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Edited by Phyllis Schiller Myers
Virginia Commonwealth University

THEORY OF CONTRACTS

Income Insurance with Uncertain Output, by Enrique Arzac (Columbia University)

This paper examines the properties of a market solution to the output uncertainty problem faced by unincorporated primary producers. An insurance contract is formulated and shown to provide income insurance to producers without exposing insurers to moral hazard. The equilibrium relative to this contract is shown to be equivalent to that effected by a stock market available to all producers. *International Economic Review*, Vol. 30, No. 3 (August 1989), pp. 561-9. (Reprinted with permission of the *Journal of Economic Literature*).

PRINCIPAL-AGENT THEORY

A Renegotiation-Proof Mechanism for a Principal-Agent Model with Moral Hazard and Adverse Selection, by Dominique M. Demougin (University of Toronto)

In this article I shall analyze a principal-agent model with moral hazard and adverse selection. I show that for a large class of environments, communication has no value to the principal and that he cannot do better than to average over the different types of agents. This observation is then used to derive a renegotiation-proof mechanism. *Rand Journal of Economics*, Vol. 20, No. 2 (Summer 1989), pp. 256-67. (Reprinted with permission of the *Rand Journal of Economics*).

GAME THEORY

Signaling, Forward Induction, and Stability in Finitely Repeated Games, by Martin J. Osborne (McMaster University, Hamilton, Ontario)

In a finitely repeated two-person game, suppose that after a deviation by player i from path P in period t there is only one continuation path Q in which player i 's payoff from period t on is higher than it is in P . Suppose also that

player j cannot benefit from deviating from Q , whatever outcomes ensue. Then it is shown that the path P is not stable in the sense of Kohlberg and Mertens (*Econometrica*, 54 (1986), 1003–1037). It follows that, in a repeated game of coordination, among the set of pure outcome paths which consist of sequences of one-shot Nash equilibria, only those with payoffs very nearly Pareto efficient are stable. *Journal of Economic Theory*, Vol. 50, No. 1 (February 1990), pp. 22–36. (Reprinted with permission of Academic Press, Inc.)

UTILITY THEORY

The Causes of Preference Reversal, by Amos Tversky (Stanford University), Paul Slovic (University of Oregon), and Daniel Kahneman (University of California, Berkeley)

Observed preference reversal (PR) cannot be adequately explained by violations of independence, the reduction axiom, or transitivity. The primary cause of PR is the failure of procedure invariance, especially the overpricing of low-probability high-payoff bets. This result violates regret theory and generalized (nonindependent) utility models. PR and a new reversal involving time preferences are explained by scale compatibility, which implies that payoffs are weighted more heavily in pricing than in choice. *The American Economic Review*, Vol. 80, No. 1 (March 1990), pp. 205–217. (Reprinted with permission of *The American Economic Review*).

Projected Long-term Demographic Trends and Aggregate Personal Saving in the United States, by A. Clark Wiseman (Gonzaga University)

The Modigliani-Brumberg life-cycle model predicts a relationship between age distribution and the aggregate saving ratio via the population growth rate, which affects the ratio of earner/savers to retiree/dissavers. Aging resulting from slower population growth will result in a decline in the aggregate saving rate. This paper utilizes empirical age-saving relations, together with projected long-run population age distributions, to estimate the age distribution effect on aggregate personal saving. Results predict a much smaller decline in the saving ratio than is generated by the basic life-cycle model. *Journal of Post Keynesian Economics*, Vol. 11, No. 4 (Summer 1989), pp. 497–508. (Reprinted with permission of the *Journal of Economic Literature*).

Multivariate Decision-Making under Risk Aversion, by Larsk J. Olson (University of California, Riverside)

This paper develops new multivariate stochastic dominance rules for the class of all risk averse decision-makers, in which the separation of preferences over commodity bundles from attitudes toward risk is made explicit. *Journal of Economic Theory*, Vol. 50, No. 1 (February 1990), pp. 193–203. (Reprinted with permission of Academic Press, Inc.)

PROBABILITY THEORY

On Maximum Likelihood Estimation for Count Data Models, by Werner Hürlimann (Winterthur-Leben, Switzerland)

Based on the pseudo compound Poisson representation of any discrete distribution defined on the positive integers, we study properties of maximum likelihood equations. Necessary and sufficient conditions are given for a moment estimator equation to be maximum likelihood. The results are illustrated including claim frequency models recently discussed in actuarial literature: Sundt/Jewell's family, Hoffmann/Thyrión's family and Ruohonen's model. Among the contagious count data models the log-zero Poisson is analyzed. The hyper-Poisson is shown to be not infinitely divisible except in the Poisson case. *Insurance: Mathematics and Economics*, Vol. 9, No. 1 (March 1990), pp. 39-49. (Reprinted with permission of the North-Holland Publishing Company).

MATHEMATICAL AND STATISTICAL MODELS

Stochastic Interest Rates and Autoregressive Integrated Moving Average Processes, by Jan Dhaene (Instituut voor Actuariële Wetenschappen, K.U. Leuven, Belgium)

A practical method is developed for computing moments of insurance functions when interest rates are assumed to follow an autoregressive integrated moving average process. *Astin Bulletin*, Vol. 19, S (November 1989), pp. 43-50. (Reprinted with permission of the *Astin Bulletin*).

RUIN THEORY

Three Methods to Calculate the Probability of Ruin, by François Dufresne and Hans U. Gerber

The first method, essentially due to Goovaerts and De Vylder, uses the connection between the probability of ruin and the maximal aggregate loss random variable, and the fact that the latter has a compound geometric distribution. For the second method, the claim amount distribution is supposed to be a combination of exponential or translated exponential distributions. Then the probability of ruin can be calculated in a transparent fashion the main problem is to determine the nontrivial roots of the equation that defines the adjustment coefficient. For the third method one observes that the probability of ruin is related to the stationary distribution of a certain associated process. Thus, it can be determined by a single simulation of the latter. For the second and third methods the assumption of only proper (positive) claims is not needed. *Astin Bulletin*, Vol. 19, No. 1 (April 1989), pp. 71-90. (Reprinted with permission of the *Astin Bulletin*).

HEALTH CARE AND INSURANCE

The Rationale Nonpurchase of Long-Term-Care Insurance, by Mark V. Pauly (University of Pennsylvania)

Only a tiny fraction of the nonpoor population currently purchases private insurance coverage against long-term-care (LTC) costs. Studies generally attribute the failure to purchase private coverage to "unawareness" by potential purchasers of the benefits of coverage and a misperception that Medicare currently covers long-term care. I explore alternative reasons for failure to purchase coverage by well-informed, expected utility-maximizing risk-averse individuals for whom LTC is associated with a large increase in mortality and for whom family members represent an alternative source of care. There may be no demand for LTC insurance even if it is made available at actuarially fair premiums because the main consequence of coverage is to enhance the expected value of one's estate. *Journal of Political Economy*, Vol. 98, No. 1 (February 1990), pp. 153-68. (Reprinted with permission of The University of Chicago Press).

SOCIAL INSURANCE

The Politics of Modernization: Britain's National Health Service in the 1980s, by Patricia Day and Rudolf Klein (University of Bath)

The history of the British National Health Service (NHS) over the past decade demonstrates both institutional adaptation and insulation from more basic structural change. Reflecting international trends, the NHS has, on the one hand, recentralized decision making, adopted strong managerialist policies, accommodated a modicum of privatization, and stressed the client's role in some service choices. On the other hand, the government has skirted introducing unbridled competition into the health service. Assessment of a 1989 "Government Review" highlights the tensions the NHS faces between budgetary pressures and consumer demands, and between centralized controls and medical autonomy, among others. *The Milbank Quarterly*, Vol. 67, No. 1 (1989), pp. 1-34. (Reprinted with permission of the Cambridge University Press).

Projected Outcomes and Length of Time in the Disability Insurance Program, by John C. Hennessey and Janice M. Dykacz (Social Security Administration)

This first phase of a longitudinal analysis of disabled-worker beneficiaries examines the first event of interest after entitlement-recover, death, or retirement. Mathematical models are used to project these events and to calculate the proportion of beneficiaries who leave the program for these reasons. Eleven percent will recover, 36 percent will have their benefit terminated at death, and 53 percent will retire. Mean length of time in the program is estimated to be 9.3 years. Considerable variation was found in the outcomes and mean number of years in the program by primary diagnosis,

educational level, primary insurance amount, and sex. *Social Security Bulletin*, Vol. 52, No. 9 (September 1989), pp. 2-41.

The Monthly OASDI One-Percent Sample File, By Lewis F. Frain (Social Security Administration)

The Social Security Administration compiles a one percent microdata sample file each month from its principal data file, the Master Beneficiary Record, which is used to administer the Old-Age, Survivors, and Disability Insurance (OASDI) program. This one percent OASDI sample provides current program and demographic information so that data can be quickly tabulated to respond to specific research, legislative, and administration questions about the OASDI program. This article briefly describes the development of Social Security Administration's Master Beneficiary Record and documents the contents, technical features, and uses of the one percent file that is developed from the master record. *Social Security Bulletin*, Vol. 52, No. 6 (June 1989), pp. 8-15.

The "Twin-Pillar" Approach to Social Insurance in the UK, by John Creedy (University of Melbourne) and Richard Disney (University of Kent, Canterbury)

This paper considers the recent shift towards private provision of social security in the United Kingdom, as part of the "twin-pillar" approach of the Conservative government. Emphasis is on the encouragement of personal and occupational pensions, rather than public provision, above a basic minimum, and the transfer of the administration of sickness insurance to employers via the introduction of statutory sick pay. It is found that the new arrangements are difficult to rationalize in terms of standard economic arguments concerning public and private provision. The new arrangements have been introduced without adequate analysis of redistributive and labor-market implications. The sick pay scheme has, in addition, introduced a potential problem of employer moral hazard. *Scottish Journal of Political Economy*, Vol. 36, No. 2 (May 1989), pp. 113-24. (Reprinted with permission of the *Journal of Economic Literature*).

LIFE ANNUITIES

The Cost of Annuities: Implications for Saving Behavior and Bequests, by Benjamin M. Friedman (Harvard University) and Mark J. Warshawsky (Board of Governors of the Federal Reserve System)

The fact that most elderly U.S. individuals maintain a flat age-wealth profile, rather than buy individual life annuities, contradicts the standard life-cycle consumption model. Average expected yields on individual life annuities in the United States during 1968-1983 were lower by 4.21-6.13 percent, or 2.43-4.35 percent after allowing for adverse selection, than yields on plausible alternative investments. Simulations of a model of saving and

portfolio allocation show that during the early retirement years such yield differentials can account for the absence of annuity purchases even without a bequest motive. At older ages the combination of such yield differentials and a bequest motive can do so. *The Quarterly Journal of Economics*, Vol. CV, Issue 1 (February 1990), pp. 135-54. (Reprinted with permission of *The Quarterly Journal of Economics*).

PENSIONS AND RETIREMENT

Determinants of Actuarial Cost Method Changes for Pension Accounting and Funding, by Dimitrios C. Ghicas (Baruch College)

This study identifies and evaluates some possible determinants of the switch from a cost-allocation actuarial cost method to a benefit-allocation actuarial cost method. The primary effects of this switch are a decrease in pension expense and in the amount funded to the pension plan. The decreases in pension expense and funding arise because benefit-allocation methods have lower pension liabilities than do cost-allocation methods.

In addition, the study examines whether an actuarial alignment of pension assets to the reported present value of the accumulated plan benefits motivates the switch in actuarial cost methods and controls for the effect of differing interest rates in the computation of the accumulated plan benefits.

The hypotheses are tested by comparing switch firms to industry-matched nonswitch firms and using proxy measures to operationalize the theoretical concepts. The comparisons are performed in the year prior to the switch, the year of the switch, and year following the switch by relying on multivariate logit models. The primary advantage of logit models is the presence of consistent coefficient estimates whenever choice-based sampling is involved. Univariate matched-pairs t-tests and Wilcoxon sign-rank tests are also performed in the year of the switch.

The empirical findings suggest that financial statement considerations and reduction in pension funding appear to be the primary reasons associated with the switch in actuarial cost methods. The reduction in pension funding is first accomplished by the use of higher interest rates, which decrease pension liabilities, and then by the switch into a benefit-allocation method, which provides an additional decrease in the pension liabilities. The last step is used if firms have limited freedom to make further increases in interest rates as unreasonably high interest rates are not permissible under ERISA.

Empirical evidence based on multivariate logit models reveals a lower current assets to current liabilities ratio, a slower rate of investing into new projects, and a higher long-term debt to total tangible assets ratio for switch firms in comparison to nonswitch counterparts for the year of the switch. *The Accounting Review*, Vol. 65, No. 2 (April 1990), pp. 384-405. (Reprinted with permission of *The Accounting Review*).

Unisex Pensions and Retirement, by Stephan F. Gohmann (University of Louisville) and James E. McClure (Ball State University)

How will workers alter their retirement decisions in response to recent Supreme Court rulings that outlaw gender-based pension contributions and benefits? Upper bounds for these retirement responses are established in this paper. These bounds are shown to depend on the age and sexual composition of the pension cohort. With respect to cohort age, we show that the retirement responses of older workers are larger than those of younger workers. With respect to the cohort's composition, we show that the retirement responses of men become more pronounced and those of women less pronounced as the proportion of women in the cohort increases. *Journal of Economics and Business*, Vol. 42, No. 1 (February 1990), pp. 69-79. (Reprinted with permission of the *Journal of Economics and Business*).

INSURER MANAGEMENT

On the Corporate Demand for Insurance: Evidence from the Reinsurance Market, by David Mayers (Ohio State University) and Clifford W. Smith, Jr. (University of Rochester)

Significant attention has focused on the determinants of corporate insurance purchases. While this analysis generally involves observable firm characteristics, its implications have been untested. This is primarily due to the difficulty in obtaining data on corporate insurance purchases. We examine one industry where data on insurance purchases are systematically reported: the insurance industry. A reinsurance contract is an insurance policy purchased by one insurance company from another. Our examination of reinsurance purchases by property/casualty insurance companies provides strong evidence on the effects of ownership structure, size, geographic concentration, and line-of-business concentration on the demand for reinsurance. *Journal of Business*, Vol. 63, No. 1, Pt. 1 (January 1990), pp. 19-40. (Reprinted with permission of The University of Chicago Press).

Insurability and Moral Hazard in Agricultural Insurance Markets, by Robert G. Chambers (University of Maryland)

Pareto-optimal and constrained Pareto-optimal all-risk insurance contracts are studied. Conditions required for emergence of competitive insurance markets are isolated and discussed. Full insurance contracts are shown to be dominated by contracts involving coinsurance and deductibles if insurers are pseudo-risk adverse. The effect of moral hazard on all-risk agricultural insurance indemnity schedules is examined. Results for indemnity schedules under moral hazard and constant absolute risk aversion show that providing farmers with the incentives to take appropriate actions may imply lower deductibles in the presence of moral hazard than in the absence of moral hazard. *American Journal of Agricultural Economics*, Vol. 71, No. 3 (August 1989), pp. 604-16. (Reprinted with permission of the *Journal of Economic Literature*).

Predicting IBNYR Events and Delays I. Continuous Time, William S. Jewell (University of California, Berkeley)

An IBNYR event is one that occurs randomly during some fixed exposure interval and incurs a random delay before it is reported. Both the rate at which such events occur and the parameters of the delay distribution are unknown random quantities. Given the number of events that have been reported during some observation interval, plus various secondary data on the dates of the events, the problem is to estimate the true values of the unknown parameters and to predict the number of events that are still unreported. A full-distributional Bayesian model is used, and it is shown that the amount of secondary data is critical. A recursive procedure calculates the predictive density; however, an explicit formula for the predictive mode can be obtained. The main computational work is the evaluation of an integral involving the prior density of the delay parameters, but this can be simplified in the exponential case using Gammoid approximations. *Astin Bulletin*, Vol. 19, No. 1 (April 1989), pp. 25-55. (Reprinted with permission of the *Astin Bulletin*).

On Experience Rating and Optimal Reinsurance, by Jukka Rantala (The Ministry of Social Affairs and Health, Helsinki, Finland)

This paper presents applications of stochastic control theory in determining an insurer's optimal reinsurance and rating policy. Optimality is defined by means of variances of such variables as underwriting result of the insurer, solvency margins of the insurer and reinsurer and the premiums paid by policyholders. *Astin Bulletin*, Vol. 19, No. 2 (November 1989), pp. 153-78. (Reprinted with permission of the *Astin Bulletin*).

INSURANCE RATING MODELS

Use of Spline Functions for Premium Rating by Geographic Area, by G. C. Taylor (William C. Mercer Campbell Cook & Knight)

This paper gives details of a case study in the premium rating of a Householders Contents insurance portfolio. The rating is performed by the fitting of bivariate spline functions to a version of operating ratio described in Section 3.

The use of bivariate splines requires a small amount of mathematical equipment, which is developed in Section 4. The fitting of splines, using regression is carried out in Sections 5 and 6, where the numerical results are given, including some assessment of goodness-of-fit.

Contour maps of the spline surfaces are also given, and used for the selection of geographic areas used for premium rating purposes. These are compared with the areas, past and present, actually used by the insurer concerned. *Astin Bulletin*, Vol. 19, No. 1 (April 1989), pp. 91-122. (Reprinted with permission of the *Astin Bulletin*).

A Generalization of Automobile Insurance Rating Models: The Negative Binomial Distribution With A Regression Component, by Georges Dionne and Charles Vanasse (Université de Montréal, Canada)

The objective of this paper is to provide an extension of well-known models of tarification in automobile insurance. The analysis begins by introducing a regression component in the Poisson model in order to use all available information in the estimation of the distribution. In a second step, a random variable is included in the regression component of the Poisson model and a negative binomial model with a regression component is derived. We then present our main contribution by proposing a bonus-malus system which integrates a priori and a posteriori information on an *individual basis*. We show how net premium tables can be derived from the model. Examples of tables are presented. *Astin Bulletin*, Vol. 19, No. 2 (November 1989), 199-212. (Reprinted with permission of the *Astin Bulletin*).

LIABILITY RULES

Optimal Claim Behaviour for Third-Party Liability Insurances or To Claim or Not To Claim: That is the Question, by N. P. Dellaert, J. B. G. Frenk and A. Kouwenhoven (Econometric Institute, Erasmus University, Rotterdam, The Netherlands) and B. S. Van Der Laan (Goudse Verzekeringen, Stationsplein, The Netherlands)

It is proved that the optimal decision rule to claim or not to claim for damages is of the form: 'to claim for damage only if its amount exceeds a certain limit'. Optimal critical claim sizes are derived, a sensitivity analysis is given with respect to changes in (the parameters of) the distributions of the number of claims and the claim size. *Insurance: Mathematics and Economics*, Vol. 9, No. 1 (March 1990), pp. 59-76. (Reprinted with permission of the North-Holland Publishing Company).

Sharing of Information Prior to Settlement or Litigation, by Steven Shavell (Harvard Law School and National Bureau of Economic Research)

In this article the voluntary sharing of information prior to settlement negotiations is studied in a model where one type of litigant - plaintiffs, to be exact - possesses private information. In equilibrium, plaintiffs whose expected judgments would exceed a certain threshold will reveal their information (if they can credibly establish it) and settle for higher amounts than if they were silent; plaintiffs with lower expected judgments will remain silent and settle. The effect of the legal right of "discovery" is also examined. *Rand Journal of Economics*, Vol. 20, No. (Summer 1989), pp. 183-95. (Reprinted with permission of the *Rand Journal of Economics*).

Liability and Information, by Alfred Endres (Technical University of Berlin)

The performance of negligence and strict liability (with defense of contributory negligence) is analyzed in the case of bilateral accidents and a nonmarket setting. Three models are considered. They differ with respect to the assumptions as to how much the potential injurers and victims, as well as the courts, know about expected accident losses and the cost of accident prevention. It is shown how equilibrium care levels are affected by the involved parties' degree of information. For all models, equilibrium care levels are compared to Pareto-optimal and second-best levels. *Journal of Institutional and Theoretical Economics*, Vol. 145, No. 2 (June 1989), pp. 249-74. (Reprinted with permission of the *Journal of Economic Literature*).

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