



Health as Human Capital: Theory and Implications

A New Management Paradigm

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People Matter!

The Human Capital Paradigm

The human capital paradigm provides an appropriate conceptual model for the management of health benefits because people matter. The essential idea is that human beings can be regarded, among other things, as a stock of capital. This human capital provides a flow of services that, utilized with time, can be used in employment to earn an income and other work-related rewards, or alternatively, in leisure to enhance human enjoyment and quality of life.

As with physical capital (factories, houses, roads, machines, etc.), the quantity and quality of the human-capital stock can be increased through investment. This investment includes education and training, as well as the prevention and treatment of illness. All investment involves costs and produces benefits, and if the investment is to be economically feasible, the benefits must exceed the costs. The human-capital framework facilitates the analysis of the economics of health benefits (both in employment and leisure) and costs (treatment costs and productivity losses) resulting from health impairment, both of enormous importance in contemporary society.

The human capital of workers is influenced both by the employer's demand for productive labor and by a number of factors embodied in the workers themselves. From the hiring firm's perspective, profits are critically affected by the productivity of the human capital stock of the firm's employees. On the one hand, all workers have specialized aptitudes, skills, and attitudes that are costly for the firm to replace. On the other hand, ill and dysfunctional workers impose

costs on the firm through productivity losses caused by work absences as well as the health and safety benefit programs paid for by the firm.

The human capital of workers also depends on the how much time and money the household allocates to maintaining and augmenting its human capital through its own investment, and how time is allocated between work and leisure. If the household directs more hours to work then less time is available for leisure. Income is expected to increase, but leisure will decrease. While the decision to work generally involves this straightforward tradeoff of leisure for money income, investment in human capital tends to be more complex. For example, some types of investment in human capital will increase labor productivity, while other types may enhance the value of the household's leisure-time activities. If an employer-provided benefit (such as sick leave) increases the value of leisure more than the value of work, the benefit may actually encourage workers to work less rather than more. Hence, employer-provided health and disability benefits may affect the work-leisure tradeoff as well as the human-capital investment choices of workers in complex ways.

We assume that both the employer and the household are trying to maximize their respective levels of well being. In operational terms, this means that employers are attempting to maximize their profits, while households are trying to maximize the value of the goods and services they consume.

Investment in the Human Capital Stock by the Employer

The employer manages inputs such as labor, capital, land, and raw materials in order to produce goods and services (Varian, p.309). How the employer does this most efficiently depends upon the available technologies and input and output prices. Technology includes the relevant scientific knowledge and available information on productivity and costs. Input and output prices are often determined beyond the control of an employer in markets in which he competes with other employers. If the employer is to maximize profits, his management task is to choose inputs, techniques, and management practices, which minimize production costs for a given level of output. When this has been accomplished, production by the employer is considered to be "efficient." Hence, if production efficiency is achieved, re-allocating workers and other inputs to different tasks could not increase profits. Competition among employers will generally lead to an efficient industry, since higher-cost firms will be unable to survive in a competitive environment.

Labor services represent the flow from a stock of human capital. They are the human input to the production process, conventionally described as worker-hours or worker-days. Moreover, workers are the recipients of medical treatment and illness prevention which add to the stock of human capital.

Physical capital consists of those inputs to production that are themselves produced goods, such as machines, factories, equipment, and tools (Varian, p.310). A stock of physical capital resources can be acquired by a process known as invest-

ment. Investment, in turn, requires saving of resources. Both households and business firms engage in saving. For households, saving represents the difference between consumption and income. For firms, saving (retained earnings) obtains when payments by the firm to the owners of productive inputs are less than firm revenues. In both cases, saving provides resources that may be converted into maintaining and augmenting the capital stock through investment.

It is important to note that factors of production such as labor, capital, land, and raw materials are not homogeneous in quality. Higher-quality factors are capable of generating more output, thus raising the possibility that investment can increase the quality of factors of production as well as their quantity. Both will increase output or reduce costs. If more output is produced with a given quantity of inputs, productivity is thereby increased. In fact, productivity is usually measured simply as output per unit of input. Investment by the employer in improving the quality of inputs is made with the aim of increasing productivity. From the vantage of the employer, in order for investment in human capital to be economically feasible, the expected value of the additional output from a given investment in human capital must be higher than an equally costly investment in physical capital.

Investments in Human Capital

That the productivity of human labor can be enhanced through investment is an old and commonplace notion. However, labor viewed and analyzed as human capital is of relatively recent origin. The most common variant of the idea is that human capital can be

increased by investment in education and on-the-job training. These investment costs may be borne by the employing firm, the household itself, or the public sector.

Empirical studies indicate that economic growth is promoted more by investment in human capital than in physical capital (Denison). Returns from human capital investment are realized as a flow of labor services through time (just as the returns to building a dam are realized as a flow of irrigation water and other services through time). Accordingly, younger workers can be expected to make larger investments in human capital because they have a potentially longer working life over which they can claim the productivity benefits of those investments.

Health as Human Capital

Preventive and therapeutic health care services may improve workers' productivity as well as increase their quality of life. If so, these services increase the stock of human capital, and consequently increase the productivity of labor services as well as the quality of life emanating from that stock (Mushkin). Workers who have better health therefore provide immediate benefits to themselves and to their employers by gaining greater mental acuity, strength, and stamina while on the job. Hence, investment in preventing and curing disease and disability that increases physical energy and psychological zest for living and working is productivity-enhancing and makes labor more valuable to the firm. For the firm and its employees, therefore, incentives to invest in health capital are powerful, just as they are by investing in education and job training.

The accounting calculus of investment in human capital is more complex than a simple comparison of annualized costs and benefits. Since workers generally are employed by a given employer for many years, the stream of productivity benefits from the investment may last over the entire period of employment. Hence, these investments "might lower current receipts and raise current expenditures, yet firms could profitably provide them if future receipts were sufficiently raised or future expenditures sufficiently lowered (Becker, 1962, p.11)."

Investment in health usually complements investment in education and training since returns to the latter will be higher if people can work for longer periods or at a higher level of intensity if they have better health. Similarly, returns to health will likely be higher if the labor force is better educated and more informed about what contributes to its state of wellness (Gillis, et al. p.248).

The Household's Optimal Allocation of Financial and Time Resources

As indicated earlier, the household, rather than an individual worker, is assumed to be the supplier of labor services. Modeling decisions solely from one individual's perspective in a multi-person household is likely to be too narrow for many critical issues. Individual employees are usually part of a broader social fabric in which the well being of other household members also affect individual decisions and behavior. It is customary in the social sciences including economics, therefore, to use the household (often defined as the family) as the analytical unit of choice. Of course, in some circumstances the household consists of only one person.

The new economics of the family, pioneered by the Chicago School (Stigler and Becker), conceptualizes the household as a multi-person unit that employs a production function to secure what it wants in output—maximal well being (utility) for all constituent members. Well being is derived from consumption of goods and services obtained from market purchases and from the leisure time enjoyed by family members. The inputs to the production function also consist of market-purchased goods and services (e.g., tools, energy, transport, etc.) and the time, skills, and knowledge of different members of the household (Blaug, p.240). The goods and services obtained from the market include health care, purchased with income produced by the household's own time, skills, training, and other human capital.

Some of the items in the household's production function have complex and interesting interrelationships. Consider the relationship between health and work. Members of the household who find their work satisfying and remunerative will want to maintain and increase their stock of human health capital so that they can both work harder and enjoy better health. Work is good for health and vice versa. It is commonly known that persons who enjoy work are generally healthier than those who do not, and people who are healthy are likely to enjoy work more than those who are not. Hence, a fulfilling, stimulating, productive, and remunerative job is one of the most significant ways of producing both a happy life and building human capital. In contrast, household members who are not satisfied with their employment are more likely to invest in forms of human capital that increase the value of their

leisure. They also are more likely to increase their consumption of disability income and health care benefits, thus increasing health care costs.

The Production of Household Consumption Capital

The household is constrained in receiving utility from consumption by its money income used to purchase market commodities and by the time available to work and consume (Becker 1965). Because the household can utilize debt and convert potential future income into current purchasing power, the relevant money income for analysis is "permanent" or "sustainable" income. Since consumption occurs through time, and time is limited to 24 hours a day, time as well as income is a flow rather than a stock resource. The household's consumption problem, therefore, is two-fold: 1) to allocate purchasing power and available time to the bundle of commodities that will maximize well being, and 2) to allocate consumption optimally between the present and the future.

As implied in point 2, the household may save income rather than consume it, thereby providing opportunities for investment that can increase the quantity and quality of consumption commodities available in the future. In other words, household investment in physical and human capital is possible only because the household does not consume all of its current income. Augmentation of the capital stock may then be employed: 1) to increase future market income by increasing the productivity of labor, 2) to provide an inventory of commodities that may be used for future consumption, and 3) to increase the ability of the household to gain utility from future consumption. The first of

the three may be referred to as "earnings" capital, while the latter two are "consumption" capital. Examples of the first type of consumption capital include things like vacuum cleaners and freezers that can be used in future time periods. An example of the second is investment in music appreciation that will increase the utility of consuming music in the future.

Past investment largely determines the current stock of human capital. Often, making such investment is a dynamic and cumulative process. Consider consumption capital in music appreciation mentioned in the previous paragraph. Past investment affects the current stock of music appreciation capital which obviously affects the pleasure derived from the current consumption of music (Dockner and Feichtinger, p.256). Of course, like all stocks of capital, human capital depreciates through time, and investment is required both to maintain and enhance it.

Human Capital Theory and Health-Related Work Absence

Let us now explore some of the implications of this theory for health as human capital. Suppose that a worker has taken leave from work on some kind of medical sick leave or disability income program provided by the employer. Sick leave, workers' compensation insurance, and disability programs offer disability pay for the period away from work, and workers' compensation insurance provides complete coverage of medical expenses as well.

What factors determine a worker's claim to benefits and his return to work? The human capital theoretical model developed above suggests that it may be too simplistic to assume

that a worker will file only the minimal claim needed to restore health, or that he will necessarily return to his job when fit to work. Fitness to resume work itself may be quite subjective and is clearly not determinable solely by health care providers. The "value system" of the individual worker undoubtedly plays a significant role in whether and when he returns to work. These "employability values" include: tolerance for pain and discomfort, innate preferences for work and leisure, loyalty to the employing firm and its goals, the value derived from leisure time while away from work, and even moral issues like "an honest day's work for a day's pay."

Prices and costs are also relevant. If the worker must forfeit income if not at work, the lost income will be compared with the value of leisure time when deciding whether to return to work. Obviously, the more generous the income replacement available in sick leave and disability income programs coupled with the ability of the employer to monitor health related lost time, the greater the number of claims that will be filed and the longer will be the absence from work.

Information exchanged between the sick leave and disability system participants may also play an important role in how workers respond to incentives. Calling the health condition leading to the work absence a "work disability" rather than "temporary work interruption," for example, may legitimize any hesitancy on the part of the employee to return to work. Inability to measure the true extent of an injury or illness, or fully monitor the appropriateness of its treatment, will obviously impact the behavior of employees and health care providers under most insurance reimbursement arrangements.

Since each individual is different, however, empirical analysis of actual worker behavior in making claims for benefits is necessary to determine the importance of the postulated theoretical factors. Workers who may be similar to other workers in their health status, but make claims for benefits more frequently because of differences in the "employability values" mentioned above, or in their stock of consumption capital, can be said to be "benefit-system dependent."

Some of these theoretical issues can be illustrated more concretely by considering a specific program where differences in worker behavior are rather pronounced—sick leave. Most employers provide a certain number of days of sick leave annually, and often the rules permit these to be accumulated over several years. Normally, sick leave is fully covered by income up to some limit of days off imposed by the employer.

The theory discussed above, however, suggests that sick-leave absences from work may not be entirely health related. It has become common in many local cultures for sick leave to be regarded as a perquisite of employment—an entitlement, much like paid vacation. Workers are "expected" to take whatever unutilized sick leave is available. "Calling in sick" may also be a popular tactic in pursuing some collective bargaining or political agenda.

After sick leave has been utilized to its limit, if illness persists and is serious enough to require the care of a health care provider and the use of prescription drugs, most employers provide employee disability and health insurance to defray all or part of the medical costs and some part of the wage losses. A worker, however, may pre-

fer to be absent from work because of increased dependence on the benefit system, and the resulting needs for a medical excuse. And when treatment is dispensed on a fee-for-service basis, health care professionals have incentives to treat patients, the more the better. They become willing co-operators in producing work absences. Incentives are theoretically somewhat different for Health Maintenance Organizations (HMOs) that generally treat ill patients for a fixed amount, except for "work-related" injuries compensable under workers' compensation. Most states require firms to provide workers' compensation (WC) insurance to workers. This insurance provides income for time off and medical expenses connected with job-related illnesses, generally on a fee-for-service basis. Thus HMO health care providers have financial incentives to label demand for their services as work related with revenues based on a fee for serviced basis. In any case, health care providers are almost never rewarded directly for getting people back to work. Frequently, workers have little incentive to return to work quickly as most firms also offer a disability plan that provides some continuation of income (and sometimes medical costs) when absences from work exceed the limits normally imposed by WC insurance.

To sum up, insurance claims and time spent away from work for disability or health care treatment are influenced by the following.

1. The health status of the individual
2. The value of leisure time while on health-related leave
3. Factors connected to the costs and benefits of returning to work

4. The income foregone while away from work.

The first point implies that those individuals who have more acute and chronic disease conditions are most frequently ill or disabled can be expected to file more claims for health benefits.

The second point suggests that leisure-time activity is causally related to a worker's "disability consumption capital" stock, which stock consists both of accumulated disability experience of the worker and his "innate" preferences for leisure. A consequence of accumulating consumption capital through time is that a worker's satisfaction with his current claimant status will depend in part on how much time he has spent as a claimant in the past and how much he has invested in leisure consumption capital. The effect of accumulated benefits on consumption capital is a phenomenon we refer to as "claimant learning."

Point three suggests that the likelihood of returning to work will also depend on the working conditions expected when that occurs. Suppose that the longer a worker is away from his job, the greater the costs of returning to work. That is, in most jobs certain aspects of work are not adequately covered by substitute workers, and therefore work to be done accumulates, awaiting the return of the worker. Also, long absences contribute to depreciation of knowledge about the job and the skills associated with performing it successfully—i.e., a worker suffers a loss in employment-related human capital. In short, the longer a worker remains absent from work, the larger is the expected productivity loss even when the worker returns to his job.

The clear implication of points 2 and 3 is that the longer a worker remains absent from work, the greater is the relative stock of claimant capital for leisure time, and the greater the loss of human capital relevant to productive employment after returning to work.

Point 4 suggests that the employment-related human capital stock affecting worker productivity is also relevant to the choice of whether or not to return to work. The larger this stock, the greater the worker productivity on the job, and the higher the labor income. Hence, the opportunity cost of being on a claim and absent from work is generally higher for those with greater human capital stock, unless benefit income fully replaces lost wage income. The fourth point also indicates the relevance of the insurance policies of the firm and the government. These policies establish income limits available while absent from work, generally specified as the percentage of "regular" income available while covered by the firm's medical care and disability programs. They also specify the time periods over which income payments may be received. Obviously, the more generous the terms of medical care treatment and income supplements while on medical leave or disabled, the lower will be the costs of remaining away from work, and hence, the greater the number of claims made for illness and disability assistance and the longer the time period spent in work absences.

Introduction to Human Capital Management

Like in all markets, a market that provides efficient allocation of health care resources requires that the decision-making parties have good information. In many sectors of the U.S. economy, competitively determined prices provide both the appropriate information and the incentives to use that information appropriately. But sufficient information for an efficient market is generally lacking in the health benefits sector.

Historically, there has been precious little price competition for medical services. Principal-agent and insurance moral hazard problems, exacerbated by the magnitude of employer sponsored health benefits insurance options and coverage, frequently accompanied by enrollment selection bias are ubiquitous in the health benefits sector; and government subsidies and regulatory entitlements (OSHA, FMLA, HIPAA, etc.) often further produce perverse consumption incentives and may distort what little price and service quality information that is available.

In summary, the absence of price and quality information, insurance coverage selection bias and moral hazard information asymmetry, government subsidies and regulations at many levels, and the complex principal-agent relationships layered among patient, health care provider, third party administrators, insurers, regulators, and employers are all important issues that have much adverse impact on human capital investments, some of which are discussed below.

Health Care From a Two-Party System to a Health Benefits Multi-Party System

There was a time when the health care market functioned much like other markets. I well recall – with the unforgettable smell of ether anesthesia as my reminder – my own tonsillectomy, which occurred in the mid-1940s and well before health insurance was available for me and my family in rural Wyoming. Quite simply, the event was a market transaction between the demander (me as the patient, and my parents as the household) and the supplier (a local family physician and the hospital). Fees were negotiated for a defined service, a delivery time was scheduled, and the surgery was performed. The information shared between demander and supplier about service, access, and price was almost perfect, and the result was a successful transaction and a satisfied consumer and health care provider. That transaction was devoid of perverse incentives, since the successful transaction itself was the primary incentive for both parties.

That kind of two-party, market-based transaction rarely occurs in today's health benefits marketplace. In its place is a consumption process that involves many third parties, in which the recipient rarely pays directly for services and in which access and price are generally negotiated by administrators and sponsors. The problem is that although this multi-party process generates enormous amounts of transaction data, mostly claims based, virtually no useable information that defines access, price, services provided, and service quality that is typically

available to all the parties involved in a market transaction, and especially not to the ultimate consumer of health care services, the patient.

The process of delivering health care services has grown beyond the private sector and now includes significant governmental involvement, especially with the passage of Medicare and Medicaid legislation. When the United States is not at war, health care, in addition to Social Security and welfare, is and has been for almost three decades, the dominant national debate from both cost and quality perspectives. There have been huge income transfers from taxpayers and benefits sponsors to the recipients of these three programs. Frequently there is benefits usage overlap by recipients.

When health care benefits, often provided through health insurance plans, are looked at individually and combined with other health-related benefits (such as workers' compensation and auto, disability income, and sick leave programs), there is similar overlap use, and the size of the resource consumption is truly monumental, even independent of the associated lost productivity for employers that sponsor health benefits. Although this maze of benefit programs, both public and private, are all health related, they are highly intertwined, a fact frequently left out of the health care debate. The Clinton Administration's ill-fated health care reform, for example, made only peripheral mention of the workers' compensation system and did not recognize demand-side influences on consumption of disability income benefits at all. It is difficult to conceive how those managing the design of such a massive overhaul of health care could ignore other health-related benefit programs with clear

overlap use by those demanding and supplying services.

We now know that health care consumers who simultaneously collect some kind of income replacement from disability programs use "extra" medical services. When you add to the medical services cost the perverse demand-side incentives in the form of disability compensation paid to health care recipients, it is hardly surprising that the current healthcare marketplace is in such shambles and there is such pressure to reform it. But a prerequisite for successful reform is an understanding of the roots of the sharp escalation in costs of healthcare and related income supplements.

The Information Asymmetry Problem

Borrowing from the terminology of economics, tremendous information asymmetries exist in the healthcare delivery process, and these asymmetries lead to significant inefficiency and waste in the system. Information asymmetry is inherent in the concepts of insurance moral hazard, selection bias, and the principal-agent problem, all to be discussed shortly. Even though the traditional consumer may not be directly paying the bill for the inefficiency that inheres in these problems, there is "no free lunch." Ultimately, the consumer pays the price in opportunity cost for our bloated health benefits system either through taxes or through forgone wages that could have been paid instead of employee benefits.

Information asymmetry is a term economists use to describe a transaction in which one of the parties involved has more relevant information than the other parties. Information asymmetry that currently exists in the

health benefits system is present in several forms and at several levels of service delivery. Medicine is a highly technical field that is constantly changing and rapidly expanding, and is fertile ground for such informational imbalance. It has its own specialized and difficult lexicon. Although some information asymmetry exists in nearly all markets, medicine is almost unique in that physicians possess information that is, for the most part, inaccessible or unavailable to patients. These factors contribute to a tremendous information gap between those who demand and those who supply medical services, and the consequences are significant for the efficiency of the system.

Additionally, the vagaries of the healing process itself make the end product of the service risky and unpredictable for both the patient and the provider. Moreover, consumers would find it costly to "shop around," sampling and testing various medical treatments before consuming them. As a result, most consumers are "rationally ignorant" of the alternative treatments available as well as their costs and have traditionally deferred to suppliers to recommend treatment for medical problems. But suppliers do not hold all the relevant information either. Wellness is quite subjective, and patients, therefore, have some information about their health conditions that is not available to the suppliers. The important point is that information exchange can be very costly, especially when information is highly technical or very subjective. The costs of better information exchange are likely to be higher than the benefits, unless costs can be reduced and/or benefits increased. We discuss some of these opportunities later.

Insurance Moral Hazard

As pointed out above, the health care and health benefits marketplace generates an enormous amount of transaction data from the many claims processing functions that take place. Nevertheless, the market is essentially devoid of the integrated information that not only defines access, price, and the quantity and quality of services provided, but that also links the many parties involved in the consumption process across all benefits. Without such information, consumers are prone to insurance moral hazard, basically a change in behavior that results from a change in the direct cost for health care borne by consumers who receive some form of insurance. Because insurance normally reduces the direct cost of health care to the individual consumer and shifts it to the entire pool of insureds, insured benefits programs can affect the probability that consumers will file claims, will influence the length of a claim, and will impact the health or safety precautions taken by a consumer.

A health benefits system operating under the assumption that health care consumers and providers are motivated only by successful diagnosis and treatment of an injury or illness, and by the accompanying restoration of health and return to work, necessarily casts a blind eye on the incentives that the system implicitly produces for health benefits consumers. And, perhaps more importantly, it does not deal with the underlying information problem. In short, this conceptual approach to the delivery and management of health care is fundamentally flawed. It ignores the fact that health care consumers' try to improve their own overall welfare. Nor does the existing model take into account the

expansion of insurance and the inter-relatedness of the several health insurance benefits, and, therefore, for all these reasons, does not provide an adequate management theory.

This system of insured health benefits sponsored by employers and the government and administered by third parties has produced a system in which price – the primary and most important market information to guide resource allocation – is virtually hidden from consumers, and in which the common notion is that cost cannot be reduced without impacting service access and quality.

Far from accurately portraying the complex interactions among all parties involved, the biomedical management model has forestalled research into incentive responses in the health benefits marketplace and has stunted the development of the types of data and analysis necessary to understand those responses. If all participants are passive and do not respond to economic incentives, then monitoring their responses to changes in price, costs, insurance plans, preferences for physicians, and government regulations is unnecessary. Aggregate data on claims and classes and levels of usage would suffice for analysis. If participants actively respond to incentives in their behavior, however, aggregate data are insufficient, and employee-specific observation is necessary for analysis.

As a result of the “biomedical management” model, and spurred by government tax subsidies, the purchase of health benefits has drifted away from normal supply and demand market dynamics between demanders and suppliers that exist in most markets. Instead, the buyer, user, provider, and administrator of health care all

exist in their own spheres, connected by an inefficient and wholly inadequate information system. In this marketplace – where the buyer is no longer the user of the services and the true consumer may even be difficult to identify – employees are prevented from participating in market decisions and are deprived of information about costs. Because they lack full information, demanders cannot simply turn to competitive suppliers without incurring significant costs. Key purchasing decisions are increasingly left to third-party administrators and managers who are ignorant of user/provider incentives when they formulate benefit plans. Operating in this limited information scheme, this market environment enables an individual in one sphere to maximize his or her own welfare without other players in the system even knowing about it.

Principal-Agent

Another important consequence of information asymmetry that has emerged in this complex health benefits marketplace is referred to as the “principal-agent” problem. Agents are people or firms engaged by a principal, usually an owner, to perform some work or service on behalf of the principal. Normally, the agent’s sole interest is satisfying the needs and desires of the principal, for a price, of course. A doctor, for example, when paid to deliver a medical service, is the agent of whoever owns the asset used to pay for the services and is therefore the principal. In a simple doctor-patient, two-party system, principals and agents are easily identifiable, and they freely negotiate a treatment service and a price for the service. This, like any other free market transaction, creates the expectation that both parties will benefit from the trade.

However, principal-agent interactions in many markets may involve the principal delegating some decision-making authority to an agent for a variety of reasons. A principal-agent problem arises when and if the agent makes a decision that is mostly or partially in his interest rather than in the interest of the principal. The problem is most severe when the principal is unable to monitor the self-serving behaviors of the agent. In other words, when the principal's resources are being consumed for purposes other than those the principal intended, inefficiency and waste are produced.

Because of benefits-cost-sharing provisions, it is difficult to define even who the principal and agent are in most current health care consumption decisions. Some would argue that "patients' rights" are sacred, even when someone else, such as an employer, a sponsor, or taxpayers, is paying the bill. Others would argue that those who know the most about the "appropriateness" of medical services should make the treatment decisions, since they purport to know what is best. But the reality is that huge amounts of resources are being consumed without the information necessary to know who is consuming, who is paying, and what services are being delivered at what cost and of what quality.

When decisions about treatment are made with insufficient scrutiny from the principal, periods of claims can be lengthened, treatments extended, and costs inflated. Inefficiency is exacerbated when agents use information asymmetries and their own discretion in recommending treatment to benefit themselves at the expense of the principal. Tort laws may circumscribe somewhat the power of agents to

abuse principals, but opportunities for abuse of the relationship are so ubiquitous and of such magnitude that legal proscriptions are by no means adequate to control the problem. Given the increasing information asymmetry among benefits sponsors, administrators, patients, and physicians as a result of the increasing scientific and technical complexity of medicine as well as the extremely complicated institutional milieu that characterizes modern medicine, it is rather obvious that the principal-agent problem is worsening through time.

The principal-agent problem will not be easy to solve. It would be extremely costly, if not impossible, for patients to achieve the same degree of knowledge of treatment alternatives, effectiveness, and costs that their doctors have. Additionally, patients are often locked into employer-provided health plans that make it expensive for them to take their business elsewhere, even if they are not satisfied with their care. And it is rarely cost effective for individuals and their insurance companies to take legal action to correct physician malpractice, especially since it is not in the self-interest of doctors to testify against one another, and since some states have placed limits on the size of judgments that can be awarded in malpractice suits.

The complexity of the medical care system itself greatly augments the gravity of the principal-agent problem. In a benefits-centric biomedical approach with insurance provided by employers and/or government, it is sometimes difficult to identify who is principal and who is agent—who is acting in behalf of whom. And information asymmetries exist at all levels of the interconnections among the various parts. In the two-party health

care system described at the top of this piece, this issue was clear and simple. In a sponsored multi-benefits system it is extremely complex and clouded by sponsored benefits and cost sharing arrangements. For example, if the health care service sought and provided is paid for by the patient as part of a deductible or co-payment, then clearly the patient is the principal and the medical provider the agent. But if provider access, service fees, and quality management have already been negotiated by an employer in the role of the principal, even though they may only be paying part of the tab, information asymmetry is exacerbated. In a system that does not recognize and monitor individual behavior, we should expect to (and we do) observe practices that are costly and medically unproductive for patients, only sometimes are beneficial for physicians, and always wasteful for the economy as a whole in the sense that the "needs" of the principals are not being met in a cost-effective way.

Selection Bias

A number of efforts have been made to curb excessive health care spending. Because those efforts have not been based on adequate and appropriate information, their success has been limited. Chief among them has been the Health Maintenance Organization (HMO) movement. The essence of the HMO is to integrate health care delivery and health insurance, offering access to health coverage for a single, capitated price. This should encourage physicians to provide cost-effective health care because they cannot augment revenues by increasing treatments for each enrolled individual. Revenues can be increased only by adding new enrollees. This is the expectation, the reality is that the

effectiveness of HMOs as cost-control centers has not been proven and remains in question.

Some experts believe that surging enrollment in managed care plans caused a rare decline in average costs per covered enrollee in 1994. Others argue, however, that managed care strategies will not cause an historic permanent decline in the growth of health care costs, but may instead only stall increases in the short term. And, perhaps most significantly, still others argue that the quality of health care is declining because HMOs are pressured to cut costs by limiting services to patients whose treatment needs are determined by the HMO rather than the patient. Because of the fixed capitated fee for enrollment, the HMO has strong incentives to limit enrollment, if possible, to those whose medical needs are fewer and less costly. In general, this would mean younger and healthier enrollees. The consequence is an adverse-selection bias.

At the same time, a political battle is being fought over whether Medicare and Medicaid beneficiaries will be pushed into the HMOs in the hope of reducing the runaway costs of these programs. Selection bias, however, means that the HMOs will strongly resist this pressure. As pointed out above, their ability to reduce costs rests heavily on their success in enrolling younger, healthier people. They may succeed in controlling costs if they are required to enroll older, sicker people. While HMOs appear to be suffering politically because of the very access and coverage issues they were intended to solve, they are really plagued by the same information problems that afflict the rest of the health care sector of the economy. If they had the information to base en-

rollment fees on the health status and prospects of each individual (or even broad classes of individuals), the inefficiency problem would largely disappear.

A New Integrated Information-Driven Market Model

Despite its intrinsic flaws the biomedical management model prevails. Even in the best run corporations in the world, human resource functions continue to be run on the basis of the biomedical model. These corporations would never ignore the synergies between production divisions, but they continue to segregate health, workers' compensation, and short- and long-term disability pay and performance into separate departments with little strategic oversight into the ways that benefits interact with one another to affect worker productivity. They ignore strategic health and disability synergies because the biomedical model implies that such oversight is superfluous – all health-related conditions will be treated the same, regardless of the incentives to which program participants respond.

Fixing the information asymmetry problems in the current health benefits system, of which health care remains the dominant element compared to workers' compensation and disability income benefits, requires an understanding that the current biomedical model is not adequate for the delivery, financing, and management of health care. A more appropriate model is one that recognizes the complexity of the health care system – a model that accounts for the interactions of patients, physicians, insurance companies, third party administrators, and government regulators by reducing information asymmetry. Such a model rests on the foundation

of timely, useful information. At the flowering of the Information Age, the success of that model in controlling costs, improving health, and ultimately, in increasing productivity, depends on technological infrastructure that is capable of transforming raw data into useful information.

Benefits sponsors and insurers that resist the trend toward an information-driven economy, and more specifically, an information-driven system of health care delivery and cost management, simply will not be able to compete. The task of gathering, organizing, and applying information has become too important to ignore. Armed with complete, accurate, and timely information, decision makers will have the power to improve the productivity of benefits recipients, to intervene appropriately to solve developing problems within the workforce, and make better financial, production, and marketing decisions, among innumerable other advantages. In short, effective information management is the power to positively affect access, price, and outcomes.

Data Integration and Integrated Information System

A key component of using information to reduce health benefits costs and improve productivity is an information management system that harnesses the power of information. Historically, various types of health benefits data have been stored separately in sites that are exclusive of one another, and only limited bits of information have been shared. The data that were available has been used to control only the supply side of the health benefits cost equation. Benefits sponsors have never been able to put the disparate pieces of information together to paint for themselves an in-

tegrated picture of their benefit programs. Effective information management systems – those that provide decision-makers with all the necessary, relevant information they need to make timely decisions – are tools powerful enough to revive a slumping health benefits industry and enhance health and productivity.

A Person-Centric Behavioral Management Model

In addition to requiring timely information, a shift from the traditional view of the consumer in the health care delivery system to a more modern and complex, but also more accurate, view requires health benefits sponsors to accept a new paradigm. That new paradigm regards people as human capital, which, like physical capital, can be enhanced through investment. Such investments include the protection of health and rehabilitative treatment of illness and injury as well as education and training to improve skills. As with any investment, an investment in human capital involves costs and is expected to produce benefits.

A person-centric behavioral approach that is driven by integrated information links the many participants in the process and supports health benefits management as an investment strategy with the goals of improved health and productivity. This conceptual framework allows for the analysis of health benefits in terms of treatment costs and productivity losses that result from health conditions. Essentially, from a social perspective, outcomes are tied to health and productivity. When people become ill or are injured, costs are imposed on themselves, their employers, and

even society since many benefit programs are tax subsidized, mainly because health and safety benefits paid by a sponsor are tax exempt. But society (taxpayers) also suffers aggregate income losses because of worker absence and productivity loss due to illness and disability. Thus, the total cost of health benefits is much larger than generally thought because it must include the tremendous costs associated with the loss of human capital and diminished productivity.

That the productivity of human labor can be enhanced is an old notion, probably as old as man himself. However, labor viewed and analyzed as human capital is a much more recent idea. The most common formulation is that human capital can be increased by investments in education and job training. But preventive and therapeutic health services also improve productivity, as well as quality of life. These health services, therefore, also increase the stock of human capital and, consequently, increase the productivity of labor services. People who are in better health provide immediate benefits to themselves and society through greater mental acuity, strength, and stamina on the job. Investment in preventing and curing disease and disability that increases physical energy and psychological zest for living and working enhances productivity and makes labor more valuable to the firm. For the person and for benefits sponsors (employer and government), then, incentives to invest in health can be just as powerful as incentives to invest in education and job training.

Viewing health as a form of human capital represents a significant step forward in the management of health benefits cost. This paradigm is inextricably linked to the notion that people

respond to incentives and are, therefore, likely to exploit the information asymmetries defined in this paper. A primary attribute of the person-centric behavioral approach is its focus not on claims or other aggregate data, but on the claimants themselves. Indeed, the model hinges on a balanced market approach that enables effective management of both the demand and supply sides of the health benefits management equation. This suggests that it is too simplistic to assume that a person will file only the minimal claim necessary to restore health, or that the person will return to a productive life when they are physically fit to return to work. Fitness to resume a productive life can be quite subjective and is not determinable solely by medical experts. The value system of the person also plays a significant role in whether and when people rehabilitate from illness and injury. Such values include the person's tolerance for pain and discomfort, preferences for work and leisure, and loyalty to an employing firm and its goals. More generous sick leave and disability programs will obviously result in a greater number of claims being filed, longer absences, and reduced productivity.

To further complicate matters, certain illnesses and injuries are easier to diagnose and treat than others. A compound bone fracture, for example, is obvious both to the service demander and supplier. Since there is little opportunity for information asymmetry, the claims management process is quite simple and works well. A back strain, by contrast, is not easily observed or treated, and the origin of the strain may be difficult to determine. Hence, considerably more opportunity for information asymmetry exists, and the claims manage-

ment process and its ultimate effects are likely to be much more complex.

An integrated information-driven, person-centric behavioral model places such incentives, attitudes, and medical realities into the context of a person's life. As a result, it is more relevant to actual workplace outcomes than the biomedical model. This person-centric model establishes congruence between the goals of the person and the goals of the benefits sponsors, whether an employer or the government. Both are motivated to protect health and generate productivity, rather than being motivated to consume disability income and health care benefits. Sponsors will value and reward productivity and invest in their human capital with performance pay, training and education, and preventive health and safety programs. Viewed as an investment, traditional health benefits can be funded with health and productivity protection as the expected returns.

Managing Beyond the Mean

In addition, the model's focus on person-centric data, rather than on aggregate data, enables sponsors to selectively target health and productivity programs to their most costly, least productive people. Person-centric analysis of several large American firms has revealed a "Pareto effect." Named after Italian economist Vilfredo Pareto, the 80/20 rule suggests that maldistribution of consumption or risk occurs such that a minority of a population incurs a majority of any given unit of measure. With respect to health benefits, the data indicate that between 10 and 15 percent of a firm's employees typically incur 80 percent of the firm's cost and utilization of employee health benefits. Those employees tend to file disability

claims that are often behavioral in nature – that is, they are difficult to diagnose and treat. Clearly, it would be more cost effective for firms to manage their benefits programs and costs by focusing on the small minority of employees who use the majority of their health care dollars. But without a model that recognizes such complexities, and that is driven by timely, person-centric information, employers are unable to appropriately target their highest-cost, highest-need employees.

Long-Term Management Strategy

For individual people and benefits sponsors, this information-driven human capital management model is the primary component of a long-term solution to the convoluted, authoritarian, monopolistic health benefits system that has developed in the last half century. The new model will have information at its core – detailed, person-centric information that is captured and organized by effective information management systems, and that can be used to most effectively manage benefit programs and the people who use those programs.

End Notes

ⁱ These assumptions will permit us to employ conventional economic theory to derive behavioral implications and make predictions. Since these predictions can, in principle, be falsified by real-world data, we believe that our framework **incorporates** a methodology that meets criteria required by the best tradition in the social sciences. For an excellent discussion of these issues see Mark Blaug, *The Methodology of Economics*, (London: Cambridge University Press, *Surveys of Economic Literature*, 1980).

ⁱⁱ Societal saving may also be affected by the fiscal actions of the government sector. When the government spends more than available revenues acquired through taxes (the well-known budget deficit), the gap must be borrowed from savers, either domestic or foreign. Hence, if budget deficit **exists** the government sector is dissaving, and the shortfall must be acquired from the savings pool that might otherwise have been used for private investment that has been "crowded out."

ⁱⁱⁱ These ideas were largely conceived and promoted by Nobel Laureate Professor T. W. Schultz and his students at the University of Chicago. Probably Schultz' most famous student in human capital is the 1992 Nobel Laureate in Economic Science, Professor Gary S. Becker, now at the University of Chicago.

^{iv} As indicated in this section, the relationship, between work and health is complex and under-researched. Haveman, et.al (1994) find that work time per se is not a significant determinant of health, but they do not include job satisfaction in their analysis.

^v To be covered for healthcare treatment by a group health plan made available by most firms, healthcare professionals must certify the need for care. These professionals normally must be licensed, certified, and registered in the state where the service is rendered. This requirement, however, does not ensure that all insured illnesses are debilitating and require treatment.

^{vi} Although the benefits vary among firms, disability payments under WC commonly include up to 66 2/3% of an employee's gross weekly wage, not to exceed the maximum limit placed on such payments by regulations imposed by the state. WC benefits also often include 100% coverage of all related, reasonable, and necessary medical expenses associated with job-related illnesses.

^{vii} Disability income may be available from the following sources: a medical absence (sick leave) policy, a short-term disability plan, and a long-term disability plan. Income may also be acquired through a pension plan and a profit-sharing plan if the necessary criteria are met. If the employee is disabled, he may also be eligible for federal Social Security payments.

In one firm for which we have data, for example, for benefits to begin an employee must submit proof of disability and be under the care of a healthcare professional. Proof of disability may include current clinical status, the healthcare professional's treatment plan and dates, test results, and significant objective findings which serve to substantiate the period of time the healthcare professional indicates that the employee is disabled. However, pain, without objective findings, is not generally considered to be proof of disability, even though non-specific low back pain is the most costly of all workers' compensation claims in this company. The employee must remain under the care of a healthcare professional during the entire period of disability.

Short-term disability benefits end the day the employee 1) recovers from the disability, 2) ceases to be under the care and treatment of a healthcare professional, 3) the day that employment is terminated, and 4) at the end of 26 weeks, whichever comes first.

If the employee has a long-term occupational disability, however, disability payments (LTDP) may be received until the earlier of the following: the end of occupational disability, or two years. If the employee has total disability due to a physical problem, benefits continue until the earlier of: the day disability ends or the day age 65 is reached. LTDP benefits for a disability due to mental or nervous condition may continue only for a maximum of 2 years.

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