0.0485) | (15.9065) |
| Education: < Highschool |  | |  |  |  |  |  |  |  |
| Highschool | -0.0374 | | 156.1759\*\*\* | 0.1032 | 887.4185\*\*\* | 0.0008 | 72.8263 | 0.0009 | 177.1498\*\*\* |
|  | (0.0574) | | (22.5772) | (0.1013) | (199.5918) | (0.0733) | (41.7523) | (0.0574) | (18.3423) |
| Some college | 0.1547\*\* | | 336.5835\*\*\* | 0.2304\*\* | 762.0709\*\*\* | 0.0514 | 56.1021 | 0.1457\*\* | 306.9176\*\*\* |
|  | (0.0487) | | (19.1223) | (0.0860) | (165.2462) | (0.0621) | (34.2773) | (0.0483) | (15.5453) |
| Graduate | 0.2818\*\*\* | | 580.8666\*\*\* | 0.3348\*\* | 801.1364\*\*\* | -0.0899 | 20.1997 | 0.1608\* | 283.8117\*\*\* |
|  | (0.0674) | | (26.4673) | (0.1113) | (209.0447) | (0.0898) | (52.4728) | (0.0651) | (20.7385) |
| Age | 0.0103\*\*\* | | 14.7617\*\*\* | -0.0065\*\* | -5.7765 | -0.0059\*\*\* | -0.2414 | 0.0136\*\*\* | 23.0336\*\*\* |
|  | (0.0014) | | (0.5596) | (0.0023) | (4.2471) | (0.0018) | (1.0104) | (0.0014) | (0.4709) |
| Family Inc. | 0.0000 | | 0.0002 | -0.0000 | 0.0004 | -0.0000\* | -0.0001 | -0.0000 | -0.0003\*\*\* |
|  | (0.0000) | | (0.0001) | (0.0000) | (0.0009) | (0.0000) | (0.0002) | (0.0000) | (0.0001) |
| Staff-HMO | -0.0325 | | -127.4104\*\*\* | 0.0593 | -46.1169 | 0.0085 | 39.8163 | -0.0739 | 52.0913\*\*\* |
|  | (0.0389) | | (15.2513) | (0.0625) | (115.6008) | (0.0496) | (28.1084) | (0.0380) | (12.1067) |
| Gatekeeper | 0.0444 | | -54.9894\*\* | -0.0430 | -269.3078 | -0.0220 | 19.5430 | 0.0064 | 49.6182\*\* |
|  | (0.0511) | | (20.0300) | (0.0833) | (155.0006) | (0.0642) | (36.3050) | (0.0495) | (15.6858) |
| SAQ: “I don’t need Insurance”, ref. Strongly Disagree |  | |  |  |  |  |  |  |  |
| Disagree | -0.2543\*\*\* | | -483.6081\*\*\* | -0.2000\* | -553.9089\*\*\* | -0.0955 | -83.4893\* | -0.2445\*\*\* | -667.4602\*\*\* |
|  | (0.0466) | | (18.2928) | (0.0839) | (157.8205) | (0.0613) | (35.0809) | (0.0454) | (15.5161) |
| Uncertain | -0.3430\*\*\* | | -536.7195\*\*\* | -0.0742 | 98.8400 | -0.1039 | -68.3397 | -0.2411\*\*\* | -394.6975\*\*\* |
|  | (0.0621) | | (24.2920) | (0.1122) | (207.4508) | (0.0849) | (47.7636) | (0.0617) | (19.7693) |
| Agree | -0.5141\*\*\* | | -685.4086\*\*\* | -0.2083 | -290.0212 | -0.4327\*\*\* | -175.0332\*\* | -0.4810\*\*\* | -945.4696\*\*\* |
|  | (0.0542) | | (20.9963) | (0.1083) | (199.5038) | (0.0890) | (56.9043) | (0.0542) | (18.5968) |
| Strongly Agree | -0.5060\*\*\* | | -1144.6123\*\*\* | -0.2145 | -956.9905\* | -0.2972 | -232.4337\* | -0.4121\*\*\* | -418.6329\*\*\* |
|  | (0.1009) | | (40.0237) | (0.2058) | (384.6172) | (0.1559) | (94.5169) | (0.1017) | (32.3116) |
| Didn’t answer | -0.4537\*\*\* | | -363.2094\*\*\* | 0.0607 | 255.1874 | -0.0224 | -32.1684 | -0.4210\*\*\* | 316.7059\*\*\* |
|  | (0.0529) | | (20.3196) | (0.0841) | (156.2563) | (0.0691) | (39.7918) | (0.0525) | (18.0766) |
| Constant | -0.0769 | |  | -2.1006\*\*\* |  | -1.1715\*\*\* |  | -0.5664\*\*\* |  |
|  | (0.0928) | |  | (0.1648) |  | (0.1213) |  | (0.0915) |  |
| No. of Obs. | 7255 | | 7255 | 7255 | 7255 | 7255 | 7255 | 7255 | 7255 |
|  |  | |  |  |  |  |  |  |  |
|  |  | |  |  |  |  |  | *Standard errors in brackets \*p<.05 \*\*p<.01 \*\*\* p<.001* |  |

Table 4: Effect of Narrow Networks on Healthcare Visits

*\*p<.05 \*\*p<.01 \*\*\* p<.001*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | (1) | (2) | (3) | (4) |
|  | Outpatient Visits | Inpatient Visits | ED visits | RX count |
|  | Coef./std.errors | Coef./std.errors | Coef./std.errors | Coef./std.errors |
|  |  |  |  |  |
| Narrow Network (1/0) | -0.1163\*\*\* | -0.2319 | 0.0287 | -0.1387\*\* |
|  | (0.0324) | (0.1703) | (0.0844) | (0.0422) |
| Female (1/0) | 0.4720\*\*\* | 1.1509\*\*\* | 0.1702\* | 0.3766\*\*\* |
|  | (0.0301) | (0.1836) | (0.0793) | (0.0398) |
| Smoker (1/0) | -0.0609 | 0.1020 | 0.3291\*\* | -0.0188 |
|  | (0.0495) | (0.2780) | (0.1142) | (0.0648) |
| Married (1/0) | 0.0153 | 0.0014 | -0.0692 | -0.0967\* |
|  | (0.0336) | (0.1892) | (0.0867) | (0.0449) |
| CCI > 0 | 0.2030\*\* | 0.2175 | 0.1479 | 0.7842\*\*\* |
|  | (0.0649) | (0.3680) | (0.1632) | (0.0868) |
| Health status, ref: Excellent |  |  |  |  |
| Very Good | 0.3059\*\*\* | 0.3740 | 0.4414\*\*\* | 0.4159\*\*\* |
|  | (0.0379) | (0.2097) | (0.1131) | (0.0496) |
| Good | 0.5830\*\*\* | 1.3364\*\*\* | 0.7981\*\*\* | 0.8688\*\*\* |
|  | (0.0412) | (0.2338) | (0.1166) | (0.0548) |
| Fair | 1.1246\*\*\* | 2.5218\*\*\* | 1.3637\*\*\* | 1.3882\*\*\* |
|  | (0.0635) | (0.3440) | (0.1532) | (0.0868) |
| Poor | 1.7409\*\*\* | 3.8097\*\*\* | 1.9538\*\*\* | 1.9384\*\*\* |
|  | (0.1307) | (0.6859) | (0.2546) | (0.1847) |
| Race, ref: Caucasian |  |  |  |  |
| African-American | -0.3776\*\*\* | 0.1012 | -0.0136 | -0.4076\*\*\* |
|  | (0.0451) | (0.2448) | (0.1107) | (0.0591) |
| Asian | -0.3670\*\*\* | -0.6132\* | -0.6698\*\*\* | -0.6366\*\*\* |
|  | (0.0515) | (0.2964) | (0.1697) | (0.0689) |
| Hispanic | -0.2279\*\*\* | 0.2237 | -0.1842 | -0.5253\*\*\* |
|  | (0.0406) | (0.2226) | (0.1065) | (0.0530) |
| Other | 0.0553 | 0.7692 | -0.0071 | -0.0442 |
|  | (0.0886) | (0.4747) | (0.2280) | (0.1190) |
| Region, ref: Northeast |  |  |  |  |
| Midwest | -0.1117\* | 0.0512 | 0.0811 | 0.1907\*\* |
|  | (0.0488) | (0.2840) | (0.1277) | (0.0648) |
| South | -0.0766 | -0.0295 | 0.1011 | 0.2076\*\*\* |
|  | (0.0445) | (0.2560) | (0.1168) | (0.0598) |
| West | -0.0444 | -0.2055 | -0.0011 | -0.0237 |
|  | (0.0448) | (0.2513) | (0.1222) | (0.0602) |
| Education, ref: < Highschool |  |  |  |  |
| Highschool | 0.0403 | 0.6047\* | 0.0765 | -0.0974 |
|  | (0.0552) | (0.3042) | (0.1377) | (0.0705) |
| Some College | 0.3144\*\*\* | 0.5745\* | 0.1920 | 0.0225 |
|  | (0.0460) | (0.2643) | (0.1174) | (0.0594) |
| Graduate degree | 0.4612\*\*\* | 0.9023\* | -0.0684 | -0.0912 |
|  | (0.0602) | (0.3556) | (0.1726) | (0.0798) |
| Age | 0.0086\*\*\* | -0.0117 | -0.0104\*\* | 0.0337\*\*\* |
|  | (0.0012) | (0.0073) | (0.0034) | (0.0017) |
| Staff-HMO (1/0) | -0.1002\*\* | 0.2082 | 0.0460 | -0.1047\* |
|  | (0.0353) | (0.1939) | (0.0923) | (0.0460) |
| Gatekeeper plan (1/0) | -0.0578 | -0.0734 | -0.0087 | -0.0558 |
|  | (0.0452) | (0.2527) | (0.1207) | (0.0601) |
| SAQ: “Don’t need ins”, ref: Strongly disagree |  |  |  |  |
| Disagree | -0.2940\*\*\* | -0.6989\*\* | -0.2222 | -0.3905\*\*\* |
|  | (0.0434) | (0.2419) | (0.1163) | (0.0576) |
| Uncertain | -0.3849\*\*\* | 0.4517 | -0.2379 | -0.4455\*\*\* |
|  | (0.0615) | (0.3273) | (0.1617) | (0.0811) |
| Agree | -0.6400\*\*\* | -0.4485 | -0.7134\*\*\* | -0.8492\*\*\* |
|  | (0.0560) | (0.3011) | (0.1716) | (0.0725) |
| Strongly agree | -0.6565\*\*\* | -0.5569 | -0.5254 | -0.8342\*\*\* |
|  | (0.1060) | (0.5524) | (0.3047) | (0.1325) |
| Didn’t answer | -0.3996\*\*\* | 0.2862 | -0.0912 | -0.3592\*\*\* |
|  | (0.0510) | (0.2601) | (0.1308) | (0.0662) |
| Constant | 0.3175\*\*\* | -3.3403\*\*\* | -2.0915\*\*\* | 0.1282 |
|  | (0.0869) | (0.5020) | (0.2321) | (0.1163) |
| No. of Obs. | 7255 | 7255 | 7255 | 7255 |