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A Microeconomic Model Of Healthcare Systems: From Theoretical To Practical

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A MICROECONOMIC MODEL OF HEALTHCARE SYSTEMS: FROM THEORETICAL TO PRACTICAL

by

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ABSTRACT

This thesis is a microeconomic market analysis of healthcare systems. Different countries use various forms for financing and providing healthcare, and the effects of market forces on the quality, access and economic efficiency of these divergent healthcare markets is the primary subject. The purpose of this thesis is to describe the forces working in the healthcare market. Free-market healthcare systems allow medical providers to become price-setters. Price-setting by medical providers creates an economically inefficient system which decreases public access to healthcare but creates a high quality system. Single-payer systems make government the price-setter which creates a system in which medical providers are price-takers. Government price-setting guarantees access but quality and economic efficiency vary drastically between countries. Universal single-payer systems tend to set prices higher than the theoretically necessary price which creates a high quality, economically inefficient system. Socialized single-payer systems tend to set prices lower than the theoretically necessary price which creates government savings, wait-lists and poorer quality. The quality, economic efficiency, and equity of the healthcare system are determined by the form of the market used in the country. Ultimately, this market determines price. In a free-market system price is determined by providers of healthcare, in a socialized market price is determined by government, and in a universal healthcare system price is negotiated by both healthcare providers and government. Price negotiation in a universal system creates the greatest access to healthcare, and quality of healthcare. Socialized systems can be more economically efficient than a universal system, but quality and access can be limited. Price negotiation in a universal healthcare system fixes the problems inherent in the healthcare market.

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CHAPTER 1: INTRODUCTION

In this thesis I develop two healthcare market models, and tests these two models using aggregate data from the OECD. The focus of the healthcare market models laid out in this work is in advanced industrial countries, low income countries will not have the wherewithal to fund healthcare on the same levels as the wealthier countries, and their supply and demand lines will diverge greatly from those of an advanced industrial country. This is an original thesis—the market models do not rely on previous theories or the research of others. I developed them in an attempt to understand why the healthcare literature contained very divergent views on which type of healthcare system was functioning best. I use aggregate data provided by the OECD (but the analysis and statistics derived from the data were completed by me and do not rely on the research of others). The works of others are only used to describe how the individual countries' systems are functioning. The term "healthcare system" refers to the type of financing and provision of healthcare used in a country. The term "healthcare market" refers to the connection and interaction between the supply and demand of healthcare. Three countries are discussed in terms of how they relate to these healthcare market models—the United States, the United Kingdom, and Germany. The market models created in chapter 2 are theoretically driven. They are not meant to model the real world exactly as it is, as every country has a different form of healthcare system—they are meant to describe the forces that are taking place in the real world healthcare markets by using economic terms, such as supplier incentives and motivations. The models are an abstraction, and as such, no country is perfectly described by them. It is almost certain that not all healthcare providers are out to make large profits, but they do act in a profit-seeking manner. Chapter 2 is attempting to describe their motivations and incentives for

profit-seeking. Chapter 3 tests whether or not these theoretical models are actually describing the processes taking place in the world. Chapters 4, 5 and 6 are used to show how these theoretical market models are implemented in the three different forms of healthcare systems.

Healthcare is a major concern for every country in the world. It is of particular importance for the advanced industrialized countries that often control the financing of their healthcare systems. Advanced industrial countries' governments are deeply involved in the funding and running of their healthcare systems, which places healthcare at great importance for them. Most developed countries use some form of government financed healthcare, and guarantee access to medical treatment for their entire populations. However, the United States, as one of the most advanced industrial and economically powerful countries in the world, fails to provide healthcare for its entire population, and has, according to the OECD, large income inequalities to access.[1] The Western World has used the free-market economy to provide surpluses in every form of goods, from food to automobiles. The ability of a free-market economy to self-regulate, and create profitable surpluses is cause for excitement. The free-market is important because of its ability to negotiate a price that is set by supply being equal to the demand for a good or service. However, often there are problems in a free-market. The free-market works as a balancing mechanism for the supply and demand of goods. The supply of goods is based on the price of the good that a provider can earn, and the demand for the good is based on the cost of that good. As price increases the supply increases due to more firms entering into the production of that good. And, as price increases the demand for the good decreases as fewer and fewer consumers can afford to pay for the good. The price of the good is set by the market through competition at the point where the demand for the good equals the

[1] OECD 2004

supply of the good. But, what happens when the demand for a good is set, and does not fluctuate with the price? What good is a free-market if it is not negotiating a price where supply meets demand? Suppliers can earn large profits by merely charging more for their goods instead of increasing the quantity of goods provided. Demand for healthcare is constant—it does not fluctuate with price. As price increases fewer people can afford care, but the same number still require care. The free-market falls short of supplying the full demand for healthcare. The United States relies on the free-market for its supply of healthcare, and by doing so limits access to care and increases the costs of care. In a normal market the price of a good is negotiated by the demand for the good and the supply of the good. But, in the healthcare market there is no such negotiation of price. In a free-market system price is primarily set by providers, in a socialized system price is primarily set by the government. It is usually through a universal healthcare system that price is negotiated between the suppliers of healthcare and the demanders of healthcare. This negotiation between supply and demand in a universal healthcare system fixes the problems of price-setting in the healthcare market, and forces the price negotiation that the free-market is hailed the world over for doing with other goods and services but fails to do in the healthcare market.

How does healthcare function as a market? What are the market effects from government intervention into the healthcare system? What indicators should be used in discussion of the overall functionality of the system? How can access, quality, and economic efficiency be balanced in a way that reflects the real goals of a population or government? This thesis analyzes how the market functions in healthcare in three divergent systems; free-market, socialized and universal. In chapter 2 I develop two models that demonstrate the market forces as they relate to the provision of healthcare, by examining the price and quantity of services

provided. These models represent the different effects on the market that are caused by the identity of the price-setter; provider price-setting, and government price-setting. These models are then examined in terms of aggregate data, in chapter 3, on various healthcare indicators provided by the OECD. The indicators examined are life expectancy, per capita expenditure, infant mortality, deaths by disease (respiratory, diabetes, and cerebrovascular), numbers of practicing physicians and nurses, and life style factors (obesity, overweight population, smoking, and alcohol consumption). Life expectancy is used as a proxy for quality of care, access to care and life style choices. However, life style choices are also examined separately in terms of their effects on life expectancy, and on per capita expenditure. Likewise, the number of medical professionals is examined both in terms of its effects on life expectancy, but also in terms of its effect on healthcare expenditure. Three countries are then analyzed in terms of how they function according to the market models. The United States is discussed in chapter 4 as a model of a free-market healthcare system. I chose the United States was because it is the prime example of how free-market healthcare functions (and because it is one of the only free-market healthcare systems in the industrialized world). Furthermore, the United States also has a functioning universal healthcare market in the form of Medicare and Medicaid. This second healthcare market allows for easy comparisons between how a free-market healthcare system and a universal healthcare system create different health outcomes. Chapter 5 discusses the healthcare system of the United Kingdom. I chose the U.K. as an example of a socialized healthcare system because it is often used in arguments against using a socialized healthcare system due to waitlists and a perceived low quality of care. Socialized healthcare has a wide range of quality conditioned by the manner in which governments set prices. Some socialized systems have high life expectancies and others have low life expectancies compared to other

industrialized countries. This wide variation is caused, for the most part, by differences in how governments go about their price-setting (socialized countries with high expenditures on healthcare had higher life expectancies than socialized countries with low expenditures, and life style factors were found to influence life expectancy, but not per capita expenditures on healthcare, see chapter 3). The more negotiation of price between healthcare providers and government the higher the quality of care can be achieved in the system. The case of the United Kingdom is very useful in discussing this variation, because throughout the last ten years it has been increasing its price negotiation and expenditures which has shown an improvement in life expectancy and the number of practicing physicians (quality and access). In other words, the United Kingdom exhibits both low and high access socialized healthcare. Chapter 6 analyzes the healthcare system of Germany as an example of a universal healthcare system. Germany was chosen, not because it is the best universal healthcare system in terms of health outcomes, but because it is the first universal healthcare system, and as such, has served as a model for other countries to build their own healthcare systems. Much of the German healthcare institution has been copied by other countries, and thus it demonstrates how most of the universal healthcare systems function. Chapter 7 provides the conclusions from my analysis.

There are various indicators used when discussing a healthcare system. The three indicators most widely discussed are access, quality of care and economic efficiency. The indicator of most importance to the researcher or the government directly determines their views on the functionality of the system. And, the indicator that researchers are most focused on is determined by their views on healthcare as a right or a commodity. If healthcare is viewed as a commodity, then quality and economic efficiency become the most important indicators of system functionality. If healthcare is viewed as a right, then access and quality become the most

important indicators of the functionality of the system. There is no way to balance economic efficiency, access and quality in a healthcare market. One, or possibly two of the indicators must be sacrificed.

The balance of access, quality and economic efficiency in a healthcare system is determined by the identity and goals of the price-setters. Healthcare does not follow a normal free-market structure due to quasi-monopolistic competition (and a myriad of principle-agent dilemmas, which cause imperfect knowledge on the part of medical consumers). In a free-market this structure allows for healthcare providers to become price-setters, and bypass a competitive market. When healthcare providers are price-setters, the price will be set high, which will lower access, create higher quality (due to competition for consumers), and be economically inefficient. However, if government controls healthcare financing, healthcare providers either take the price that the government offers or do not receive payment. This allows government to do the price-setting. When government controls healthcare financing and the provision of healthcare it will tend to set prices as close to cost as possible. Low price-setting can lower quality and create waitlists. But if the government only controls healthcare financing and not the provision of healthcare, the government will tend to set prices higher by forced negotiations with healthcare providers. High price-setting will increase quality through competition, ensure access, but the system will be economically inefficient.

Background

Various states use differing methods of funding healthcare. In most advanced industrialized states the government has taken control over the financing, and/or management of

healthcare (the United States remains an outlier)[2]. Three different forms of healthcare finance and management have been distinguished in the literature on healthcare. Differing authors or organizations use different names for these systems but all have the same three descriptions of the systems: 1. *the entrepreneurial model*[3] (Free-market healthcare, the United States), which is characterized by private insurance and provision of healthcare, hereafter referred to as free-market healthcare; 2. *the mandated insurance model*[4] (universal healthcare, Germany), which is characterized by compulsory universal coverage financed through a social security framework, and/or direct control of the provision of healthcare by government, hereafter referred to as universal healthcare; and 3. *the national health service model*[5] (socialized healthcare, the United Kingdom), which is characterized by universal coverage for all citizens through general tax funding, and ownership or direct control of provision of healthcare by government, hereafter referred to as socialized healthcare. This thesis separates the three forms of healthcare systems by whether the provision and financing of healthcare is primarily public or private. A free-market system has private funding and private provision of healthcare. Socialized healthcare has public funding and public provision of healthcare. Universal healthcare has public funding and private provision of healthcare. Because some organizations classify the healthcare system only according to the financing mechanism (direct tax, or insurance pooling systems) and not by the ownership of medical provisions they may classify a country's system differently than I do in this thesis (for example, many classify Canada as a socialized healthcare system, such as Fried[6], because it uses direct taxation to fund its healthcare system, however, in this thesis I classify

[2] Matcha 2003
[3] Fried 2002, pg 26
[4] Fried 2002, pg 26
[5] Fried 2002, pg 27
[6] Fried 2002, pg 26

Canada as a universal system because financing is public and provision is primarily private). Provision of healthcare refers to both general practitioners and hospitals. As stated, there are three important indicators that define a successful healthcare system that must be examined: First, equity—also referred to as access to medical needs, how easily patients gain access to medical attention and removal of barriers to access such as low income, or poor status of health: Second, quality and effectiveness of healthcare services—patient satisfaction and meeting of patient needs: And third, macroeconomic and microeconomic efficiency—cost effectiveness of the overall healthcare system.

Currently there is large disagreement among policy makers on how to best fund healthcare and provide high quality of healthcare; and a disagreement in the academic literature as to which system functions best. Both the World Health Organization and the OECD rank the healthcare systems of various states, with the United States ranked relatively low considering its high expenditures both as percent of GDP and spending per capita, but neither can agree on who has the best system or how to rank the systems (in fact the World Health Organization uses three different ways for ranking healthcare systems within their own analyses)[7]. Many academics have argued that the U.S. healthcare system is in complete disarray: Mueller[8] argues that the system is too costly, and that access is limited; Bartlett and Steele[9] argue that the healthcare market in the United States wastes money due to inefficiency, fraud and profits to companies that deny healthcare to some; Kassirer[10] and Abramson[11] have similar arguments and reason that the problems of the U.S. healthcare system are due to profit seeking by providers who overcharge

[7] World Health Organization 2006
[8] Mueller 2001
[9] Bartlett 2004
[10] Kassirer 2004
[11] Abramson 2005

and give low quality care; Kleinke[12] blames the fragmented funding sources (differing insurance programs) of healthcare for the problems of the system. Yet, other authors argue that the market improves competition and thus quality of the healthcare system, among them Cutler,[13] Dranove[14] and Robinson[15]. Ohsfeldt and Schneider[16] argue that competition increases the quality of the healthcare system and that profit seeking by providers does not have adverse effects on the cost of healthcare, in fact it spurs innovation. Both groups are correct, the system is over-priced as many have argued, and competition due to profit seeking by healthcare providers does increase the quality of care.

I develop an economic model that describes the market forces that are occurring in the healthcare system. This model takes account of quality, equity, and efficiency, in all three forms of healthcare financing and provision. I show that, surprisingly, whether or not the state owns and runs the hospitals has less effect on the overall functionality of the system than whether or not the government directly controls price-setting of medical treatment. However, government control of medical provision will most likely lead to lower price-setting than free-market provision of healthcare, which in turn, will cause a decrease in quality of care in the overall system. Table 1 shows the general differences between the indicators of a successful healthcare system in relation to the type of system financing.

[12] Kleinke 2001
[13] Cutler 2004
[14] Dranove 2000
[15] Robinson 1999
[16] Ohsfeldt 2006

Assumptions about Healthcare

The study of healthcare contains many nuanced dilemmas. Consumers must rely on doctors to tell them what their needs (preferences) are. Consumers rarely directly pay for their own care, and rely on either insurance or government for payment. Pharmaceutical companies must rely on the medical community as their agents (which cause them to spend billions of dollars on advertising, see chapter 4). All of these relationships create principle-agent dilemmas; which lead to a lack of knowledge on the part of one party or the other, and allow them to have more power when negotiating. Principle-agent dilemmas make it impossible for healthcare financers to know the real costs of healthcare and thus make it possible for healthcare providers to increase the total price of healthcare creating artificially increased expenditures. The provision of healthcare also provides further dilemmas for the study of the healthcare as a market. In a normal market services are provided for self-interested reasons—to make money, but many healthcare professionals argue that they enter into practice out of more altruistic purposes (for examples look at Doctors Without Borders, Mercy Ships, and the myriad of low income healthcare offices that only cater to low income families). This makes the supply of doctors difficult to examine as a mere function of price determining quantity. To this end, I assume that a small number of medical professionals will enter into practice at cost, but to provide enough medical professionals for an entire population price will play a major role. In the study of economics, competition is believed to create higher quality goods, and lower price. In perfect competition firms must compete with each other, which drives price downward in an attempt to control a larger share of the market, and the quality of goods is increased in the same attempt to control a larger share of the market. My research assumes that competition does

increase quality—if 300 physicians are competing for one position a more experienced physician will be chosen than if only 10 physicians are competing for one position. Furthermore, competition leads employees to try harder to distinguish themselves from other employees, which can increase experience, education, and gives motivation for improving quality. However, due to the unique nature of the healthcare system, and all of its asymmetrical information, competition will not decrease price—this is not an assumption about the system but a conclusion arrived at by examining the healthcare market, which will be discussed in the next chapter. It is also assumed that the life expectancy in a given country is a function of the quality of care, the access to care and life style choices. Life expectancy is increased as quality and access increase. However, life expectancies also vary depending on diet and other lifestyle factors that are not easily identified but have an overall effect. The last assumption pertains to demand—there is a theoretically set demand for any given ailment, the total number of cases of the population that has this ailment. This demand may or may not be known, but is theoretically immovable at any given moment. If 100 people have cancer the demand for cancer treatment will be 100 units at any price. Actual demand for healthcare may never fully meet this theoretical demand, because of patient preferences—some patients do not seek treatment for various reasons, but the theoretical demand still exists.

The next chapter lays out the argument for the market models and why and how supply and demand are meeting in the three forms of healthcare markets. Chapter 3 then tests these models using aggregate level data from the OECD, and controls for access and life style factors.

Figures and Tables

Table 1: Interaction Between Healthcare Systems and Indicators

	Quality	Equity	Efficiency
Free-Market	High	Medⁿ	Low
Universal	Low to High	Med-High/ High*	Inverse to quality^
Socialized	Low to High	High*	Inverse to quality^

ⁿAccess for the poor extremely low
*May have waitlists despite guaranteed treatment
^Not directly inverse, but as efficiency decreases quality increases, and as efficiency increases quality decreases

CHAPTER 2: A MICROECONOMIC MODEL OF HEALTHCARE SYSTEMS

What does the healthcare market look like? Does it follow a standard microeconomic model of other normal goods? To answer these questions requires an in-depth analysis of general markets in comparison to the market of healthcare. Unlike other goods in the marketplace, healthcare has a somewhat unique position (some authors such as Robert Ohsfeldt argue that it is not unique, but my model will show why it is in fact unique). Ohsfeldt argues that competition in the free-market healthcare system spurs an increase in quality and also economic efficiency in the same manner that the free-market does with other goods.[17] However, my models show that economic efficiency is not achieved through a free-market healthcare system, but increased quality is.

This chapter develops two economic models for healthcare systems, a provider price-setting model, and a single-payer model. These models are abstractions from the real world based on logical arguments. Stockman explains that:

> When economists think logically about an economic problem, they produce economic models: An economic model is a description of logical thinking about an economic issue. It may express its conclusions in words, graphs, or mathematical symbols. Logical thinking by itself is not sufficient to reach reliable conclusions about economics; logic needs the support of evidence. Economic evidence is any set of facts that helps convince economists that some positive statement about the economy is true or false.[18]

[17] Ohsfeldt 2006
[18] Stockman 1999, pg 19

In this thesis I follow this economic modeling format: first, this chapter lays out the logic behind supplier and consumer motivations in the healthcare market. Chapter 3 tests these logic based arguments with aggregate data from thirty OECD countries. And chapter 4, 5, and 6 provide an examination of how three different countries follow the models through policy. The models developed in this chapter do not fully represent the complexities of the healthcare market:

> Models are simpler than the real-life situations they represent. Many real-life situations are too complicated for the limited abilities of human minds to comprehend. Consequently, we create models—simplified versions of reality—to help think logically about real life. A model assumes that features of an issue are important to think about while other features are unimportant enough to ignore.[19]
>
> Economic models serve three purposes: 1. *Understanding.* A model simplifies an issue to help people understand it. 2. *Prediction*. A model helps people to predict, so they can answer questions […] [and] to resolve complicated, real-life issues. 3. *Interpretation*. A model helps people to interpret data as evidence about positive economic statements.[20]

A "good" model's predictions will be supported by the data, and a "bad" model will not achieve the predicted outcomes.[21] Healthcare systems are extremely complicated, which means that all variables cannot be discussed. Therefore, I have selected the variables that I feel are most important to the functioning of the healthcare market. If my models are "good" the aggregate data should follow the predicted pattern, and the case studies should show that price-setting within countries is following the predicted form and achieve the predicted outcomes. These predictions are:

[19] Stockman 1999, pg 21
[20] Stockman 1999, pg 21
[21] Stockman 1999, pg 20

1. A country with price-setting by providers will have high expenditures and decreased life expectancy due to lowered access (usually a free-market system).
2. A country with price-setting by government will have decreased expenditures and a decreased life expectancy due to waitlists and decreased quality (usually a socialized system).
3. A country in which price is negotiated by providers and financers of healthcare will have moderately high expenditures and an elevated life expectancy (usually a universal system, and sometimes a socialized system).

Model Assumptions

In a normal market the price and quantity of a good provided is determined by supply and demand, and with competition between firms, price is driven down. Demand in the normal market is determined by consumer tastes and preferences based on resources. And supply is determined by the costs of production, the quality of the good and the scarcity of resources. The point at which supply and demand meet determines the price and quantity of the good provided. A good is considered a normal good, "If a rise in income raises the demand for a good."[22] But, in healthcare a very different relationship exists—there are two different demand curves. The first demand curve is not determined by consumer preferences or tastes, but is determined by ailment and remains perfectly inelastic[23] (as price increases the demand remains the same). The demand for treatment of any given ailment remains completely unresponsive to fluctuations in price. If a patient has cancer and needs chemotherapy, he will still demand the chemotherapy at

[22] Stockman 1999, pg 78
[23] Stockman 1999, pg 103-111

any price. Demand is further complicated by a lack of knowledge on the part of the consumer, who must rely on an agent (doctor) to determine one's true demand. Patients neither know what antibiotics to take or the quantity of antibiotics to take for any given infection, which means they must rely on medical providers to determine these choices for them. However, theoretically there is a constant number of consumers with any given ailment, and thus there is a set demand for services (Dt-Theoretical, actual demand based on need, the true number of cases of each ailment). The second demand curve in the healthcare market is based on the ability of consumers to pay for services (Da-Demand based on ability to pay). The ability to pay for medical services interjects another problem of discussing the healthcare system—often consumers do not pay for medical services directly, and must rely on insurance providers as their agents (coupled with the principle-agent dilemma of doctors and patients). Insurance providers as profit-seeking agents attempt to decrease their own costs while maximizing their profits, which can further decrease access for the overall population. Some authors, such as Kleinke, have noted this exact problem.[24] As consumers' incomes increase the demand for healthcare only increases to the theoretical demand, and thus the demand for healthcare cannot be considered a normal good. Furthermore, as price increases the theoretical demand (Dt) for healthcare remains constant, but the ability demand (Da) decreases (see figure 1). And, as ability demand moves away from theoretical demand, access becomes limited—patients who require services due to ailment do not receive treatments that they cannot afford. Demand in a normal market is only limited by the price of the product, but healthcare demand has a real set value that remains constant despite all other factors—this represents an obvious divergence from normal markets. The second demand curve (Da) matches a normal market. So, should a government be

[24] Kleinke 2001

concerned with meeting the theoretical demand, or only providing services for those that can afford treatment? Which demand curve is most important, the theoretical demand or the ability demand? These questions can only be answered by a philosophical discussion of whether or not healthcare is a right or commodity[25]. I assume that a government or population is concerned with meeting the theoretical demand, that is, the general consensus in most countries is that healthcare should be provided for all of those that require care, not only to those that can afford care (even if this is not the case no politician or government would claim that it was not).

Supply in the healthcare market remains similar to supply in a normal market, with a couple of exceptions—theoretically there is a constant cost for every procedure (the biopsy of two moles costs exactly twice as much as the biopsy of one mole) which develops a perfectly elastic[26] supply line (Supply at cost, Sc; this supply at cost has no effect on free-market healthcare, but comes into play when discussing government price-setting). There is also a second supply based on the entrance of healthcare providers based on the ability to earn money (Sp-the supply of medical providers), which follows a normal supply concept—as price increases the number of firms and physicians wanting to enter the medical field increases with a theoretical minimum of Sc.

If the healthcare market functioned as a normal market in a wealthy, advanced industrialized state (poorer, pre-industrial states will have extremely diverse supply and demand curves, and, as stated, will not be discussed in this paper) the price and quantity of services would be equal to where Da (the demand with the ability to pay) meets Sp (the supply of medical professionals). Access would be limited to those who can afford treatment and this loss of

[25] Almgren 2007
His book is an analysis of healthcare from a Rawlsian perspective, and offers multiple views of healthcare as both a right and as a commodity.
[26] Stockman 1999, pg 103-111

access is represented by the difference between Dt and Da where Sp and Da meet. In figure 1 full provision of the theoretical demand and optimal economic efficiency is represented by P(Dt=Sp). But, the real price (Pn) and quantity (Qn) provided *if healthcare functioned like a normal market* would be represented by the point where Da meets Sp, and would not fully meet the theoretical demand.

Unfortunately this is not what the real healthcare market looks like; it does not function like a normal market (If it were functioning like this the United States should be spending less per capita on healthcare than other states that are providing services that meet the theoretical demand—the U.S. would have price=Pn and quantity=Qn, and other states would have P(Dt=Sp) and the quantity would equal Dt). Free-market systems would be represented by the blue line and universal and socialized markets would be represented by the red line in Figure 1. The United States, according to the OECD, is currently spending twice as much on healthcare per capita as every other advanced industrial nation, which negates the idea that healthcare is functioning like a normal competitive market.

The Free-Market Healthcare Market

So, what is really going on in the healthcare market in a free-market system? Why does the United States pay twice as much per capita on healthcare than other states that actually meet their theoretical demands?[27] There are other factors putting pressure on the healthcare market that a normal competitive market does not contain. Asymmetrical information (patients do not know what their needs are, and how much they really cost) and the quasi-monopolistic nature of

[27] OECD Health Data Set 2006

healthcare (generally there is only one hospital in any given region, which gives hospitals regional monopolies) allow providers of healthcare to become price-setters. Hospitals do not compete directly with one another; consumers simply choose the hospital that is closest to them or included in their healthcare plan in emergency situations or for routine care. Furthermore, hospitals and physicians, being self-interested, try to maximize their profits, but there is little competition in the region to keep prices low. Increasing profits for hospitals can be accomplished by raising the prices of routine medical treatment (1 Tylenol pill costing $50 at the hospital) that would be far too inconvenient for consumers to travel to receive (and laws prohibit them from doing so), or by specializing treatment and technology in certain fields that will attract consumers from other markets. For example, while hospitalized, a patient is charged the $50 for one dose of Tylenol which outside of the hospital costs less than a $1. The patient is unable to leave the hospital to purchase the medication for physical reasons, and laws further prohibit the patient from doing so, therefore, the hospital is given monopoly control over the price of the Tylenol (see Chapter 4). Hospitals can further increase their profits by specializing in certain fields that will attract consumers from other regions—such as a hospital specializing in the treatment of cancer (see chapter 4). Patients will be willing to travel longer distances to receive specialized higher quality treatments in non-emergency, complicated situations; which increases the share of the healthcare market for the hospital in those specialized fields. This second type of profit seeking leads to competition between hospitals; which increases the ability to receive higher quality treatment, but drives price upward for a myriad of reasons—because newer technologies often cost more to purchase and use, and because the demand for one hospital becomes higher than for another, the hospital with higher demand is able to set prices even higher (Nike can charge more for their shoes than other shoe companies because the demand for

Nike is higher than other shoe companies' shoes). Consumers with insurance often do not know, or even care, about the price of treatment being higher at one hospital than at another, they just want the best quality treatment available. Insurance companies are actually paying for the services, but their users are choosing where to receive treatment which decreases the ability of a higher price from deterring the consumption of the more expensive medical treatments. This form of competition increases quality, but fails to drive price downward. Many insurance companies attempt to curb this from happening by requiring patients to go through their primary care physicians as a gatekeeper to other medical treatment or creating other limits. These limits, such as co-pays, can help moderate the overall expense for insurance companies, but do not limit the decisions of medical providers. If an insurance company refuses to pay for treatment at a certain location, they are likely to lose consumers. For example, if an insurance company refuses to allow its consumers to use the services of one hospital in a region because it costs more than another hospital, but another insurance company allows the use of that hospital by its consumers, there is motivation for consumers to switch insurance companies. Medical providers and insurance companies are both fully aware of this fact. Therefore, when negotiations take place between insurance companies and medical providers, the medical providers can always choose to refuse service to that insurance company if the price offered by the insurance company is lower than the provider wishes to receive. The insurance company is motivated to offer a higher price, or face losing consumers. Insurance companies are competing directly with one another; this direct competition creates motivations for paying higher costs to medical providers than if there were only one insurance company. However, medical providers must have consumers which mean that they cannot refuse services to all insurance companies. Insurance companies with large consumer bases can negotiate lower prices with hospitals than insurance companies with

small consumer bases, because medical providers are more afraid of losing a large consumer base than a small consumer base. Hospitals do not have to worry what other hospitals are charging for their services, they only need to focus on the price that they can negotiate from insurance companies. This gives medical providers a quasi-monopolistic control over the price of medical treatment. According to Stockman a monopoly is defined as, "A firm is a monopoly if it (a) faces a downward-sloping demand curve for its product and (b) makes decisions without considering the reactions of other firms."[28] Hospitals easily fit into this category. Decisions made by hospitals are often not based on competition with other hospitals, but on maximizing profits while meeting demand in a given region. And, where competition exists between hospitals (because patients have the ability to choose between two hospitals); price is further inflated, despite the competition, by specializing in certain types of illnesses. This allows hospitals to be price-setters. Price-setting allows providers to choose the price they want, and given their rational self interest price will most likely be placed high. The price chosen will be made where Da decreases at a faster rate than price increases (or rather where the total revenue (TR) is maximized, which will be much higher than the cost based on the supply and demand). If a 1 unit increase in price decreases demand by more than 1 unit the price will be set too high. For example if price for chemotherapy is increased from $100 per unit to $101 per unit, and demand with the ability to pay decreases—Da decreases from 100 units to 98 units, the increase in price will, therefore, not be made (TR=$10,000 ($100*100patients), or TR=$9898 ($101*98patients)). But, if the price is increased from $50 per unit with a demand of 150 units, to a price of $100 a unit with a demand of 100 units the price will be set at the higher TR (TR=$7,500 ($50*150patients), or TR= $10,000 ($100*100Patients)) (Actual monopoly price-

[28] Stockman 1999, pg 321

setting is slightly more complicated involving the Marginal Cost and Marginal Revenue, but for simplicity this model can be used by assuming that the cost of producing one more unit increases identically at every point, marginal cost has the same value at every quantity; the biopsy of one mole costs $1, the biopsy of 2 moles costs $2, and the biopsy of 10 moles costs $10, which gives the same marginal cost at every quantity)[29]. In this second scenario the hospital will set the price at $100 because its total revenue will be maximized despite serving fewer patients. Thus, the price will be set artificially high. Furthermore, because of the regional monopoly on healthcare provision, small populated regions can even further inflated prices. High tech goods such as MRI machines and CT scanners can cost large amounts of money (I was unable to find actual prices because companies do not disclose this information to the public), if a low populated region buys a MRI unit and only performs a small number of scans with the machine each year, they must charge each patient more for the use of the machine than in a region where the machine is used more frequently. If ten patients are paying for a machine it will cost more than if one thousand patients are paying for the machine.

However, this high price of medical care will have a positive side effect; it will stimulate competition for medical positions. The opportunity to earn substantial amounts of money will increase the number of physicians, medical technology companies, and pharmaceutical companies willing to enter into the medical market. Given the limited number of necessary physicians (the demand with the ability to pay at a given price), medical professionals will compete with each other for their position, which will allow hospitals to hire better quality and qualified medical professionals. For example, if a country were to pay physicians only $10 an hour, the number of physicians willing to work would be low, and there would not be enough

[29] Stockman 1999, pg 321-327

physicians to fill vacancies, which would mean that hospitals would have to hire any willing physician. But, if a country were to pay $1000 dollars an hour, there would be more than enough physicians willing to enter into practice. This overabundance of physicians willing to enter the market would allow hospitals to choose between large quantities of physicians which will allow them to fill their positions with higher quality physicians. This competition between physicians for a limited number of medical positions increases the quality of the overall healthcare system. In the United States this competition also allows medical schools to only take the best and brightest of upcoming students. If a medical school only has 30 open positions for students and has 300 applicants, they will be able to get higher quality applicants than if only 60 applicants were available. This is the reason why medical schools in the United States have a high volume of applicants, and medical schools can be highly selective. Many people wish to become medical professionals, but do not get accepted into medical programs. If they were all selected for medical programs the market would become flooded with physicians. Medical schools function as a limiting agent and filter on the number of medical professionals entering into the market.

Figures 2 and 3 show that within the last 15-20 years there have been little changes in the demographics of healthcare providers. Physician to population ratios have been relatively stable with an average of 2.26 doctors for every 1000 population in the United States, and a current ratio of 2.4 doctors through 2003 and 2004.[30] Likewise, the nurse to population ratio has been stable with and average of 7.74 nurses for every thousand population, and a current trend since

[30] OECD Health Data Set 2006

1995 of 7.8 nurses per 1000 population (medical professionals are discussed further in chapter 3).[31]

High price-setting increases economic inefficiency (represented by the yellow area on Figure 4), decreases access (represented by the grey area on figure 4) and creates larger competition, which can increase the quality of healthcare. The surplus supply of doctors—due to both lowered access and an increased willingness to enter into the market caused by high returns—leads to more competition for patients between general practitioners and hospitals (represented by the combination of the grey area and blue area). These two areas, the grey and blue, do not represent the total number of medical providers in the market. They represent the number of medical providers willing to enter the market. Hospitals and doctors must compete with each other for a "limited" number of patients that can afford treatment; this competition can drive an increase in quality to persuade consumers to use one service over another. Rather than reduce prices which would increase demand with the ability to pay, but diminish overall profits, doctors and hospitals will focus on increasing quality of care to gain consumers, not the reduction of price. This occurs because, as discussed earlier about hospital profits, a small decrease in price does not increase the quantity demanded at an equal rate, which means doctors and hospitals can actually increase profits by serving fewer patients. Individual doctors can increase their share of the market of patients by increasing their reputations, or by creating deals with insurance providers, which can have a mild effect on lowering price. Patients rarely know the cost one physician charges over another because they rely on insurance providers to make the payments for them, which means that if one physician lowers his or her price consumer demand will not increase. The only option to increase consumer demand for one physician over another

[31] OECD Health Data Set 2006

is through the quality of care provided. Demand for one physician over another will increase by insurance providers as price is lowered, which has caused variable pricing to take effect in the United States. Often, physicians will charge insurance providers less for services than individuals without insurance (further discussion on variable pricing and insurance will be made in the section on the U.S. healthcare system). Theoretically, these free-market healthcare systems lead to high costs, lowered access and high quality of care.

The Single-Payer Healthcare Markets

Single-payer systems (a system in which the government directly controls funding of healthcare), or government run competitive pooling systems (payroll insurance pooling systems) remove the ability of providers to become price-setters. Either providers take the price offered by the single-payer or do not receive compensation—providers then become price-takers, in place of price-setters. Single payer systems (both universal and socialized healthcare) generally integrate legal provisions that ensure healthcare for all citizenry, which eliminates the Da demand curve completely. Single-payer systems allow the government to do the price-setting. Generally, the form of decision making in the price-setting methods of a government determines the overall functionality of the system. Governments that run both the provision of healthcare and the financing of healthcare will tend to set prices as close to the supply at cost (Sc) as possible. If all decisions are made by the government, without negotiation with healthcare providers, which is often the case when government runs both the provision of healthcare and the financing of healthcare for its citizens, then the supply at cost becomes an important variable. When the government knows the actual cost (Sc) of every procedure the price will be set as close

as possible to that price, despite the supply of doctors being too low to meet the theoretical demand at that given price. If the government sets price too low, or too close to Sc wait lists will accrue (QDt – QP-), economic efficiency will increase (and can lead to government savings from P(Dt=Sp)), but quality will be suspect. As can be seen by the grey area on figure 5, when price is set closer to Sc, and below Sp, wait lists will accrue due to a lack of medical providers. And, the green area illustrates the money saved by the government. The United Kingdom gives a good example of this occurring. Prices were set much lower ten years ago than they are currently set, and the government has been attempting to introduce more price negotiation into their healthcare market.

In the cases where medical providers are allowed to negotiate with government for the setting of price (usually when hospitals are privately owned and operated) prices may be artificially inflated. When governments do not run the hospitals they are less likely to know Sc, which requires them to rely on the medical providers for negotiating with the price-setting. Because of imperfect knowledge on the part of government, healthcare providers can negotiate higher prices than in systems where government has substantial knowledge about the cost of healthcare provision. If price is set high (P+) the system will be economically inefficient, theoretical demand (Dt) will be fully met, and a surplus of provision (and thus higher quality) can be achieved. The yellow area in Figure 5 shows the amount of money wasted (if the economically efficient point is P(Dt=Sp)), and the blue area shows the surplus in medical provision, which increases competition and quality. Theoretically it is possible to set the price where theoretical demand meets the supply of doctors. If price is set at this point where the theoretical demand matches the supply of doctors (P(Dt=Sp)) the system will be economically optimal, fully supply for the theoretical demand, but the quality of healthcare will not be

guaranteed. In theory, if government both funds and operates the provision of healthcare the price will be set closer to Sc (however, governments are not only concerned with costs of healthcare, they are also concerned with quality, which has led to many reforms in socialized healthcare systems to help stimulate quality). But, when government only runs the funding of healthcare and provision remains private, the price will be set higher than P(Dt=Sp), but still lower than in a free-market system where price is set by providers.

Conclusions

A free-market healthcare system allows medical providers to become price-setters. Price-setting allows for high profits which stimulates higher quality of care, but decreases access to healthcare. This system is characterized by massive amounts of economic inefficiency, high quality, and decreased access. A socialized healthcare system, because of its knowledge about the cost (Sc), will set prices as close to Sc as possible, which will decrease quality and create waitlists. This system is characterized by guaranteed access to medical care; however waitlists create problems of access to care, increased economic efficiency, and decreased quality. A universal healthcare system, due to imperfect information of the part of government, will have to negotiate the price for healthcare which allows medical providers to receive higher payments and stimulates higher quality of healthcare. This system is characterized by increased quality, full access with short wait periods, if any exist, and a moderate degree (when compared to free-market systems) of economic inefficiency. This creates three different forms of price-setting; the free-market system price is set by medical providers, the socialized system price is set by government, and the universal system price is negotiated by medical providers and government.

The next chapter analyzes aggregate data on thirty OECD countries in relationship to the market models created in this chapter, to test whether or not these models provide a real representation of the market forces that are taking effect on the healthcare systems.

Figures and Tables

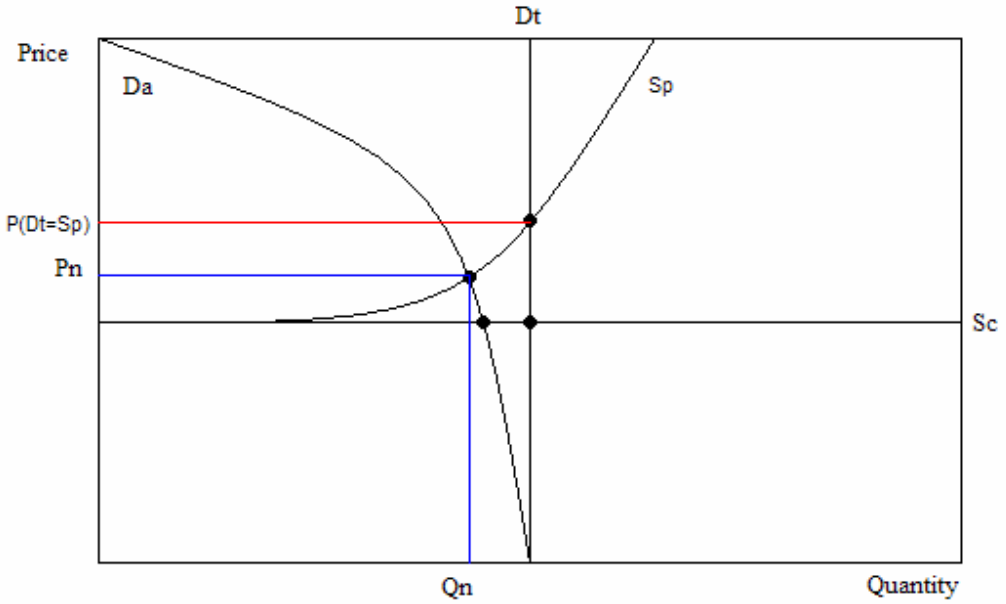


Figure 1: General Supply and Demand Structure of Healthcare if Healthcare Functioned Like a Normal Market

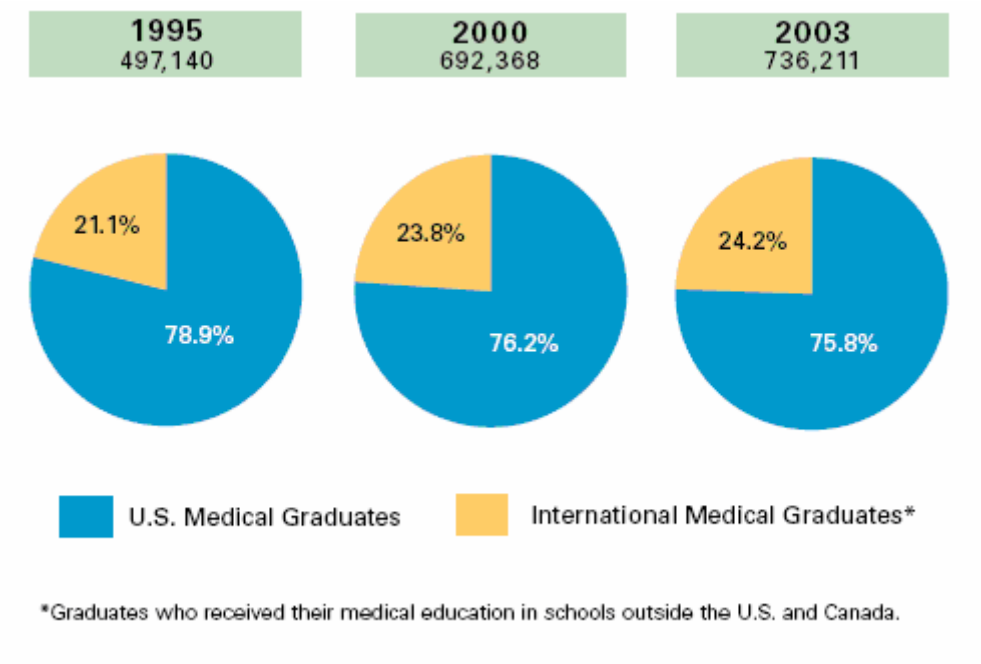


Figure 2: Active Physicians by Medical Education
Source: Blue Cross Blue Shield 2007

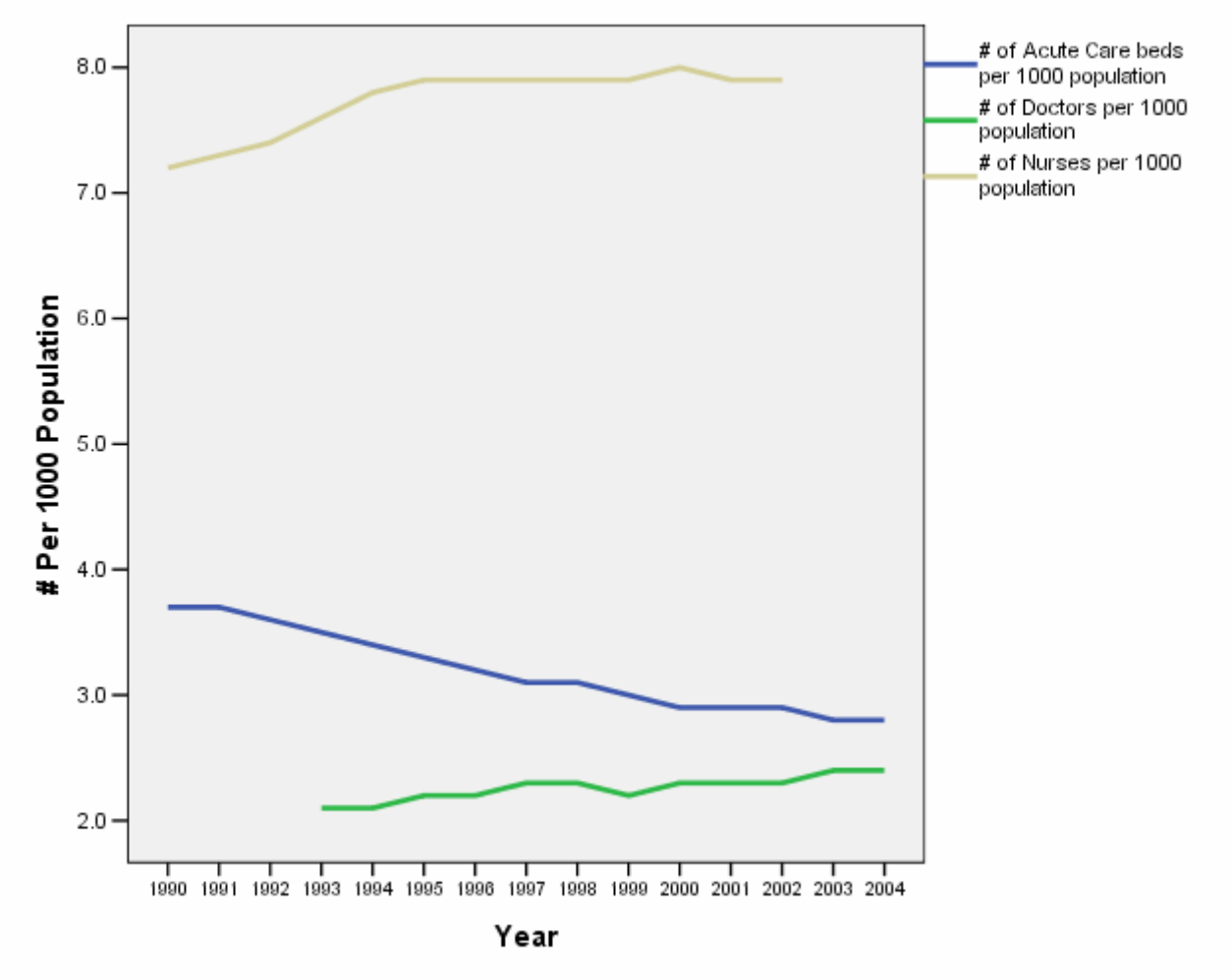


Figure 3: Number of Medical Personnel in the United States
Source: OECD Health Data Set 2006

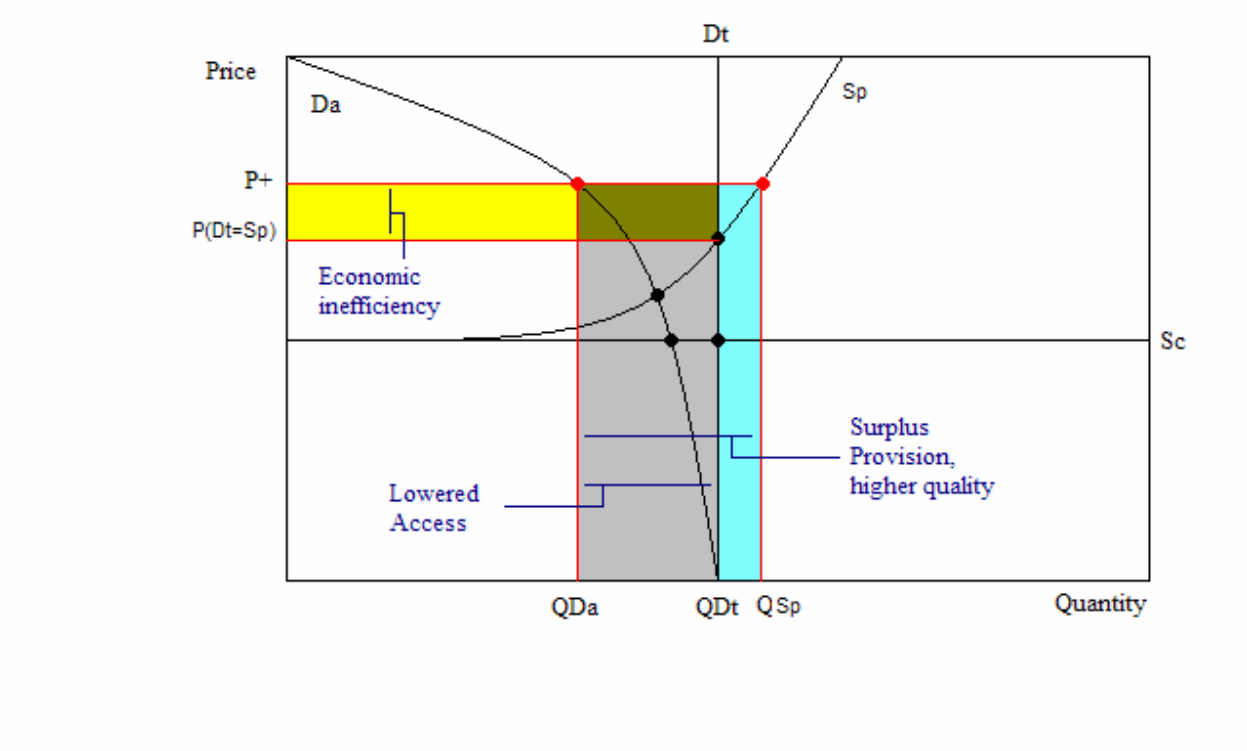


Figure 4: Provider Price-Setting

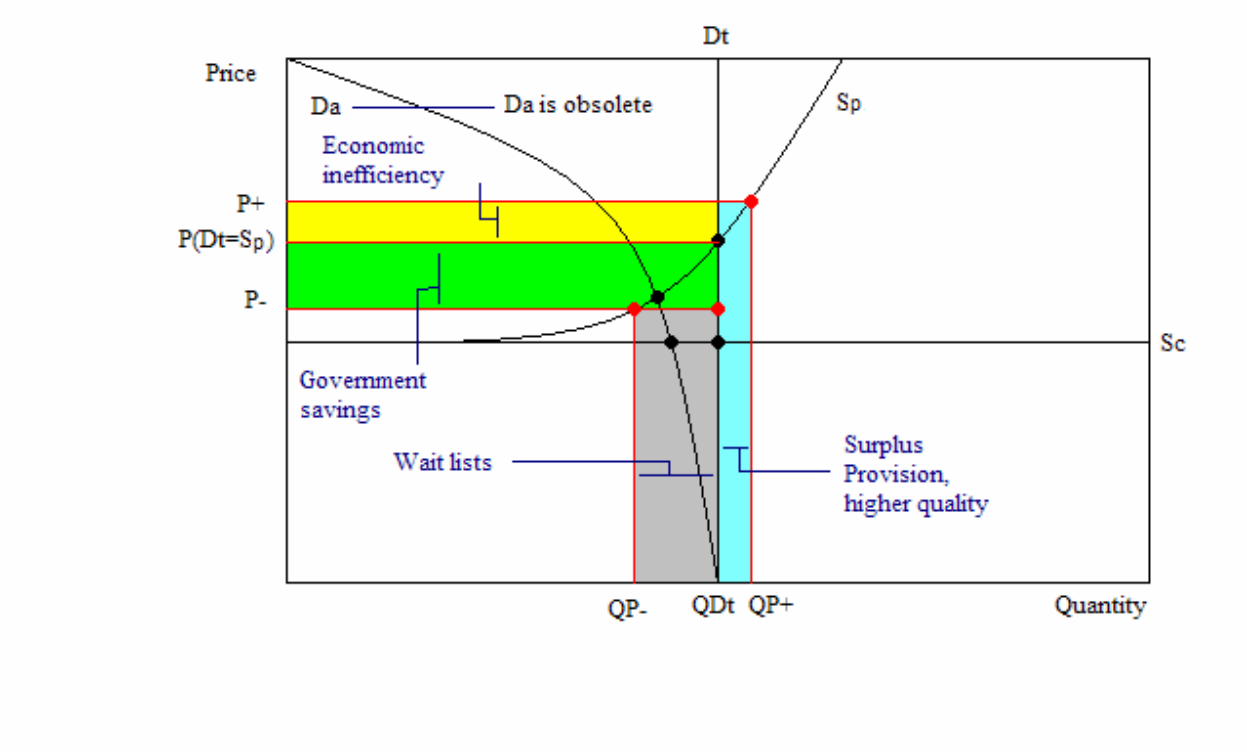


Figure 5: Government Price-Setting/ Da is Obsolete

CHAPTER 3: EVALUATING HEALTHCARE SYSTEMS

All three factors (access, quality, and economic efficiency) must be discussed when evaluating any healthcare system. As my models of healthcare systems show there is no way to balance all three factors perfectly. To guarantee high quality care economic efficiency must be sacrificed, to guarantee access government must control price-setting and price must be higher than the cost of the actual services provided. And, economic efficiency and full access cannot be reached through a free-market even if a high quality system can be maintained. How well a healthcare system is functioning is largely determined by the viewpoint of the person evaluating the system. If economic efficiency is most important, then a system that sets price as close to Sc as possible will be viewed as superior to other systems. If quality is most important, then a free-market system, or possibly an overpriced single-payer system will be viewed as superior to the other systems. And, if access is most important, then a single payer system that is economically inefficient is superior to all other systems. These market models have been tested using various aggregate variables from thirty OECD countries.

Methodology

The following analyses of the thirty OECD countries' healthcare systems will use various forms of aggregate level data to evaluate the quality, economic efficiency, and access in each system. Life expectancy is both a function of quality of healthcare, and access to healthcare (as well as various life-style choices). I argue in this analysis that the higher the quality of healthcare and the higher the access to healthcare the longer the life expectancy, with all other

factors being constant. Thus, aggregate data should show that as per capita expenditure on healthcare increases life expectancy should increase. However, overpriced healthcare markets should also have lowered life expectancies due to decreased access. Therefore, there should also be a decrease in life expectancies in countries' whose markets are at the highest levels of per capita expenditure on healthcare. Infant mortality rates should share an inverse relationship to life expectancy and per capita expenditure. As expenditures increase infant mortality rates should decrease, but infant mortality rates should again increase once per capita expenditure becomes too high and lowers access. Spending on healthcare is used to evaluate the economic efficiency of the system. The OECD Health Data Set 2006 available online at www.OECD.org contains data on the health systems of thirty different countries. Data for analysis were taken from the most recent year. If data for an individual country were not available for 2006 the most recent previous years' data were used. Per capita expenditure is based on PPP (purchasing power parity) in U.S. dollars. PPP allows for the values to represent actual costs in each market, differing currency values have already been accounted for. All bar charts are ranked from highest overall life expectancy at the top to lowest life expectancy at the bottom. The OECD Health Data Set 2006 reports healthcare expenditures in only certain areas:

> Total expenditure on health is defined as the sum of expenditure on activities that – through application of medical, paramedical, and nursing knowledge and technology – has the goals of:
>
> - Promoting health and preventing disease;
> - Curing illness and reducing premature mortality;
> - Caring for persons affected by chronic illness who require nursing care;
> - Caring for persons with health-related impairments, disability, and handicaps who

require nursing care;

- Assisting patients to die with dignity;

- Providing and administering public health;

- Providing and administering health programmes [sic], health insurance and other funding arrangements.

With this boundary, general public safety measures such as technical standards monitoring and road safety are not considered as part of expenditure on health. Activities such as food and hygiene control and health research and development are considered health-related, but are not included in total health expenditure. Expenditures on those items are reported separately in the chapter on health-related functions.[32]

Some expenditures not related directly to prolonging life are included in the OECD data, but others such as elective cosmetic surgery, are not included. This distinction is important lest it be argued that the United States has high per capita expenditures on healthcare primarily due to elective non-life prolonging procedures and services, such as increased expenditures on plastic surgery. Expenditures on healthcare education are also not included in the data set, which includes the educating and training of healthcare professionals.

Aggregate Data

So, how do the different models of healthcare markets hold up to the aggregate level data? Life expectancy is the most readily available aggregate level data to judge a healthcare system; the life expectancy of a country is determined by the quality of healthcare, access to

[32] OECD 2007, Definitions

healthcare and lifestyle choices, but which factors are most important? If quality of healthcare were determined solely by financial resources, then it would be reasonable to believe that the more money per capita spent on healthcare should increase the overall quality of the system, which would increase life expectancy. However, Figure 6 demonstrates that per capita expenditure does not solely determine life expectancy. The data suggests that life expectancy is increased to a certain point by expenditure, but that many countries spend more money than is necessary to increase life expectancy. The examples of Luxembourg and the United States clearly show that, as far as life expectancy is concerned, there is a large amount of economic waste. The large per capita expenditures on healthcare in the United States and Luxembourg, with only moderate total life expectancies demonstrate clearly that these countries are not getting the outcomes in life expectancy that one would predict given their extremely high expenditures. According to the above market models of healthcare, a country with a free-market healthcare system will have high expenditures and a lowered life expectancy due to lowered access (life style factors will be discussed later). A country with a socialized healthcare system will have low expenditures, guaranteed access, but will also have a lowered life expectancy due to waitlists and a decreased quality. And, a country with a universal healthcare system will have increased per capita expenditures, and an increased life expectancy due to high quality and full access. This means that, according to the models, countries with low expenditures on healthcare should have decreased life expectancies due to lowered quality and lowered access, and countries with high expenditures should have lowered life expectancies due to decreased access, despite high quality. Countries with expenditures in the middle of the spectrum should have the highest life expectancies due to full access, and high quality. Table 2 shows the predicted relationship between per capita expenditures on healthcare and total life expectancy if the market models are

functioning the way predicted. A linear regression analysis and a quadratic regression analysis were performed for total life expectancy and per capita expenditure. The linear regression was performed to test whether or not the relationship was linear: as expenditures increase does life expectancy increase? And, to show that the relationship between per capita expenditure on healthcare and life expectancy is quadratic and not linear as some have argued (such as Cutler, Dranove and Robinson). It has been argued that the overall relationship is that as expenditures increase the quality of healthcare increases, and the United States is merely an outlier that does not conform to the rest of the world. The quadratic regression was performed, to test whether or not life expectancy was determined by expenditures in the manner suggested by the healthcare models; as expenditures increase does life expectancy increase? And, when expenditures reach the highest spectrum does life expectancy decrease? The relationship between life expectancy and per capita expenditure is either *only* linear or it is quadratic and will also show *both* a quadratic and a linear relationship. If the relationship is only linear the market models in the last chapter are incorrect, and the more money spent on healthcare the higher the life expectancy, and access is not limited by high expenditures on healthcare. But if the relationship is both linear and quadratic the models are correct in that as expenditures increase life expectancy increases, until the point where expenditures become too high and start decreasing access and thus overall life expectancy. SPSS provided the following linear regression analysis for per capita expenditure and total life expectancy (Table 3). The linear regression for life expectancy and per capita expenditure appears to hold up well, with an R^2 of 0.314, and a significance value of 0.001. However, the linear regression only has a regression coefficient of 0.001—the regression shows that for every dollar increase in per capita expenditure there is a 0.001 year increase in the total life expectancy on average. For example the United States, given its per capita expenditure on

healthcare of $6102, would have a life expectancy of 81.497 years. And, a country in the middle of expenditures, like Germany with expenditures of $3034 per capita, would have a life expectancy of 78.429 years. The linear regression is only taking account of the increases in healthcare quality caused by increasing per capita expenditure. According to Pollock:

> If the magnitude of the PRE statistic [R^2] is less than .1, then the relationship is weak; if it is greater than .1 but less than .2, then the relationship is moderate; if it is greater than .2 but less than .3, then the relationship is moderately strong; and if the magnitude of the PRE statistic is greater than .3, than the relationship is strong. […] In the analysis of social science data, especially survey data, large PRE magnitudes (of say, .5 or above) are uncommon.[33]

According to Pollock's assessment the linear relationship between per capita expenditure and life expectancy is moderately strong. There is support for the fact that as expenditures increase total life expectancy increases. However, the market models above showed that life expectancy should decline despite high expenditures if access were lowered. When a quadratic regression is computed (as my market models suggest that life expectancy at both ends of the expenditure spectrum will have lowered life expectancies, see table 2) the data seems to be more profound. The R^2 of .710 shows that 71 percent of the variation in life expectancy is accounted for by considering quality (as a function of expenditure) and access (increased access as expenditure increases to a point where access is then decreased due to high costs), and with significance values of .000 shows that all variables are statistically significant, and the relationship is far stronger than the linear relationship—so strong in fact, that this R^2 magnitude of .71 is very uncommon. The linear regression is only picking up one aspect of the variation caused by

[33] Pollock 2005, pg 148

increasing expenditures, whereas, the quadratic regression is picking up the variation at both ends of the healthcare expenditure spectrum. As can be clearly seen on Figure 7 the quadratic regression is a better fit to the data and offers much greater predictive capabilities. Furthermore, when the poorer countries (The Czech Republic, Slovak Republic, Poland, Mexico, Turkey, Hungary, and Korea) are removed from the data set the linear regression only has an R^2 of only .009 and a significance value of 0.678. No linear relationship exists once these poorer countries are removed from the data set. When poor countries that do not spend much on healthcare are removed from the equation no linear relationship between per capita expenditure and life expectancy exists, in fact the linear regression shows that as spending increases life expectancy changes at a rate of 0.000. Whereas, a quadratic relationship still holds true with an R^2 of .302 and significance values of .014 and .010. Figure 8 visually demonstrates this complete lack of a linear relationship between per capita expenditure and life expectancy.

This is the quadratic equation for per capita expenditure and life expectancy when all countries are included:

(1)

Predicted Life Expectancy = 70.775yrs + .005yrs (Per Capita Expenditure) – .00000066yrs (Per Capita Expenditure)²

Equation 1 shows a base life expectancy in the thirty OECD countries of around 70.8 years and that for every dollar of per capita expenditure life expectancy is increased by .005 years until the point where the per capita expenditure squared and multiplied by .00000066 years decreases life expectancy by becoming larger than the increase in life expectancy caused by the increase in expenditure. Using equation 1 it is possible to predict the life expectancy of a country based on

its expenditures extremely well. Table 5 shows the per capita expenditures on healthcare, the predicted life expectancies for all thirty OECD countries based on equation 1, the actual life expectancies in each country, the difference between the predicted life expectancy and the actual life expectancy, and the type of system. The mean life expectancy for each system type and the mean difference in life expectancy from the predicted life expectancy are provided. Universal healthcare systems have a mean life expectancy of 79.45, socialized healthcare systems have a mean life expectancy of 77.51, and free-market healthcare systems have a mean life expectancy of 76.7. A quadratic regression was performed for life expectancy and per capita expenditure on healthcare for all three system types, and the results are provided in table 6. The regression was found to be insignificant when dealing with universal healthcare systems, but extremely strong and significant for socialized and free-market healthcare systems. Examination of the scatter plot for universal healthcare systems shows an accumulation of countries at around the $3,041 (Netherlands) to $3,159 (France) per capita expenditure point, and a life expectancy range of 78.6 (Germany, second lowest in healthcare expenditures of the six countries) to 80.3 years (France, highest in expenditures of the six countries). Six of the twelve universal healthcare systems are all within a $118 range and 1.7 year life expectancy range. This accumulation of data points around the same values of per capita expenditure and life expectancy has rendered the regression statistically insignificant. However, this tendency for universal healthcare systems to converge in similar values is enlightening. It demonstrates that universal healthcare systems tend to negotiate similar prices for healthcare, and maintain similar outcomes in terms of life expectancy at these negotiated prices. Figure 9 shows the scatter plots for per capita expenditure and life expectancy by system type. The average life expectancy for each system type is represented by the black line and the red lines are the quadratic regressions. Figure 10 separates

the quadratic regression of per capita expenditure on healthcare and life expectancy by the type of healthcare system. Universal healthcare systems accumulate around the center of the regression, and free-market and socialized systems are spread out through the regression.

Figure 11 visually shows an overlay of the quadratic regression of per capita expenditure and life expectancy and the market models (provider price-setting, Figure 4, and single-payer systems, Figure 5) discussed in the previous section. As per capita expenditure increases life expectancy increases, but once per capita expenditure reaches around four thousand dollars per capita, life expectancy begins to decrease. This overlay clearly shows the effects of increasing expenditure increasing the overall quality and access to healthcare and thus the life expectancy, and the effects of overly inflated medical costs at the upper spectrum of per capita health expenditures decreasing access and thus overall life expectancy. Japan remains an outlier with low expenditures and high life expectancies. According to equation 1, Japan, given its expenditures on healthcare should have a life expectancy of around 78.68, but in actuality has a life expectancy of 82.1 years. However, the quadratic regression does not account for life style factors, and Japan appears to have an increased life expectancy due to these lifestyle factors (diet and exercise). The life expectancy of Japan should be lower given their per capita expenditures on healthcare, but some other variable is increasing their life expectancies. In theory, as stated earlier, life expectancy is a function of quality of care, access to care, and life style choices. The quadratic regression is a function of quality of care and access to care, the remaining differences in life expectancy should be due to life style factors. In other words, the quadratic regression takes account of the effects on life expectancy due to variations in per capita expenditure as a function of access and quality of care.

The quadratic regression accounts for most of the variation due to quality and access, so it appears that the life style factors are having a great effect on Japan's life expectancy. Japan has a universal healthcare system with guaranteed access to healthcare. The quadratic regression may not be picking up on the increased quality of care in Japan, as it does in other countries. Japan has an extremely elevated life expectancy due to the quality of its system despite expenditures. One reason for this increased quality of care in Japan is that it has the highest levels of high technology in their healthcare system with the United States coming in second. It would be reasonably argued that this access to high tech machinery is increasing the quality of the healthcare system despite any lowered competition from lowered expenditures. Figure 12 suggests that Japan can afford high technology that other countries cannot and that the quality of healthcare in Japan is higher than other countries with the same expenditures. However, it is not the purpose of this thesis to explain the variations of life expectancies in every country; it is only to show that the markets are functioning in the manner laid out by the market models in the previous chapter. Despite Japan being an outlier, the healthcare market models in the previous section can explain 71 percent of the variation in life expectancy between countries (with the remaining 29 percent most likely linked to life style choices, and some other minor differences between each country's healthcare market not being accounted for purely as a function of expenditure.

However, the case of Japan brings up another important variable into the model. It is necessary to examine the changes in life expectancy based on life style variables. The OECD health data set contains data on alcohol consumption, the percent of population that is obese, the percent of the population that is overweight, and tobacco consumption. A linear regression analysis was performed for all four variables and total life expectancy resulting in none of the

variables being statistically significant. All four life style factors had random effects on the life expectancy of a given country. However, when poorer countries were removed from the data set, alcohol consumption, obesity and overweight did become statistically significant. This is most likely due to these life style factors being linked to wealthier countries. It takes money to consume alcohol, and large amounts of food. Poorer countries will have decreased life expectancies due to low quality of care and low access to care, but will not have "wealthy" life style factors decreasing their life expectancy. In other words, wealthy countries should have higher rates of obesity, and alcohol consumption due to the ability to purchase alcohol and food products than poorer countries. Poorer countries will exhibit lowered life expectancies due to lowered access and quality of care, and wealthier countries should exhibit lowered life expectancies due to an increased level of obesity and alcohol consumption. These life style factors are having an effect on the life expectancy when controlling for the wealth of the country.

Next all four variables were used in linear regression analyses with per capita expenditure to test if their effects were influencing expenditures. In other words, were the effects of these life style factors influencing the costs of healthcare? If so, could they be causing a spurious relationship between per capita expenditures on healthcare and total life expectancy? It would be reasonably predicted that as the number of smokers, alcohol consumption, number of overweight and number of obese population increased that per capita expenditure on healthcare should increase to pay for related health services. Countries with high values of these variables should have increased per capita expenditures. This may be causing the observed relationship between per capita expenditure on healthcare and life expectancy—poor countries would have decreased life expectancies due to decreased quality and access to care, and wealthy countries would have decreased life expectancies due to an increase in negative life style choices that can only be

afforded by the wealthy which would cause an increase in healthcare expenditures. However, no such relationship exists between countries. None of the variables were statistically significant in any way even when controlling for the wealth of the country. As the number of smokers, the number of obese, the number of overweight, and alcohol consumption increased, even when controlling for the wealth of the country, there was no statistically significant change in the per capita expenditures for healthcare. In fact, the data showed that as the number of smokers increased that the per capita expenditure on healthcare decreased (however, it was not statistically significant). The relationship between per capita expenditures and life expectancy cannot be viewed as spurious, because even when controlling for the wealth of a country there is no significant change in per capita expenditures due to increasing values of the life style factors. Based on these analyses it could be reasonably argued that the effects of life style factors on life expectancy are accounted for by the remaining 29% variation in life expectancy that is not accounted for by the quadratic regression of per capita expenditure on healthcare and life expectancy. Basically the quadratic regression is accounting for the difference in life expectancy due to the quality and access to healthcare as a function of per capita expenditure on healthcare (71%), and the remaining variation (29%) is attributed to the difference in life style factors. The observed relationship between per capita expenditure and life expectancy is not spurious. If the relationship between life expectancy and per capita expenditure were spurious then the data would show that the countries spending the most on healthcare per capita would be those with the highest rates of obesity, overweight population, alcohol consumption, and tobacco consumption. These high rates of life style factors should increase per capita expenditures and decrease life expectancies. This is not the case—life expectancy is decreased but per capita expenditure is not increased. Therefore, obesity, smoking, being overweight, and consuming

alcohol do decrease life expectancy, but are not the cause for increased expenditures on healthcare. The countries paying the most for healthcare are not the countries with the highest levels of these negative life style factors, if they were it could be argued that this was the reason why wealthy countries had decreased life expectancies and increased expenditures. But, this is not the case, and it is not supported by any of the data.

Furthermore, Figure 15 adds more support for the market models. Low expenditures yield higher infant mortality rates due to lowered quality and access and high expenditures increase infant mortality rates due to decreased access (See table 2). The quadratic regression shows that 49 percent of the variation in infant mortality rates is due to expenditures on healthcare. This is the quadratic regression equation for infant mortality and per capita expenditure:

(2)

$$\textit{Predicted Infant Mortality Rate} = 16.928\textit{deaths} - .008\textit{deaths}*(\textit{per capita expenditure}) + .00000103\textit{deaths}*(\textit{per capita expenditure})^2$$

Equation 2 can be used to estimate the number of infant mortalities per 1000 live births. The relationship, according to Pollock is strong (despite being weaker than that of total life expectancy), and adds further support that the healthcare market models give an accurate description of the processes taking effect in healthcare systems. An examination of three causes of death showed the same relationship with per capita expenditure. However, the diabetes death rate and respiratory death rate were found to be statistically insignificant. Cerebrovascular death rates mirrored the predicted outcomes as infant mortality rates. Death rates should be higher for

countries spending too little money due to poor quality and waitlists and should also be higher at the upper spectrum of per capita expenditure due to decreased access, with the lowest rates in the middle of the per capita expenditures. Even though diabetes and respiratory disease death rates were insignificant statistically they also followed the predicted pattern which is seen in figure 16. The quadratic regression for per capita expenditure and cerebrovascular deaths had an R^2 of .511 which means that fifty-one percent of the variation can be accounted for as a function of per capita expenditure on healthcare, which according to Pollock is an extremely strong relationship.

Lastly, it would be predicted that as expenditures increase the total number of physicians should increase to meet the increased demand for healthcare due to increasing access. And, when access becomes limited due to high costs the number of physicians should begin to decrease again to match the demand. The number of practicing healthcare professionals can be used as a gauge for the levels of access to healthcare. If access to healthcare is being increased through laws and funding, then the number of practicing healthcare professionals should increase as the number of healthcare consumers increase. And, if access is being limited by the price becoming too high, then the number of practicing healthcare professionals should decrease to meet the demand with the ability to pay for services as it decreases (Da). Figure 16 shows that this relationship holds true.

The quadratic regression for total number of physicians and nurses and per capita expenditure has an R^2 value of .415, which shows that forty-two percent of the variation in the number of healthcare professionals per 1000 population is due to per capita expenditures on healthcare. The R^2 for physicians is .257, and for nurses .493. Once again, according to Pollock's assessment these would be extremely strong relationships.

[Figure 18]

Figure 18 breaks down the quadratic regression of medical providers and per capita expenditure on healthcare by the type of system. Once, again universal healthcare systems show up predominately toward the middle of the regression in terms of the number of healthcare professionals, and free-market and socialized systems are interspersed throughout the regression.

If life expectancy is partially determined by access to healthcare then there should be a linear relationship between the number of medical professionals and life expectancy. Figure 19 clearly supports this assumption. The number of physicians has an R^2 of .111, but it only has a significance value of .072 which is right on the cusp of being significant. The number of nurses has an R^2 of .253 and is significant. The number of physicians and nurses combined (total number of healthcare professionals) has an R^2 of .283, and is also significant. There is definitely a causal relationship between life expectancy and the number of healthcare professionals. And, there is a causal relationship between per capita expenditures and the number of healthcare professionals. Therefore, the quadratic regression for per capita expenditure on healthcare and life expectancy is a good proxy for the access and quality in the system.

Furthermore, the quantity of high technology goods should increase as profits for these goods increases. However, unlike with physicians there should not be a decrease in the number of high technology goods due to decreased access, because as discussed in chapter 2 hospitals without a population large enough to support the use of these goods will still purchase them and then pass the extra expense onto the local population that uses them. Figure 18 shows that this assumption from the model in chapter 2 is also correct. The levels of healthcare professionals show an increase as per capita expenditures increase and then a decrease when expenditures become too high. These levels are following exactly the predicted pattern of increasing and decreasing access from the models in chapter 2. And, the levels of high technology goods are

also following the predicted pattern. Figure 21 is an overlay of both the quadratic regression for per capita expenditure on healthcare and life expectancy, and the quadratic regression for per capita expenditure and the number of practicing healthcare professionals per 1000 population. As can be seen from the figure, the models from chapter 2 are accounting for both the changes in quality of care and the changes in access to care. The quadratic regression for per capita expenditure on healthcare and life expectancy is not due in any way to life style factors, and can be considered a good measure of the quality of care and access to care in a healthcare system.

Conclusions

The market models from chapter 2 hold up extremely well under the examination of the aggregate data. The aggregate data are nearly irrefutable—the quadratic regressions of life expectancy, infant mortality rates, and rates of deaths by certain diseases fully support the hypothesis that as spending on healthcare increases life expectancy will increase and infant mortality and deaths by disease rates will decrease. And, when spending becomes too high, access will become limited and life expectancy will decrease and infant mortality and deaths by disease will increase. Life style factors do affect life expectancy, but do not affect per capita expenditures, thus ruling out any spurious relationship (the countries spending the most on healthcare are not those with the highest levels of smoking, obesity, overweight population, or alcohol consumption). The number of practicing physicians exactly mirrors the predicted pattern and can be used as an overall proxy for access to healthcare—it also shows that the use of total life expectancy is a good proxy for the combination of quality of care and access to care. Furthermore, universal healthcare systems tend to accumulate toward the center of the

regressions, suggesting that negotiations are causing them to balance supply and demand. Whereas, socialized systems are more interspersed throughout the regressions suggesting that price setting is taking place in a haphazard manner. And, free-market systems are placed at the extremes of the regressions. Given this information, it is clear that healthcare cannot be considered a normal good, and the market cannot cause supply to meet the theoretical demand and set an appropriate price for healthcare. If the market cannot settle an appropriate price that causes supply to meet the theoretical demand, which it cannot, then forced negotiations of price is the next best system of price-setting. The following three sections turn to an examination of three countries with divergent healthcare markets. The United States is discussed because it is the prime example of a free-market healthcare system (and one of the only examples in the developed world). The United Kingdom was chosen because it is often used as a case against government financing of healthcare due to waitlists and poor customer service. The purpose of choosing the United Kingdom is because of these perceived problems, which many consider a fault of government intervention into the free-market. But, as the aggregate data have shown, the perceived problems in the British system are actually caused by a lack of negotiation between providers and consumers of healthcare. Surprisingly, the United Kingdom fares well when discussing life expectancies. Lastly, Germany is discussed, not because it is the "best" system of healthcare, but because it is the first universal healthcare system, and as such, has been a model on how to run and finance healthcare that has been emulated the world over. If one were to choose the best universal system for discussion based purely on the best fit for the universal healthcare model Switzerland would be the obvious choice with healthcare expenditures of $4077 per capita and a life expectancy of 81.2 years.

Figures and Tables

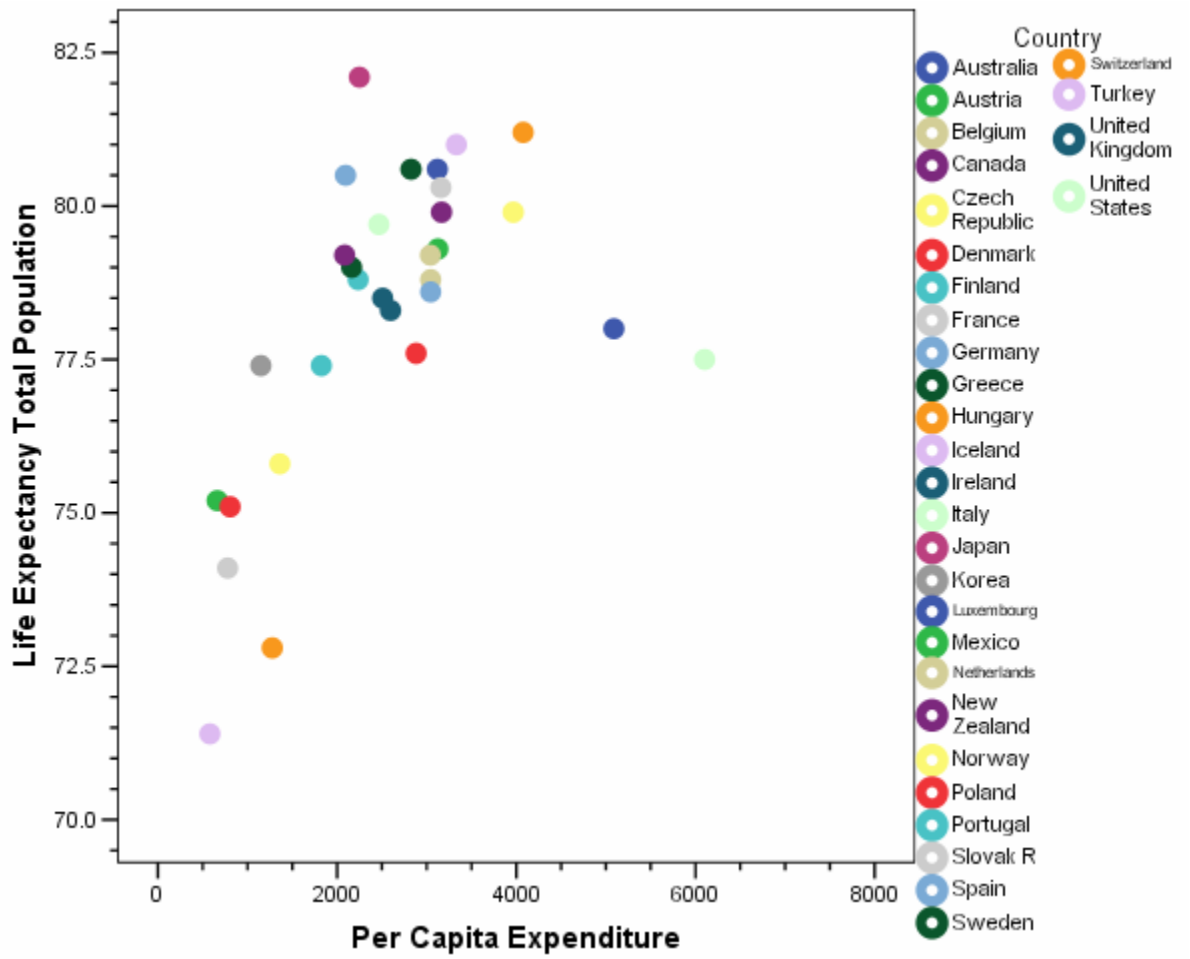


Figure 6: Per Capita Expenditure on Healthcare and Total Life Expectancy
Source: OECD Health Data Set 2006

Table 2: Relationship between Expenditures, Life Expectancy and Infant Mortality

Expenditures	High	Middle	Low
Life Expectancy	Middle	Highest	Lowest
Infant Mortality	Middle	Lowest	Highest

Table 3: Model Summary for Linear and Quadratic Regression of Per Capita Expenditure and Life Expectancy

Model Summary and Parameter Estimates

Dependent Variable: Life Expectancy total population

	Model Summary					Parameter Estimates		
Equation	R Square	F	df1	df2	Sig.	Constant	b1	b2
Linear	.314	12.800	1	28	.001	75.395	.001	
Quadratic	.710	33.132	2	27	.000	70.775	.005	-6.6E-007

The independent variable is $ Per Capita.

Figure 7: Linear and Quadratic Scatter Plot All 30 OECD Countries
Source: OECD Health Data Set 2006

Table 4: Model Summary for Life Expectancy and Per Capita Expenditure (Wealthy Countries Only)

Model Summary and Parameter Estimates

Dependent Variable: Life Expectancy total population

	Model Summary					Parameter Estimates		
Equation	R Square	F	df1	df2	Sig.	Constant	b1	b2
Linear	.009	.178	1	20	.678	79.598	.000	
Quadratic	.304	4.150	2	19	.032	73.739	.003	-4.5E-007

The independent variable is $ Per Capita.

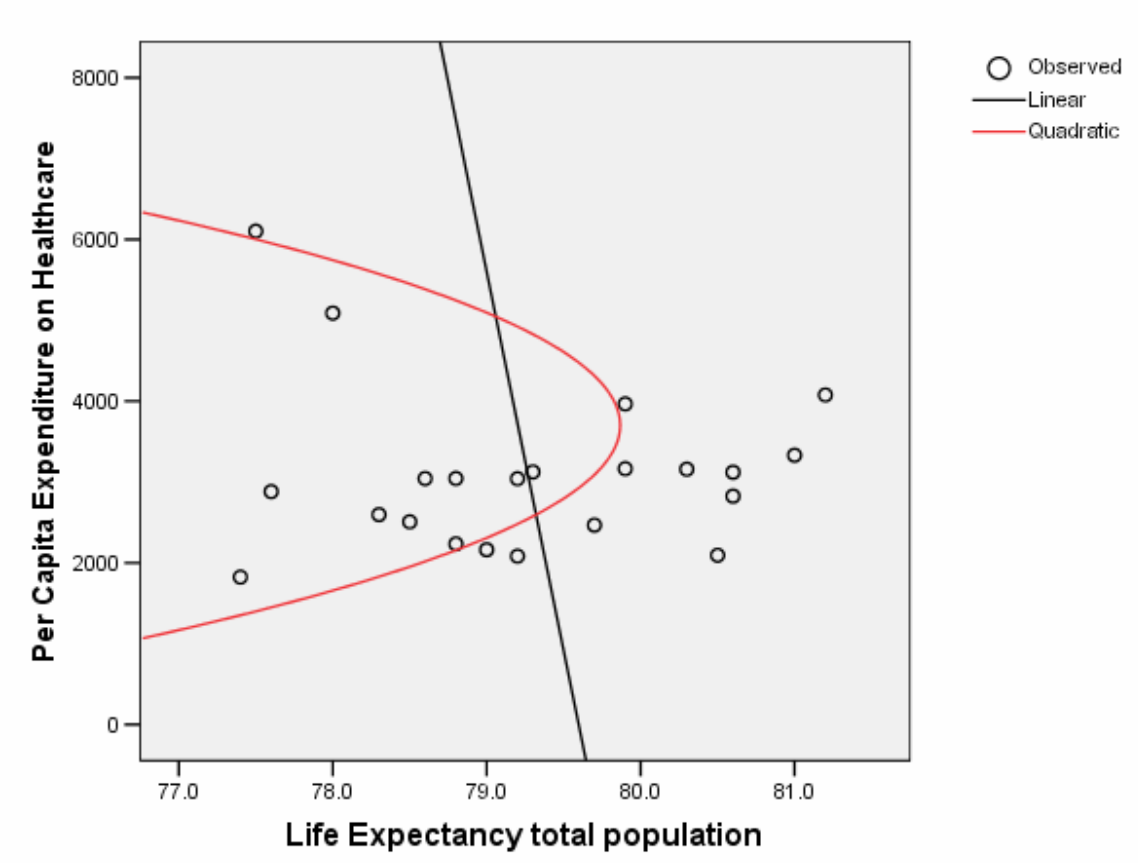


Figure 8: Linear and Quadratic Scatter Plot of Wealthy Countries Only
Source: OECD Health Data Set 2006

Table 5: Predicted Life Expectancy and Type of System
Source: OECD Health Data Set 2006, and Calculations from Equation 1

Country	Per Capita Expenditure	Predicted Life Expectancy	Life Expectancy	Difference	Health System	Mean Life Expectancy
Japan	2249	78.68	82.1	3.42	Universal	
Switzerland	4077	80.19	81.2	1.01	Universal	**Universal**
Iceland	3331	80.11	81	0.89	Socialized	79.45
Australia	3120	79.95	80.6	0.65	Socialized	
Sweden	2825	79.63	80.6	0.97	Socialized	**Socialized**
Spain	2094	78.35	80.5	2.15	Universal	77.51
France	3159	79.98	80.3	0.32	Universal	
Canada	3165	79.99	79.9	-0.09	Universal	**Free-Market**
Norway	3966	80.22	79.9	-0.32	Socialized	76.7
Italy	2467	79.09	79.7	0.61	Universal	
Austria	3124	79.95	79.3	-0.65	Universal	**Mean**
Netherlands	3041	79.88	79.2	-0.68	Universal	**Difference**
New Zealand	2083	78.33	79.2	0.87		
Greece	2162	78.50	79	0.50	Socialized	**Universal**
Belgium	3044	79.88	78.8	-1.08	Universal	0.17
Finland	2235	78.65	78.8	0.15	Socialized	
Germany	3043	79.88	78.6	-1.28	Universal	**Socialized**
United Kingdom	2508	79.16	78.5	-0.66	Socialized	-0.43
Ireland	2596	79.31	78.3	-1.01	Socialized	
Luxembourg	5089	79.13	78	-1.13	Universal	**Free-Market**
Denmark	2881	79.70	77.6	-2.10	Socialized	1.32
United States	6102	76.71	77.5	0.79	Free-market	
Korea	1149	75.65	77.4	1.75	Free-market	
Portugal	1824	77.70	77.4	-0.30	Socialized	
Czech Republic	1361	76.36	75.8	-0.56	Universal	
Mexico	662	73.80	75.2	1.40	Free-market	
Poland	805	74.37	75.1	0.73	Socialized	
Slovak R	777	74.26	74.1	-0.16	Socialized	
Hungary	1276	76.08	72.8	-3.28	Socialized	
Turkey	580	73.45	71.4	-2.05	Socialized	

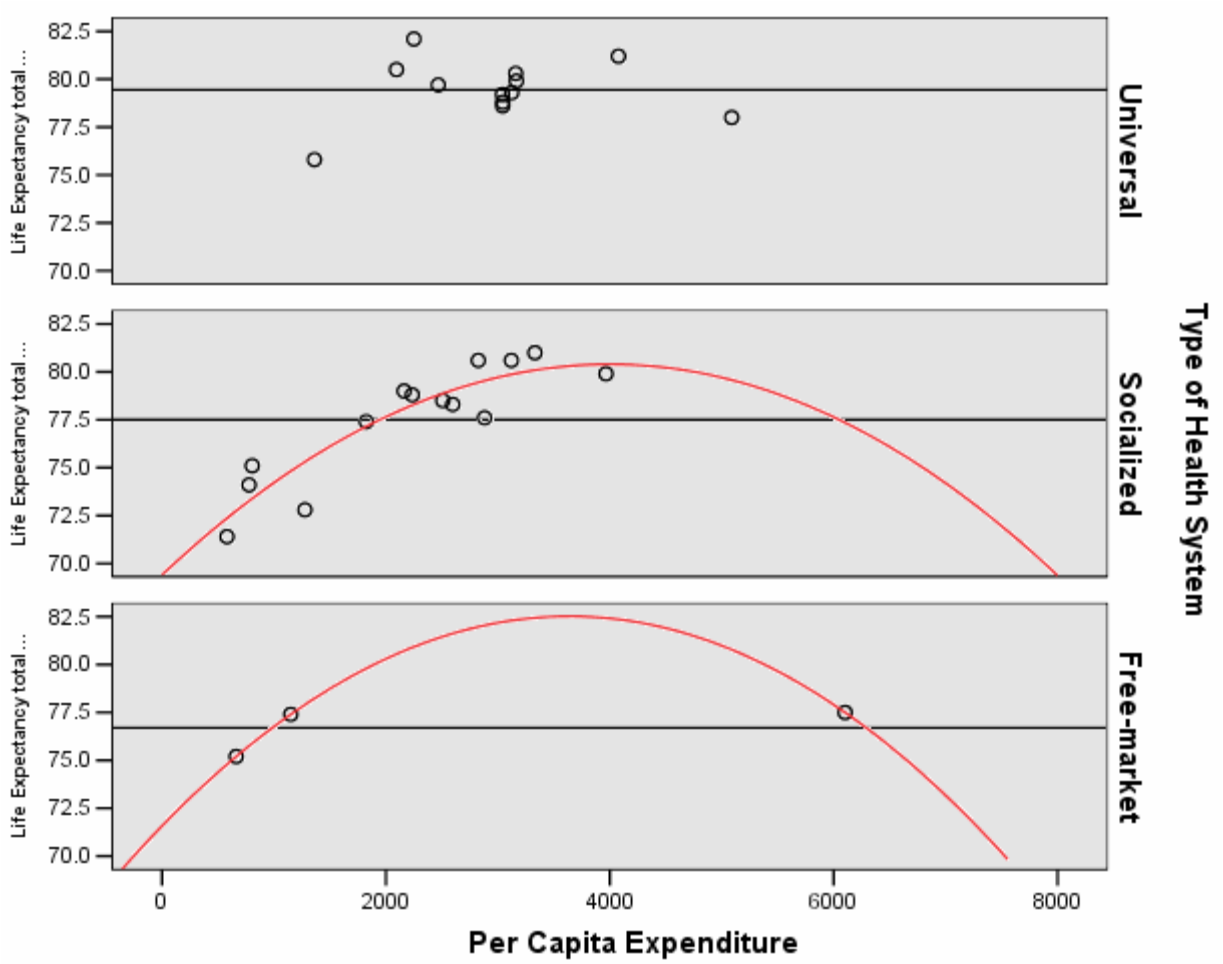


Figure 9: Life Expectancy and Per Capita Expenditure by System Type
Source: OECD Health Data Set 2006

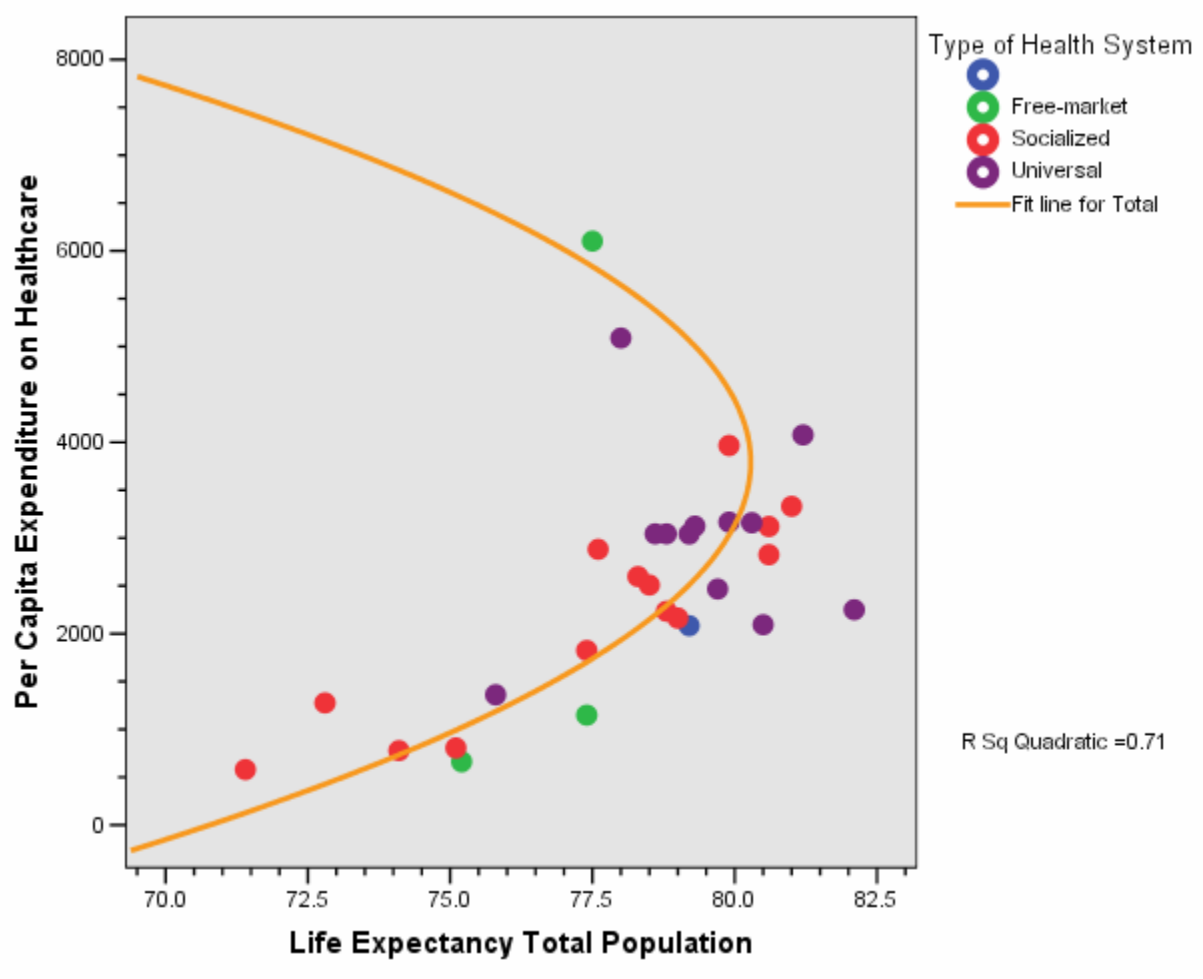


Figure 10: Quadratic Regression by System Type
Source: OECD Health Data Set 2006

Table 6: Model Summary for Quadratic Regression by System Type

Model Summary and Parameter Estimates

Dependent Variable: Life Expectancy total population Universal Healthcare System

	Model Summary					Parameter Estimates		
Equation	R Square	F	df1	df2	Sig.	Constant	b1	b2
Linear	.012	.125	1	10	.731	78.885	.000	
Quadratic	.312	2.044	2	9	.185	72.269	.005	-6.9E-007

The independent variable is $ Per Capita.

Model Summary and Parameter Estimates

Dependent Variable: Life Expectancy total population Socialized Healthcare System

	Model Summary					Parameter Estimates		
Equation	R Square	F	df1	df2	Sig.	Constant	b1	b2
Linear	.783	43.342	1	12	.000	71.793	.003	
Quadratic	.837	28.341	2	11	.000	69.408	.005	-6.9E-007

The independent variable is $ Per Capita.

Model Summary and Parameter Estimates

Dependent Variable: Life Expectancy total population Free-Market Healthcare System

	Model Summary					Parameter Estimates		
Equation	R Square	F	df1	df2	Sig.	Constant	b1	b2
Linear	.360	.561	1	1	.591	76.017	.000	
Quadratic	1.000	.000	2	0	.	71.581	.006	-8.3E-007

The independent variable is $ Per Capita.

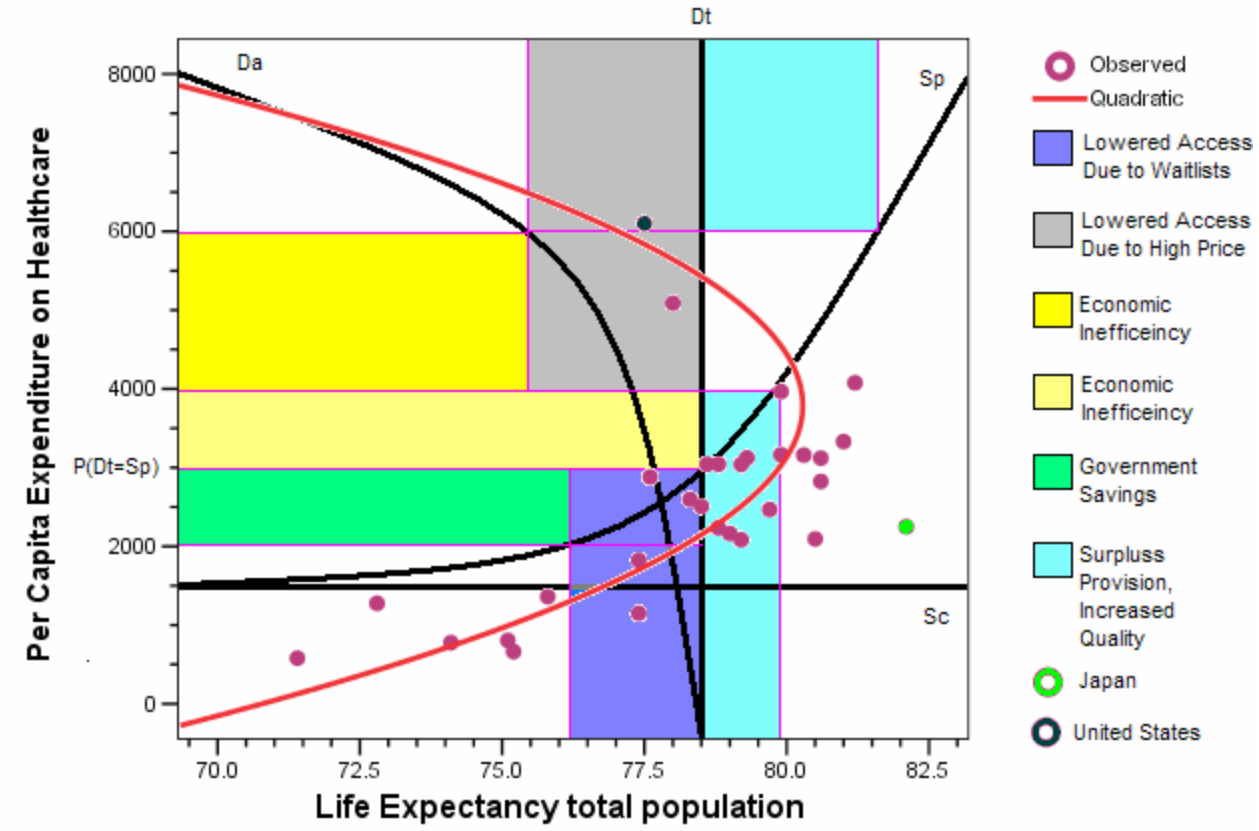


Figure 11: Quadratic Regression and Market Model Overlay
Source: OECD Health Data Set 2006 (For the Quadratic Regression)

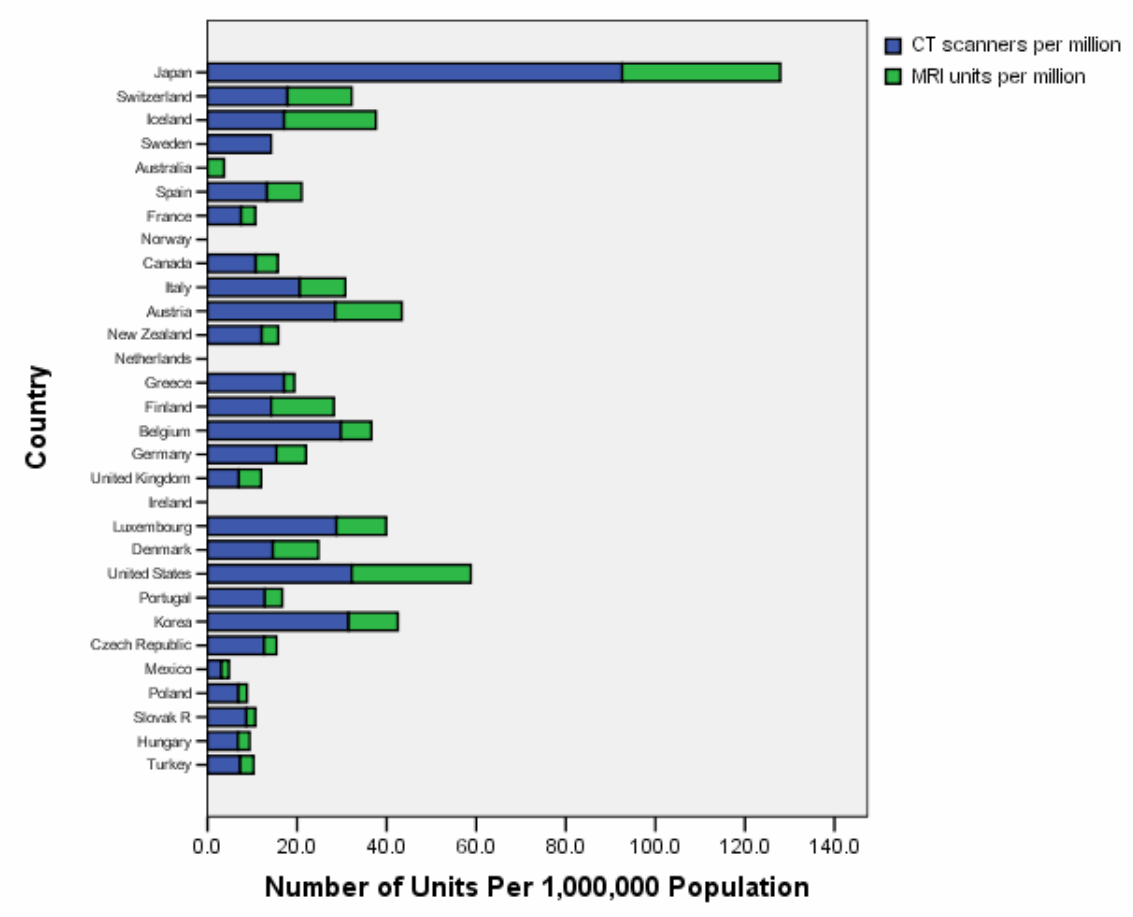


Figure 12: Number of High Tech Units Per Million
Source: OECD Health Data Set 2006 (Some Data Missing from OECD Data Set)

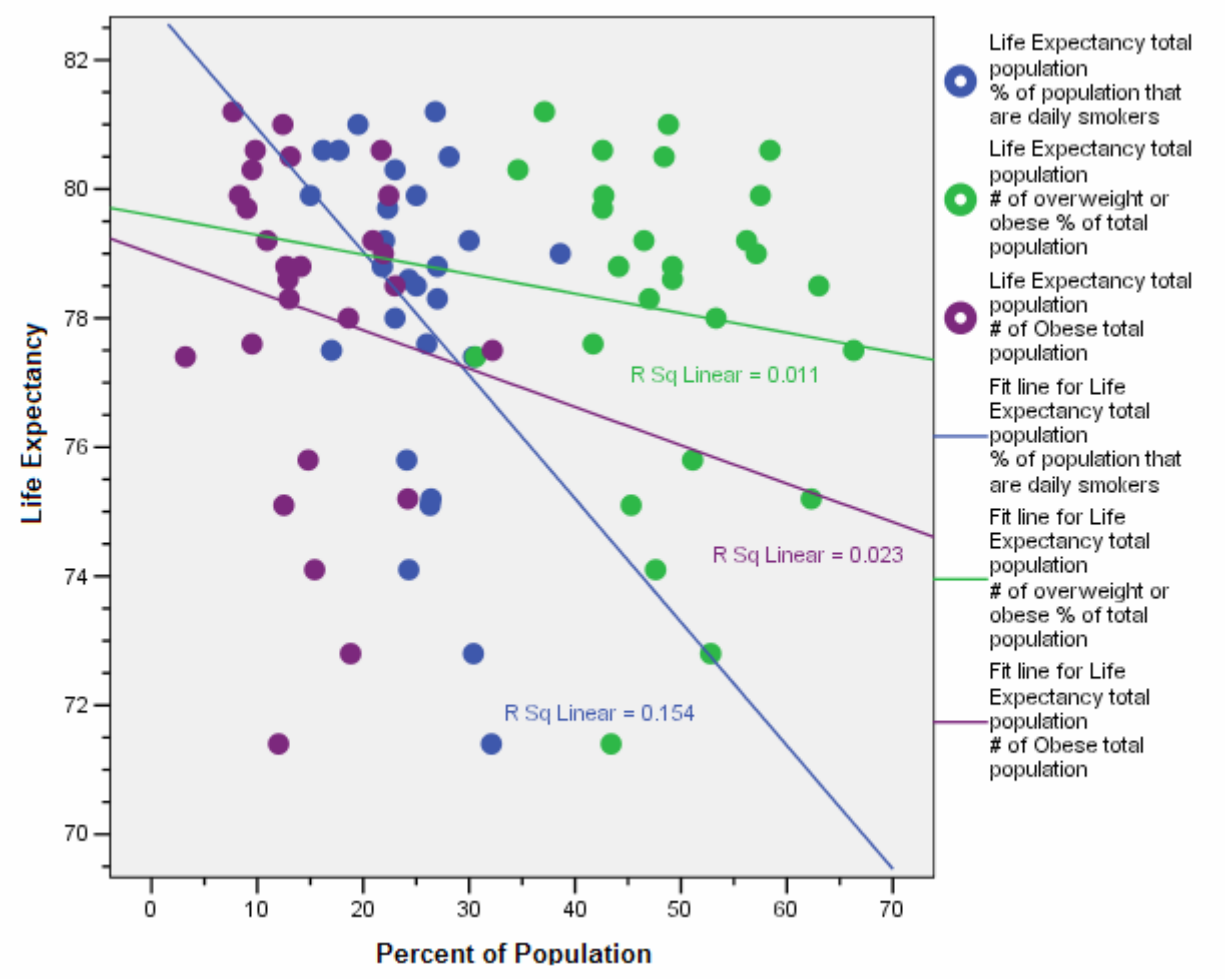


Figure 13: Life Style Factors and Life Expectancy
Source: OECD Health Data Set 2006 (Minus Poorest OECD Countries)

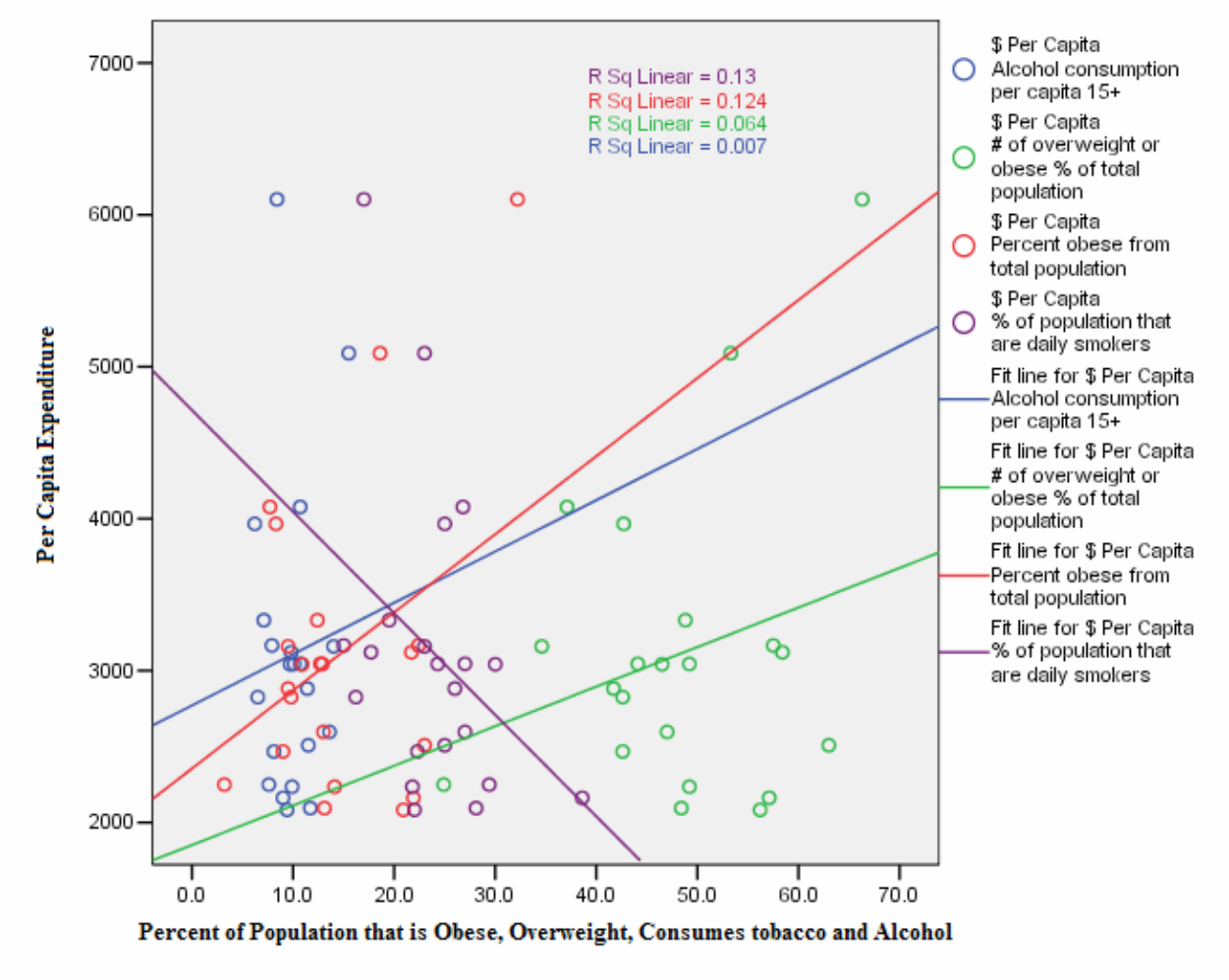


Figure 14: Life Style Factors as an Explanation for Expenditures
Source: OECD Health Data Set 2006 (Wealthy Countries Only, No Variables Significant)

Table 7: Summary for Infant Mortality and Per Capita Expenditure Regression

Model Summary and Parameter Estimates

Dependent Variable: Infant mortality per 1000 births

	Model Summary					Parameter Estimates		
Equation	R Square	F	df1	df2	Sig.	Constant	b1	b2
Linear	.198	6.908	1	28	.014	9.747	-.002	
Quadratic	.496	13.265	2	27	.000	16.928	-.008	1.03E-006

The independent variable is $ Per Capita.

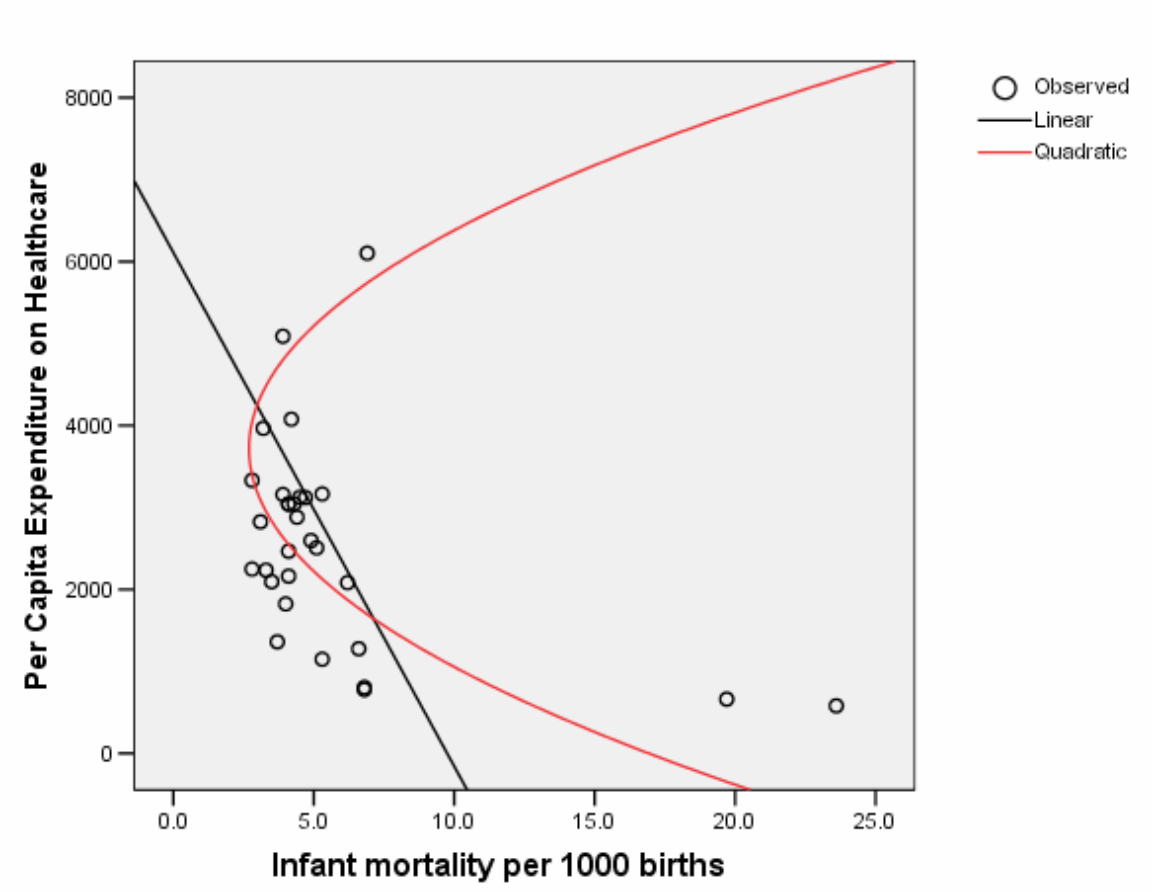


Figure 15: Linear and Quadratic Scatter plot of Infant Mortality and Per Capita Expenditure

Source: OECD Health Data Set 2006

Table 8: Model Summary for Cerebrovascular Deaths and Per Capita Expenditure

Model Summary and Parameter Estimates

Dependent Variable: Total Cerebrovascular deaths per 100,000

	Model Summary					Parameter Estimates		
Equation	R Square	F	df1	df2	Sig.	Constant	b1	b2
Quadratic	.511	8.876	2	17	.002	182.905	-.068	7.67E-006

The independent variable is $ Per Capita.

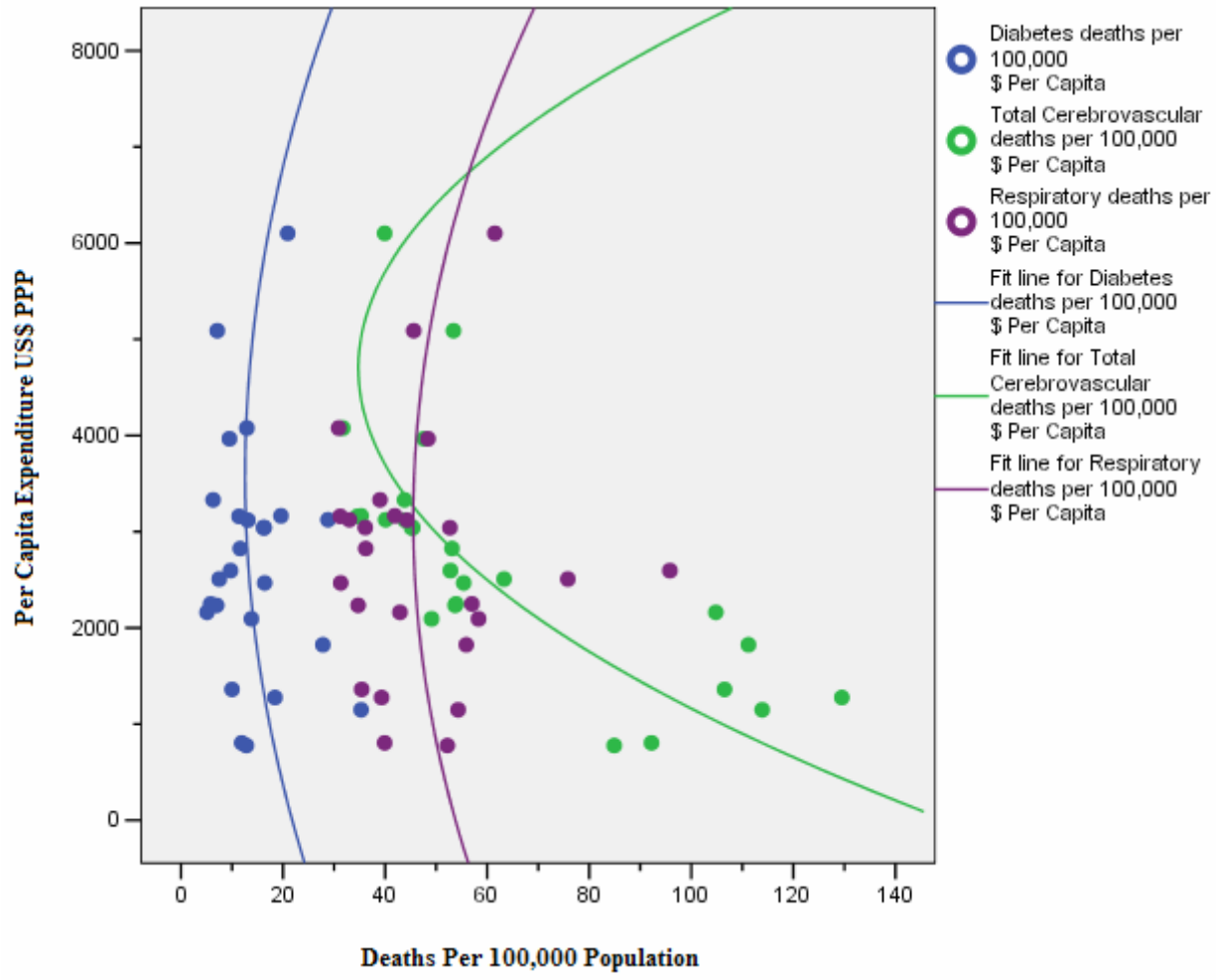


Figure 16: Complex Disease Deaths and Per Capita Expenditure
Source: OECD Health Data Set 2006

Table 9: Model Summary for Per Capita Expenditure and Healthcare Professionals

Model Summary and Parameter Estimates

Dependent Variable: Physicians per 1000

	Model Summary					Parameter Estimates		
Equation	R Square	F	df1	df2	Sig.	Constant	b1	b2
Quadratic	.257	4.666	2	27	.018	1.498	.001	-1.5E-007

The independent variable is $ Per Capita.

Model Summary and Parameter Estimates

Dependent Variable: Nurses per 1000

	Model Summary					Parameter Estimates		
Equation	R Square	F	df1	df2	Sig.	Constant	b1	b2
Quadratic	.493	13.151	2	27	.000	-.037	.005	-5.6E-007

The independent variable is $ Per Capita.

Model Summary and Parameter Estimates

Dependent Variable: Total # of doctors and nurses per 1000

	Model Summary					Parameter Estimates		
Equation	R Square	F	df1	df2	Sig.	Constant	b1	b2
Quadratic	.415	7.101	2	20	.005	-6.561	.010	-1.2E-006

The independent variable is $ Per Capita.

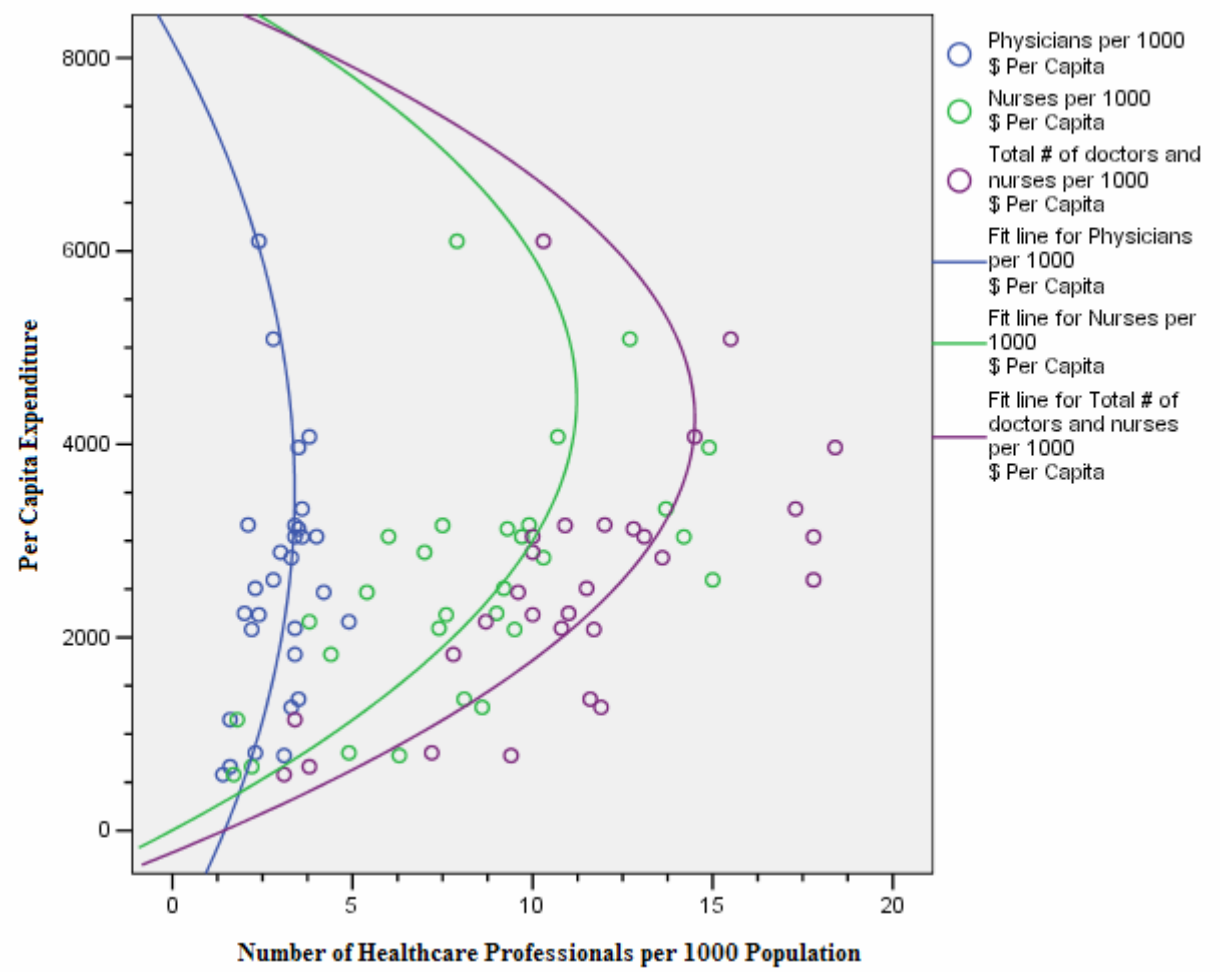


Figure 17: Healthcare Professionals and Per Capita Expenditure
Source: OECD Health Data Set 2006

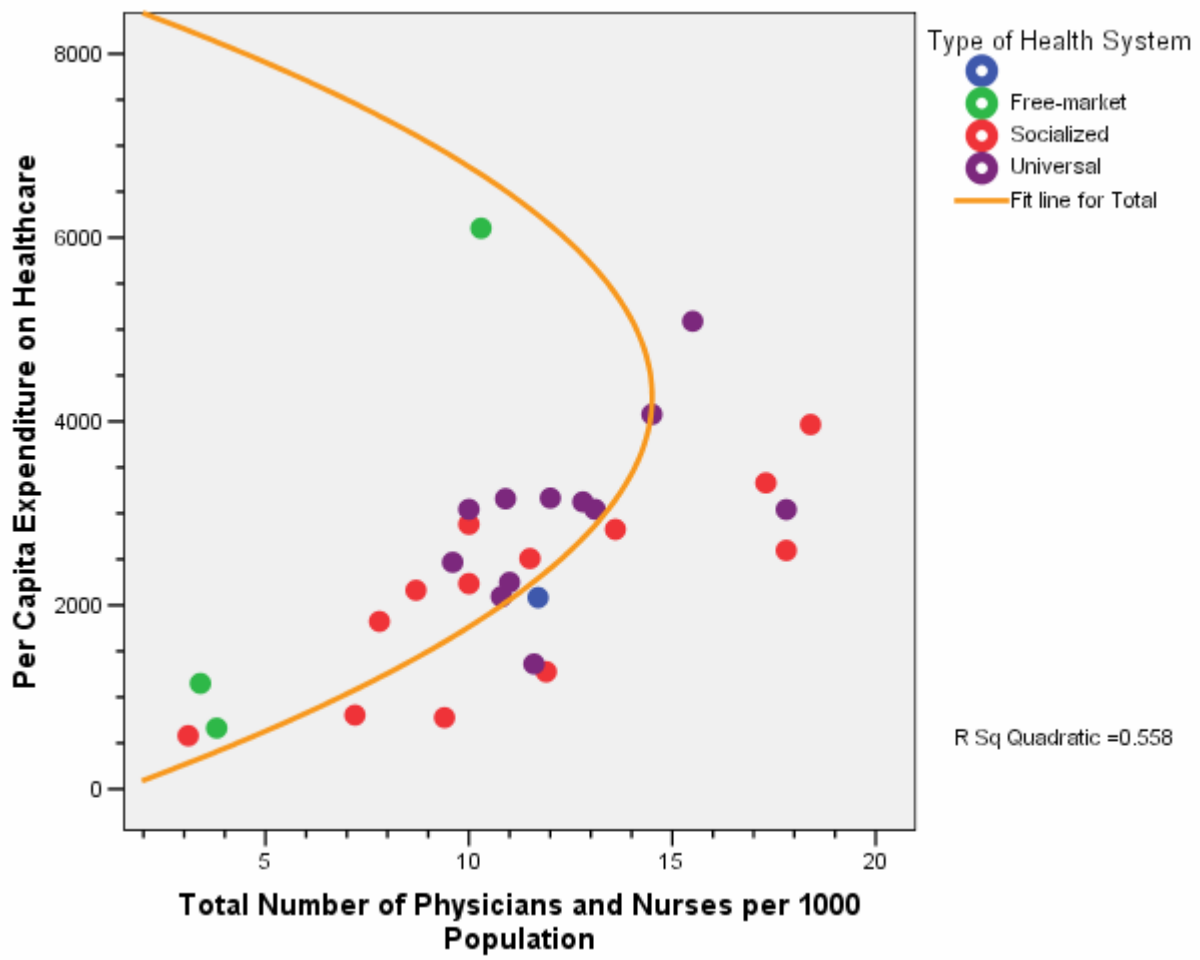


Figure 18: Medical Professionals Quadratic Regression by System Type
Source: OECD Health Data Set 2006

Table 10: Model Summary for Number of Healthcare Professionals and Life Expectancy

Model Summary and Parameter Estimates

Dependent Variable: Life Expectancy total population

	Model Summary					Parameter Estimates	
Equation	R Square	F	df1	df2	Sig.	Constant	b1
Linear	.111	3.496	1	28	.072	75.231	1.017

The independent variable is Physicians per 1000.

Model Summary and Parameter Estimates

Dependent Variable: Life Expectancy total population

	Model Summary					Parameter Estimates	
Equation	R Square	F	df1	df2	Sig.	Constant	b1
Linear	.253	9.483	1	28	.005	75.370	.348

The independent variable is Nurses per 1000.

Model Summary and Parameter Estimates

Dependent Variable: Life Expectancy total population

	Model Summary					Parameter Estimates	
Equation	R Square	F	df1	df2	Sig.	Constant	b1
Linear	.283	10.673	1	27	.003	74.391	.338

The independent variable is Total # of doctors and nurses per 1000.

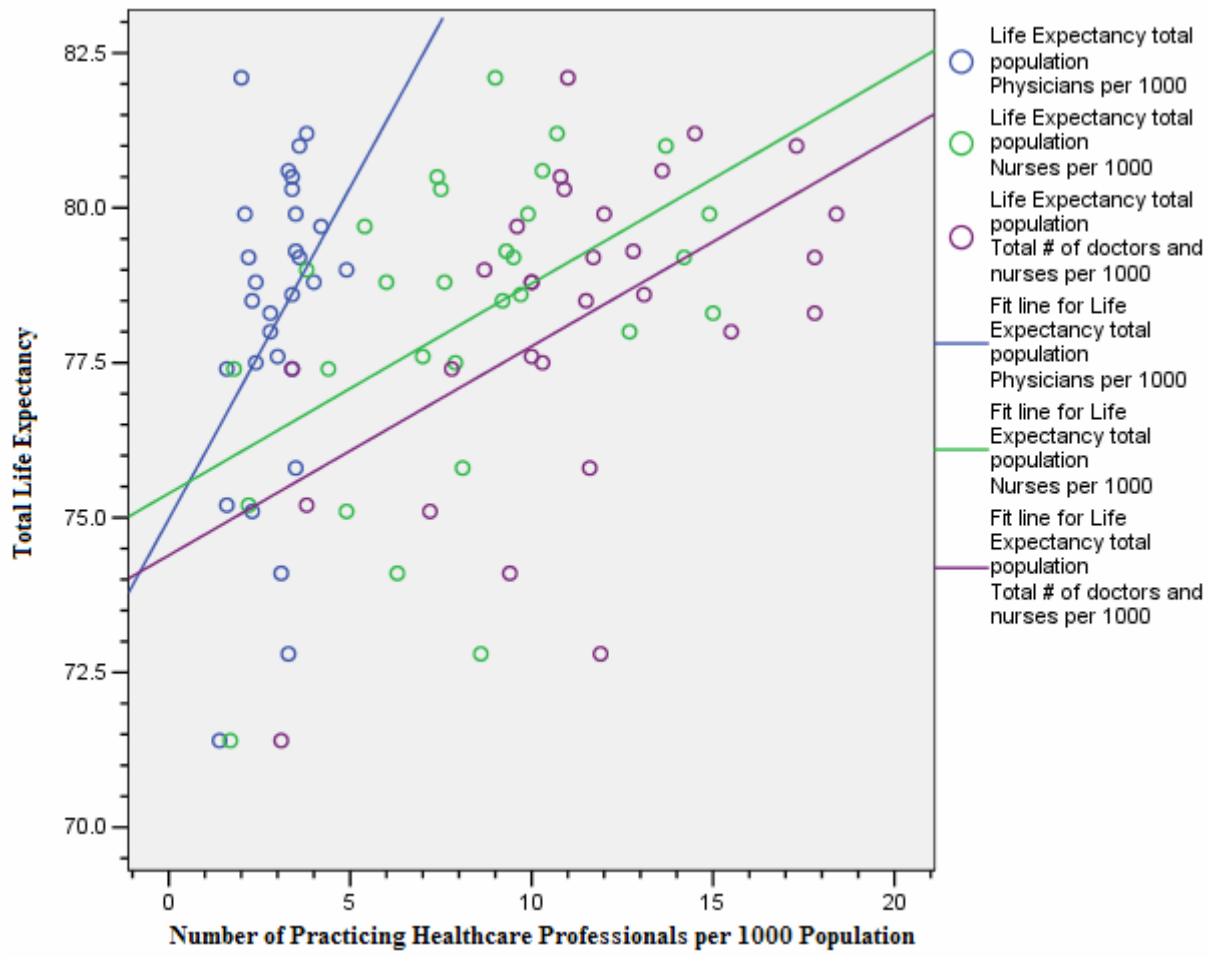


Figure 19: Number of Healthcare Professionals and Life Expectancy
Source: OECD Health Data Set 2006

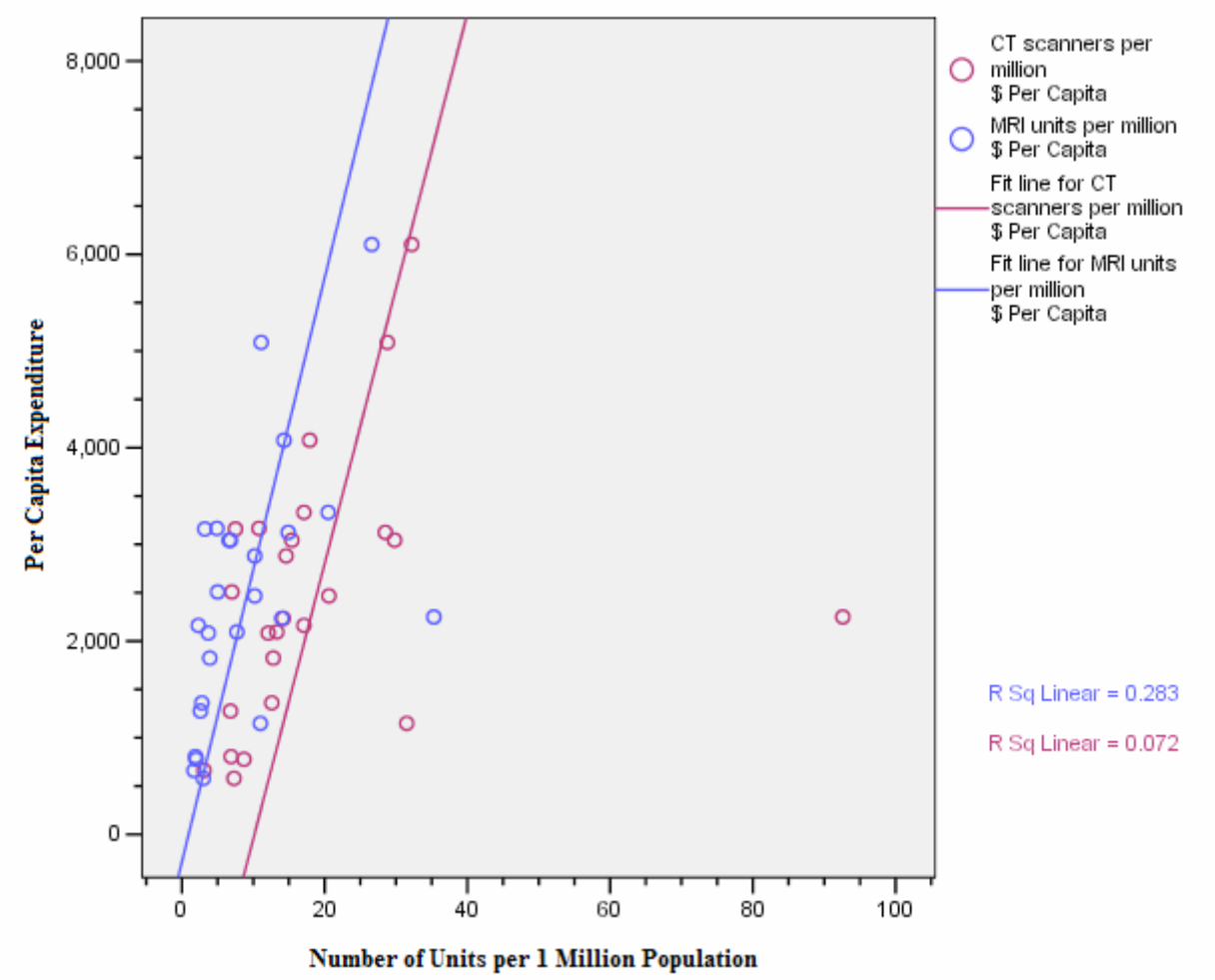


Figure 20: High Technology and Per Capita Expenditure
Source: OECD Health Data Set 2006

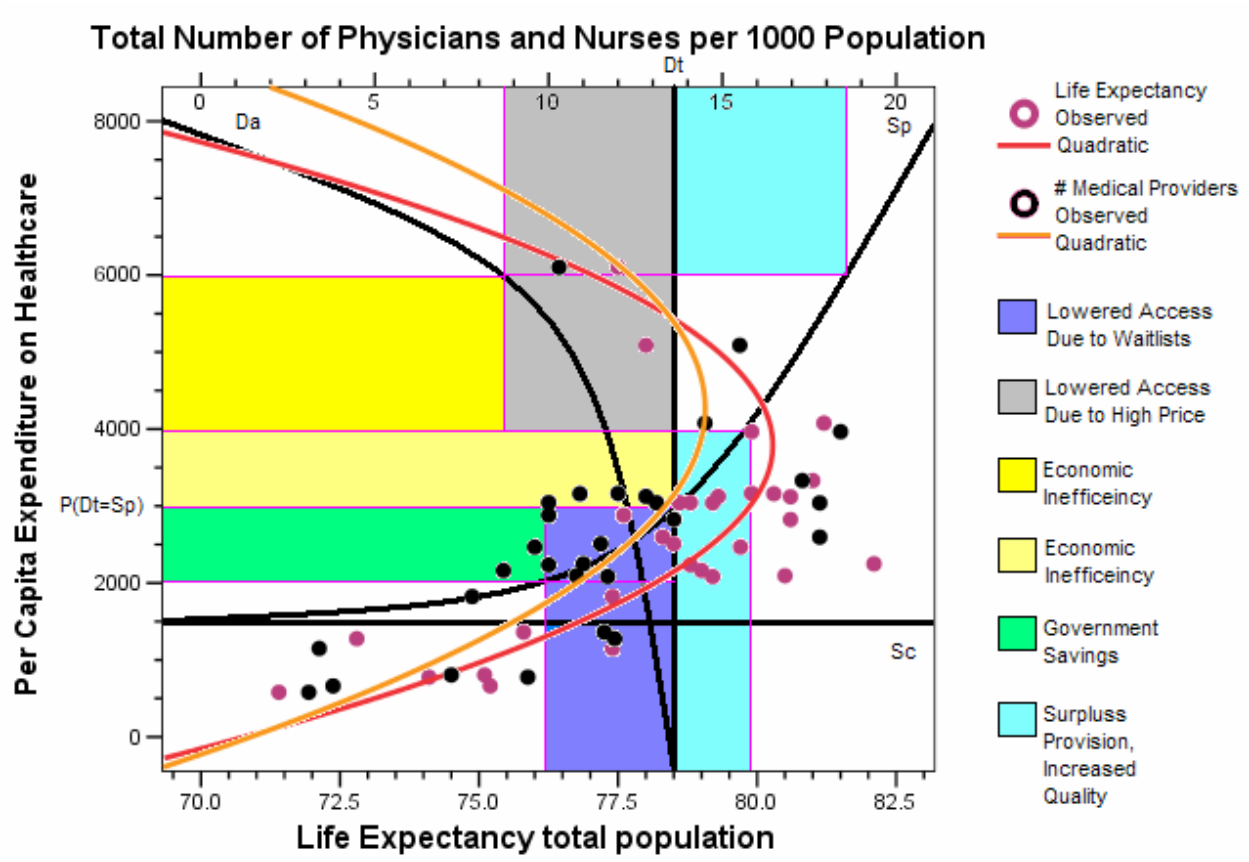


Figure 21: Quadratic Regressions for Medical Professionals and Life Expectancy Overlaid on Model

Source: OECD Health Data Set (For Quadratic Regressions Only)

CHAPTER 4: THE UNITED STATES

The difference between the United States and the rest of the developed world is in the identity of the price-setters. Because the United States uses the free-market to provide for most aspects of its healthcare system price controls cannot be managed on a system wide level. The United States remains an outlier only in how it chooses to finance healthcare, the actual market forces taking place on the U.S. healthcare system are the same as those in every other developed healthcare system.

Private insurance, usually provided by employers, is the main financing mechanism for healthcare in the United States:

> In 2001, 65 percent of employers offered health insurance benefits to their employees. Of Americans with employer-based health insurance in 2001, the majority (48 percent) are insured through preferred-provider organizations. Preferred-provider organizations are a type of managed care in which incentives (e.g., lower copayments) to individuals who use these providers. […] Twenty-three percent of Americans are enrolled in health maintenance organizations (HMOs). Individuals enrolled in HMOs pay a monthly premium and a small coypayment, usually around $10, for each visit and prescription. Most HMOs provide members a wide range of preventative and primary healthcare services that emphasize behaviors and services that will reduce disease and disability and avoid more costly care. Point-of-service plans allow a person to choose to receive services from participating of nonparticipating providers, but benefits are usually more limited if a nonparticipating provider is used. Of those employer-based health insurance, 22 percent had point-of-service plans in 2001. Only 7 percent of Americans with

employer-based health insurance had conventional health insurance plans, known as fee-for-service or indemnity plans, in 2001.[34]

However, the U.S. government does not rely solely on private methods for financing healthcare. The U.S. has various forms of public financing of healthcare, the most commonly known of which provides healthcare for the elderly population through the government called Medicare. The other systems are Medicaid, Veterans Health Administration and worker's compensation.[35] This creates two different healthcare markets in the United States. The Medicare program functions similarly to a single-payer market, because it is a single-payer system. The life expectancy of the elderly (those above age 65) in the United States for males is 16.8 years and 19.8 years for females. The average life expectancy for males in the advanced industrial countries of the OECD is 16.67 years and for females 20.11 years. In other words, once the United States government finances healthcare for the entire elderly population the life expectancy mirrors that of every other single-payer healthcare system. The United States has two healthcare markets, a free-market for the majority of the population and a single-payer system for the elderly. The population in the United States has high life expectancies after the age of 65, due to the guaranteed access to healthcare provided by Medicare. Figure 20 shows the life expectancies after age 65 in order of total life expectancy.

The U.S. is lower on the chart which shows that it has a lower total life expectancy, but at the same time its life expectancy for the elderly is much higher than its neighboring countries with lower total life expectancies. Total life expectancy for the United States is one of the lowest of all the industrialized OECD countries, but the life expectancy for those above the age of 65 is

[34] Fried 2002, pg 74
[35] Fried 2002, pg 72

almost exactly on average with all the OECD countries. This difference (the lower than OECD average total life expectancy compared to matching the average OECD life expectancy for the elderly) demonstrates the issue of access effecting life expectancy in the United States. Once U.S. citizens reach the age of 65 they are guaranteed access, and with a high quality system their life expectancies are increased. Total life expectancy in the United States is low, but the life expectancy for the elderly in the United States is high when compared to the rest of the OECD countries. The only factor that changed on a system wide level was the guaranteed access to healthcare by the elderly (if life style factors are held constant for both the entire U.S. population and the elderly population). Life style factors should remain constant in a given population (the overall U.S. population is overweight; therefore the elderly population in the U.S. is probably also overweight: Americans eat fatty foods; therefore, it is likely that elderly Americans eat fatty foods). It is not likely that the increase in life expectancy is due to changing life style factors (otherwise that would mean that a large number of the population on their 65 birthday happens to decide to change their diet, exercise routines, and lose weight). It would be reasonable to assume then, that the increase in life expectancy exhibited by the elderly in the United States is linked to the biggest change that occurred in the overall system from the age of 64 to 65, namely guaranteed access to healthcare. Figure 23 shows the uninsured in the United States by age group. The effects of the market forces on the two separate American healthcare systems match my market models if life style factors are held constant for the elderly population within the United States. The United States is not an outlier and the market is functioning in the same manner that it functions in every country, the difference is in the identity of the price-setter.

An examination of healthcare financing reveals the true nature of the inadequacies of free-market financing of healthcare in the United States compared to the other OECD countries.

The red area on Figure 24 represents the amount of money spent annually by the government in each country per capita, the blue area represents private expenditures which includes private insurance, co pays, and charitable monies. The U.S. government currently spends annually $2728 per capita on healthcare, and privately $3374 is spent annually per capita. The average spent annually by public expenditure in all thirty OECD countries is $1862.90, and $2226.17 annually per capita when examining only the advanced industrial countries. The United States government is currently spending more money per capita on healthcare than the average OECD country—in fact, it is fourth highest for public expenditures per capita in the OECD. And, it is currently spending more money per capita than the average of the advanced industrial countries that provide healthcare for their entire populations. These data suggests that given current expenditures in the United States, the government should be providing healthcare for the entire population not just the elderly. It also means that if the government were to take over price-setting in the medical system by creating a single-payer system additional expenditures would not be necessary and *the system currently has the funding, without raising taxes, to provide healthcare for the entire population*. The predicted life expectancy in the United States according to equation 1 is 76.71 years and the actual life expectancy is 77.5 years. If the United States, given current public expenditures of $2728 per capita on healthcare, were to take control of financing of healthcare by instituting a universal healthcare system and continue spending the same amount per capita on healthcare the predicted life expectancy for the country would be 79.5 years; a difference of two years. By changing how healthcare is financed, the United States could theoretically increase the overall life expectancy of the entire country by two years. To put this into context, Truth (a nonprofit organization against smoking, located online at www.whudafxup.com) claims that 5.6 million years of potential life is lost each year in the

United States due to smoking.[36] With a population of 300 million, that amounts to .02 years off the life expectancy of every American. If no one in the country smoked tobacco the life expectancy of the U.S. population would only be increased by .02 years, but changing the financing of healthcare would increase the life expectancy by 2 full years.

How is it possible that the U.S. government is already spending enough per capita to provide healthcare for the entire population, but only actually be providing healthcare for the elderly? The Medicare program (prior to the partial privatization of the program under the Bush administration—which, according to my model, there is little wonder why the latest reports show that the privatization of Medicare has actually increased costs) was able to price-set. Medicare offered the same amount of money statewide for medical procedures, which was able to keep costs lower than private insurance. However, due to the free-market system Medicare is still being charged more than necessary if the government were to control the funding of the entire medical system in the United States. For example, whereas insurance providers are charged $10 for a dose of Tylenol which actually only costs $1, Medicare is only charged $5 (not actual amounts, values are created for demonstrative purposes only). Medicare is able to keep prices lower than private insurance companies, by setting standard prices for all medical providers that receive Medicare payments. A recent study by the state of Pennsylvania showed this exact fact[37]. Medicare was charged a flat rate across the state, whereas insurance providers were charged variable prices. The *New York Times* notes that:

> The report by the Pennsylvania Health Care Cost Containment Council, a state agency, provides a rare glimpse of such detailed information about hospital payments and patient

[36] Truth 2007
[37] New York Times June 14, 2007

> outcomes. And the seemingly random nature of payments is striking. Although Federal Medicare payments are largely fixed, they varied somewhat among Pennsylvania hospitals surveyed. The far greater disparity involved commercial insurers, which must negotiate their rates hospital by hospital.[38]

Variable pricing occurs, because, as the *New York Times* notes, insurance providers are not given information on what hospitals are charging other insurers. Every insurance company must negotiate individually with hospitals for prices. Given their lack of information they are unable to gain control over price in any reasonable manner. This lack of price negotiation by insurance providers creates, which is seen in Figure 25, even more waste in the U.S. healthcare market, and it further decreases access. Figure 25 shows the difference that private insurers are charged over what the government insurers are charged. According to Blue Cross Blue Shield there were 2,984 non-profit hospitals operating in the United States in 2003, 790 for-profit hospitals and 1121 state and government hospitals.[39] The majority of hospitals in the United States are either non-profit or government owned. No matter if a hospital is non-profit or for-profit hospitals are charging more for services from private insurers than from government insurers in both situations. The Pennsylvania Health Care Cost Containment Council (PHC4) stated in its report on healthcare in the State of Pennsylvania that:

> All but 22 of the 174 GAC [General Acute Care] hospitals [in the State of Pennsylvania] functioned solely as non-profit organizations. All income or 'profit' from their operations is retained within the organization. The primary uses of income are to fund

[38] New York Times June 14, 2007, pg C4
[39] Blue Cross Blue Shield 2007, pg 33

> capital improvements, retire outstanding debt, and to provide a reserve in the event revenues do not cover expenses in the future.[40]

Whether hospitals are using profits to return to shareholders, or to fund capital improvements and build reserves, they are still attempting to gain profits. Even non-profit hospitals are acting in a profit-seeking manner. The PHC4 reports that private insurance paid an average of $10,306 per patient at inpatient discharge, and Medicare paid an average of $9,361 per patient at inpatient discharge, for a difference of $945 per patient.[41] The PHC4 reports that, in 2006, 538,700 inpatients with private insurance were discharged.[42] The $945 payments per patient by private insurance above Medicare payments multiplied by the number of privately insured discharges shows that $509,071,500 was paid by private insurers over the costs that Medicare would have paid. This $509 million came from the State of Pennsylvania alone. Medicare could have been able to negotiate a difference of $509 million less than private insurance was able to do. The United States spends $6102 per capita on healthcare, with a population of around 300 million, which amounts to a total of $1.8 trillion dollars being spent on healthcare. If all 50 of the U.S. states could each save the same amount that the State of Pennsylvania could have on inpatient care alone, it would equal $25.45 billion in savings from current expenditure levels on inpatient hospitalizations. $25.45 billion is 1.4 percent of the $1.8 trillion spent on healthcare in the United Sates. Clearly price negotiations through government have the ability to decrease costs. Thirty percent of U.S. healthcare expenditures went to hospital care.[43] The PHC4 reports that 62% of the money taken in by hospitals came from inpatient care.[44] Sixty-two percent of the

[40] Pennsylvania Health Care Cost Containment Council 2007, pg 1
[41] Pennsylvania Health Care Cost Containment Council 2007, pg 12
[42] Pennsylvania Health Care Cost Containment Council 2007, pg 12
[43] Blue Cross Blue Shield 2007, pg 37
[44] Pennsylvania Health Care Cost Containment Council 2007, pg 7

30% equals 18.6% of the $1.8 trillion, leaving 81.4% of the money spent on healthcare in the United States coming from areas other than inpatient care. If 1.4% can be saved in a sector of the healthcare system that accounts for less than a fifth of overall expenditures, it is reasonable to believe that the other four fifths could have similar savings, for a total savings of 7% just by restructuring insurance to be provided by the government.

Private insurance companies cannot negotiate the lowered prices that the government Medicare program negotiates. Private insurance companies wishing to make a profit, and having little control over price, must create profits by denying claims, restricting the use of expensive procedures and pharmaceuticals (variable co-pays on prescriptions are a primary example), and flat out denying access to health insurance for those living with costly illnesses, such as HIV, Juvenile Diabetes, and other long term illnesses. All these methods of profit seeking by private insurance further decrease access, and, unfortunately, this decreased access is usually felt most by those who need medical care the most (those with long term illnesses). The free-market also gives incentives for medical providers to work primarily in the areas that can earn the most money. Primary care physicians are actually in short supply:

> Although certain specialties have an oversupply of physicians, many parts of the United States are classified as 'medically underserved areas.' In fact, more than 46 million people live in areas with shortages of primary health professionals, and 25 million live in areas with shortages of dental health professionals.[45]

[45] Fried 2002, pg 77

These shortages in routine care further decrease access to healthcare and lower the total life expectancy. Blue Cross Blue Shield notes that primary care physicians as a percentage of all physicians is down to 58.5% in 2003 from 63.6% in 1990 and 66.2% in 1980.[46]

Often the pharmaceutical industry is discussed when speaking of the U.S. healthcare system. It has been argued that healthcare in the United States is more expensive because it is subsidizing the healthcare systems of the rest of the world by paying for pharmaceutical research.[47] Figure 26 shows that there may be some credibility to this argument. It is true that the United States does pay more for pharmaceuticals than other OECD countries (OECD average is $396, and the United States pays $751). Those costs account for a relatively large part of the over expenditure on medical care in the United States. The U.S. is paying almost twice as much as the OECD average, but the extra $355 per capita spent by the U.S. on pharmaceuticals only accounts for about twelve percent of the total waste in the U.S. healthcare market (the U.S., as stated earlier, pays roughly $3,000 more than the OECD average on healthcare, and pays $355 more on pharmaceuticals than the OECD average, the $355 amounts to 11.8% of the $3,000 being spent on healthcare over the OECD average). However, an examination of the pharmaceutical industry shows that U.S. $31.477 billion was spent on research[48] and U.S. $11.443 billion was spent on advertising.[49] To put this into context, if the U.S. population is 300 million and each person is paying $751 on pharmaceuticals yearly, then the total spent on pharmaceuticals in the United States is $225.3 billion. The 11 billion dollars spent on advertising represents 5 percent of the money spent on pharmaceuticals and the 31 billion dollars spent on research and development represents 13.9 percent and cannot account for the high U.S.

[46] Blue Cross Blue Shield 2007, pg 38
[47] Schweitzer 1997
[48] National Science Foundation, online at http://nsf.gov
[49] Blue Cross Blue Shield 2007, pg 44

expenditures on healthcare. Obviously pharmaceutical research costs are not the reason for an over-priced U.S. healthcare system, and the United States is not subsidizing the healthcare systems of other countries. Figure 28 further shows the research and development expenditures of all the OECD countries, which further demonstrates that the United States is not leading the world in research and development costs.

In the end, the United States remains an outlier compared to other OECD countries because of its absence of using government-run healthcare insurance, not because the market forces are any different from the rest of the developed world. It is true, that if one has enough money, the United States has one of the best quality healthcare systems in the world and access is not limited. However, if one does not have the financial backing or insurance, the United States may as well not even have a healthcare system. The wealthy countries of the OECD have an average life expectancy of 79.39 years. The United States has an average life expectancy of 77.5 years. Most likely, (according to all the aggregate data in chapter 3) the decreased access to healthcare in the United States is costing the entire population almost two years off of their total life expectancy. Those 46,000,000 uninsured Americans (usually from the poorer classes in society)[50] are most likely decreasing the total life expectancy of the entire country. The OECD report on *Income Inequality and Health* states that:

> With respect to *physician utilization*, need is more concentrated among the worse off, but after 'standardizing out' these need differences, significant horizontal inequity favoring the better off is found in about half of the countries, both for the probability and the total

[50] United States Department of Health and Human Services

number of visits. The degree of pro-rich inequity in doctor use is highest in the US, followed by Mexico, Finland, Portugal and Sweden.[51]

These data seems to suggest one simple fact—the United States should restructure the financing of healthcare, and by doing so, force negotiations between healthcare providers and healthcare financers. Costs could be contained and reduced, and life expectancy could be increased by increasing access to medical care. If a universal healthcare financing system were to be implemented, overall costs should be reduced rapidly by removing variable pricing, decreasing over-pricing in the system, and removing incentives for regional hospitals to buy expensive equipment that it does not have the population to support (government can control the purchasing of equipment on a population basis). If the Pennsylvania study holds true for the rest of the country, then government should be able to decrease expenditures on healthcare by 7%, or $427 per capita overnight, and if it could also reduce the pharmaceutical costs to match those of the rest of the OECD it could reduce per capita expenditure by another $355, for a total savings of $782 per capita. Per capita expenditure could be reduced to $5320, which should also increase access according to the market models in chapter 2, and the quadratic regression. Equation 1 predicts that the life expectancy of the United States with expenditures at $5320 would be 78.69 years, an increase of one year. However, such a policy would receive, and has received, great resistance by healthcare providers, insurance providers, and high tech companies such as pharmaceuticals. Profits would be reduced for all of those involved in the healthcare system, access would be increased, and the quality (given that the United States government is already paying the fourth highest in per capita public expenditures for healthcare) should remain very high.

[51] OECD 2004, pg 6

Figures and Tables

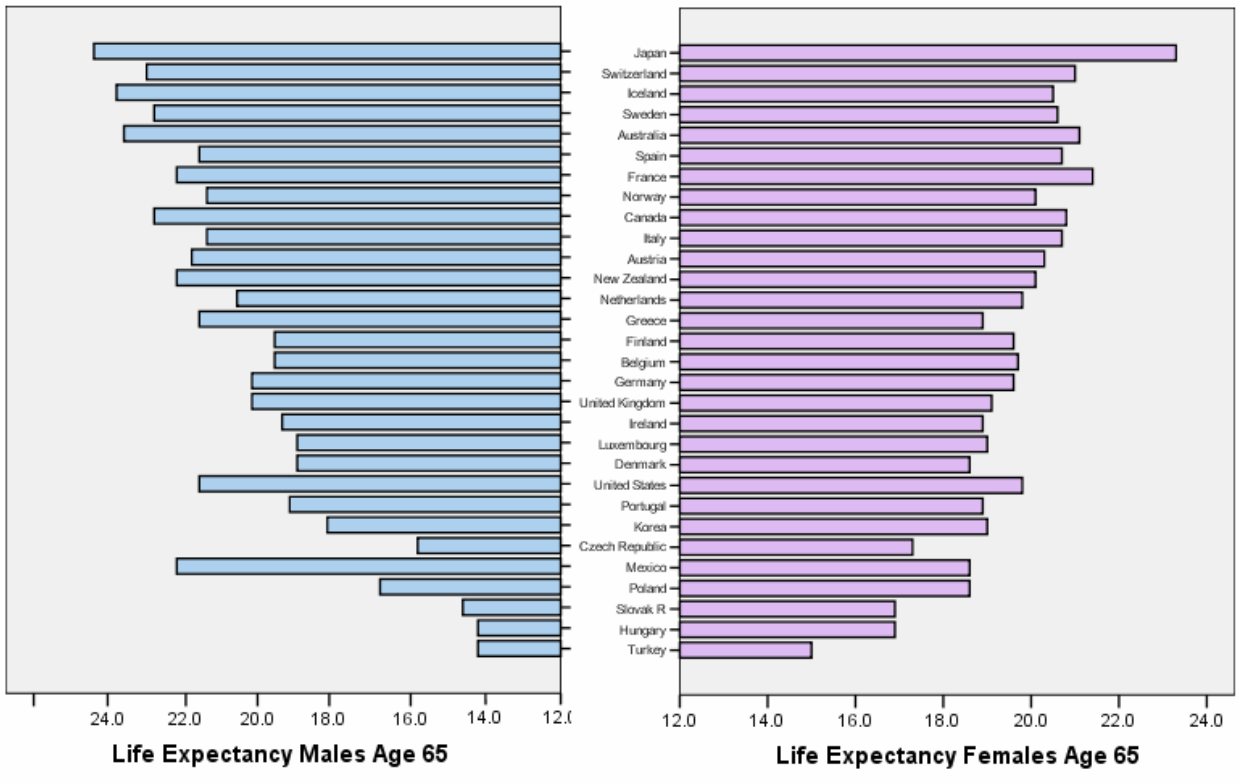


Figure 22: Life Expectancy after Age 65
Source: OECD Health Data Set 2006

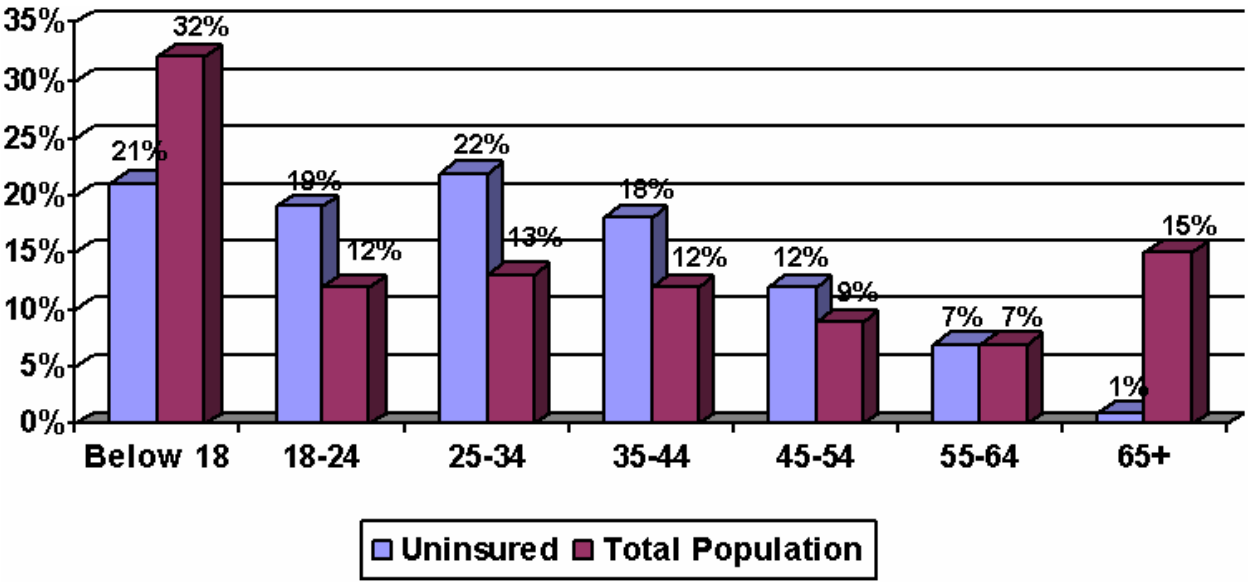


Figure 23: Distribution of the Uninsured and Total U.S. Population by Age
Source: The United States Department of Health and Human Services

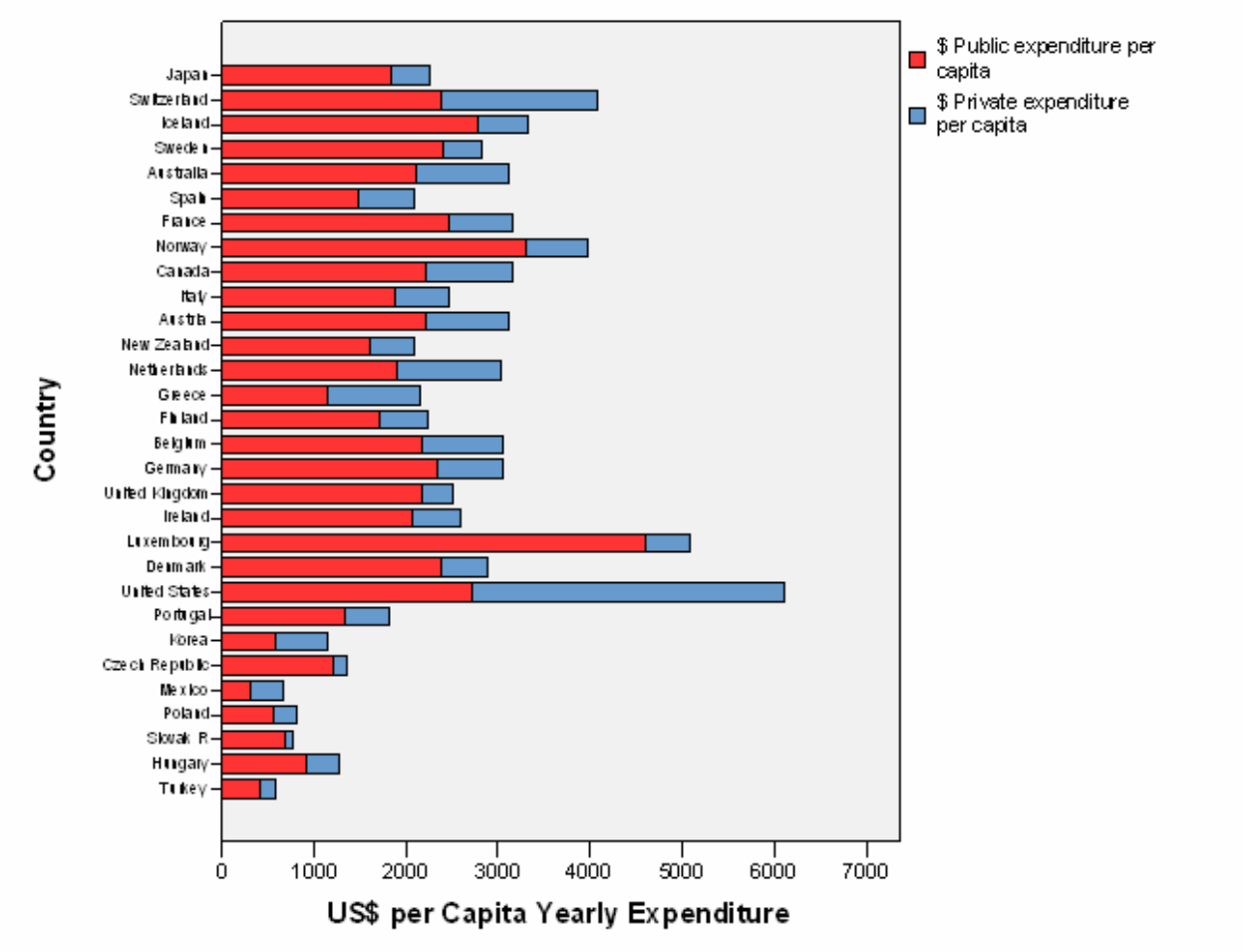
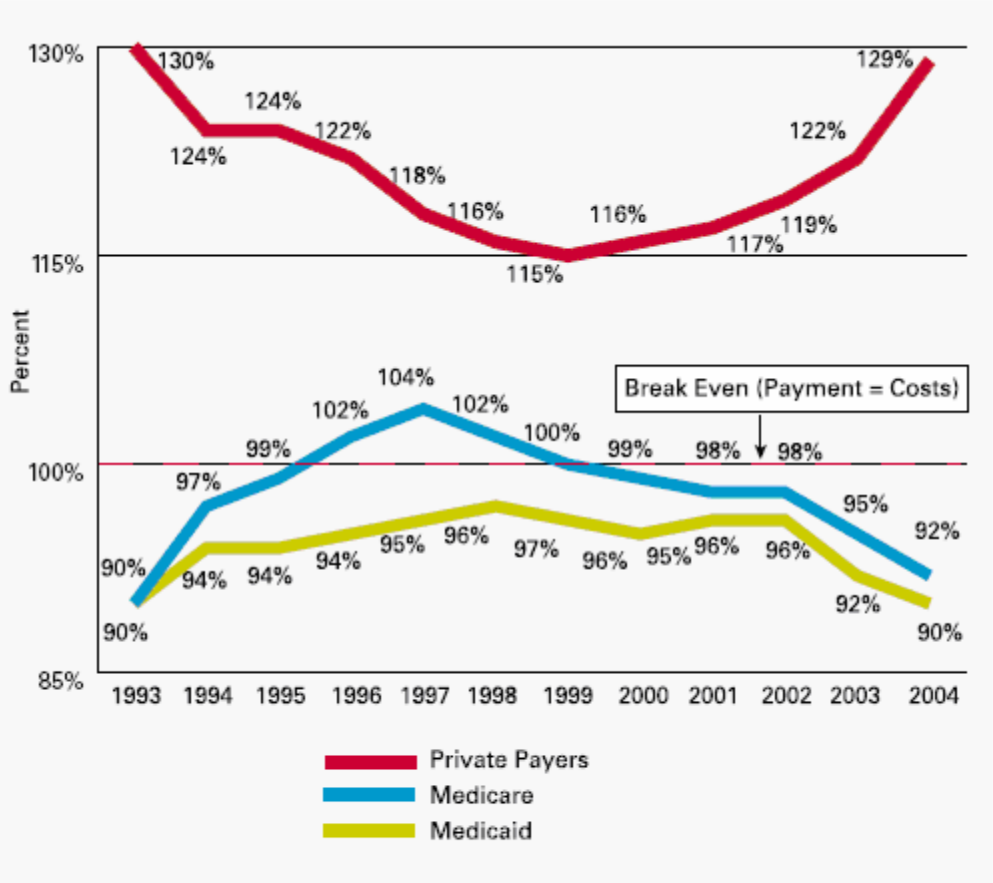


Figure 24: Healthcare Financing
Source: OECD Health Data Set 2006



Note: Payment-to-cost ratios indicate the degree to which payments from each payer covers the costs of treating that provider's patients. Data are for community hospitals and cover all hospital services. Imputed values were used for missing data (about 35% of observations). Most Medicaid managed care patients are included in the private payers' category.

Figure 25: Hospital Payments by Source of Funding
Source: Blue Cross Blue Shield 2007

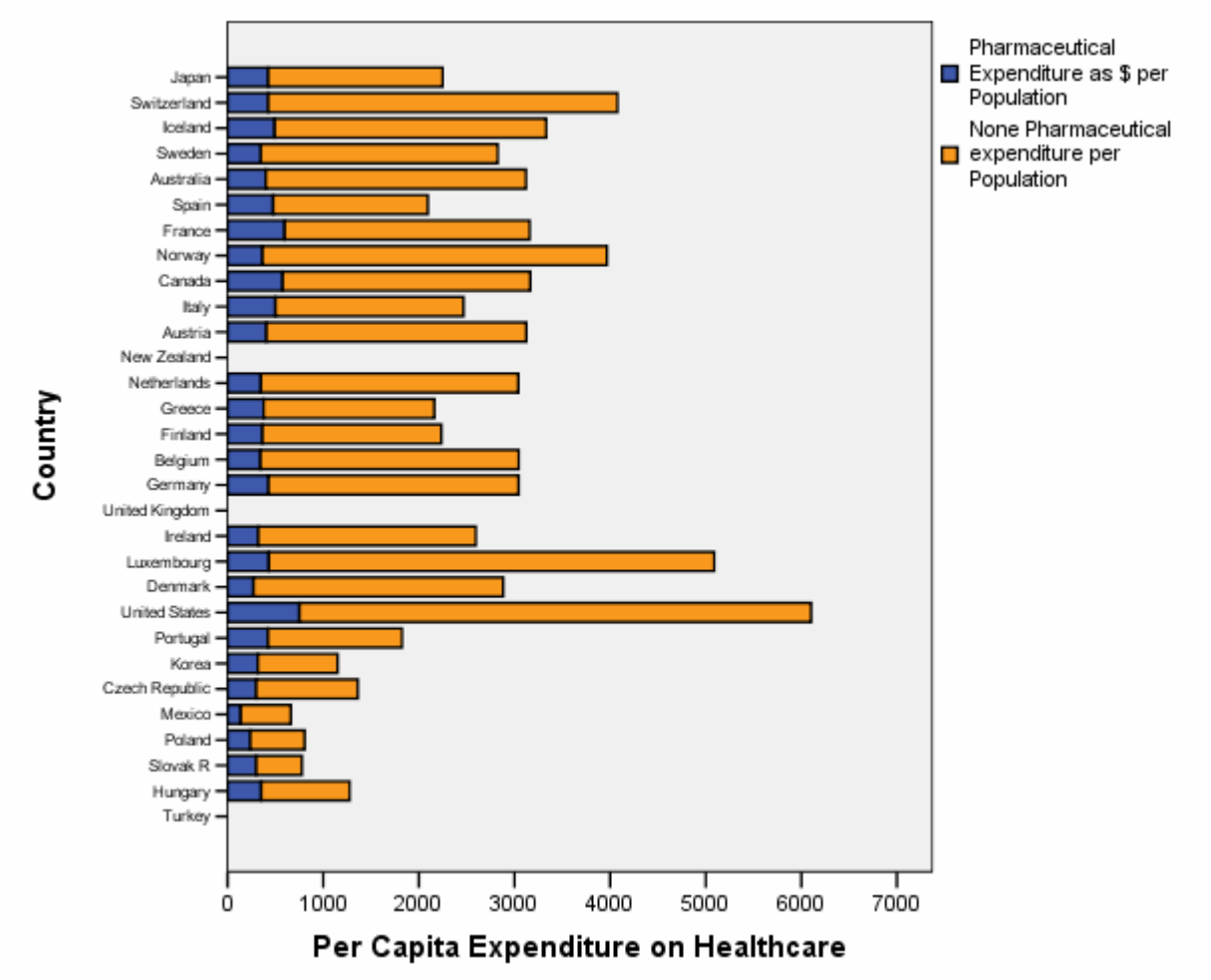


Figure 26: Pharmaceutical Expenditures
Source: OECD Health Data Set 2006

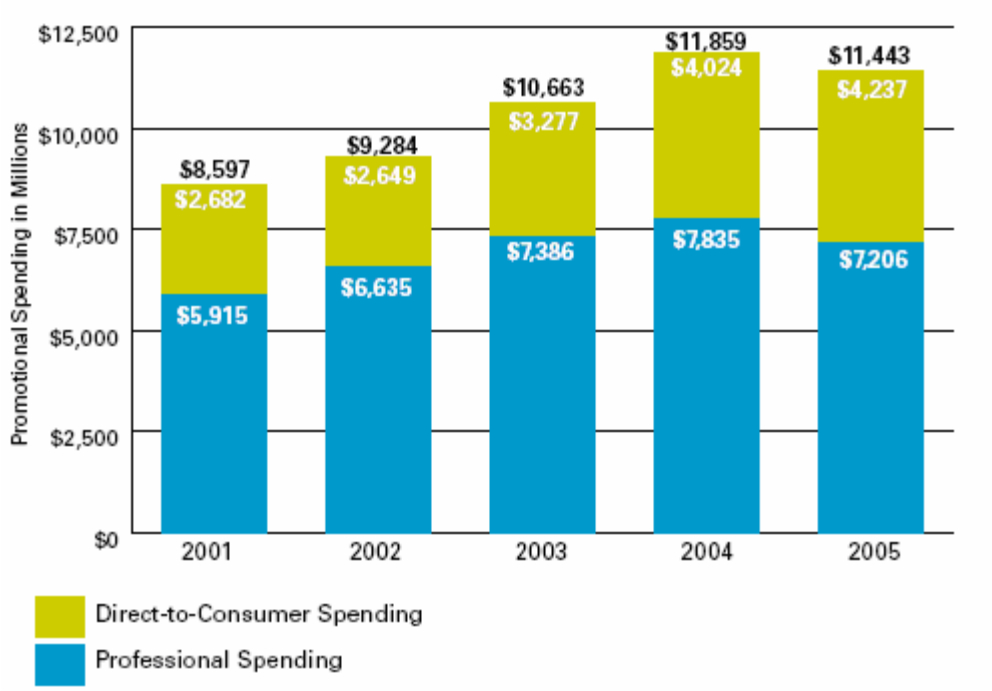


Figure 27: Advertisement Expenditures by Pharmaceutical Companies
Source: Blue Cross Blue Shield 2007

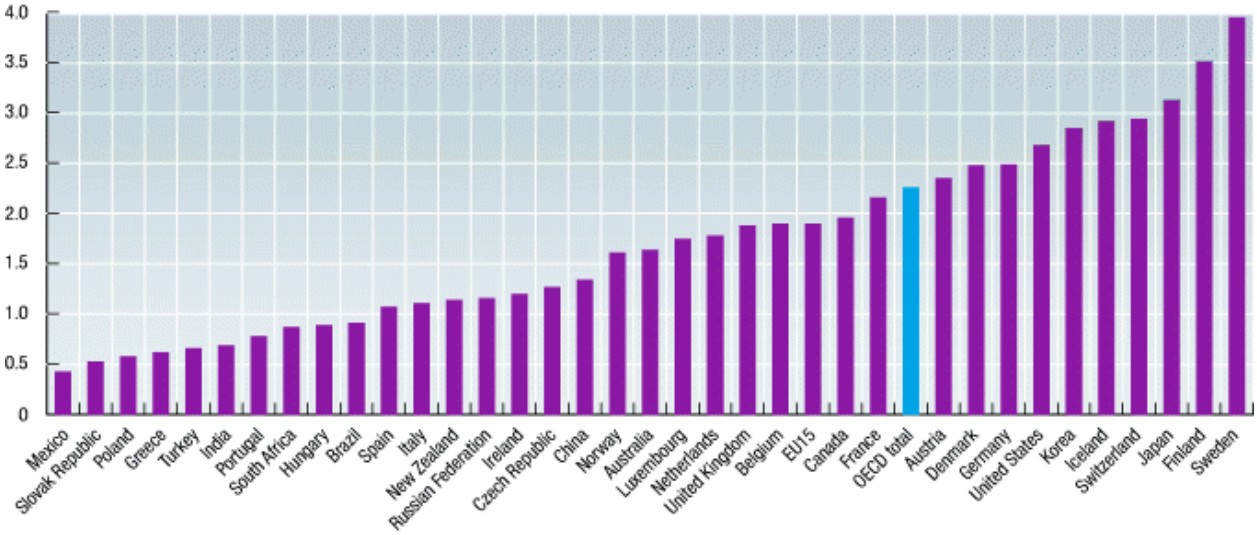


Figure 28: Gross Domestic Expenditure on R&D (As a Percentage of GDP, 2005 or Latest Available Year)
Source: OECD Factbook 2007

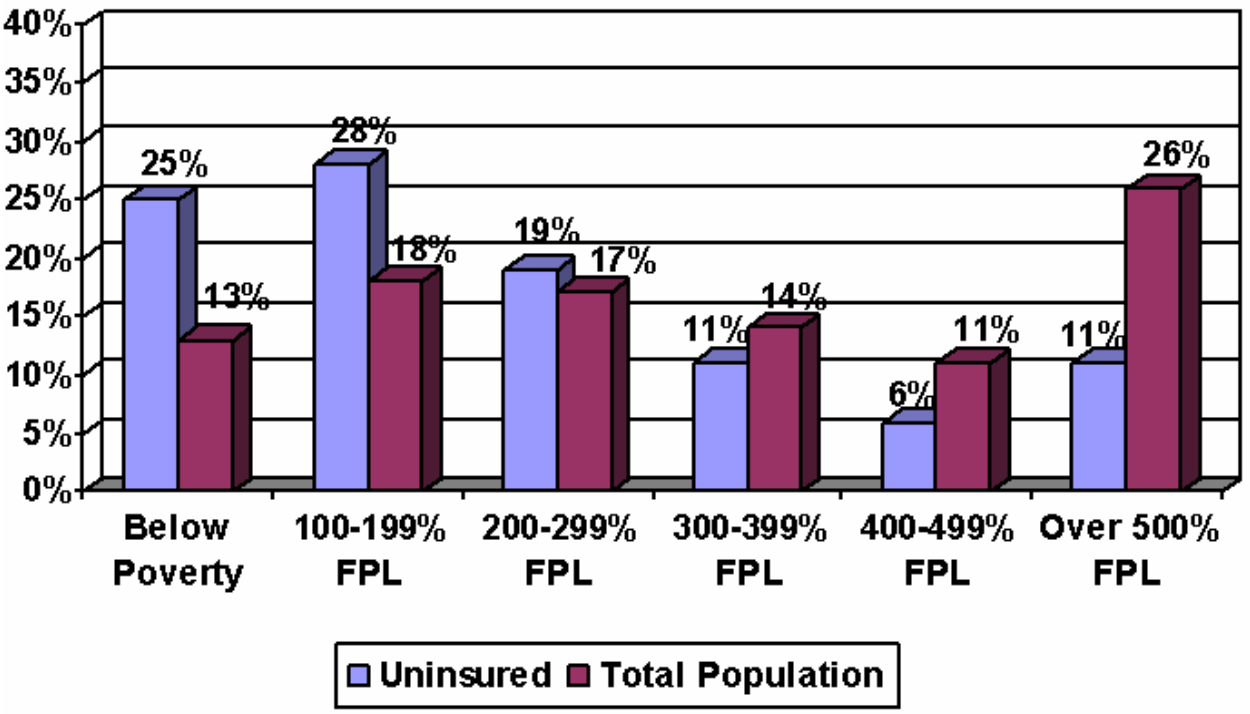


Figure 29: The Distribution of the Uninsured and Total U.S. Population by Income
Source: The United States Department of Health and Human Services (FPL= Federal Poverty Line)

CHAPTER 5: THE UNITED KINGDOM

The United Kingdom primarily provides healthcare through its National Health Service. However, private insurance can be purchased. The NHS was created in 1948 to provide for all of the health needs of the population.[52] The healthcare system in the United Kingdom is often used as an argument against socialized healthcare. Originally the system was completely run by the NHS, which set all prices and ran all hospitals. Previously the system followed the market model on single-payer systems, which shows that governments that run both the funding of healthcare and the provision of healthcare will set prices low, which will create waitlists and lowered quality. Funding for the healthcare system has been based on general taxation since its inception in 1948. Both parties within the British government have found problems with the NHS system. The British NHS has gone through many changes in the last fifteen years, and the Labour party has been behind the most recent changes. Fried notes that:

> In an effort to make the NHS more efficient, it underwent a critical structural reform during the 1990s, which included the introduction of market forces. The key change of the reform was to separate 'purchasing' and 'providing' (or 'buying' and 'selling'). In accordance with this change, two major divisions of the NHS emerged: *purchasers*, made up primarily of the District Health Authorities and the GP (general practitioner) fund holders, and *providers*, which were mostly self-managed NHS hospital and community trusts and GPs. A competitive 'internal market' was introduced that required providers to specify quality and price levels; they are awarded contracts by purchasers on the basis of these. Thus, providers now had to compete with both quality and cost to attract

[52] Fried 2002, pg 272

> purchasers, who are now free to maintain contracts with providers located outside their traditional geographic boundaries.

These changes did not meet the intentions of the government. According to the market models in chapter 2 this separation of purchasers and providers should help stimulate price negotiation, which should increase costs and quality. However, after the separation of purchasers and providers of healthcare in the United Kingdom's healthcare system, price was still only set by the financers of healthcare. Costs were only moderately kept under control, and quality of care was not increased. This makes sense according to the models in chapter 2; if healthcare providers are not allowed to negotiate the price, price will remain low. This low price will not stimulate increased quality. Furthermore, competition between healthcare providers for contracts will cause them to try and reduce their costs, to maintain profits. The easiest way to reduce costs is to reduce the quality of care. This competition actually leads to a lower quality system, not higher quality. When the Labour party came into power it had its own views on how to increase quality in the healthcare system:

> In 2000, another major change in the NHS resulted from the new Labour government's intention to reduce much of the competition injected into the system by the previous government. The document, *The New NHS: Modern, Dependable*, outlines the government's vision for a healthcare system built on collaboration and partnerships. Among the changes instituted were the dissolution of GP fund holding with primary care groups and the development of interagency collaboration between primary care groups and local social services departments. The Labour reforms further included the creation

> of primary care groups, primary care trusts, the Commission for Health Improvement, the National Institute for Clinical Excellence, and the Clinical Governance program.[53]

The plan calls for more private ownership of medical provision, and bringing in private entities to govern publicly owned facilities. Rowland noted that:

> In keeping with its belief that direct state ownership of public facilities is inefficient, the Labour Party is seeking greater involvement of the for-profit sector in both the ownership and the operation of publicly funded healthcare facilities. To this end the Blair government has signaled that NHS bodies must make use of the for-profit sector when commissioning healthcare services.[54]

Rowland believed that interjecting private provision of healthcare into the British system would increase costs and decrease the quality of the system. However, the market models in chapter 2 suggest that the costs will increase through private provision of healthcare, but that the quality will also increase.

The aggregate data on the United Kingdom supports the Labour Party's belief that private provision of healthcare is necessary. Figure 28 shows the life expectancy from birth of the British population in years overlaid on the per capita expenditures. Using the data provided by the OECD the average increases in life expectancy and per capita expenditure were computed. Between 1980 and 1989 the life expectancy increased an average of .24 years per year, and per capita expenditures increased and an average of $50.56 per year. Between 1990 and 2000 the life expectancy increased by .20 years and per capita expenditure increased by $77.8 per year.

[53] Fried 2002, pg 272
[54] Rowland 2001, pg 403

Between 2000 and 2004 the life expectancy increased by .275 years and the per capita expenditure increased $159 per year.

The percentage increase in expenditure between 1980 and 1989 was 7.63%, 5.86% between 1990 and 1999, and 7.32% between 2000 and 2004. The policies pursued in the 1990s did manage to decrease the percent increase in per capita expenditure in the United Kingdom by about 2%, however, it also decreased the rate at which life expectancy increased. Figure 30 also shows two points between 1990 and 2000 (1993 and 1995) in which life expectancy actually decreased. The form of competition introduced during the 1990s did curb spending, but it also curbed the increases in life expectancy, and at two points actually decreased the life expectancy. Figure 31 shows the overlay of the percentage changes in per capita expenditure and total life expectancy. It clearly shows that throughout the 1990s the percentage changes in per capita expenditure were decreased, and that these decreases coincided with the decreases in life expectancy. The steps taken in the 1990s to separate the financers and providers of healthcare in the United Kingdom were needed, however the two groups need to negotiate the price rather than have the financers continue to set the price. The Labour plan seems to be working toward its projected goals of, "More power and information for patients, more hospitals and beds, more doctors and nurses, much shorter waiting times for hospital and doctor appointments."[55] The Labour government actually argued for increasing per capita expenditures to match those of the European average, as a method of increasing the quality of care and decreasing wait periods.[56] With an annual growth rate on expenditures in the United Kingdom from 2000 to 2004 of 7.32% and a rate of 7.63% before the separation of purchasing and financing in the 199s, and a rate of

[55] Fried 2002, pg 277
[56] Fried 2002, pg 273

5.86% during the 1990s, it is clear that introducing more private ownership and operation of healthcare provision did not drastically increase prices. In fact the growth rate is slightly lower during the more recent period than before the reforms took place by both the governments during the 1990s and the Labour government. And, the increase in life expectancy from 2000 to 2004 of 0.275 is higher than the growth rates for life expectancy in the previous two decades. The Labour reforms have not increased the expenditure growth rates, which are actually lower than before the reforms of the 1990s, and have managed to slightly increase life expectancy growth rates. Rowland's assessment that introducing private provision of healthcare would decrease the quality of care and increase the costs of care are unfounded.

As expenditures have increased in the United Kingdom the life expectancy has also increased. Equation 1 shows a predicted life expectancy in the United Kingdom, given its current per capita expenditures of $2508, of 79.16 years. The actual life expectancy in the United Kingdom is 78.5 years. According to the equation, the United Kingdom should have a higher life expectancy, but only by 0.6 years. Equation 1 predicts the life expectancy in the United Kingdom fairly well. Given the Labour government's argument for increasing expenditures on healthcare, and entering more private provision of healthcare into the system, there should be an increase in the life expectancy of the British people over the next few years that coincide with these increases in expenditures and private provisions. The advanced industrial countries of the OECD have an average life expectancy of 79.39 years and an average per capita expenditure of $2226.17. The Labour government has achieved its goal of matching the expenditures and life expectancy equivalents of the rest of the developed OECD countries.

The United Kingdom, like the United States, offers two examples of two different healthcare markets which has made it useful for study. Fifteen years ago the British system of

healthcare was much different than it is now. The previous system showed an incredible ability to keep costs low, but there were complaints of long waits and poor quality, which are reflected in the drops in life expectancy.

The new system has not drastically increased costs, but has increased access (Figures 32 and 33) and increased the overall quality of the system. As per capita expenditures on healthcare have increased so have life expectancy and the number of practicing physicians. The market models laid out in chapter 2 are fully supported by the effects that the policy changes have made on quality, access and costs in the United Kingdom.

Figures and Tables

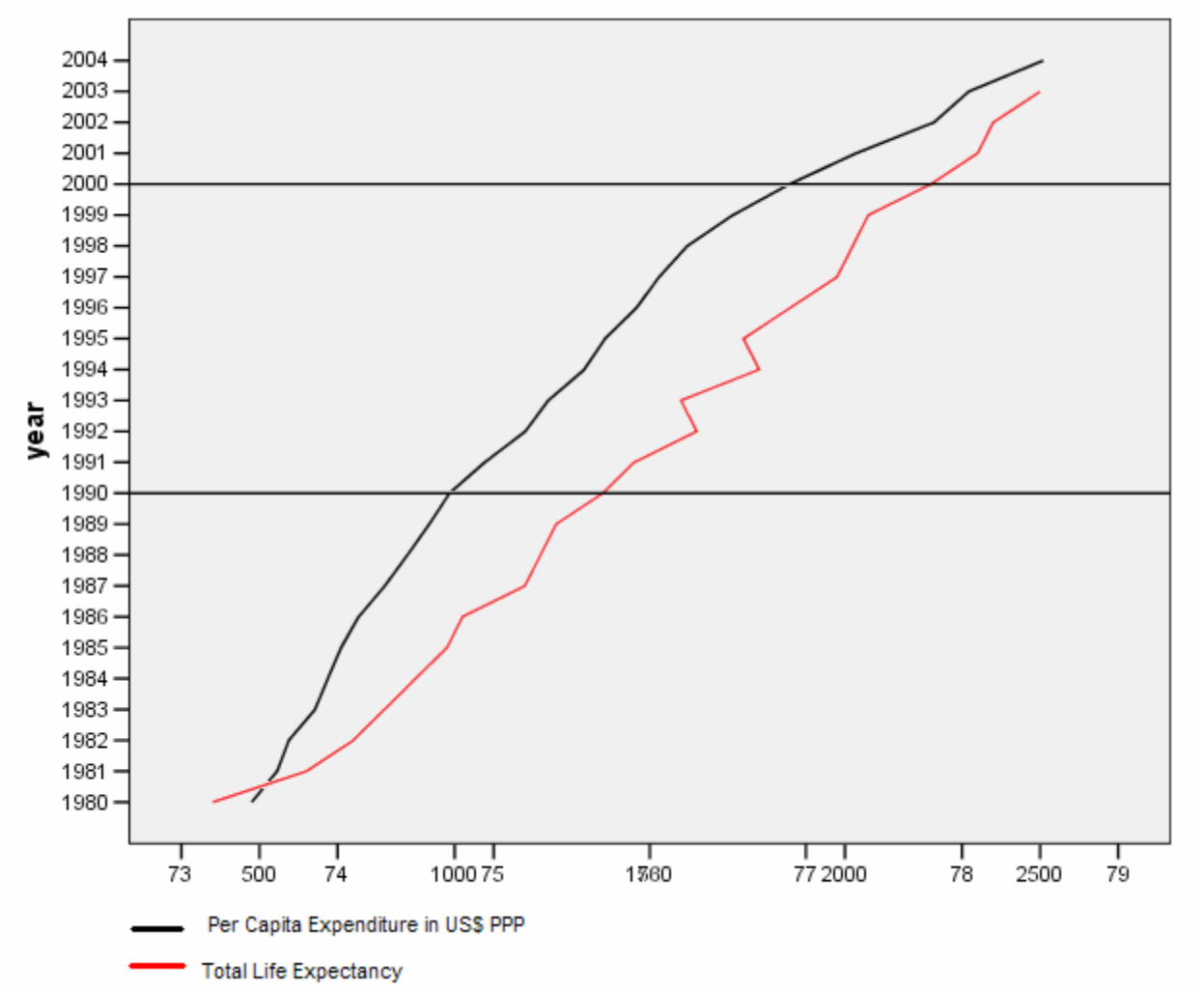


Figure 30: Change in Life Expectancy and Per Capita Expenditure on British Healthcare
Source: OECD Health Data Set 2006

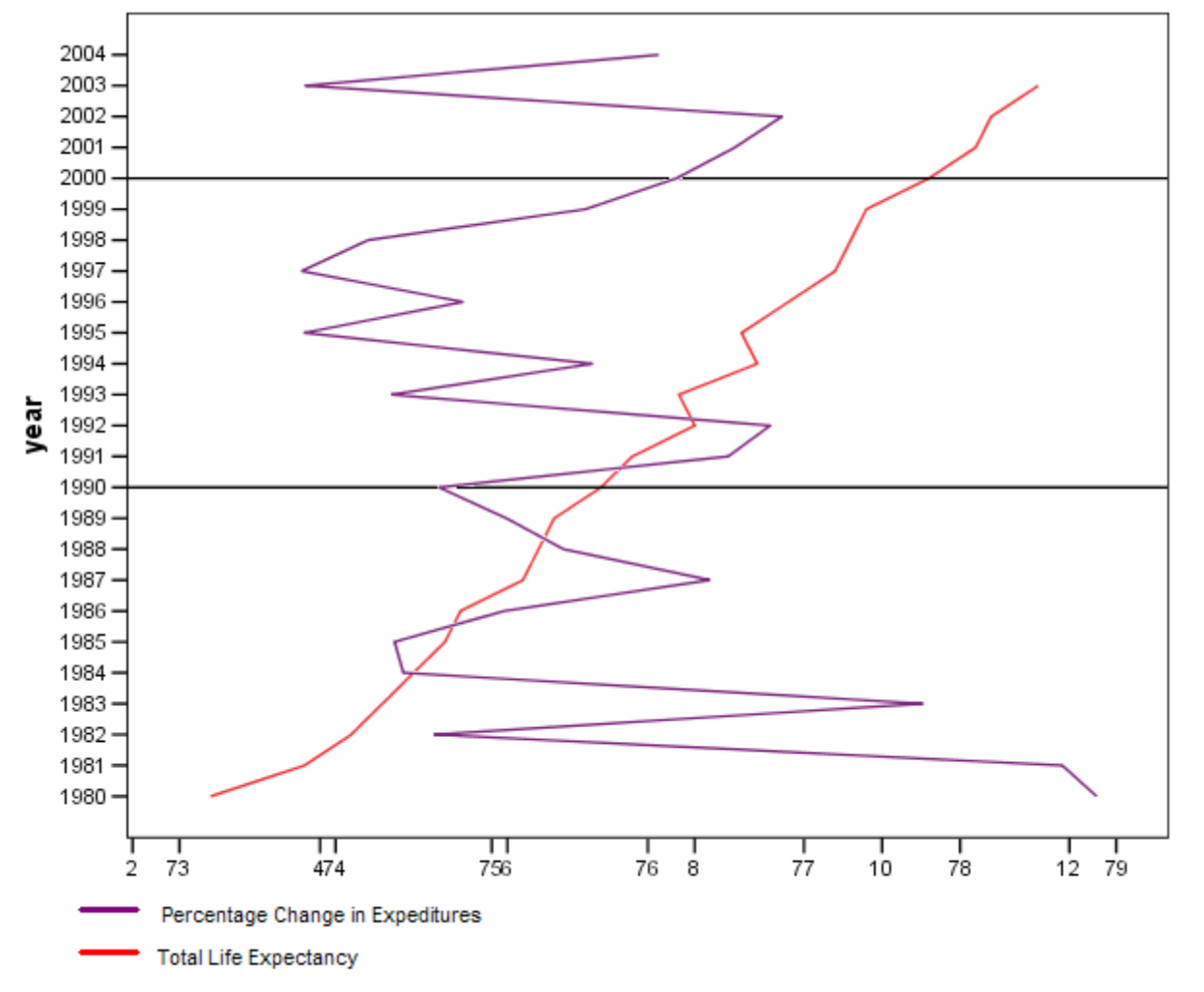


Figure 31: Percentage Change in Healthcare Expenditures Overlaid on Life Expectancy
Source: OECD Health Data Set 2006

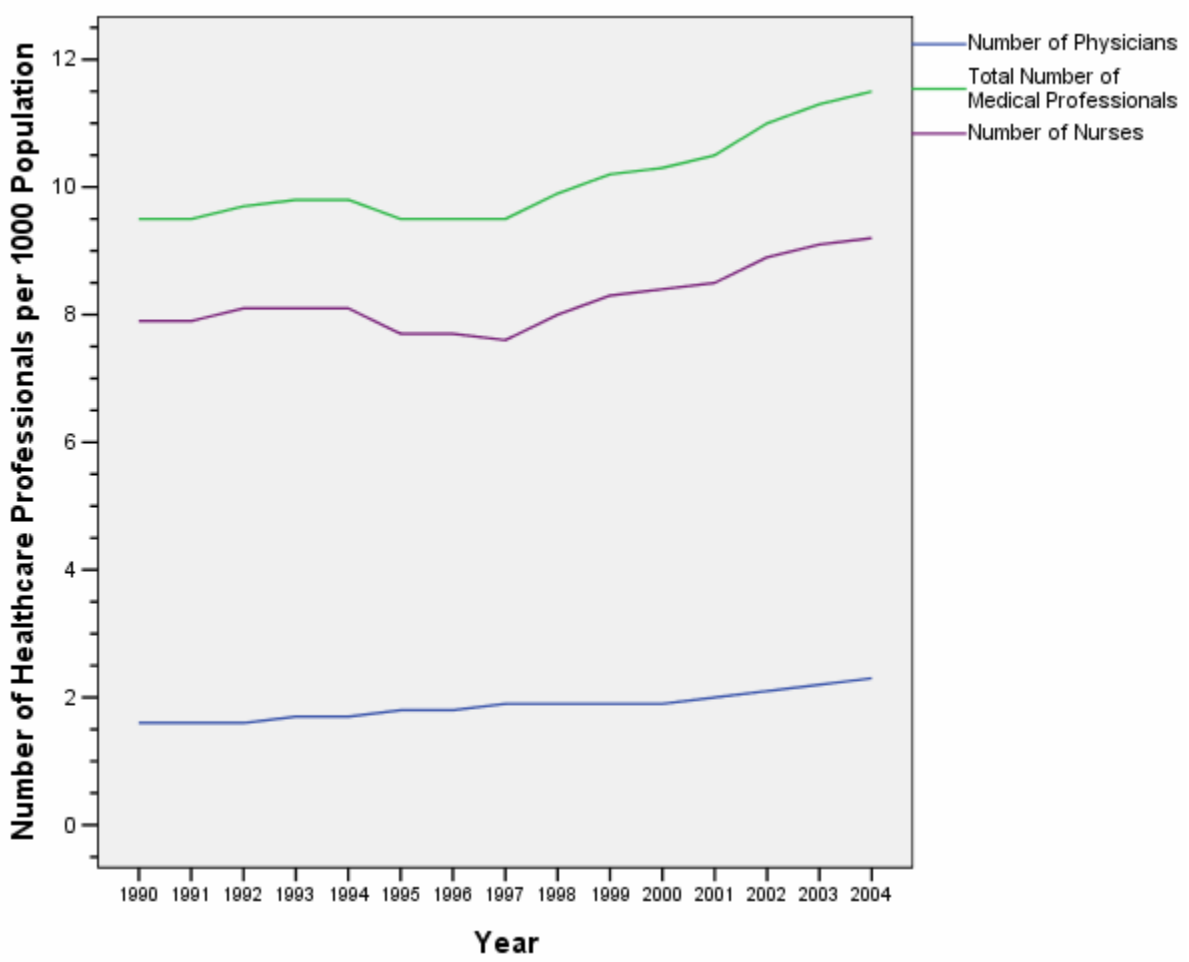


Figure 32: Number of Medical Professionals by Year in the UK
Source: OECD Health Data Set 2006

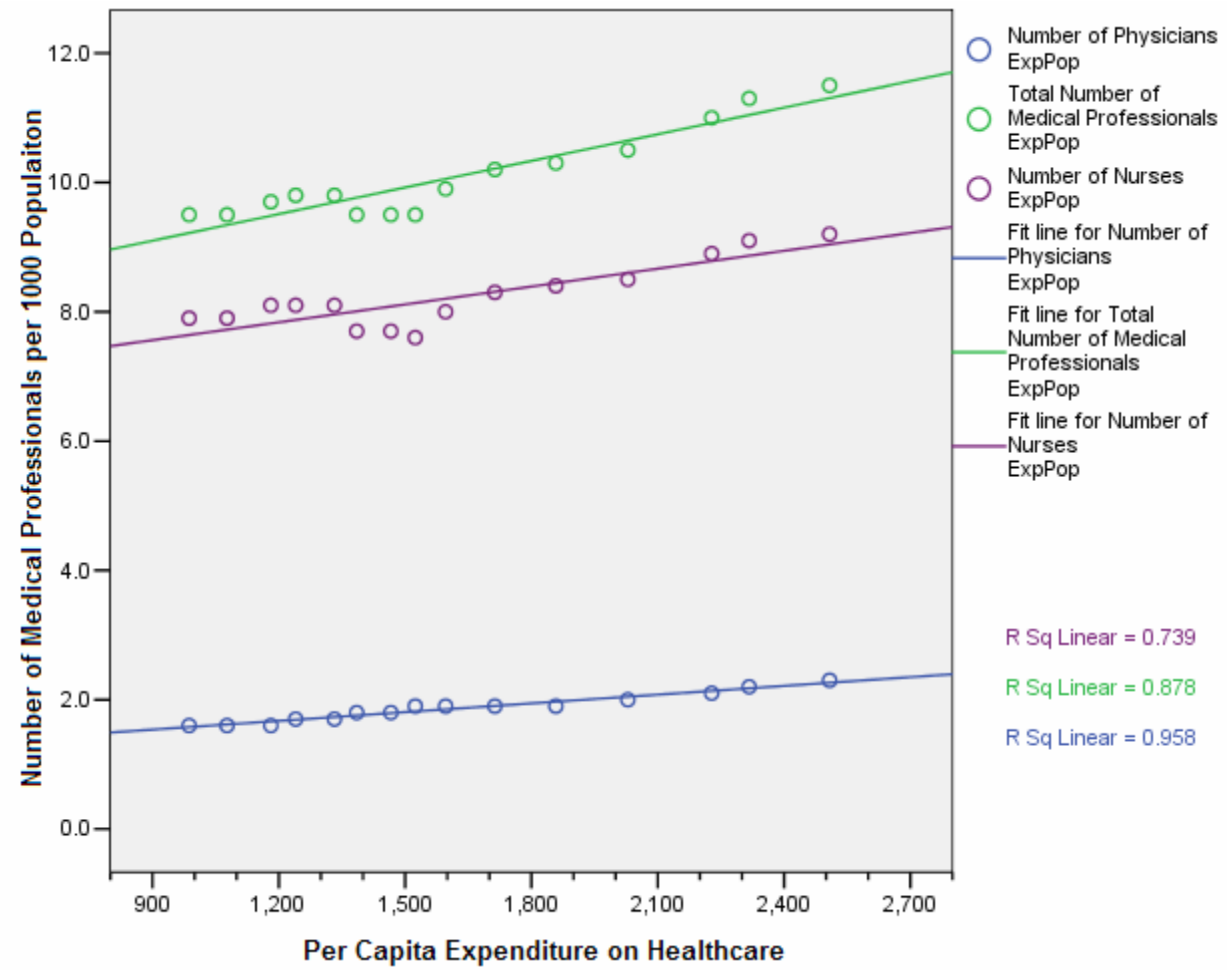


Figure 33: Linear Regression for Per Capita Expenditure and Number of Healthcare Professionals in the UK

Source: OECD Health Data Set 2006

CHAPTER 6: GERMANY

> When Otto von Bismarck imposed compulsory health insurance in Germany some 115 years ago and mandated its support through separate, primarily occupation-based funds known as 'sickness funds,' under the joint control of employers and employees, he created what would eventually become the most widely emulated medical delivery system in the world. Indeed, Germany was the first nation to adopt a national healthcare program. This system has greatly influenced Eastern European countries, which are currently importing selected features of the German system into their own health systems. Long admired by policy experts, the German system has undoubtedly contributed to good industrial relations in the health sector of the economy through a decentralized structure that has served to integrate numerous groups into administration and policymaking.[57]

The German Constitution guarantees healthcare to its citizens, through sickness funds that are paid for and administered by employers and employees.[58] Germany uses a social corporatist model for the running of both its provision of healthcare and financing of healthcare (meaning that interest groups are organized into hierarchies and these groups are then brought into government policy making decisions). Medical associations and hospital associations are organized into regional medical associations. Sickness pools have little influence over the operations of medical provision, and are primarily responsible for the collection and paying of funds for healthcare. The government controls budgets and costs of healthcare through laws and regulations:

[57] Fried 2002, pg 121
[58] Fried 2002, pg 124

> The present federal system was originally based on the principles of subsidization and self-administration, which granted considerable fiscal and administrative independence to the sickness funds, the hospital association, the medical profession, state governments, and other suppliers of services. However, the macroeconomic objective to keep health spending under close control has, in reality, resulted in a system that has grown away from local autonomy and pluralism. The government increasingly defines health finance matters through laws and regulations, although details of the content continue to be delegated to healthcare providers.[59]

What this amounts to in the German healthcare market is the private provision of healthcare, public financing of healthcare through insurance pools, and government regulation of costs. Medical providers are forced into regional groups and insurance is forced into pools. Government then meets with insurance pools to discuss financing of healthcare and available funding. Government also meets with medical associations to discuss their needs and budgets. After receiving information from both the financers of healthcare and medical associations the government determines budgets and operating expenses for healthcare provision. Healthcare providers are then free to spend their budgets where necessary.

> Hospital operating costs and capital costs are paid through separate mechanisms, and funding comes from different sources. Hospital capital is supplied by area government funds out of general taxation. Hospital operating budgets are negotiated at the regional level, hospital by hospital, with sickness funds. The sickness funds are obligated to meet hospitals' historic operating costs, and, in turn, hospitals are obligated to provide necessary economical services. Payments to hospitals are based on a prospective budget

[59] Fried 2002, pg 125

> negotiated between each hospital and the sickness funds; the Lander then approves all hospital budgets.[60]

This forced negotiation between healthcare financers and healthcare providers through government regulation allows the German healthcare system to achieve high quality, high access, and regulate economic efficiency. The quality of care in the German system is not altered by hospitals attempting to be within their budgets. Hospitals, outside of normal operating costs, can charge per case, per procedure, or per diem.[61] If individual cases cost more than originally budgeted for the hospital can apply for (*Fallpauschalen*) reimbursement of its costs, or if an individual procedure ended up being more expensive than budgeted for the hospital can apply for (*Sonderentgelte*) reimbursement, and if an individual needs more time in the hospital for care than originally budgeted for the hospital can apply for per diem reimbursement.[62] These reimbursement programs allow hospitals to treat patients individually without worrying about going over their budget, but at the same time routine procedures are kept at a constant price rate—a rate that guarantees that hospitals will receive their historical payments, which gives medical providers incentive to enter into the medical field.

General practitioners are funded differently than hospitals—they are given budgets for care for a given region. General practitioners are forced into regional chambers of physicians. These regional associations then disburse funding:

> A sickness-fund physician's income is derived from the number of services rendered annually and the level of reimbursement for each service. Reimbursement is determined by the Uniform Evaluation Standard fee schedule, which defines charges for about 2,000

[60] Fried 2002, pg 127
[61] Fried 2002, pg 128-129
[62] Fried 2002, pg 128-129

> items and determines their relative point value to one another. Along with the physician's own payment, each fee item includes the overhead costs of supporting a practice, costs for single-use items like gloves and syringes, and costs incurred when equipment is used during procedures.[63]

Patients are given free choice on which physician's office they choose to use. Wait-lists do not exist and physicians compete with each other for patients, but this competition does not affect price it only affects the quality of care. All practicing physicians and hospitals are guaranteed to make a profit by serving the public through the various financing schedules. If the physician is seeing patients, they are making money. Physicians do not rely on pure number of patients for making money, and can see fewer patients depending on the type of ailment. Not only are there no wait-lists for services, Germans have a wide variety of benefits through their healthcare system, Fried explains that:

> Germans have one of the most comprehensive health insurance benefits programs in the world. According to the health insurance law, sickness-fund benefits include ambulatory, hospital, and preventative care and screening programs; physiotherapeutic, maternity, and preventative care; drugs prescribed by physicians; family planning; rehabilitation; eyeglasses; medical appliances; and dental care, including prostheses.[64]

All of these services are provided on a budget of $3043 per capita yearly (however some extra benefits are now being cut in the German healthcare system like eyeglasses). The advanced industrial OECD average is $2226.17 per capita on healthcare expenditure. The German system pays higher prices than the average OECD country. The average life expectancy in Germany is

[63] Fried 2002, pg 130
[64] Fried 2002, pg 131

78.6 years, and the advanced industrial OECD average is 79.39 years. The life expectancy of Germany is slightly lower than the OECD average. Given its expenditures Germany should have a higher life expectancy—equation 1 shows that the predicted life expectancy of Germany is 79.88 years. It appears that life style factors may be decreasing the German life expectancy, or that there is economic waste in the system, or perhaps benefits such as eyeglasses, prostheses, and dental care that do not increase life expectancy are the reasons for the slightly elevated expenditures. Most likely it is a combination of all three factors. However, the importance of discussing the overall German system of healthcare is in how it negotiates price. Germany, as stated earlier is the model by which many other countries use to build their healthcare systems, and for this purpose it was chosen for analysis over other universal healthcare systems that have higher predicted life expectancies.

The German healthcare system represents the prime example of forced price negotiation between medical providers and medical financers. The market appears to be functioning exactly as predicted by the universal healthcare market model (figure 3). There is little wonder why so many countries look to Germany on how to provide medical care. It has a high quality system that guarantees payment for physicians and provides full access, not to mention many extra benefits like dental and optical care that do not increase life expectancy but do increase the quality of life.

CHAPTER 7: CONCLUSIONS

I came into this project with the bias and assumption that socialized healthcare was the best way to run a healthcare system. I was shocked to discover that my bias was incorrect. Universal coverage with private provision of healthcare appears to offer the most benefit to a society. These systems provide access for their entire populations, create high quality, but over-pay for medical services. However, socialized healthcare can have the same outcomes as universal healthcare when there is the same degree of price negotiation between medical providers and medical financiers. In the end, it appears that it is best to over-pay the medical community, because it appears that you actually do get what you pay for when full access to healthcare is guaranteed. Over-payment creates quality producing profit incentives, and guarantees that enough medical professionals will enter into the healthcare market. I followed a microeconomic method for creating the models in this thesis that began with discussing the underlying motivations of suppliers and consumers in the healthcare market, and how the market was affecting their behavior. I then tested this model against the real-world data, and found the evidence largely in support of the model. In fact, I failed to find any way in which the assumptions in chapter 2 were incorrect when looking at the aggregate data and case studies. It is very likely and almost certain that some of the assumptions from chapter 2 are incorrect (or only partially correct) because they are an abstraction from the real-world. However, the model derived from these assumptions is supported by all the data. The free-market appears to be unable to force a price that causes the supply of medical provisions to meet the theoretical demand for healthcare. It creates a massively overpriced healthcare system and decreases access as discussed in chapter 4, on the United States healthcare system. A universal healthcare system,

by its nature of private provision of healthcare and public funding of healthcare, forces price negotiation, as shown in chapter 6. The price negotiation creates a high quality system that does not limit access. A socialized healthcare system has a tendency to set prices too low, but can balance the supply and demand for healthcare when price negotiation is entered into the system, as shown in chapter 5. Ultimately, the difference between a universal healthcare system and a socialized healthcare makes little difference to the life expectancy if both systems have forced price negotiation which is seen in the reforms taking place in the United Kingdom. Table 11 summarizes the findings on life expectancy and per capita expenditure. It also shows the predicted life expectancy in the United States if it had a single-payer system based on its current public expenditures, and its predicted reduction in expenditures if the government ran all healthcare financing.

Free-market capitalism works well in balancing the supply and demand of goods, and setting a price that creates surpluses. However, it fails to make supply and demand meet in the healthcare market. A free-market forces a negotiation between consumers and producers in the marketplace of normal goods, but fails to force these same negotiations in the healthcare marketplace. To replicate the negotiations (supply meeting demand) of a normal market, in the healthcare market there must be one consumer of healthcare to balance out the monopolistic characteristics of healthcare provision. *Negotiations between the provision of healthcare and the consumption of healthcare must be artificially introduced*. When the U.S. system artificially introduces price negotiation through Medicare massive savings can be seen over private insurance, and the system manages to guarantee access. When more private provision of healthcare was introduced into the British healthcare system life expectancies and access increased. The German system shows a model of how price negotiation should take place within

the healthcare system. This thesis has developed two market models of healthcare based on economic inquiries. The models remain theoretical, but the aggregate data and the case studies fully support them.

Further studies using the models developed in this thesis could be done of any country's healthcare system. This thesis also implies that a government should be concerned with introducing the market structure of price negotiation into its healthcare system, and that market structures such as hospitals competing directly with each other for funding will have negative implications to the quality of healthcare. These models also suggest a way to evaluate how well a healthcare system is functioning. By using equation 1 it is possible to gauge how expenditures and life expectancies should match up. If a country wants to increase the life expectancy of its population it can locate itself with the quadratic regression and make adjustments where necessary to per capita expenditures and price negotiations.

The main implication of this thesis is that healthcare financing should be largely public, whether through direct taxation or employer insurance pooling, and that healthcare provision should be largely private (whether for profit or non-profit). Free-market healthcare systems like the United States should work toward government funded healthcare, and socialized healthcare systems like the United Kingdom should work toward increasing private provision of healthcare. There is much concern currently about the funding of healthcare due to changing demographics (a smaller working population will soon be supporting a larger unemployed population). This thesis offers no method for containing these concerns, governments must find their own way to deal with the upcoming problems of financing healthcare with smaller working populations. Relying on the free-market to provide healthcare once the demographic changes happen will not increase the quality, access, or economic efficiency of healthcare. The upcoming demographic

problem is of raising enough money to cover healthcare expenditures, not in trying to cut costs per capita in the healthcare system. Furthermore, equation 1 shows that life expectancies in all countries paying less than $4,000 per capita on healthcare can increase their life expectancies by increasing funding to around $3,900 per capita, which would yield a predicted life expectancy of 81.15 years. I have no suggestion how to raise the necessary funds to maintain this level of per capita expenditure, but governments should be working toward this goal. This also means that if the United States had guaranteed access to healthcare and was able to reduce its expenditures through price negotiations closer to the $4,000 per capita level that the life expectancy of the entire population would be increased. This would require a 33% reduction in current expenditures which is not completely unreasonable given the probable 7% reduction in healthcare expenditures merely by government financing the healthcare system over private insurance financing the healthcare system. Not to mention the theoretical 11.8% reduction in healthcare expenditures when coupled with a reduction in pharmaceutical costs. Corporations in America should be backing such policies as it would decrease their healthcare expenditures (rather than paying for higher priced private health insurance due to its inability to negotiate lower costs, corporations could pay for government healthcare at an overall lower cost and cut their healthcare expenditures). Theoretically, if the government began financing healthcare by taking in corporate money that is currently going to fund private health insurance in the form of a healthcare tax, there would be an 11.8% reduction in healthcare expenditures—which, would yield a life expectancy of 78.69 years according to equation 1, and reduce corporate healthcare expenses by the 11.8%.

Figures and Tables

Table 11: Life Expectancy and Expenditures
Source: OECD Health Data Set 2006, and Calculations from Equation 1

	United States	**United Kingdom**	**Germany**
Per Capita Expenditure	$6102 / $2728 (Public Exp) $5320 (Reduction by Gov't)	$2508	$3043
Actual Life Expectancy	77.5	78.5	78.6
Predicted Life Expectancy	76.71 / 79.5 (Public Exp) 78.69 (Reduction by Gov't)	79.16	79.88

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