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MODELING THE CAUSES AND CONSEQUENCES OF LACK OF HEALTH INSURANCE COVERAGE: GAPS IN THE LITERATURE

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Modeling the Causes and Consequences of Lack of Health Insurance Coverage: Gaps in the Literature

The decline in the percentage of Americans covered by health insurance has generated concern among policy makers and scholars worried about negative consequences associated with lack of coverage. Moreover, because the health care financing system is intertwined with the labor market, policy makers are concerned about the consequences that any reforms to the health care financing system would have on labor markets and how labor market behavior would influence the success of health care financing reforms.

The purpose of this paper is to identify gaps in our knowledge about the causes and consequences of the lack of insurance coverage. This topic is very broad and many studies, published and ongoing, are relevant. To identify gaps in the literature, it is necessary to provide a conceptual framework for thinking about the causes and consequences of the lack of coverage and then asking where, within that framework, greater research is needed.

Our framework is loosely based on a general equilibrium model. It recognizes that almost all important outcome variables are determined as part of a grand system of interactions between decentralized agents acting to achieve their own particular objectives. Perturbations to one part of the system will ripple through all parts of the system until a new equilibrium is achieved. We examine the literature to identify important aspects of a general equilibrium model that seem under-studied. We also review selected portions of this literature where we believe there are important conceptual or empirical issues relating to the general equilibrium framework that are worthy of discussion.

Because of the breadth of this task, we focus on work that could loosely be characterized as *structural.* We use the term structural in this context to encompass two distinct, but related ideas. In the first usage, structural is used in a simultaneous equations sense to refer to empirical models that include endogenous variables in the set of explanatory variables. This is in contrast to reduced form models that only include exogenous variables on the right hand side and measure the relationship between those

variables and the dependent variable after all intervening endogenous variables have adjusted.

The second usage of the term structural refers to models, and associated econometric exercises, which relate the estimated parameters to underlying parameters of the primitive functions (e.g. utility, production, profit) that fundamentally govern behavior. We term these models *parametrically structural*. It is possible to be structural in the simultaneous equation sense but not parametrically structural. In either case, it is possible to be structural without modeling all markets or interconnections that might exist.

Structural models in this area are important because of the many markets and actors that influence coverage decisions and subsequent consequences. Our intent is to identify areas in which current research is lacking and to highlight the methods researchers have used to address the endogeneity problems that inherently plague work in this area.

Researchers, for convenience or necessity, often assume that certain theoretically endogenous variables are exogenous. The resulting estimates provide descriptive information but may not determine causality to the degree necessary to intelligently inform policy makers. Of course, because almost all key variables are endogenous in the broadest sense, over the longest time frame, it is easy to take issue with almost all empirical estimates. A thoughtful critique must weigh the potential magnitude of the endogeneity bias, its qualitative importance, and the feasibility of a cure.

Although we emphasize the general equilibrium nature of modeling coverage, we recognize that existing structural research, while capturing important linkages among markets and actors, does not represent a full general equilibrium model. Moreover, we recognize that reduced form models are often sufficient to answer compelling theoretical and empirical questions.

Section 1 of the paper provides the foundation for this review. It summarizes each of the key classes of actors – consumers, employers, insurers, medical care providers and the government, focusing on interrelationships between the relevant markets. Section 2 examines selected issues that we believe, based on our model and literature search, are under-studied.

The process used to select issues and relevant literature for this synthesis involved, in part, examination of literature related to insurance coverage that was deemed 'structural'. We identified such literature through searches of Medline, Econlit, and a variety of government and non-profit websites. The searches focused on identifying articles relating to causes for coverage (or lack of coverage), characteristics of the uninsured, and consequences of being without coverage. In total, over 800 papers were articles were identified and each was abstracted. The coding protocol included a category for "structural". Articles were coded as structural if the authors presented an underlying model of behavior or recognized the endogeneity of key variables in their estimation approach. For example, articles that used instrumental variable techniques were, by our definition, considered structural. We suspect that many models that one might consider structural would slip through our classification system. For example, we wanted to include papers that use natural experiments to identify the effects of endogenous variables on outcomes of interest in our category for structural. Yet many papers that rely on natural experiments for identification use OLS techniques and may have been mistaken for reduced form models by abstractors. Therefore, we supplemented our sample through discussion with colleagues and snowball samples from existing literature. In some cases we include articles which estimate reduced form models if the derivation of those models reflects a structural model.

Despite the breadth of this search, other understudied issues certainly exist. Many of those will be identified and discussed in the other papers included in this volume. For example, researchers have rarely treated health insurance as endogenous when modeling the effects of coverage on health status (Levy and Meltzer, 2001). We have tried to select issues that we believe will fall outside of the scope of the complementary syntheses.

I Basic framework

Insurance status is the result of a complex set of interactions between at least five key types of actors: households, firms, insurers, medical providers/medical industry, and government. This overview of the actors, their motivations, and their interactions with each other is intended to illustrate the general equilibrium model that determines insurance status. This discussion highlights the multiple dimensions that must be

considered to develop a truly structural understanding of the determinants of insurance status.

Households:

Households' objectives are to maximize their utilities with respect to health insurance, health care, and non-health consumption. For households comprised of multiple individuals, these decisions are made jointly, recognizing the preferences and opportunities of all members of the household. Demand for health insurance is a "doubly derived" demand. First, the demand for health care is derived from the demand for health and the expected ability of health care to contribute to improved health. Second, the demand for health insurance is derived from the fact that the health states that generate demand for health care occur randomly, placing the household's income at risk. In addition, the very high cost of health care for some illnesses implies an access motive for holding health insurance, where the household effectively trades a relatively small amount of income (the premium) for the ability to purchase care they otherwise could not afford in event of serious illness (Nyman, 1999). Ex ante, households do not know their precise health care needs. In choosing a plan, they will pay a lower price for medical care ex post along with accepting a bundle of measures (e.g., network restrictions, gatekeeping, utilization review, provider capitation) designed to control the moral hazard created by the price reduction.

Household preferences with respect to health insurance depend on factors such as the degree of risk aversion, attitudes towards health care [e.g., taste for style of care (aggressive vs. conservative); how much they value unrestricted choice of providers], family structure, health status (itself a function of past health insurance status), income (itself a function of health and health insurance).

Because most non-elderly Americans receive their health insurance as a fringe benefit of employment, crucial interactions occur between households and firms. The set of insurance plans available to a household depends on the decision of whether to participate in the labor force as an employee (vs. self-employment or non-employment), whether more than one household member participates, and for which firm or set of firms the household members work. All of these decisions may themselves be a function of the

health insurance offers made by firms. By determining households' incomes, these employment decisions also, in part, determine eligibility for various public programs and charity care. Given the insurance options and terms available to them through employer-sponsored plans for which they are eligible, the individual insurance market, and public programs, households then choose which employment option, if any, to take.

Firms:

For this overview, we focus on the role of profit maximizing firms. The basic points could be extended to non-profit maximizing firms. Given this focus, understanding firms' decisions with respect to health insurance requires an understanding of how those decisions further the pursuit of profit, given the macroeconomic environment, competition in the firms' output markets, and competition for labor inputs. Firms attempting to maximize their profits are expected to offer wage/benefit packages that attract the desired quantity and types of labor at the minimum cost in terms of total compensation. Most importantly they must decide whether to offer insurance at all and which plan or plans to offer. The pre-tax treatment of employer-paid premiums and the effects of pooling on the administrative load encourage employer provision of health insurance, provided workers attach sufficient value to health insurance. Employers' decisions are expected to be based upon the value current and prospective employees place on insurance and particular plan attributes relative to receiving cash compensation. Hence, employees' preferences should play a substantial role in explaining firms' choices with respect to health insurance.

What is less clear on theoretical grounds is which employees' preferences are give the most weight. There are three alternatives: the median employee as in a union bargaining model (Goldstein and Pauly, 1976), some set of "marginal" employees (e.g., most recent hires or those most likely to be recruited away by another employer), or a broader set of workers with heterogeneous preferences (Moran, Chernew, and Hirth, 2001). Firms' ability to shift the cost of health insurance onto workers via lower wages or lower wage growth also impacts firms' incentives to provide insurance. Such wage offsets might occur at the level of the employee group as a whole (e.g., all employees within the group are effectively community rated), within specific demographic sub-

groups (Gruber, 1994), or at the worker-specific level. To the extent that health insurance costs cannot be shifted back onto individual workers or narrow demographic subgroups, firms would have an incentive to consider health status in their hiring decisions.

Beyond decisions about whether and what to offer, firms also must decide how to provide coverage in the most efficient manner. This involves issues such as whether to self-insure, participation in employer coalitions, how to price plans to employees [e.g., employer pays premium in full vs. employer pays a fixed amount towards any plan chosen; pricing to encourage employees to take up coverage from a spouse's job (Dranove, et al., 2000), and what information to provide employees to aide or influence their choices (Scanlon et al., 2002).

Insurers:

Although some health insurers are organized as non-profits, for simplicity we will assume that insurers are also interested in maximizing their profits. The level of competition in insurance markets, both within and between types of insurers (traditional, HMO, PPO, POS), determines insurer strategies with respect to pricing, exclusivity of networks, efforts to control adverse selection and moral hazard, policy with respect to preventive care, new technologies, attempts to cream skim good risks from the insurance pool, and actions designed to forestall the enactment of public regulation deemed onerous by insurers. Less competitive markets may result in higher premiums for any given level of quality or lower quality coverage for any given premium. However, less competition may also raise insurers' incentives to cover preventive care (as they may be more likely to view the enrollee as a long-term client), and reduce insurers' concerns about adverse selection or their ability to cream skim.

Health Care Providers and Pharmaceutical/Device Suppliers:

The incentives facing health care providers are a function of the insurance status of their patients. These incentives include payment amounts and methods (fee for service, capitation, salary) as well as other financial and non-financial incentives to avoid tests or specialty referrals or to steer patients to certain providers. Thus insurance status

will affect medical care utilization and, ultimately, health status. Physician practice patterns may reflect the composition of the insurance status of the physician's panel of patients. Therefore changes in aggregate composition of coverage may influence all individuals. Evidence for such a spillover exists (Baker and Corts, 1996, Baker and Shankarkumar, 1997) but evidence also suggests that, even when the provider is held constant, insurance type might affect utilization (Murray et al, 1992, Pearson et al, 1994).

In the long run, the structure and prevalence of insurance determines the incentives for the development of new medical devices and pharmaceutical agents along with the types of innovation most likely to be economically attractive (Weisbrod, 1991). The historical FFS-dominated financing system encouraged the development and diffusion of quality-enhancing technologies even if they substantially increased the cost of care. A managed care-dominated system is more likely to encourage cost-decreasing innovations (e.g., a new pharmaceutical treatment in lieu of surgery). Similarly, managed care may encourage the development of new treatments that decrease the non-financial (e.g., side effects) costs of seeking care (Baumgardner, 1991). Because historically managed care has not made heavy use of patient cost-sharing, managed care plans may have a hard time controlling the use of morbidity-reducing techniques such as minimally invasive surgery (Chernew, et al, 1997).

Government:

Federal, state, and local governments play major roles in influencing insurance status of the population, as direct providers of insurance, as subsidizers of private insurance, and as regulators of firms and insurers. Ascribing motives to the various agencies involved is difficult, as motivations could vary from those of a beneficent social planner attempting to discern and respond to societal preferences, to those of a self-interested politician beholden to special interests or a bureaucrat "captured" by the industry being regulated. Clearly, government inextricably influences health insurance status directly or indirectly through its interactions with each type of actor discussed above.

As a direct provider of insurance (e.g., Medicare, Medicaid, CHAMPUS) and provider or subsidizer of charity care (e.g., public hospitals and clinics, Medicaid DSH

payments), government can "crowd out" private insurance by making the alternatives of public insurance or uninsurance relatively more attractive to households (and implicitly to firms who decide whether and what plans to offer based in part on their workers' preferences) (Cutler and Gruber, 1996). Conversely, government encourages the provision and take up of private insurance by measures such as the tax treatment of premiums and allowing employers to escape certain regulations by self-insuring under the Employee Retirement Income Security Act (ERISA). Various levels of government place requirements on insurers (e.g., coverage mandates, legal liability), employers (rules for benefit deductibility), providers (licensure and certification, Certificate of Need, quality regulation), and developers on new technologies (patent laws, laws with respect to substitution of generic drugs, NIH research spending). To the extent that these various requirements, laws, and regulations affect the costs and capabilities of medical care, they will affect the rate of coverage by affecting the price and desirability of health insurance. Providers' responses to public payment policy (e.g., cost-shifting) can further affect private health care prices and utilization and, hence, insurance premiums.

Paths to health insurance coverage

Because much of our discussion focuses on determinants of coverage, a more explicit outline of the various paths by which individuals might obtain coverage is useful. Such a model would reflect at least four sources by which an individual may obtain coverage: through their own employer, through a spouse's employer, through a government program and through purchase in the private market. In each case a straightforward equation can relate the probability of coverage through the given source to a variety of more detailed decisions. These equations are outlined by (1) – (4).

Own employer coverage (OEC):

(1) P(OEC) = P(work for firm that offers)* P(eligible|offer)*P(participate|eligible)

Spousal employer coverage (SEC):

(2) P(SEC) = P(Spouse works for firm that offers)* P(eligible|offer)*P(part.|eligible)

Government coverage (GOVC):

(3) P(GOVC) = P(eligible for government coverage)*P(participate|eligible)

Non-group market coverage (NGC):

(4) P(NGC) = P(purchase non-group coverage)

The non-group coverage market model would reflect the possibility of single or family coverage and the spousal coverage model would be adjusted for children and individuals who might be eligible for dependent coverage from multiple sources.

Each of the terms on the right hand side of the preceding equations reflects a more complex structural model that would recognize the discrete choice model that underlies each of the probabilities. Moreover the probabilities that appear in the equations are not independent and coverage sources are not mutually exclusive. The employment decisions that are embedded in the offer and eligibility terms in equations (1) and (2) are clearly jointly determined and influenced by the utility of the other branches.

Finally, the behavioral components of each of the preceding models reflect constraints emanating from the government and markets for medical care. For example, behavior in medical care markets determine the cost structure of insurers. Competition in insurance markets determines the mark-ups for premiums, which influence coverage decisions, which in turn collectively influence behavior in medical markets. Government action, either through direct regulation of insurers of health care providers, as well as through the influence exerted as a large purchaser of care, may influence behavior at many junctures in the system.

II Selected issues

A) The endogeneity of workers sorting into firms and firm decisions regarding benefit packages

One of the fundamental issues for empirical work in this area is the extent to which workers sort into firms based on preferences for insurance coverage. If workers perfectly sort into the labor force and into specific employment opportunities as a function of preferences for health insurance, many of the employer decisions that are commonly considered important in models of firm behavior become unimportant. It may be the case that it is prohibitively costly for all firms to provide health plan options that satisfy the preferences of all potential employees. In this case, it can be more efficient for firms to choose a niche in terms of their health plan offerings and allow workers to sort into firms. The set of employers in a market area would offer benefit packages consistent

with the distribution of worker preferences and workers would select firms whose benefit offerings matched their preferences. If the demand for coverage changed due to an exogenous shock to workers' demand for health insurance, firm benefit offerings would change accordingly and workers would "re-sort" as necessary.

The degree of sorting has substantive normative ramifications because with perfect sorting one would assume the lack of coverage among workers in firms not offering coverage reflected a low demand as opposed to an institutional barrier presented by the employer-based health care financing system (Long and Marquis, 1993). Implications for policy simulations are significant. The stronger the sorting, the less responsive coverage rates would be to interventions aimed at employers (e.g., subsidies to employers, low cost insurance pools). The ultimate impact of such endeavors would depend on the extent they are passed on to workers. Conversely, if there is little sorting, many "high demand" workers would be employed by firms not offering coverage, and initiatives to encourage employer sponsored coverage could be more effective.

The existence of strong labor market sorting on the basis of preferences for health insurance also has important empirical ramifications for studies of the demand for insurance at the firm level. With strong sorting, firm characteristics (including firm size) are endogenously determined and therefore not appropriate controls in models of insurance demand. Such studies (e.g., Feldman, et al., 1997; Nichols and Blumberg, 1999; Hadley and Reschovsky, 2001) have identified the demand equation by excluding variables thought to be related to the price of insurance but not to workers' preferences for coverage. Predominant among these is the size of the firm or the establishment, which is related to lower prices due to lower loading charges for large employers. If workers sort themselves into firms according to their preferences for health insurance, this approach can lead to biased estimates. For example, if small employers find it more costly to provide coverage, they would simply choose to occupy the niche for workers who prefer cash compensation to health insurance. The size distribution of firms would adjust as necessary to satisfy workers preferences. In such an environment, models of coverage could focus only on individual and market characteristics. Estimates of demand that are identified using firm level traits, such as models of employee take-up identified using employer co-premiums, would be mis-specified. Additionally, models of firm

behavior would have to treat employee traits as endogenous. For example, if the error term in the firm level offer equation includes unobserved firm level preferences, worker traits such as health status, gender, education and marital status, may reflect the sorting of low demand workers into certain firms, not the impact of low demand workers on firms' decisions. Moreover, perfect sorting would call into question the common argument that an advantage of the employer based health insurance system is that it mitigates adverse selection. For these reasons, one's opinion about worker sorting has a strong impact on the interpretation of much of this work.

There are a variety of reasons why we would not expect perfect sorting and empirical evidence exists to suggest sorting is not perfect. From a conceptual perspective, perfect sorting requires a large number of firms willing to employ any type of worker, so that heterogeneous preferences can be satisfied. Such models require the assumption that production functions do not present a barrier to individual sorting based on tastes for coverage. For example, imagine all office workers had a high demand for coverage and all factory workers had a low demand for coverage. If the production function requires both office and factory workers, sorting across firms based on tastes for coverage would not be possible.

Of course one could still have sorting within firms, with some individuals purchasing coverage and others not, based on their tastes, but this requires incentives within the firm, such as co-premiums or targeted wage offsets, to generate such separation (Goldstein and Pauly, 1976). Yet tax laws tend to encourage low employee co-premiums and wage offsets targeted at individuals (as opposed to groups) seem implausible. Moreover, the fixed costs of offering different health plans tends to limit the ability of firms to match workers preferences exactly (Moran, Chernew, and Hirth, 2001). Finally, models of perfect sorting become more complex in a dynamic context in which workers develop firm specific human capital, but their tastes for coverage may change over time. Costs of switching jobs would tend to generate imperfect matching of preferences to benefit design over time.

Many studies present descriptive statistics or reduced form estimates consistent with implicit or explicit models of sorting. Workers in firms that do not offer coverage are more likely to have characteristics associated with low demand for coverage. For

example workers in firms that do not offer coverage are more likely to be young, male, and have other sources of coverage (Long and Marquis, 1993; McLaughlin, 1993).[1]

Relatively few studies formally examine the extent of worker sorting. Monheit and Vistnes (1999) examine job choice as a function of preferences for insurance. Preferences are measured directly through survey questions regarding an individual's taste for insurance.[2] They present a model of job choice that recognizes the endogeneity of the wage, but ultimately they estimate a reduced form model. The dependent variable is the probability that a worker obtains a job where coverage is offered (which does not necessarily imply that coverage was accepted by the worker). The wage differential between jobs with and without coverage is omitted from the equation because it is endogenous and it is replaced with exogenous correlates of wage differential. These are intended to reflect the costs of insurance (reflecting the belief that these costs get passed onto workers in the form of lower wages). These variables include: occupation, state health insurance taxation rates, medical costs in the worker's county, regional variables and indicators for rural locale are also included along with worker demographics. The findings suggest that there is job sorting, but that a substantial number of 'mismatches' between workers' stated preferences and their employers' decisions to offer insurance exist. Despite difficulties in fielding and interpreting surveys about preferences, additional studies that directly measure preferences for insurance and relate them to labor market outcomes would improve our understanding of the extent of sorting.

Using tax rates faced by workers to identify variation in the price of insurance, Gruber and Lettau (2000) conclude that the median tax price of a firm's workers is related to firms' decision to offer insurance and the total spending on insurance. However, they find evidence that in addition to the median tax price, the preferences of the highest tax rate workers may receive special weight in firms' decisions whereas under perfect sorting, all workers' preferences would be reflected in firms' decisions.

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[1] One potentially fruitful area to find evidence of sorting would be in models of the joint nature of household labor supply. Although we are aware of some structural empirical work that models joint labor supply decisions (Van Soest, 1995), this work does not incorporate the role of insurance in the labor supply decisions, and thus does not provide evidence regarding sorting. See Buchmueller and Valletta, 1999 for estimates of the impact of a husbands' insurance status on the labor supply of wives.

[2] More generally, the issue of family decision-making with respect to health insurance (e.g., decisions about seeking or choosing from multiple sources of coverage, aggregating individual preferences to family-level decisions) deserves more attention.

Scott, Berger and Black (1989) present a formal model of job sorting. They argue that as incentives to sort change over time, due to changes in marginal tax rates or changes in the importance of fringe benefits, employment patterns will change. For example, they argue that firms in industries where fringe benefits become more important over time will substitute toward occupation groups with high demand for coverage. They present evidence consistent with this model based on several tests of job sorting, each based on longitudinal data. Although the theoretical model developed by Scott, Berger and Black is relatively structural, their empirical work does not address the endogeneity of key explanatory variables, such as the percent of compensation paid for in the form of fringe benefits.

Another body of literature that addresses the imperfections in sorting is the job lock literature. This body of work investigates the hypothesis that individuals with insurance coverage through their employer are discouraged from switching jobs because they fear losing insurance coverage. Evidence of job lock implies some frictions in the labor market (though it may be that individuals are always getting their preferred benefit package, even if they are not at their ideal job otherwise). If individuals could perfectly sort along all dimensions, there would be no job lock.

Currie and Madrian (1998) provide a detailed review of this literature, including a thoughtful discussion of the important identification issues. The key identification strategies commonly used rely on comparisons of job switching rates for individuals without alternative sources of insurance with individuals who have alternative sources of coverage (and therefore presumably are not job locked). The availability of alternative coverage may itself be endogenous and therefore in many specifications variables that are presumably related to the value an individual would place on insurance (e.g. family size) are used as further sources of identification. Buchmeuller and Valletta, 1996, were the only study in this literature that we found that was explicitly worried about the joint nature of job changes among spouses, but even in this work they treat the availability of spousal coverage as exogenous.

In any case, the job lock literature has reported conflicting findings. We concur with Currie and Madrian who write “the literature could benefit greatly from a systematic analysis of what constitutes a valid strategy in identifying the effect of health insurance

on job turnover and how robust empirical estimates are to changes in sample composition, changes in variable definitions, and changes in estimation strategies."

On balance, we believe there is reasonable evidence that in the cross section workers appear to sort themselves in ways consistent with preferences for insurance coverage but that sorting is not perfect. Metrics to measure the degree of sorting or to asses the situations in which such sorting compromises empirical strategies to measure other phenomenon have not been developed. Similarly the normative implications of the observed degree of sorting have not been well described.

Moreover, we do not have sufficient evidence regarding the time period over which sorting would occur in response to policy changes. Presumably policy changes that affected incentives for coverage would have ramifications for the distribution of firm size or the distribution of workers across firms, occupations, and industries, but little is known about how long such adjustment would take or how large it would ultimately be. If such adjustments are slow, some empirical strategies, such as those that rely on difference in difference estimators may be less subject to biases due to sorting than they would be if adjustments occurred rapidly.

With imperfect sorting, employer behavior, and internal firm decision making rules, become salient. Competition in labor markets also becomes potentially important as it determines the extent to which firms must take workers' preferences into account when making benefits decisions. Unfortunately, these descriptive correlations leave open the direction of causality: do firms' offering decisions attract particular workers or does the employment of particular workers determine what firms offer?

The practical significance of sorting depends on its magnitude. Sorting based on observed covariates would generally not bias empirical work, but sorting based on unobservables could lead to erroneous conclusions. Thus the degree to which sorting influences results will depend in part on the set of covariates included. The importance of sorting is also likely to vary by research question.

We found one area where we could compare the results from two studies (Chernew, Frick, and McLaughlin, 1997, and Gruber, 2001) that make different assumptions about sorting to assess the magnitude of the different assumptions on results. Specifically, Chernew, Frick, and McLaughlin (1997) examine take-up rates using

variation in employee co-premiums to identify the price effect. They include only workers that work in firms that offer coverage and do not have another source of coverage. The magnitude of the selection bias will depend on the extent of sorting. They also control for worker characteristics, so that within this sample the identifying assumption is that, controlling for these traits, workers do not sort to high or low co-premium firms based on insurance preferences (they may sort on observables). Despite the apparent weaknesses, the strategy of using co-premiums to identify demand systems is not uncommon (e.g., Feldman et al, 1989). Such studies are valuable because the use of co-premiums, as opposed to tax rate variation, to identify demand allows one to assess the demand curve at very different points and using different identifying assumptions. Although it seems clear that studies such as Chernew, Frick and McLaughlin (1997), which rely on variation in co-premiums for identification, could be substantially biased by sorting, Gruber (2001) notes that his results, which rely on an arguably more exogenous source of variation (tax rates) to identify demand, are similar.

B.) *Measuring the price of insurance*

One of the key variables in determining coverage is the price of insurance. However defining and measuring that price is not straightforward. The fundamental complication arises because of the heterogeneity in insurance products. In a full structural demand system, employers and employees would face a myriad of prices for a large number of potential products. Included would be publicly subsidized products. The utility of not having health insurance coverage would be influenced by the availability of free or subsidized care. Because most individuals purchase coverage through their employer, a complete structural model would recognize that employers may perceive (and act on) a set of prices that differs from the set relevant to employees. In such a model, identifying the right choice set for individuals is complicated. Depending on what one assumes about the extent to which health insurance benefits influence worker selection into firms, the set of health plans in an individual's choice set may reflect all plans in the market (assuming the individual can select the firm with his preferred plan) or only those plans offered by his employer (assuming no sorting).

Moreover, if sorting is imperfect, the choice set should reflect options for coverage through one's spouse.

Even if the full set of health plans in the relevant choice set were observed (including their premiums and benefit packages), the multi-layered nature of health care financing affects price measurement. For example, one may opt to use the full premium or employee (or employer) share or some combination of the two as the relevant price measure, depending on what one assumes about the extent to which health care premiums are shifted to groups of workers or to individual workers. Because firm decisions often apply to groups of workers, understanding whether the appropriate price is that facing the median worker, the marginal worker (e.g., most recently hired or most likely to leave the firm), or some other group of workers is important.

In this section we discuss three issue related to measurement of price. First we discuss conceptually what the appropriate price measure would be. Second we discuss whether price should be assumed to vary at the market, firm, or individual level, and finally we discuss issues related to how the wage offset affects the measurement of price.

1. Conceptually measuring price

The dominant paradigm today, reflected in widely used health economics textbooks, defines the price of insurance as the difference between the premium and the expected payout, commonly referred to as the *load* (Feldstein, 1999; Phelps, 1997) The motivation for this approach reflects a definition of the insurance products as primarily a financial instrument. Individuals pay a premium in exchange for an expected payout. As Phelps states in his textbook, "If the loading fee = 0, the premium just matches the expected benefits and the insurance itself would be free." In such a setting the relevant price for each health plan in an individual's choice set would be the loading fee.

Researchers seldom observe the load directly, but instead search for correlates of the load. For example it is generally accepted that large firms face smaller loads than small firms, though the magnitude of the firm size/ load relationship is much more poorly understood. Because insurance is generally purchased with pre-tax dollars, a particularly important correlate of the load is tax rates.

The subsidy for insurance generated by the tax system has proven the foundation for substantial number of investigations of individual behavior (Gruber and Poterba, 1993; Taylor and Wilensky 1983; Royalty 2000) and firm behavior (Leibowitz and Chernew, 1992). Many issues arise when using tax rates as a proxy for loads, for example variation in tax rates is correlated with variation in income and variation in federal tax rates is collinear with temporal trends. We briefly discuss empirical issues related to the use of taxes to identify price effects in the section on identification issues below.

Apart from empirical issues that must be addressed when using tax rates, or other proxies for the load, theoretical issues exist regarding the wisdom of conceptualizing the price of insurance as the load. Specifically, insurance products are much more complicated now than when researchers first started using the load as a measure of price. Even with traditional FFS insurance, it has generally not been recognized that the welfare loss from moral hazard should be thought of as part of the load (the value of the marginal units of care consumed only because insurance reduces their price is less than their actuarial cost). Further, many insurance products provide much more than financial protection, incorporating features to control moral hazard, monitor quality of care, and negotiate favorable medical care prices. These features likely contribute to the administrative costs that constitute the load. Yet they provide real value and may in fact contribute to a lower premium despite the higher load. Essentially, good management can impart just as much value to an insurance policy as good medical care, but the loading-fee measure of price treats management as a deadweight loss -- whereas all medical care is counted as part of the policy's value, even if it is induced by moral hazard.

In a simpler world, the load was positively correlated with premiums. Now that correlation may be much weaker and may even be negative. For example, if a managed care organization incurs some new administrative costs to better control moral hazard, the load rises but the premium may fall and enrollees may prefer the new, higher load policy to the old policy.

If one were to rely on the load as the measure of price, one might conclude that average prices were rising as managed care penetration increased, which could explain falling coverage rates. But managed care products must be offering value for that added load or enrollees would prefer lower load (as traditionally measured), FFS coverage. In a

simple structural demand system, one would expect that the addition of extra products would increase coverage rates as some of the uninsured might prefer the new products to remaining uninsured. More complex models might yield different conclusions because the entry of managed care might influence adverse selection and the pricing of other products, potentially destabilizing equilibrium. Virtually no work examines the impact of managed care on coverage rates from an empirical perspective. Theoretical work suggests that the impact of managed care on the existence of equilibrium is equivocal (Chernew and Frick, 1999).

An alternative price measure is the premium itself. Unlike the load, which explicitly incorporates benefit design into the definition of price (because benefits determine the expected payout), use of the premium as the price measure requires controlling for benefit packages. Essentially this is equivalent to a hedonic pricing approach. Much of the work on competition in insurance markets has used this approach (Wholey et al., 1995).

The tax subsidy measure of price may remain valid even if one abandons the load as the conceptually correct measure of price. It measures a source of variation in premium that generates no value to consumers. Several factors may influence premiums generally but not influence the tax price such as competition in the health care or health insurance sectors or general inflation in health care costs. Interpretation of elasticity driven by variation in these factors requires one to make assumptions about whether these factors generate value to consumers. If they are associated with changes in value, then measures of price elasticity based on tax prices may not be appropriate for assessing elasticity with respect to premiums if the variation in premiums is driven by these other factors.

For example, reasonable evidence suggests that premiums vary due to competition in the insurance industry (Wholey et al., 1995). If tax rates are held constant, changes in insurance market competition may influence premiums and alter coverage rates. To the extent that high premiums due to lack of insurance market competition provide no value, elasticities may be similar to those estimated based on variation in tax prices. However if a lack of competition alters product space or quality, the elasticities may differ.

Similarly, if premium variation is due to variation in prices or costs of medical care we would expect elasticities to differ from those calculated using the tax price differences because this cost variation would affect the utility of being uninsured. In fact, if the medical care price variation is driven by variation in the quality of medical care, the elasticity will differ from what would be observed if the variation in medical care were due to variation in market power of medical care providers.

Finally, over time health care premiums have risen, largely due to new medical technology. Very little is known about how rising premiums will affect coverage rates over time. Elasticities based on tax prices, or cross sectional variation in premiums, will generally not provide appropriate measures of the elasticities of coverage over time. We identified only 2 studies that use multivariate techniques to examine the role of rising costs in contributing to declining coverage rates over time, (Kronick and Gilmer, 1999 and Fronstin et al., 1997). Kronick and Gilmer (1999) relies on national measures of health care costs, relative to income, and generates most of the variance in the cost to income ratio from variation in income, not health care costs. Fronstin et al. (1997) analyzes state level data from 1988 – 1992 and includes only one cost proxy, the price of a hospital day. Both studies treat costs as exogenous.

2. Price at the market/ firm/ or individual level

A separate issue related to price measurement in structural models is whether price should be thought of as unique to a firm or worker or common within markets.

One approach is to treat insurance as a composite good and assume prices vary at the market level. This approach attempts to exploit variation in the menu of prices without worrying about the details of the endogenous choice of plans or benefit packages made by firms or workers. This approach also avoids complicated issues related to the joint nature of insurance decisions within families, in which the prices for coverage for both workers are relevant.[3]

[3] Shur and Taylor, 1991 present descriptive statistics regarding the insurance decisions of two earner couples when both are offered coverage and when only one is offered coverage. Monheit, Schone and Taylor, 1999 estimate multivariate models of coverage decisions in two earner households when both are offered coverage. They treat the benefit availability as exogenous and report that the co-premium requirements are crucial determinants of joint insurance demand.

Models that use the tax price for identification and control for worker characteristics related to tax rates separately, would be a typical example of the market level approach. The elasticities measured relate to the probability of having or offering coverage as a function of the tax subsidy in the given area. The exact price quote or benefit package that would be chosen is treated as endogenous and often variation in worker traits are considered endogenous as well so the identification is solely off changes in the tax price holding constant worker traits in the area. The tax subsidy serves the role of a price index, with the caveat that variation in the tax price may largely be driven by changes in tax rates within particular income classes. If elasticity of demand for insurance varies by income, tax price elasticities would differ from elasticities derived from variation in premiums due to other factors such as market structure (which would likely affect prices faced by all consumers).

Similarly, other work measures variation in price using price lists provided by insurers, though not all firms may have access to these premiums (McLaughlin, et al., 2001, Leibowitz and Chernew, 1992; Marquis and Long, 1995, Swartz 1988). The price quotes serve as a price index. It shouldn't matter very much which policy is taken as the index policy because evidence suggests that premiums for different insurance policies are highly correlated across markets (McLaughlin et al, 2001; Leibowitz and Chernew, 1992). For example, Leibowitz and Chernew observed premiums for several different insurance plans in different markets and found the correlation of premiums among plans to be .99. McLaughlin et al. (2001) observed premiums from different insurers, for different Medigap policies in different markets and found a high correlation among the premiums (though there was substantial variation in premiums within markets from different insurers.) Like the tax price approach, using premiums as price indices holds benefit design constant. The exact price quote or benefit package that would be chosen is omitted from the model because it is endogenous. Because the market price approach does not use data on the relative prices of different benefits packages and plan designs within the market, it cannot address questions related to which plan a firm or worker would purchase, but it may be a reasonable method to address the decision to purchase coverage vs. to not purchase coverage.

The price index approach is imperfect because, institutionally, it is clear that the exact premium quoted to a firm may be a function of firm or worker characteristics. A growing body of literature assumes price is firm specific. Recent work has attempted to estimate multi-stage models that combine hedonic pricing equations and selection corrections to impute prices facing non-offering firms (Feldman et al., 1997; Blumberg et al., 1999; Nichols et al., 2001). These models use a structural approach to infer prices under the assumption that firms who elect not to offer coverage do so in part because they face higher prices. Because of some controversy surrounding these methods, we outline them below.

Feldman et al. estimate a structural model of the decision by small firms to offer coverage. This is treated as a small firm demand equation. The key parameter of interest is the sensitivity of small firms to premiums. The structural model is developed primarily to address the failure to observe the premiums for firms that do not offer coverage. A three-step process is employed. In the first step a reduced form probit is estimated for the offer decision. The second step involves estimation of a hedonic pricing equation based on a sample of firms observed to offer coverage. Because this sample reflects the systematic decisions of firms facing high premiums not to purchase coverage, the premium equation incorporates a selection correction term generated from the reduced form probit. Predicted premiums are generated from the premium equation, incorporating the adjustment for selection. The third step involves estimation of the structural probit that uses the predicted premiums from the second step as the measure of premiums (for all firms). Nichols et al., (2001) adopt a similar approach, although in some specifications they do not include the selection correction term when generating the predicted premiums following the estimation of the premium equation in step 2.

In each case, the structural probit (demand) is identified by excluding supply variables that appear in the premium equation but are assumed not affect the firm's demand directly. In fact, variables may enter the premium equation either directly, or via the selection term which captures, in a complex, non-linear form, the variables from the reduced for probit. The key identifying variables in Feldman et al., 1997 are establishment size, the percent of employees who are permanent, years in business, whether the firm is in an urban area, employee turnover, and a binary variable indicating

whether the number of temporary employees varies by season. These are assumed to affect premiums, but not be correlated with the error in the offering equation. The Nichols et al. (2001) study relies solely on establishment size to identify the structural probit equation, including firm size variables in the structural offer equation.

A key issue with this approach is whether the identifying instruments reflect firm or worker tastes for coverage. For example, if individuals sort in the labor market, individuals in small firms may systematically have a lower demand for coverage. The unobserved taste variables that are correlated with observed, otherwise exogenous, traits related to coverage are included in the error of the structural probit which could generate a bias. For example, if establishment size is used to identify the model, the assumption is that the impact of establishment size on offering accrue exclusively through the impact of establishment size on premiums, without any impact of individuals with low demand for coverage sorting into small firms.

A third method of measuring prices is at the individual level. Such an approach is adopted by Pauly and Herring (2001) who estimate the load that individuals will face based on the average load in their industry and the tax subsidy appropriate for their income and average industry employer contribution. Models that use the tax price as a source of variation, but do not control for individual traits related to tax rates would also fit into this category. Like the market level approach, this approach treats the specific insurance policy that an individual purchased (or would have purchased) as endogenous and does not incorporate the associated premium into the measure of price.

3. How does the wage offset affect measurement of price?

All of the methods of price measurement discussed above ignore the extent to which the employer contributes to health insurance premium. Considerable evidence suggests that the incidence of health insurance premiums falls completely on workers, at least on average (Gruber, 1994). In fact some work indicates that the wage offset is group specific. For example Sheiner, (1997) and Pauly and Herring, (1999) find that older workers, with higher expected expenditures, experience a greater wage offset and Gruber (1994) finds that the cost of mandated maternity benefits falls on women of child-bearing age and their husbands.

Yet, as mentioned in the context of the sorting discussion, many studies use the employee co-premium as the appropriate measure of price and workers seem to respond to this price measure to a greater extent than to the full premium (Chernew et al., 1997). It appears that when employees make health insurance participation decisions they do not anticipate that their decision will influence their wages at the individual level. It also suggests that worker sorting based on co-premiums is not perfect. If workers assume that the ultimate incidence of the employer-paid premiums is on the employer, the group of employees as a whole, or on large demographic sub-groups of employees, the out-of-pocket premium is correct measure of price for determining workers' decisions about insurance take-up or plan choice from the firm's set of offerings.

Given the importance of co-premiums in determining take-up rates, understanding the determinants of co-premiums is important. To some extent workers can select firms whose contribution policies match their preferences. However, competition among firms may influence equilibrium co-premiums. Dranove et al., 2000 present a structural model of co-premiums that emphasizes the desire by employers to avoid providing coverage for employees' spouses. They find empirical support for this model by relating rising co-premiums to rising participation of women in the labor force.

C) Dynamic versus static models

The importance of understanding the dynamics of health insurance arises in part from the likelihood that short and long spells of insurance have different causes and consequences (Swartz, 1994). Short spells may reflect situations such as transitions between jobs while long spells may reflect low employability or an enduring low demand for insurance on the part of the individual. Individuals experiencing short spells without coverage are unlikely to suffer sufficient access barriers to seriously compromise long-term, preventive care, but are still at a non-trival risk of suffering an event that would lead to hospitalization or be considered a pre-existing condition when coverage is restored (Swartz, 1994). It is even possible that extra care will be consumed prior to the loss of coverage (in cases where loss can be anticipated) or after coverage is resumed to make up for any reduced consumption during the short intervening spell without coverage, although Long et al. (1998) found little evidence of these phenomena.

Conversely, those with long spells without coverage would be more likely to suffer decreased health status. Since the causes of short and long spells are likely to be quite different, policy interventions would likely have to be prioritized and targeted to these subpopulations. Static and dynamic models can answer questions that may differ in subtle but important ways (e.g., who does not have insurance at a point in time vs. who is most vulnerable to losing their coverage?).

Virtually no work examines structural models of the duration of spells without coverage. The work in this area has been primarily descriptive or reduced form. Swartz and McBride (1990) examine how individual characteristics that are associated with a lack of coverage at a point are related to duration of being without coverage. They find, among other things, that individuals who are employed at the beginning of the spell are likely to have short spells. Work by Swartz, et al. (1993a and 1993b) estimates hazard models of the duration of spells of uninsurance. Predictors are baseline characteristics measured the month before the uninsurance spell began (income, industry of employment, work status, education, demographics, and region).

Recent work has focused on particular demographic subgroups, including children (Czajka, 1999 and 2000; Lin and Lave, 1998), the near elderly (Jensen, 1992; Sloan and Conover, 1998), single women (Short and Freeman, 1998), and Medicaid recipients (Berger and Black, 1998).

Two recent papers (Czajka, 1999 and 2000) examine the dynamics of insurance and uninsurance among children using the 1992-1994 SIPP. Czajka presents information on spells of insurance and uninsurance, transitions between different types of insurance, participation vs. eligibility for Medicaid, and the relationship between coverage transitions and "trigger events" such as changes in a parent's employment. The trigger events are primarily endogenous and no attempt is made to identify exogenous events.

Jensen (1992) and Sloan and Conover (1998) examine dynamics of insurance among the near elderly. Both examine the effects of precipitating events such as changes in employment status, again without looking for exogenous reasons for such events. In addition, Sloan and Conover estimate the effects of a variety of state policies with respect to health insurance regulation, cost, and availability. They do not address the endogeneity of job changes but do recognize the potential endogeneity of policies to

public attitudes towards health insurance. They address the public policy endogeneity using a difference in difference approach. Interpretation of these longitudinal models requires a sense of whether the system is in transition or has already settled into an equilibrium. The rate of positive transitions (into coverage or into better coverage) might be different if the insurance-friendly policies were recently adopted, capturing a one time transition rather than a steady state flow between insurance states.

Rather than taking employment status as exogenous, Short and Freedman's (1998) study of insurance dynamics among single women explicitly estimates a reduced form model. If sufficiently powerful, exogenous predictors of employment (e.g., variations in macro conditions) could be identified, a more structural approach may be feasible in this subpopulation and others who are likely to be relatively sensitive to such conditions.

This work provides a reasonable, descriptive understanding of the duration of uninsurance and transitions into and out of the insurance pool and sets the stage for more detailed, structural evaluations. Such investigations could examine the effects of levels and changes in exogenous variables on insurance status, use IVs to examine the effects of levels and changes of endogenous variables (e.g., changes and variations in macroeconomic conditions could proxy for employment; non-labor income could proxy for earnings). Even determining what variables are exogenous takes on new dimensions in a dynamic context. For example, modelers need to distinguish between exogenous baseline characteristics, exogenous time-varying characteristics, pre-determined endogenous variables, and contemporaneous endogenous variables.

D) Identification issues

Articles that attempt to control for the endogeneity of key explanatory variables typically use one of two methods, instrumental variables or natural experiments. These two approaches both seek to identify endogenous effects by finding variables correlated with the endogenous variable, but orthogonal to the error term. Despite this fundamental similarity, the approaches differ in a variety of ways. The IV models typically rely on variables that would be considered endogenous in other settings, but not related to the relevant error term (e.g. cost shifters can be used to identify a demand equation). Rarely

is the exogeneity indisputable, but most studies appeal to a theoretical motivation for why the identifying variables satisfy the criteria of suitable instruments. Testing the validity and power of instruments is important and a topic of much recent work (Bound et al 1995; Staiger and Stock, 1997).

The natural experiment studies seek some exogenous event generated by nature to generate identification. Rosenzweig and Wolpin (2000) distinguish between exogenous factors truly generated by nature (season of birth, twins, etc.) and factors reflective of regulatory action or public policy. Some recent work has questioned the exogeneity of the regulatory action or public policy variables. Noting that these 'experiments' are generated in a political context that may be influenced by factors related to primary equations of interest (Besley and Case, 2000; Levitt 1997; Kubik and Moran, 2001).

Another concern with much of the natural experiment work that relies on state level policy initiatives for identification is the validity of the reported standard errors. Bertrand, Duflo, and Mullainathan (2001) generate 'placebo' laws at the state level and test for the effects of these randomly generated 'laws' on female wages. They find a statistically significant effect, at the 5% level, about 45% of the time, suggesting that the standard errors are seriously biased downward. Several solutions exist. For example, Arellano (1987) suggest using Huber/White standard errors.

Several types of natural experiments are commonly relied upon in the literature related to the causes and consequences of lack of coverage. One commonly used source of 'natural experiment' is the cross-sectional variation and changes over time in state and federal tax rates to identify the effect of the price of insurance on coverage. (See for example, Gruber and Poterba, 1994; Gruber, 2001; Gruber and Lettau, 2000; Leibowitz and Chernew, 1992; Royalty, 2000). The use of tax rate variation is attractive because tax policy is often driven by factors other than those directly related to health care. However, authors using this source of variation often note that cross sectional variation in taxation may be correlated to average market level taste for insurance and it is possible even that changes in tax rates are related to unobserved demand variables.

To address these concerns, Gruber (2001) and Gruber and Lettau (2000) employ the National Bureau for Economic Research's TAXSIM model to simulate the extent of the tax subsidy to insurance by state, year, and earnings decile. This simulated variable

serves as an instrument for the price of insurance. Since the model separately controls for state, year, and decile of earnings, along with a wide variety of other variables that may be related to the demand for insurance, identification of the tax price effect is the interactions of states, years, and earnings deciles.[4] Essentially, the variation in tax price arises from point in time variations in progressivity of tax schedules and changes over time in the structure of federal and state taxation that have differential impacts across the income spectrum. Because some of these changes may be correlated with the demand for insurance, they also perform sensitivity analyses adding year*state and year*income decile interactions. With these interactions, identification is through differences across states in progressivity of their tax schedules and changes over time in progressivity.

The range and variation in tax price is important in drawing inferences about which firms or workers the estimated elasticities reflect. The decisions of firms that would offer insurance (or workers who would have insurance) even if they faced high tax prices (low subsidies) are not reflected in the estimates (their decisions are not "marginal" to the observed range of tax prices). Likewise, firms (or workers) who would not offer or hold insurance even if they faced low tax prices are not reflected. Thus, the estimates reflect the behavior of "marginal" firms of workers who would offer or hold insurance at some observed tax prices but not at others (Angrist, et al, 1996). Thus, it is important to understand the range over which the observed tax prices vary.

In Gruber and Lettau (2000) the average tax price among each firm's sample of workers was 0.741 with a standard deviation 0.058 indicating the most of the firms were in a range of about 0.65 to 0.85. In Gruber (2001), the mean tax price among individuals was 0.65 with a standard deviation of 0.093, implying an approximate range of 0.50 to 0.80. However, since much of this variation can be traced back to variation in income, year, and state (factors separately controlled for in the models due to the potential for endogeneity), the actual range and variation being used to estimate the tax price effect is less clear. This is even more true in specifications the include year*state and year*income decile interactions.

The additional levels of differencing (or in a multivariate context, additional levels of interactions) are intended to provide greater assurance that the variation being

[4] In Gruber (2001), a fourth level interaction with marital status is used.

used to identify the tax price effect is truly exogenous to the demand for insurance. However, this assurance comes at a cost. Every level of differencing and every additional set of control variables reduces the fraction of the overall variation in tax prices that is actually used to estimate the tax price effect. This issue is often treated as solely one of statistical power, with an implicit presumption that if the coefficient of interest can nonetheless be estimated precisely there is little reason to be concerned about the loss of variation in the tax price.

However, an important, often unrecognized issue also exists. In the extreme, much of the remaining, independent variation of the tax price measure may reflect only a few anomalous cases (e.g., states with tax policies very different than the national norm for certain income groups). Such observations may be far from the norm for a variety of unobserved reasons. As these potentially atypical cases make up a larger fraction of the variance actually used to identify the tax price effect in models with more levels of differencing or interactions, it can become difficult to pinpoint the true source of identification and the range of tax prices to which the estimated elasticity applies.

To use an analogy to the natural experiment literature on education, twins data have been used to identify the impact of education on earnings (Behrman and Rosenzweig, 1999). Presumably, differences between identical twins in educational attainment and earnings would not reflect many of the common sources of spurious inferences: genetic ability, home environment, parental resources, and birth cohort. This should allow clean inferences about the relationship between education and earnings if enough variation remains to precisely estimate the coefficient on education. However, these estimates may still be problematic. Most twins have similar educational attainment. Thus, identification is derived primarily from the relatively few sets of twins whose educational attainments differ substantially. These cases may themselves be unusual, reflecting a variety of unobserved anomalies such as one twin having suffered an accident or illness or substance abuse problem while the other twin did not. If these anomalies drive the variation in both education and earnings, the model would not uncover the structural coefficient on education and may well lead to a more biased estimate than would be derived from a non-experimental model.

Despite these cautions, the tax policy natural experiment may still provide the most convincing available source of exogenous variation in the price of health insurance. However, an analysis of which observations are providing the bulk of the identifying variation could clarify the range of subsidies to which the results pertain and provide greater assurance that the results are not being driven by a smaller number of atypical cases.

E. The impact of labor market competition on firm behavior

Another issue that arises in estimates of employer offering decisions is the role of competitors in determining whether a firm offers insurance. Feldman et al (1997), Blumberg, et al (1999), and Nichols (2001) are among the most sophisticated studies to examine this issue. In these studies, the authors include measures of whether competitors (in product or labor market space) offer coverage. These variables are treated as exogenous. A more structural treatment would recognize the correlation in competitor behavior. This correlation may occur because of a structural model in which competition drives firms to offer coverage if competing firms do, analogously to the medical arms race models. Alternatively, structural models might have a niching feature in which some firms offer and others do not, facilitating worker sorting. This type of niching is analogous to the models of the crowding out of charity care. A third possibility is that there is a common market shock that causes all firms to act similarly. One possibility would be to instrument for other firm's behavior with other firms' characteristics, as is done in the charity care literature (e.g., Frank and Salkever, 1991), but this requires detailed information on competitors which might not be available.

F. The impact of policy on premiums and co-premiums and the importance of competition

Implementation of government policies to encourage insurance coverage may influence the equilibrium value of premiums and co-premiums which may influence the costs and impact of the government policies. For example, depending on the extent to which subsidies shift the demand for insurance, and indirectly for medical care, and depending on the extent of adverse selection in health insurance markets, policies which subsidize the cost of insurance will alter premiums.

The magnitude of the demand shift effect depends on the degree of competitiveness in the insurance and medical care markets. If both markets are constant cost and perfectly competitive, with U-shaped average cost curves, the demand curve shifts will not influence equilibrium premiums in the long run. If insurance markets or medical care markets are not perfectly competitive, the shift in demand curves induced by subsidies would tend to increase premiums.

We would expect variation in the degree of competitiveness across insurance markets. Wholey et al. (1995) present a model which relates premiums to the elasticity of demand faced by HMOs. They note that the firm level elasticity will vary with market structure variables. Premiums will also vary with competition from non-HMO health plans and with market level elasticity of demand for coverage. Understanding the variation in insurance market competitiveness across markets is important because such variation could influence the impact of policies designed to increase coverage.

Relatively few empirical studies have investigated competitiveness in health insurance markets and they have focused on the HMO market (Feldman et al, 1993; Wholey et al., 1995). Typically this literature measures HMO competition as a function of the number of HMOs and of HMO penetration. Although the endogeneity of competition is recognized, existing work does not attempt to adjust the estimates. For example, Wholey et al., note the endogeneity argument and argue that lags in entry decisions minimize the bias and that the bias would result in an underestimate of the competitive effect.

Their empirical work supports the model. Premiums do respond to measures of competition. Although the theory presented in Wholey et al. explicitly relates to elasticity parameters, the empirical work is not tied explicitly to these parameters. Thus, we can conclude that competition can lower premiums, but we cannot ascertain the extent to which competition exists even in the most competitive markets.

In addition to competition in insurance markets, competition in medical care markets is relevant to the impact of coverage on premiums. As more individuals obtain coverage the demand for medical care rises. The extent to which this will increase premiums in the long run depends on the competitiveness of medical care markets. If

medical care markets are not competitive, increased coverage will cause increased premiums even if insurance markets are perfectly competitive.

There is an extensive literature on competition in health care markets, which we do not have space to review. Several points are worth noting. First, conventional wisdom is that prior to the growth in managed care, competition in medical care markets increased costs due to a medical care arms race (Luft et al., 1986). Feldman et al. (1986,) report hospitals in Minneapolis had substantial market power in 1981.

Since the growth of managed care, medical care markets may have become more competitive. Zwanziger and Melnick (1988) report a change in competitiveness in California as managed care has grown. A similar finding is reported by Dranove, et al. (1993). The degree to which a competitive market exists will depend on the hospital market structure and the insurance market structure. For example, using California data through 1994, Chernew, et al. (2002) report that HMOs paid close to marginal cost for open heart surgery, suggesting competitive pricing for medical services in the HMO market, but that FFS insurers paid above costs, suggesting hospitals had market power when serving these payers. They do not estimate the precise elasticity in the FFS market. Only the HMO returns were sensitive to hospital market structure. More detailed work is needed to understand variation in competition and how provider margins respond to coverage rates.

Even if the medical care market is competitive, increasing coverage rates could raise premiums because of the connection between coverage and development of medical technology. There is widespread consensus that the development and diffusion of medical technology has been a primary cause of rising health care expenditures (Chernew, et al., 1998; Newhouse 1992; Scitovsky 1985; Scitovsky and McCall 1975; Cutler and McClellan 1996; Cutler, 1995).

It is likely that such technological development is related to coverage rates. Peden and Freeland, 1995 suggest that as much as 70% of the impact of cost increasing technologies on expenditure growth can be indirectly attributed to insurance coverage. Yet very little is known about the extent to which increased coverage, at the margin, would affect technology development. Moreover, if the financing system becomes more dominated by managed care, incentives to develop technology change (Gelijns and

Rosenberg, 1994). Very little evidence exists concerning the extent to which managed care will alter the process and nature of medical technology developments and the ramifications his will have for premiums and hence coverage rates.

Apart from the demand shift effects on premiums, subsidies may alter equilibrium premiums by altering the average health risk of the insured. Theory is equivocal regarding whether the uninsured are healthier than the insured. Models of adverse selection would suggest that the uninsured would be are systematically healthier. However, cream skimming on the part of insurers and the correlation between income, health status and coverage may result in an uninsured population systematically sicker than the insured population. Evidence supports the notion that there is great heterogeneity among the insured regarding health status, with publicly insured individuals being less healthy than privately insured. As a whole, the insured appear to be on average more healthy than the uninsured, unconditional on income (Personal Communication, Bradley Herring, 2001). Conditioning on income may alter the conclusion. Pauly and Herring (1999) report no relationship between risk and coverage among high income individuals. They also report that certain high risk, low income workers are less likely to be covered than low risk counterparts. The impact of selection on premiums as coverage rates rise depends more on the health of the marginal individual gaining coverage as opposed to the average health of all uninsured. Very little empirical work examines the health status of the marginal individuals (which likely depends on the exact policy adopted). One exception is the work of Pauly and Herring 2000, which is based on a structural model of coverage, allowing simulation of such effects in the case of a subsidy for coverage.

A final mechanism through which expanded coverage might influence premiums is through reductions in the burden of charity care on providers stemming from increased coverage. Dranove (1988) presents a model of cost shifting in which hospitals increase prices to private payers as public payers decrease reimbursement. By analogy, one might assume that if reimbursement increases for currently uninsured patients, prices would fall for insured individuals, leading to lower premiums. In essence this would be 'reverse cost shifting'.

Whether such an effect would occur in response to increase coverage remains uncertain. Dranove (1988) presents some evidence supporting the model of cost shifting

based on data from Illinois in the early 1980s. Yet, even if we accept this evidence, and assume evidence for cost shifting could be considered evidence for 'reverse cost shifting', which may not be true, the theoretical model indicates that the ability of hospitals to cost shift depends on the extent of their market power. As discussed above, it is likely that in many markets hospitals have lost market power since the early 1980s. Thus the extent to which reverse cost shifting would hold down premiums remains unclear.

Taken together, one realizes that there are a variety of ways in which increased coverage could affect premiums in equilibrium. Empirical evidence of the direction and magnitudes of these effects, separately or in combination, are lacking.

Apart from the effect of subsidies on premiums, subsidies may also affect co-premiums. For example, the model of Dranove et al., (2000) which indicates that higher tax subsidies reduce co-premiums. Empirical studies of this phenomenon are also lacking.

IV Conclusions

The basic framework developed above highlighted the myriad of structural relationships that exist between the five key types of actors whose decisions and interactions determine health insurance coverage in the population. Understanding these relationships is crucial for the development of valid policy simulations. Unfortunately, the complexity and shear number of these linkages ensures that such simulations will always have to rely to a certain extent on assumptions and on empirical estimates that fall short of the ideal. Nonetheless, careful attention to the issues highlighted in this review can aid in both the interpretation of existing findings and the formulation of future research.

There are several topics that we believe are of particular interest and deserving of more attention. First, considerably more attention needs to be devoted to measuring the magnitude of employee sorting among firms on the basis of health insurance. Current evidence suggests that, though sorting exists, it is not perfect and empirical work is inconsistent in its consideration of such sorting. Future research must improve our understanding of the extent to which such sorting influences econometric strategies for

identifying the causes and welfare implications of lack of coverage. For example, appropriate model specification (e.g., are worker characteristics exogenous to the firm and are firm characteristics exogenous to the worker) and interpretation of empirical findings rely heavily on the extent of sorting. With very strong sorting, employers are primarily a "pass through" whose decisions have little impact on the prevalence and distribution of coverage in the population. With less perfect sorting, employers become active and important players.

Second, greater attention must be paid to the conceptualization of the price of insurance. Theoretical concepts of price such as the load or the absolute premium may not be correct in many decision contexts, particularly in a world of differentiated insurance products. In policy environments considerable confusion may arise due to definitional inconsistencies regarding normally straightforward parameters such as elasticities.

We believe the common definition of the price as the load distracts attention from several research questions that deserve great attention. These questions include a) how the patterns of coverage will change over time as premiums rise (largely due to medical technology and b) how the development of managed care will affect coverage rates (even though it may increase loads). The first question is important because it addresses the long term impact of policies to encourage coverage. The second question is important because current political debate surrounding limits on managed care may be perceived in a different light if the option of managed care prevented a meaningful number of individuals from losing coverage entirely.

A third general area of research that deserves greater attention is the dynamic aspects of health insurance because short and long-term lack of coverage are quite different phenomena. Models of the dynamic patterns of coverage must be explicit about the process that generate changes in coverage status and the extent to which these triggering events are endogenous, exogenous, and/or subject to policy manipulation.

Fourth, greater research is needed to understand the extent to which key variables such as health insurance premiums will respond to policies designed to influence coverage rates. Theory is ambiguous in this regard, but these indirect effects may overwhelm the direct effects of policy initiatives.

Fifth, as in all empirical work, issues of identification are crucial. As always, the validity of instruments in IV models is a central issue. In addition, we believe more attention should be paid to the potential endogeneity of public policy actions that are commonly considered natural experiments and thus truly exogenous. Tax rate changes are perhaps the most clearly exogenous, though they may affect only a narrow set of workers (in terms of income level or location) in a narrow range of price variation. Other health related regulations might be less exogenous. Moreover, we believe the field would benefit from greater examination of the extent to which the well-known critiques leveled against instrumental techniques apply to some of the natural experiment work. Specifically, we believe that a greater understanding of the range and source of variation in natural experiment work would be valuable.

Identifying research strategies that can adequately address these areas is complicated. Clearly there is room for novel identification strategies and data gathering exercises (for example, there are no publicly available databases that exist that measure longitudinal or cross sectional variation in premiums). As progress is made in these areas, researchers will be much better able to inform policy makers regarding the impact of strategies aimed at increasing coverage rates.

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