Leases for Lives

Many historians of insurance have commented on the disconnect between the rise of English life insurance companies in the early eighteenth century and the mathematics behind the sound pricing of life insurance products that was developed at about the same time. Insurance and annuity promoters typically ignored this mathematical work. Bellhouse explores this issue and shows that the early mathematical work was not motivated by insurance but instead by the fair valuation of life contingent contracts related to property.

Even the work of the mathematician James Dodson in the creation of the Equitable Life Assurance Society, offering sound actuarially based premiums, did not change the industry in any significant way. The tipping point was a crisis in 1770 in which the philosopher and mathematician Richard Price, as well as other mathematicians, showed that a dozen or more recently formed annuity societies could not meet their financial obligations and were inviable.

David R. Bellhouse holds degrees in Actuarial Science and in Statistics. He has worked for over 40 years at the University of Western Ontario, where he is now Professor Emeritus. He has published extensively in the history of probability, statistics, and actuarial science. He has recently published a major biography of Abraham De Moivre. Bellhouse is a fellow of the American Statistical Association and has served as President of the Statistical Society of Canada. He is a recipient of Western's Gold Medal for Excellence in Teaching and was recently given the University of Manitoba Faculty of Science Honoured Alumni Award.

Leases for Lives

Life Contingent Contracts and the Emergence of Actuarial Science in Eighteenth-Century England

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Preface

I studied actuarial science as an undergraduate and then gave it up to pursue statistics as a field of study. Throughout my entire career I maintained an interest in history to the point that eventually my research moved away from technical work in statistics to the history of statistics. I seem to have come full circle by researching and then writing a book on the history of actuarial science.

In one sense this book is a natural outgrowth of an article I wrote with my friend and colleague, Christian Genest, on the life of Abraham De Moivre, the eighteenth-century Huguenot mathematician working in London, England. De Moivre is best known for his work in probability theory, but is also seen as one of the fathers of actuarial science. After much more research I was able to write a full-length biography of De Moivre. In that book there is a chapter on De Moivre's actuarial work, beginning in 1725 with his book on life annuities. When I was researching that chapter, what intrigued me was that I found a number of manuscripts showing English mathematicians around the 1740s answering questions on life contingent contracts involving life annuities but related to property. These questions had nothing to do with the insurance and annuity industry. That was puzzling to me. At about the same time I was reading histories of insurance and found, to my surprise, another puzzle. Although the insurance industry started in England in the late seventeenth century, mathematicians were not involved in the industry until the 1750s or 1760s and then only peripherally. It was not until much later in the eighteenth century that mathematics became more engaged in the insurance and annuity industry. Apparently, mathematicians like De Moivre were neither needed not wanted by the industry. The manuscripts that I initially found marked the beginning of a long paper chase that has resulted in what I hope are solutions to these puzzles.

What I have shown is that mathematical work in actuarial science was initially motivated by problems in the valuation of life contingent contracts related to property: leases for lives, reversions on estates, and

marriage settlements. There was one enterprising mathematician, James Dodson, who tried in the 1750s to translate his skills in these areas to the establishment of a life insurance company. He died before the company was finally founded in 1762. The company he worked to establish, the Society for Equitable Assurances, may have remained the outlier among life insurance companies had it not been for mathematicians in the 1770s pointing to the very shaky foundations of several organizations offering life annuities. Because of the work of these mathematicians, especially Richard Price, almost all of these organizations ceased operating and those remaining reformed the products they offered. This was the turning point in the mathematicians' involvement in the life insurance and annuity industries. Throughout this entire period mathematicians continued to work as consultants on life contingent contracts related to property.

Acknowledgments

Writing this book would not have been possible without the help of several librarians and archivists. For many of them I do not have names. These include staff members at Cambridge University Library, St. John's College Library Cambridge, Columbia University Library, London Metropolitan Archives, Exeter Cathedral Archives, and Canterbury Cathedral Archives. They were all very helpful when I visited them. Among these people one stands out. This is David Raymont, the librarian at the Institute and Faculty of Actuaries in London, England. We met on several occasions and corresponded many times. He was most helpful every time I visited him. My most memorable visit was when Mr. Raymont brought me a manuscript as I was working away at a table in the library and said something like, "You might be interested in this one. We recently purchased it." It turned out to be a previously unknown letter of Richard Price that illustrates Price's work as a consultant on the valuation of a marriage settlement. I never would have found that manuscript on my own.

Another librarian I would like to thank is my sister-in-law, Carol Budnick. At one point I was considering giving up working on the book. I did not know if the effort I was expending would actually result in a published book. A grant application that I had made to fund research for the book had been turned down twice. Carol encouraged me to make a proposal to a publisher. As a result of her encouragement, I contacted Diana Gillooly at Cambridge University Press. My proposal was accepted and Diana has been very encouraging and helpful in getting this book to press. I was also able to find some creative ways to fund the research I needed to finish the book.

I am grateful to Columbia University Library for providing me with the photographs from the Thomas Simpson correspondence that they hold. The photographs appear in Figures 6.1 and 6.7. The reproductions of newspaper advertisements in Figure 6.2 appear with permission of the British Library. I am also grateful to the London Metropolitan Archives for photographing an entry in the London Assurance

Corporation's policy books that appears in Figure 10.3. The photograph appears with permission of Royal & Sun Alliance Insurance plc.

For many years Stephen Stigler has encouraged me in my historical pursuits. In fact, without his initial encouragement I might never have taken the journey that has resulted in this book. With respect to the current work, I want to thank him for alerting me to the possible origins of Richard Price's interest in life annuities through John Eames.

Once I finished the manuscript I asked a few people to look at it. Harry Panjer, an actuary, and Roger Emerson, a historian of Britain in the eighteenth century, were both supportive of the finished product. Two anonymous readers for Cambridge University Press made several suggestions that have improved the manuscript.

Most importantly, I want to thank Christian Genest, my friend and statistical colleague, as well as my coauthor on three historical papers. At the point where I was no longer seeing words on the page after reading the manuscript many times, Christian went over what I had written very carefully and made several excellent editorial suggestions, which I hope I have followed closely.