Structural Factors Affecting the Health Insurance Coverage of Workers at Small Firms

by

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Small business owners cite the cost of employer-sponsored health insurance (ESI) as their most pressing problem; according to the National Federation of Independent Business, this issue is more important than taxes, labor quality, and government red tape. The Kaiser Family Foundation has reported significant increases in health insurance premiums for the past several years, and several studies have documented the struggles that many entrepreneurs face in offering health insurance coverage to their workers. For instance, prior research by the Office of Advocacy has shown that employees at small firms are less likely to have coverage than the employees of larger entities.*

This report analyzes state and metropolitan statistical area (MSA) variations in the cost of employer healthcare and ESI coverage rates. Several important factors are investigated, including the impact of local market characteristics, the composition of the workforce, and the efficiency in delivering healthcare services. The goal of this research is to understand the complex interactions of the healthcare market and the cost of insurance and their impact on workers at small businesses.

Overall Findings

The two most important factors associated with being uninsured are wages and firm size. Individuals who work for a small firm or who receive a lower wage are less likely to have health insurance coverage. Workers at firms of 100 to 249 employees spend the most on healthcare expenses, suggesting that the largest firms may be more likely to self-insure and keep a closer watch on benefits and expenditures. This finding may also suggest that the employees of the medium-size firms with 100 to 249 employees have more generous benefits.

Highlights

- African-American employees are as likely as their white counterparts to have health insurance; Hispanics are less likely to be covered.
- Workers in states with higher concentrations of Medicaid beneficiaries are more likely to lack private health insurance. Workers in states with higher per capita healthcare expenditures are less likely to lack private health insurance.
- Workers in MSAs with higher birth rates spend less on healthcare and are less likely to be insured.
- Individual union members have greater average healthcare expenditures than non-union members; they are also more likely to have ESI coverage. Workers in MSAs with greater manufacturing and white-collar industries are more likely to have ESI coverage than other workers.
- Workers in MSAs with a greater number of hospital beds have higher total healthcare expenditures, but there is no association with ESI coverage rates for those workers. Similarly, labor and capital costs (nurses and hospitals) are associated with higher individual expenditures, but not ESI coverage.
- MSAs with higher rates of specialty services are associated with higher total healthcare expenditures but not ESI coverage rates. The key specialty services examined are ambulatory surgical centers, advanced imaging centers, alcohol and drug rehabili-

*Joel Popkin and Company. *Cost of Employee Benefits in Small and Large Businesses.* U.S. Small Business Administration, Office of Advocacy. August 2005. **www.sba.gov/advo/research/rs262tot.pdf.**

tation centers, and having a greater supply of emergency room physicians.

- The research suggests that MSAs with higher rates of health maintenance agreements (an indicator of health maintenance organization penetration) had more competition and lower healthcare costs. However, no direct link to ESI coverage rates could be discerned.

Scope and Methodology

Micro-level data from the Medical Expenditure Panel Survey (MEPS) were used for the analysis. MEPS is a collection of large-scale surveys of families and individuals, their medical providers, and employers across the United States. The MEPS data were selected for this study because surveys are conducted more frequently than other sources over a greater number of metropolitan areas, and local access to small area identifiers is available through the MEPS data center.

The report uses basic logistic and hazard models to test the micro-level predictors on having private healthcare insurance and healthcare expenditures, respectively. The micro-level predictors included demographic, household, health status, and employment variables. Random effects models were used to test state- and MSA-level measures to test the various hypotheses of ESI coverage rates.

This report was peer reviewed consistent with the Office of Advocacy's data quality guidelines. More information on this process can be obtained by contacting the director of economic research at *advocacy@sba.gov* or (202) 205-6533.

Ordering Information

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1. Introduction

Small business owners cite the cost of employer-sponsored health insurance (ESI) as their most pressing problem—more critical than taxes, labor quality, and government red tape (National Federation of Independent Business, 2006). The difficulties experienced by small employers coupled with trending healthcare costs have left workers at small firms with fewer health insurance options (U.S. General Accounting Office, 2000 and 2001). Providing health insurance through the workplace, especially for large employers, offers clear economies of scale. Smaller firms tend to derive a greater benefit through tax subsidies; although, low-wage workers are less likely to have ESI coverage (Glied, 2005).

The 1990s witnessed a flurry of state and federal reforms to ESI markets aimed to help address some of these issues, including guaranteed coverage and rate restrictions (GAO, 2000; Glover et al., 2000). At the federal level, the Health Insurance Portability and Accountability Act (HIPAA) and the Employee Retirement Income Security Act (ERISA) affected both small and large firms. Unfortunately, state and federal reforms have failed to increase the rates at which small employers offer ESI to their workers (AHRQ, 2004). Health insurance purchasing cooperatives were crafted to assist small employers, but they have been similarly unsuccessful in stemming the tide of increased ESI costs for small employers (Wicks, Hall, and Meyer, 2000).

A great deal of research has been conducted on micro- and organizational-level determinants of ESI coverage rates at small firms. This paper departs from existing research by examining macro-level variations in ESI coverage rates and healthcare expenditures, including heterogeneity across states and metropolitan market areas. Several important factors are investigated, including the impact of local market characteristics, the composition of the workforce, and the efficiency in delivering healthcare services. The goal of this research is to understand the complex interactions of the healthcare market and the cost of health insurance and their impact on workers at small businesses.

2. Literature Review

A number of surveys have been used to create nationally representative estimates of the number of people without insurance coverage. Depending on the survey and timeframe, estimates of the number of uninsured non-elderly Americans ranged from 19 million to 44 million during the mid- to late-1990s and 46.6 million persons in 2005 (U.S. Census Bureau, 2006b). The wide range can be attributed to the varied survey sources, methodologies, and timeframes (CBO, 2003). Using projections for national healthcare, Gilmer and Kronick (2005) projected that the number of non-elderly uninsured Americans would grow to 56 million by 2013. Clearly, uninsured workers are a significant and growing segment of America.

Correlates of Lower Health Insurance Rates at Small Firms[1]

Compared to large employers, small employers are less likely and/or able to provide ESI to their employees. In firms of 1,000 or more employees, 79 percent of workers receive ESI, compared to the 70 percent covered in firms with 25 to 99 employees (Fronstin, 2005a). Using 1996 Medical Expenditure Panel Survey Insurance Component (MEPS-IC) data, Branscome (2004) documented that smaller firms were less likely to offer health insurance to their employees at the national level and in the 40 states for which estimates were possible.

Workers may lack health insurance under varying circumstances: when not offered by their employers (offer rate), when they have not met eligibility requirements, or when they chose to forgo ESI (acceptance rate). Between 1988 and 1997, offer rates remained relatively constant. Over that same period, however, the number of workers eligible to participate in ESI declined from 82 percent to 75 percent. This drop in offer rates was attributed to increased use of part-time, temporary, and contingent workers. In more recent years, the drop in offer rates coincided with increased cost-sharing by workers and has been attributed to the weak labor market and rising health benefit costs (Fronstin, 2005a; Gabel et al., 2005).

Among firms employing three to nine workers, the lack of ESI is particularly acute. In 2005, fewer than half of these very small firms offered ESI to their employees, compared to nearly all firms with 200 or more workers (Kaiser Family Foundation, 2005). Offer rates also vary by type of industry, region of the country, state, race, and ethnicity. The principal reason given by employers for not offering ESI is that workers decline ESI when it is offered because of cost. Regardless of firm size, two out of three workers accept ESI when it is offered. A second reason for declining ESI is worker coverage by another plan, typically their spouses' plan. Data summarized by the Employment Benefit Research Institute show take-up rates declining from 89 percent in 1988 to 83 percent in 1995 to 82 percent by 2001 (Fronstin, 2005c).

[1] Some workers may also elect to obtain coverage through a family member and their health insurance plan or seek independent, non-employer coverage.

ESI premiums, meanwhile, increased by 59 percent between 2001 and 2004 (Gabel et al., 2004). Nearly 68 percent of the 2.5 million uninsured workers eligible for ESI cited high cost as their reason for rejecting coverage. Although only 1 percent of these stated that they preferred higher wages in lieu of coverage, another 4 percent felt they did not need health insurance. In the words of the author, "...these responses indicate that these uninsured workers generally desired coverage but considered it too expensive" (Thorpe and Florence, 1999). Managed care practices were useful in stemming the large premium increases in the early 1990s, but have since been ineffective (Enthoven, 2003). ESI plans have evolved into a widening package of employee contributions that include increased premium payments, deductibles, co-payment amounts, and benefit options.

In response to rising employee premium contribution rates, the Agency for Healthcare Research and Quality conducted research on the impact of contribution amounts on acceptance rates. When employee premium contribution rates were set to zero, projected enrollment rates increased by 20 to 25 percent. For low-wage establishments, enrollment rates were projected to increase by about 10 percent (AHRQ, 2004). Issues affecting offer rates by employers are less tractable. Although small firms are likely to have less favorable cost structures, firms with large numbers of low-wage workers, high turnover, no unions, and many part-time workers tend to have lower offer rates (AHRQ, 2004).

It is not surprising that small firms are likely to offer lesser-valued ESI coverage or none at all. One study looked at two cost-saving options available to employers: reducing benefits and increasing employee cost-sharing (Lee and Tollen, 2002). The authors developed actuarial models using data on small firms and found that eliminating specific benefit types produced greater savings than reducing those benefits. Increasing the amount of cost sharing produced an even greater savings (44 percent) than eliminating benefits (Lee and Tollen, 2002). If small firms could reduce administrative costs and reduce the cost of ESI coverage, more small firms may elect to provide benefits.

Characteristics of Workers at Small Firms and ESI Enrollment

Employed spouses and family members can enroll in family plans to avoid the disadvantages faced by their small employers who may or may not offer ESI coverage. However, some low-wage workers at firms of all sizes, including older, younger, and immigrant groups, are less likely to have ESI coverage. About 70 percent of non-elderly Whites receive ESI, but only 42 percent of Hispanics are insured through their workplace. Although Whites and African Americans not receiving ESI are most likely to receive publicly-funded insurance (e.g., Medicaid), Hispanics are more likely to be uninsured than to receive public insurance (Fronstin, 2005a).

In 2003, 38 percent of working-age Hispanics were uninsured, compared with 16 percent of White males (AHRQ, 2004). About 36 percent of young adults ages 19 to 24 and 23 percent of older working women (ages 55 to 64) with health problems were also uninsured. These numbers fail to reflect workers in the informal labor economy who were not part of the Medical Expenditure Panel Survey (MEPS) sample used by researchers. Informal or casual

labor is more likely to be performed by immigrant Hispanics and Asians. For male breadwinners, their families are also unlikely to have access to ESI, though they may be eligible for public services.

For all-sized firms, service sector (wholesale, retail, personal, and service) employees had higher rates of uninsurance than other industries (Popkin and Company, 2005). Ten to 23 percent of part-time and seasonal employees had ESI coverage; although, many may have obtained individual coverage or were covered under a family member's plan. When housing costs and/or family expenses are high, the contribution costs are more likely to be out of reach for these special population subgroups.

Personal income is, by far, the strongest determinant of a worker receiving health insurance from any source (Fronstin, 2005a). Fewer than one in four persons earning below $30,000 per year are insured. By contrast, about 19 of 20 persons earning $50,000 or more per year are insured. Medicaid is the principal source of public health insurance and, for those earning below $20,000 per year, public insurance is the source of health insurance. The percentage of those receiving ESI is commensurate with earnings increase. According to Department of Labor statistics, only 58 percent of workers earning less than $15 per hour had access to ESI compared with 87 percent of higher paid workers (U.S. Department of Labor, 2005a).

Structural Factors Impacting the Cost of Health Insurance

A number of important structural factors in the U.S. labor market have changed over the last 15 years as ESI costs have increased. Some reflect changes in the labor market; others reflect the changing nature of work and global competition among firms. As less industrialized countries developed cheaper manufacturing capabilities, U.S. firms increased their outsourcing to firms overseas. The net result was that union-protected wages and benefits eroded, especially in lower skilled industries. With fewer jobs and higher healthcare costs, more firms relied on part-time workers. As new employment grew overseas, the workforce of those 50 years and older—with accompanying higher healthcare costs—became a greater proportion of employees in U.S.-based industries.

Once a mainstay of employment and of ESI, manufacturing is no longer the principal source of employment for many Americans. Of workers aged 18 to 64, 24 percent were employed in the manufacturing sector in 1987. By 2002, that percentage had dropped 5.2 percent to 18.8 percent. Of these workers, 78.9 percent received ESI from their employer in 1987, but only 69.4 percent received benefits in 2002 (down 9.5 percent) (Fronstin, 2004; Kaiser Family Foundation, 2005). During this same period between 1987 and 2002, the number of workers employed in the service sector increased from 17.7 percent to 26.4 percent (up 8.7 percent). ESI for service sector employees also increased during this interval (from 48 percent to 51 percent), but rates remain well below the 73.2 percent of those in public sector jobs who receive ESI.

Data on employers of 50 or more workers, compiled by AHRQ using 2002 MEPS data, found that although those providing professional services had higher than average enrollment

(67 percent versus the national average of 62.7 percent), those in retail trade, construction, and other services had the lowest rates (43.3 percent, 58.0 percent, and 42.1 percent, respectively). These percentages can be contrasted with the 82.3 percent of mining and manufacturing workers in this survey who received ESI (Fronstin, 2004; Kaiser Family Foundation, 2005).

Firms that employ union workers are much more likely than firms without union workers to offer health benefits to their employees. Ninety percent of firms with union workers offer health benefits, whereas only 59 percent of firms that do not have union employees offer health coverage (Kaiser Family Foundation, 2005b). This is partially explained by the overlap of union jobs with other structural aspects of ESI. In 2003, fully 95 percent of union workers were employed full time (Fronstin, 2006).

Union workers tend to have higher earnings than nonunion workers and are more likely to work in manufacturing (13.9 percent) or in the public sector (40.7 percent) (U.S. Department of Labor, 2005b). Union membership has steadily declined from a high of 20.1 percent in 1983 to 12.5 percent of all wage and salary workers in 2004, reducing the total number of employees with ESI (U.S. Department of Labor, 2005b). The decline in union participation in the private sector (e.g., manufacturing) may be partly responsible for the decline in ESI coverage as union contracts generally include ESI coverage benefits.

Also affecting ESI is the shift towards more part-time, temporary, and contract workers (Fronstin, 2004). In 2004, fully 72.7 percent of family heads who were full-year, full-time workers received ESI. For those workers who were family heads, but who did not work full-year, full-time jobs, only 39.2 percent received ESI. The majority of these other workers relied either on Medicaid for coverage (27.9 percent), were uninsured (27.4 percent), or purchased their own insurance (11.1 percent) (Fronstin, 2005a). Among firms with 50 or fewer workers, firms with smaller proportions of full-time workers are less likely to offer health benefits. More than one-half of employers not offering health benefits and 30 percent of employers offering health benefits report that fewer than 80 percent of their employees work full time (Fronstin, Helman, Greenwald, and Associates, 2003).

Large firms are much more likely to offer ESI to part-time workers. In 2005, fully 65 percent of firms with 5,000 or more workers offered ESI to part-time workers. By contrast, only 27 percent of firms with 3 to 24 workers offered ESI to part-time workers. Temporary workers fare much worse. Although large firms are more likely than small to offer temporary workers ESI, relatively few temporary workers are offered ESI. Only 9 percent of firms employing 5,000 or more workers and 3 percent of firms with 3 to 25 workers offered temporary workers ESI in 2005 (Kaiser Family Foundation, 2005).

State Policies and Programs

States have traditionally regulated insurance. Each state has a department of insurance with enforcement staff and procedures in place. States impact ESI costs in several ways: regulatory costs (including plan rating requirements), administrative expenses, and mandated

plan benefits. Under premium compression regulations, the insurer increases the premiums it charges its lowest-cost or healthiest firms and reduces the premiums it charges its highest-cost or less healthy firms. The intent of premium compression is to reduce the disparity between high- and low-cost premiums. Instead, most studies show that the overall cost of health insurance increases in those states that mandate premium compression regulations or that premium compression rules generally decrease ESI coverage (CBO, 2005). Marsteller and others found a decrease in private coverage of one percentage point when premium compression laws were imposed on the small group market (CBO, 2005; Marsteller, Nichols, Badawi, Rajan, and Zuckerman, 1998). According to the Congressional Budget Office (CBO), this corresponds to a loss of approximately 2.3 million enrollees (in 1999 population figures; CBO, 2000).

Simon's study of insurance coverage using a nationally representative sample and the microsimulation study by Buchanan and Marquis support the finding of a significant loss in coverage as a result of premium compression laws (Simon, 1999; Buchanan and Marquis, 1999). According to Simon, "…within small firms, low-risk individuals experienced a 5.7 percentage point decline in the rate of coverage through their employer, while the coverage rate of high-risk individuals does not appear to decrease" (Simon, 1999). Sloan and Conover, on the other hand, found no significant effect on coverage in the small-group market (Sloan and Conover, 1998). Buchmueller and DiNardo found no effect on coverage, but noted a switch from fee-for-service plans to managed care plans in response to premium compression rules (Buchmueller and DiNardo, 1999).

Health insurance companies' administrative expenses for can be divided into four categories: transaction-related expenses, benefits management expenses, selling and marketing expenses, and regulatory and compliance expenses (Thorpe, 1992). Administrative costs have been estimated as making up 20 to 25 percent of small employers' expenses and approximately 10 percent of large employers' premium costs. Between 1 and 3 percent of this difference is attributed to large employers' ability to self-fund; using benefit consultants instead of insurance agents (whose fees are higher) saves large firms another 2 to 4 percent. Other sources for the difference are not discussed (U.S. General Accounting Office, 2001). A Blue Cross and Blue Shield study estimated that average administrative expenses across all businesses were 12.4 percent of total revenues in 2002 with a range of 8.5 percent for the 25th percentile to 16.9 percent for the 75th percentile (Actuarial Research Corporation, 2003; Sherlock Company, 2002).

State-imposed mandates are believed to increase the cost of ESI by requiring small employers to purchase services they may not need or want. Many states mandate the inclusion of certain benefits in all health insurance plans. For example, mandated treatments may include: treatment for alcoholism, drug abuse, mental illness, chiropractic care, and bone marrow transplants. It is likely that these mandates increase the cost to firms who would not otherwise have wanted to purchase these services and may discourage some of these small employers from offering coverage. Countering the claim that removal of these mandates will significantly alter the kinds of plans offered, Gruber notes that even when exempted under ERISA, many self-insured employers offer mandated benefits despite exemption from state regulations (Gruber, 1994).

In summarizing studies across several states, the GAO concluded that the actuarial costs of mandated benefits were between 5.4 and 22.0 percent of total claims costs (U.S. Government Accountability Office, 1996). Correcting this estimate to back out the misattributed costs of unrequired benefits (i.e., when benefits required by one jurisdiction were not required by another), the Congressional Budget Office estimated that the actual effective marginal cost of mandated benefits was between 0.28 and 1.15 percent of the small business premiums (CBO, 2000).

Several studies suggest that the Congressional Budget Office's estimate is conservative. For example, Marsteller and others found that a mandate to cover alcoholism or drug abuse treatments reduced private insurance coverage by about 2.5 percentage points (Marsteller et al., 1998). Jensen and Gabel report that about one-fifth to two-fifths of firms not offering coverage would do so if state mandates were eliminated (Gabel and Jensen, 1989; Jensen and Gabel, 1992). Jensen and Morrisey estimated that state mandates account for between 5 percent and 21 percent of health insurance claims and that up to 18 percent of small businesses without health coverage would buy health insurance if there were no state-mandated benefits (Jensen and Morrisey, 1999).

Sloan and Conover analyzed individual-level data gathered from multiple states over time and came to a similar conclusion. Removing the average number of benefit mandates would increase coverage by about 4 percent—a figure suggesting that the lack of coverage for between one-fifth and one-fourth of the uninsured is attributable to benefit mandates (Sloan and Conover, 1998). A micro-simulation model by Blumberg and others at the Urban Institute chose to assume that the mandate exemption of association health plans (AHPs) and HealthMarts would reduce premiums to small firms by 5 percent (Blumberg et al, 2003; Blumberg, Nichols, and Liska, 1999).

The perception that health insurance mandates drive up premium costs and make insurance unaffordable for many is widely held. Westerfield (2003) cites testimony to Congress by a number of witnesses representing employer groups, institutions, and specialists (DePosada, 2002; Dressler, 1999; Goodman and Musgrave, 1988; Keating, 2002; Nelson, 2002; Wilson, 2000). According to Westerfield's (2003) review, "Mandated benefit laws…force buyers of insurance to accept benefits they may not want and may not need….[A]s a result, many healthy people who are potential buyers of bare-bones insurance have been priced out of the market" (p. 24). These advocates are "unanimous in their position that mandates cause great harm" (Westerfield, 2003).

Although mandates remain a popular target for reform, a PriceWaterhouseCoopers report for Blue Cross Blue Shield recently examined the factors fueling the estimated 13.7 percent increase in health insurance premiums for large employers between 2001 and 2002. It estimated that rising provider expenses (hospitals) drove approximately 18 percent of the growth. Another 18 percent could be attributed to general inflation, 22 percent to technology, 15 percent to government mandates and regulation, 15 percent to consumer demand, and 7 percent to litigation and risk management (PriceWaterhouseCoopers, 2002).

States also administer publicly funded health insurance. Low-income workers may be eligible for public health insurance, depending upon the generosity of state Medicaid policies. The influence of public health insurance may also affect private ESI markets. There is some evidence that the availability of subsidized public health insurance depresses ESI enrollment rates (Kronick and Gilmer, 2002).

Geographic Heterogeneity

In the United States, the probability of being covered by health insurance varies considerably by state. In seven states (HI, MA, MN, NH, RI, VT, WI), the share of the population (non-elderly) without ESI is less than 12 percent; in another 18 states, the share approaches 20 percent. The highest percentage of workers without ESI is found in the West-South-Central region (Fronstin, 2005a). Eligibility for ESI in this region may be low because of lower average income and higher unemployment rates. Workers in these regions may also be more likely to work part-time or belong to racial or ethnic groups that are generally less likely to be covered by insurance (Fronstin, 2005b).

ESI plans available to small firm employees are largely influenced by state regulation of healthcare (as described above), as well as regional economic and population issues. Across states, insurance rates for all working-age persons tend to be lowest in southern and southwestern states, especially Texas, Louisiana, New Mexico, and Nevada. These states also tend to have greater numbers of minorities, immigrants, and Native Americans (Robert Wood Johnson Foundation, 2005).

Regional cost issues may also affect access to ESI plans and their costs. Service cost differences across regions are likely to affect ESI premiums, as evidenced by geographic cost practice indices as used by the Centers for Medicare and Medicaid Services. Several factors—regional industries and the workers employed in firms; the number and degree of specialization in healthcare services; wage and salary levels; and the number and type of ESI providers that market their plans within regions—all influence what firms and employees can afford.

Regional variation in ESI plan costs was investigated in a 2000 study on HMO penetration of regional markets (Baker et al, 2000). The authors demonstrated that when regional markets have higher HMO market penetration rates, the ESI plan costs are lower. This particular study used metropolitan statistical area (MSA) as the unit of observation, compared with other studies that focus on workers, employers, and providers.

Consumer Markets and Healthcare Costs

Individual healthcare beneficiaries influence consumer markets for healthcare, despite the mediating role of their employers. Two significant population trends, the aging of the United States population and immigration, could significantly affect the cost and availability of ESI. As individuals enter their 50s, there is a likelihood of increased morbidity. Treatment for

cardiovascular, cancer, and musculoskeletal problems is more likely to occur and require greater healthcare costs. A study by Strunk, Ginsburg, and Banker (2006) found that an aging population affects the demand for inpatient services, especially for diseases of the circulatory, respiratory, and musculoskeletal systems. Increased incidence of these diseases begins about age 50 and accelerates in subsequent decades. Large proportions of pre-Medicare beneficiaries may drive up the cost of ESI plans. Large proportions of Medicare beneficiaries may also affect the fees available to physicians and usher in less expensive service delivery options, including outpatient surgical centers. Population aging, then, may have a significant impact on healthcare costs within market areas and on the provision of healthcare services.

Communities with greater fertility rates are also likely to have higher ESI costs. The children of the Baby Boomer generation and recent immigrants make up a growing proportion of women of child-bearing age in the United States. Significant costs are associated with childbirth, including prenatal and neonatal care, and inpatient delivery costs. When large numbers of women of child-bearing age are clustered in particular regions, healthcare costs are likely to increase and this may affect ESI plan costs.

Efficient Delivery of Healthcare Services

Delivery of healthcare services encompasses the costs of services provided and the efficiency with which they are used. The cost of underutilized capital assets must be paid for through a smaller-than-planned consumer base. Mandated benefits (such as psychiatric care and state-of-the-art imaging), may raise the cost of health insurance. As a result, healthcare insurance providers may have higher costs for including these services. But when persons lack health insurance and are not eligible for public assistance, they may rely on more costly emergency room services for care that could have been provided with affordable health insurance. Competition between new forms of service delivery (including physician and hospital-based outpatient services such as ambulatory surgical centers) has affected the cost of regional services as each vies for customer.

Several recent studies used data from the Community Tracking Study (CTS) to examine the efficient use of services and the impact on costs and utilization of healthcare services. Bazzoli et al (2003) examined utilization trends in community hospitals and found potential capacity constraints in large and small MSAs. Emergency departments also exhibited similar problems in both large and small MSAs. They found that hospitals in these small and large markets were actively adding new capacity, building new hospitals and adding beds to existing ones. The authors conclude, however, that the scale of hospital expansion during 2002-2003 was unwarranted as the extra capacity was not immediately needed.

In a related study using the CTS, Bazzoli, Gerland, and May (2006) examined hospital construction during 2005. They examined the construction of new hospitals and the expansion of existing hospital services. They concluded that such construction may increase overall healthcare costs because of underused and duplicative capacity in some markets. Alternatively, aging and outdated facilities may contribute to inefficient services provision in

less affluent markets. These two studies and anecdotal evidence on the proliferation of specialized healthcare services suggest that market-based forces may be less efficient and more costly. New radiology and ambulatory surgical centers, specialized rehabilitation centers, and other facilities, can all add to the cost of healthcare insurance through wasted resources. Including service benefits that are seldom used or are not common in traditional health insurance plans may also raise the cost of healthcare plan and contribute to lower rates of ESI coverage at small firms.

Conceptual Summary of Issues

Our current knowledge of the employee healthcare market is largely based on micro-level research and qualitative macro-level findings from the CTS. As described above, there is extensive research chronicling the decline in ESI coverage rates and the increase in healthcare expenses. Current research on the macro-structural influences on ESI coverage rates is far less available. A number of research questions present themselves in trying to understand the macro-level factors affecting ESI coverage rates. This study expands the findings from both important streams of research to investigate their joint influences on the cost of employee healthcare and ESI coverage rates. We examine the role of state regulations and policies, consumer markets, the industrial structure of work, and healthcare service delivery issues.

1. State Regulations and Policies

H1: How are state healthcare costs and insurance rates associated with individual healthcare costs (per capita expenses) and insurance rates, given differences in state mandates, administrative costs, and federal Medicaid contribution rates?

2. Consumer Markets

H2: What is the impact of regional consumer markets, including the impact of population aging and higher morbidity and mortality rates, and foreign-born immigrants with greater fertility rates, on regional healthcare expenditures and insurance rates?

3. Industrial Structure

H3: How is the industrial structure of work, reflected by manufacturing and union jobs, associated with healthcare expenditures and insurance rates in regional markets?

4. Service Delivery

H4a: What is the implication of the level of service utilization rates for emergency room, outpatient, and inpatient services on regional healthcare expenditures and insurance rates?

H4b: What is the impact of specialty services, including ambulatory surgical centers, psychiatric services, and so forth, on healthcare expenditures and insurance rates?

H4c: Has managed care played a significant role in lowering regional healthcare expenditures and insurance rates?

5. Trends

H5a: How have changes in the industrial structure of work, particularly declining manufacturing and union jobs, affected insurance rates?

H5b: What impact do macro-level changes in consumer markets, industry structure, and service delivery have on insurance rates and healthcare expenditures?

3. Methodology

Micro-level data from the MEPS, collected and maintained by AHRQ, were used for the analysis. MEPS is a collection of large-scale surveys of families and individuals, their medical providers, and employers across the United States, originally based on a sample selected from participants of the National Health Interview Survey (NHIS).[2] The Center for Studying Health System Changes has a similar source of healthcare expenditures data, the Community Tracking Study (CTS).[3] The MEPS data were selected for this study, however, because surveys are conducted more frequently over a greater number of metropolitan areas, and local access to small area identifiers is available through the MEPS data center at AHRQ.

The MEPS data includes sample surveys of 12,860 households in 2003. The sample survey asks detailed family, employment, and health-related questions, including employer insurance, its costs, and medical expenditures for all household members. The MEPS household data are linked to county-level measures from the area reference file (ARF) that describe detailed population characteristics and county-level costs, utilization, facilities, medical staff, and special services. Respondents resided in 954 U.S. counties in 2003 and 256 metropolitan areas (MSAs). The county-level measures were aggregated or totaled for each demographic and healthcare measure to describe corresponding metropolitan or market area measures that potentially affect the cost and availability of healthcare insurance. State-level measures were obtained from published sources that describe some of the state-based issues affecting uninsurance rates in each of the 50 states, including federal contribution rates for Medicaid, per capita measures of expended healthcare costs, and so forth. MEPS can provide both cross-sectional and longitudinal information about its participants. This analysis focused on Panel 7-Round 3 and Panel 8-Round 1 respondents during 2003.

The methodological plan was to fit basic logistic and hazard models to test the micro-level predictors on having private healthcare insurance and healthcare expenditures, respectively. The micro-level predictors included demographic, household, health status, and employment variables. State-level measures were added to test H1 and determine the extent that these micro-level measures varied by state of residence, using multilevel or hierarchical linear models. The ARF metropolitan measures were sequentially applied to the micro-level model, again using multilevel fitting techniques to test H1 to H4.

The general structure of the multilevel models proposed for this project is shown below in equations 1 through 5. The equations presume the following:

(i) a hierarchical structure of employees,
(j) employers impacting worker outcomes, and
(k) contextual market/metropolitan and state factors impacting both firms and employees.[4]

[2] For more information on MEPS, see http://www.meps.ahrq.gov/.
[3] For more information on the Center for Studying Health Systems Changes, see http://www.hschange.org/.
[4] Technically, state regulations may exert a separate influence and could be expressed as another level in the hierarchy. To simplify the models, we shall attempt to express state regulations as covariates, but will also test whether a state-level set of hierarchical measures is required for the models.

1. $Y_{ijk} = \beta_{0jk} + \beta_{1jk} X_{1jk} + \beta_{2jk} X_{2jk} + \beta_{3jk} X_{3jk} + ei_{jk}$

Equation 1 expresses each of our various outcome measures, Y, as a function of

β_0, a standard regression intercept
β_1, a vector of employee characteristics and choices
β_2, a vector of state characteristics
β_3, a vector of market/metropolitan characteristics

The multilevel methodology assumes that the coefficients expressed in equation 1 are random values, that is, firms and markets may have statistically significant and unique β's, compared to a single β or slope in a standard regression model. Our random slopes are based on level-specific γ's for regions and industries. Error terms are expressed in two parts, fixed effect (e) and random (u). The random effects of employees, states, and markets are expressed in equations 2 through 5.

2. $\beta_{0jk} = \gamma_{00} + \gamma_{01} Z_{jk} + u_{0jk}$
3. $\beta_{1jk} = \gamma_{10} + \gamma_{11} Z_{jk} + u_{1jk}$
4. $\beta_{2jk} = \gamma_{20} + \gamma_{21} Z_{jk} + u_{2jk}$
5. $\beta_{3jk} = \gamma_{30} + \gamma_{31} Z_{jk} + u_{3jk}$

Based on this methodology and the outcomes and predictors described above, we propose four general cross-sectional and trend models.

Cross-sectional models to be estimated:

1. 2003 insurance rate = person-level variables + employer variables + state variables + regional/market variables.

2. 2003 healthcare expenditures = person-level variables + employer variables + state variables + regional/market variables.

Trend models to be estimated:

1. 2003 insurance rate = person-level variables + employer variable change (1995-2000) + regional/market variable changes (1995-2000).

2. 2003 healthcare expenditures = person-level variables + employer variable changes (1995-2000) + regional/market variable changes (1995-2000).

Results

Table 1 displays the sample characteristics of the 2003 MEPS data used for the analyses. This MEPS population reflects employed persons, ages 21 through 64, who are at risk for not

having ESI coverage as an employee or spouse. Firm size and hourly wage-rate categories have been constructed to compare the sensitivity of both measures to healthcare expenditures and ESI coverage rates.

Table 1. MEPS 2003 Sample Characteristics of Employed Persons, Ages 21-64

Characteristic		Sample Proportion	Std. Error
Has any healthcare insurance (public, private)		0.833	0.004
Has private healthcare insurance		0.798	0.004
Female		0.495	0.005
Black		0.044	0.002
Hispanic		0.129	0.003
Single		0.411	0.005
Fair/poor health		0.080	0.003
Education	> HS	0.097	0.003
	GED	0.040	0.002
	High school graduate	0.471	0.005
	Bachelor's degree	0.204	0.004
	Graduate degree	0.095	0.003
Firm size	1 to 9	0.175	0.004
	10 to 49	0.288	0.004
	50 to 99	0.132	0.003
	100 to 249	0.145	0.004
	250 or more	0.260	0.004
Union membership		0.133	0.003
Hourly wage rate	< $7	0.083	0.003
	$7 to $8.99	0.111	0.003
	$9 to $11.99	0.178	0.004
	$12 to $14.99	0.147	0.003
	$15 or more	0.481	0.005

Source: MEPS 2003 Household Component Survey (employed persons ages 21-64).

Tables 2 and 3 provide more detailed statistics of employer, worker, and insurance characteristics of the sample. About 130 million American workers are ages 21 to 64 years old. More than half of Americans in this age group work for small firms with fewer than 50 workers, although their share of wages is somewhat disproportionate at about 45 percent. As recent research indicated, private insurance rates are in extreme disproportion relative to wages, either through their employer or any other private insurance provider, including family and single coverage policies.

Table 2. Shares of Workers, Wages, and Insurance Rates by Firm Size

	Firm Size (Number of Employees)					
	1-9	**10-49**	**50-99**	**100-249**	**250+**	**Total**
Share of workers (percent)	25.8	26.2	11.7	13.2	23.1	100.0
Share of wages (percent)	21.9	24.3	11.8	14.0	28.0	100.0
Private insurance coverage from employer (percent)	62.1	75.5	82.4	85.3	92.3	
Private insurance coverage from any source (percent)	67.6	79.3	85.8	88.4	93.9	

Source: MEPS 2003 Household Component Survey (employed persons ages 21-64).

American workers at small firms are disproportionately affected. Table 3 takes a closer look at this relationship by breaking down wage rate groups at small firms. Higher-income workers at all sized firms have far less trouble than those greatly disadvantaged, small firm workers with low-wage rates. This relationship between firm size and wage rate suggests the relationship between insurance coverage and firm size is more complex than whether small firms can afford to provide coverage for their employees. Industry and location may also be important factors.

Table 3. Private Insurance Coverage Rates by Firm Size and Wage Group

	Firm Size (Number of Employees)					
Wage Rate	**1-9**	**10-49**	**50-99**	**100-249**	**250+**	**All**
Less than $9	37.1	45.1	52.8	57.4	70.1	48.5
$9-$15	66.0	76.8	79.1	84.6	88.6	78.7
More than $15	82.1	90.9	95.5	94.4	96.9	93.1
All	62.7	74.9	82.2	85.3	92.2	79.8

Source: MEPS 2003 Household Component Survey (employed persons ages 21-64).
Note: The number of observations is reduced for the number of cells in this table; nearly all have hundreds of raw observations and only one or two cells have at least 60 observations.

Model 1 shows the relationship between key worker characteristics and whether workers have private health insurance. The reference group for Model 1 is white married men working at large firms (more than 250 workers) who earn more than $15 per hour.[5] This preliminary multivariate analysis demonstrates what previous research and Tables 1 and 2 hinted at: the most important single factors associated with being uninsured are not race, gender, or education, but wages and firm size, as the magnitude of parameter estimates for firm size and wage rates exceed all others. There is a gradation of declining risk probability

[5] Regression models omit reference group variables, in this case, achieving a high school diploma, working for a firm with more 225 employees, and having a wage rate of at least $15 per hour. Similarly, white male non-Hispanic (and other) characteristics are omitted. Being female, therefore, is associated with a greater likelihood of having ESI coverage as the parameter is greater than 0, although being Hispanic is associated with a lower probability of having insurance (-0.810 < 0). The size of the parameter estimates is associated with how high or low those probabilities are, which is usually captured as an odds ratio. The odds ratio can be calculated by exponentiating the parameter estimates of binary predictors. For example, women are 64 percent more likely than men to have ESI coverage (exp(0.489)=1.64).

of being uninsured based on both increasing firm size and wage rate. Model 2 looks at the same worker characteristics and is a more parsimonious model for fitting the macro-structural predictors. The dominance of firm size and wage rate as key factors are demonstrated as the parameter estimates change only slightly after eliminating the other socioeconomic variables. Although employed blacks and whites who are similar have the same likelihood of having insurance, Hispanics are less likely to have ESI, among ethnic and non-ethnic subgroups. The model results reflect employed persons ages 21-64, and uninsured and unemployed persons may include greater proportions of blacks and non-Hispanics. The key finding in the two tables is that firm size plays a significant role in workers having ESI coverage, independent of wage rate and other key socioeconomic factors.

Models 1 and 2: Micro-level Predictors of Private Health Insurance Coverage: Full and Parsimonious Models

	Model 1: Micro-level Predictors of Having Private Health Insurance†		Model 2: Subset of Micro-level Predictors of Having Private Health Insurance †	
Variable	**Estimate**	**Std. Error**	**Estimate**	**Std. Error**
Intercept	3.192 **	0.103	3.107 **	0.083
Female	0.498 **	0.058		
Black	-0.149	0.143		
Hispanic	-0.810 **	0.066		
Single	-0.872 **	0.057		
Fair/poor health	-0.161 *	0.088		
Education: 0 years	-0.780 **	0.075		
Education: GED	-0.575 **	0.116		
Education: Bachelor's degree	0.264 **	0.095		
Education: Graduate degree	0.776 **	0.178		
Union member	0.862 **	0.122		
Firm size: 1-9	-1.393 **	0.091	-1.468 **	0.085
Firm size: 10-49	-0.855 **	0.086	-0.951 **	0.080
Firm size: 50-99	-0.623 **	0.104	-0.639 **	0.098
Firm size: 100-249	-0.324 **	0.106	-0.387 **	0.099
Hourly wage: less than $7	-2.404 **	0.098	-2.891 **	0.086
Hourly wage: $7-8.99	-1.913 **	0.090	-2.450 **	0.079
Hourly wage: $9-11.99	-1.044 **	0.086	-1.450 **	0.077
Hourly wage: $12-14.99	-0.598 **	0.097	-0.915 **	0.089
	χ^2 likelihood ratio=3421.9		*χ^2 likelihood ratio=2607.5*	

Source: MEPS 2003 Household Component Survey (employed persons ages 21-64).
† Model 1 categorizes participants with public insurance as uninsured; Model 2 is presented as a more parsimonious model for the macrostructural models to follow.
*** $p < 0.05$, * $p < 0.10$*

Table 5 shows model results from a variance components analysis using Model 2 results. The variance components analysis separates the micro-level (level 1) influences on insurance

coverage rates and provides an estimate of the residual variance because of macro-level factors (level 2), that is, heterogeneity from state-level influences (Model 3) and metropolitan-level influences (Model 4).[6] The key results from Table 5 are the residual variance estimates because of unexplored factors at the state and MSA levels. Both state and MSA models have significant residuals with greater unexplained variances in Model 4. There is greater variability between MSAs than between states, reflecting contextual issues, rather than the influence of firm size and wage rates on private health insurance coverage.

Models 3 and 4. Variance Components Analysis of Micro-level Predictors of Private Health Insurance Coverage for States and MSAs

	Model 3: Variance Components Due to State Heterogeneity†		Model 4: Variance Components Due to MSA Heterogeneity†	
Fixed Effects (Level 1)	**Estimate**	**Std. Error**	**Estimate**	**Std. Error**
Intercept	3.313 **	0.102	3.184 **	0.094
Firm size: 1-9	-1.470 **	0.086	-1.481 **	0.087
Firm size: 10-49	-0.959 **	0.081	-0.963 **	0.082
Firm size: 50-99	-0.626 **	0.099	-0.640 **	0.099
Firm size: 100-249	-0.404 **	0.101	-0.382 **	0.101
Hourly wage: <$7	-2.859 **	0.088	-2.875 **	0.089
Hourly wage: $7-8.99	-2.426 **	0.804	-2.428 **	0.081
Hourly wage: $9-11.99	-1.456 **	0.078	-1.457 **	0.079
Hourly wage: $12-14.99	-0.928 **	0.090	-0.924 **	0.091
Random Effects				
Level 2				
σ^2 (Intercept)	0.120 **	0.037	0.189 **	0.042

Source: MEPS 2003 Household Component Survey (employed persons ages 21-64).
† Model 3 is variance components analysis after adjusting for state-level heterogeneity; Model 4 is a variance components analysis after adjusting for MSA-level heterogeneity.
*** p < 0.05, * p < 0.10*

The next set of models examines macro-structural influences on ESI coverage, controlling for the parsimonious set of person-level variables (firm size and wage rate). An extensive set of variables was examined beyond the results shown. One important statistic was examined closely in all models. Multicollinearity, or overlapping influence between predictor variables, can produce biased estimates and less robust model results. Multicollinearity can be viewed as two predictor variables that are highly correlated with each other. For example, a significant overlap between morbidity rate and proportion of Medicare recipients was demonstrated. Medicare recipients are likely to have higher rates of heart disease and cancer, so MSA cancer prevalence rate and MSA proportion of Medicare recipients were multicollinear variables. In nearly all situations where multicollinearity arose, endogenous or

[6] The firm size and wage rate variables are directly related to some of the variance or share in the probability of having ESI coverage. Part of the variance in ESI coverage is not explained by the firm size and wage rate variables. The variance analysis test shows that a significant proportion of this variance is due to differences between states and MSAs. These differences will be investigated in subsequent models.

intervening variables were maintained and exogenous variables were excluded. Multicollinearity was tested frequently in the model development, and separate models are reported for the various research questions and issues to avoid multicollinearity between the individual models.[7]

Models 5 and 6 explore the association of ESI coverage with per capita medical expenditures, state HMO penetration rate, proportion of Medicaid beneficiaries, and the federal contribution rate to state Medicaid.[8] These measures have been selected to reflect differing state policies about public insurance, the extent that HMOs exist as a less expensive source of healthcare insurance, and overall healthcare spending in each state. Though Model 5 can be estimated as having heterogeneity at the state or MSA levels as shown in Table 3, MSA has been selected for these and all subsequent random effects models because of the greater heterogeneity among MSAs than among states. Persons living in MSAs are influenced by their state regulations that can be incorporated into two-level models of persons and MSAs.

The number of Medicaid beneficiaries in an MSA is inversely proportional to the number of workers with private healthcare insurance. This suggests that workers in states with less robust economies (greater proportions of Medicaid beneficiaries) are less likely to have private insurance. Per capita healthcare expenditures are directly associated with having private insurance. States with lower per capita spending may have less robust economies, and workers in those states are less likely to have private health insurance. There is no evidence from Model 5 that federal Medicaid contribution or HMO penetration is associated with private health insurance rates among those workers.

Model 6 examines consumer-based issues and the demand for health insurance in MSAs because of selected health problems. Workers in MSAs with higher birth rates are less likely to have private health insurance. Foreign-born workers are more likely to be of child-bearing age so recent Hispanic immigration over the last 10 years may contribute to this finding. Total mortality, cancer prevalence, and ischemic heart disease rates are associated with being aged 65 or more, but may also reflect excess mortality and cancer incidence rates that exist in the South. Workers in MSAs with higher rates of ischemic heart disease are less likely to have private insurance, suggesting that lack of health insurance may contribute to those rates or that medical costs and risks are higher for insurers and thus healthcare insurance may be less affordable and accessible to many.

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[7] Multicollinearity can be considered a measurement issue where two variables are measuring the same construct and only one must be chosen. However, seeming multicollinearity may arise when there is a clear and natural ordering of variables, like age and morbidity. In the latter situation, it may be more appropriate to fit structural equations and/or latent variable models that capture this underlying complexity of relationships.

[8] The remainder of the models fitted to ESI coverage use continuous dependent variables and have a different interpretation than the previous model results. The parameter estimates reflect the continuum of state values for the described categories. Positive parameter estimates reflect a direct association; for example, greater per capita medical expenditures are associated with higher probabilities of having ESI coverage. Negative parameters indicate an inverse association, so MSAs with greater Medicaid expenditures are associated with a lower probability of having ESI coverage.

Models 5 and 6. Macro-level Predictors of Private Health Insurance Coverage: State Regulations and Consumer Markets

	Model 5: State Regulations†		Model 6: Consumer Markets†	
Fixed Effects (Level 2)	**Estimate**	**Std. Error**	**Estimate**	**Std. Error**
Intercept	2.706 **	0.591	4.243 **	0.662
Medical expenditures (per capita)	0.001 **	<0.001		
HMO penetration (percent)	-0.004	0.004		
Medicaid beneficiaries (percent)	-3.357 **	1.048		
Federal Medicaid contribution (percent)	-0.002	0.007		
Birth rate (3-yr)			-0.310 **	0.092
Total mortality rate (3-yr)			0.391	0.332
Cancer prevalence (percent)‡			0.342	1.331
Ischemic heart disease prevalence (percent)			-1.615 **	0.497
Random Effects				
Level 2				
σ^2 (Intercept)	0.152 **	0.038	0.109 **	0.033

Source: MEPS 2003 Household Component Survey (employed persons ages 21-64) and NCHS 2002 Area Reference File.
†Personal-level variables are the same as the micro-level model M2, but have been excluded for display purposes.
‡ Birth, mortality and cancer rates are 3-year averages for 1997-1999.
*** p < 0.05, * p < 0.10*

Model 7 shows the association between MSAs with larger proportions of manufacturing, white-collar, and unemployed workers. Unfortunately, service worker population values were unavailable at the ARF county- and MSA-levels; however, they make up most of the reference group of workers by type of industry. Workers in MSAs with greater proportions of manufacturing and white-collar jobs were more likely than the reference group to have private health insurance coverage. Workers in MSAs with greater proportions of unemployed workers were less likely to have private health insurance coverage, again suggesting less robust local economies. MSAs with greater proportions of manufacturing workers may well have been helped by workers' union affiliation and enhanced fringe benefits.

Model 8 examines a large number of service delivery issues, but only one is significant: MSAs with a greater proportion of skilled nursing facilities were associated with workers having greater access to private health insurance. The relationship between per capita beds in short-term hospitals and private health insurance coverage was moderately significant. Workers in MSAs with a higher number of short-term hospital beds per capita are less likely to have private insurance coverage. The finding about short-term hospital beds and beds in skilled nursing facilities may underscore an important theme. Beds in skilled nursing facilities are less expensive than beds in short-term hospitals. The inappropriate use of short-term hospital beds (as substitutes for beds in skilled nursing facilities) may increase costs that are passed on as higher medical costs.

Models 7 and 8. Macro-level Predictors of Private Health Insurance Coverage: Industrial Structure and Service Delivery Ecology

	Model 7: Industrial Structure†		Model 8: Service Delivery Ecology†	
Fixed Effects (Level 2)	**Estimate**	**Std. Error**	**Estimate**	**Std. Error**
Intercept	2.540 **	0.333	2.556 **	0.184
Manufacturing workers (percent)	8.090 **	2.776		
White-collar workers (percent)	2.222 **	1.035		
Unemployed workers (percent)	-1.102 **	0.463		
Hospitals per capita			1.076	0.788
Short-term hospital beds per capita			-0.131 *	0.071
Long-term hospital beds per capita			0.032	0.075
Skilled nursing facility beds per capita			0.095 **	0.023
Short- and long-term nurses per capita			0.075	0.054
Random Effects				
Level 2 σ^2 (Intercept)	0.159 **	0.040	0.139 **	0.037

Source: MEPS 2003 Household Component Survey (employed persons ages 21-64) and NCHS 2002 Area Reference File.
† Personal-level variables are the same as the micro-level model M2, but have been excluded for display purposes.
*** p < 0.05, * p < 0.10*

Models 9 and 10 look at additional aspects of service delivery. Model 9's results show that workers in MSAs with higher rates of emergency room visits are more likely to have private insurance coverage, rather than higher rates from uninsured persons using emergency room services and driving up costs. The relationship between emergency room usage and costs will be addressed in later models that examine total healthcare expenditures. Workers in MSAs with higher rates of inpatient days were less likely to have private health insurance. This finding may again reflect efficiency and cost issues, as higher rates of inpatient days may produce higher costs and price health insurance at higher rates. None of the measures for specialized services was highly significant in Model 10. The specialized service may not directly influence private insurance rates but could have an impact on costs, which will also be addressed in the investigation of total expenditures.

Models 9 and 10. Macro-level Predictors of Private Health Insurance Coverage: Service Delivery Utilization and Specialization

	Model 9: Service Delivery: Utilization†		Model 10: Service Delivery: Specialization†	
Fixed Effects (Level 2)	**Estimate**	**Std. Error**	**Estimate**	**Std. Error**
Intercept	2.806 **	0.191	3.003 **	0.213
Emergency room visits per capita	1.149 **	0.563		
Inpatient days (short term) per capita	-0.969 **	0.362		
Inpatient days (short- and long-term) per capita	0.265	0.229		
Outpatient days (short term) per capita	-0.327	0.282		
Outpatient days (short- and long-term) per capita	0.496 *	0.279		
Hospitals with less than 100 beds per capita			0.005	0.152
Hospitals with 200 or more beds per capita			-0.138	0.211
Ambulatory surgical centers per capita			-0.006	0.052
Advanced imaging centers per capita			0.125 *	0.065
Alcohol/drug rehab centers per capita			1.846	1.224
MDs with specialties per capita			0.008	0.034
Cardiologists per capita			-0.148	0.337
Thoracic surgeons			0.034	0.673
Emergency room MDs per capita			0.107	0.149
OB-Gyns per capita			-0.126	0.207
Random Effects				
Level 2				
σ^2 (Intercept)	0.153 **	0.039	0.167 **	0.043

Source: MEPS 2003 Household Component Survey (employed persons ages 21-64) and NCHS 2002 Area Reference File.
†Personal-level variables are the same as the micro-level model M2, but have been excluded for display purposes.
*** p < 0.05, * p < 0.10*

Model 11 shows that regional cost factors for facility and payroll expenditures were not associated with ESI coverage rates. Facility and payroll expenses were highly significant predictors of private insurance coverage rates when micro-level variables were excluded from the model. It is unclear without further investigation as to the interaction between the micro-level variables and the two key macro-level expense variables.

Model 11. Macro-level Predictors of Private Health Insurance Coverage: Service Delivery Expense

Model 11: Service Delivery Expense†			
Fixed Effects (Level 2)	**Estimate**		**Std. Error**
Intercept	3.100	**	0.166
Total facility expense (short term) per capita	0.098		0.426
Total facility payroll (short term) expense per capita	-0.083		1.004
Random Effects			
Level 2			
σ^2 (Intercept)	0.190	**	0.044

Source: MEPS 2003 Household Component Survey (employed persons ages 21-64) and NCHS 2002 Area Reference File.
† Personal-level variables are the same as the micro-level model M2, but have been excluded for display purposes.
*** p < 0.05, * p < 0.10*

Models 12 and 13 examine recent trends in MSAs and their association with private insurance coverage rates. Nearly all of the service delivery trends were measured between 1995 and 2000. (Changes in the number of nurses per capita was based on change between 1990 and 2000.) Workers in MSAs with a growing proportion of white-collar workers had higher rates of private insurance. Some evidence of waste and cost issues is suggested in Model 13, where increasing per capita costs are associated with lower rates of private healthcare coverage.

MSAs with an increase in admissions and nurses per capita were associated with lower rates of private health insurance coverage, but the construction of excess hospitals or the addition of beds were not. Increases in the number of cardiologists (and other specialty providers not shown) did not significantly correlate with lower private health insurance rates.

Models 12 and 13. Macro-level Predictors of Private Health Insurance Coverage, 1995-2000: Structural and Service Delivery Trends

	M12: Structural Trends†		M13: Service Delivery Trends †	
Fixed Effects (Level 2)	**Estimate**	**Std. Error**	**Estimate**	**Std. Error**
Intercept	3.128 **	0.114	3.186 **	0.119
Δ Total facility expense. (percent)	-0.057	0.760		
Δ Facility payroll expense (percent)	-0.178	0.719		
Δ Manufacturing workers	0.318	0.322		
Δ White-collar workers	1.791 **	0.867		
Δ Total hospitals (percent)			-0.183	0.454
Δ Total beds (percent)			0.274	0.489
Δ Admissions (percent)			-1.601 **	0.478
Δ Emergency room MDs (percent)			0.152	0.171
Δ Cardiologists (percent)			0.342 *	0.196
Random Effects				
Level 2				
σ^2 (Intercept)	0.182 **	0.043	0.164 **	0.040

Source: MEPS 2003 Household Component Survey (employed persons ages 21-64) and NCHS 2002 Area Reference File.
†Personal-level variables are the same as the micro-level model M2, but have been excluded for display purposes.
*** $p < 0.05$, * $p < 0.10$*

The final model planned for this section was to present a consolidated model with all of the above factors included to determine the strongest and most important predictors of healthcare insurance. Despite heroic efforts to develop a consolidated model, significant and substantive inter-correlations between macro-level predictors were apparent; a different methodological approach using a structural equations model was deemed more appropriate, rather than eliminating correlated predictor variables. The structural equations model is beyond the methodological plan of this paper and will be developed in a subsequent manuscript.

The Role of Healthcare Expenditures

Some of the potential predictors that were hypothesized to influence private insurance rates were not significant. It may well be that some of those factors influence total expenditures instead, making private health insurance more or less expensive in MSAs that spend more on healthcare, because of more expensive populations or higher regional costs. That is, total healthcare expenditures may be an intervening measure and the statistically non-significant variables in the previous section could have direct effects on healthcare expenditures with indirect influences on insurance rates. This section takes the same approach and tests the various MSA-level predictors and their association with individual workers' total expenditures on healthcare.

Models 14 and 15 replicate efforts in Models 1 and 2 and examine the association of socioeconomic measures, firm, and wage rates with total healthcare expenditures. Results were obtained using Tobit models, and the parameter estimates are interpreted differently than the logistic model results.[9] Predicting total expenditures, negative parameter estimates indicate lower expenditures than the reference group, and positive parameter estimates reflect higher values than the reference group. The reference group is unchanged and reflects white married men employed in large firms (250 or more employees), earning at least $15 per hour, and having a high school education and good to excellent health.

The factors influencing expenditures are similar, but muted compared to those affecting private insurance rates. Small firms and low rates remain important discriminators, but the more advantaged subgroups—those earning $12 or more per hour and having similar levels of education (GED and bachelor's degree)—are no different than the reference group (workers with a graduate degree had somewhat higher expenditures). Two new findings, however, are apparent. Black workers had fewer healthcare expenditures than whites and Hispanics, though their private insurance rates are similar to those of whites. There is also evidence of what was revealed in the literature about expenditures at the largest firms. Workers at firms with fewer than 50 employees spend less on healthcare than those working at more advantaged firms of 250 or more workers. There is no difference between somewhat larger firms of 50-99 workers, compared to the largest firms. Workers at firms of 100 to 249 employees spend the most on healthcare expenses. This finding suggests that the largest firms and mega-corporations may be more likely to self-insure and keep a closer watch on benefits and expenditures; although, the somewhat smaller firms (100-249 employees) have more liberal benefit plans. Union members also spend more than other workers because of the influence of union contracts on maintaining the quality of health insurance benefit plans. Union members, however, may also include large numbers of older workers with increasing healthcare needs. Health expenditures are, not surprisingly, the greatest among workers in poor or fair health. Model 15 recasts these results in a more parsimonious model to prepare for the macro-structural models that will follow.

[9] Tobit models were proposed by the economist James Tobin to address dependent variables that were censored or not fully observed (limited dependent variables). For example, healthcare expenditures include positive values, including 0; although, negative values are not observed.

Models 14 and 15. Micro-level Predictors of Healthcare Expenditures: Full and Parsimonious Models

	Model 14: Micro-level Predictors of Healthcare Expenditures†		Model 15: Subset of Micro-level Predictors of Healthcare Expenditures †	
Variable	**Estimate**	**Std. Error**	**Estimate**	**Std. Error**
Intercept	7.506 **	0.043	7.741 **	0.034
Female	0.416 **	0.032		
Black	-0.531 **	0.074		
Hispanic	-0.403 **	0.043		
Single	-0.081 **	0.032		
Fair/poor health	0.877 **	0.051		
Education: 0 yrs.	-0.091 *	0.053		
Education: GED	-0.019	0.076		
Education: Bachelor's degree	0.023	0.043		
Education: Graduate degree	0.116 **	0.058		
Union member	0.128 **	0.047		
Firm size: 1-9	-0.112 **	0.049	-0.133 **	0.050
Firm size: 10-49	-0.105 **	0.043	-0.144 **	0.044
Firm size: 50-99	-0.019	0.052	-0.045	0.054
Firm size: 100-249	0.105 **	0.050	0.088 *	0.052
Hourly wage: less than $7	-0.497 **	0.060	-0.429 **	0.056
Hourly wage: $7-8.99	-0.263 **	0.055	-0.193 **	0.051
Hourly wage: $9-11.99	-0.103 **	0.046	-0.064	0.044
Hourly wage: $12-14.99	-0.076	0.049	-0.030	0.048
Scale	1.396	0.011	1.443	0.011
Weibull shape	0.716	0.006	0.693	0.006
	χ^2 likelihood value=-15131		*χ^2 likelihood value=-15574*	

Source: MEPS 2003 Household Component Survey (employed persons ages 21-64).
† Model 15 presents hazard model results on micro-level characteristics of total healthcare expenditure; Model 16 is presented as a more parsimonious model for the macro-structural models to follow.
*** $p < 0.05$, * $p < 0.10$*

Model 16 examines the implication of state regulations on healthcare expenditures. Workers in MSAs with higher per capita healthcare expenditures spend more on healthcare, a straightforward expectation of higher costs in some MSAs. There is also evidence that MSAs with greater HMO penetration have lower healthcare expenditures and that workers in MSAs with a greater proportion of Medicaid beneficiaries also spend less. HMO penetration may well have an independent effect on healthcare expenditures and create the sort of competition cited in previous research, though there was no significant relationship with private health insurance rates. Workers in MSAs with a high proportion of Medicaid beneficiaries spend less on healthcare. This suggests that healthcare is less expensive in those MSAs either due to lower regional costs or more efficient delivery of services. Reining

in healthcare costs may also allow states covering those MSAs to provide Medicaid coverage to more beneficiaries because of lower costs.

Workers in MSAs with higher birth rates spend less on healthcare and have higher private health insurance rates (Model 17). The results of Model 17 reinforce what was found in Model 6. This again suggests that private health insurance and the ability to afford healthcare are distributed heterogeneously across MSAs rather than evenly spread throughout the United States, perhaps because of the characteristics of workers and consumers in those MSAs.

Models 16 and 17. Macro-level Predictors of Healthcare Expenditures: State Regulations and Consumer Markets

	Model 16: State Regulations†		Model 17: Consumer Markets†	
Fixed Effects (Level 2)	**Estimate**	**Std. Error**	**Estimate**	**Std. Error**
Intercept	7.461 **	0.267	7.855 **	0.284
Medical expenditures (per capita)	<0.001 **	<0.001		
HMO penetration (percent)	-0.006 **	0.002		
Medicaid beneficiaries (percent)	-0.999 **	0.463		
Federal Medicaid contribution (percent)	0.002	0.003		
Birth rate (3-yr)			-0.092 **	0.040
Total mortality rate (3-yr)			0.233 *	0.141
Cancer prevalence (percent)‡			0.231	0.578
Ischemic heart disease (percent)‡			-0.829 **	0.194
Scale	1.438	0.011	1.439	0.011
Weibull shape	0.696	0.006	0.695	0.006
	χ^2 likelihood value=-15554		*χ^2 likelihood value=-15547*	

Source: MEPS 2003 Household Component Survey (employed persons ages 21-64) and NCHS 2002 Area Reference File.
†Personal-level variables are the same as the micro-level model M15, but have been excluded for display purposes.
‡ Three-year average for 1997-1999.
*** p < 0.05, * p < 0.10*

Model 18 examines the impact of workers in predominantly manufacturing or white-collar MSAs as spending more or less on their healthcare costs. There is no support that spending differs by the industrial climate of MSAs, though workers in MSAs with higher unemployment rates spend less, either because costs or wages are less, and there are fewer dollars committed to healthcare expenses. In relation to Model 7, the industrial climate in MSAs does not affect healthcare expenditures of workers, but it does influence private health insurance rates. (These were found to be lowest for manufacturing workers and next lowest for white-collar workers.) This again provides further evidence of the interaction between the organization of work and the provision of healthcare insurance, rather than overall expenditures on healthcare.

Model 19's results suggest that workers in MSAs with a higher number of hospitals and nurses per capita have higher total healthcare expenses. This provides some support for the hypothesis that wasteful spending may occur in some MSAs and drive up total healthcare costs. The direct association between beds in skilled nursing facilities and indirect association between short-term beds and total expenditures is counter-intuitive to results from Model 8 on ESI coverage rates.

Models 18 and 19. Macro-level Predictors of Healthcare Expenditures: Industrial Structure and Service Delivery Ecology

	Model 18:Industrial Structure†		Model 19: Service Delivery: Ecological†	
Fixed Effects (Level 2)	**Estimate**	**Std. Error**	**Estimate**	**Std. Error**
Intercept	7.697 **	0.100	7.314 **	0.075
Manufacturing workers (percent)	-0.663	1.193		
White-collar workers (percent)	0.458	0.330		
Unemployed workers (percent)	-0.393 **	0.183		
Hospitals per capita			0.998 **	0.243
Short-term hospital beds per capita			-0.069 **	0.030
Long-term hospital beds per capita			0.002	0.033
Beds in skilled nursing facilities per capita			0.029 **	0.009
Short- and long-term nurses per capita			0.075 **	0.024
Scale	1.439	0.011	1.439	0.011
Weibull shape	0.695	0.006	0.695	0.060
	χ^2 likelihood value=-15559		*χ^2 likelihood value=-15540*	

Source: MEPS 2003 Household Component Survey (employed persons ages 21-64) and NCHS 2002 Area Reference File.
†Personal-level variables are the same as the micro-level model M15, but have been excluded for display purposes.
*** p < 0.05, * p < 0.10*

Model 20 shows that most of the measures describing the efficiency of healthcare delivery or excess service consumption in MSAs have little influence on total expenditures. The key finding here is that MSAs with higher per capita visits to emergency rooms have greater healthcare expenditures. Workers in MSAs with greater per capita rates of use of emergency rooms spend more on healthcare and have higher private health insurance rates (Model 9). MSAs with greater emergency room usage could have a greater proportion of older residents. Alternatively, more expensive MSAs may have more uninsured workers that utilize emergency room services more often. Further investigation needs to be conducted to untangle this relationship and the findings from Model 19.

Model 10's results showed that none of the specialized service delivery characteristics is associated with private health insurance coverage. Model 21 enhances those results as

workers in MSAs with a greater concentration of ambulatory surgical centers, advanced imaging centers, and alcohol and drug rehabilitation centers spent more on healthcare than workers in other MSAs. If these factors drive up healthcare costs, then they may have an indirect effect on private health insurance rates not found in Model 10. That is, minimizing excess capacity in some MSAs may well contribute to higher ESI coverage rates for some workers. There is reinforcing evidence about the impact of emergency room visits (Model 20) for MSAs with higher concentrations of emergency room physicians.

Models 20 and 21. Macro-level Predictors of Healthcare Expenditures: Service Delivery Utilization and Specialization

	Model 20: Service Delivery: Utilization†		Model 21: Service Delivery: Specialization†	
Fixed Effect (Level 2)	**Estimate**	**Std. Error**	**Estimate**	**Std. Error**
Intercept	7.414 **	0.080	7.437 **	0.089
Emergency room visits per capita	0.829 **	0.237		
Inpatient days (short term) per capita	-0.220	0.157		
Inpatient days (short- and long-term) per capita	0.070	0.101		
Outpatient days (short term) per capita	0.130	0.120		
Outpatient days (short- and long-term) per capita	-0.068	0.120		
Hospitals with less than 100 beds per capita			-0.068	0.058
Hospitals with 200 or more beds per capita			-0.027	0.089
Ambulatory surgical centers per capita			0.037 *	0.020
Advanced imaging centers per capita			0.103 **	0.027
Alcohol/drub rehab centers per capita			1.836 **	0.537
MDs with specialties per capita			0.018	0.013
Cardiologists per capita			-0.119	0.135
Thoracic surgeons per capita			-0.051	0.278
Emergency room MDs per capita			0.131 **	0.061
OB Gyns per capita			-0.153 *	0.088
Scale	1.441	0.011	1.436	0.011
Weibull shape	0.694	.006	0.696	0.006
	χ^2 likelihood value=-15559		χ^2 likelihood value=-15532	

Source: MEPS 2003 Household Component Survey (employed persons ages 21-64) and NCHS 2002 Area Reference File.
†Personal-level variables are the same as the micro-level Model 15 but have been excluded for display purposes.
*** p < 0.05, * p < 0.10*

Model 22 again shows that MSAs with greater facility or payroll costs to support healthcare services have no direct correlation with private health insurance rates (Model 11) or

healthcare costs. Preliminary models that did not include the micro-level characteristics of workers showed statistically significant associations between MSAs with greater expenditures and private health insurance rates. They may well be important factors that intervene with other micro-level variables that have not been brought out in these preliminary analyses.

Model 22. Macro-level Predictors of Healthcare Expenditures: Service Delivery Expense

Model 22: Service Delivery Expense†		
Fixed Effect (Level 2)	**Estimate**	**Std. Error**
Intercept	7.690 **	0.061
Total facility expense per capita	-0.132	0.168
Total facility payroll expense per capita	0.400	0.396
Scale	1.443	0.011
Weibull shape	0.693	0.010
	χ^2 *likelihood value=-15573*	

Source: MEPS 2003 Household Component Survey (employed persons ages 21-64) and NCHS 2002 Area Reference File.
†Personal-level variables are the same as the micro-level Model 15, but have been excluded for display purposes.
*** p < 0.05, * p < 0.10*

Models 23 and 24 describe the relationship between structural and service delivery trends and 2003 healthcare expenditures. MSAs with a growing number of white-collar workers had greater expenditures on healthcare compared to other workers and regardless of whether facility expenses changed. Although the growth of white-collar workers was associated with higher rates of healthcare expenditures and ESI, the presence of larger proportions of white-collar workers was not a predictor of higher expenditures (Model 18). That is, the growth of labor markets with white-collar workers was more important than having longstanding white-collar markets. The Model 24 results mirror those in Model 13. MSAs with higher per capita admission rates had lower expenditures and lower insurance rates. This suggests that the higher admission rates may have been the result of having a greater proportion of Medicare beneficiaries. Conversely, MSAs with less healthy populations and higher admission rates could have insurance providers who raised health insurance plan costs and limited insurance rates to avoid higher liability costs. MSAs with more cardiologists had higher healthcare expenditures and insurance coverage rates. One explanation is that advantaged MSAs with higher insurance coverage rates attract more cardiologists, further driving up per capita healthcare costs. Put another way, lucrative markets may attract healthcare providers and broaden the availability of services, which further increase costs.

Models 23 and 24: Macro-level Predictors in Healthcare Expenditures, 1998-2003: Structural Service Delivery Trends

	Model 23: Structural Trends†		Model 24: Service Delivery Trends †	
Fixed Effect (Level 2)	**Estimate**	**Std. Error**	**Estimate**	**Std. Error**
Intercept	7.720 **	0.042	7.747	0.047
Δ Total facility expense (percent)	-0.520	0.316		
Δ Facility payroll expense (percent)	0.361	0.304		
Δ Manufacturing workers (percent)	0.190	0.117		
Δ White-collar workers (percent)	0.950 **	0.266		
Δ Total hospitals (percent)			0.266	0.185
Δ Total beds (percent)			-0.207	0.206
Δ Admissions (percent)			-0.660 **	0.198
Δ Emergency room MDs (percent)			-0.065	0.068
Δ Cardiologists (percent)			0.366 **	0.087
Scale	1.441	0.011	1.440	0.011
Weibull shape	0.694	0.006	0.695	0.005
	χ^2 likelihood value=-15554		*χ^2 likelihood value=-15550*	

Source: MEPS 2003 Household Component Survey (employed persons ages 21-64) and NCHS 2002 Area Reference File.
†Personal-level variables are the same as the micro-level model M15, but have been excluded for display purposes.
*** $p < 0.05$, * $p < 0.10$*

As with the health insurance models, strong inter-correlations between the macro-level predictors suggest the appropriateness of using structural equations models to elaborate the set of predictors on healthcare expenditures and the relationship between healthcare expenditures and health insurance rates. The model results suggest multiple indicators are at work that reinforce and conflict with each other in complex ways.

Discussion

Many of the macro-level issues suggested as potential influences were associated with private health insurance rates. The model results are evaluated below to try to answer the research questions posed earlier:

How are state healthcare costs and insurance rates associated with individual healthcare costs (per capita expenses) and insurance rates, given differences in state mandates, administrative costs, and federal Medicaid contribution rates?

The variance components analysis showed that a significant share of the variance in insurance rate is due to differences among states (as well as MSAs). Workers in states with higher concentrations of Medicaid beneficiaries were less likely to have private health insurance; those in states with higher per capita healthcare expenditures were more likely to

have private health insurance. There are clear differences between states and whether their workers have private health insurance. These issues should be followed up with additional state-level identifiers that better describe differences in state regulations, as well as these states' industrial structure and economies in those states, and their link to insurance regulations and policies. State insurance polices, more importantly, may provide greater benefits to medium-size and large firms than to small firms and their employees.

What is the impact of an aging population with higher morbidity and mortality rates and foreign-born immigrants with higher fertility rates on regional healthcare expenditures and insurance rates?

The findings are consistent for both total healthcare expenditures and having ESI coverage. Workers in MSAs with higher birthrates spent less on healthcare and were less likely to be insured. Similarly, workers in MSAs with higher rates of ischemic heart disease expended less on healthcare services and were less likely to have ESI coverage. Although there is no direct link between the health condition of the general MSA population and the workers' outcomes, the results suggest a tendency for two important groups—child-bearing women and persons with cardiovascular problems— not to receive the full care that those who work in larger firms, have higher wages, or live in different MSAs might receive. That is, independent of their employment situation, workers in different MSAs have different levels of access to ESI coverage.

How is the industrial structure of work, reflected by manufacturing and union jobs, associated with healthcare expenditures and insurance rates in regional markets?

Both of the full micro-level models showed that individual union members had greater healthcare expenditures, on average, than non-union members, and were more likely to have ESI coverage (see Models 1 and 10). This finding was expected. There was no corresponding measure at the MSA level in the ARF data so the relationship between predominant industrial structure and individual outcomes used available measures. Proportions of workers in manufacturing and white-collar jobs were the major discriminators of the industrial structure of MSAs. The residual reference group included service, wholesale, and other workers in smaller industry groups in those MSAs.

The results showed that workers in MSAs with greater manufacturing and white-collar industries were more likely to have ESI coverage than other workers. This can be interpreted in several ways. First, assuming the reference group is predominantly service workers, it shows that the demand for health insurance by manufacturing and white-collar workers requires their employers to provide affordable ESI coverage, regardless of the size of the firm. It also shows the apparent disadvantage of working in the service economy, which likely includes lower wage rates as part of their lower ESI coverage rate. But, the relationship between predominant industry structure in an MSA (white-collar and manufacturing) was not statistically different than the reference group, suggesting similar total expenditures. This provides further evidence that not only are individual firm characteristics associated with ESI coverage rates, but the market area industrial structure or MSA characteristics are also associated with individual ESI coverage rates. Workers in

MSAs with higher rates of unemployment spent less on total healthcare and were less likely to have ESI coverage. MSAs with declining economies and workforces probably have firms on the margin that are disadvantaged and have lower profits, making the provision of ESI less likely, although individual workers control their spending and access to needed healthcare services.

What is the implication of the service utilization rates for emergency room, outpatient, and inpatient services on regional healthcare expenditures and insurance rates?

The service delivery measures are trickier to interpret. All of the service delivery measures were based as per capita rates for each MSA. The supply of beds, hospitals, or nurses may be associated with more attractive revenues available for providing these services, sicker populations, or a large numbers of Medicare-covered residents. All three can affect the price of services and whether firms can afford to provide ESI coverage. Healthcare providers that service large Medicare populations may be better able to provide less expensive services because they provide higher volumes of healthcare services. Similarly, confounding issues between supply, demand, and price can be difficult to separate. This preliminary study makes no effort to disentangle them, as better data and methods are required than those available for this analysis.

Workers in MSAs with a higher number of hospitals had higher total healthcare expenditures, but there was no association with ESI coverage rates for those workers. If having a greater number of hospitals is directly associated with individual healthcare expenditures rather than implied via the MSA-worker link, there appears to be no impact on ESI coverage. Workers in MSAs with a greater number of short-term hospital beds and inpatient days had lower ESI coverage rates; although, the supply of short-term beds was associated with lower expenditures. Conversely, workers in MSAs with more per capita skilled nursing facility beds and outpatient days at short- and long-term hospitals were more likely to have ESI coverage; although, skilled nursing facility beds were associated with higher total healthcare expenditures. Workers in MSAs with more nurses per capita spent more on average than other workers on healthcare, but there was no difference in their ESI coverage rates.

Labor and capital costs (nurses and hospitals) are associated with higher individual expenditures, but not ESI coverage rates. MSAs that provided more expensive services (per capita) had lower ESI coverage rates; although, more cost-effective services (skilled nursing facility bed and outpatient days) were associated with higher insurance rates. These results suggest a direct association between the provision of services and individual ESI coverage, although insurance costs are an intervening variable between the number of hospitals and nurses and ESI coverage rates.

Emergency room visits did not fit as cleanly. Workers in MSAs with greater rates of emergency room use spent more on healthcare, but also had higher rates of ESI coverage. It is unclear whether ESI coverage led to additional utilization of emergency services or if specific subpopulations were linked with the emergency room use.

What is the impact of specialty services, including ambulatory surgical centers, psychiatric services, and so forth, on healthcare expenditures and insurance rates?

Workers in MSAs with higher rates of specialty services were associated with higher total healthcare expenditures, but not ESI coverage rates. The key specialty services included ambulatory surgical centers, advanced imaging centers, alcohol and drug rehabilitation centers, and having a greater supply of emergency room physicians. MSAs with more specialty centers and higher total expenditures are more likely to be in larger MSAs rather than smaller ones because of market size and cost issues. Workers in MSAs with more advanced imaging centers were more likely to have ESI coverage. Together, the results suggest that specialized services are associated with total healthcare expenditures, but not directly associated with ESI coverage rates.

Has managed care played a significant role in lowering regional healthcare expenditures and insurance rates?

Only a single measure (HMO penetration) is available to test the influence of managed care on coverage and cost outcomes. HMO penetration rates (in MSAs) did not affect individual ESI coverage rates for workers participating in the MEPS study. Workers in MSAs with higher rates of HMO penetration, however, had lower healthcare expenditures, on average, than workers in MSAs with lower HMO penetration rates. This suggests that having more HMOs increased competition and reduced costs in those MSAs, though there was no discernible direct impact on ESI coverage rates.

How have changes in the industrial structure of work, particularly declining manufacturing and union jobs, impacted insurance rates?

Declining manufacturing was not associated with total health expenditures or ESI coverage rates relative to the reference group of service and other workers. The comparison between manufacturing workers with relatively high rates of union contracts that include benefit packages was expected to compare favorably with more marginal service sector workers. This non-significant result may be attributable to older manufacturing workers leaving the workforce and having continued healthcare coverage through their employer or Medicare coverage rather than entering service sector jobs with lower expected rates of ESI coverage. Workers in MSAs with increasing numbers of white-collar workers had greater healthcare expenditures and higher ESI coverage rates. White-collar workers and their employers expect health insurance as part of their benefit package, and it translates to higher ESI coverage rates in the MEPS cohort. Having ESI coverage appears to have led to greater use of services and higher healthcare expenditures.

What impact do macro-level changes in consumer markets, industry structure, and service and delivery have on insurance rates and healthcare expenditures?

Changes in per capita hospitals and all hospital beds between 1995 and 2000 were not associated with either healthcare costs or ESI coverage rates. The change in admission rates from 2000 to 2005, however, was inversely associated with healthcare costs and ESI

coverage rates. Nationally, admission rates increased, so greater rate changes were associated with lower ESI coverage rates and total healthcare expenditures. As indicated earlier, the link between MSA characteristics and individual outcomes is tenuous, and the growth in admission rates may be attributable to retirees on Medicare or unemployed persons in the community. Workers in MSAs where the number of cardiologists grew between 2000 and 2005 were more likely to have ESI coverage and had higher total healthcare expenditures.

These findings suggest that MSAs with higher admission rates lead to lower insurance coverage rates and lower total healthcare costs. Conversely, the growth in cardiologists may be contributing to increased healthcare expenditures. Further analyses need to be conducted to fully understand these relationships.

Assembling the Results

The set of potential macroeconomic measures was far more extensive than the results that are included in the tables. The analysis results provide support for all of the basic research questions that were posed. There is, however, a need to organize the results into a more meaningful set of findings. Further testing needs to be conducted, but the results of this paper demonstrate that metropolitan and market area factors have an impact on the healthcare costs and ESI coverage rates that appear to operate jointly and are mediated by the other factors discussed in this paper.

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