THE VIABILITY OF THE EMPLOYER-PROVIDED HEALTH INSURANCE SYSTEM

By

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ABSTRACT OF THE DISSERTATION

The Viability of Employer-Provided Health Insurance System

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Professor John F. Burton, Jr.

The dissertation evaluate the viability of employer-provided health insurance (EPHI) system in the United Stated, using two confidential data sets that have been made available to me by the Bureau of Census, including the Medical Expenditure Panel Survey-Insurance Component and Longitudinal Business Database.

The empirical findings suggest that the current EPHI system will sustain, at least in a short period. Despite the public accusations that employers are fleeing from the insurance market, I find that dropping health insurance coverage is indeed rare. Employers are also reluctant to replace their insurance plans with HMOs, regardless of its price advantage. Once health insurance is offered, employers still make insurance plans available to most of their workers.

However, employers are controlling insurance costs in more subtle ways with some success. They transferred a significant portion of the EPHI costs to their workers through increasing their contribution to the insurance premiums or lowering their wages. Around 20 percent of the increased insurance costs were shifted to workers through employee contribution to health insurance, and at least another 20 percent was transferred through slowing down wage growth after 2001. My findings also suggest the quality for EPHI purchased by employers falls behind the advance of medical service in general.

When the quality for EPHI at the market improves by 1 unit, a typical employer will only increase its quality for health insurance around 0.32 units.

Finally, the empirical results of this dissertation suggest that offering health insurance is a blessing for the business. Establishments offering EPHI were 29.2 percent more like to survive than others. Furthermore, the gap of default rate between establishments offering health and those not offering did not shrink from 1997 to 2004, despite the increase of health insurance costs.

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The research in this dissertation was conducted while the author was a Special Sworn Status researcher of the U.S. Census Bureau at the New York Census Research Data Center. Research results and conclusions expressed are those of the author and do not necessarily reflect the views of the Census Bureau. This dissertation has been screened to insure that no confidential data are revealed.

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Part I: Introduction

Chapter 1: History of Health Insurance in the United States

The history of health insurance in the United States can be traced back to 1798, when the congress established the U.S. Marine Hospital service for seaman, which was financed through mandatory wage deductions (Scofea 1994). However, insurance policies in the nineteenth century focused more on the protection of income loss due to accidents, rather than the cost of medical treatment. The notion of health insurance then was similar to today's disability insurance. Given the rudimentary state of medical technology in the nineteenth century, most patients were treated in their home and medical expenditures for American families were generally very low. Hospitals and physicians did not establish the modern form of medical treatment until antiseptic methods were established in early twentieth century (Thomasson 2003). In the meantime, health was deemed as uninsurable by commercial insurance companies. They believed that the insurance for health service suffered more serious adverse selection problem than other types of insurance lines such as death or home insurance because insurance companies had little information regarding a person's actual health status before the policy was purchased. The concern was that people with poor health would claim to be healthy and were more likely to sign up for health insurance.

The history of modern health insurance and employer-provide health insurance (EPHI) started in the early twentieth century. Similar to Burton and Mitchell's (2003) history of employee benefits and social insurance, I divide the history of EPHI into six time periods: The Progressive Era (1900-1920), the Period of Normalcy (the 1920s), the

New Deal and World War II Era (1930-45), the Post-World War II Era (1946-1979), the Managed Care Era (1980-1999), and the Modern Era (the 2000s).

1.1 The Progressive Era (1900-1920)

In the early 20th century, some farsighted companies adopted policies, known as "welfare capitalism", to pay workers with non-wage form of compensation (Burton and Mitchell 2003). The "welfare work", termed by John Commons (1903), included a broad range of benefits other than wages: 1) health and safety benefits at the workplace and at workers' home, 2) educational, recreational, and social activities, 3) and financial benefits plans, including pensions and health care. The underlying impetus of "welfare work" was the industrial revolution in the nineteenth century and also the relocation of farm workers to the urban areas (Jacoby 1975). The purpose of offering those non-wage forms of compensations was to develop a loyal workforce and maintain a long term relationship with workers.

Following the lead of the European countries, the Progressives started to push for public health care system in 1910s. However, the drive for mandatory insurance was quickly defeated by employers, unions, and health care providers. None of the parties was willing to give up their domain to the federal or state governments.

In contrast, a mandatory program for workplace health and safety seemed acceptable for all parties. The first social insurance program, workers' compensation, was adopted by many states between 1900 and 1920. Workers' compensation benefits included both cash and medical compensation. The program replaced a portion of wage loss due to the accident, and it also covered most of the medical bills. To qualify for the

benefits, the injury had to be an accident which arose out of the employment and in the course of employment.

1.2 The Period of Normalcy (1920s)

Medical costs substantially increased in the 1920s due to technology advances and quality improvements. Thanks to our pioneers in the field of medicine and medical instruments, hospital and doctors in the 1920s could treat patients in a scientific, precise, and effective way. Professional health service became irreplaceable and the demand for physician visits and hospital stays were dramatically driven up.

Another contributor to the rising medical costs was the quality control of health treatments initiated by American Medical Association (AMA).The AMA formed the Council on Medical Education (CME) in 1904 to standardize the requirement for medical licensure. CME imposed restrictive requirements on medical education with stricter entrance requirements, better facilities, higher fees, and tougher standards. Consequently the number of medical school dropped from 131 in 1910 to 95 in 1915 and 81 in 1922 (Thomasson 2003). Hospitals were also upgraded through standardization and accreditation. In order to gain the accreditation of the American College of Surgeons (ACS), a hospital had to meet a set of standard relating to the staff, records, and facilities available. Increasing requirements for license and accreditation, in addition to a rising demand for health service, eventually resulted in rising medical costs.

The effort for a government-run or mandatory health care program was a notable failure during the 1920s. Nonetheless, the federal government successfully set up three

welfare programs: two related to World War I and an infant and maternal health program (Burton and Mitchell 2003).

1.3 New Deal and World War II Era (1930-1945)

No private insurance agencies underwrote health insurance until the 1930s. The breakthrough was the Great Depression, which wiped out most families' savings and seriously damaged their economic conditions. Few people could afford hospital care, leaving most hospitals in deep financial problems. More than 100 hospitals failed in the first year of the Depression and those that remained in business were operating at around 50 percent of their capacity (Scofea 1994). To provide families with necessary care and to relieve the hospital from the financial stress, a group of teachers at Baylor University contracted with the University hospital, which agreed in 1929 to provide a service of 21 days hospitalization at an annual premium of $6 per teacher. This development is the forerunner of the well known Blue Cross plans.

The idea of prepaid hospital service plans spread rapidly through out the country during the Great Depression. This arrangement brought mutual advantages to both subscribers and hospitals in the 1930s. While it allowed patients to afford hospital stay, it also guaranteed hospitals' revenue despite the falling of the economy. To protect themselves from competition with Blue Cross, physicians began to organize similar prepaid plans that covered physician services, known as Blue Shield plans. In 1939, the first Blue Shield plan was offered by California physicians.

Despite the developments of the Blues, only 12 million out of 132 million population, or roughly 10 percent of the population, in the United States was covered by

some form of health insurance by 1940 (Scofea 1994). Health insurance did not cover the majority of working families until employer-provided health insurance (EPHI) became popular in World War II.

In 1942, the Congress enacted the Stabilization Act, which limited the amount of wages that employers could increase annually during the war time. At the same time, the law permitted the adoption of EPHI and other employee benefits. With many soldiers fighting on the battle fields, the labor force in the homeland of United States was scarce and the labor market was very tight. Many employers provided EPHI to get around the federal government's control of wages and to attract more workers.

EPHI was also stimulated by collective bargaining during the same period. The War Labor Board decided that employee benefits, such as pensions and health insurance, were part of wages and thus could be part of the terms of collective bargaining agreements. Therefore the union movement was allowed and actually encouraged to negotiate health benefits on behalf of workers. Further, health insurance was held to be a mandatory subject of collective bargaining by the National Labor Relation Board shortly after the war. Unions made health care a major goal at the bargaining table. According to the data of Health Insurance Institute (1961), the number of persons enrolled in health insurance at the national level jumped about seven times from 1940 to 1950.

The New Deal was also a hallmark for social insurance. In response to the Great Depression, the Congress during the Roosevelt Administration passed the Social Security Act in 1935 in order to protect workers from poverty during the financial crisis. The Act established mandatory insurance for Old Age (OA) and unemployment benefits. Although initially funded by general revenues of the federal government, OA was

ultimately financed by employers and employees through a payroll tax beginning in 1937. A retired worker receives monthly OA benefits if he/she has contributed sufficient amount of money to the OA system. The normal retirement age was set at 65 and now is 67 for individuals born after 1960. The amount of OA benefit is based on workers' pre-retirement contribution and a redistribution formula used by the federal government, by which low-income workers get a higher portion of their pre-retirement wages when they retire than high-income workers.

Unemployment insurance (UI) is a federal-state program. The UI program is funded by employers without any contributions from employees. A federal tax is assessed against all covered employers, which is largely forgone if a state has a UI program that meets several federal standards. If a state failed to establish a program, the federal tax will be levied and no money will be returned for the unemployment benefits there. Needless to say, all states quickly installed their own UI programs. UI benefits typically cover a portion of wage loss up to 26 weeks. However, the federal government may help to extend the benefits to another 13 weeks if the unemployment rate in that state is very high.

1.4 Post-World War II (1946 -1980)

Employee benefits paid by employers surged during this period. Employers paid only $2 billion or 1.5 percent of the payroll to their pensions in 1948, while the figure jumped to $103 billion or 7.5 percent of the payroll in 1980. Employers' payments for health insurance were $0.4 billion or 0.3 percent of the payroll in 1948. The payments steadily grew to $61 billion or 4.4 percent of the payroll in 1980 (Table 1.1). The private

health insurance system in the United States was well established by the 1960s. The private system, mainly sponsored by EPHI, covered around 75 percent of the population in 1958 (Thomasson 2003).

Table 1.1: Employers Spending on Employee Benefits 1948-2005

	Wage and salaries	Employer contribution for benefits		Employer contribution for pension		Employer contribution for health insurance	
Year	$Billion	$Billion	As % of wages and salaries	$Billion	As % of wages and salaries	$Billion	As % of wages and salaries
1948	135.6	3.4	3.19%	2	1.47%	0.4	0.29%
1950	147.2	4.7	3.96%	2.9	1.97%	0.7	0.48%
1955	212.2	8.4	3.96%	5	2.36%	1.7	0.80%
1960	272.9	14.3	5.24%	8.2	3.00%	3.3	1.21%
1965	363.8	22.7	6.24%	12.8	3.52%	5.9	1.62%
1970	551.6	41.8	7.58%	23.3	4.22%	12.1	2.19%
1975	814.8	87.6	10.75%	52	6.38%	25.5	3.13%
1980	1377.6	185.2	13.44%	102.8	7.46%	61	4.43%
1985	1995.5	281.5	14.11%	143.4	7.19%	110	5.51%
1990	2754	377.8	13.72%	153	5.56%	176.9	6.42%
1995	3435.7	493.6	14.37%	197.5	5.75%	242.8	7.07%
2000	4829.2	609.9	12.63%	222.6	4.61%	331.4	6.86%
2001	4942.8	642.7	13.00%	230.8	4.67%	353.3	7.15%
2002	4980.9	745.1	14.96%	296.2	5.95%	386.5	7.76%
2003	5127.7	815.6	15.91%	325.5	6.35%	423.4	8.26%
2004	5377.1	866.1	16.11%	325.6	6.06%	469.7	8.74%
2005	5664.8	933.2	16.47%	345.6	6.10%	514.5	9.08%

Source: U.S Department of Commerce, Bureau of Economic Analysis, Table 3.6, 6.11, and 6.3

A major contributor to this growth is the preferred-tax policy for employee benefits. Under rules of the 1954 Internal Revenue Code (IRC), employer contributions to EPHI were considered as a deductible operating cost and were not subject to employers' income tax and payroll tax. In addition, EPHI benefits were exempt from employees' taxable income. Providing EPHI benefits is more attractive than paying wages for those workers who need health insurance. Another contributor of the EPHI growth is the developments of union movement. The 1950s is considered as the "golden

age" of unionism in the United States. Its coverage peaked at 35 percent in 1954. Union members benefited from the outcomes of aggressive collective bargaining. Workers who were not unionized also received a spillover effect from the collective bargaining (Kahn 1980). Many employers provided comparative compensation package to their workers to avoid the unionization of their workplace. During the postwar era, the United States decisively moved to a system of a private EPHI system (Burton and Mitchell 2003).

The spread of EPHI also helped defeat the efforts of the Truman Administration to enact a federal health plan in 1949. Proponents of government-sponsored health insurance system finally realized that the only way they could succeed was to do it incrementally (Marmor 2000). The first government-sponsored health insurance system in the United States, Medicare, was passed in 1965. Medicare is part of Social Security system, thus is also funded by the payroll tax. Both employee and employer have to contribute a portion of their wages income as part of their FICA contribution to the federal government. In exchange, individuals and their spouses receive health care benefits when they reach 65 and are entitled to Social Security benefits. Individuals may receive early OA benefits with a reduced rate at age 62, but the earliest date of Medicare is age 65. Medicaid was also enacted in the same year. In contrast to Medicare, Medicaid is a means-tested, federal-state program that provides medical resources for those needed individuals or families such as low-income and disabled persons and that is funded from general revenue.

In addition to Medicare, disability insurance (DI) was established and included as part of Social Security in 1956. DI initially covered workers more than 50 years old and disabled children. Those limitations were subsequently removed and most workers are

now covered by DI. Along with the expansion of benefits, the Social Security program experienced several financial problems in the postwar period. The employee contribution increased from 1 percent of the first $3,000 dollar before 1949 to 6.2 percent of the first $25,900 of earnings in 1980. Employers' contribution increase was identically increased as employee contribution.

There were still drives for national mandatory health insurance program in the 1970s. President Nixon proposed an employer-mandated plan which required employers to pay 65 percent of the insurance cost for employees who worked more than 25 hours per week. The proposal was endorsed by large employer groups, such as National Association of Manufacturers (NAM), but it was opposed by small businesses and the labor movement. Small businesses argued that EPHI was too expensive for some firms to afford, while union leaders prefer a single-payer model rather than an employer-mandated model (Burton and Mitchell 2003). The topic of a national health insurance plan was picked up again by Carter Administration in 1977. However, the tide of employers' interests was shift away from providing benefits at workplace (Burton and Mitchell 2003). The debate whether the "competition" or "regulation" of a health system would better service this country started and maintained unsolved until today (Moran 2005).

1.5 Managed Care Era (1980-1999)

The fast growth of EPHI spending in the postwar era seeded a fear factor for employers, insurers, and the government. Prior to the mid-1970s, most employees were covered by conventional EPHI plans. Under a conventional plan, patients had

considerable freedom in choosing medical providers. Providers made ultimate decisions for medical treatments. However, the medical bill was paid by insurance companies, a third-party who did not have much information of the medial process. Since the consumers and providers have few incentives to keep the medical spending efficient, health care costs grew very fast.

Managed care was introduced in the 1980s to curtail the fast growth of the EPHI premiums. Managed care plans generally control patients' access to medical providers. They tend to use primary care physicians as gatekeepers for specialty cares. They also encourage or force participants to use exclusive provider networks. Managed care plans usually require the providers to share financial consequences of medical decision, or they directly hire their own physicians. Integrating of risks of the insurer with the provider could substantial reduce the problem of provider moral hazard. Providers have fewer opportunities to overuse or abuse the medical resources under a managed care system. In addition, managed care plans usually include comprehensive procedure for utilization management to determine the necessary of the treatment, to monitor the ongoing care, and to review the appropriateness of the medical process. In short, physicians and hospitals have much less discretion in decision making under a managed care plan than a conventional plan. They have to ask permission from the insurance companies for the treatments of their patients. Consequently the medical costs were substantially reduced by the tight control of resource utilization.

Managed care was embraced quickly by employers and other consumers due to its low price. While the conventional plan dominated the health insurance market in the 1970s, its market share was dwindled to only 3 percent in 2005 according the KFF/HRET

annual report. Today almost no health care plan is paid fee-for-service. KFF/HRET annual reports also reveals a sharp decline in annual premium growth from 18 percent in 1989 to 0.8 percent in 1996, which was mainly caused by the spread of manage care plans.

To cope with the rising cost of health insurance, the Clinton Administration initiated another effort to enact national health insurance in 1993. The national health care task force was created and chaired by the First Lady, Hillary Clinton. The core element of the Clinton healthcare plan was a mandate for employers to provide health insurance coverage to all of their employees through competitive but closely-regulated health maintenance organizations (HMOs). The proposal was killed by the conservatives, the insurance industry, and the health care industry. However, the defeat of this proposal was also due to the First Lady's role in the secret proceedings of the Health Care Task Force, which sparked litigation against the Clinton Administration.

1.6 Modern Era (2000 -)

Managed care reached its limit of effective cost control in late 1990s. It was fiercely criticized by the public, who perceived that managed care plans often focused more on reducing costs than on improving quality. Patients pressed for greater choices of medical service and providers negotiated more aggressively with insurers. In the meantime, there were few additional easy targets left for cost reduction. As a result, the annual premium growth rate climbed up to two-digits again in the 2000s.

In the 2000s, a new type of cost control plan, known as consumer-driven health care, was invented and later boosted by the Bush Administration with favorable tax

treatments in the Medicare Prescription Drug, Improvement, and Modernization Act of 2003. Under the law, a health savings account (HSA) can be created for the purpose of tax deductions. Deposits and withdrawals from an HSA are tax free if the money is spent on medical items or services. Consumers wishing to deposit pre-tax funds in an HSA must be enrolled in a qualified high-deductible health plan (HDHP). In 2007, qualified plans must have a minimum deductible of $1,050. Thus a patient must pay the first $1,050 medical cost using her/her HSA savings until the deductible threshold is passed and the insurance benefits kick in. HSAs are the most popular form of tax-preferenced health care spending accounts. Others include Archer Medical Savings Accounts (MSAs), Flexible Spending Arrangements (FSAs), and Health Reimbursement Accounts (HRAs).

Consumers tend to be more cost cautious when they have to pay out of pocket for the medical service (Manning et al. 1987). A few studies confirm that a consumer-driven health plan is an effective tool in slowing down the growth of health care costs (Gorman 2006). This new form of health insurance quickly drew the interests of those employers who were struggling with two-digit insurance cost growth. Around 10 percent of firms offered consumer-driven health plans in 2007, an increase from 4 percent in 2005. The plans covered 3.8 million workers in 2007 (KFF/HRET 2007).

Since the consumer-driven health plan is new, its future remains uncertain. It is not clear how far this new form of EPHI can go and what impact it will have on our society. Meanwhile, the quality question is raised: can consumers effectively and scientifically manage their own health care? Patients are not medical experts. It is difficult for them to balance between saving and spending on health issues. Saving on a

small illness could lead to a life-threatening decease in the future. More research and studies should be devoted to this new form of EPHI plan.

Chapter 2: Issues in EPHI

As history opens the page of twenty-first century, the EPHI system in the United State is at an intersection. EPHI has become a mixed bless and a dilemma. It provides a much cheaper price of health insurance than individuals could obtain elsewhere. However, the rising costs of heath care also impose heavily financial burdens on employers and workers, which in turn affect the business climate and the cost of living. In response to this dilemma, this thesis provides a thorough evaluation of EPHI system and estimates its viability in the near future.

2.1 Price Advantage of EPHI

The price of EPHI is much cheaper than the price of health insurance in individual insurance markets for several reasons. First, the EPHI can effectively reduce the problem of adverse selection. Adverse selection is pre-contractual opportunism. When there is information asymmetry between the contracting parties, the party who has private information will hide its content in order to get a better deal (Pauly 1974). A health insurance plan attracts purchasers with poor health, whose health information is little known by the insurance carrier. Meanwhile, persons who are in good health are less inclined to purchase insurance. The result is that on average the health status of persons purchasing insurance is worse than the average health status of the general populations, which is likely to lead to underwriting losses. Hence sickness insurance was considered as uninsurable by commercial insurance companies in the nineteenth century.

However, insuring most persons in a working group, a strategy invented by Blue Cross and Blue Shield, could substantially reduce the adverse selection. Working is a

signal or message of good health. Limiting the medical coverage to those employed is an effective screening tool for the insurer to exclude those with poor health. In addition, individuals' risks are pooled together by their employers in the EPHI market. The insurance is priced at a group level, where the healthy workers have to subsidize those with poor health. Hence the cost of adverse selection is substantially born by those healthy workers instead of the insurance companies. In addition, the insurance contract between the employer and the insurance company is relatively stable. Insurers can use experience rating to obtain accurate health information for the group of workers over time.

Second, group insurance can substantially reduce administration expenses and insurance loadings due to economies of scale. Moreover, employers have greater bargaining power than individuals when they haggle with insurance companies. Premiums paid by large employer are closer to an actuarial fair price. According to Congressional Research Service (1988), large firms can reduce the cost of providing health insurance by almost 35% relative to small groups.

Finally, the Internal Revenue Service (IRS) excludes non-wage forms of compensation, such as health insurance and pensions, from taxable income. Employers' spending on the EPHI is not subject to income tax for both employers and employees. Ironically, if individuals purchase health insurance from a place other than their employer, most of the cost cannot be deducted from their taxable income. Gruber and Potera (1996) estimate that the tax deducted health insurance can reduce the cost on average about 27% compared with health insurances that employees purchase with their after-tax income. The federal government is punishing any type of private health insurance other than the

EPHI. It may be an incentive to encourage individuals to stay in the work force, but it is very likely to leave a portion of the population uninsured because they cannot obtain insurance at a price comparable to those who obtain their insurance through the employer.

2.2 The Rising Cost of EPHI

Despite the financial advantages of EPHI over insurance purchased by individuals, the EPHI is under considerable financial pressure for several reasons.

2.2.1 EPHI is Expensive

The purpose of insurance is to forgo a small and certain amount of money in order to avoid an uncertain catastrophic loss. In EPHI, workers and/or their employers pay premiums to health insurance companies. In exchange, the insurer should take care of the medical expenses according to the terms of insurance once the workers and their families get ill. However, after decades of premiums growth, EPHI premiums are no longer a small amount of money comparing to workers' earnings. The average EPHI premium for a family-coverage plan was $10,728 in 2005 (MEPS-IC), while the annual income was $46,326 for the median household and $19,178 for the twentieth percentile household in the same year (Census 2005). Thus an average EPHI family plan would cost 23 percent of the annual income of a median household and 56 percent of a household with earnings at the twentieth percentile in 2005. Of course, if those families obtained their health insurance through individual policies, the premiums would be much higher.

The price of health insurance in the private market is not affordable anymore for many ordinary American families. If the employers stop offering health insurance, more

than half of working families would become uninsured. Meanwhile, many employers are also struggling to afford EPHI to their employees. Although many employers request employees to share a portion of the insurance cost, they had to spend 9 percent of payroll on EPHI in 2005, up from 0.4 percent in 1948 (Table 1.1). It is no surprise that companies are complaining about the cost of EPHI and its negative impact on business developments.

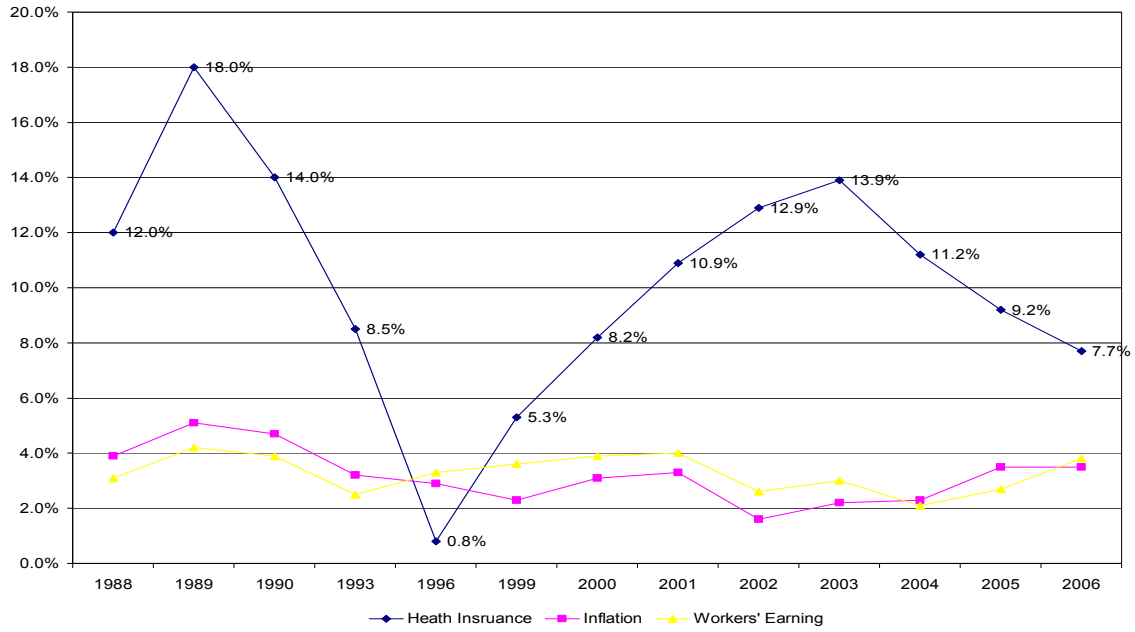
2.2.2 The Growth of Premiums Seems Out of Control

The problem of EPHI is not only the current high price, but also the escalation in employer expenditures. As Figure 2.1 indicates, the growth of health insurance premiums has substantially exceeded the growth of inflation and workers' earning in the last two decades. While workers' earnings and the overall cost of living increased around 2 to 4 percent a year, EPHI expenditures were flying skyward at around 10 percent a year. From 1987 to 2006, the premium doubled almost every 10 years. The average premium for a single-coverage plan was $1,992 and $4,954 for a family plan per enrollee in 1996. The figure jumped to $3,991 and $10,728 in 2005 (MEPS-IC 1996-2005).

Insurance companies tried many tactics to cool down the heat of premium growth, but few of them worked well. Deductibles, co-payment, and coinsurance were included in the insurance contract since the birth of EPHI to control the moral hazard problem. Moral hazard is the post-contractual opportunism. When the output of the contract is not freely observable, the party holding private information will pursue its own interests (Arrow 1963). Empirical research generally confirmed that individuals consume less health service if they have to pay out of their own pocket (See detailed review from Culter and

Zeckhauser 2000). However, those cost-sharing tactics did not provide sufficient constraints on health care expenditures, so other approaches such as managed care to limit the growth of health care expenditures have been adopted. The goal of managed care is to control the over-utilization of medical services by both consumers and providers, and thus assure insurers that most medical treatments are necessary and appropriate. Those tactics squeezed some waste out of the health care expenditure at the beginning. However, they became less effective after they were used for a while (Economic Report of the President 2002).

Figure 2.1: Percentage Increase in Health Insurance Premiums Compared to Other Indicators, 1988 – 2006



Source: KFF/HRET Employer Health Benefits 2006 Annual Survey, Exhibit A

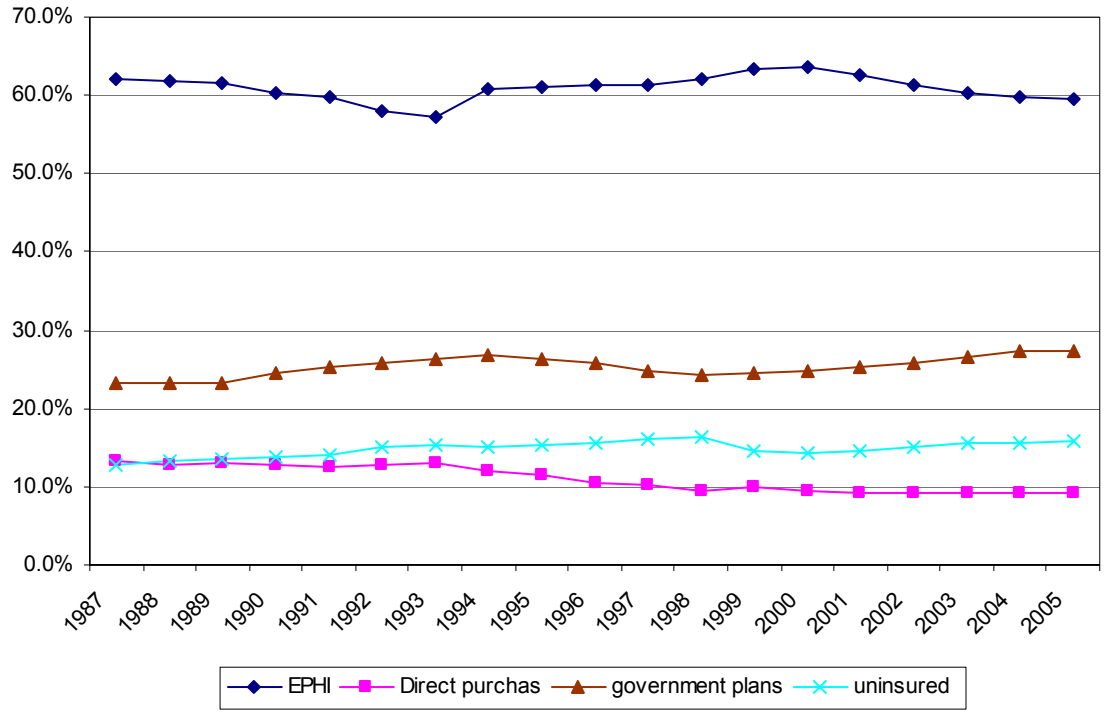
How the HDHP plans will affect premium growth is not clear at this moment. However, the main logic of a HDHP plan is to control patients' moral hazard in medical consumption, which is nothing new comparing to previous strategies. If there are some major causes other than moral hazard involving consumers and providers (such as the

aging population, the advance of technology, the excessive regulations, or the increasing valuation of health), insurers are driving down the wrong avenue. As a result, the cost growth will be out of control unless the true cause is found and addressed.

2.2.3 The Expansion of Public Health Programs and the Increase of Uninsured

When the price of health insurance grew rapidly, many individuals turned to the government for help. The rolls of Medicare grew from 30.5 million persons, or 12.6 percent of the population in 1987, to 40.2 million, or 13.7 percent of the population, in 2005. During the same period, the enrollments of Medicaid increased from 20.2 million, or 8.4 percent of the population, to 38.1 million, or 13 percent (Figure 2.2), an 89 percent increased in 18 years!

Figure 2.2: Health Insurance Coverage from 1987 to 2005



Source: Census 2006

The increased enrollments exerted enormous pressure on the budgets of federal and state governments. The federal government is already struggling with potential under funding problems of OA and current deficits for DI benefits. When baby boomers start to retire in 2008, the growth of health care costs and Medicare enrollments could precipitate a perfect storm for the federal government and the economy at large.

Despite the expansion of public insurance, the number of uninsured has also climbed. While there were 31 million Americans (or 12.9 percent of the population) not covered by any typed of health insurance in 1987, the figure increased 44.4 percent and reached a record high of 45 million (or 15.3 percent of the population) in 2005 (Figure 2.2).

Affordability is definitely a major reason why so many people are uninsured. In 2005, 24.2 percent of households with annual income of less than $25,000 were not covered by any type of health insurance. The percentage decreased to 20.1 percent and 13.3 percent for household with annual income between $25,000 and $49,000 and between $50,000 and $74,000 respectively. Only 7.7 percent of households with income more than $75,000 were uninsured (Census 2005).

2.3 The Debate over the Future of EPHI System

The rising cost of EPHI and the increase of the uninsured population have drawn tremendous public attention. It is one the most important topics for the presidential election in 2008. Presidential nominees from both parties, Senator John McCain, and Senator Barack Obama, provide detailed reform plans for a new health care system. Many American voters are seriously looking for a change in the current EPHI system.

Scholars (Enthoven and Fuchs 2006; Moran 2005) have called attention to the threats to the viability of the EPHI system. According to them, employers are the major payer of EPHI. Employers generally consider their insurance expenditure as part of their operating costs, similar to the cost of equipments, phone bills, or finances. These scholars point out that many employers were dropping and scaling back their EPHI benefits in recent years. If this trend continues, they argue that the majority of workers will lose their EPHI coverage and become uninsured. Therefore the EPHI system will collapse and this nation needs another way of financing its health care system.

However, many economists, relying on the theory of compensating wage differentials, claim that this concern about the future of the EPHI is overstated. According to the theory, although firms nominally pay a large portion of health insurance, the actual costs are borne by employees in the form of lower wages. Theoretically, there should be a one-on-one trade-off between wages and EPHI (Summers 1989; Currie and Madrian 1999). The increased health insurance costs would be eventually transferred to employees through wage adjustment, and the total labor costs to employers should not be changed. In this case, employers would not cut health benefits and the system will survive.

2.4 Goal of the Thesis

The fundamental purpose of this thesis is to evaluate the viability of current EPHI system: if the trend continues, will the system collapse? I develop the fundamental research question by investigating three sequential issues: 1) Do employers maintain their net costs of EPHI by requiring employees to pay a larger share of premium or by

lowering wages? 2) If employers' net costs of EPHI are increasing, are the employers dropping or reducing EPHI coverage? 3) If the net costs for employers are increasing and employers are neither dropping nor reducing EPHI coverage, are those employers offering EPHI being forced out of business?

If employers can control their insurance costs by compensating wage differentials or by requiring employees to share more of insurance cost, the system should be viable. However, if employers' net costs of EPHI increase, then the EPHI is in jeopardy if firms either drop or reduce their health benefits or if the firms offering EPHI go out of business.

The rest of the thesis is arranged as followed. Chapter 3 describes the data I use for the thesis, which is the last chapter of Part I. Part II (Chapter 4 and 5) examines the first sequential issue by providing a theoretical analysis and the empirical evidence of compensating wage differentials. Part III (Chapter 6 and 7) deals with the second sequential issue by investigating employers' strategies of cost control in response to the rising EPHI costs. Part IV (Chapter 8 and 9) explores the third sequential issue by estimating the impact of the rising EPHI costs on business survival. Finally, Part V (Chapter 10) draws the conclusions about the viability of EPHI based on the evidence from the previous chapters.

Chapter 3 Data

The basic data set used in this study is the Medical Expenditure Panel Survey-Insurance Component (MEPS-IC), which collects establishment level data for EPHI. The survey is sponsored by the Agency for Healthcare Research and Quality (AHRQ) and is conducted by the Bureau of Census. Approximately 30,000 establishments are included in the survey every year. The available data are from 1997 to 2005. However, the MEPS-IC data are not panel data. AHRQ tries to draw different samples in different years. The overlap of samples across years is very low.

The MEPS-IC provides detailed EPHI information: premiums for single and family coverage, contributions by employers and employees, share of eligible workers, plan enrollments, deductibles, co-payments, coinsurance, and many general attributes of the health insurance plan, such as the requirement of primary physician, exclusive provider network, and waiting period for the eligibility, coverage for prescription drug, dental care, mental health, etc. Establishment characteristics information is also available: the establishment size (employment), one-digit industry code, location which includes state and county information, year of survey, share of unionized workers, the age of the establishment, percentage of female workers, percentage of workers older than 50, percentage of part-time worker, and percentage of workers earning low/medium/high wages.

The survey of MEPS-IC is designed to cover establishments with one or more employees. In my thesis, I only included establishments with ten or more employees in my sample. When Zawacki and Taylor (2005) reviewed the MEPS-IC data from 1997 to

2001, they discovered an interesting phenomenon: small establishments with fewer than 10 employees were much less likely to offer health insurance than larger employers; however, if EPHI was offered, small employers were much more likely to pay 100 percent of the cost. A possible explanation is that many small establishments are family businesses or professional offices with a few partners, such as law firms or medical clinics. In these establishments, EPHI is purchased for the owners of the business or for the partners rather than for the employees. The focus of my thesis is health insurance purchased by employers for employees.

However, I also ran the same set regressions with establishments hiring more than one employee. The direction and significance of the coefficients in most models are not much different than regressions models using the sample of establishment hiring more than 9 employees, though the magnitude of coefficients differs. The results are shown in Appendix 2.

Many employers offered more than one health plan. MEPS-IC asks establishments to report no more than four of them. If all of the insurance information is numeric, I can calculate a weighted average of multiple plans for the value of insurance variables for each establishment, using the number of employees covered by each plan as weights. However, many variables are categorical or dummies. For example, the value of insurance providers contains: 1-exclusive providers, 2-any providers, and 3-mixed providers. There is no average for this type of variables. Though it is not perfect, I use the most popular plan to represent all if multiple plans were offered.

MEPS-IC does not contain wage information. Thus I also use the Longitudinal Business Database (LBD) in addition to MEPS-IC in my study. LBD is a universe for

establishments operating in the United States. It tracks all US business establishments from 1976 to 2005. The sample size is around 5 to 8 million each year. The LBD includes establishment characteristics information, including: employment, payroll, time of birth and death of the business, four-digit industry code, and business address. LBD is a panel dataset. Historical wage and employment data are available for most establishments. When I estimate compensating wage differentials, MEPS-IC and LBD datasets are merged through establishment identifiers.

Part II. Compensating Wage Differentials

Chapter 4 The Theory of Compensating Wage Differentials

4.1 The Simple Theory of Compensating Wage Differentials

The idea of compensating wage differentials is from Adam Smith's *The Wealth of Nations*. The theory states that employers pay higher wages to compensate workers for undesirable working conditions, such as an unpleasant work environment or long working hours. Health benefits are considered as a desirable working condition, which means that a job without EPHI has to compensate workers with a higher wage. However, firms only pay what the job deserves (as measured by marginal revenue product). Assume a job is worth \$100. If the firm does not provide health insurance, the wage will be exactly \$100. If the firm provides a health benefit that is worth \$20 to employees, the wage will be reduced to \$80. Hence the cost of health insurance is eventually and entirely born by employees. This simple theory of compensating wage is described as

$$W = C - H \tag{4.1}$$

where W = wage, H = cost of premiums for EPHI, and C = total compensation. Equation (1) implies that $\frac{\partial W}{\partial H} = -1$. Thus higher EPHI premiums should result in a one-on-one tradeoff in wages, ceteris paribus.

Labor economists (See detailed review from Currie and Madrian 1999) argue that employers should keep their total labor costs constant despite any changes in insurance price. The increased health costs should be compensated by wage reductions. Following the earlier example, if the health cost increases to \$30, the wage should become \$70. The employer's compensation expenditure remains \$100. In this case, no matter how much

the insurance price changes, employees will be the bearer of the cost. Employers should not worry about the higher costs of health insurance.

Numerous studies have designed to test the existence of compensating wage differentials. The empirical model used by most studies is described as

$$W=\alpha_0+\alpha_1 H+\beta' X+\varepsilon \quad (4.2)$$

where W = wage, H= the cost of health insurance, and X is a vector of factors that would affect the level of wages other than health insurance. If X is fully controlled, α_1 should be to -1.0 (Currie and Madrian 1999).

However, the simple theory has found little empirical support in studies of EPHI. Most studies in the last century failed to locate a negative tradeoff between wages and EPHI costs (See Currie and Madrian 1999 for a detailed review). Indeed, the findings suggest there is either a positive relationship between wages and health benefits or no relationship at all. There are several possible explanations for the failure to find empirical supports for the simple theory of compensating wage differentials, which I summarize in the following section.

4.2 Why Does the Simple Theory Not Work Well?

4.2.1 The Endogeneity Problem of EPHI

Most recent empirical studies focused on the endogeneity problem of EPHI. Economists agree that the EPHI is endogenous in Equation 4.2). The endogeneity comes from an unobserved variable: productivity. Workers with high productivity are usually paid high wages and are provided better benefits. If productivity is not controlled in the regression model, higher wages may appear to be the result of higher health benefits.

Assume the true model for compensating wage differentials is[1]:

$$W = \alpha_0 + \alpha_1 H + \alpha_2 Z + \varepsilon \qquad \text{Equation (4.3)}$$

where $\varepsilon \sim N(0, \sigma^2)$; W = wage; H = EPHI cost; and Z = productivity. If Z is omitted, then we estimate

$$W = \alpha_0 + \alpha_1 H + \varepsilon^* \qquad \text{Equation (4.4)}$$

where $\varepsilon^* = \alpha_2 Z + \varepsilon$. The estimate coefficient of health insurance in the ordinary-least-square (OLS) model becomes

$$\hat{\alpha}_1 = \alpha_1 + \alpha_2 \beta_{HZ} \qquad \text{Equation (4.5)}$$

where $\beta_{HZ} = \frac{\sigma_{HZ}}{\sigma_H^2}$; σ_{HZ} is the covariance between H and Z; and σ_H^2 is the variance of H (Greence 2003; Clarke 2005). β_{HZ} is the coefficient of H on Z in the auxiliary regression.

If $\alpha_2 = 0$ or $\beta_{HZ} = 0$, which means the productivity is not correlated with either wages or EPHI costs, then $\hat{\alpha}_1 = \alpha_1$. Under this assumption, the estimate for α_1 in equation 4.3 is not biased when productivity is not included as a variable. However, productivity is generally positively correlated with both wages and health insurance costs. Thus $\hat{\alpha}_1 > \alpha_1$, and the estimate for α_1 is biased upward. Therefore many studies that found a positive coefficient for the cost of health insurance without controlling for productivity are misleading.

Three methods have been used to correct for the endogeneity probem:1) the difference-in-difference model, 2) the fixed-effects model, or 3) the two-stage least square (TSLS) model. The first method was used by Levy and Feldman (2001), who

[1] To make it simple, I exclude X, the vector of other regressors, from Equation (4.3). The derivation including X is shown in Appendix 1.

examined the changes in health care coverage and wages in two different periods for the same group of workers, thus controlling for productivity. However, they found no evidence of a significant wage reduction from higher health care costs at either the individual level or group level. Simon (2001) investigated the changes of benefits and wages for laid-off workers who obtained other jobs. She found a wrong-sign relationship between wages and health benefits. Those who lost health insurance also lost wages relative to other displaced workers, while those who gained health insurance also gained in wages.

The second method relies on a fixed effects model. Miller (2004) found a roughly 10 to 11 percent trade-off between health insurance and wages for male workers aged between 25 and 55.

The third method uses TSLS regressions. Jensen and Morrisey (2001) used a series of individual and firm characteristics as instruments for health insurance. They did not find a significant tradeoff relationship. Olson (2002) used the husband's union status, husband's firm size, and husband's health insurance coverage as instruments for the wife's health insurance provided by her own employment. The estimates suggest that wives with their own EPHI accept a wage about 20% lower than what they would have received working in a job without the benefit. By using medical malpractice payments as the instrument for the health insurance premium, Baicker and Chandra (2005) also confirmed the compensating wage differentials theory. For every 10 percent increase in health insurance premium, wages were decreased by 2.3 percent.

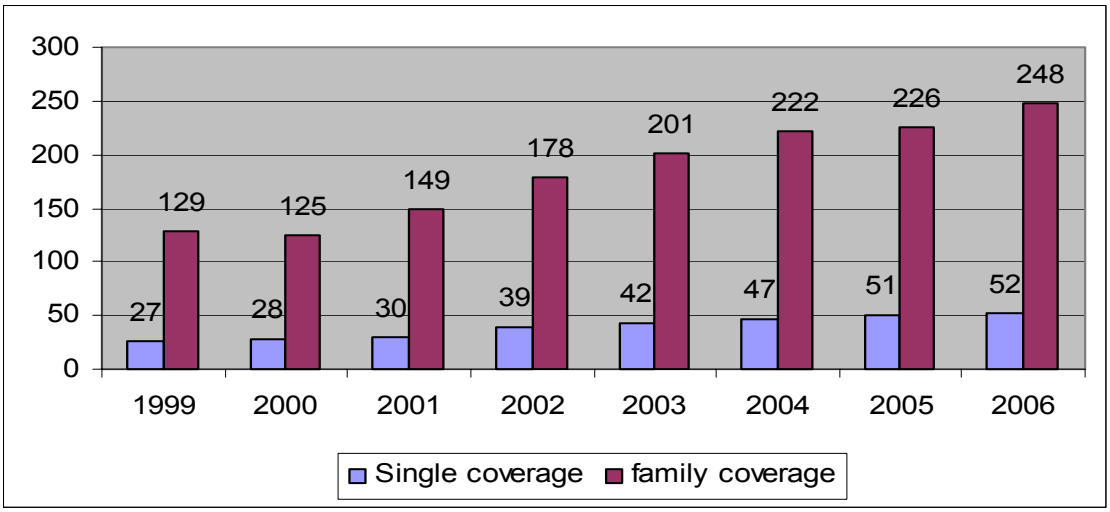
To sum up, some but not all recent studies produced evidence of a tradeoff between health insurance and wages by correcting for the endogeneity problem caused by the lack of a measure of productivity. However, the tradeoff ratio is still far less than 1.0.

4.2.2 Gross Wages versus Net Wages

The gross wage is the total wage that a worker receives from the employer, while the net wage is equal to the gross wage minus the employee's contribution to the health insurance premium. From an employer's standpoint, there should be little or no difference between (i) adjusting to higher total premiums by reducing worker's gross wages and (ii) adjusting to higher total premiums by not changing workers' gross wages but by requiring the employees to increase their contribution to health insurance. However, the result might be quite different if we use gross wages instead of net wages as the dependent variable of Equation 4.2) or Equation 4.3). Suppose an employer is able to make workers pay all the insurance costs out of their own pockets. Then the insurance costs are fully shifted to the worker through employee contributions instead of through reductions in the gross wage. However, a regression would show no tradeoff between the gross wage and total premium, which suggests the tradeoff ratio is zero, whereas in reality the tradeoff ratio is 1.0.

The cost of employee contribution to insurance premium is no longer a negligible amount due to escalated growth lately. The monthly average employee contribution was $27 for a single-coverage plan and $129 for a family-coverage plan in 1999. The figures almost doubled to $52 and $248 respectively seven years later in 2006 (Figure 4.1).

Figure 4.1: Employee Contribution to Health Insurance ($ per month)



Source: KFF/HRET 2007

There are four possible explanations for the spread and the increasing magnitude of employee contribution for health insurance. The first is to correct employees' valuation of employee benefits (Pauly 1986). Employers complain that their high spending on health insurance is not appreciated by their employees. Few employees know the value of their health benefits. When the costs of health insurance increases, increasing employee contribution can let workers feels the pain of the market. The corrected valuation could also help workers sort themselves to their best fitted jobs. A worker who places a high value on health benefits is willing to pay for the cost of EPHI.

The second explanation is the spread of flexible benefits (Gruber and McKnight 2003). Many employers provide more than one insurance plan to their workers. The employers typically pay a fixed cost for insurance. Workers who choose an expensive insurance plan have to pay more for the coverage. Hence the growth of employee contribution is partially the result of the employees' own choices.

The third explanation is the expansion of Medicaid (Gruber and McKnight 2003). Employers may increase the cost-sharing in order to force workers to apply for Medicaid. Gruber and McKnight (2003) discovered that for each 10 percentage point increase in the share of workers eligible for Medicaid, the employers' share of insurance cost falls by 1.4 percent. The private insurance is partially crowded out by the public insurance.

The final and most popular explanation for increasing employee contribution is shifting insurance costs from employers to employees (Enthoven and Fuchs 2006; Moran 2005; Sommers 2005). Shifting insurance cost through employee contribution may be more effective than through wage reduction, if the firm is constrained from lowering wages as I will examine later. Gruber and McKnight (2003) confirm that the increase in medical costs is a driving factor for the growth of employee contribution.

Despite the theoretical justification for looking at net wages, not gross wages, and the increasing importance of employee contributions for health insurance, most previous studies have only looked at the effect of higher health insurance premiums on gross wages, not on net wages. In this thesis, I will examine the tradeoff relationship between premiums and net wages in Chapter 5.

4.2.3 Constricted Theoretical Framework

The EPHI system is embedded in a complicated and dynamic economic environment. The simple theory of compensating wage differentials is only concerned with labor costs and implicitly assumes that the only possible consequence of higher EPHI premiums is an equivalent decline in wages. In the simple theory, many factors that are also important to the trade-off between premiums and wages are ignored. In this

section, I discuss three factors that can make the expected tradeoff between wages and health insurance different than 1.0. I first introduce the factors and then explore them in more details.

First, employees and employers can value health insurance differentially, and their valuations affect the incidence of the cost of insurance (Summers 1989; Chelius and Burton 1995; and Currie and Madrian 1999). Only if the employers' valuation of the EPHI is zero and the employees' valuation is equal to the actual insurance cost, is the expected trade-off between wage and health insurance equal to 1.0.

Second, Chelius and Burton (1995) pointed out that the trade-off between insurance premiums and wages for workers' compensation premiums depends on the elasticities of supply and demand in both labor market and product market, and that analysis is applicable to EPHI premiums. When the labor supply is inelastic, it is easy for employers to transfer the insurance cost to employees. Similarly, when the company is a monopoly or oligarchy in its product market so that the demand in the product market is inelastic, it is easy to transfer the insurance cost to its customers.

Third, firms are subject to constraints of downward wage rigidity. Employers can hardly cut wages. They are more likely to fire a person than to lower the wage. Although a portion of insurance can be shifted to workers through slowing down wage growth, the cost shifting is still difficult when the growth of EPHI is greater than the growth of wages. As a result, some of the increases in EPHI cost will be absorbed by employers.

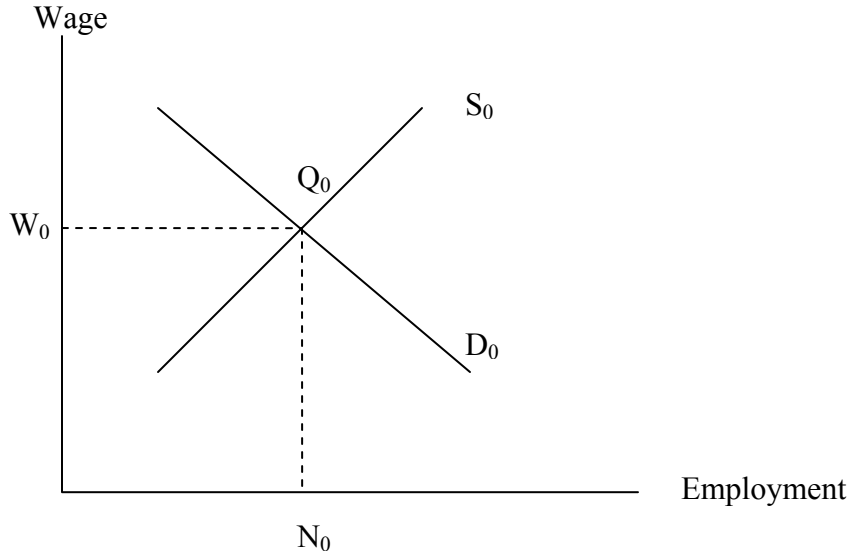
4.2.3.1 Reason One: Heterogeneity of the Valuation of Health Benefits

The rational of providing health benefits is because both employers and employees value EPHI. However, the valuation is heterogeneous. A female, older, and risk-averse individual may value the health insurance package more than a male, younger, and risk-seeking person. A company suffering higher turnover costs may value their health insurance benefits more than those with lower turnover costs. When investigating the trade-off between wages and health insurance, one has to take the value of health insurance from both parties into account (Summers 1989; Chelius and Burton 1995; Currie and Madrian 1995). The following 4 models demonstrate the impact of the valuation of health insurance on the tradeoff between wage and health insurance.

Model 1: Wage only

Figure 4.2 indicates the initial employment contract without any health benefits. S_0 is the labor supply curve from workers; D_0 is the labor demand curve from employers; and the market equilibrium bundle is $Q_0 (W_0, N_0)$, where W_0 = wage, and N_0 = number of employees.

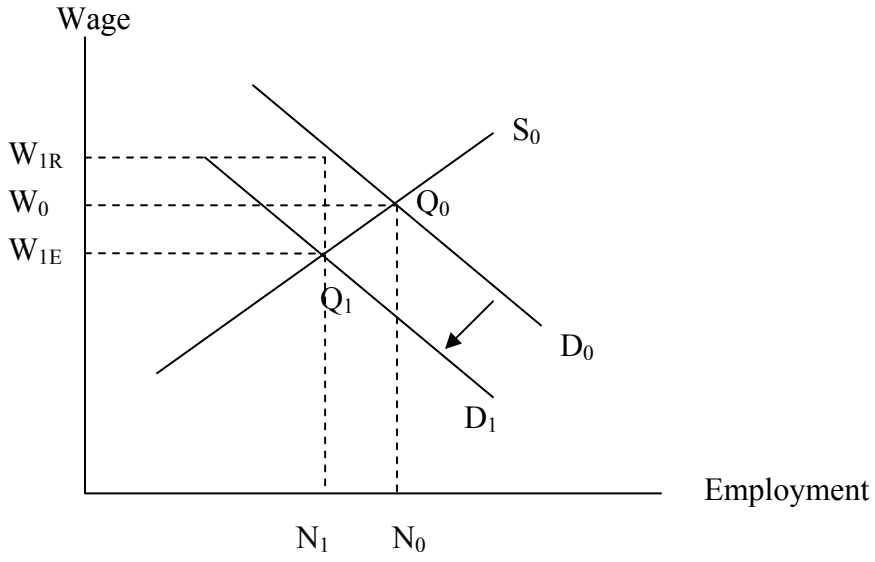
Figure 4.2: No health Insurance is Purchased



Model 2: Health insurance is purchased by the employer, but both employees and employers do not value the cost of health insurance.

If both parties do not value their health benefits at all, labor supply curve will not change; but the labor demand curve shifts down since the health insurance is an extra cost imposed on the employers (Figure 4.3). The new equilibrium bundle becomes Q_1 (W_{1E}, N_1). W_{1E} is the wages that employees receive, while W_{1R} is the total compensation paid by employers, where $W_{1E} < W_0 < W_{1R}$. Although the health insurance is nominally paid by the employers, it is in fact paid by both parties. Employers pay a higher compensation = $W_{1R} - W_0$, while employees receive a lower wage = $W_0 - W_{1E}$. The cost of health insurance is equal to ($W_{1R} - W_{1E}$). The trade-off between wage and health insurance is between 0 and 1.0, depending on the relative elasticities of labor supply and labor demand. Both parties are worse off by the arrangement of health insurance. The employment level declines from N_0 to N_1.

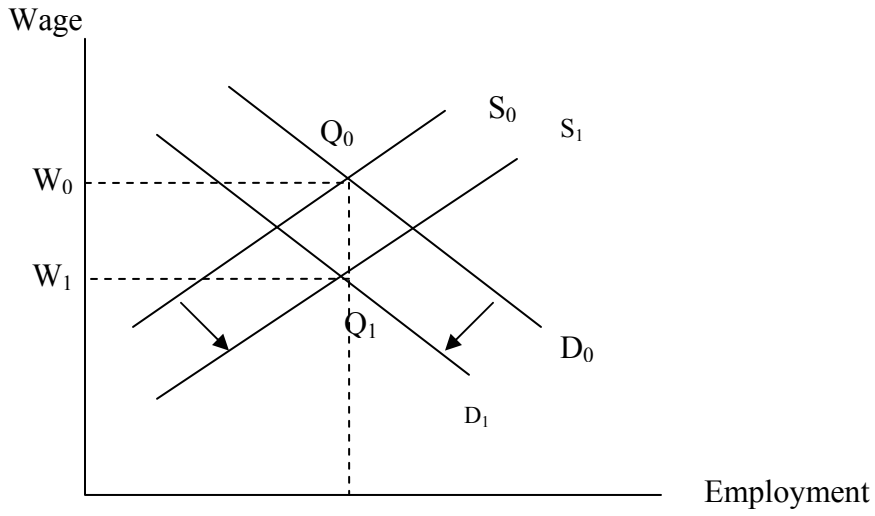
Figure 4.3: Employers and Employees Valued the Cost of health Insurance as Zero



Model 3: Health insurance is purchased by employers; employees value it as its cost; and the employers' valuation is zero.

Similarly, the demand curve shifts down. Since health insurance provides values to employees, they are willing to give up some of their wages to obtain insurance. The labor supply curve also shifts down (Figure 4.4). The new equilibrium bundle is Q_1 (W_1, N_1), where $N_1 = N_0$. Insurance cost is equal to ($W_1 - W_0$). Hence if employees value of health insurance as its cost, employers can transfer all the insurance costs through wage reductions. The trade-off is 1.0. If employees value health insurance less than its cost, the trade-off should be less than 1.0. On the other hand, if the employees value health insurance greater than its cost, the tradeoff should be greater than 1.0.

Figure 4.4: Employees Value EPHI as Its Costs and Employers Value It as Zero



Royalty (2008) suggests that employees may be more responsive to insurance coverage instead of the dollar value of the premium, because in many occasions the premium does not reflect the generosity of the plan. After controlling for benefit

characteristics, she found that employees valued single coverage plans around 4.5 times of their actual costs and valued family plans more than 8 times of their costs. Hence if employees place greater value on an insurance plan than its cost, we may find a wage-benefit tradeoff ratio greater than 1.0.

Model 4: Health insurance is purchased by employers; employees' valuation of health insurance is zero; employers value the health insurance as its cost.

Employers may provide health benefits to prevent turnover. If the employer believes that the cost of insurance is equal to reduction in the cost of turnover, the investment is worthwhile. Hence the labor supply and demand should not be affected by providing health insurance (Figure 4.2). The new equilibrium should be identical to Figure 4.2, without any change of the supply and demand curves. The spending on health insurance has no impact on employees' wage level. We should not observe any tradeoff.

It is arbitrary to predict a one-on-one trade-off relationship between wage and health insurance, because the simple theory of compensating wage differentials looks like a special case demonstrated by Model 3. In the real life, both workers and employers probably place some value on health insurance, which suggests a combination of Model 3 and Model 4. Most employers providing health insurance believe that it can reduce turnover and increase productivity (Fronstin and Helman 2003). Likewise, most employees place a positive value on health insurance due to the high cost of medical service. The result is that the expected trade-off between wage and health insurance is unlikely to be 1.0.

4.2.3.2 Reason Two: Elasticity of Labor Market and Product Market

Chelius and Burton (1995) argue that employers not only can shift EPHI costs to employees through lower wage, but also can transfer the costs to consumers through higher price. They claim that the magnitude of cost shifting depends on the elasticity of supply and demand in the labor and product markets. Suppose health insurance is purchased by the employer, and neither the employer nor the employee gives any value to it (Model 2). Figure 4.5 indicates an inelastic labor supply curve (a curve with steeper slop than the supply curve in Figure 4.3), while the labor demand curve is identical with Figure 4.3. Compared with Figure 4.3, the total insurance cost in Figure 4.5 does not change, but employers bear less of the cost. Hence it is easier for employers to transfer extra premium costs to workers in a market with inelastic labor supply.

Figure 4.5: Inelastic Labor Supply

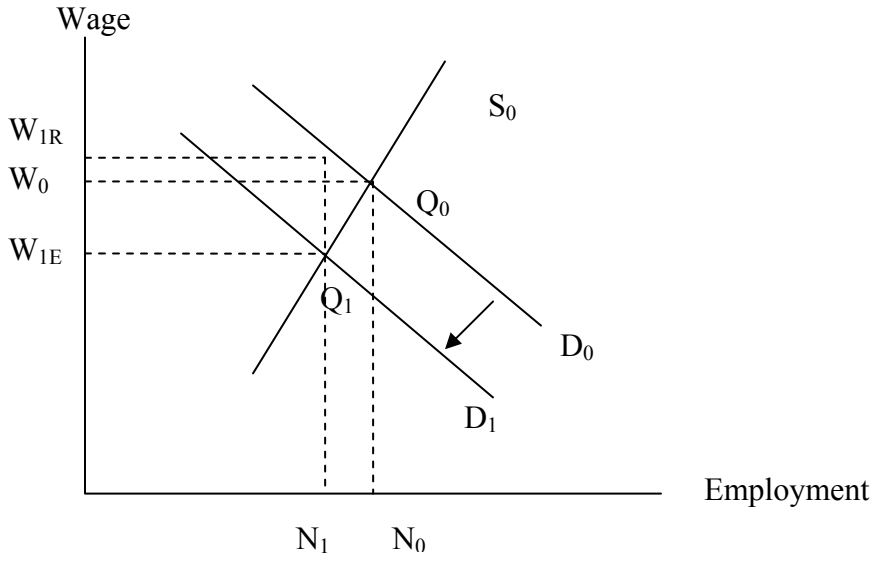
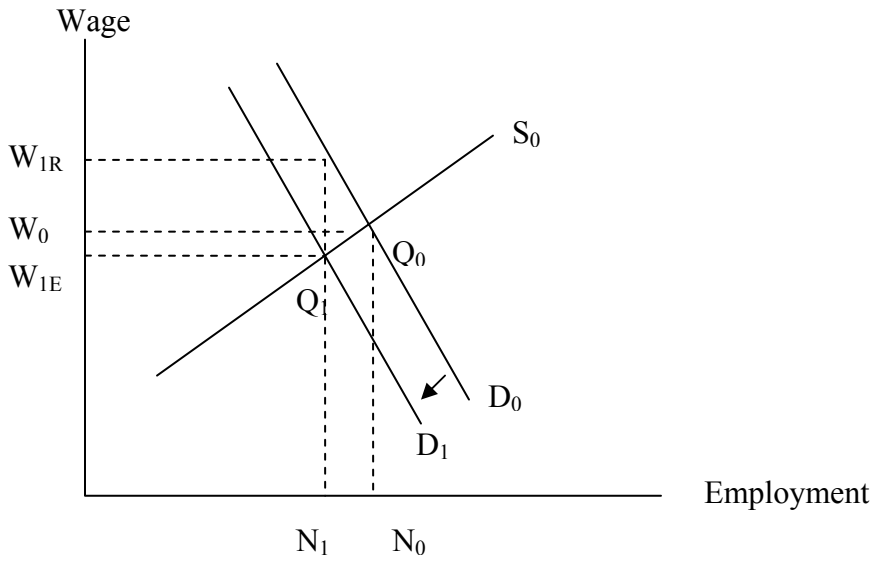


Figure 4.6 indicates a more inelastic labor demand curve than Figure 4.3, while the labor supply curve is identical to Figure 4.3. I also keep the total insurance cost

identical. Compared with Figure 4.3, the employer bears more of the insurance cost. Hence it is more difficult for employers to transfer insurance cost to workers in a market with inelastic labor demand.

Figure 4.6: Inelastic Labor Demand



The employer can also shift the insurance cost to its customers. Monopoly or oligarchy producers dominate their product market. They can transfer the increased cost to their consumers without losing their profit. In the 1960s and 1970s, when American automakers still controlled the market, they could more easily increase the price of automobiles and shift the insurance cost to consumers. Now the market has become very competitive. The cost of labor is a big issue for the survival of GM, Ford, and Chrysler. There is almost nowhere for them to shift the benefit cost. It would be misleading to seek a trade-off in cost of insurance if one does not take the market elasticity in the labor and product markets into account. In general, higher elasticity of the demand curve in the product market is associated with higher elasticity of demand in the labor market.

4.2.3.3 Reason Three: Wage Rigidity

For those workers whose wages are at or barely above the minimum wage, it is illegal to provide them EPHI in exchange for a lower wage. Unions do not care much about economic theories. They fight for both generous wages and health care coverage for their members. It is not easy to reduce either wages or benefits in a unionized workplace. Nevertheless, employers find that the main constraints in adjusting wages downward come from factors other than minimum wage regulations or unions.

Firms providing health insurance are not convinced that their employees are willing to take a wage-cut when there is an increased cost for EPHI. In fact, researchers have observed nominal wage rigidity. For example, when the unemployment rate is high, a rational firm is supposed to lower the wage level or replace current workers with a lower-paid workforce. However, evidence from most studies suggests that nominal wage cuts are indeed rare (See a detailed review by Howitt 2002).

Economists have developed several theories to explain nominal wage rigidity: contract theory, implicit contract theory, efficiency wage theory, fair wage theory, insider-outsider theory, and reciprocity theory. Detailed reviews of the theories can be found in Campbell and Kamlani (1997, Table 1, p. 760) and Howitt (2002). I found two theories are particularly relevant for this study: implicit contract and fair wage.

Most workers are risk averse. They prefer a stable wage over the business cycle that is lower than the average wage in a spot market. Hence there is an implicit agreement between workers and firms that the wage will be kept stable during a down turn of the economy (Baily 1974, Gordon 1974, Azariadis 1975). Unilaterally cutting wages or

benefits violates the implicit contract, which will create hostility from the workers. Firms would be penalized by workers' less effort on the job or leaving for other firms.

According to the fair wage theory, workers have expectations or perceptions of a fair wage. If the wage is below their expectation, their efforts will decline proportionally to the wage gap (Akerlof and Yellen 1990). As a consequence, firms have little incentive to cut wages or benefits, even during the midst of severe and prolonged recession.

To find out whether these theories are reflected in managers' behavior, a number of studies interviewed or surveyed management for the explanation of nominal wage rigidity. The majority of the firm owners or managers indicated their reluctance to cut wages (Kaufman 1984; Blinder and Choi 1990; Bewley 1995, 1999; Agell and Lundborg 1995; and Campbell and Kamlani 1997). The reasons they provided were similar to those postulated by the theories: they feared that a pay cut would adversely affect workers' morale and motivation and as a consequence, the production may be interrupted. Particularly interesting were two studies (Bewley 1994; Fehr and Falk 1999) that found job applicants were willing to take lower pay in a downturn of the economy, but firms would not take the workers' underbidding offers.

While employers are therefore unlikely to translate higher premiums for EPHI into immediate wage cuts, arguably employers can transfer the higher insurance cost to employees through slowing down or stopping wage growth. When the business goes well, firms are prepared to increase wages or at least adjust nominal wages to the rate of inflation. American workers have been experiencing nominal wage growth since World War II. Although real wages declined in certain period, the average nominal wage was gradually climbing. If the business revenue growth is higher than the premium growth,

firms can simply slow down the wage growth to absorb the extra costs. As discussed in previous sections, the magnitude of cost transferring should depend on the elasticity of labor market and employees' valuation of health insurance.

However, the growth of health premiums has consistently exceeded the growth in nominal wages or business revenues for a couple of decades. Slowing down or stopping nominal wage growth may not be sufficient to shift all the increased insurance costs to workers. As a result, employers have to absorb a big chunk of the extra costs. By using Current Population Survey (CPS) data from 2000-2001, Sommers (2005) confirmed that increased health costs slow down nominal wage growth. He found that the real wages for insured workers were decreased more than uninsured workers when the inflation rate was high. Also the Economic Policy Institute (2006) reported that, despite the recovery of the economy and strong growth of productivity after September 11, workers' nominal wage growth did not keep pace with the productivity growth. One possible explanation could be that the rapid growth of health insurance premiums during this period constrained the growth of wages.

4.3 Conclusion

This Chapter reviews the simple theory of compensating wage differentials and provides theoretical arguments to explain why the simple theory is incomplete. The empirical evidence concerning the tradeoffs between premiums for EPHI and wages will be used to formulate the empirical tests in the next chapter. The basic proposition that flows from this chapter is Hypothesis 1.

Hypothesis 1: Compensating wage differential between higher premiums for EPHI and wages should exist. However, the expected trade off ratio depends on the precise formulation of the empirical models. For examples, the tradeoff should be greater between EPHI premiums and net wages than between EPHI premiums and gross wages. Based on the theory and previous studies, I anticipate that the tradeoff will be greater than 0, but is unlikely to be 1.0.

Chapter 5: Empirical Evidence of Compensating Wage Differentials

5.1 Variables and Hypotheses

The variables and their descriptive statistics are shown in Table 5.0.1. I use both the gross wage and the net wage as dependent variables in my regression models. The gross wage is the annual average gross wage at establishment level. The wage data come from LBD, which contains some extreme value for wages. To maintain the quality of the measure of the gross wage, I exclude establishments with annual wages less than $10,000 or greater than $100,000 from my regression sample. A typical worker's gross wage in my sample is $32,794 a year. The net wage is equal to the gross wage minus employee contribution to health insurance. The average net wage is $32,099 per worker.

Table 5.0.1: Descriptive Statistics for Chapter 5 (Model 5.1 and Model 5.3-5.5)

Variables	Number of establishments	Mean	Standard Deviation
Gross wage ($1,000/year)	68,652	32.794	17.762
Net wage ($1,000/year)	68,652	32.099	17.596
Total EPHI premium per worker ($1,000/year)	68,652	2.867	2.334
Market premium ($1,000/year)	68,652	4.906	1.185
Establishment size	68,652	159.789	636.637
Share of female workers	68,652	0.451	0.295
Share of older workers	68,652	0.191	0.159
Unionization	68,652	0.056	0.192
Multiple unit	68,652	0.397	N/A
Share of part-time workers	68,652	0.171	0.238
Establishment age	68,652	15.403	8.958
Unemployment rate	68,652	0.048	0.011

The total EPHI premium is the weighted average of actual EPHI payments per active worker (excluding retirees) among workers who enrolled in single-coverage plans,

employee-plus-one-coverage plans, family-coverage plans, workers who were not covered by EPHI, and workers who were covered by EPHI but did not take up the benefits. The total EPHI premium is the sum of employee contribution and employer contribution. If the establishment did not provide EPHI, the total paid EPHI premium is equal to zero. The mean of insurance cost per worker is $2,687.

The market premium is the weighted average premium paid by a group of employers and among single-coverage plans, family-coverage plans, and employee-plus-one-coverage plans. Based on MEPS-IC, AHRQ calculates average premiums paid at the establishment level. The average premium varies by state, year, and firm size in five categories: 0-9 employees, 10-24 employees, 25-99 employees, 100-999 employees, and 1000 employees above. It is the premium per enrollee, which does not take workers uncovered by EPHI into account. The average premium represents the market price that an establishment faced in a specific state, in a specific year, and with specific size. It contains separate values for single-coverage plans, employee-plus-one-coverage plans, and family plans. I average the three types of average premiums into a unified market premium by using enrollments as weights. The average market premium is $4,906 per year per enrollee in the sample.

It should not be surprising that the market premium is much higher than the total EPHI premium, since many employers did not offered health insurance. Even if they did, many workers, especially part-time workers, were not eligible for the benefits.

My control variables include establishment size, multiple unit, unionization, share of female workers, share of part-time workers, share of older workers aged 50 above, age of the business, and state unemployment rate. Establishment size is measured by the

number of active employees at the establishment. Multiple unit is a dummy variable, which is equal to 1 if the establishment belongs to a corporation with different locations and 0 otherwise.

I reviewed the literature of compensating wage differentials in Chapter 4. My prediction is that the total EPHI premium per worker should be negatively associated with the gross wage and the net wage, but the coefficient of EPHI premiums should be smaller using the net wage as the dependent variable than using the gross wage. I also predict that the EPHI premium should be positively associated with employee contribution to the EPHI premium.

Previous studies have also examined other determinants of wages or workers' income, and I include many of them in my regression models as control variables. It is well established that union members are paid higher than nonunion workers (Freeman and Medoff 1984; Lewis 1986; Belman and Voos 1993), though later studies found that the union wage premium experienced a modest decline along with the decrease of union coverage in recent decades (see a detailed review from Belman and Voos 2004 for later studies). Empirical research generally found that female workers receive lower wages than male workers, although the gender gap of income has been shrinking in recent years (Jarell and Stanley 2004; Blau and Kahn 2000; Weinberger 1998; Blau and Kahn 1997; Brown and Corcoran 1997; Stanley and Jarell 1997; Macpherson and Hirsch 1995; Killingsworth 1990). Older workers generally receive higher wages than young workers (Lazear 1980). Large firms typically pay higher wages than small firms (Oi 1983; Oi and Idon 1999; Troske 1999). Companies staying longer in the business are likely to pay a higher wage (Davis and Haltiwanger 1991; Troske 1998; Brown and Medoff 2003).

Workers are paid more if the local unemployment rate is lower (See a detailed review from Card 1995). Since I calculated the gross wage and the net wage as the average income of all workers, a high share of part-time workers should lead to a lower mean of wage. My hypotheses are summarized in Table 5.0.2.

Table 5.0.2: Hypotheses for Chapter 5

Variables	Dependent variable	
	Gross wage and net wage	Employee contribution to EPHI Premium
Total EPHI premium per worker	-	N/A
Total EPHI premium per covered worker	N/A	+
Establishment size	+	-
Share of female worker	-	+
Share of older worker	+	-
Unionization	+	-
Multiple unit	+	-
Share of part-time workers	-	+
Establishment age	+	-
Unemployment rate	-	+

5.2 Regression Models and Results

I employ five empirical models in this chapter to test the theory of compensating wage differentials. Because health benefits and wages are sensitive to location, year, and industry, I also show the differences due to those factors. Thus each model includes three columns: 1) a regression without any state, year, industry dummies, 2) a regression with state and year dummies, and 3) a regression with state, year, and industry dummies. In order to avoid the problem of heteroskedasticity or cluster, I produce robust standard errors for all regressions.

5.2.1 The Relationship between EPHI Costs and Gross Wages

Model 5.1: $$Grosswage = \alpha_0 + \alpha_1 HI\cos t + \sum \beta_i X_i + \varepsilon$$ Equation 5.1)

Grosswage is the gross wage per worker; HIcost is the total EPHI premium per worker; X is a vector of control variables, including establishment size, unionization, share of female workers, share part-time workers, share of older workers, business age, multiple-unit, and state unemployment rate.

Table 5.1: Compensating Wage Differentials-using gross wages as the dependent variable

Variables	Column 1	Column 2	Column 3
Total EPHI premium per worker	2.615***	2.459***	2.360***
	(0.038)	(0.038)	(0.038)
Establishment Size	0.001***	0.001***	0.001***
	(2.06e-4)	(2.06e-4)	(2.01e-4)
Unionization	1.202***	0.546	0.472
	(0.342)	(0.341)	(0.333)
Share of female worker	-7.015***	-7.355***	-10.370**
	(0.208)	(0.207)	(0.258)
Share of older worker	-0.057	0.237	-0.201
	(0.389)	(0.386)	(0.386)
Share of part-time worker	-16.274***	-17.293***	-16.189***
	(0.249)	(0.256)	(0.266)
Multiple Unit	0.318**	0.703***	1.419***
	(0.130)	(0.129)	(0.130)
Age of the establishment	-0.006	-0.009	-0.003
	(0.007)	(0.007)	(0.007)
Unemployment rate	56.540***	-20.308*	-16.381
	(5.145)	(11.567)	(11.408)
Constant	28.245***	27.481***	27.989***
	(0.296)	(0.691)	(0.716)
State and Year Dummies	No	Yes	Yes
Industry Dummies	No	No	Yes
R-square	0.273	0.300	0.317
Number of establishments	68,652	68,652	68,652

Note:
1. Robust standard errors are included in the brackets
2. * significant at 10% level, ** significant at 5% level, *** significant at 1% level.

Table 5.1 presents the results of Model 5.1. As expected for a regression that does not control for the endogeneity problem caused by unobserved productivity, the health total premium is positively correlated with the gross wage. The coefficient is 2.615 without state, year, or industry dummies, 2.459 with state and year dummies, and 2.36 with state, year, and industry dummies. Take column 3 as an example, if a company pays $1 more in health insurance than other companies, it also pays $2.36 more in wages, controlling for other variables and dummies in my regression model.

No results from control variables contradict my hypotheses. Establishment size and multiple units, which measure the business size, are positively associated with the gross wage, while the share of female workers and the share of part-time workers are negatively associated with the gross wage. The coefficients of other variables are not significant in the regressions with dummies.

5.2.2 The Relationship between Total EPHI Contributions and EPHI Premiums

Before using the net wage instead of the gross wage as the dependent variable in testing the theory of compensating wage differentials, I have to confirm that employers request more employee contribution when the premium is high. Otherwise, using the net wage will not make much difference with using the gross wage for the coefficient of the total premium.

Since I am only concerned with how much employers would request employees to share the EPHI costs once they offered health insurance, I exclude establishments that did not offer health insurance from my previous regression sample. The descriptive statistics of this sub-sample is shown in Table 5.0.3.

Table 5.0.3: Descriptive Statistics for Model 5.2

Variables	Number of establishments	Mean	Standard Deviation
Employee contribution to EPHI per covered worker ($1,000/year)	67,749	1.278	1.292
Total EPHI premium per covered worker ($1,000/year)	67,749	4.888	2.409
Establishment size	67,749	168.612	653.175
Share of female worker	67,749	0.462	0.288
Share of older worker	67,749	0.191	0.157
Unionization	67,749	0.058	0.195
Multiple unit	67,749	0.241	0.259
Share of part-time workers	67,749	0.176	0.246
Establishment age	67,749	15.504	8.968
Unemployment rate	67,749	0.048	0.011

Employee contribution to EPHI per covered worker is employees' share in dollars of the EPHI premium if they are they eligible for health insurance. Workers covered in EPHI typically paid $1,278 a year out of their pocket for their insurance. Total EPHI premium per covered worker is the average premium for covered workers among single-coverage plans, family-coverage plans, and employee-plus-one-coverage plans, which includes employer contribution and employee contribution to the insurance. The mean value of the total EPHI premium per covered worker is $4,888. My control variables in this section are identical to other sections of this chapter.

There is only one empirical study by far, Gruber and Mcknight (2003), that investigates the determinants of employee contribution. However, they did not employ the variables I used in this study. Since employee contribution to EPHI premium is a cost for employees, I expect the sign of the coefficient of control variables will flip if I use employee contribution as the dependent variable rather than the gross wage or net wages.

My hypotheses are summarized in Table 5.02. The empirical model is shown in Model 5.2.

Model 5.2 $$HIEE = \alpha_0 + \alpha_1 Totpremium + \sum \beta_i X_i + \varepsilon$$ Equation 5.2)

HIEE is the employee contribution to the EPHI per covered workers. Totpremium is the EPHI premium per covered worker, including employer contribution and employer contribution. X is a vector of control variables, including establishment size, unionization, share of female workers, share part-time workers, share of older workers, share of high-paid workers, age of the business, multiple-unit, and state unemployment rate.

The results are shown in the Table 5.2. The coefficient of Totpremium is 0.213 without state, year, or industry dummies, 0.201 with state and year dummies, and 0.205 with state, year, and industry dummies, which are consistently around 0.2 in all three columns. When employers purchased one more dollar of health insurance, they typically asked employees to share $0.2 of the extra one-dollar cost. Consequently the net wage will decrease by $0.2 because of employee contribution. The results represent the first step in determining that higher premiums lead to a reduction in net wages. Hence using the net wage as the dependent variable in estimating compensating wage differentials is more accurate and more precise than using the gross wage.

The results of control variables match with all my hypotheses in column 3 when state, year, and industry dummies are included. Their coefficients are all significant and have the right sign.

Table 5.2: Regression Results for Employee Contribution to EPH

Variables	Column 1	Column 2	Column 3
Total EPHI premium per covered worker	0.213***	0.201***	0.205***
	(0.004)	(0.004)	(0.004)
Establishment Size	-4.1e-5***	-4.64e-5***	-3.59e-5***
	(8.02e-6)	(8.39e-6)	(7.34e-6)
Unionization	-0.853***	-0.761***	-0.749***
	(0.026)	(0.026)	(0.026)
Share of female worker	0.014	0.020	0.127***
	(0.018)	(0.018)	(0.022)
Share of older worker	-0.325***	-0.357***	-0.285***
	(0.034)	(0.033)	(0.033)
Share of part-time worker	0.024	0.035	-0.081***
	(0.021)	(0.022)	(0.023)
Multiple Unit	-0.035***	-0.041***	-0.052***
	(0.009)	(0.009)	(0.010)
Age of the establishment	-0.004***	-0.005***	-0.004***
	(0.001)	(0.001)	(0.001)
Unemployment rate	-3.012***	0.172	0.188**
	(0.393)	(0.911)	(0.907)
Constant	0.570***	0.824***	0.731***
	(0.025)	(0.072)	(0.076)
State and Year Dummies	No	Yes	Yes
Industry Dummies	No	No	Yes
R-square	0.155	0.169	0.174
Number of establishments	67,749	67,749	67,749

Note:
1. Robust standard errors are included in the brackets
2. * significant at 10% level, ** significant at 5% level, *** significant at 1% level.

5.2.3 The Relationship between the EPHI Cost and the Net Wage

Model 5.3: $$Netwage = \alpha_0 + \alpha_1 HI\cos t + \sum \beta_i X_i + \varepsilon$$ Equation 5.3)

The only difference between Model 5.3 and Model 5.1 is the dependent variable, where Netwage is equal to the gross wage minus employee contribution to health insurance; HIcost is total EPHI premium per worker; and X is a vector of control variables, including establishment size, unionization, share of female workers, share part-

time workers, share of older workers, business age, multiple-unit, and state unemployment rate.

Table 5.3: Compensating Wage Differentials-using net wages as the dependent variable

Variables	Column 1	Column 2	Column 3
Total EPHI premium per worker	2.430***	2.277***	2.176***
	(0.038)	(0.038)	(0.039)
Establishment Size	0.001***	0.001***	0.001***
	(2.08e-4)	(2.08e-4)	(2.04e-4)
Unionization	1.780***	1.078***	0.987***
	(0.342)	(0.341)	(0.333)
Share of female worker	-7.015***	-7.357***	-10.354***
	(0.209)	(0.207)	(0.259)
Share of older worker	0.025	0.344	-0.113
	(0.390)	(0.386)	(0.387)
Share of part-time worker	-16.081***	-17.091***	-15.948***
	(0.250)	(0.256)	(0.266)
Multiple Unit	0.312**	0.695***	1.417***
	(0.131)	(0.129)	(0.130)
Age of the establishment	-0.006	-0.009	-0.003
	(0.007)	(0.007)	(0.007)
Unemployment rate	57.989***	-20.301*	-16.351
	(5.152)	(11.589)	(11.429)
Constant	27.925***	27.147***	27.691***
	(0.296)	(0.692)	(0.718)
State and Year Dummies	No	Yes	Yes
Industry Dummies	No	No	Yes
R-square	0.257	0.284	0.301
Number of establishments	68,652	68,652	68,652

Note:
1. Robust standard errors are included in the brackets
2. * significant at 10% level, ** significant at 5% level, *** significant at 1% level.

As shown in Table 5.3, when the dependent variable is changed to the net wage from the gross wage, the coefficients of total EPHI premiums decline. The coefficient is 2.43 without in column 1, 2.28 in column 2, and 2.18 in column 3. The different of

coefficient of each column between Model 5.3 and Model 5.1 is around 0.2, which are consistent with the results in Model 5.2. However, the coefficients of the total EPHI premium in Table 5.3 are still positive. Again using column 3 as an example, an establishment spending $1 more in health insurance will pay $2.18 more to workers for net wages after controlling other variables in my regression models.

The effects of control variables do not change much in Table 5.3 comparing with Table 5.1, except the share of unionization. Unionization has no impact on the gross wage, but it has a positive impact on the net wage. A one-percentage-point increase of union coverage will drive up the mean annual net wage around $10.

5.2.4 The Relationships between Net Wages and EPHI Costs Controlling for Endogeneity

Model 5.4: Two-Stage-Least-Squares (TSLS) regression of Model 5.3

To correct the endogeneity problem, I use the market premium as the instrument for HIcost and rerun Model 5.3 with TSLS regression models. Presumably, the market premium is a good instrument for the insurance cost. The productivity of a single firm may be associated with its insurance cost, but it should not be correlated with the average premiums paid by a large group of employers. Thus the market premium can predict the exogenous part of the insurance premium that an employer should pay. The predicted insurance costs should be exogenous in estimating the tradeoff relationship between net wages and insurance costs.

Table 5.4 shows the regression results of TSLS models using market premium as the instrument for the total EPHI premium per worker. The instrument does not seem to

work well. The coefficients of insurance premiums in column 2 and column 3 are slightly less than those in Table 5.2, but they are still far greater than 2.0. I also ran the TSLS regressions separated by 1-digit industry, but I failed to find any negative relation between net wages and the insurance cost. Overall the TSLS models do not produce significant differences compared to the OLS models.

Table 5.4: Compensating Wage Differentials-TSLS using net wages as the dependent variable

Variables	Column 1	Column 2	Column 3
Total EPHI premium per worker	3.990***	2.126***	2.136***
	(0.108)	(0.440)	(0.458)
Establishment Size	0.001***	0.001***	0.001***
	(1.76e-4)	(2.35e-4)	(2.21e-4)
Unionization	-0.169	1.254**	1.035***
	(0.387)	(0.607)	(0.633)
Share of female worker	-6.638***	-7.397***	-10.388***
	(0.215)	(0.238)	(0.462)
Share of older worker	-2.833***	0.567	-0.065
	(0.440)	(0.749)	(0.666)
Share of part-time worker	-10.994***	-17.611***	-16.073***
	(0.415)	(1.530)	(1.448)
Multiple Unit	-0.941***	0.818**	1.447***
	(0.153)	(0.370)	(0.366)
Age of the establishment	-0.055***	-0.005	-0.002
	(0.008)	(0.012)	(0.011)
Unemployment rate	37.279***	-19.374	-16.102
	(5.437)	(11.864)	(11.743)
Constant	25.357***	30.954***	27.761***
	(0.342)	(1.375)	(1.081)
State and Year Dummies	No	Yes	Yes
Industry Dummies	No	No	Yes
Pseudo R-square	0.224	0.284	0.301
Number of establishments	68,652	68,652	68,652

Note:
1. Robust standard errors are included in the brackets
2. * significant at 10% level, ** significant at 5% level, *** significant at 1% level.

5.2.5 The Relationships between EPHI Costs and Net Wages in Separate Time Periods

Model 5.5: Separate regressions of Model 5.3 by three time periods

In Model 5.5, I use the OLS regression of Model 5.3 and separate the regression into three sequential time periods, 1997 to 1999 (Time 1), 2000 to 2002 (Time 2), and 2003 to 2005 (Time 3). Without controlling for productivity, establishments with better EPHI coverage pay higher wages than their counterparts. However, if firms slow down or stop wage growth to offset the insurance costs, we should observe a decline of the coefficient of the EPHI costs, despite the uncontrolled endogeneity problem.

Table 5.5: Separate Regression of Model 5.3 by Three Time Periods

Panel A: regressions without state dummies, year dummies, or industry dummies					
Coefficient for total EPHI premium per worker	Robust Std. error	95% confident interval	No. of Estab.	R-square	Time period
3.051	0.083	(2.888, 3.214)	20,926	0.233	1997-1999
2.369	0.077	(2.218, 2.519)	24,122	0.241	2000-2002
2.163	0.053	(2.060, 2.267)	23,604	0.274	2003-2005
Panel B: regressions with state dummies and year dummies					
Coefficient for total EPHI premium per worker	Robust Std. error	95% confident interval	No. of Estab.	R-square	Time period
2.897	0.083	(2.734, 3.060)	20,926	0.256	1997-1999
2.310	0.072	(2.169, 2.452)	24,122	0.273	2000-2002
2.057	0.052	(1.955, 2.160)	23,604	0.301	2003-2005
Panel C: regressions with state dummies, year dummies, and industry dummies					
Coefficient for total EPHI premium per worker	Robust Std. error	95% confident interval	No. of Estab.	R-square	Time period
2.798	0.084	(2.633, 2.963)	20,926	0.275	1997-1999
2.223	0.073	(2.080, 2.366)	24,122	0.290	2000-2002
1.941	0.053	(1.837, 2.045)	23,604	0.319	2003-2005

The results are shown in Table 5.5. There are substantial declines of the coefficients of total EPHI premium per worker across the three time periods. The pattern

of the decline is consistent in all three panels. In Panel C the coefficient is 2.798 in Time 1. It declines to 2.223 in Time 2, and 1.941 in Time 3. I calculate the change of coefficients overtime, as shown in Table 5.5.1. Most of changes of the coefficient are significant at 5% confidence level. From Time 1 to Time 3, the coefficient of EPHI costs declines 0.888 in Panel A, 0.84 in Panel B, and 0.857 in Panel C.

Table 5.5.1: Changes of the Coefficients for Total EPHI Premium per Worker

Time periods	Without dummies	With state and year dummies	With all dummies
From Time 1 to 2	-0.682**	-0.587**	-0.575**
From Time 2 to 3	-0.206	-0.253**	-0.282**
From Time 1 to 3	-0.888**	-0.840**	-0.857**

Note:
1. ** significant at 5% level
2. Time 1 is 1997 to 1999; time 2 is 2000-2002; time 3 is 2003-2005.

Under Panel C, employers who paid $1 more in health insurance were also paid $2.798 more in wages in Time 1, but they only paid $2.223 more in wages in Time 2 and $1.941 more in wages in Time 3. According to Equation 4.5, there could be three possible explanations for the systemic decline of the slope of EPHI costs: 1) employers were more aggressive in shifting the insurance costs to workers through wage adjustment (α_1 was decreased); 2) employers were unwilling to pay more wages due to reasons other than the increased insurance costs (α_2 was decreased); 3) the growth of EPHI costs exceeded the growth of productivity (β_{HZ} was decreased).

First, the decline of the slope of EPHI premiums may be attributed to an increase of the tradeoff between wages and EPHI premiums (a decrease of α_1, where $\alpha_1 = \frac{\partial W}{\partial H}$, holding productivity constant). As I discussed in Chapter 4, the tradeoff ratio fluctuates

depending on the elasticity of the labor market or the elasticity of the product market. When the product market becomes competitive or when the labor market softens, companies are more likely to shift the insurance cost to workers through wage adjustments. In contrast, when the company dominates the product market or when labor market is tight, the insurance costs are usually borne by the consumers or by the employers.

The second explanation is the decrease of the association between wages and productivity, $\alpha_2 = \frac{\partial W}{\partial Z}$, holding health insurance costs constant. For a given unit of productivity, employers sometimes are less willing to pay the amount of wages they used to pay for reasons other than the increased insurance costs. The decline of union coverage is often considered as an antecedent of the stagnant wage growth. In addition, many firms operating in global market have to control their labor costs to compete with those companies in developing countries. Nevertheless, I have included many factors such as union density, unemployment rate, industry dummies, and state dummies that could affect the relationship between wages and productivity as control variables. Even if there are some structural changes of α_1, it should be largely controlled and should not be a consistent source for the decline of $\hat{\alpha}_1$.

The third explanation is the slope of EPHI costs on productivity (β_{HZ}) declines, where $\beta_{HZ} = \frac{\partial Z}{\partial H}$, holding wages constant. When the growth rate of EPHI costs exceeds the growth rate of productivity, a dollar of EPHI cost will be associated with fewer unit of productivity in later years. Thus $\hat{\alpha}_1$ is reduced due to the decrease of the endogeneity part.

Although I failed to find a proxy for productivity in my sample, Bureau of Labor Statistics provides a measure of labor output for productivity at national aggregate level. As indicated in Table 5.5.2, the productivity and EPHI costs ratio decreased from 5.253 in Time 1 to 4.542 in Time 2 and 4.023 in Time 3, which is mainly due to the escalation of EPHI premium growth.

Table 5.5.2: The National Average Productivity and EPHI Costs in Private Sectors

Period	Productivity (1992=10,000)	EPHI costs ($1,000)	Productivity/EPHI costs
Time 1	13.354	2.542	5.253
Time 2	14.718	3.241	4.542
Time 3	16.899	4.201	4.023

Note:
1. Productivity = labor output / employment. The numbers for labor output and employment are at national aggregate level and for private sectors, both from Bureau of Labor Statistics (BLS).
2. EHPI cost = employer contribution to EPHI / employment. The numbers for employer contribution to EPHI are from Bureau of Economic Analysis. Employment data is from BLS.

In Table 5.5.3, I simulate the coefficient of EPHI costs on wages using the changes of the correlation between productivity and EPHI costs as the single determinant of the decline of $\hat{\alpha}_1$. Assume $1 of EPHI cost was associated with 5.25 units of productivity and $2.798 wage in Time 1. One dollar of EPHI costs became associated with 4.542 units of productivity in Time 2 and 4.023 units of productivity in Time 3 according the Table 5.5.2. If the correlation between wage and productivity was constant across these three periods, the wages associated with $1 of EPHI cost should become $2.419 in Time 2 and $2.143 in Time 3. In other words, if the change of β_{HZ} is the only factor affecting the value of $\hat{\alpha}_1$, $\hat{\alpha}_1$ should become 2.419 in Time and 2.143 in Time 3.

Table 5.5.3: Simulation of the Coefficients for EPHI on Wages

Period	EPHI ($)	Productivity	Wage ($)	Wage from Panel C in Table 5.5	Differences in wage prediction
Time 1	1	5.253	2.798	2.798	0
Time 2	1	4.542	2.419	2.223	0.196
Time 3	1	4.023	2.143	1.941	0.202

Comparing Panel C in Table 5.5.1 with Table 5.5.3, the decline in of $\hat{\alpha}_1$ is approximated 0.2 more than the predicted decline in both Time 2 and Time 3. Since we assume α_2 is constant, the extra decline of $\hat{\alpha}_1$ should be attribute to the decrease of α_1. Employers shifted $0.2 more to worker through wage adjustments for each $1 they spent on EPHI in Time 2 and Time 3 than Time 1.

Time 2 is a recession period, when companies should be more sensitive to the labor costs than other periods. Those companies offered EPHI experienced more pressure from the bottom line than those who did not offered, especially when the cost of EPHI jumped 27.48% in Time 2 and 29.63% in Time 3 according to Table 5.5.2. Companies with EPHI should be more likely to stop or slow down wage growth to offset the extra insurance costs. As a result, the tradeoff ratio between wages and EPHI costs should be increased.

5.3 Conclusions

In this chapter, I tried OLS regressions with wages and net wages as the dependent variables. The insurance costs are positively associated with both measures of wages, which is consistent with much previous research but not with the theory of compensating wage differentials. My TSLS regressions do not make much difference in

the apparent relationship between wages and insurance costs. This suggests that market premium may not be a good instrument to correct for the endogeneity problem. Finally I run separated regressions for three sequential time periods. The decline of the coefficient of EPHI premiums in three periods provides evidences that employers are more sensitive to the increased insurance costs during a recession. The tradeoff ratio increase 0.2 from Time 1 to later periods.

Due to the omission of productivity in my regression models, I failed to estimate a negative tradeoff ratio. However, my findings suggest the existence of compensating wage differentials. Employers offering health insurance paid $0.2 less in wages for each dollar they spent on insurance in later periods than Time 1. If the tradeoff between wages and EPHI is 0 in Time 1, it should 0.2 in Time 2 and Time 3. If the tradeoff ratio is 0.3 in Time 1, it should be 0.5 in later periods. In short, the tradeoff ratio should be at least 0.2 during 2000 to 2005.

Part III Drop or Scale Back EPHI Benefits

Chapter 6 The Demand for Health Insurance

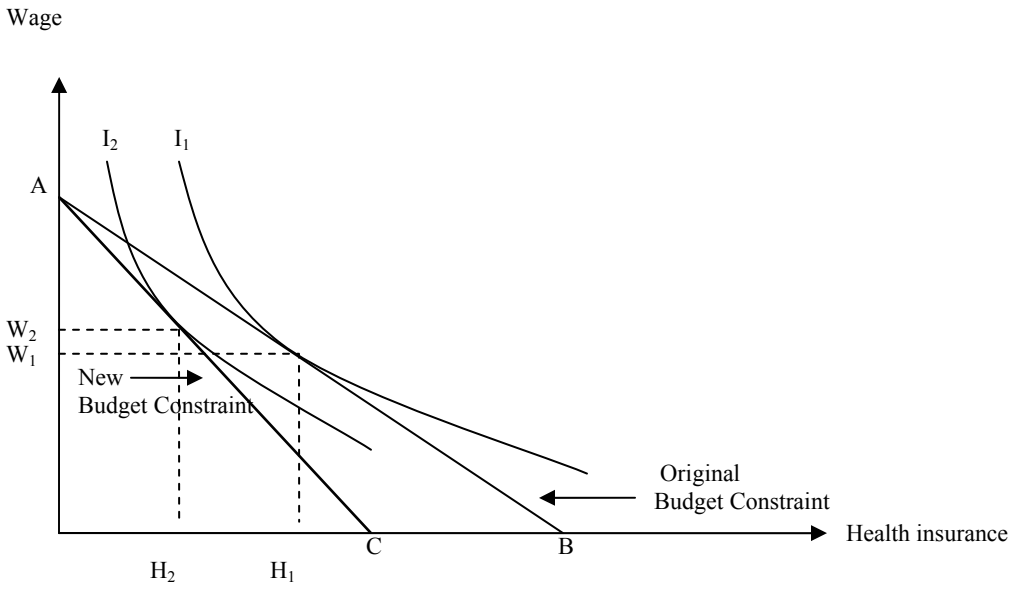
If the increase in total premiums does not result in a corresponding reduction in net wages, then employers can undertake other strategies to deal with higher cost of EPHI. Enthoven & Fuchs (2006) and Moran (2005) claim that employer are eliminating or scaling back health benefit in response to the premium growth. If the demand for health insurance is elastic, the EPHI coverage should be diminished in response to the premium increase.

6.1 The Demand for Health Insurance

Health insurance is considered as a normal good. The quantity of EPHI consumption depends on the price of insurance, ceteris paribus. No matter who is the ultimate payer of health insurance, the purchaser and the buyer should abide to the law of demand in the insurance market. If the employer values the health insurance at its cost and the employee gives no value to the health insurance at all, then the employer should be the consumer of EPHI. According to the law of demand, the employer will reduce the consumption of EPHI when the price goes up.

If the employer's valuation of EPHI is zero and the employee's valuation is equal to the cost, then the employee is the ultimate buyer of EPHI and the employer is the agent or the intermediate buyer for the employee in the health insurance market. When the price of EPHI increases, the employer should act on the employee's behalf and reduce or drop the coverage, as shown in Figure 6.1.

Figure: 6.1: The Demand of Health Insurance



The original market equilibrium is at the bundle (W_1, H_1), where the indifferent curve is I_1 and the budget constraint line is AB. If the insurance price increases, the budget constraint line shifts in to AC and the indifference curve becomes I_2. The new optimal bundle is (W_2, H_2), where $W_1<W_2$, $H_1 > H_2$. Employees are willing to give up some portion of their health coverage and save the cash for other consumptions. The optimal solution is to reduce the quantity of health insurance purchased. Assuming that the total labor costs do not change, a rational employer would reduce the quantity of health coverage and pay more in cash to workers.

If both the employer and the employee place some value on health insurance, the cost of EPHI should be shared by the employer and the employer. Both employer and the employee are the buyer or consumer of the health insurance. The coverage of health insurance also should decline if the price increases.

6.2 Literature Review

Many studies have devoted to investigate the price-demand elasticity of health insurance. The literature includes the employees' demand for health insurance at the individual level and the employers' demand for health insurance at the firm or establishment level. All of the studies found a negative relationship between the price and the demand, though the price elasticity varies widely.

6.2.1 Individuals' Demand for Health Insurance

Several studies focused on the impact of insurance price on individuals' decision of purchasing health insurance. Marquis and Long (1995) examined decisions to purchase insurance individually by persons who do not have EPHI coverage. They found a price elasticity of -0.3 to -0.4. Gruber and Poterba (1994) tested how the self-employed responded to a new tax subsidy of health insurance introduced by the Tax Reform Act of 1986. Their results suggested a price elasticity of -1.8. Royalty (2000) examined individuals' response to a tax subsidy for purchasing health insurance. She found the price elasticity for workers with median income in her sample is -0.57.

Two studies estimate whether the amount of employee contribution to insurance premium affects their take-up ratio of EPHI (Chernew et al. 1997; Blumberg et al. 2001). Both revealed very small price elasticities. The price elasticity was between -0.03 to -0.095 in the study of Chernew et al. and between -0.003 to -0.04 in the study of Blumberg et al.

These differences between these two of studies and others should not be a surprise. The price elasticity typically indicates employees' response to the percentage changes of

insurance premium. However, individuals may be more sensitive to the absolute dollar value changes than the percentage changes of their out-of-pocket expense. In fact, the employee contribution usually takes up a small portion of total premium. For example, the total premium in Chernew et al.'s study was $139.77 per month, while the employee contribution was only $17.65 per month. A 10 percent increase of employee contribution is only $1.8, while a 10 percent of total premium is $14. If the employee had to pay the total premium out of his or her own pocket, the price elasticity would probably be much higher.

Another group of studies examined the impact of employee contribution on their choices among different plans. Many employers offered more than one insurance plan. Expensive plans are usually generous in medical benefits but require a higher employee contribution. Employees can choose the best fit plan for them or their families based on their needs for health insurance and their budget constraints. Most studies concluded that employees are sensitive to the out of pocket spending in choosing insurance plans (Feldman et al 1989; Barringer and Mitchell 1994; Royalty and Solomon 1998; Monheit and Vistnes 1999; Buchmuller and Feldstein 1997; Royalty 2008). Controlling for other plan characteristics, higher employee contribution plans are less attractive.

6.2.2 Employers' Demand for Health Insurance

Most recent studies found a large price elasticity of EPHI for employers. Feldman et al. (1997) discovered that the elasticity of firms' demand for health insurance was -3.91 for single coverage plans and -5.82 for family coverage plans. Their sample was limited to small firms hiring fewer than 50 employees. Though small firms should be

more sensitive to insurance price than large firms due to their affordability, their estimate of elasticity is still much larger than in previous studies (Feldman et al. 1997). Gruber and Lettau (2004) studied the impact of tax subsidies on a firm's decision to offer insurance. They found the price elasticity was -0.25 of offering EPHI and -0.7 of insurance costs if EPHI was offered.

One study tested if employers would drop health insurance if the insurance cost increased. When the Quebec government removed the tax-preferred policy for employer-provided supplementary health insurance in 1993, the coverage declined about one fifth (Finkelstein 2002). Using a difference-in-difference model, Finkelstein estimated the price elasticity as about -0.5.

6.3 Employers Strategies in Reducing the Coverage of EPHI

Based on the previous discussions of the theory and the empirical evidence, I will examine several possible strategies used by employers in response to the rapid increases in EPHI premiums in recent decades.

6.3.1 Drop EPHI

From 1996 to 2005, the price of EPHI almost doubled. According to the law of demand, many employers should have dropped their health plans. Our current EPHI system is assumed to be a market mechanism. In theory, employers should be able to enter and exit the insurance market without constraints. Moreover, the general public has been criticizing employers' decisions to drop health insurance. Recent public media has described the EPHI system as: it is "vanishing" or "failing"; "employers are fleeing the

system"; "EPHI is ending"; "it is dying in front of our very eyes"; and "employer-based health coverage is melting away like a popsicle on the summer sidewalk" (Fronstin 2007).

However, some studies indicate that dropping EPHI may not be a common occurrence. Kaiser/ HERT surveyed employers every year from 1999 to 2007. Very few employers indicate that they would completely drop EPHI coverage. In 2007, only around 1 percent of surveyed employers said they were very likely to drop EPHI coverage; and only 2 percent said they were somewhat likely to drop. Employers are concerned that dropping EPHI would be too dramatic a decision to be accepted by their employees. Workers' moral would be seriously undermined, which could have a negative impact on firm performance. A new report from GAO (2007) indicates that the decline of EPHI coverage recent years is mainly due to new firms and old firms without health insurance being less likely to adopt EPHI, not because those employers offering health insurance dropped their coverage.

Employers' concern regarding the negative impact of dropping health insurance may lead them to continue providing EPHI despite the high cost of health insurance. However, neither KFF/HRET(2007) nor GAO (2007) could provide empirical evidences to prove that firms offering insurance continue to do so. In the meantime, EPHI coverage is declining after 2000 and the general public believed employers are breaking the social contract. In addition, Finkelstein (2002) found that employers in Quebec dropped their supplemental health insurance with little hesitation when they lost their preferred tax policy. Though workers in Canada are basically covered by a universal plan, the supplemental insurance could fill up to a 15-percent gap of total health care expenditure that was not covered by public health insurance system. Hence the experience in Quebec

could shed some lights on the private health system in the United States. I expect that dropping health insurance may be relatively inelastic compared to newly adopting EPHI due to the image of being a "bad" employer if you drop a benefit you already offer. However, there is no reason that employers did not drop health benefits at all given the escalation of premium growth.

Hypothesis 2a: Employers will drop their health benefits in the face of high insurance costs.

6.3.2 Reduce the Value of EPHI

There are many ways that employers can reduce the costs of EPHI even if they do not completely drop the plans. Given the limits of the data I am using, I will only examine three categories: 1) they could shift to HMO; and 2) they could make fewer workers eligible to EPHI. 3) they could reduce the quality of the benefits through other ways.

6.3.2.1 Shift to HMOs

There are mainly four types of health insurance used in the market in the last two decades: conventional, preferred provider organization (PPO), point of service (POS), and health maintenance organization (HMO).The access to medical care becomes less generous from conventional plan to HMO respectively (Beam and McFadden 2005) [2]. HMO plans employ the most restrictive review process of medical care. Any medical

[2] The categories of insurance plans may be different in different studies. I used Beam and McFadden's definitions for both my theoretical chapter and empirical analysis.

treatment, except emergency, has to be done in the network, and has to be approved by a primary care physician or a care manager. Policyholders of PPO and POS plans have more freedom in choosing their medical care than HMO, but their choices are also limited. In contrast, patients under a conventional plan can freely obtain their health care with minimum interruption from their insurance underwriters. Correspondingly, conventional plans are roughly the most expensive insurance type, and HMO plans are the cheapest one. PPO, POS, and HMO are managed care plans, which was the major strategy used by insurers and employers for medical cost control in the 1990s.

Presumably, when the cost of health insurance grows faster than the corporate earning, a rational firm should move from an expensive plan to a cheap one if they are the ultimate payer of the insurance. It is also unlikely that the employer will keep the expensive plan and request employees to pay all the increased costs. The literature general confirms that employees are sensitive to out of pocket spending in choosing insurance plans. Chenerw et al. (1997) and Blumberg et al. (2001) further concluded that employees might not take advantage of the availability of EPHI due to high employee contribution.

Miller (2001 and 1997) discovered that restrictive managed care plans like HMOs did not reduce the quality or outcome of health care, although they are less appealing to patients due to their uncomfortable utilization management systems. If the spending on EPHI premiums is eroding employees' pocket, they should forgo the comfort of more expensive plans and stick with HMOs. Having a cheaper plan is better than being insured in a plan with unaffordable insurance costs. As I discussed in Chapter 2, the most expensive plan – the conventional plan -- dominated the insurance market prior to the

1980s, but had almost disappeared by 2005. In contrast, the cheapest plan, HMO, dominated the growth of insurance plans, a development likely to persist if the escalation of premium growth continues.

Hypothesis 2b: Employers will offer HMOs more than other types of insurance in response to the growth in insurance premiums.

6.3.2.2 Reduce the Eligibility

The Health Insurance Portability and Accountability Act (HIPAA) prohibits any group health insurance plan from rejecting the health care coverage of any individuals based on their health status, medical history, genetic information, or disability. However, employers can limit employee's eligibility for EPHI coverage upon other reasons, such as tenure, occupation, or number of hours of work. Thus the law does not prohibit employers from excluding some of their employees from EPHI coverage. If the employer cannot lower wages to offset the rising EPHI cost or drop EPHI coverage completely, a rational and more realistic strategy is to cover fewer employees. Presumably the employees not eligible for EPHI are those the employer feels less critical to the operation of the firm.

To my knowledge, only one study has examined the impact of higher EPHI premiums on the eligibility changes. Farber and Levy (2000) found that employers would continue to provide health insurance to their core jobs and reduce the availability of health insurance on peripheral jobs in response to the rising insurance costs. They found that the decrease of health insurance coverage in the U.S. from 1988 to 1997 was substantially due to the decline in eligibility for new and part-time employees.

Part-time workers are definitely a target for EPHI limitations. They are mostly excluded from EPHI even if their employers provide health insurance to full-time workers. In 2004, only 30 percent of part-time workers were eligible for EPHI if their employer offered health insurance. However, more than 88 percent of full-time workers were eligible if their employers offered EPHI (Table 6.1).

Hypothesis 2c: Employers will make EPHI available to a smaller percentage of their workers in response to the growth in EPHI premiums.

Table 6.1: Percent of Eligible Employees at Establishments Offering EPHI in 2004

Firm size	All employees	Full-time employees	Part-time employees
Less than 10 workers	81.5%	92.1%	34.3%
10-24	76.1	90.8	20.8
25-99	78.1	87.9	17.7
100-999	78.4	88	21.7
1000 or more	81	88	37.5
Less than 50	78.5	90.8	24
50 or more	80.2	87.9	31.3
Total	79.8	88.5	29.7

Source: MEPS-IC 2004

6.3.2.3 Reduce the Quality of Health Benefits

Another way of controlling for the insurance costs is to provide lower quality of health insurance plan. I define the quality of health insurance as the coverage of medical care service in this thesis. For a specific type of insurance plan, let's say PPO, employers can lower the insurance costs through high deductible, high coinsurance, high co-payment, low stop limits, exclusion of dental care or prescription drug, etc. For example,

if the deductible for one-day stay in the hospital is increased from $0 to $100, the quality of the health insurance declines due to the elimination of the first $100 coverage.

Gabel et al. (2003) and Trude et al. (2002) claim that employers use high deductibles, high coinsurance, or high co-payments to transfer the increased costs of medical care to employees. KFF/HRET annual survey also confirms the rapid growth of workers' out-of-pocket payments including deductibles, co-payments, and stop limits for medical treatments. In 1999, 23 percent of HMO covered workers paid $5 for a doctor visit; and 60 percent of them paid $10 for a visit. In 2006, only 3 percent paid $5 per visit and 21 percent paid $10 per visit. The majority of workers paid $15 and $20 co-payment for their physician visit (Table 6.2). In fact, HMOs typically require smaller co-payment for doctor visits than do other types of health insurance. The co-payments of other insurance plans are much higher during the same period.

Table 6.2: Percentage of HMO Covered Workers Paid for Physician Visit

Copay	1999	2000	2001	2002	2003	2004	2005	2006
$5	23%	22%	15%	7%	4%	3%	5%	3%
$10	60	54	56	52	35	28	23	21
$15	12	16	22	27	37	40	34	37
$20	1	3	3	11	12	22	27	25
Other	3	6	4	3	12	7	11	15

Source: KFF/HRET 2007

Due to limits of data, I cannot examine each of those tactics. However, I can estimate the overall changes of the quality of health insurance benefits by investigate the changes of the real costs of EPHI. Presumably, the price of a product or service should reflect its quality in a competitive market. After controlling for the inflation factor, a better-quality insurance plan should cost more than a lower-quality one, ceteris paribus. In Chapter 7, I use the real value of EHPI premiums, which is the EPHI premium divided

by medical CPI, to measure the quality of EPHI. I expect the growth of the quality of EPHI purchased by employers should be slower than the growth of the quality of EPHI in the market in response to the rising insurance costs.

Hypothesis 2 d: The growth of the EPHI quality purchased by employers should be slower than the growth of the quality of EPHI in the market.

Chapter 7: Empirical Evidence of Dropping or Scaling back EPHI Benefits

The challenge of testing firms' price elasticity of health insurance is to find a measure of the price of EPHI faced by each firm. There is no standard price schedule of health insurance for companies. The price of EPHI varies widely depending on the generosity of the plan, the health risk of the workforce, the bargaining power of the company, and many other factors. An easy way is to use the premium actually paid by the company as the insurance price. However, the actual premium is endogenous in estimating insurance demand. The causality between the actual premium and a firm's demand for insurance could go either way. Purchasing a cheap insurance plan may suggest that the price is low for a given quality of health insurance. It nonetheless could also imply that the company has a lower demand for health insurance or that the quality of the plan that was purchased is low. In addition, there is no actual premium information for firms not offering health insurance. One has to obtain the price of EPHI for those firms elsewhere.

Two measures of insurance premiums available that companies would face were used in recent studies: 1) predicted premium and 2) tax subsidies for insurance. Feldman et al (1997) employed what they called "supply" factors (number of employees, percentage of full-time workers, location, and turnover rate) as instruments to predicted employers' willingness-to-pay price for a minimum coverage. Then they used the predicted premium to estimate the price elasticity of demand, a typical two-stage-least-square (TSLS) model for an endogenous variable. The advantage of using the predicted premium rather than actual premium is to provide an exogenous measure of the insurance

price. It also allows insurance prices to be imputed for firms that did not purchase health insurance. However, it is difficult to find exogenous instruments which are highly correlated with the premium but not correlated with insurance demand. As Gruber and Lettau (2004) pointed out, those instruments used by Feldman et al (1997), such as firm size and percentage of full time workers, are also antecedents of firms' demand for EPHI, although Feldman et al. categorized them as supply factors. Therefore the estimate of price elasticity may be biased due to the endogeneity of the imputed premium.

Another measure of the premium is the tax-subsidy for EPHI coverage. If workers are the ultimate payer of health insurance, they receive a discount in the EPHI price based on their marginal tax rate. Individuals with high wages would face higher marginal tax rate and thus pay less for the same amount of EPHI coverage than those with low wages. Gruber and Lettau (2004) computed average rates of tax-subsidy for each firm as a measure of the after-tax EPHI price. However, their average tax subsidy is not identical to the premium. It is a discount rate that the firm would face in purchasing EPHI based on its federal tax and state tax. The premium that a firm would face depends on a set of firm characteristics and worker characteristics, while the tax subsidy varies only upon workers' income and life status. One has to make sure that other factors are fully controlled when using the tax subsidy as a measure of the EPHI premium.

The fundamental problem of the tax-subsidy is that it is also a proxy for wages. Workers with higher wages usually face a higher marginal tax rate. What Gruber and Lettau estimated is more the income elasticity than the price elasticity of insurance demand. Further, the relationship between wage and benefits are endogenous as I

discussed in Chapter 4 and Chapter 5. Without controlling for productivity, the estimates for the elasticity of demand for insurance in Gruber and Lettau's model may be biased.

In this thesis, I use the market premium of EPHI to measure the EPHI premium available to the establishment. As I explained in Chapter 5, market premium is the weighted average premium among a group of employers and among single-coverage plans, family-coverage plans, and employee-plus-one-coverage plans. Based on MEPS-IC, AHRQ calculates average premium paid at the establishment level. The average premium varies by state, year, and firm size in 5 categories: 0-9 employees, 10-24 employees, 25-99 employees, 100-999 employees, and 1000 employees above. It is the premium per enrollee, which does not take workers uncovered by EPHI into account. The average premium represents the market price that an establishment faced in a specific state, in a specific year, and with specific size. It has separate values for single-coverage plans, employee-plus-one-coverage plans, and family plans. I average the three types of average premiums into a unified market premium using enrollments as weights.

The group average premium is by no means a perfect measure of market price. However, with the richness and depth of MEPS-IC data, it provides a reasonable measure of a typical employer's choice in a specific stratum. More importantly, it avoids the endogeneity problem of relying on the actual insurance premium purchased by a single establishment as a measure of the price of health insurance. The demand of a single establishment should have no impact on the average premium paid by a large group of companies. MEPS-IC is the most comprehensive health care survey at the establishment level in the United States, and so this measure of market price is the best available..

7.1 Empirical Model

This chapter does not replicate previous studies examining whether or not an employer offers health insurance given an insurance price. In contrast, I am only interested in whether employers drop EPHI, shift to cheaper plans, limit the eligibility, or reduce insurance spending if the price is increased. Hence establishments that did not offer EPHI at the beginning of the survey period are excluded from the sample of this chapter.

I employ four empirical models in this chapter to examine the insurance demand. Similar to Chapter 5, each model includes three columns: 1) regression without any state, year, industry dummies, 2) regression with state and year dummies, and 3) regression with state, year, and industry dummies. In order to avoid the problem of heteroskedasticity or cluster, I produce robust standard errors for all regressions.

The empirical model of this chapter is described below

$$Y = \alpha_0 + \alpha_1 HIM + \sum \beta_i X_i + \varepsilon \qquad \text{Equation 7.1)}$$

Y represents four dependent variables in four differential models: Model 7.1) Y is DropHI, which is equal to 1 when the establishment dropped EPHI in the survey year, 0 otherwise; Model 7.2) Y is HMO, which is equal to 1 when the insurance plan requested a gatekeeper and exclusive provider network; Model 7.3) Y is eligibility, which is the percentage of workers that were eligible for the health insurance; and Model 7.4) Y is the real EPHI premium per covered worker, which is the EPHI premium per covered worker divided by the CPI index for medical care . The real EPHI premium is a weighted average among the single-coverage plan, the employee-plus-one-coverage plan, and the

family-coverage plan. Model 7.1 and Model 7.2 are logit regression models, while Model 7.3 and Model 7.4 are OLS regression models.

The independent variables for the four models are basically identical. HIM is the market premium in Model 7.1, Model 7.2, and Model 7.3. In Model 7.4, HIM is the real market premium, which is market premium divided by the CPI index for medical care. X is a vector of control variables, including establishment size, unionization, share of female workers, share of part-time workers, share of older workers aged 50 above, share of highly-paid workers (who paid more than $15 per hour before 2000, $21 from 2000 to 2003, $22.5 in 2004, and $23 in 2005), business age, multiple-unit, which is equal to 1 if the establishment belongs to a firm with different locations and 0 otherwise, and state unemployment rate.

Table 7.0.1 presents the means of the sample for this chapter. Dropping EPHI is indeed rare. Only 315 out of 60,329 establishments dropped health care coverage in the survey year, which represents only 0.5 percent of the sample. Adopting an HMO is not popular either. Only around 24 percent of establishments purchased HMO plans for their workers. Once firms offered health insurance, on average they make 78% of their employee eligible to participate in the plan. Market premium per enrollee is $4,896. The real EPHI premium is $1, 752 per enrollee and the real market premium is $1.757 per enrollee.

My hypothesis for the impact of the market premium on the employers' strategies was presented in Chapter 6. The market premium should be positive associated with dropping EPHI and offering HMO, and should be negatively associated with the percentage of workers who are eligible for EPHI benefits. The real market premium

should be positively correlated with the real EPHI premium actually paid, but the coefficient should be less than 1.0 (Table 7.0.2).

Table 7.0.1: Descriptive Statistics for Chapter 7

Variables	No. observations	Mean	Standard Deviation
DropHI (Yes=1, No=0)	60,329	0.005	N/A
HMO (Yes=1, No=0)	64,945	0.239	N/A
Eligibility	67,749	0.784	0.269
Total EPHI premium per covered worker $1,000/year	67,749	4.888	2.409
Real EPHI premium per covered worker $1,000/year	67,749	1.752	0.793
Market premium $1,000/year	67,749	4.896	1.180
Multiple unit (Yes=1, No=0)	67,749	0.438	N/A
Real Market premium $1,000/year	67,749	1.757	0.293
Establishment size	67,749	168.612	653.175
Share of female worker	67,749	0.462	0.288
Share of older worker	67,749	0.191	0.157
Share of unionized worker	67,749	0.058	0.195
Share of highly-paid worker	67,749	0.241	0.259
Share of part-time worker	67,749	0.176	0.246
Age of establishment	67,749	15.504	8.968
State unemployment rate	67,749	0.048	0.011

Note: DropHI and HMO have some missing values, which result in fewer observations of these two variables than others.

Previous studies have confirmed that female workers demand more health insurance than male workers (Feldman et al. 1999; Marquis and Long 1995; Gruber and Poterba 1994), and old workers request more health benefits than young workers (Feldman et al. 1999; Barringer and Mitchell 1994). Promoting wages and benefits are the central terms of collective bargain. Not surprisingly, empirical evidences suggest that unionization is a key determinant of proving health benefits (Buchmueller et al. 2002;

Moran et al. 2000; Feldman 1999). Due to the price advantages, large firms typically provide better health benefit than small firms (Bundorf 2001; Moran et al. 2000; Feldman et al 1999). Moran et al. (2000) and Feldman et al (1999) found that an establishment staying longer in business is more likely to provide benefits. Part-time workers are less likely to be covered by health insurance, which is confirmed by national aggregate data (MEPS-IC 1996-2005; KFF/HRET1999-2007) and also empirical studies (Bundorf 2001; Moran et al. 2000; Feldman et al. 1999). As I discussed in Chapter 4 and Chapter 5, workers with high wages typically receive generous health benefits. Moran et al. (2000) and Barringer and Mitchell (1994) also found that employees with high salary obtained better health insurance. Companies experience more budget pressure in a recession, which leads to less spending in health benefits. Bundorf (2001) confirms that companies are less likely to provide health insurance during an economy downturn.

My predictions for the independent variables other than market premium are also shown in Table 7.0.2. I predict most variables have positive impacts on insurance demand, except market premium, the share of part-time workers, and the state unemployment rate. Therefore, establishment size, share of female workers, share of older workers, unionization, share of highly-paid workers, multiple units, and business age should have negative impacts on dropping health insurance and offering HMO plans and positive effects on the percentage of workers eligible for health benefits and the quality of insurance plans. In contrast, the share of part-time workers, and the state unemployment rate should be positively correlated with dropping EPHI and purchasing HMO, and negatively correlated with the percentage of workers eligible for health benefits.

Table 7.0.2: Hypotheses for Chapter 7

Variables	Drop HI or HMO	Eligibility or real EPHI premium
Market premium	+	+ but less than 1.0
Real Market premium	+	-
Multiple unit	-	+
Establishment size	-	+
Share of female worker	-	+
Share of older worker	-	+
Share of unionized worker	-	+
Share of highly-paid worker	-	+
Share of part-time worker	+	-
Age of establishment	-	+
State unemployment rate	+	-

7.2 Results and Discussions

7.2.1 Model 7.1: Dropping EPHI

The results of dropping EPHI are shown in Table 7.1. The coefficients are mostly consistent across three columns. None of the coefficients of market premium is significant. The p-values of the coefficients for the market premium are very close to 1.0, indicating that the variable is almost totally irrelevant to whether an establishment drops EPHI. The establishment size, the share of highly-paid workers, belonging to a firm with multiple units, and establishment age are all significantly and negatively associated with health insurance, which confirm my hypotheses. The coefficients of other variables are mostly not significant. The pseudo R-square is from 0.138 to 0.164.

The effect of market premium on the decision to drop EPHI is truly a surprise. Employers seems insulated from the escalation of premium from 1997 to 2005. Despite constant complaining about the high cost of EPHI, almost no employer eliminated their EPHI because of the price increase.

Table 7.1: Logit Regression for Dropping EPHI

Variables	Column 1	Column 2	Column 3
Market premium	-0.034	0.01	0.011
	(0.053)	(0.16)	(0.160)
Establishment Size	-0.015***	-0.015***	-0.015***
	(0.003)	(0.003)	(0.003)
Share of female worker	-0.23	-0.222	0.168
	(0.207)	(0.207)	(0.249)
Share of older worker	0.277	0.299	0.379
	(0.369)	(0.384)	(0.382)
Unionization	-0.446	-0.236	-0.291
	(0.672)	(0.667)	(0.668)
Share of highly-paid worker	-3.79***	-3.624***	-3.466***
	(0.642)	(0.664)	(0.658)
Share of part-time worker	1.496	1.605***	1.620***
	(0.226)	(0.234)	(0.244)
Multiple Unit	-1.639***	-1.673***	-1.635***
	(0.187)	(0.187)	(0.192)
Age of the establishment	-0.027***	-0.027***	-0.024***
	(0.007)	(0.007)	(0.007)
Unemployment rate	13.146***	9.634	10.159
	(4.772)	(12.945)	(12.981)
Constant	-4.113***	-4.544***	-4.482***
	(0.361)	(1.345)	(1.348)
State and Year Dummies	No	Yes	Yes
Industry Dummies	No	No	Yes
Pseudo R-square	0.138	0.16	0.164
Number of establishments	60,329	60,329	60,329

Note:
1. Robust standard errors are included in the brackets
2. * significant at 10% level, ** significant at 5% level, *** significant at 1% level.

One may argue that dropping EPHI is such a rare event, according to Table 7.0.1, that the estimate of the effect of market premium on the decision to drop EPHI may not be accurate. However, the results in Table 7.1 suggest that employers did drop EPHI due to other reasons. Small firms and new firms are more likely to drop health care coverage. A high portion of low-wage (and presumable lower skilled) workers drives the

elimination of EPHI. In addition, the pseudo R-squares in Table 7.1 are reasonable for such an extreme event. The logit regressions explain from 14 to16 percent of the variation of dropping EPHI, and, with minor exceptions, the variables are either consistently insignificant or significant with the same sign and roughly the same magnitude in all three regressions, which indicate my estimates are robust.

Previous studies generally found an elastic insurance demand in response to the premium. Lower premiums or higher tax-subsidy generally attracts more employers to offer EPHI. My findings nonetheless can be reconciled with existing literature. This is first study that directly estimates the impact of price on employers' decision to drop EPHI in the United States. The factors inducing an establishment to drop insurance coverage may be different than the factors causing a firm to initially offer EPHI. Similar to wage rigidity, employers may be subject to benefits rigidity: increasing employee benefits is doable, but cutting benefits is not acceptable.

7.2.2 Model 7.2: HMO

Table 7.2 presents the logit regression results for Model 7.2. The dependent variable is whether the employers purchase an HMO plan in response to the market premium growth. The coefficient for market premium is negative in column 1, which is the opposite of the expected sign. However, the coefficient becomes insignificant when I include state, year, and industry dummies in column 2 and 3. Unionization, the share of highly-paid workers, and multiunit are negatively associated with HMO in all columns. Firm size is positively correlated to purchasing HMO, but its coefficients are very close to zero. The share of female workers is positively correlated with HMO in column 1 and

column 2, but its effect is insignificant when the industry dummies are added in column 3. The share of part-time workers and unemployment rate have negative impacts on purchasing HMOs when the year, state, and state dummies are included in column 2 and column 3. The share of older workers and establishment age have negative impact on adapting HMO plan according to column 1, but its effects disappear when state, year, and industry dummies are added in.

Table 7.2: Logit Regression for Shifting to HMO

Variables	Column 1	Column 2	Column 3
Market premium	-0.100***	0.025	0.022
	(0.009)	(0.025)	(0.025)
Establishment Size	2.59e-5*	3.48e-5**	3.2e-5**
	(1.39e-5)	(1.52e-5)	(1.62e-5)
Share of female worker	0.208***	0.164***	0.042
	(0.034)	(0.037)	(0.045)
Share of older worker	-0.190***	-0.087	-0.108
	(0.063)	(0.066)	(0.067)
Unionization	-0.131***	-0.170***	-0.156***
	(0.053)	(0.056)	(0.057)
Share of highly-paid worker	-0.217***	-0.827***	-0.877***
	(0.038)	(0.043)	(0.045)
Share of part-time worker	0.031	-0.115***	-0.083***
	(0.041)	(0.044)	(0.046)
Multiple Unit	-0.310***	-0.246***	-0.236***
	(0.019)	(0.020)	(0.021)
Age of the establishment	-0.003***	0.001	0
	(0.001)	(0.001)	(0.001)
Unemployment rate	1.138	-6.591***	-6.615***
	(0.846)	(2.145)	(2.146)
Constant	-0.567***	-2.435***	-3.198
	(0.054)	(0.244)	(0.284)
State and Year Dummies	No	Yes	Yes
Industry Dummies	No	No	Yes
Pseudo R-square	0.008	0.11	0.111
Number of establishments	64,945	64,945	64,945

Note:
1. Robust standard errors are included in the brackets
2. * significant at 10% level, ** significant at 5% level, *** significant at 1% level.

In contrast to my hypothesis, employers did not shift their insurance plans to HMOs when the price of the insurance is high during the period I study. HMOs are not as attractive to workers as other plans due to their restrictive utilization management and limited access to medical providers, which is the reason for the low price. However, the heath care quality of HMOs is comparable to other plans, as I discussed in chapter 6. The results indicate that employees did not give up the comfort of medical care even though the comfort comes with a higher cost. It implies that the current insurance premium may be still affordable to employers and employees.

The results also reveal that employers are less likely to provide HMO plans when a union is present. Firms with multiple units and a high share of highly-paid workers tend to offer expensive plans. These results were expected. However, there are also some surprises. Employers tend to offer HMO plan during a boom period instead of during a recession. Establishments with a lower proportion of part-time workers tend to be more likely to offer HMO plans.

7.2.3 Model 3: Eligibility

The regression results for eligibility are described in Table 7.3. Eligibility is the percentage of the establishment's employees who are eligible for EPHI. In column 1, the coefficient for market premium is positive, which is opposite to what I expected. However, it becomes insignificant when state dummies, year dummies, and industry dummies are included in column 2 and column 3. The coefficients for establishment age, share of older worker, share of highly paid worker, and multiple unit are positive and significant in some or all columns, while the coefficient of unionization, and share of

part-time workers are negative and significant in all columns. Establishment size is negatively associated with the dependent variable in some column, but the coefficient is very close to zero. The coefficient of the share of female workers is positive in column 1 and column, but it flips to negative in column 3. The coefficient of state unemployment rate is insignificant in all columns.

Table 7.3: OLS Regression for Eligibility for EPHI

Variables	Column 1	Column 2	Column 3
Market premium	0.004***	-0.001	-0.003
	(0.001)	(0.002)	(0.002)
Establishment Size	-1.61e-6*	-1.15e-6	-3.55e-6***
	(9.37e-7)	(9.34e-7)	(9.55e-7)
Share of female worker	0.007**	0.005*	-0.026***
	(0.003)	(0.003)	(0.004)
Share of older worker	0.094***	0.089***	0.065***
	(0.005)	(0.005)	(0.005)
Unionization	-0.026***	-0.030***	-0.029***
	(0.005)	(0.005)	(0.005)
Share of highly-paid worker	0.121***	0.127***	0.124***
	(0.003)	(0.003)	(0.003)
Multiple Unit	0.036***	0.036***	0.030***
	(0.002)	(0.002)	(0.002)
Share of part-time worker	-0.671***	-0.671***	-0.641***
	(0.005)	(0.005)	(0.005)
Age of the establishment	0.001***	0.001***	4.7e-4***
	(8.83e-5)	(8.85e-5)	(8.84e-5)
Unemployment rate	-0.104	0.064	0.052
	(0.069)	(0.159)	(0.157)
Constant	0.809***	0.807***	0.870***
	(0.005)	(0.016)	(0.016)
State and Year Dummies	No	Yes	Yes
Industry Dummies	No	No	Yes
R-square	0.448	0.453	0.466
Number of establishments	67,749	67,749	67,749

Note:
1. Robust standard errors are included in the brackets
2. * significant at 10% level, ** significant at 5% level, *** significant at 1% level.

Similar to the empirical results concerning the decision to drop EPHI or to shift to HMOs, employers are reluctant to reduce the eligibility of workers for EPHI in response to the rising insurance costs. The results are contrary to Farber and Levy's (2000) findings, where they concluded that the eligibility of new and part-time workers substantially declined from 1988 to 1997. However, the methodology used by Farber and Levey was decomposition analysis. They basically compare means of different job groups in different years. The limitation of their methodology compared to a regression model here is that many of the factors affecting insurance demand, such as firm characteristics, individual characteristics, location, or industry, cannot be controlled. In addition, the time period of my sample (1997-2005) only overlaps one year with Farber and Levey's time period (1988-1997). If employers substantially reduced eligibility for part-time workers and new workers in the early 1990s, there may not be much room left for them to further squeeze workers out of the coverage later.

The results of other variables are predictable, except unionization and female workers. Union coverage is associated with lower eligibility for health insurance. Previous studies typically found a high coverage of workers for health benefits associated with unionization (Buchmueller et al. 2002; Moran et al. 2000; Feldman 1999). Though unions only negotiated benefits for their own members, other workers in the same company are also likely to receive compensation package as good as union members if the employer does not want an expansion of unionism (Khan 1980). A possible explanation here is that labor costs are typical high in the union sector. Unions may have started to give up health benefit for new employees or part-time employees to avoid laid-off or wage-cut. If this pattern is true, the growth of EPHI premium will in the short run

disproportionally affect health benefits in unionized establishments and may in the long run be detrimental to the development of unionization in the United States.

The effect of female workers coefficient was positive in column 1 and column 2 but turns to be negative when industry dummies were included in column 3. After controlling for industry, female workers were less likely to be eligible for health insurance. Female workers usually demand more health insurance than male workers. The results here indicate that employers may be more oriented toward costs saving instead of employees' needs. As I discussed in Chapter 5, health benefits are likely to correlate with wages. Female workers are typically paid less than male workers. If I don't control for productivity, lower paid workers typically receive less health benefits. Therefore, the negative relationship between the share of female workers and the eligibility of health insurance could also reflect the gender discrimination of compensation in general.

7.2.4 Model 4: Insurance quality

In Model 7.4, I use the real EPHI premium to measure the quality of health benefits. Presumable, the cost of the EPHI should reflect the quality of the insurance. However, the data I used are across 9 years, which is a period that the market premium of EPHI almost doubled. Hence I use the real term of insurance costs to measure the insurance quality. After the controlling the inflation of medical service, an insurance contract with a higher premium should provide better medical services.

Table 7.4 provides the regression results of the quality of insurance affected by the rising real market premium of EPHI. In column 1, the coefficient of real market

premium is 0.78, which implies that market premium is a good measure of insurance price. The coefficient decreases to 0.325 and 0.322 when state dummies, year dummies, and/or industry dummies are included in column 2 and column 3. When the real market premium is increased by $1, the real value of the EPHI plan that employers offered to their workers only went up by $0.32.

Table 7.4: OLS Regression for Real EPHI Premium per Covered Worker

Variables	Column 1	Column 2	Column 3
Real market premium	0.780***	0.325***	0.322***
	(0.01)	(0.020)	(0.020)
Establishment Size	-1.7e-5***	-3.4e-6	-6.31e-6
	(4.66e-6)	4.91e-6	(4.86e-6)
Share of female worker	-0.074***	-0.060***	-0.156***
	(0.011)	(0.011)	(0.013)
Share of older worker	0.45***	0.415***	0.377***
	(0.020)	(0.020)	(0.020)
Unionization	0.252***	0.281***	0.284***
	(0.017)	(0.017)	(0.017)
Share of highly-paid worker	0.49***	0.57***	0.533***
	(0.012)	(0.012)	(0.013)
Multiple Unit	0.063***	0.067***	0.073***
	(0.006)	(0.006)	(0.006)
Share of part-time worker	-0.023*	-0.012	0.031**
	(0.014)	(0.014)	(0.015)
Age of the establishment	0.006***	0.005***	0.005***
	(3.34e-4)	(3.33e-4)	(3.36e-4)
Unemployment rate	1.127****	1.748***	1.756***
	(0.247)	(0.571)	(0.569)
Constant	0.036*	1.081***	1.186***
	(0.020)	(0.062)	(0.064)
State and Year Dummies	No	Yes	Yes
Industry Dummies	No	No	Yes
R-square	0.158	0.174	0.286
Number of establishments	67,749	67,749	67,749

Note:
1. Robust standard errors are included in the brackets
2. * significant at 10% level, ** significant at 5% level, *** significant at 1% level.

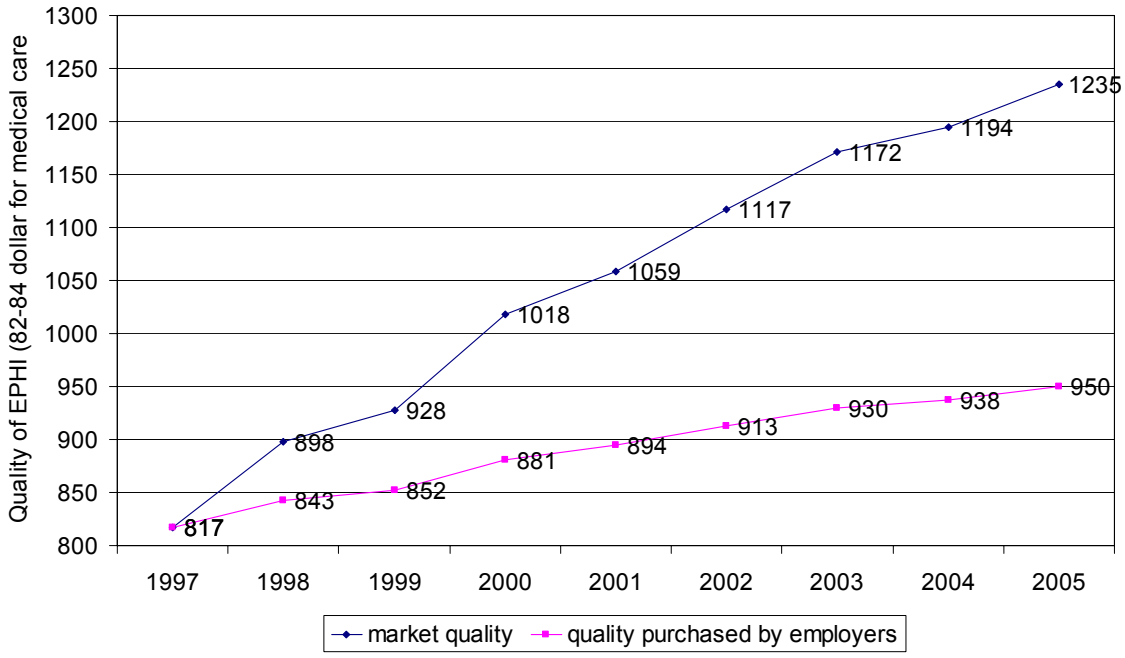
The results in column 1 suggest that employers purchase comparative quality of health insurance in the EPHI market. When the quality of health insurance is increased by 1 unit in the market, a typical employer may increase its health insurance quality by 0.78 units. However, after controlling for those unobserved state and year factors, the growth of insurance quality purchased by employers falls behind the growth of EPHI quality in the market. Column 2 and column 3 indicate that when the quality for EPHI in general improves by 1 unit, a typical employer will only increase its quality for health insurance around 0.32 units.

To further understand the results in column 2 and column 3, I use the growth of national average premium as an example to simulate the growth of insurance quality (Figure 7.1). In 1997, the national average real premium for a single-coverage insurance plan was $817 in 82-84 dollar. It grew to $1,235 in 2005. If I control all other factors and leave real market premium as the single determinant of insurance demand for employers, an establishment who purchased EPHI at $817 in 1997 would pay only $950 for its insurance package in 2005. Assuming that the real premium of an insurance plan perfectly reflects its quality, my findings suggest that employers did not catch up with the advance of health care service in the United States.

The share of older workers, share of highly-paid workers, unionization, belonging to a multiple unit, and establishment age are the driving factors for good quality of EPHI. The share of female workers is negatively correlated with employers' real spending on health insurance, which is similar to the results of Model 7.3. The results of unemployment rate – that employers' real expenditures of health care are higher when unemployment rates are elevated -- contradicts the general view. Apparently, employers

are more generous in health insurance during a recession. Another surprise is the share of part-time workers. In column 3, when all dummies are controlled, employers with more part-time workers actually offer a better quality of health insurance.

Figure 7.1: Simulation-The National Average Growth of EPHI Quality



7.3 Conclusions

Contrary to previous studies and the general public view, the results in this chapter suggest that employers are subject to benefit rigidity. Employers were sometimes accused of relying on various tactics to control insurance cost, but there is little evidence these tactics were adopted by employers. Despite the escalation of premium growth from 1997 to 2005, employers did not drop EPHI coverage, shift to HMO plans, or reduce the eligibility of their workers for EPHI. They apparently were afraid that a dramatic reduction in benefits would lead to low workplace moral.

Employers only employ those tactics that are accepted as reasonable by their workers and are not considered as unduly hostile when they deal with rising insurance costs. Employers make the initial decision to voluntarily offer health insurance to their workers based on their best interest of business. However, once they start to offer EPHI, they cannot freely adjust the benefit levels when premiums increase. They are reluctant to take dramatic actions in cutting benefits. Hence the demand of insurance is elastic in initially offering the coverage, but inelastic in cutting it once the EPHI is in place.

Insurers can definitely take advantage of this inelastic demand. If the demand does not fall when they raise the premium, they will continue increasing premiums. It is relative easy for them to pass their higher costs to consumers of health care. Thus the costs of technology advance, regulation, adverse selection, or moral hazard can be quickly transferred to the consumers by increasing the premium for health insurance. Therefore, benefit rigidity could be a driving factor of high insurance premium that artificially inflates the price of EPHI.

However, employers were trying hard to control insurance costs with some success. The growth quality health plans was slowed down due to the high insurance premiums. Traditional health care plans are replaced by managed care plans. Patients have less access to medical care providers. Most workers have to pay a higher deductible, coinsurance, or co-payment than a few years earlier. Many medical care services, such as dental care, vision care, and mental care, are eliminated from EPHI coverage. Both the employers and the employees are the victims of the ever-increasing insurance premium. Both have to pay a higher cost for the EPHI, but employees receive benefits with a relative low quality.

Among my control variables, I found that establishment with multiple units or a larger size, a higher proportion of highly-paid workers, and a longer time in the business offer better health benefits to their workers, which is mostly consistent in four models and confirm my hypotheses.

However, there are many interesting finding that falls out the range of my expectations. With the present of unions in the workplace, employers are less likely to eliminate health insurance or shift to HMO plans, and they are more likely to provide a better quality of health benefits. However, the percentage of workers eligible for EPHI is lower in union sector than a non-union place, which is indeed a surprise compared with previous literature. My findings suggest that unions are losing their control in promoting workers' benefits due the growth of EPHI costs. They have to give up the coverage for new and part-time employees in order to maintain the benefits for their current members. If this pattern persists, the growth of health insurance costs will become a major obstacle for labor movement in the United States in the future.

The results of Model 7.3 and Model 7.4 suggest that companies typically offer lower benefits to their female workers than to male workers. Female workers usually require more health benefits than their male colleagues. Unfortunately their demand was not fully recognized by their employers. Similar to the wage discrimination, women are less likely to eligible for the health benefits and receive a lower quality of health insurance.

The impacts of part-time workers are mixed. As expected, establishments with more part-time workers are more likely to eliminate health insurance and have fewer percentage workers eligible for the benefits. However, they are less likely to provide

HMO plans and more likely to offer a better quality of health insurance (in column 3 of Model 7.5, after controlling all dummies). After excluding a large number of part-time workers from EPHI coverage, the costs pressure may be reduce so that employers can afford a better plan to their core employees.

Last but not least, unemployment rate produce strange results in Model 7.2 and Model 7.4. Presumably, companies should spend less on health insurance during an economy downturn. However, my results demonstrate an opposite pattern. They are less likely to purchase HMO plans and more like to provide a better quality of health insurance in the recession. The explanation here again could be derived from the wage and benefit rigidity. During a recession, companies usually keep the core employees and lay off peripheral workers in order to maintain their core operation. Core employees are typically paid with higher wages and better benefits. Due to wage and benefit rigidity, companies would lay off workers rather than cut wages or benefits. When the company lets many of their peripheral workers go, the average wages and average benefits for the remaining work force are actually increased.

Part IV: EPHI and Business Survival

Chapter 8: Theory for EPHI and Business Survival

The previous chapters indicated that firms might not be able to fully shift the costs of higher EPHI to workers in the forms of lower wages or higher premiums. In addition, firms offering EPHI have neither dropped the insurance nor significantly reduced workers' eligibility for health benefits. If so, economic theory suggests that firms offering EPHI will be at a competitive disadvantage relative to other firms, and that the firms offering EPHI are therefore more likely to fail.

However, the obvious question is: why are employers reluctant to drop EPHI, given the additional costs borne by firms that offer the benefit? The question can be restated as: if the EPHI puts firms at risk, why don't they get rid of it? In fact, the percentage of firms offering health insurance is largely unchanged from the 1980s to the 2000s despite decades of rising insurance costs (Fronstin 2007). Thus not only did those firms with EPHI not drop health insurance, most new firms or firms without health insurance also offered EPHI. On the one hand, employers keep complaining that the high cost of EPHI may lead to their default. On the other hand, few of them drop EPHI.

In this chapter, I develop a theoretical framework to examine whether EPHI is critical to business competitive advantage and thus promotes business survival. This theory recognizes that EPHI is indeed costly and getting more expensive to offer, but postulates that the benefit of offering EPHI exceeds the cost. The net gain of offering health insurance for most firms should be positive.

8.1 The Benefits of Offering EPHI

From the employers' view, health insurance is an effective means to attract and retain employees. The historical reasons of EPHI are to build a loyal workforce and to attract scarce workers, as I discussed in Chapter 1. In addition, providing EPHI can improve the health of work force and thus maintain and increase productivity in the long run.

8.1.1 Attracting and Retaining Employees

The well accepted business reasons for offering EPHI are to attract and remain talents (Beam and Mcfadden 2005). Resource-based view (RBV) has clearly demonstrated that human resources are a critical resource of business competitive advantage (Wright et al 2001; Wright et al. 1994; Lado and Wilson 1994; Barney 1991). A company has to maintain a stable and reliable work force in order to survive and develop in the long run. Providing EPHI is the basic tool to keep employees around.

Human capital theory claims a firm pays a higher wage for a worker in order to train him/her with firm specific skills (Becker 1964). Then the firm can recoup their investments in human capital during the post-investment years. The departure of the worker results in the direct cost of the investments partially or fully wasted. In addition, hiring is expensive. For example, money has to be spent on recruiting as line managers and HR managers spend time on the interviewing process. Moreover, it always takes time to train a new person to become as productive as the replaced one.

However, the indirect costs of turnover are more important to a firm's competitive advantage than the direct costs. Barney (1991) categorizes possible firm resources into three components: physical capital, human capital, and organizational capital. Losing a

talented employee may export all three capitals to their competitors. The person may be part of a core technology; he/she may invite former colleagues to join the new company; or he/she may understand the management system very well. A loss of a talented employee thus makes the company vulnerable to keeping its unique attributes. As a result, the firm may lost its competitive advantage when those separated employee carry the firm's resources to their new jobs.

The literature mostly finds that providing EPHI can reduce job turnover, although there are some differences among the studies. Using National Medical Expenditure Survey (NMES) data from 1987, Madrian (1994) found that workers' mobility is reduced by 31% in those firms offering EPHI. However, Kapur (1998) failed to find a significant and substantive impact of health insurance on job departures using the same data source. Buchmueller and Valetta (1996) used Survey of Income and Program Participation (SIPP) data from 1984 and found that mobility was reduced by 26%. Gilleskie and Lutz (2002) found little evidence of a reduction in job turnover. However, the data they used are from the National Longitudinal Survey of Youth (NLSY) and the younger worker sample in the NLSY may not be comparable to other studies. Adams (2004) confirmed the existence of job lock by using Current Population Survey (CPS) data from 1988 to 2000.

Labor economists term the reduction of turnover "job lock" or "industrial feudalism". They claim that job lock may be detrimental to the society at large if the economy requires a more mobile workforce. However, job-lock may be beneficial to individual firms. Besides saving on the direct costs of recruiting and replacing, job-lock makes corporate resources inimitable and thus maintains a business competitive advantage.

8.1.2 Increase Individual Productivity

EPHI should also have impact on individual productivity. Health insurance protects workers from the loss of illness and improves health and safety of the workplace. A worker is more productive when he is healthy. If EPHI can maintain a healthy work force, the firm can reap the benefit from high productivity. Ayanian et al (2000) found that uninsured individuals are less likely to seek and obtain medical treatment than insured persons. Further, most studies found that the probability for serious diseases or death is substantially higher among the uninsured people than the insured (Young and Cohen 1991; Ayanian et al 1993; Franks et al 1993; Solire et al 1994; Baker et al. 2001). For example, Baker et al. (2001) conclude that uninsured persons were 1.4 times more likely to have a major health decline or to die and were 1.2 times more likely to develop an activity limitation than insured people.

O'Brian (2003) review previous empirical studies estimating impact of good health on workers' productivity. He concludes that 1) the illness of workers or their families is the most important reason for the absenteeism; 2) healthy workers earn substantially higher than unhealthy workers, other things equal; 3) a good health of a population is a reliable predictor of a better economy.

8.2 The Cost of Not Offering Health Insurance

In 2005, more than 70 percent of employers with 10 or more employees and more than 90 percent employers with more than 50 employees offered health insurance (Table 8.1). When most of your competitors are offering health insurance, the benefit of offering health insurance may not be significant, but the cost of not offering is very high.

Table 8.1: Percentage of Firms Offering Health Benefits, by Firm Size, 1990-2006

Firm Size	1999	2000	2001	2002	2003	2004	2005	2006
3-9 Workers	56%	57%	58%	58%	55%	52%	47%	48%
10-24	74	80	77	70	76	74	72	73
25-49	86	91	90	86	84	87	87	87
50-199	97	97	96	95	95	92	93	92
All small firms (3-199)	65	68	68	66	65	63	59	60
Large firms (200 or more)	99	99	99	98	98	99	98	98
All firms	66	69	68	66	66	63	60	61

Source: Kaiser/HERT (2006)

Institutional theory posits that firms offer health insurance in order to gain legitimacy and hence the resources necessary to ensure their survival (Meyer and Rowan 1977). Organizations may adopt practices voluntarily in response to the pressure of normative standards or involuntarily in response to coercion by powerful institutions (DiMaggio and Powell 1983; Tolbert and Zucker 1996). When a large number of organizations offer EPHI, it becomes a normative format for the rest to follow (Barringer and Milkovich 1998). The normative format of EPHI also involves the expectation of the society at large. Americans believe that employers should be responsible for their employees' health insurance (Meyer and Rowan 1977). Even many employers agree that offering health insurance is a right thing to do (Fronstin 2003).

A deviation from the normative practice may cost the company in two ways: 1) low productivity and 2) bad corporate reputation. A normative practice can be categorized as a dissatisfaction-avoidance factor or a hygiene factor. As defined by Herzberg (1968), employees may not be motivated by a hygiene factor, but they would be dissatisfied or even aggravated if the hygiene factor is reduced or eliminated. Since most

employers are offering health insurance, adapting EPHI is no longer special. In contrast, workers expect a good employer to provide a decent health insurance package. As the expense of health care grows, workers become more sensitive to their health benefits and rely more on their employment for health care coverage. According to a Census report (2005), the percentage of direct purchases of health insurance had steadily fallen from 13.4 percent of the population in 1987 to 9.1 percent of the population in 2005.

Workers working in a firm without health insurance are unlikely to consider their job as a career and to be committed to their jobs. Employees do not treat their job seriously and frequently attempt to quit and look for a job with health insurance. If the company plans to build a long-term relationship with workers, they have to provide health benefits. Otherwise, the company will lose its key workers and the business is less likely to survive.

Not offering health insurance can also diminish the corporation's reputation. The focus of American economy has transferred from the manufacturing sector to the service and retail sectors. Customer service and public relations are the key issues for many companies today. Good reputations are critical assets to the business development. Its intangible character makes it difficult to replace or imitate, which will help the company sustain their competitive advantage (Fombrun and Shanley 1990; Barney 1991; Roberts and Dowling 2002). Some studies confirm that good reputations are associated with better firm performance (Herrmans et al. 1993; McGuire et al. 1990; Roberts and Dowling 2002).

The corporate reputation is not limited to the products or services that companies provide to their costumers. Employment relationship and the impact to other stake

holders are equally important. Companies not offering health insurance are often marked as “bad employers”. Shopping with them is viewed as supporting exploitation of their employees and thus is not encouraged. As the biggest employer in the nation, Wal-Mart has been struggling with its cost saving policies in health benefits and its reputation. It finally adopted a relative expensive health care program, which is contrary to its long-time low-cost strategy, in order to quell the heated public criticism that its workers were largely uninsured.

There are also coercive pressures that force firms to provide EPHI to their workers. Many states have been working on a universal coverage or employer-mandated health care system at the state level. At this moment, only Hawaii and Massachusetts have passed such laws. Unions are also fighting aggressively on health care coverage for the members, according to previous studies and findings in Chapter 7. Without the UAW, retirees at GM may have lost their health insurance coverage long time ago, given that no more than 13 percent of employers offered health insurance to their retirees in 2005 (MEPS-IC).

Those coercive institutions keep forcing the company to adopt and maintain health insurance plans. Firms without EPHI or with meager health care benefits have to constantly defend their choices. The state of Maryland was upset about Wal-Mart’s cheap insurance plans for its employees, and enacted laws that require large employers spend a minimum expenditure on health insurance. The company fought the law in court and won the challenges, but the victory was not cost free in terms of loss of reputation (not to mention legal fees). Furthermore, there are more battles ahead for EPHI-free companies.

As a result of the growth of uninsured citizens, law makers are not willing to give up government intervention in the private insurance market.

In essence, employers not offering health insurance are deemed as cheap, negligent, or indifferent to the needs of their workers and of society. Providing decent health insurance is a sign that a firm is both responsible and productive.

8.3 EPHI and HPWS/HRM

Scholars in the field of industrial relation (IR) and strategic human resource management (SHRM) argue that a high performance work system (HPWS) or a high road human resource strategy should lead to greater competitive advantage (Jackson et al. 1989; Appelbaum and Batt 1994; Wright and McMahan 1992; Schuler and Jackson 1999; Godard and Delaney 2000; Wright and Boswell 2002). Most empirical findings in the 1ast two decades confirmed that HPWS or HRM practices simulates better firm performance and thus results in a greater chance of business survival (Arthur 1992; Osterman 1994; Huselid 1995; Macduffie 1995; Delery and Doty 1996; Youndt et al. 1996; Huselid et al. 1997; Ichniowski et al. 1997; Appelbaum et al. 2000). However, no theoretical or empirical research has included health insurance in their HPWS/HRM system. The importance of EPHI in HPWS/HRM system and its effects on business competitive advantage has long been ignored.

Recent research has focused on the impact on firm performance of sets of human resource (HR) practices or the HR system. Researchers suggest that the combination of a group of HRM practices rather a single one improves the overall firm performance (Huselid 1995; Delery and Doty 1996; Lepak and Snell 1999; Wright and Boswell 2002).

Individual HR practices can complement, substitute for, or even conflict with others. HR managers have to make sure that the practices in the same system are congenial with each other. An essential element of HWPS is to invest in human capital (Appelbaum and Batt 1994, Godard 2000; Wright and Boswell 2002). Offering EPHI can be a starting point of spending on human resources. It is hard to believe that a company would be generous in developing human capital if it does not provide a decent health insurance package. HWPS requires the mutual trust and commitment of parties, the management and the rank-and-files, in the long run. To make HPWS works, the management has to demonstrate their willingness to invest in and communicate with employees. Providing health insurance is the least thing that employers can do to show goodwill to their workers.

Offering EPHI is nonetheless not identical to having a HPWS system. EPHI is a necessary but not sufficient condition for a HPWS system. A firm with EPHI may not necessary adapt a HPWS system, but few firms without EPHI are unlikely to have invested in any expensive HRM practices. The HPWS program is associated with better performance. Since firms without health insurance do not have HPWS practices, it is reasonable to believe that these firms have lower performance.

Two studies found that providing EPHI promotes firm performance. Exploiting data from MEPS-IC and Economic Survey in 1997, McCue and Zawacki (2006) found that firms offering EPHI substantially outperformed those not offering EPHI. After controlling for the distribution of human capital, productivity, and other firm characteristics, Decressin et al (2005) estimated that the performance of firms offering employee benefits would be 15 percent higher than those not offering benefits in 1997.

8.4 Net benefit of offering EPHI

Needless to say, offering EPHI is expensive. However, the benefits of offering it are also substantial. To employers, the question has to be the net benefits of offering health insurance rather than just the expenses of offering health insurance, where the net benefit considers both the gain of offering EPHI to productivity and profitability and the cost of offering the insurance. The difference between the gain and the cost of offering EPHI are the profit margin or the net benefit of for providing health insurance to workers. As long as the net benefit is positive, a rational firm should offer health insurance. Consequently offering health insurance is beneficial to the business survival.

Hypothesis 3a: Employers offering EPHI should have competitive advantages and thus less likely to default than those not offering EPHI.

8.5 The Impact of Rising EPHI Costs

I do not claim the rising insurance costs have no negative impact on business survival at all. Firms offer health insurance because the net benefits of offering EPHI are positive. When cost of EPHI increases, the difference between the gain and the cost shrinks and net benefit of offering EPHI falls. If the cost of offering EPHI keeps rising and eventually exceeds the gain of offering it, a rational employer will no longer provide health benefits.

In the past eight years, health insurance premium has doubled (Kaiser/HRET 2007). If firms offering EPHI were doing well in 1990s, are they still better off offering

EPHI in the 2000s? EPHI costs are no longer a trivial part of labor cost. The increased costs of health insurance should have a negative impact on the bottom line, controlling for all other factors. The advantage of the high road strategy will be diminished by the continuous growth of EPHI costs. The high road strategy or HWPS may be a better solution for society at large, but the increased EPHI cost may be becoming a serious obstacle to implementing the optimal strategy.

Hypothesis3b: The performance gap between employers offering health insurance and employers not offering the benefit should be shrinking over time along with the rising insurance cost. Consequently the death rate for firms offering EPHI should increase relative to the death rate for firms not offering EPHI over time.

Chapter 9: Empirical Research III – Business Survival

9.1 Variables and Hypotheses

The measure of business survival used in this thesis is straightforward: the establishment survives one year after the survey. I take advantage of the LBD data, which tracks the birth and death of each establishment in the United Stated. I have to exclude 2005 from my sample since there is no survival information in 2006. So the covered period of my sample is from 1997 to 2004. Table 9.0.1 presents the means of variables. The death of business is equal to 1 when the establishment defaults one year after the survey, and 0 otherwise. Among the establishments in my sample, 2.4 percent of them went out of business one year after the survey. This number is much higher than the probability of 0.5 percent that an establishment dropped health insurance, as shown in Table 7.0.1. It is surprising that more firms going out of business than dropping EPHI.

Table 9.0.1: Descriptive Statistics for Chapter 9

Variable	Number of establishment	Mean	Standard Deviation
Death of business	69678	0.024	N/A
OfferHI	69678	0.855	N/A
Establishment size	69678	143	579
Share of female worker	69678	0.469	0.295
Share of older worker	69678	0.181	0.159
Unionization	69678	0.051	0.184
Share of highly-paid worker	69678	0.214	0.254
Multiple unit	69678	0.387	N/A
Share of part-time worker	69678	0.215	0.281
Establishment age	69678	14.6	8.813
Unemployment rate	69678	0.048	0.011

The main independent variable in this chapter is offering EPHI, which is equal to 1 when the establishment offered health insurance and 0 otherwise. About 85.5 percent of the establishment offered health insurance in the survey year. My control variables are identical to those used in Chapter 7, including establishment size, share of female workers, share of older workers, share of highly-paid workers, share of part-time workers, unionization, establishment age, multiple unit, and state unemployment rate. Their descriptive statistics are shown in Table 9.0.1.

As I discussed in Chapter 8, I expect that establishments offering EPHI are less likely to default than those without EPHI. However, the gap of default rate should decline over time. Some of my control variables are also the determinants of business survival. Presumably, if a firm has stayed in business for while and grown larger, it should in a stable stage of its life cycle and thus less likely to default. Previous studies provide evidences that larger firm and older firm are more likely to survive (Agarwal and Gort 2002; Gimeno et al. 1997; Brock and Evans 1989; Dunne 1989;). Companies are also more likely to fail during a recession. Thus I expect the death rate of business should be positively correlated with the unemployment rate. As I discuss in the previous section of this chapter, a higher level of human capital is associated with better performance. The share of highly-paid workers is a proxy for human capital. I expect it should be negatively correlated with the death of the business. Part-time workers typically are less skillful. Thus the share of part-time workers should increase the possibility of the death of the business. There is no consistent evidence that share of female workers, share older workers, and share of unionized workers should have impact on productivity or firm

survival. Hence I have no predictions for those variables. My hypotheses are summarized in Table 9.0.2.

Table 9.0.2: Hypotheses for Chapter 9

Variable	Business Default
OfferHI	-
Establishment size	-
Share of female worker	?
Share of older worker	?
Unionization	?
Share of highly-paid worker	-
Multiple unit	-
Share of part-time worker	+
Establishment age	-
Unemployment rate	+

9.2 Empirical Models and Regression Results

I employ two empirical models in this chapter to estimate the likelihood of business death. Similar to Chapter 5 and Chapter 7, each model includes three columns: 1) regression without any state, year, industry dummies, 2) regression with state and year dummies, and 3) regression with state, year, and industry dummies. In order to avoid the problem of heteroskedasticity or cluster, I produce robust standard errors for all regressions.

Model 9.1: $$Death = \alpha_0 + \alpha_1 OfferHI + \sum \beta_i X_i + \varepsilon$$ Equation 9.1)

This is a probit model, where death is equal to 1 if the establishment is out of business one year after the survey and 0 otherwise; OfferHI is offering EPHI in the survey year. X is a vector of control variables, including unionization, share of female

workers, share part-time workers, share of older workers aged 50 above, share of highly-paid workers , business age, multiple-unit, and state unemployment rate.

Table 9.1: Probit Regression Results for the Death of Business

Variables	Column 1	Column 2	Column 3
Offer EPHI	-0.114***	-0.138***	-0.124***
	(0.030)	(0.031)	(0.031)
Establishment Size	5.29e-5***	5.34e-5***	5.28e-5***
	(1.2e-5)	(1.23e-5)	(1.25e-5)
Share of female worker	0.048	0.048	0.089**
	(0.037)	(0.038)	(0.045)
Share of older worker	-0.042	-0.044	-0.023
	(0.071)	(0.073)	(0.073)
Unionization	-0.108*	-0.102	-0.068
	(0.063)	(0.064)	(0.066)
Share of highly-paid worker	0.112***	0.158***	0.164***
	(0.043)	(0.045)	(0.046)
Share of part-time worker	-0.145***	-0.128***	-0.168***
	(0.043)	(0.044)	(0.046)
Multiple Unit	-0.028	-0.025	-0.042*
	(0.023)	(0.023)	(0.024)
Age of the establishment	-0.020***	-0.020***	-0.018***
	(0.001)	(0.001)	(0.001)
Unemployment rate	-1.033	-1.312	-1.344
	(0.882)	(2.395)	(2.399)
Constant	-1.578***	-1.812***	-1.764***
	(0.056)	(0.181)	(0.187)
State and Year Dummies	No	Yes	Yes
Industry Dummies	No	No	Yes
Pseudo R-square	0.021	0.042	0.047
Number of establishments	69,678	69,678	69,678

Note:
1. Robust standard errors are included in the brackets
2. * significant at 10% level, ** significant at 5% level, *** significant at 1% level.

Table 9.1 presents the results of Model 9.1. The probit coefficients of offering EPHI are consistently negative in three columns. It confirms my hypothesis that offering EPHI will reduce the probability of a business default. The marginal effects of the probit

coefficient are shown in Table 9.1.1. The probability of default is reduced around 0.007 by offering EPHI. Since the mean default rate of the sample is 0.024, it is a 29.2 percent reduction in the risk of business death.

As I expected, establishments staying longer in the business are more likely to survive. The impacts of firm size on firm survival are mixed. While an establishment with multiple units is less like to default, an establishment with a larger size is more likely to run out of business. Contrary to my expectation, the share of highly-paid workers is consistently positively associated with the death of the business; and the share of part-time workers has negative impact on the default rate. In addition, the share of female workers is a factor of increasing the chance of a business death, according to column 3.

Overall, the results in Table 9.1 indicate that labor costs are important factors affecting business survival. Hiring a high-wage workforce may lead to better performance, but it also makes the company more vulnerable to default. In contrast, hiring more part-time workers can help the business survive. The results of offering health insurance also fit into this scenario. The benefits of offering health insurance exceed the costs of offering it. The positive net benefit of providing EPHI helps keeping the business running.

Although nobody has argued this before, there could be a reverse causality from business survival to offering EPHI. If the business is doing well, the employer may be more likely to spend on EPHI. A counter argument would be that offering health insurance is a normative practice. The cost of not offering EPHI is so high that most companies have to offer it before the business develops an effective strategy for survival.

In addition, if the reverse causality exists, one should also observe a negative correlation between business survival and wages: a better performing company may pay higher wages. However, the results in Table 9.1 suggest that high wages lead to higher default rate.

In any case, I tried a two-step probit model using market premium as the instrument for OfferHI. The results are shown in Appendix A.1. The Wald test of endogeneity is not significant in all three columns, which means the variable-OfferHI-probably is not endogenous and the results in Table 9.1 are reliable.

Model 9.2 Separate regressions of Model 9.1 by three time periods (1997-1999, 2000-2001, and 2002-2004)

Model 9.2 replicates the probit model of Model 9.1 with separate regressions for three sequential time periods. I will compare the coefficients of offering EPHI among the three time periods, 1997-1999 (Period I), 2000-2001 (Period II), and 2002-2004 (Period III). Presumably, the rising insurance cost should exert pressures on companies' bottom line. The net benefits of offering EPHI should decline over time. I expect a decrease of the coefficient of OfferHI from Period I to Period II.

The results of separate regressions for the three time periods are shown in Table 9.2. The coefficients of offering EPHI are significant and have the same sign for Period I and Period III as the results for all years shown in Table 9.1. However, the coefficient is not significant in Period II. The United States experienced a major recession starting in 2001. The death of business in this chapter reflects a default one year after the survey. Thus Period II measures default in 2001 and 2002, which is right in the midst of the

recession. The defaults during a recession could be mostly derived from the effects of the macro-economy while the impact of offering EPHI is limited.

Table 9.1.1: Marginal Effect of Offering EPHI in Model 9.1

	Column 1	Column 2	Column 3
Marginal effect of offering EPHI	-0.007	-0.008	-0.007
Standard error	0.002	0.002	0.002

Table 9.2: Separate Regression of Model 9.1 in Three Time Periods

Panel A: regressions without state dummies, year dummies, or industry dummies						
Time period	Coeff. of offer EPHI	Robust Std. error	95% confident interval		No. of Estab.	Pseudo R-square
1997-1999	-0.136***	0.052	(-0.239	-0.034)	24,385	0.040
2000-2001	-0.031	0.057	(-0.143	0.082)	17,832	0.021
2002-2004	-0.205***	0.051	(-0.305	-0.105)	27,461	0.024
Panel B: regressions with state dummies and year dummies						
Time period	Coeff. of offer EPHI	Robust Std. error	95% confident interval		No. of Estab.	R-square
1997-1999	-0.147***	0.053	(-0.251	-0.043)	24,385	0.052
2000-2001	-0.049	0.058	(-0.163	0.065)	17,832	0.045
2002-2004	-0.203***	0.052	(-0.304	-0.102)	27,461	0.036
Panel C: regressions with state dummies, year dummies, and industry dummies						
Time period	Coeff. of Offer EPHI	Robust Std. error	95% confident interval		No. of Estab.	R-square
1997-1999	-0.130**	0.054	(-0.234	-0.025)	24,385	0.056
2000-2001	-0.045	0.059	(-0.160	0.070)	17,832	0.052
2002-2004	-0.183***	0.052	(-0.285	-0.081)	27,461	0.043

Note: * significant at 10% level, ** significant at 5% level, and *** significant at 1% level

Table 9.2.1 shows the change of the coefficients of offering EPHI among different time periods. Surprisingly the effect of offering EPHI in improving firm survival did not decline over time. It actually increased, though the change is not significant at the 5 percent confident level. According to MEPS-IC, the average EPHI premium increased around 60% from 1997 to 2002, which is much higher than the growth of the economy

and workers' earning. However, the increased insurance costs did not have a negative impact on business survival. The gap of the business default rate between firms offering health insurance and those not offering remains intact.

Table 9.2.1: Changes of the Coefficients for Offering Health Insurance

Time periods	Without dummies	With state and year dummies	With all dummies
From time 1 to 3	-0.069	-0.056	-0.053

Note:
1. ** significant at 5% level
2. Time 1 is 1997 to 1999; time 2 is 2000-2001; time 3 is 2002-2003.

9.3 Conclusion

This chapter provides empirical evidence that offering health insurance is a blessing for the business. Establishments offering EPHI were 29.2 percent less likely to run out of business than those who do not offer. Furthermore, the gap of default rate between establishments offering health and those not offering did not shrink from 1997 to 2004, despite the increase of health insurance costs. EPHI was not a poison pill at least until 2004. My results also indicate that labor costs are a dominant antecedent of business default. Establishments with more highly-paid workers and few part-time workers are more likely to go out of business.

The costs of offering health insurance obviously increased during the survey period. There are at least two possible explanations why the positive impact of offering EPHI on firm survival did not change overtime: 1) the benefits of offering EPHI also increased; or 2) employers shifted the rising insurance costs to workers.

The higher are the costs of health insurance, the higher is the financial pressure on individual workers to remain insured, and the higher is the expectations of society for EPHI. Being sick is more risky in terms of financial losses in 2004 than in 1997. The

demand of insurance is increased at the individual level, and the pressure is transferred to employers, since they could provide the cheapest insurance. A risk-averse person should give more weights to health benefits in deciding to take or change a job. Therefore the benefits to an employer of offering health insurance rise in tandem with the increased cost of EPHI.

Another explanation for the consistent positive impact of offering EPHI over years is that employers shifted some of the increased costs to employees. As the findings in Chapter 5 and Chapter 7 suggests, employers actually transferred a portion of insurance costs to workers. They increased employee contribution to EPHI premiums and slowed down wage growth over time, thus reducing the growth of net wages. They also delay the improvement of the quality of the health insurance they purchased for their employee. If the increased insurance cost could be substantially trimmed or transferred to workers, the total labor cost of hiring a person may not increase much. As a result, the business itself should not be affected by the rising insurance costs.

However, lacking a measure of firm performance, I hesitate to generalize that offering health insurance should cause better performance. The probability of default certainly reflects the competitive advantage of a company in certain extent, but it is an extreme event of business activity. A company with better chance of survival may not always perform better. In addition, it is still possible that firms offered health insurance because they were doing better, despite my statistical efforts. Nevertheless, my findings consistently suggest that offering health insurance does no harm to firm survival. This is the first study that provides empirical evidences that the rising insurance costs are not driving companies out of business. The costs of health insurance increased more than

60% from Period I to Period III, but the strength of business survival of establishments offering health insurance did not reduce comparing to those who did not offer.

Part V: The Viability of the EPHI System

Chapter 10: The Viability of the EPHI System and Future studies

10.1 The Viability of EPHI

10.1.1 Viable in a Short Term

The findings in this thesis suggest that the current EPHI system in the United Stated will sustain itself at least in a short period. Despite the public accusations that employers are fleeing from the insurance market, no empirical evidence supports the view that they are dropping health insurance coverage in a significant degree. Employers are also reluctant to replace their insurance plans with HMOs, regardless of its price advantage. Once health insurance is offered, employers still make insurance plans available to most of their workers. There is no trend of the coverage decline for any types of employees due to the rising insurance premiums. In contrast to the general view, I found the insurance demand is actually inelastic in response to the rising premiums.

However, employers are controlling insurance costs in more subtle ways with some success. They transferred a significant portion of the EPHI costs to their employees through lowering their wages or increasing their contribution to the insurance premiums. Around 20 percent of the increased insurance costs were shifted to workers through employee contribution to health insurance, and at least another 20 percent was transferred through slowing down wage growth after 2001. My findings also suggest that the growth of insurance quality was slowed down due to the high insurance premiums. Though employers paid more for EPHI, employees actually did not receive a high quality of health benefits. They have less access to health care and have to pay high deductibles,

coinsurance, and co-payments when they obtain medical care. Many medical services, such as dental care and vision care, are dropped from the coverage of EPHI. Meanwhile, workers are required to share a significant portion of the premium.

Even though some of the increased insurance costs are carried by workers and their families, employers are still absorbing an increasing amount of insurance costs. However, the results in Chapter 9 confirm that the rising insurance costs have not had a negative impact on establishment survival. Companies who offered health insurance were more likely to survive in the 1990s, and their competitive advantages did not erode after the surge of insurance costs in the 2000s. The EPHI system still receives strong support from employers. No matter voluntarily or coercively, few of them are ready to drop EPHI.

The EPHI system also seems to be working well from the employee side. Though I do not provide a direct estimate of employees' response to the rising insurance cost, previous studies discovered that workers' price elasticity of EPHI demand is quite low (Blumberg et al. 2001 and Chernew et al. 1997). Once the health benefits are offered by their employers, the vast majority of workers, who do not have an alternative source of insurance coverage, will take the coverage. The main reason why employees do not accept the coverage under EPHI is not the out-of-pocket costs for the premium. Fronstin(2007) also confirms that the take-up ratio for EPHI did not change much from two decades ago. Fewer than 5 percent of workers eligible for health benefits are uninsured in 2005.

The fluctuation of EPHI coverage may follow a cyclical pattern. According to the Bureau of Census (2006), the coverage of EPHI was 57.1 percent of the population in

1993, which is lower than the 59.7 percent in 2006. Many researchers called attention to the collapse of EPHI in the 1990s (Pauly 1997), but the coverage came back to a peak of 64.2 percent in 2000 (Chart 2.2). One cannot predict the viability of a system simply by looking the data during a downturn of the cycle and ignore the growth in the upturn period.

To sum up, the current situation for the EPHI system sounds scary, but it is nothing new. Employers and employers are surely in pain, but they are still hanging on to the system. There is no evidence of substantial decline in insurance demand up until 2005. The EPHI system will viable at least in the near future.

10.1.2 Problems of Current EPHI System

The current EPHI system is in theory governed by a market mechanism. Parties voluntarily make their choices of purchasing EPHI based on their best interest. For the workplace, offering EPHI is supposed to be a win-win strategy for the employer and the employee. Employees can receive a cheaper price of health insurance and obtain affordable health care. Employers can attract and retain talented workers with a relative low cost. However, as the price of health insurance goes up, a win-win strategy may at some point become a lose-lose situation. Both parties are struggling with the higher costs. Neither one could benefit from the ever-increasing insurance price.

Employees have to pay an increasing portion for the insurance premiums. Moreover, their out-of-pocket spending for medical treatment also leaped in the last decades. After paying a high cost for their insurance, many workers are actually hesitant to seek health care because of the high co-payment, coinsurance, and deductibles for

physician visit, hospital care, and prescription drugs. Both the health insurance and the health care are becoming less affordable to them. The growth of wage is slowed down by the inflation of health insurance cost. Individuals are the biggest losers of our health care system.

In the mean time, employers do not benefit from the rising insurance costs either. Ideally they can shift some of the insurance costs to their workers and stay away from consequence of bearing all the rising insurance costs. However, cost-shifting is easier said than done. There are many tactics employers are effectively unable to use, such as dropping EPHI or shifting to HMOs. Some strategies have worked for controlling insurance costs in the past. However, if the growth of insurance costs continues beyond the growth of workers' earnings and the economy, there won't be much room left for employers to manipulate the costs.

More importantly, compensation is the most effective way of motivating workers. A hardworking person expects some reward at the year end. No increase in wages may turn a committed worker to be an aggravated one. Compensation growth is typically correlated with profit growth. Companies have to maintain a steady pace of wage growth to keep workers with them in the competitive environment. Slowing down wage growth may be one of the last resorts companies would adopt. When an employer starts to pay employees in a passive way, its business growth may also be slowed down.

The results in this thesis are based on a study of the American market. Companies offering health insurance are in a better shape than their American counterparts who are not offering. However, this may not be the case in a global market. Few employers in other countries are struggling with their employee benefits as serious as American

employers. American companies may have lost their competitive advantage to their international competitor because of the rising health insurance costs.

The inelastic insurance demand could also be a driving factor of the premium growth. No matter who is ultimate payer of health insurance, EPHI is purchased regardless its price. The inelastic demand of EPHI discourages insurers' incentives for cost control. As results, the costs of moral hazard and adverse selection could be easily shifted to the consumers of EPHI through increasing premium. The increased premiums would further drive up the demand for EPHI since it is the cheapest health insurance available in private market. Thus insurance demand and higher premium may ratchet each other up in an ongoing cycle.

10.1.3 Viability in the Long Run

My empirical findings suggest that current EPHI system should be viable in the near future, but they could not guarantee that the system will survive in a long run if the growth of insurance premiums continues. In a recent survey conducted by the Employee Benefit Research Institute (2007), most employers interviewed expressed their unwillingness to eliminate the insurance coverage for their employees. However, they all agree that they are waiting for a tipping point. As soon as one major employer drops health insurance, others could quickly take actions.

Both employers and employee are the victims of the higher insurance costs. So far the insurance costs are still in the range of affordability of most workers. They still prefer a PPO plan with comfortable access to health but expensive premiums to a HMO plan. They may not have realized that the slow growth of their salary is partially or largely due

to the rapid increase in the cost of health insurance. However, complains from both sides become louder. If there is no major intervention to the escalation of premium growth, the majority of American families may no longer be able to absorb the high premiums and will be forced to stay away from health insurance. If the escalation of premium is not stopped, one day, the majority of employers may also discover that the health insurance costs are higher than they could afford. By then, employers will lose all their options for cost-shifting and will abandon their sponsorship for EPHI. The consequence will include negative impacts on firm performance and business survival.

10.2 Future study

This thesis provides many interesting findings. However, many questions remain unanswered. In the near future, I plan to work on the following research questions.

10.2.1 The Impact of Rising Insurance Costs on the Employment

Increases in the cost of employee benefits should have an impact on the employment (Summer 1989, Chelius and Burton 1999, Currie and Madrian 1999). However, not many studies have tested the consequence for employment by the rising insurance costs.

If employers have to bear the extra insurance costs, the increased labor cost will decrease the labor demand, which will reduce the number of employees. If employers can transfer most of the extra insurance cost to their employees, the labor supply should decline, because employees have to pay an extra ‘tax’ of working. Consequently the employment level will also decrease.

My proposed study will focus on employers' hiring decisions in response to the rising cost of health insurance: 1) will they hire fewer new employees? 2) will they hire more part-time workers? 3) will they lay off current workers? or 4) will they permanently eliminate positions or outsource their jobs?

If employers reduced hiring due to the rising insurance cost, health care benefits could serve as an explanation of the anemic recovery of American labor market after the recession of 2001.The finding of this study could also shed lights on the growth of outsourcing in American labor market. If the rising insurance cost stimulates outsourcing, the American health care system may be moving American jobs offshore.

10.2.2 The Impact of Government Intervention

The drive of government intervention in the health care system started before the significant growth of the private EPHI system after World War II. With the rising insurance costs and the fallings of the private insurance system, the outcry for government intervention is becoming stronger again. However, the efficiency of government intervention is always a concern. A regulation with good intention may not work in the way it was designed.

Despite the limited intervention of federal government in the private market, many states have passed laws to regulate their local EPHI market. For example, almost all states have adopted anitgag-clause legislation to prohibit the terms of insurance contracts that prevent physicians from discussing with patients treatment options that may not be covered by the plan. Several states have recently adopted legislation to require insurance plans to cover health service from non-network providers. Some states

also mandate the coverage for emergency room service, mental health, and plastics surgery.

The purpose of the second future study is to evaluate the impact of those state laws. The study will examine the possible outcomes followed the enactment of the legislations: 1) did those state laws reduce coverage of EPHI? 2) did those state laws improve the quality of the health care? 3) did those state laws affect business decision to self-insurance or relocation?

The findings of this study can shed lights on the feasibility of mandatory benefits at a national level, which are proposed by the two democratic presidential candidates for 2008.

10.2.3 Consumer-driven Health Plans

Since the practice of consumer-driven health plan is still relative new, its impact on the cost and quality of health care is still unknown. MEPS-IC started to collect data on HDHP and HAS in recent years. I can use the available data to estimate the take-up rates and total premiums for the consumer-driven health plans. However, I have to search other data to measure the quality of health care. In any case, the impact of consumer-driven health plans will become a popular topic in the field of employment relationship and health care management if their coverage continues to expand.

Appendix 1: The Endogeneity Problem of Compensating Wage Differentials

The correct model to estimate compensating wage differentials is

$$W=\alpha_0+\alpha_1 H+\alpha_2 Z+\beta' X+\varepsilon \qquad \text{Equation A.1)}$$

where $\varepsilon \sim N(0,\sigma^2)$; W = wage; H = the cost of health insurance; and Z = productivity. If Z is omitted, the empirical model becomes

$$W=\alpha_0+\alpha_1 H+\beta' X+\varepsilon^* \qquad \text{Equation A.2)}$$

where $\varepsilon^*=\alpha_2 Z+\varepsilon$. The estimated coefficient for H is given by

$$\hat{\alpha}_1=\alpha_1+\alpha_2\beta_{HZ} \qquad \text{Equation A.3)}$$

where $\beta_{HZ}=\frac{(r_{HZ}-r_{HX}r_{XZ})}{1-r_{HX}^2}\frac{\sigma_Z}{\sigma_H}$; r_{HZ} is the correlation between H and Z; r_{HX} is the correlation between H and X; r_{XZ} is the correlation between X and Z; and σ_Z is the standard deviation of Z; and σ_H is the standard deviation of H (Hanushek and Jackson 1977; Clarke 2005). β_{HZ} is the coefficient for Z on H in the auxiliary regression including X.

Assume X is not correlation with H. Then $r_{HX}=0$, and $\beta_{HZ}=\frac{\sigma_{HZ}}{\sigma_H^2}$, where σ_{HZ} is the covariance between H and Z; and σ_H^2 is the variance of H. Equation A.3) becomes identical to Equation 4.5).

Appendix 2: Regressions including Establishments Hiring Less than 10 Employees

Many establishments hiring less than 10 employees are family business or professional offices with a few partners, such as law firms or medical clinics. In these establishments, EPHI is often purchased for the owner of the business rather than for the employees. The focus of my thesis is health insurance purchased by employers for their employees. Hence I excluded establishments hiring less than 10 employees from all the previous regression models.

However, I also ran regressions with all establishments except self-employed (establishments hiring more than 1 employees) for all previous empirical models. The results are reported from Table A.5.1 to Table A.A.1

Compared to the sample with establishments hiring 10 or more employees, the regression results from the larger sample are mostly similar except in two tables: Table A.7.3 and Table A.A.1.

Table A.7.3 presents the impact of rising insurance costs on the percentage of workers who are eligible for EPHI. Contrary to my hypothesis and results in Table 7.3, the coefficient of market premium is positive in three columns. It implies that when the market premium went up, more workers were eligible for health insurance. The results nonetheless can be reconciled by including those small businesses to the regression sample. When the market premium increases, individuals can save more in income taxes through purchasing EPHI. Owners of small business should find EPHI more attractive than other type of private insurance plan. While large employers look for cost control

from EPHI, small business owners may be more likely to purchase EPHI to take advantage of the tax deduction for themselves.

Table A.A.1 shows the results of two-step probit regressions on the death of business using market premium as the instrument for offering EPHI. It seems the instruments work well for the large sample that including establishments hiring less than 10 employees. The coefficient of offering EPHI is positive and significant in column 2 and column 3. Further, the p-value for Wald test of endogeneity is less than 0.05 in column 2 and column3, which indicates that offering EPHI is endogenous in the regular probit model (Table A.9.1) and Table A.A.1 is more reliable. The signs of the coefficient for highly paid workers and part-time workers both flipped in Table A.A.1 compared to Table A.1.

When including establishments hiring less than 10 employees in the regressions, the results in Table A.A.1 suggest that establishments offering health insurance are more likely to go bankruptcy; hiring more highly-paid workers increase the probability of default; and part-time workers have negative impacts on business survival.

However, the findings in Table A.9.1 and Table A.A.1 do not contradict the results in Table 9.1 and Table A.1. The society often does not expect small firms to offer health insurance to their employees. The cost of not offering is very low. Small establishments offering health insurance are more likely to be those who had a better shape in business than those did not offer. Thus offering EPHI is endogenous in Model 9.1. When I use market premium as the instrument, Table A.A.1 presents the exogenous effect of offering EPHI. If EPHI serves solely on the interests of business owners, the benefits of offering EPHI in attracting and maintaining employees and the costs of not

offering EPHI all disappear. Thus purchasing EPHI is mostly an expense to the business and should have negative impact on the bottom line.

The impact of highly-paid workers and part-time workers on business death in Table A.A.1 can also be explained by the characteristics of small establishments hiring less than 10 employees. The share of highly paid workers is actually a proxy for the human capital of the business owners, while the share of part-time workers reflects the labor cost of workers. My results suggest the human capital of the business owners is more important than labor cost of their workers to the business survival.

Table A.1: Two-Step Probit Regression of the Death of Business

Variables	Column 1	Column 2	Column 3
Offer EPHI	0.578	0.227	0.568
	(0.749)	(2.213)	(2.375)
Establishment Size	5e-5***	5.16e-5***	5.09e-5***
	(1.23e-5)	(1.63e-5)	(1.24e-5)
Share of female worker	0.025	0.037	0.119
	(0.045)	(0.075)	(0.113)
Share of older worker	-0.046	-0.043	-0.004
	(0.071)	(0.073)	(0.098)
Unionization	-0.111**	-0.096	-0.064
	(0.066)	(0.076)	(0.070)
Share of highly-paid worker	-0.027	0.086	0.041
	(0.157)	(0.441)	(0.424)
Share of part-time worker	0.073	-0.010	0.045
	(0.240)	(0.714)	(0.734)
Multiple Unit	-0.129	-0.079	-0.143
	(0.112)	(0.328)	(0.346)
Age of the establishment	-0.023***	-0.021**	-0.021***
	(0.004)	(0.010)	(0.009)
Unemployment rate	-0.105	-1.169	-1.052
	(1.369)	(2.606)	(2.667)
Constant	-2.136***	-2.074	-2.282
	(0.606)	(1.595)	(1.790)
State and Year Dummies	No	Yes	Yes
Industry Dummies	No	No	Yes
Wald test of endogeneity p-value	0.354	0.867	0.771
Number of establishments	69,678	69,678	69,678

Note:
1. Robust standard errors are included in the brackets
2. * significant at 10% level, ** significant at 5% level, *** significant at 1% level.

Tables for Appendix 2
Regression results for all establishments hiring more than 1 employee

Table A.5.1: Compensating wage differential-wage as the dependent variable (Model 5.1 with a larger sample, including establishments hiring less than 10 employees)

Variables	Column 1	Column 2	Column 3
Total EPHI Premium per worker	2.089***	1.964***	1.869***
	(0.024)	(0.024)	(0.024)
Establishment Size	0.001***	0.001***	0.001***
	(2.48e-4)	(2.45e-4)	(2.28e-4)
Unionization	3.585***	3.152***	2.871***
	(0.3)	(0.3)	(0.297)
Share of female worker	-3.872***	-4.006***	-6.566***
	(0.130)	(0.129)	(0.154)
Share of older worker	0.179	0.172	-0.323*
	(0.191)	(0.19)	(0.189)
Share of part-time worker	-12.431***	-13.218***	-12.347***
	(0.156)	(0.159)	(0.161)
Multiple Unit	0.848***	1.189***	1.826***
	(0.108)	(0.107)	(0.108)
Age of the establishment	0.029***	0.026***	0.02***
	(0.005)	(0.005)	(0.005)
Unemployment rate	53.681***	-14.837*	-15.155*
	(3.697)	(8.361)	(8.259)
Constant	25.980***	25.365***	23.259***
	(0.206)	(0.521)	(0.557)
State and Year Dummies	No	Yes	Yes
Industry Dummies	No	No	Yes
R-square	0.198	0.219	0.234
Number of establishments	139,603	139,603	139,603

Note:
1. Robust standard errors are included in the brackets
2. * significant at 10% level, ** significant at 5% level, *** significant at 1% level.

Table A.5.2: Regression results for employee contribution to the EPHI premium (Model 5.2 with a larger sample, including establishments hiring less than 10 employees)

Variables	Column 1	Column 2	Column 3
Total EPHI premium per covered worker	0.191***	0.183***	0.186***
	(0.003)	(0.004)	(0.004)
Establishment Size	-1.48e-5***	-1.98e-5***	-1.07e-5**
	(5.55e-6)	5.72e-6	(5.31e-6)
Unionization	-0.692***	-0.617***	-0.619***
	(0.025)	(0.025)	(0.025)
Share of female worker	0.023	0.025*	0.165***
	(0.014)	(0.014)	(0.017)
Share of older worker	-0.481***	-0.493***	-0.457***
	(0.024)	(0.024)	(0.024)
Share of part-time worker	0.012	0.03	-0.024
	(0.019)	(0.019)	(0.02)
Multiple Unit	0.179***	0.17***	0.150***
	(0.008)	(0.008)	(0.008)
Age of the establishment	-0.003***	-0.003***	-0.003***
	(4.92e-4)	(4.89e-4)	(4.94e-4)
Unemployment rate	-2.764***	0.701	0.69
	(0.351)	(0.782)	(0.78)
Constant	0.441***	0.408***	0.337***
	(0.021)	(0.06)	(0.063)
State and Year Dummies	No	Yes	Yes
Industry Dummies	No	No	Yes
R-square	0.122	0.132	0.136
Number of establishments	109,060	109,060	109,060

Note:
1. Robust standard errors are included in the brackets
2. * significant at 10% level, ** significant at 5% level, *** significant at 1% level.

Table A.5.3: Compensating wage differentials-using net wage as the dependent variable (Model 5.3 with a larger sample, including establishments hiring less than 10 employees)

Variables	Column 1	Column 2	Column 3
Total EPHI premium per worker	1.914***	1.790***	1.694***
	(0.024)	(0.024)	(0.024)
Establishment Size	0.001***	0.001***	0.001***
	(2.48e-4)	(2.45e-4)	(2.28e-4)
Unionization	4.031***	3.569***	3.286***
	(0.301)	(0.3)	(0.297)
Share of female worker	-3.871***	-4.007***	-6.582***
	(0.13)	(0.129)	(0.154)
Share of older worker	0.334*	0.337*	-0.161
	(0.191)	(0.19)	(0.189)
Share of part-time worker	-12.329***	-13.12***	-12.243***
	(0.156)	(0.159)	(0.161)
Multiple Unit	0.708***	1.049***	1.692***
	(0.109)	(0.108)	(0.108)
Age of the establishment	0.028***	0.026***	0.020***
	(0.005)	(0.005)	(0.005)
Unemployment rate	55.026***	-15.209*	-15.532*
	(3.703)	(8.376)	(8.273)
Constant	25.784***	25.252***	23.232***
	(0.206)	(0.523)	(0.559)
State and Year Dummies	No	Yes	Yes
Industry Dummies	No	No	Yes
R-square	0.181	0.203	0.218
Number of establishments	139,603	139,603	139,603

Note:
1. Robust standard errors are included in the brackets
2. * significant at 10% level, ** significant at 5% level, *** significant at 1% level.

Table A.5.4: Compensating wage differential-TSLS using net wages as the dependent variable (Model 5.4 with a larger sample, including establishments hiring less than 10 employees)

Variables	Column 1	Column 2	Column 3
Total EPHI premium per worker	3.937***	0.436	-0.105
	(0.104)	(0.734)	(0.786)
Establishment Size	0.001***	0.002***	0.002***
	(1.88e-4)	(3.53e-4)	(3.25e-4)
Unionization	0.560***	5.748***	6.144***
	(0.369)	(1.21)	(1.277)
Share of female worker	-3.696***	-4.121***	-7.508***
	(0.137)	(0.146)	(0.433)
Share of older worker	-0.877***	0.939**	0.43
	(0.214)	(0.379)	(0.323)
Share of part-time worker	-7.004***	-16.87***	-16.931***
	(0.311)	(2.04)	(2.056)
Multiple Unit	-1.527***	2.586***	3.650***
	(0.155)	(0.83)	(0.854)
Age of the establishment	-0.047***	0.068***	0.07***
	(0.006)	(0.023)	(0.022)
Unemployment rate	39.282***	-10.239	-9.349
	(3.936)	(8.897)	(8.902)
Constant	22.776***	26.879***	30.373***
	(0.258)	(0.918)	(1.328)
State and Year Dummies	No	Yes	Yes
Industry Dummies	No	No	Yes
Pseudo R-square	0.112	0.173	0.166
Number of establishments	139,603	139,603	139,603

Note:
1. Robust standard errors are included in the brackets
2. * significant at 10% level, ** significant at 5% level, *** significant at 1% level.

Table A.5.5 Separate regression of Model 5.3 by three time periods (including establishments hiring less than 10 employees)

Panel A: regressions without state dummies, year dummies, or industry dummies						
Coefficient of total EPHI premium per worker	Robust Std. error	95% confident interval		No. of Estab.	R-square	time period
2.524	0.067	(2.413,	2.634)	40,978	0.167	1997-1999
1.953	0.045	(1.865,	2.041)	47,544	0.175	2000-2002
1.637	0.033	(1.571	1.702)	51,081	0.191	2003-2005
Panel B: regressions with state dummies and year dummies						
Coefficient of total EPHI premium per worker	Robust Std. error	95% confident interval		No. of Estab.	R-square	time period
2.383	0.057	(2.272,	2.494)	40,978	0.190	1997-1999
1.876	0.044	(1.789,	1.962)	47,544	0.198	2000-2002
1.568	0.033	(1.503,	1.633)	51,081	0.210	2003-2005
Panel C: regressions with state dummies, year dummies, and industry dummies						
Coefficient of total EPHI premium per worker	Robust Std. error	95% confident interval		No. of Estab.	R-square	time period
2.280	0.057	(2.168,	2.392)	40,978	0.203	1997-1999
1.785	0.044	(1.699,	1.872)	47,544	0.213	2000-2002
1.469	0.033	(1.403,	1.534)	51,081	0.223	2003-2005

Table A.5.5.1: Changes of the coefficients of total EPHI premium per worker

Time periods	Without dummies	With state and year dummies	With all dummies
From time 1 to 2	-0.571**	-0.507**	-0.495**
From time 2 to 3	-0.316**	-0.308**	-0.316**
From time 1 to 3	-0.887**	-0.815**	-0.811**

Note:
1. ** significant at 5% confidence level
2. Time 1 is 1997 to 1999; time 2 is 2000-2002; time 3 is 2003-2005.

Table A.7.1: Logit regression for dropping EPHI (Model 7.1 with a larger sample, including establishments hiring less than 10 employees)

Variables	Column 1	Column 2	Column 3
Market premium	0.005	0.054	0.062
	(0.024)	(0.072)	(0.072)
Establishment Size	-0.042***	-0.043***	-0.043***
	(0.005)	(0.005)	(0.005)
Share of female worker	-0.467***	-0.465***	-0.235**
	(0.092)	(0.093)	(0.105)
Share of older worker	0.210*	0.199*	0.246**
	(0.116)	(0.118)	(0.118)
Unionization	-0.435	-0.342	-0.483
	(0.326)	(0.325)	(0.331)
Share of highly-paid worker	-1.642***	-1.605***	-1.543***
	(0.148)	(0.152)	(0.153)
Share of part-time worker	1.467***	1.555***	1.607***
	(0.101)	(0.102)	(0.105)
Multiple Unit	-1.923***	-1.970***	-1.945***
	(0.126)	(0.126)	(0.129)
Age of the establishment	-0.029***	-0.029***	-0.028***
	(0.003)	(0.003)	(0.004)
Unemployment rate	9.015***	12.299**	12.225**
	(2.376)	(5.689)	(5.690)
Constant	-3.205***	-4.079***	-4.271***
	(0.168)	(0.616)	(0.629)
State and Year Dummies	No	Yes	Yes
Industry Dummies	No	No	Yes
Pseudo R-square	0.139	0.151	0.153
Number of establishments	99,104	99,104	99,104

Note:
1. Robust standard errors are included in the brackets
2. * significant at 10% level, ** significant at 5% level, *** significant at 1% level.

Table A.7.2: Logit regression for shifting to HMO (Model 7.2 with a larger sample, including establishments hiring less than 10 employees)

Variables	Column 1	Column 2	Column 3
Market premium	-0.075***	0.006	0.004
	(0.007)	(0.019)	(0.019)
Establishment Size	3.51e-5***	4.67e-5***	4.56e-5***
	(1.3e-5)	(1.36e-5)	(1.39e-5)
Share of female worker	0.037	-0.019	-0.028
	(0.025)	(0.027)	(0.032)
Share of older worker	-0.176***	-0.129***	-0.124***
	(0.036)	(0.038)	(0.038)
Unionization	-0.216***	-0.235***	-0.233***
	(0.048)	(0.050)	(0.051)
Share of highly-paid worker	-0.258***	-0.754***	-0.765***
	(0.028)	(0.031)	(0.032)
Share of part-time worker	0.052	-0.083**	-0.070**
	(0.032)	(0.034)	(0.035)
Multiple Unit	-0.272***	-0.189***	-0.188***
	(0.016)	(0.017)	(0.018)
Age of the establishment	-0.004***	-0.001	-0.001
	(0.001)	(0.001)	(0.001)
Unemployment rate	-0.598	-7.552***	-7.557***
	(0.674)	(1.651)	(1.652)
Constant	-0.540***	-2.170***	-2.270***
	(0.042)	(0.178)	(0.182)
State and Year Dummies	No	Yes	Yes
Industry Dummies	No	No	Yes
Pseudo R-square	0.006	0.103	0.111
Number of establishments	103,637	64,945	64,945

Note:
1. Robust standard errors are included in the brackets
2. * significant at 10% level, ** significant at 5% level, *** significant at 1% level.

Table A.7.3: OLS regression for eligibility (Model 7.3 with a larger sample, including establishments hiring less than 10 employees)

Variables	Column 1	Column 2	Column 3
Market premium	0.004***	0.006***	0.005***
	(0.001)	(0.001)	(0.001)
Establishment Size	-3.5e-6***	-3.65e-6***	-6.25e-6***
	(9.63e-7)	(9.7e-7)	(1.13e-6)
Share of female worker	0.004*	0.003	-0.018***
	(0.002)	(0.002)	(0.003)
Share of older worker	0.073***	0.071***	0.062***
	(0.003)	(0.003)	(0.003)
Unionization	-0.019***	-0.022***	-0.024***
	(0.004)	(0.004)	(0.004)
Share of highly-paid worker	0.100***	0.104***	0.098***
	(0.002)	(0.002)	(0.002)
Multiple Unit	0.016***	0.016***	0.013***
	(0.001)	(0.001)	(0.001)
Share of part-time worker	-0.632***	-0.633***	-0.614***
	(0.004)	(0.004)	(0.004)
Age of the establishment	-1.06e-4	-1.44e-4**	-3.7e-4***
	(6.88e-5)	(6.9e-5)	(6.96e-5)
Unemployment rate	-0.053	-0.044	-0.053
	(0.054)	(0.124)	(0.123)
Constant	0.850***	0.838***	0.878***
	(0.004)	(0.012)	(0.012)
State and Year Dummies	No	Yes	Yes
Industry Dummies	No	No	Yes
R-square	0.405	0.410	0.417
Number of establishments	109,060	109,060	109,060

Note:
1. Robust standard errors are included in the brackets
2. * significant at 10% level, ** significant at 5% level, *** significant at 1% level.

Table A.7.4: OLS regression for real total EPHI premium per covered worker (Model 7.4 with a larger sample, including establishments hiring less than 10 employees)

Variables	Column 1	Column 2	Column 3
Real market premium	0.783***	0.361***	0.358***
	(0.009)	(0.017)	(0.017)
Establishment Size	-1.55e-5***	-3.94e-6	-7.36e-6
	(4.59e-6)	(4.8e-6)	(4.76e-6)
Share of female worker	-0.099***	-0.090***	-0.188***
	(0.009)	(0.009)	(0.011)
Share of older worker	0.396***	0.378***	0.356***
	(0.014)	(0.014)	(0.014)
Unionization	0.260***	0.280***	0.281***
	(0.016)	(0.016)	(0.016)
Share of highly-paid worker	0.467***	0.527***	0.489***
	(0.010)	(0.010)	(0.011)
Multiple Unit	0.031***	0.040***	0.062***
	(0.012)	(0.012)	(0.012)
Share of part-time worker	0.037***	0.037***	0.049***
	(0.005)	(0.005)	(0.005)
Age of the establishment	0.006***	0.006***	0.005***
	(2.9e-4)	(2.91e-4)	(2.93e-4)
Unemployment rate	0.829***	2.478***	2.471***
	(0.216)	(0.486)	(0.484)
Constant	0.074***	0.858***	0.958***
	(0.018)	(0.043)	(0.045)
State and Year Dummies	No	Yes	Yes
Industry Dummies	No	No	Yes
R-square	0.130	0.141	0.146
Number of establishments	109,060	109,060	109,060

Note:
1. Robust standard errors are included in the brackets
2. * significant at 10% level, ** significant at 5% level, *** significant at 1% level.

Table A.9.1: Probit Regression result for the death of business (Model 9.1 with a larger sample, including establishments hiring less than 10 employees)

Variables	Column 1	Column 2	Column 3
Offer EPHI	-0.161***	-0.175***	-0.165***
	(0.016)	(0.016)	(0.016)
Establishment Size	5.79e-5***	5.85e-5***	5.9e-5***
	(1.24e-5)	(1.25e-5)	(1.28e-5)
Share of female worker	-0.059***	-0.062***	0.004
	(0.022)	(0.022)	(0.026)
Share of older worker	-0.061**	-0.059*	-0.052*
	(0.031)	(0.031)	(0.031)
Unionization	-0.062	-0.052	-0.044
	(0.052)	(0.053)	(0.054)
Share of highly-paid worker	0.047*	0.054*	0.090***
	(0.027)	(0.028)	(0.029)
Share of part-time worker	-0.051**	-0.041	-0.053**
	(0.025)	(0.025)	(0.026)
Multiple Unit	0.002	0.003	-0.012
	(0.018)	(0.019)	(0.019)
Age of the establishment	-0.020***	-0.019***	-0.018***
	(0.001)	(0.001)	(0.001)
Unemployment rate	-0.329	-0.392	-0.354
	(0.602)	(1.564)	(1.566)
Constant	-1.558***	-1.765***	-1.721***
	(0.035)	(0.108)	(0.113)
State and Year Dummies	No	Yes	Yes
Industry Dummies	No	No	Yes
Pseudo R-square	0.022	0.030	0.033
Number of establishments	148,305	148,305	148,305

Note:
1. Robust standard errors are included in the brackets
2. * significant at 10% level, ** significant at 5% level, *** significant at 1% level.

Table A.9.1.1: Marginal effect of offering EPHI in Model 9.1 with a larger sample, including establishments hiring less than 10 employees

	Column 1	Column 2	Column 3
Marginal effect of offering EPHI	-0.01	-0.01	-0.01
Standard error	0.001	0.001	0.001

Table A.9.2: Separate regression of Model 9.1 in three time period with a larger sample, including establishments hiring less than 10 employees

Panel A: regressions without state dummies, year dummies, or industry dummies						
Coeff. of offer EPHI	Robust Std. error	95% confident interval		No. of Estab.	Pseudo R-square	Time period
-0.190***	0.028	(-0.245	-0.135)	50,879	0.033	1997-1999
-0.036	0.030	(-0.094	0.022)	36,678	0.016	2000-2001
-0.253***	0.026	(-0.304	-0.201)	60,748	0.026	2002-2004
Panel B: regressions with state dummies and year dummies						
Coeff. of offer EPHI	Robust Std. error	95% confident interval		No. of Estab.	R-square	Time period
-0.2***	0.028	(-0.256	-0.144)	50,879	0.039	1997-1999
-0.04	0.03	(-0.099	0.018)	36,678	0.026	2000-2001
-0.257***	0.027	(-0.309	-0.205)	60,748	0.031	2002-2004
Panel C: regressions with state dummies, year dummies, and industry dummies						
Coeff. of Offer EPHI	Robust Std. error	95% confident interval		No. of Estab.	R-square	time period
-0.188***	0.029	(-0.245	-0.132)	50,879	0.041	1997-1999
-0.034	0.03	(-0.093	0.026)	36,678	0.029	2000-2001
-0.246***	0.027	(-0.299	-0.193)	60,748	0.035	2002-2004

Note: * significant at 10% level, ** significant at 5% level, and *** significant at 1% level

Table A.9.2.1: Changes of the coefficients of offering health insurance

Time periods	Without dummies	With state and year dummies	With all dummies
From time 1 to 3	-0.063	-0.057	-0.058

Note:
1. ** significant at 5% level
2. Time 1 is 1997 to 1999; time 2 is 2000-2001; time 3 is 2002-2003.

Table A.A.1: Two-step probit regression of the death of business with a larger sample, including establishments hiring less than 10 employees

Variables	Column 1	Column 2	Column 3
Offer EPHI	-1.298	1.155**	1.098**
	(0.898)	(0.560)	(0.554)
Establishment Size	8.54e-5***	2.36e-5	3.27e-5*
	(2.5e-5)	1.93e-5	(1.71e-5)
Share of female worker	0.005	-0.137***	0.004
	(0.056)	(0.039)	(0.026)
Share of older worker	-0.223*	0.131	0.142
	(0.131)	(0.086)	(0.090)
Unionization	0.021	-0.116*	-0.11*
	(0.085)	(0.062)	(0.063)
Share of highly-paid worker	0.398	-0.345**	-0.267*
	(0.278)	(0.170)	(0.159)
Share of part-time worker	-0.466	0.456**	0.411**
	(0.328)	(0.211)	(0.205)
Multiple Unit	0.351	-0.407**	-0.388**
	(0.276)	(0.173)	(0.166)
Age of the establishment	-0.010	-0.03***	-0.028***
	(0.007)	(0.005)	(0.004)
Unemployment rate	-2.429	0.416	0.430
	(1.772)	(1.645)	(1.645)
Constant	-0.893*	-2.425***	-2.263**
	(0.526)	(0.299)	(0.264)
State and Year Dummies	No	Yes	Yes
Industry Dummies	No	No	Yes
Wald test of endogeneity p-value	0.198	0.015	0.02
Number of establishments	148,305	148,305	148,305

Note:
1. Robust standard errors are included in the brackets
2. * significant at 10% level, ** significant at 5% level, *** significant at 1% level.

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