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Individual Health Insurance within the Family: Can Subsidies Promote Family Coverage?

This paper examines the role of price in health insurance coverage decisions within the family to guide policy in promoting whole family coverage. We analyze the factors that affect individual health insurance coverage among families, and explore family decisions about whom to cover and whom to leave uninsured. The analysis uses household data from California combined with abstracted individual health plan benefit and premium data. We find that premium subsidies for individual insurance would increase family coverage; however, their effect likely would be small relative to their implementation cost.

Almost 47 million Americans are uninsured (DeNavas-Walt, Proctor, and Lee 2006). In addition, another 20 million insured Americans belong to families that include an uninsured family member and may be affected by the lack of coverage within the family (IOM 2002). Recent analyses by the Institute of Medicine (IOM) underscore the importance of insuring all family members, and demonstrate that the presence of an uninsured family member can have adverse consequences even for insured members (IOM 2002).

The IOM reports that parents’ use of health services is a strong predictor of their children’s use of care, and that the health of one family member is related to that of others. A parent’s health, particularly a mother’s mental health, is associated with child health and development (Hammen et al. 1987; Downey and Coyne 1990). Similarly, poor child health may be related to parental health (Walker, Van Slyke, and Newbrough 1992). These findings are not contingent on health insurance status.

While the results from these studies suggest a strong association among family members’ health, whether causality exists is unclear (Levy and Melzter 2004). Even so, these findings, coupled with the extensive literature that has aimed to demonstrate that having health insurance or using more medical care improves health, substantiate the importance of providing health insurance for the entire family (Hadley 2003). Other research has examined the importance of whole family coverage and the interaction within families in use of the health system. Children are more likely to get needed care when the family is all enrolled in one health plan since parents know how to use the plan (Neuschler and Curtis 2001). Furthermore, parents’ experi-
ences with the health care system are an important predictor of children’s use of care (Hanson 1998; Newacheck and Halfon 1986).

These considerations suggest that policymakers need to look for opportunities to expand partial insurance into whole family insurance to improve health and access to health care for both insured and uninsured members of these families. Recent trends and policies, as well as new proposals, might alter decisions about coverage within the family. Tax credits for individual insurance increasingly have become the focus of policy initiatives to expand insurance. By lowering the cost of covering additional members, tax credits also may promote whole family coverage. Given that the individual health insurance market likely will be a continued focus for insurance policy in the coming years, it is important to understand family decisions of coverage within this market.

Designing policies to promote whole family coverage requires information about the factors that affect decisions to partially insure members, and how partially insured families choose which members to cover. Some limited descriptive analyses have revealed that single-parent families, low-income families, and Hispanic families are more likely to partially insure than other families (IOM 2002). The partially insured are more likely to have younger children and younger parents, less educated parents, and family members in poorer health (Hanson 2001). The role of the price of individual health insurance in family decisions—the main lever by which policymakers can influence this decision—has received limited investigation. Blumberg and Nichols (2000) found that the amount paid for family coverage was significantly related to decisions of workers to enroll family members in an individual health insurance plan. The estimated elasticity, however, was only about −.2 (Blumberg and Nichols 2000).

The aim of this paper is to add to our knowledge about decision making within the family to help in formulating policies to promote whole family coverage. We examine the family decision to purchase individual health insurance, and the decision about whom to cover and whom to leave uninsured. A significant share of those who purchase their coverage in the individual market do not cover all family members. Based on our tabulations of data from the 2002 Current Population Survey (CPS), 20% of families who purchase individual insurance do not obtain it for all family members, and about 80% of these families leave some family members uninsured. The lack of whole family coverage is even greater among low-income families purchasing insurance in the individual market; over 25% of these families do not obtain individual coverage for all family members, and almost 80% leave some family members uninsured. Understanding the effect of price on individual health insurance coverage within the family, and the role of price subsidies for adults and for children in promoting whole family coverage, is important in designing and evaluating future policy.

Conceptual Framework

Our analysis is based on the random utility model of consumer choice (McFadden 1974). Families choose a distribution of health insurance coverage, based on their available choice set, that maximizes their expected utility. Under certain assumptions, this framework yields a multinomial logit specification of family health insurance choice.¹ Our framework emphasizes the type of family individual health insurance coverage (partial or full), while allowing for families to choose public insurance, group insurance, or to remain uninsured. Our multinomial logit framework allows for six mutually exclusive choices. If families purchase any individual health insurance, they are classified in the following three categories: 1) purchase individual health insurance, and cover the entire family; 2) purchase individual health insurance, but leave some or all children uninsured; or 3) purchase individual health insurance, but leave only adults uninsured. Families that do not purchase any individual health insurance are classified as: 4) covered by some group health insurance; 5) covered by some public insurance, but no group insurance; and 6) all family members uninsured.² Our primary interest in this paper is in examining the effect of insurance price and
other factors on coverage choices within the individual market (categories 1 to 3). We include categories 4 to 6 in order to classify families that do not choose the individual market.

Individual health insurance policies are priced on the basis of family composition and the number of covered members. Policies generally are priced for the policyholder only, policyholder and spouse, policyholder and one child, policyholder and more than one child, and for the family.3 The pricing structure for individual health insurance closely matches the family composition and there are generally cost consequences of insuring each marginal family member.4 The key variable of interest is the price of individual health insurance coverage. The health insurance premium is a natural measure of the price; however, the premium must be adjusted for the benefit package. Benefits determine the expected payout of the health insurance policy, and therefore the price should be calculated after controlling for the benefit package (Chernew and Hirth 2004).5

Health insurance coverage for the family is likely to be affected by the same factors that affect health insurance coverage at the individual level. We hypothesize that a higher price of coverage for an adult or a child in the individual market will increase the probability that all family members are left uninsured, and reduce the probability that the family will have individual health insurance. Conditional on purchasing some individual health insurance, a higher adult price will increase the probability of leaving adults uninsured, and reduce whole family coverage. Similarly, a higher price of coverage for a child should increase the probability of leaving children uninsured.

We also expect factors that measure preferences for health care to affect family health insurance choice. In particular, we would expect the demographic composition of the family, family health, education, and income to affect choice. Older adults have higher expected health costs, and therefore should choose to cover themselves. Being older may be associated with different preferences for one’s own health in comparison with one’s children’s health. Older parents may be expected to shift resources to cover themselves rather than to cover children. However, if older parents are more aware of the importance of health coverage and have experience with the health care system, they may be more likely to value whole family coverage (Hanson 2001; Marquis et al. 2004).

Families in worse health should have a higher demand for health insurance, and in particular, should choose to cover the family members in worse health. However, insurers’ underwriting practices may lead to higher prices and exclusions for families in poor health (Pollitz, Sorian, and Thomas 2001); therefore, these families may be screened out of the individual health insurance market despite having a high demand for coverage.

Families with higher income should be more likely to choose whole family coverage within the individual market, since these families are more likely to be able to afford higher premiums and have more to lose if they have a high-cost adverse health event while uninsured (IOM 2002). Families with educated adults may be better informed about the benefits of whole family coverage, and therefore may be more likely to cover all family members (Hanson 2001). Higher educated individuals may be more forward-looking and better at planning for the future. These preferences may result in individuals with higher education being more likely to demand preventive care and regular health evaluations, and hence have a higher demand for health insurance. In addition, individuals with higher education may be more efficient at investing in their health (Grossman 1997; Currie and Madrian 1999). If health insurance is complementary to health investments, higher educated individuals may be more likely to purchase health insurance than individuals with lower education.

Data and Methods

Data

The data for our study come from several sources: the CPS, the Survey of Income and Program Participation (SIPP), and our abstracted health insurance plan database obtained from brochures and other information
from the three largest carriers selling individual insurance in California.

We use data from the March CPS for the years 1996–2002 and from cross-section snapshots of people in the 1996 SIPP panel collected annually in March over a four-year period. The CPS is a monthly survey of about 50,000 households conducted by the Bureau of the Census for the Bureau of Labor Statistics. A supplement to the CPS administered in March of each year includes questions on health insurance coverage for each family member. The SIPP is a longitudinal survey conducted by the Bureau of the Census to gather information about the economic and demographic characteristics of the U.S. population. The 1996 panel was surveyed over the period 1996–1999; respondents were interviewed at four-month intervals.

We limit our sample to a single state, California, because cooperation from insurers was necessary to obtain detailed information about the benefits and premiums of plans offered over time. We need to observe decisions among families who face different premiums in order to estimate how decisions are affected by premiums. California is good for our study because it is a large state with in-state variation in the premiums charged. There was also a significant restructuring of some plans that occurred in January 2001, altering the characteristics of plans and the premiums facing consumers in their decisions. Therefore, we use data that reflect decisions made by consumers before and after this time.

The study abstracted detailed benefit and premium information about all individual and family health insurance products offered by the three participating carriers in California over the 1996–2002 period. About 80% of subscribers in the individual market in California enroll in one of the products included in the study. The abstracted benefit data describe deductibles, coinsurance or copayment amounts, and maximum payments for a wide range of inpatient and outpatient health care services. There were 78 different health products offered during the study period. The products offered by a carrier varied over time; the number of products offered per carrier per year ranged from one to 19. Variation in the product slate over time means that prices and product characteristics vary independently and vary across consumers in our database. In addition, geographic variation in prices provides additional variation in relative product prices. The average deductible in real dollars was $1,000, ranging from $0 to $4,300. One-fifth of the plans were health maintenance organizations (HMOs), 92% included drug benefits, and 50% covered mental health. The vast majority of plans specified an out-of-pocket maximum, which averaged $3,700 among plans with a maximum. The Actuarial Research Corporation (ARC) used the abstracted benefit data to develop measures of the actuarial value of each individual health insurance policy by simulating what the plan would pay for the health care services incurred by each person in a standardized population. The average payout (a single number for each plan) is the actuarial value.

Insurer price files provide information on premiums by age of subscriber, type of family enrolled, and geographic pricing area. Premiums were linked to respondents in the surveys based on the age of the subscriber (or family head), time, and the county of residence. We linked premiums for all plans offered at the time of enrollment to the subscribers. Premiums for individual coverage are converted to “prices” by adjusting for the actuarial value of benefits and for the price of medical care in the area, so they are a price per unit of benefit. The actuarially adjusted premium controls for variation in premiums that is due to quantity variation rather than variation in the price per unit of quantity. The mean marginal adult premium was $141 per month, and ranged from $37 to $1,144 per month, depending on the plan, age of subscriber, and pricing area. The mean marginal child premium was $53 per month.

The study also measures premiums relative to the price of all other goods and services, since economic theory suggests that demand depends on this relative price. The price of medical care is based on the Medicare geographic practice cost index (for cross-section variation) adjusted by the consumer...
Table 1. Distribution of family insurance coverage choices, 1996–2002

<table>
<thead>
<tr>
<th>Sample: California families</th>
</tr>
</thead>
<tbody>
<tr>
<td>Families with individual insurance (%)</td>
</tr>
<tr>
<td>All family members insured (%)</td>
</tr>
<tr>
<td>Some children uninsured (%)</td>
</tr>
<tr>
<td>Only adults uninsured (%)</td>
</tr>
<tr>
<td>Total (preceding 3 rows) (%)</td>
</tr>
<tr>
<td>Number of families with individual insurance</td>
</tr>
<tr>
<td>Families with some group insurance (%)</td>
</tr>
<tr>
<td>Families with some public insurance (%)</td>
</tr>
<tr>
<td>Families with all uninsured members (%)</td>
</tr>
<tr>
<td>Total (sum of top row and preceding 3 rows) (%)</td>
</tr>
<tr>
<td>Total number of families</td>
</tr>
</tbody>
</table>


Note: Families are those with two or more related individuals.

price index (CPI) for Los Angeles over time.\textsuperscript{11} The cost of other goods and services is based on wages (for cross-section variation) adjusted by the CPI for Los Angeles over time.\textsuperscript{12} The cross-section wage index is based on occupational employment statistics collected by the Bureau of Labor Statistics.\textsuperscript{13} The price for individual coverage is measured after tax, by taking into account the share of premiums that are deductible for the self-employed. Marginal tax rates for each family were estimated using the National Bureau of Economic Research TAXSIM model (Feenberg and Coutts 1993).

Methods

In our analysis, families are defined as units that include some children and either one or two parents.\textsuperscript{14} We fit multinomial logit models to examine family decisions. The decision categories and the distribution of the sample is shown in Table 1; about 5% of families purchase some individual coverage, 64% do not purchase individual coverage but have group coverage, 17% are in public programs and have no private insurance, and 14% of families are completely uninsured. For families purchasing individual coverage for at least some family member, we examine the decision to cover all family members, to leave some children uninsured, or to leave only adults in the family uninsured. Nearly all families that purchase individual health insurance for one child cover all children on the same policy. In families with some children covered by individual health insurance, less than 1% of families leave other children uninsured or cover them using public coverage or employer coverage. In 36% of families with some children uninsured, an adult in the family is uninsured as well. If some family members are covered by public insurance and all others are insured by the private plan, the family is considered to cover all family members.\textsuperscript{15}

Even though our overall sample is relatively large (N=17,500), the subsample of families with individual insurance becomes much smaller (N=882). As a result, we have relatively few cases where families with individual insurance leave some children uninsured (N=71) or leave only adults uninsured (N=45).\textsuperscript{16}

The primary variable of interest in our models is the price paid for individual health insurance. Actual prices paid for individual health insurance are inherently endogenous because of insurer underwriting and pricing practices. In addition, the benefit package offered to a potential subscriber may be endogenous as well because insurers may choose to selectively sell policies to some consumers. A structural model of prices, benefits, and take-up is necessary to estimate all the endogenous linkages in the health insurance market (Blumberg and Nichols 2000). However, a structural model requires access to variables that determine insurance offers and prices but not individual demand preferences, and often places relatively strong
assumptions on the model. Since we do not have the necessary identifying variables to estimate a structural model, we employ an approach that uses imputed prices based on a price list that measures the expected premium rather than the actual premium paid (Marquis and Long 1995).\textsuperscript{17} Since the premium used is based on a price list, it is exogenous to the individual purchaser, and is based on an expected or minimum price for a standardized benefit package for similar purchasers given residence, age, and time. Premium variability may stem from variations in the cost of providing health care across county, managed care penetration, practice variations, and plan competition. These sources of variation are exogenous to the individual consumer, and therefore provide valid sources of identification.\textsuperscript{18} The premium for the chosen policy and the chosen benefit package is not included in the model (and is not observed in our data) because it is endogenous. As noted earlier, our data also have some exogenous variation in premiums as a result of significant restructuring of some plans that occurred in January 2001.\textsuperscript{19}

We fit our model to the sample of families in California for whom we have measures of premiums based on insurer price lists.\textsuperscript{20} Actuarial adjustment enables us to standardize benefits across plans; therefore, we select the plan with the minimum single premium after adjusting for differences in plan generosity and benefit structure.\textsuperscript{21} We include measures of the individual monthly market price for an adult and the price for a (additional) child in our models. Prices entered in the model are logarithmically transformed. Prices for insuring an additional adult (a spouse) and for insuring a family are highly correlated with the adult price \((r = .9)\), but the price of insuring a child is not as highly correlated \((r = .3)\), and therefore there is enough variation to include both adult and child price measures. Furthermore, in order to examine the effect of price on leaving adults uninsured versus leaving children uninsured (two of the options in the multinomial logit model), it is necessary to have separate price measures for adults and for children. We explore the sensitivity of our results to alternative measures of price later when we discuss specification checks. We chose the minimum cost plan to measure individual plan prices since this measure is most likely to be appropriate in a model with full information, and is close to the uninsured reservation price. If search costs are low, we expect that the cheapest plan available will be similar to the plan that meets the uninsured reservation price.

Offer premiums also may vary by health status; insurers set different prices depending on health status of applicants and, in some cases, may refuse to accept applicants for coverage for certain policies. In a hypothetical case study of consumers with health problems, one-third were denied individual coverage and only 10\% were offered coverage without a price mark-up or benefit limitations. However, there was wide variation between insurers—consumers who were offered marked up premiums or reduced benefits at one insurer often were offered a standard policy by another insurer (Pollitz, Sorian, and Thomas 1991).\textsuperscript{22} Moreover, a recent survey of insurers’ actual experience suggested that about 80\% of applicants are offered a standard policy at standard prices (Musco and Wildsmith 2004). Premium mark-ups due to health status are not part of our premium measure. However, the participating carriers provided us information about the pricing tier for actual enrollees—and the vast majority of enrollees pay the base price for coverage. This suggests that many potential purchasers can find coverage at the base price for a policy. Nonetheless, for some individuals, health status may be correlated with the difference between the actual offer price and our proxy measure. To control for the bias that this may impart to our estimate of price response, we also include controls for health status of family members.\textsuperscript{23}

County of residence is required to link premium information to families. However, county is not available on the SIPP public use files, and to avoid disclosure is restricted on the CPS public use files to residents of large counties. To merge in the price data, therefore, we were required to access restricted files at the census data center. For these analyses, we pooled the SIPP and CPS data available at
Table 2. Sample means by insurance category (combined CPS and SIPP data)

<table>
<thead>
<tr>
<th>Demographics</th>
<th>All insured</th>
<th>Some children</th>
<th>Only adults</th>
<th>Group insurance</th>
<th>Public insurance</th>
<th>All uninsured</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head age</td>
<td>42.33</td>
<td>39.95</td>
<td>37.04</td>
<td>39.51</td>
<td>34.91</td>
<td>37.27</td>
</tr>
<tr>
<td>One parent</td>
<td>.22</td>
<td>.26</td>
<td>.16</td>
<td>.20</td>
<td>.57</td>
<td>.41</td>
</tr>
<tr>
<td>Female head</td>
<td>.17</td>
<td>.20</td>
<td>.09</td>
<td>.15</td>
<td>.51</td>
<td>.31</td>
</tr>
<tr>
<td>Less than high school</td>
<td>.07</td>
<td>.16</td>
<td>.30</td>
<td>.12</td>
<td>.51</td>
<td>.45</td>
</tr>
<tr>
<td>High school</td>
<td>.39</td>
<td>.51</td>
<td>.33</td>
<td>.45</td>
<td>.42</td>
<td>.41</td>
</tr>
<tr>
<td>College</td>
<td>.54</td>
<td>.32</td>
<td>.36</td>
<td>.43</td>
<td>.08</td>
<td>.14</td>
</tr>
<tr>
<td>Number of children</td>
<td>1.85</td>
<td>1.81</td>
<td>1.65</td>
<td>1.89</td>
<td>2.29</td>
<td>1.94</td>
</tr>
<tr>
<td>Minimum child age</td>
<td>8.53</td>
<td>7.78</td>
<td>8.09</td>
<td>7.85</td>
<td>5.46</td>
<td>7.52</td>
</tr>
<tr>
<td>Family income ($)</td>
<td>79,587.72</td>
<td>53,111.39</td>
<td>54,079.89</td>
<td>69,699.25</td>
<td>15,237.57</td>
<td>28,742.90</td>
</tr>
<tr>
<td>White</td>
<td>.67</td>
<td>.52</td>
<td>.45</td>
<td>.53</td>
<td>.23</td>
<td>.23</td>
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<tr>
<td>Black</td>
<td>.04</td>
<td>.04</td>
<td>.07</td>
<td>.07</td>
<td>.11</td>
<td>.04</td>
</tr>
<tr>
<td>Hispanic</td>
<td>.11</td>
<td>.21</td>
<td>.32</td>
<td>.26</td>
<td>.54</td>
<td>.59</td>
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<tr>
<td>Other</td>
<td>.18</td>
<td>.23</td>
<td>.15</td>
<td>.14</td>
<td>.11</td>
<td>.13</td>
</tr>
<tr>
<td>Work characteristics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Head works</td>
<td>.88</td>
<td>.87</td>
<td>.74</td>
<td>.94</td>
<td>.51</td>
<td>.78</td>
</tr>
<tr>
<td>Head is self-employed</td>
<td>.41</td>
<td>.27</td>
<td>.15</td>
<td>.04</td>
<td>.04</td>
<td>.13</td>
</tr>
<tr>
<td>Head offered employer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>health insurance</td>
<td>.28</td>
<td>.36</td>
<td>.44</td>
<td>1.00</td>
<td>.32</td>
<td>.47</td>
</tr>
<tr>
<td>Health</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bad adult health</td>
<td>.07</td>
<td>.12</td>
<td>.04</td>
<td>.09</td>
<td>.24</td>
<td>.12</td>
</tr>
<tr>
<td>Adult disabled</td>
<td>.06</td>
<td>.02</td>
<td>.02</td>
<td>.06</td>
<td>.17</td>
<td>.05</td>
</tr>
<tr>
<td>Children in bad health</td>
<td>.13</td>
<td>.13</td>
<td>.10</td>
<td>.20</td>
<td>.36</td>
<td>.28</td>
</tr>
<tr>
<td>Minimum marginal prices</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adult price ($)</td>
<td>80.77</td>
<td>72.90</td>
<td>71.10</td>
<td>74.97</td>
<td>66.18</td>
<td>73.73</td>
</tr>
<tr>
<td>Child price ($)</td>
<td>36.05</td>
<td>34.98</td>
<td>33.90</td>
<td>34.54</td>
<td>35.03</td>
<td>36.24</td>
</tr>
</tbody>
</table>

the census data center to increase the sample size available for the analysis of individual health insurance choices.

Explanatory variables in the model include: indicators for age of the family head (25 to 34, 35 to 44, 45 to 54, 55 to 64, under 25 omitted), number of parents, gender of head, education of the head (less than high school, college, high school omitted), race of family head (black, Hispanic, other, white non-Hispanic omitted), number of children, age of the youngest child, the logarithm of family income, whether any adult is in fair or poor health, whether any adult is disabled, whether any child is in good, fair, or poor health, whether the head is employed, whether the head is self-employed, whether the head was offered group coverage, indicators for the data set for the observation, price of insurance, and year indicators. 24, 25

Table 2 presents the means on the covariates for the different insurance groups used in the analysis. The table also shows the distribution of minimum child and adult prices, by insurance category. This simple tabulation does not show much of a relationship between prices and insurance coverage; however, these means do not control for any confounding influences.

We illustrate the effect of subsidies and changes in demographic characteristics on family choices by using our fitted models to predict choices as we vary the subsidy or a characteristic. To simulate the effect of subsidies, we use the model estimates and predict choices made by the sample of Californian families. The marginal effect of varying demographic characteristics predicts choices for a population with the mix of characteristics observed in the sample as the characteristic under study is varied. The marginal effects for indicator variables should be interpreted as the effect of shifting the entire sample from zeros to ones (for

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example, adult health shifts from all adults in good health to all adults in bad health). The marginal effects for continuous variables should be interpreted as shifting the entire sample from one value to a second value (for example, family income shifts from the 25th percentile to the 75th percentile).

Our statistical tests take into account the intertemporal correlation for families that appear in our sample in more than one year. This occurs because the SIPP is a four-year panel and because a part of the CPS sample in each year was interviewed in the prior year. Our analyses pool the CPS and SIPP data and are weighted using survey sample weights adjusted for multiple data sets.26

Results

Effect of Price

The price of adding a child to the policy is statistically significant in explaining insurance choices of families in California data (p = .02).27 Statistical significance is measured by the joint significance of price coefficients, over all six insurance outcomes, in the multinomial logit model. Full results from the multinomial logit model are in Table 3. Among families who choose the individual market, an increase in the price of adding a child significantly increases the likelihood of having some children uninsured relative to fully insuring the family (p = .01).28 In addition, an increase in the price of adding a child significantly increases the proportion of partially insured families with some children uninsured relative to leaving only adults uninsured (p = .02). Furthermore, an increase in the price of adding a child also increases the probability that the family remains completely uninsured relative to choosing the individual market and covering the full family (p = .06).29 The price of adding an adult to the policy is not significant in the multinomial logit models.

The implications of these results for alternative subsidy schemes are given in Table 4.30 A 20% subsidy to the (incremental) child price would decrease the number of families with uninsured children, within the individual market, by about two percentage points. Extrapolating nationwide, this is equivalent to about 40,000 fewer families having uninsured children, and about 55,000 additional children having health insurance coverage. As a result, within the individual market the number of families with whole coverage increases by about 1.5 percentage points; however, this increase is not statistically significant. The percentage of families selecting the individual market also rises; however, the increase is small and statistically insignificant (less than one percentage point). This is equivalent to a price elasticity of demand for individual coverage of about −.12, and a price elasticity of demand for whole coverage, among families who choose the individual market, of about −.08.31 Most of this change is reflected in an increase in the number of wholly insured families; there is very little effect on the proportion of families with only adults uninsured. Targeting the subsidy to low-income families approximately halves this gain in whole coverage. We also find that subsidies to the child price reduce the percentage of families with no insurance; although this effect is statistically significant, it is relatively small in magnitude. The predictions for subsidies to the adult price also show a somewhat larger and statistically significant increase (although still less than one percentage point) in individual coverage than predictions for the child price. Subsidies in adult price also appear to reduce group coverage; however, this effect is small in magnitude. Subsidies to the adult price appear to have a larger role in drawing families into the individual market, whereas subsidies to the child price appear to promote whole family coverage within the individual market.

Other Factors

The effects of other characteristics on family coverage decisions are illustrated in Table 4. These are marginal effects of the characteristic obtained by predicting average choices for a population by varying the characteristic under study and holding constant the other explanatory variables. We focus our discussion on the effect of factors in the individual market, although we provide estimates for all insurance states for comparison. Poor health may increase the cost of purchasing individ-
Table 3. Parameter estimates from the multinomial logit model of family health insurance coverage

<table>
<thead>
<tr>
<th>Individual insurance</th>
<th>Some children uninsured</th>
<th>Only adults uninsured</th>
<th>Group insurance</th>
<th>Public insurance</th>
<th>All uninsured</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Estimate</td>
<td>SE</td>
<td>Estimate</td>
<td>SE</td>
<td>Estimate</td>
</tr>
<tr>
<td>Adult price (in logs)</td>
<td>-1.25</td>
<td>.71*</td>
<td>-.54</td>
<td>.78</td>
<td>.08</td>
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<tr>
<td>Marginal child price (in logs)</td>
<td>1.39</td>
<td>.54**</td>
<td>-.35</td>
<td>.62</td>
<td>.11</td>
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<tr>
<td>Indicators for head age (18–24 omitted)</td>
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</tr>
<tr>
<td>25–34</td>
<td>.74</td>
<td>.73</td>
<td>-.97</td>
<td>.69</td>
<td>-.43</td>
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<tr>
<td>35–44</td>
<td>.71</td>
<td>.79</td>
<td>-.97</td>
<td>.88</td>
<td>-.63</td>
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<tr>
<td>45–54</td>
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<td>.97</td>
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<td>1.10**</td>
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<td>55–64</td>
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<td>1.83</td>
<td>1.24</td>
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<td>Head's education (high school omitted)</td>
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<tr>
<td>Less than high school</td>
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<td>.42</td>
<td>.88</td>
<td>.47*</td>
<td>.16</td>
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<td>.30</td>
<td>-.09</td>
<td>.44</td>
<td>-.44</td>
</tr>
<tr>
<td>Number of children</td>
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<td>.15</td>
<td>-.21</td>
<td>.27</td>
<td>.11</td>
</tr>
<tr>
<td>Minimum child age</td>
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<td>.03</td>
<td>.10</td>
<td>.04</td>
<td>.00</td>
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<tr>
<td>Family income (in logs)</td>
<td>-.27</td>
<td>.23</td>
<td>.02</td>
<td>.33</td>
<td>.70</td>
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<tr>
<td>Race (white omitted)</td>
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<td>Black</td>
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<td>.39</td>
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<td>.53</td>
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<td>Hispanic</td>
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<td>.39</td>
<td>.65</td>
<td>.39*</td>
<td>1.08</td>
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<td>Other</td>
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<td>.36</td>
<td>.11</td>
<td>.50</td>
<td>.40</td>
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<td>Head works</td>
<td>.26</td>
<td>.43</td>
<td>-.10</td>
<td>.69</td>
<td>-4.04</td>
</tr>
<tr>
<td>Head is self-employed</td>
<td>-.43</td>
<td>.38</td>
<td>-.45</td>
<td>.65</td>
<td>1.19</td>
</tr>
<tr>
<td>Head offered employer health insurance</td>
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<td>.35</td>
<td>.49</td>
<td>.63</td>
<td>9.07</td>
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<td>Bad adult health</td>
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<td>.49</td>
<td>-.55</td>
<td>.72</td>
<td>.54</td>
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<tr>
<td>Adult disabled</td>
<td>-2.03</td>
<td>1.03**</td>
<td>-.106</td>
<td>.94</td>
<td>.29</td>
</tr>
<tr>
<td>Children in bad health</td>
<td>-41</td>
<td>.37</td>
<td>-.07</td>
<td>.42</td>
<td>.36</td>
</tr>
<tr>
<td>Indicators for year (1996 omitted)</td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>1997</td>
<td>-.02</td>
<td>.45</td>
<td>-.70</td>
<td>.66</td>
<td>-.09</td>
</tr>
<tr>
<td>1998</td>
<td>.36</td>
<td>.45</td>
<td>.48</td>
<td>.52</td>
<td>-.04</td>
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<tr>
<td>1999</td>
<td>.03</td>
<td>.49</td>
<td>.82</td>
<td>.51</td>
<td>-.27</td>
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<tr>
<td>2000</td>
<td>-.03</td>
<td>.50</td>
<td>.19</td>
<td>.60</td>
<td>-.17</td>
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<tr>
<td>2001</td>
<td>1.04</td>
<td>.53**</td>
<td>-.57</td>
<td>.87</td>
<td>.00</td>
</tr>
<tr>
<td>2002</td>
<td>.93</td>
<td>.47**</td>
<td>.56</td>
<td>.56</td>
<td>-.36</td>
</tr>
</tbody>
</table>

Notes: Base category: purchase individual insurance—entire family insured. SE = standard error.
* Significantly different from 0, p<.10.
** Significantly different from 0, p<.05.

pecial insurance because of underwriting. Each of the three measures of poorer family health reduces the probability of purchasing any individual health insurance. This effect is statistically significant for all health measures. Within families that purchase individual health insurance, having a disabled adult has a statistically significant effect on cover-
Table 4. Effect of subsidies and price increases on family health insurance choices

<table>
<thead>
<tr>
<th>Subsidy scheme</th>
<th>Individual insurance</th>
<th>No individual insurance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Any individual in family (%)</td>
<td>Entire family insured (%)</td>
</tr>
<tr>
<td>Current average price</td>
<td>4.91</td>
<td>85.16</td>
</tr>
<tr>
<td><strong>Price subsidies</strong></td>
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<td></td>
</tr>
<tr>
<td>20% subsidy to child price</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All children</td>
<td>5.03</td>
<td>86.57</td>
</tr>
<tr>
<td>Low-income children</td>
<td>4.96</td>
<td>85.79</td>
</tr>
<tr>
<td>20% subsidy to adult price</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All people</td>
<td>5.09**</td>
<td>82.23</td>
</tr>
<tr>
<td>Low-income adults</td>
<td>5.00**</td>
<td>83.73</td>
</tr>
</tbody>
</table>

Notes: Based on model parameters, child price is statistically significant in the model (p = .02). Estimates are simulations from a model that includes head age, number of parents, female head, head education, number of children, age of youngest child, family income, adult and child health, race, head work status, self-employment, offered employer insurance, and year indicators. Statistical significance of the predictions is ** (5% level) and * (10% level) for the comparison between the subsidy category and the base price in row 1.

age choices. Families with a disabled adult are about 3.5 percentage points less likely to leave an adult uninsured and seven percentage points less likely to leave a child uninsured. Conditional on purchasing some individual coverage for the family, high demand for health insurance from the adult appears to spill over and result in higher coverage rates for the full family.

Consistent with earlier descriptive studies, we find that families with younger parents are more likely to partially insure (Hanson 2001). Older parents are more likely to purchase individual coverage and are especially less likely to leave only adults in the family uninsured, perhaps because adult health declines with age. This effect is quite large, with parents under 25 being more than 30 percentage points less likely to have whole family coverage than parents who are 55 to 64. We do see a significant reversal in full family coverage for families with parents over age 55, though this is primarily an increase in the likelihood of having some uninsured children. This is consistent with the notion that the oldest parents choose to insure themselves rather than their children because they perceive themselves as having the highest need for coverage.

Families with higher income and education are more likely to have full family coverage and less likely to leave family members uninsured, although differences by income are modest. On the whole, families with high incomes are less likely to purchase individual health insurance and more likely to take up group coverage. However, conditional on purchasing individual health insurance, higher-income families are about three percentage points more likely to cover the full family. About 12% of families purchasing individual insurance with a parent with less than a high school education leave some children uninsured; this falls to 6% for families headed by an adult with some college or more.

Nonwhite families are less likely to purchase individual health insurance for their families, even after controlling for family income. Hispanic families are more than four percentage points less likely to have individual health insurance compared to white families. However, there are no statistically significant differences in whole family coverage within the individual health insurance market by race.

Employed family heads are more than four percentage points more likely to have whole
family coverage; however, they are no more likely to cover children in the family. Family heads who were offered employer-provided health insurance but turned it down in favor of the individual market are five percentage points less likely to cover the adults in the family and nine percentage points more likely to leave a family member uninsured, demonstrating a relatively low preference for health insurance.32

Two-parent families are more likely to purchase individual health insurance for the family, but are less likely to cover their whole family. Two-parent families are more likely to choose to cover the children and leave adults uninsured; however, this difference is relatively small—accounting for only a one-percentage-point difference in whole family coverage. Conditional on purchasing individual health insurance for some family member, families with two children versus those with one child are more likely to have whole family coverage and less likely to leave either adults or children uninsured, consistent with the notion that families with more children may have a higher demand for health insurance, and that they also may face a lower per person price for insurance once they enter the individual market.33

**Specification Checks**

We determined that our results were robust to several alternative models of insurance choice. Although we used a Hausman test to show that our multinomial logit model is not sensitive to the assumption of independence of irrelevant alternatives, we provide further evidence by exploring models with alternative structures. First, we estimated a two-part model of individual health insurance choice, where the first part of the model was a logit model for whether there was any purchase of individual health insurance in the family. The second part of this model estimated the type of individual health insurance coverage within the family (all family members insured, some children uninsured, or only adults uninsured), conditional on the purchase of some individual health insurance. Second, we estimated a multinomial logit model of individual health insurance choice estimated on the subsample of families who were defined as being in the market for individual health insurance. For this model, we excluded families that had access to group health insurance and families that were covered with public insurance, since these families were unlikely to consider purchasing in the individual market. We found virtually identical price effects within the individual market with these alternative models.

There are several alternative ways of measuring price in the analysis. We explored two alternatives in our specification checks. First, we used a single measure for the cost of insuring the full family in the individual market. We found that the family price was statistically significant in explaining whether the family chose the individual market, but did not explain the choices of whom to cover within the individual market. This is not surprising since the price was not differentiated between adults and children. The second measure was the average price of insuring adults and the average price of insuring children. Families with more children pay a lower average price per child than families with fewer children; therefore, the average price measure captures price differentials by family size. These price variables provided similar results to those reported; however, the effects were estimated less precisely.

Our study’s primary price measure was the minimum cost plan available to consumers. Most research has suggested that individuals are not very well informed about their plans and benefit options; however, this research may not apply to families who are participants in the individual market and are deciding whom to insure within the family.34 We expect that these “active” consumers may be more aware of their plan options than others. As an alternative to the minimum cost plan, we randomly selected an actuarially adjusted premium from among the individual products that were available to the person with an enrollment probability equal to the rate among new enrollees. If search costs are high, an individual may base his or her decision about the coverage of family members on the first bit of information received (the random plan); therefore, the randomly selected plan may be an appropriate measure.
Table 5. Predicted effects of selected variables on family health insurance choices; results from multinomial logit model

<table>
<thead>
<tr>
<th>Individual insurance</th>
<th>Any individual (%)</th>
<th>All insured (%)</th>
<th>Some children uninsured (%)</th>
<th>Only adults uninsured (%)</th>
<th>No individual insurance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Group (%)</td>
</tr>
<tr>
<td>Adult health</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Good adult health</td>
<td>5.12</td>
<td>86.10</td>
<td>7.71</td>
<td>6.19</td>
<td>63.78</td>
</tr>
<tr>
<td>Bad adult health</td>
<td>3.59**</td>
<td>81.95**</td>
<td>14.77</td>
<td>3.28</td>
<td>62.77</td>
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<tr>
<td>Adult disability</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Adult not disabled</td>
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<td>84.96</td>
<td>8.86</td>
<td>6.18</td>
<td>63.63</td>
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<tr>
<td>Adult disabled</td>
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<td>95.82</td>
<td>1.72**</td>
<td>2.46**</td>
<td>63.62</td>
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<td>Children’s health</td>
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<tr>
<td>Children in good health</td>
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<tr>
<td>Children in bad health</td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.25</td>
<td>85.00</td>
<td>8.64</td>
<td>6.36</td>
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<td></td>
<td>3.62**</td>
<td>89.24**</td>
<td>6.76**</td>
<td>4.00</td>
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<td>Head age</td>
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<td>Under 25 (base cat.)</td>
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<td>43.63</td>
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<td>25–34</td>
<td>4.11**</td>
<td>75.93**</td>
<td>7.88*</td>
<td>16.19</td>
<td>62.86**</td>
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<td>4.80**</td>
<td>85.53**</td>
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<td>7.88</td>
<td>9.37**</td>
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<td>Family income</td>
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<tr>
<td>25th percentile:</td>
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<td>75th percentile:</td>
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<td>86.51**</td>
<td>7.01**</td>
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<td>70.05**</td>
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<tr>
<td>Head's education</td>
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<tr>
<td>Less than high school</td>
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<tr>
<td>College</td>
<td>7.23**</td>
<td>88.05**</td>
<td>6.11</td>
<td>5.84**</td>
<td>67.64**</td>
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<td>Race</td>
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<td>White, non-Hispanic</td>
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<td>85.89</td>
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<td>Black</td>
<td>4.84**</td>
<td>83.28**</td>
<td>6.56</td>
<td>10.16</td>
<td>66.54</td>
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<td>Hispanic</td>
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<td>82.01**</td>
<td>8.95**</td>
<td>9.04</td>
<td>62.47**</td>
</tr>
<tr>
<td>Other</td>
<td>4.73**</td>
<td>80.89**</td>
<td>12.46</td>
<td>6.65</td>
<td>62.46**</td>
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<tr>
<td>Head work status</td>
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<td>Head doesn’t work</td>
<td>2.28</td>
<td>81.82</td>
<td>6.82</td>
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<td>77.13</td>
</tr>
<tr>
<td>Head works</td>
<td>5.46**</td>
<td>86.46**</td>
<td>8.73**</td>
<td>4.81**</td>
<td>62.71**</td>
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<td>Head self-employment status</td>
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<td>Not self-employed</td>
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<td>85.09</td>
<td>8.67</td>
<td>6.24</td>
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<td>4.24**</td>
<td>87.75**</td>
<td>7.29**</td>
<td>4.96**</td>
<td>73.22**</td>
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<td>Head offered group coverage</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Head not offered</td>
<td>33.92</td>
<td>89.56</td>
<td>6.58</td>
<td>3.86</td>
<td>.67</td>
</tr>
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</table>

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Table 5. (continued)

<table>
<thead>
<tr>
<th>Individual insurance</th>
<th>head offered group plan</th>
<th>Number of parents</th>
<th>Sex of family head</th>
<th>Number of children</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any individual (%)</td>
<td>1.57**</td>
<td>2.99</td>
<td>5.62</td>
<td>9.46</td>
</tr>
<tr>
<td>All insured (%)</td>
<td>80.46**</td>
<td>86.57</td>
<td>90.84</td>
<td>84.20</td>
</tr>
<tr>
<td>Some children uninsured (%)</td>
<td>10.39**</td>
<td>9.16</td>
<td>6.77</td>
<td>8.93</td>
</tr>
<tr>
<td>Only adults uninsured (%)</td>
<td>9.15**</td>
<td>4.27</td>
<td>2.39</td>
<td>6.87</td>
</tr>
<tr>
<td>Group (%)</td>
<td>81.50**</td>
<td>64.92</td>
<td>60.78</td>
<td>64.34**</td>
</tr>
<tr>
<td>Public (%)</td>
<td>8.35**</td>
<td>18.17</td>
<td>21.65</td>
<td>15.54**</td>
</tr>
<tr>
<td>Uninsured (%)</td>
<td>8.59**</td>
<td>13.92</td>
<td>11.95</td>
<td>15.29*</td>
</tr>
</tbody>
</table>

Notes: Significance in each column denotes whether the variable has a statistically different prediction compared to the base category. The base category is denoted when more than two groups are compared. Year indicators, geographic indicators, and data set indicators are also included in the model.

* Significantly different from 0, p < .10.
** Significantly different from 0, p < .05.

We found that the results from the randomly selected plan were somewhat smaller in magnitude, but had a similar pattern to those using the minimum cost plan.

To the extent that imperfect information among consumers or selective marketing may affect the health insurance options known to a consumer, the price variable relevant to the consumer may be measured with error in our analysis, leading to some bias in the coefficient on the price variable. However, since we use actual administrative price data and select several different ways of measuring price in the model, we believe that our analysis minimizes bias due to measurement error in the price variable.

The price of group coverage, if available, also may play a role in explaining individual health insurance choices. To explore this possibility, we synthetically linked our data to California business establishment in the 1997 Robert Wood Johnson Foundation Employer Health Insurance Survey. The employer survey provides information about industry, group size, and the wage composition of the workforce, as well as information about premiums. We linked workers offered insurance to businesses that offer it based on the known characteristics in each data set, industry, group size, and the probability of belonging to a firm with more or less than two-thirds of employees with an hourly wage below $10 (given the individual’s wage).

The linked data then provided simulated information about the out-of-pocket price facing the worker for group coverage. We re-estimated our model after including variables that measured the employee’s share of a single and family group premium. We found that these variables were statistically insignificant in explaining the choices of individual health insurance coverage in the family. We also found that the existing coefficients on individual market prices in the model were not sensitive to the inclusion of these variables.

Since our analysis is restricted to one state, the price of public coverage does not vary and therefore should not affect choices in our model. However, the availability of a public safety net may affect the choice of coverage. We included a measure of the safety net in the county of residence to see whether the availability of a strong safety net crowds out insurance and leads to an increase in the uninsured. The safety-net index was based on four characteristics: the dollar amount of

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local government spending for health and hospital care; admissions to safety-net hospitals; visits to the outpatient departments and emergency rooms of safety-net hospitals; and visits to community health centers. We found that the safety net did not have a statistically significant effect in explaining individual health insurance choices within the family.

Discussion

Although most families that purchase private insurance cover all family members, there are a sizable number of families that are only partially insured. As the IOM study demonstrated, both the insured and uninsured members of these families may suffer adverse health consequences as a result. Public policy is beginning to acknowledge the importance of whole family coverage. In 2001, four states began to enroll parents of children in the State Children's Health Insurance Program (SCHIP) (CMS 2002, 2003). The Health Insurance Flexibility and Accountability Initiative, announced in 2001, aimed at expanding health insurance coverage to adults in low-income families with children covered by SCHIP. Tax subsidies have been promoted as another means to expand coverage in the individual market. Evaluating the role of price subsidies for adults and for children in promoting whole family coverage within the individual market is important in conceptualizing future policy.

Our analysis suggests that subsidies for individual health insurance would promote whole family coverage and reduce the number of partially uninsured families among those who purchase individual coverage. We find that a 20% subsidy to children's individual insurance premiums in California would decrease the number of families with uninsured children by more than two percentage points. Extrapolating nationwide, this would result in an additional 40,000 families with children insured in the individual market and an additional 75,000 families with whole family coverage in the individual market. While this effect may not appear large, the vast majority of families who participate in the individual market have whole family coverage; therefore, the reduction in the proportion of families with uninsured children represents a 25% decrease in families with uninsured children in the individual market.

On the other hand, subsidies are not a very target-efficient way to promote whole family coverage. It would be difficult to restrict the subsidy only to those who would not otherwise cover all of their children, especially in the long run. As a result, the 20% subsidy program would cost about 50 times more than the direct payments needed to induce the additional 40,000 families to buy coverage. Restricting subsidies for health insurance to low-income families would improve the target efficiency of subsidies since low-income families are more likely to be uninsured. Among families who choose the individual market, 13% are uninsured compared to 19% of low-income families. However, restricting subsidies to low-income families approximately halves the benefit of premium subsidies. Furthermore, restrictions on eligibility based on income would add to administrative costs and hamper continuity of whole family coverage. In spite of these concerns, subsidies for the purchase of private insurance remain attractive to many policymakers because they extend coverage by combining public and private resources.

Our results also suggest that a continuation of current trends in premiums may lead to some erosion in whole family coverage. Premiums for individual coverage have risen dramatically over the past decade. In California, individual insurance market premiums, adjusted for benefits, rose 40% between 1997 and 2002; even after adjusting for inflation in the price of other goods and services, insurance premiums rose by 25% (Buntin et al. 2003). Extrapolating nationwide, our results suggest that an increase in premiums of this magnitude would lead about 35,000 more families who purchase in the individual market to partially insure; nonetheless, over 80% of them would continue to purchase whole family coverage. Rising premiums also would lead to at least 30,000 fewer families purchasing individual insurance.

Price is not the only barrier to covering the whole family; even with substantial subsidies
some purchasers would not cover all family members. We found substantial differences in whole family coverage by income, education, and health. Education may play a role in increasing family members' awareness of the value of whole family coverage. Individuals with higher incomes are more likely to have the available disposable income to purchase whole family coverage. Individuals with a disabled adult in the family are more likely to purchase whole family coverage, conditional on purchasing individual health insurance, suggesting that this group has a higher demand for coverage. However, overall, these families are less likely to purchase individual health insurance, consistent with the notion that the individual health insurance market charges high prices for covering sick families.

The analysis in this paper has its limitations. The model is reduced form and therefore the effects estimated do not account for structural changes in the market that may come about as a result of large changes in price. We also restrict our analysis to families with children. The IOM (2002) has highlighted the importance of studying health insurance in a family context, and therefore our focus on families with children is policy relevant. However, our results may not be applicable to address issues related to price sensitivity of individual insurance purchases in the overall market. Even though our analysis focuses on partial coverage among families purchasing individual insurance, partial coverage arises in other types of families. For instance, 35% of families with public coverage and 9% of families with group coverage leave a family member uninsured. Factors that lead to partial coverage in families with individual coverage also may play a role in the decision making of families with group and public coverage. However, further research about partial coverage decisions in these families is needed.

In summary, our findings suggest that the role of subsidies in increasing whole family coverage within the individual market is likely to be small. Among families who choose the individual market, subsidies would increase whole family coverage; however, it is problematic to design target-efficient subsidies for this population with a wide-ranging effect. Given the hopes that have been pinned on the individual market as a means for extending insurance, future research may benefit from exploring the nonprice barriers to the purchase of individual coverage and whole family coverage, and the role of insurer practices in marketing individual insurance policies.

Notes

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1 We assume that the errors in the model are additive and are independently and identically distributed with a Weibull distribution. While the multinomial logit model requires the assumption of independence of irrelevant alternatives, we found that this assumption was not violated in our models (Hausman 1978).

2 For individuals with multiple sources of coverage, the following hierarchy is used: employer, individual, public, uninsured. Only 3% of individuals who have employer coverage also have individual health insurance—it is possible that these individuals are about to experience insurance transitions or have mis-reported insurance coverage.

3 This is based on communication with the insurers who contributed data to this study.

4 Over three-quarters of families with children have two or fewer children and therefore face a marginal price of insuring an additional child.

5 Essentially, this is equivalent to a hedonic pricing approach, which characterizes much of
the research on competition in insurance markets. Hedonic pricing refers to the methodology for adjusting premiums for plan characteristics, so that the variation in premiums does not reflect variation in benefits (Wholey, Feldman, and Christianson 1995).

6 A product is defined by the benefits, and any change in benefit, such as an increase in the deductible or an increase in the out-of-pocket maximum, is a new product offering. More information about the products sold in the individual insurance market in California is found in Buntin et al. (2003).

7 Policies that provide benefits for a very limited number of severe mental health conditions are considered not to provide mental health coverage.

8 The standardized population was based on privately insured people under age 65 in the 1997 National Medical Expenditure Panel survey (MEPS) (Buntin et al. 2003).

9 The actuarial value accounts for the benefit design (copayments, deductibles, visit maximums) laid out in the plan benefit summary. It does not account for rationing that is not reflected by the formal benefit design or for behavioral responses to the plan design.

10 In a competitive market, we would expect no variation in the price per unit of benefit. However, although we are looking at one state, there is more than one market because of time and geographic variation. Moreover, lack of perfect information in the market may also permit variation in unit price within a market. Nonetheless, some of the variation in our adjusted price measure may be due to unmeasured attributes of plans.

11 The Medicare geographic practice cost index is a combination of three indices reflecting variation across areas in the financial value of a physician's time and skill (work), practice expense, and malpractice costs. The work component is based on relative wages of professionals; the practice expense component accounts for nonphysician staff wages, office rent, and equipment and supplies; the malpractice component is based on average malpractice premiums in the area.

12 The price index adjustment takes into account that prices, wages, and other income may be higher in some areas than others. Our results are not sensitive to the price adjustment.

13 We used 46 occupations for which statistics were available in all areas in California over our full time period—this accounts for about 50% of employees in the state. We applied a constant set of weights, based on the mix of employment within the state within these occupations, for each geographic area to derive the index.

14 We have checked the robustness of our results to narrowing the sample to include only those families where the policyholder resides within the family unit. We find that our results do not change.

15 Our results are similar if we exclude families with some public coverage (5% of the sample).

16 In preliminary analyses, we used data from the NHIS to supplement our sample sizes and obtained similar results with the NHIS sample. We have not reported the NHIS results because we did not have access to the data center at the National Center for Health Statistics to fit the final models. But the similarity of these early results bolsters our conclusions from the SIPP/CPS samples.

17 Another approach used in the literature is to use variation in rate of tax deductibility of insurance for the self-employed over time to identify the effect of price on health insurance choice (Gruber and Poterba 1994). Yet another uses data on hypothetical insurance prices and take-up (Marquis and Buchanan 1992; Royalty and Hagens 2005).

18 We acknowledge that the price variation across areas may be endogenous if high demand for coverage leads to higher prices, which may bias our results. We include controls for demand for coverage (demographics, health status, income, family composition) to address this issue; however, we cannot account for unobserved drivers of demand.

19 We excluded any plans that averaged fewer than 50 new enrollees per month over the year since these plans are apparently not among those factored into the choice set of most enrollees.

20 This is based on authors' discussions with the insurance companies providing data for this study.

21 We also experimented with including the actuarial adjustment as a separate variable in the model. However, it was always statistically insignificant, and therefore, we incorporated it into the price measure as would be indicated by a hedonic pricing approach.

22 Insurers can choose to cover the whole family or part of the family.

23 We cannot control for unobserved health—if price is a function of unobserved health, some bias may remain.

24 For the CPS data, the offer of group insurance was imputed for workers not enrolled in a group plan, based on characteristics of the business and worker using data from the 1997 Robert Wood Johnson Foundation Employer Health Insurance Survey. This methodology is described in Marquis et al. (2004). Health insurance offer may be endogenous—our results are not sensitive to the inclusion of this variable. We also ran models with alternative definitions of the health variables, such as any child in fair or poor health, all.
children in good, fair, or poor health, and found similar results.

25 For married couples, the spouse with health insurance that covers the family is assumed to be the family head. If this criterion did not yield a unique head, we applied additional criteria in the following order to determine the head: holding employer-provided health insurance, marginal cost of insuring the family via the offered group plan, and age of spouse.

26 We multiplied the survey sample weights by \( d_s / \Sigma d_s \), where \( d_s \) is the design factor for survey \( s \). The design factor is calculated using the standard deviation and mean for the weights in each survey. This methodology has been used to combine NLSY samples (Frankel, McWilliams, and Spencer 1983). Unweighted results were similar, although less precisely estimated.

27 The effect of price did not differ significantly between the SIPP and the CPS data, therefore we present a pooled set of price estimates, which reduces the small sample problems, for these data sets.

28 Statistical significance is based on whether the parameter for price is statistically different in the multinomial logit model in the comparison between the option of having some children uninsured relative to fully insuring the family.

29 We experimented with interactions between price and age, family health, and self-employment. However, given the limited sample sizes, we were unable to reliably estimate interactions.

30 The statistical significance for the predictions in Tables 3 and 4 are calculated by using Monte Carlo simulations (Tomz, Wittenberg, and King 2003).

31 The price elasticity of demand for individual coverage was statistically significant but small in other analyses that included single people and married couples without children (Marquis et al. 2004).

32 Only 1.5% of families offered group health insurance obtain coverage from the individual market. Since we impute health insurance offer, errors in imputation may be responsible for some of this percentage.

33 We estimated a similar multinomial logit model, without measures of individual market premiums, on the full U.S. sample and found similar, but more precise results for the demographic and family variables for this larger sample.

34 See for example, Cunningham, Denk, and Sinclair (2001).

35 See Marquis et al. (2004) for further details on the linking procedure.

36 See Marquis et al. (2004) for further details on the measurement of safety net.

37 Marquis et al. (2004) presents estimates of the overall elasticity of individual health insurance purchase.

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Individuál Health Insurance


