Review Article

John Nyman and the Economics of Health Care Moral Hazard

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In 2003, John Nyman published *The Theory of Demand for Health Insurance*. His principal contributions are (1) to replace the previously unexamined axiom of risk avoidance with the axiom of welfare maximization; (2) to uncover a misinterpretation in the literature on moral hazard, namely, the insurance payoff as a price reduction, rather than as an income transfer. The immediate consequence of these reformulations is to recognize insurance-induced health care utilization as resulting in an increase in social welfare. Despite its evident validity and enormous implications, Nyman's work has received very little attention or recognition in the health economics literature.

1. Introduction

Although it remains to be seen whether the US can bring its per capita health care costs into line with other industrial nations [1], the US, after nearly 100 years of effort, passed national health care legislation in 2010. The Affordable Care Act, as it is widely known, passed with expectations of eventually bringing the nation close to a state of universal health care coverage. The legislative and other debates leading up to passage covered a wide range of topics, but one important concept—health care moral hazard—was never explicitly encountered in the debate.

The absence of moral hazard in the debate appears to be an aberration. For more than 40 years one of the central tenets of health care economics has been the presumption that universal coverage would induce a rather substantial degree of moral hazard and therefore would reduce national economic welfare correspondingly.

Among economists, these tenets are rooted analytically in a framework known as *welfare economics*, the objective of which seeks the circumstances leading to improved or maximized *human welfare*. The nature of the framework and, more pointedly, the manner in which that framework has been mobilized to characterize the health insurance policy payoff results in a habitual conclusion that more insurance-induced health care utilization results in a decline in human welfare. Consistent with that result had been the omnipresent policy caution that extensions of health insurance coverage to the general population were to be avoided.

In 2003, John Nyman published *The Theory of Demand for Health Insurance* [2] that uncovered a number of what he argued to be critical errors in the way in which the insurance payoff has been understood through the lens of *welfare economics*, and that the cumulative effect of these errors has been to introduce a decided bias in the formulation of health coverage policy. The book is slim by page count, but momentous in its findings and implications. His analysis is stunning, with potentially revolutionary implications for the scientific-economic basis of health care finance; yet, ten years on, there appears to be little notice, pro or con, in the usual professional locations. This paper attempts to elaborate and inform that state of affairs.

Nyman's book concerns itself with the formulation of a coherent "theory of the *demand*[1] for health insurance." To the casual observer, this may appear to belabor the obvious; in fact, what Nyman presents overturns decades of questionable orthodoxy and brings economic theory into coincidence with widespread lay American and professional international thinking about health care finance and many of the practices in all other developed countries. Moreover, he does it without stepping outside the analytical norms of traditional economics.

Nyman's book is not for everyone. Much of his argument proceeds in the language, geometry, and mathematics of *welfare economics*, a particularly rarified, but respected subdiscipline within the canon of contemporary economics[2]. Nyman's conclusions, however, and particularly the implications of those conclusions are for everyone.

2. Background

Many in the US health care field, including health economists, have supported the idea of universal coverage. The tenets of the professional discipline of health economics, however, have not supported the notion of such coverage [3, 4].

The modern professional economic argument on the subject began with Arrow in 1963 [5]. Arrow's argument is based on the widespread and *strong*[3] assumption that consumers are averse to the risk of uncertain events[4] such as unpredictable medical expenses. While this assumption may appear to be self-evident, it means more in economic parlance than the vernacular words connote. To economists, *risk aversion* refers to the presumed tendency of people to prefer the certainty of a *fair insurance premium*[5] to the uncertainty of actuarially equivalent *self-insurance* ("going naked"). Believing health insurance premiums at the time to be largely *fair*, but observing a widespread lack of insurance coverage, Arrow concluded that this was a notable instance of *market failure*, a technical expression denoting the failure of the marketplace, through private incentives, to make available goods and services which are demonstrably part of the *optimal*, or *welfare maximizing*, output of the economy or otherwise revealed or understood to be highly meritorious [6].

An important analytical challenge to Arrow's argument was introduced shortly thereafter by Pauly [7]. In it Pauly argues that the lack of widely available insurance against most health care costs may be for good and rational economic reasons, not *market failure*. In particular, he points to *moral hazard*, the curious coinage of insurance underwriters to characterize the greater *demand* for services when covered by insurance than when not covered. Pauly's argument is straightforward: (1) people covered by health insurance—once the premium is paid—face much less expensive health care services than do those in similar clinical circumstances, but without insurance; (2) since it is less expensive, they purchase more of it ("sliding down their *demand curve*" for medical care services); (3) increased utilization leads, in successive periods, to higher premiums, taxes, and foregone wage increases to pay for it; and (4) the resulting increased (premium) costs of coverage make insurance less attractive, and, so goes Pauly's argument, many people refrain from its purchase[6,7].

While the foregoing argument is advanced to take exception to Arrow's finding of a *market failure* for health insurance coverage, Pauly further argues that, given the presence of *moral hazard*, any effort to extend health insurance coverage, private or public, is likely to have the effect of reducing the level of *economic welfare* across the population [7, page 534]. More than anything, this questionable implication of Pauly's argument has resulted in the aversion of economists, and especially health economists, to any significant expansion of health care coverage, referenced above.

Pauly views the insurance payoff as an artificial reduction in price, resulting in an increase in purchase of medical care services (and a reduction in the purchase of all other things), and, from fairly settled *welfare economic theory*, this results in an unambiguous decline in *welfare*[8].

While somewhat obliquely stated in the original, it should have been clear from Pauly's original comment that this argument was intended to apply only or primarily to the relatively inexpensive and predictable elements of medical care, "visits to a physician's office... dental care, eyeglasses or drugs" [7, page 535]. In 1983, he restated this qualification and persisted that, "the relevant theory, empirical evidence, and policy analysis for *moral hazard* in the case of serious illness have not been developed. This is one of the most serious omissions in the current literature" [8]. Given the extent to which *moral hazard* has dominated economist thinking on health care finance—expensive as well as inexpensive—for several decades, the neglect of this qualification is remarkable.

3. Implications and Consequences of the Original Moral Hazard Argument

Feldstein [9] set the tone for much of the empirical research to follow Pauly's comment. In this 1973 study, Feldstein inferred that, on the subject of American health insurance of the time, the *welfare* losses resulting from *moral hazard* exceeded the gains from *risk avoidance* (insurance coverage). To attenuate this disturbing perception, he recommended raising the coinsurance rate on health insurance to 66 percent. Over the next several decades, many others replicated these inferences [10]. One other study worthy of note in this regard is the RAND Health Insurance Experiment, conducted mostly during the 1980s [11].

Instead of merely a footnote qualifying Arrow's paean to universal coverage in favor of some form of catastrophic coverage, Pauly's comment launched a generation of professional work purporting to document the loss in *welfare* suffered by American health care consumers as a result of the tax exemption of employer-based insurance, first- or near-first-dollar coverage (where it existed), and copayments beneath the substantial level determined by some economists to be "optimal" [10]. By the late 1970s, this reasoning led, among other things, to a policy posture of avoiding the extension of public financing of health insurance in favor of a panoply of punitive, behavior modifying and micromanaging measures to restrict this tendency to *moral hazard*: higher deductibles and coinsurance, care management, prepayment, gatekeepers, utilization review, voluntary and mandatory second opinions, chronic disease management, and so forth, all of which underlies much of the contemporary physician displeasure with the health insurance system. Initially (in the 1970s and 80s) this emphasis was said to be erected in order to insert discipline into the markets for health care services, so that when some version of universal coverage came along, it would not be wasted in welfare-reducing *moral hazard* [12]. Eventually, with the exception of one year during the Carter and one or two during the Clinton administrations, there

was no serious progress until the Obama administration. This is largely where the main contours of the theoretical and empirical discourse remained until the past few years with the publication of Nyman's book and articles [13].

4. The Argument from Nyman

Nyman's argument can be recapitulated as follows.

The present theory and analysis of the economics of the demand for health insurance is encumbered by serious anomalies and other difficulties. What is needed is a new formulation starting from first principles, but without the necessity of deviating from any of the fundamentals of modern *welfare economics*.

In particular, *risk avoidance*, the long-standing behavioral assumption underlying the study of the demand for health insurance, is both theoretically untenable and empirically rejected.

Risk avoidance, as specified above, has formed the basis of all discussions of the economics of the demand for any type of insurance for nearly the past 60 years [14].

This axiom presumes that people purchase insurance because they prefer the certain loss of paying the premium to taking their chances with actuarially equivalent risky outcomes (self-insurance). The degree to which people are presumed *risk averse* is measured by the extent to which they are willing to pay a premium that exceeds the sum of actuarially equivalent, self-insurance outlays[9]. But this makes no sense in the case of health insurance, argues Nyman, since much of the high-end health care services normally covered by health insurance policies are out of the reach of most people's self-insurance capabilities. If you cannot afford to pay out of pocket for it, you are not buying health insurance against it for *risk-avoidance* purposes. In other words, if you cannot afford to pay the costs associated with the unforeseen and expensive covered health care interventions, then the premium for the policy covering those interventions is not the actuarial equivalent of the financial circumstances you face. Your purchase behavior, in this situation, therefore, is not driven by what economists refer to as *risk avoidance*[10].

Additionally, argues Nyman, "the demand for insurance has nothing to do with the demand for certainty, because uncertainty exists with or without insurance. Even if the consumer has insurance, the uncertainty is whether the consumer will remain healthy and incur the loss of the premium or become ill and receive an (insurance payment)" [2, page 54], and even with the payment, it remains uncertain whether the consumer's health status will improve, with obvious and serious economic and other implications.

Moreover, continues Nyman, empirically, all of the scientific research to date on Prospect Theory[11] [15, 16], which extends to all aspects of economic chance taking, suggests that people generally prefer uncertain losses to certain losses of the same expected magnitude. These consistent empirical findings cannot be consistent with an axiom that posits a predictable preference for a certain loss over actuarially equivalent uncertain losses, and where empirical findings

regularly contradict prevailing theory, the theory ought to be in question.

In place of the traditional *risk avoidance* formulation of consumer motivation, Nyman substitutes the historically prior and more general and familiar, "*weaker*," premise, namely, that consumers base their purchase decisions regarding health insurance on their effort to maximize *expected utility*[12]. This formulation has the added benefit of rendering the theory of the *demand* for health insurance consistent with the theory of demand for everything else.

The second anomaly in the contemporary economics of health insurance is the treatment of the insurance payoff as a reduction in price, leading to an increase in utilization.

Beginning with Pauly [7] all discussions of health care *moral hazard* have adopted the surprisingly arbitrary convention, as described above, that treats the insurance payoff as making the purchase of covered health care services by insured persons as if those services are available to those insured persons at substantially reduced prices (deductibles and coinsurance). The problem with this is neither logical inconsistency nor empirical contradiction as was the case with *risk avoidance*. In this case the problem is an error in adducing the *welfare* implications of the insurance-induced increase in utilization. The argument is as follows.

Fundamentally, argues Nyman, consumers *demand* health insurance in order to obtain income transfers from the insurance pool in the event of sickness.

Having discarded *risk avoidance* and using the *weaker*[13] Bernoulli [17] *welfare maximization* premise, Nyman postulates that consumers attempt to maximize their utility by purchasing health insurance, in order to have access to income transfers, which are the payoffs from the insurance pool in the event that they are sick. This enables them to purchase needed, often expensive, health care services that they would never have been able to afford without insurance. Normally in economic discourse, "affordability" refers to discussions of purchases of which people with low incomes cannot avail themselves; in this case the subject is health care services which form the standard of care in treating many serious conditions, services which are not affordable out of pocket even by a significant majority of the population[10].

These services are the often life-saving diagnostic and therapeutic interventions: non-X-ray diagnostic radiology, heart surgery, organ and bone-marrow transplants, therapeutic radiology, chemotherapy, and many, many others. These interventions cost tens and even hundreds of thousands of dollars for a single application and in most instances would not be purchased were it not for widespread insurance coverage[14]. These are presumably the services about which Pauly argued that the relevant theory, empirical evidence, and policy analysis for *moral hazard* in the case of serious illness had not been developed [8]. Arguably, Nyman's new formulation of the *demand* for health insurance offers a plausible answer to Pauly's honorably modest qualification of his own work.

Given this new formulation of the *demand* for health insurance, economic theory suggests that much of the resulting increase in health care utilization represents an

improvement in *economic welfare*, not the worsening that has been argued for the past 40 years.

The immediate consequence of this shift in motivational specification of the *demand for health insurance* brings with it a major change in the economic implications of the insurance payoff. Nyman's characterization of the insurance payoff is as the payment of a *transitory income* transfer to the insured from the insurance pool. This results in the insured consumer *demanding* more health care at every price than he/she had previously (to the income transfer, not to the holding of insurance). By the same long-standing *welfare economics* invoked above, this increased demand from increased income results in an unambiguous increase in *utility* or *welfare*.

By retaining the stronger *risk-avoidance* assumption and thereby overlooking the likely unaffordability of the sickness outcome in the Friedman and Savage scenario [18], economists from Pauly forward have been blinded to the income transfers inherent in the insurance payoff and have, instead, viewed the insurance payoff as merely reducing the price at which health care services are available to members of the insurance pool.

They do not account in the theory for how the price declines. But the insurance payoff is as much a component of *transitory income* [19] as are winnings at the gaming table. It would be difficult to overstate either the centrality or the wrong headedness of both the *risk aversion* assumption and the insurance payoff/price reduction convention for determining the *welfare* implications of holding health insurance.

Nyman is not denying the presence of *moral hazard*—the tendency to purchase more as prices decline. He is differing with the prior formulation of the consumer demand for health insurance, the characterization of the insurance payoff to sick insured individuals, and, therefore, the *welfare* implications of greater insurance coverage.

Following on this reformulation, Nyman distinguishes between *efficient* and *inefficient moral hazard*. Each is a component of the total *welfare* effect of the measurable increase in utilization resulting from increased insurance coverage. *Efficient moral hazard* is that component of the utilization increases attributable solely to the increase in income the transfer affords. From well-developed *welfare theory*, this results in an unambiguous increase in *welfare*. *Inefficient moral hazard* is that component of the increase attributable to the fact that the utilization is purchased at deductible and coinsurance rates, not full price. As reviewed in Section 2, this latter component results in an unambiguous reduction in welfare.

While the theory in question is considerably more complicated even than this discussion, it is not a distortion to say that the *moral hazard* argument of the past 40 years, as it has been applied to health insurance policy, contains an error (or at least an unrecognized assumption) that is often the barb of introductory microeconomic course pedagogy—the error of confusing a *movement along a demand curve* with a *shift in the demand schedule*. More specifically until Nyman, economists have erred in interpreting the insurance-induced increase in health care expenditure as a movement downward along a given individual's *demand curve* in response to the appearance of a reduction in price. Instead, what Nyman sees

is an outward shift in the individual's *demand curve*, resulting from the income transfer originating in policy-holder premium payments. The "pivot point" of the two interpretations is in the analytical choice between *risk avoidance* and *welfare maximization* (see Friedman and Savage [18] versus Bernoulli [17]), and the *welfare* implications of the two perspectives are starkly different. According to the orthodox theory, based on *risk avoidance*, all *moral hazard* is *inefficient*.

Indeed there is another respect in which the old *moral hazard* argument is in theoretical default. Within the presently-accepted *welfare economic* or *general equilibrium* framework, one can imagine people purchasing health insurance on the basis of either *risk avoidance* or *welfare maximization*. In either case, premium payments are made into an insurance pool. Of the people making the payments, some remain healthy throughout the term of the contract. Others do not and, if covered, submit claims for needed services; if approved, payments are made to insureds, effectively increasing their income and purchasing power. As a result, according to Nyman, the correct formulation of the insurance payoff is using the pool to transfer income from all premium payers to those who are or become sick and are covered and authorized for needed services; this transfer is a form of *transitory income* [19] enabling the purchase of otherwise unaffordable services[15]. Welfare is unquestionably increased[16].

From the point of view of the traditional theory, however, insureds are viewed, not as receiving an income transfer from the pool, but rather facing prices significantly beneath market prices for covered health care services. Within this (traditional) theory, the insurance pool ceases to be a part of the theory. It disappears once the insurance premium is paid. Under Nyman's theory premium payments are made to the pool, and income transfers are made from the pool to qualifying insureds, which use it (only) to purchase covered and authorized services. Providers, in turn, use the money to pay suppliers, purchase equipment, hire labor, and so forth. As theory, the reduced price formulation is seriously truncated.

This is the crux of Nyman's contribution—to extend the Pauly formulation in favor of the more tenable and theoretically consistent view that health insurance results in a system of income transfers from the healthy to the sick, and that these transfers often result in *net welfare increases*. Boldly put, in the face of nearly 40 years of economists trumpeting the *welfare*-reducing effects of health insurance coverage, Nyman insists, with arguably ample justification, that the truth, on balance, is just the reverse.

Substantively, in place of the decried *always inefficient moral hazard* is the additional services purchased by insureds, which most would never have been able to afford, the purchase of which, when sick, is the new, posited reason for the purchase of the insurance. In light of Nyman's contribution, prior estimates of the welfare loss due to *moral hazard* [9] have been severely overstated. Nyman concludes in a careful theoretical-empirical analysis [2, page 98] that only 31 percent of insurance-induced utilization is welfare decreasing *inefficient moral hazard*; whereas 69 percent is *efficient moral*

hazard, income increases affording people throughout most of the Nation's income distribution the ability to purchase otherwise unaffordable—and arguably effective—care.

Nyman's preliminary empirical exploration suggests the possibility, and even likelihood that valuing the total of *efficient* and *inefficient moral hazard* leads to significantly positive net social benefits.

In an effort to provide an empirical illustration of these ideas, Nyman cites [2, page 110–114] credible recent studies which reveal a 25% increased risk of mortality among the uninsured, ages 25–65, a valid estimate of the value of an additional year of life within that age interval of $100,000, and excess per capita health care expenditures among the insured of this age group (relative to those uninsured) of $976 (1996). Based on these estimates, if coverage were to be extended to the 40 million uninsured in 1996, the year to which the estimates apply (now in 2013, several million greater) Americans' one-year welfare increases from improved mortality alone would be valued at $123 billion, and welfare reductions due to the traditional *(inefficient) moral hazard* (of purchasing health care at prices beneath its cost of production) would be valued at $39 billion, with a one-year net social benefit of $84 billion "or a welfare gain from *moral hazard* that is more than three times its cost" and over $2,000 per uninsured person.

Nyman discusses a variety of qualifications in using these numbers, but concludes that the $84 billion estimate is a very conservative one for the narrow question he addresses. For those who believe that a proper estimate of net social benefits should be an important contributor to policy selection, this is an extremely important finding.

If the prior work of Pauly, Feldstein, Newhouse, Manning, and others was actually an impediment to improved coverage, then Nyman's work, if it stands up, should remove that impediment. The difficulty of measuring the effects of moral hazard, however, is a barrier to overcoming this impediment. Moreover, should these formulations and findings hold up upon further investigation, Nyman, 40 years later, reinstates Arrow's original conclusion that serious gaps in coverage strongly suggest an important instance of *market failure*. Following on that, economists should then trumpet the consequent economic desirability of increased social financing for the achievement of universal—but not necessarily first dollar—coverage against health care expenses. Should these formulations and findings hold up, we may expect these new preferences to be revealed in future polling of health economists.

5. Consequences and Implications

The first corollary of Nyman's work is that the *welfare* implications of *moral hazard* are now reversed. In the traditional formulation, insurance is seen to reduce the price of medical treatments leading to distortions in patterns of consumer purchase that unambiguously reduce *welfare*. According to Nyman's formulation, insurance provides income transfers from the insurance pool to sick insureds, enabling them to avail themselves of expensive, standards of care not otherwise

affordable for serious illnesses. Because this increase in income enables the insureds to increase their purchases of medical treatments at each price level, this leads to general increases in welfare[17]. Practical implications of this include a need to rethink and recalculate optimal copayment levels, income tax exemption on employment-based health insurance, and optimal insurance policy design. Following on that is the implication that greater coverage or elimination of the uninsured is not only good politics in some circles, but it is also good economics in any circles[18].

A final implication is the appearance that something other than mere analytic discourse is involved in this discussion of the past 40 years. In the US a unique coincidence exists of rather parlous health care coverage and a rather aggressive economic doctrine which, in effect, tends to justify that stinginess. Neither exists to any significant degree in other advanced countries[19]. There is no suggestion here of a vulgarly conceived conspiracy to suppress doctrines that would have the effect of universalizing health care coverage. What we have shown is that there is a serious scientific question about the validity of the contemporary doctrine of *moral hazard*, and that its popularity is greatest, nay, almost uniquely held—in a country with the least generous health care coverage, suggesting that the study of the doctrine of *moral hazard* belongs not only in the field of Economic Science but also in that of the Sociology of Knowledge.

6. Response to the Argument

Despite what appears to be a major challenge, the response to Nyman's work by health economists appears to be one of benign neglect followed by begrudging, albeit limited, acceptance among some. Standard reviews of the book—generally positive and summarizing Nyman's work—have appeared in four journals that can be considered peer-reviewed, professional journals of economics, health care policy, or insurance [20–23]. The book has not been reviewed in some of the leading economic or health services journals in which one would expect great interest, even if negative[20]. Nyman's theory has been the inspiration of a favorable article in *The New Yorker* in August 2005 [24][21]. It is explained in at least two health economics textbooks that have achieved several editions[22], is taught in college and university health economics or policy courses, and has spawned related theoretical and empirical work [25, 26].

The first critical review concerning Nyman's theory appeared several years before his book's publication. Blomqvist [27], while directing an entire article in response to an article by Nyman appearing earlier in the same journal [13] embodying much of the argument in the book under review, largely skirts the issues Nyman raises, damns with faint praise, and otherwise dismisses the argument. A recent article provides indirect empirical support of Nyman's measurement of efficient moral hazard by estimating that inefficient moral hazard does not contribute as much dead weight loss to the economy as might be expected [28]. Another recent article cites Nyman's concept of income transfer effect in unemployment insurance [29].

On April 1, 2010, at a Book Forum at the American Enterprise Institute, in Washington, DC, Mark Pauly presented an overview of a book he had recently published [30] (http://www.aei.org/events/2010/04/01/emhealth-reform-without-side-effects-making-markets-work-for-individual-health-insuranceem/), offering his views on health care reform. There were two discussants of Pauly's book; the first was John Nyman. The moderator, in introducing Mr. Nyman, said that "...he's written quite extensively in the field of health policy, including challenging some of Mark's earlier theories of moral hazard..." to which Mr. Pauly was heard to interject, "Well, we agree". To this day, there has been no published explanation of this comment of agreement.

Contrast the reception of Nyman's work to the recent resurrection of Arrow's article [5] that was published more than four decades ago. Arrow's article provided the basis of a special-issue tribute of the *Journal of Health Politics, Policy, and Law* in 2001, with articles from many of the nation's leading health economists and a response by Arrow [31]. The present paper attempts to call attention to how Nyman's work has been so overlooked, whereas an article 40 years old—and largely rejected within 5 years of publication—is the subject of a captive journal issue. Arguably, John Nyman is no Kenneth Arrow... at least not yet, and, certainly, Arrow is due his tribute.

All of this is underscored by two recent presidential addresses to leading economic groups. In his address to the 2006 meeting of the American Society of Health Economists, Joseph Newhouse offers a retrospective on the tradeoff between *moral hazard* and *risk avoidance* since Zeckhauser [14], though he also credits the earlier Arrow [5] and Pauly [7]. The content is brief and celebratory. No untoward ideas are considered; neither Nyman nor his ideas are mentioned or cited.

Martin Feldstein, in his address to the 2006 meeting of the American Economic Association, offers a thoughtful, undogmatic synthesis of his thinking after 40 years study of social insurance. Health insurance is treated only in a 2-page section on Medicare, but not so short that the analytical principles of *risk avoidance* and trading off risk reduction against *moral hazard* could not be avowed. Again, no contradictory ideas are acknowledged; neither Nyman nor his ideas are cited.

There has been no review and discussion in journals or conferences as panel sessions, for example, of the American Economics Association, Academy Health, or Health Services Research. This lack of a full debate subsequent to the book's publication raises several questions. Why has not there been more notice of the work and its implications for health policy? Why have not the health policy and health economics annual meetings, journals, and other publications presented or debated the work? If it is wrong, it should be challenged in the usual arenas of scholarly debate. If the burden of opinion after open debate is that the work is found wanting, then it should be dismissed. Surely, standard scholarly practice is to engage the argument and see where the dust settles.

The response of the leadership of the field perhaps can be best understood within the sociology of knowledge that explains changes in science [32]. Half a century ago Kuhn introduced a new way of thinking about these changes, which is called the theory of scientific revolutions [33]. Nyman's theory does not appear to fit within the widely understood notion of Kuhn's scientific revolution. Kuhn's notion views the various scientific disciplines as based on fundamental ideas and assumptions. At critical points in the development of the disciplines some of those ideas or assumptions are thought, generally by newer practitioners of the field, to be in some types of theoretical or empirical errors. Even in those cases where the new ideas are revealed to be superior to what they are challenging, the process of its adoption is often protracted.

Clearly Nyman is not in any way challenging the fundamentals of *welfare economics*, though that compartment of the larger economic enterprise has taken its licks over the years. On the other hand, the Friedman-Savage (risk aversion) formulation of the demand for insurance has been settled economic doctrine for more than 50 years, and Nyman points out that it is inapplicable to the circumstances of health insurance coverage anywhere. Premiums paid for health insurance policies for the majority of the population are not the actuarial equivalent of what they would be paying where they are uninsured. As such the theory is seriously flawed. As a result the insurance payoff has been misinterpreted as a reduction in the price of the covered services rather than as an income transfer from the insurance fund to the sick insured. The welfare implications, as discussed previously, are reversed with major policy implications.

Nyman's reinterpretation of the insurance payoff clearly presents a challenge to the health care *moral hazard* analysis that has been a fundamental element of health economics doctrine for almost 50 years. And as in other fields and sciences, the withdrawal of previously dominant, now flawed ideas from scientific discourse is indeed a protracted process.

7. Conclusions and Reflections

John Nyman has, in a sense, "revolutionized" the economic theory of the *demand* for health insurance [25]. His principal contributions are (1) to replace the previously unexamined—and flawed—axiom of *risk avoidance* with that of *welfare maximization*; (2) to uncover a serious error or misinterpretation in the literature on *moral hazard*, namely, the practice of his predecessors to characterize the insurance payoff as a price reduction, rather than as an income transfer (and a lesser price reduction). The immediate consequence of these reformulations is to recognize insurance-induced health care utilization as, on balance, resulting in an increase in *social welfare*, not, as argued by others for the past 40 years, an unambiguous reduction in *welfare*.
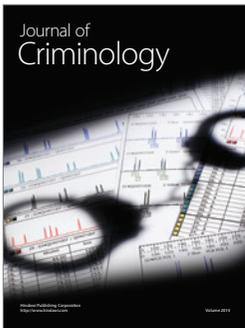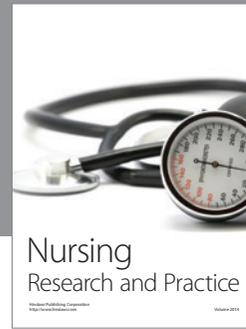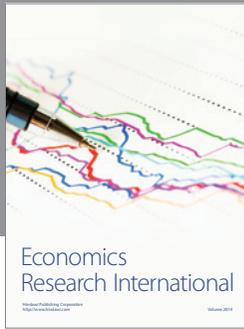
Acknowledgment

Endnotes

1. Perhaps the most deceptive is the term, "*demand*," which, in ordinary parlance suggests an "unyielding insistence," but in economic parlance indicates merely the consumer's placid willingness to purchase certain quantities of a given commodity at various prices. Throughout this text, the expression "*demand for health insurance*" has no connection to legislative passage of extended or universal health insurance coverage. The analytical issues discussed have enormous implications for such policy issues.

2. For a more accessible version, see [11].

3. We use the terms *strong* and *weak* in this discussion in the philosophic logical sense of narrow or restrictive and broad or enabling, respectively.

4. Traditionally, *risk* and *uncertainty* have been used in technical economic discussions to connote distinct ideas about the unknown future. *Risk* was used to connote circumstances in which the range of outcomes, and their probabilities were "known"; *uncertainty*, when neither was "known." In this discussion, as with the preponderance of the literature on this subject, the two terms are used interchangeably.

5. That is, a premium equal to the value of expected health care outlays faced and insured against.

6. There is a considerable level of disingenuousness in this argument and all of the related subsequent work. The clear implication of Pauly's discussion is that there but for *moral hazard* virtually all Americans would be covered by lower cost health insurance coverage. Aside from the problem of determining the portion of the growth in per capita health care costs of the past 40 years attributable to *moral hazard* and that portion to demographic and technological changes and the general level of inflation, it seems rather clear that most of today's 60 million uninsured and seriously underinsured cannot afford health insurance because of the cost relative to their income, independent of the premium elevation resulting from *moral hazard*.

7. In fairness, Arrow did note the troubling presence of *moral hazard* and the need for copayments to control them, but, until Pauly's comment, did not suggest the possibility that insurance-induced overconsumption, rather than *market failure* might be responsible for large gaps in coverage.

8. Briefly, the reason argued for the theoretical decline in *welfare* is due to a distortion in the prices faced by insured persons. Because insured persons face prices for insured medical care that is well below the market prices for those services, they purchase much more of it than they would if they faced market prices and much less of other commodities, the prices of which are largely unchanged. According to this theory, consumers are presumed to purchase goods and services in amounts that are driven by the equalization of price ratios to the corresponding ratios of gratification intensity from the commodities in question. But because the prices faced by insured persons are not market prices, they are actually obtaining lesser levels of welfare than if everyone faced market prices.

9. This excess normally would be due to such things as inaccurately high actuarial claims estimates and insurance company administrative expenses, such as advertising, claims processing, and profit taking.

10. Indeed, though this is not part of Nyman's argument, most holders of autoinsurance would never be able to cover out of pocket, or even borrow to finance, many of the costs of autoaccident liability events (and it is therefore, interestingly, obligatory); the same holds for small-owner business property coverage.

11. For which Daniel Kahneman, a psychologist, was awarded the Nobel Prize in Economic Science in 2002.

12. In a poignant but awkward hesitation, Arrow, coawarded the Nobel Prize in Economic Science in 1972 (the fourth year of the award), begins his discussion of "The Theory of Ideal Insurance" by stating that "The expected-utility hypothesis, due originally to Daniel Bernoulli [17], is plausible and is the most analytically manageable of all hypotheses that have been proposed to explain behavior under uncertainty. In any case, the results to follow probably would not be significantly affected by moving to another mode of analysis. It is further assumed that individuals are normally risk averters."

13. That is, "broader," "more inclusive," and "less restrictive".

14. This is not to suggest that all health care utilization, *après* Nyman, is efficient and appropriate. It is only to caution that what excesses do exist—and they are enormous in the US—is not a simple matter of price-reducing insurance.

15. Strictly speaking, this is not the usual textbook increase in income, since it can only be used to purchase covered health care services, not from the usual, broad panoply of consumer commodities. Yet, it is certainly a form of income, and it does enable the consumer to purchase more than without this transfer, and the consumer's *welfare* is arguably greater—where the *efficient* outweighs the *inefficient* component—than in the absence of the coverage and the services this transfer affords.

16. Even within this new framework for understanding the insurance payoff, the old *inefficient moral hazard* is still present, but a lesser portion of the welfare effect of the utilization increase (see [2]).

17. Assuming that the absolute value of *efficient moral hazard* exceeds that of *inefficient moral hazard*.

18. Of course, everything is relative. Extending health care coverage to all Americans still depends on the increased benefits, calculated according to the new metric, to be greater than those benefits that result from spending a similar amount on other non-health areas of potential benefit.

19. Michel Grignon, Personal Communication.

20. *Journal of Health Economics, Health Economics, European Journal of Health Economics, and Journal of Risk and Uncertainty*, and the *American Economic Review*.

21. Ironically, even in *The New Yorker*, and by as notable a writer as Malcolm Gladwell, none of Nyman's actual contribution to the policy discussion is included in the article.

22. One text is *Health Economics: theory, insights, and industry studies*, by Rexford Santerre and Stephen Neun, published by South-Western/Cengage Learning, now in its fifth edition. The other text is *The Economics of Health and Health Care*, by Sherman Folland, Allen Goodman, and Miron Stano, published by Prentice Hall, now in its sixth edition.

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