KING WILLIAM'S TONTINE

In a time before bonds, treasury notes, or central banks, there were tontines. These were schemes in which a group of investors lent money to a government, corporation, or king, similar to a modern-day loan syndicate. But unlike conventional debt, periodic interest payments were distributed only to survivors. As tontine nominees died, the income of survivors correspondingly increased. Morbid perhaps, but this was one of the earliest forms of longevity insurance in which the pool shared the risk. Moshe A. Milevsky tells the story of the first tontine issued by the English government in 1693, known as King William's tontine, intended to finance the war against French King Louis XIV. He explains how tontines work and the financial and economic thinking behind them, as well as why they fell into disrepute. The author concludes with a provocative argument that suitably modified tontines should be resurrected for twenty-first-century retirement income planning.

Moshe A. Milevsky, PhD, is a professor at the Schulich School of Business and a member of the Graduate Faculty in the Department of Mathematics and Statistics at York University in Toronto. Visit his website at www.MosheMilevsky.com.

"I frequently saw Moshe after he had spent the day researching this book in the bowels of the British National Archives. He was covered in as much dust as Howard Carter after he first entered Tutankhamun's tomb. This shows the thoroughness with which this fine book was written. The timing could not be better either. Lorenzo de Tonti's concept of sharing longevity risk in a pool has a key role to play in retirement income plans of the future. There will be no more entertaining study of Tonti's brilliant idea."

– Professor David Blake, Director of the Pensions Institute, Cass Business School, London

"Professor Moshe Milevsky's book explores a particularly interesting time in the origin of government debt. While the book focuses on the 1693 tontine that King William used to finance England's war with France, the book also offers a witty and pleasurable romp through the history of tontines. Finally, the book shows how the tontine principle can be used to improve today's pensions and annuities."

– Jonathan B. Forman, Alfred P. Murrah Professor of Law, University of Oklahoma College of Law

"There is no more important topic than how our aging planet will confront and manage longevity risk, or the risk of outliving our resources. *King William's Tontine* offers a smart and humorous investigation into how our forefathers addressed the problem and Moshe A. Milevsky's plan to update the solution for generations to come."

– Olivia S. Mitchell, Professor, Wharton School, University of Pennsylvania

"Moshe Milevsky has given us a royal tour of the history of the tontine, full of revealing insights and many anecdotes, and has related the tontine to present-day retirement policy challenges brilliantly."

– John Piggott, Professor of Economics, University of New South Wales

"Who could have guessed that a slightly macabre financing scheme invented by a seventeenth-century Italian businessman might hold the key to retirement security for today's workers? In this charming and witty book, Moshe Milevsky, today's leading authority on annuities, blends economic history and financial engineering to promote a new way – actually centuries old – of enabling savers to retire on a secure income."

– Laurence B. Siegel, Gary P. Brinson Director of Research, CFA Institute Research Foundation

King William's Tontine

Why the Retirement Annuity of the Future Should Resemble Its Past

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"Old age, which is exposed to so many accidents and which too often is resented by those eagerly awaiting the death of the old, will be protected from vicissitudes. The Tontine will oblige those whose interest it is to prolong the life of the old, to treat them with respect and care because of the advantage they will find and will hope to increase … It will motivate husbands and their wives to take extremely good care of each other."

Lorenzo de Tonti (1653)

In another glorious English year called 1693,
there lived a little prince William Duke of G.
He had very great dreams at the age of four,
to be a brave soldier in his uncle's French war.
The King from Orange had a constant frown,
and the people wanted little William crowned.
Thanks to a horse and a broken collarbone,
sweet loving mother Anne got lifted to the throne.
Adorable and cute the clever boy was so swell,
but nurses and doctors worried he wasn't well.
One August after celebrating the age of eleven,
he became quite ill and was called up to heaven.
Gone was the William named in a funny tontine,
and the hopes of future Stuart kings and queens.

Zoe R. Milevsky (age 10)

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Preface: In Memoriam for Jared

Spare a moment of pity for an old fellow named Jared who was first mentioned in the early chapters of the Bible, in the book of Genesis. You have certainly heard of his famous grandson Methuselah, aka the oldest living person in the Bible. Methuselah, of course, is synonymous with longevity, old age, and great genes. Entire tomes have been dedicated to Methuselah and his drawn-out life. Books such as *The Death of Methuselah*, by Isaac Bashevis Singer, or *Back to Methuselah*, by George Bernard Shaw, have made him one of the most famous literary figures – or pensioners – in Western history. The Oscar-winning British actor Sir Anthony Hopkins played him in the movie *Noah* and the great American writer Samuel Langhorne Clemens (aka Mark Twain) penned a story with Methuselah as the central character. No fine essayist passed him by.

For those of you who aren't familiar with the story, it is said that Methuselah lived to the astounding age of 969. That is 11,628 months, or 353,685 days on earth. It is no surprise that his diet, genes, many probable marriages – and even his investments – have been the subject of intense curiosity for centuries. And yet, his grandfather Jared – a man I suspect most of you have never heard of until now – lived to the equally unbelievable age of 962 years. Yes, you guessed it. He was the Bible's second-oldest literary figure. Second place garners no books, Nobels, or gene patents, hence the pity.

It was quite the family, though. Methuselah's grandson Noah – the famed sailor and nautical zookeeper – lived 950 years, which is slightly less than two decades short of Methuselah's remarkable feat, placing him in the number-three position. Noah (aka Russell Crowe) needs no introduction or any more fame. (Hey, just try booking him for a speaking engagement these days.) Moving on to number four in the biblical Guinness book of records we find Adam. Yes, the first. Adam lived to 930 and has no small part in human history, quite likely regretting the long nap he took in the Garden of Eden and not keeping a closer eye on his rib cage. But poor old Jared was the Bible's second-oldest person, missing his grandson's record leisure-shattering retirement by a mere seven years, or approximately 0.7% of his own life span. Jared lived and lived and then died, in almost complete obscurity.

Did Jared have any idea he would last that long?

This book is inspired by Jared's extended and very obscure plight. Jared is my euphemism for any retiree or pensioner who will shatter no records or become the subject of any books, documentaries, or scientific projects. They will live far longer than their parents ever did – perhaps not as long as their grandkids – but will have to find some way to pay for it all. Jared represents the hundreds of thousands, possibly millions, of elderly around the world who will reach extremely advanced ages, and nobody will consider it a big deal.

In all actuarial likelihood, you are a Jared.

Yet no insurance company, retirement system, or pension plan can afford to support all these Jareds, especially considering how little we have collectively saved for retirement. So, how will society pay for it all? I believe that (part of) the answer to Jared's dilemma is to dust off the history books and revisit a most popular and fascinating arrangement that has lain dormant for centuries. It is called *The Tontine Scheme*.

Allow me some time to elaborate. You probably have a while …

Acknowledgments

It took quite a while to complete this project. The book's gestation, in a manner of speaking, lasted longer than an elephant's. When I got started on this mission a few years ago – that is, during the highly optimistic phase – my original intention was to create *the* most comprehensive and encyclopedic reference on the finance, economics, and actuarial theory of tontines, including a broad review of the insurance history and the relevant academic literature, all wrapped up with a passionate advocacy piece arguing that tontines should be resurrected in the twenty-first century. (At least that is what I promised in the book proposal.)

Well, it took me about six months to realize that such an ambitious project was too broad, impractical, and simply unachievable in finite time. I also worried that after all that effort nobody would really care about an insurance policy that has been dead for centuries. Not to mention I came across some excellent (historical) references about tontines, which made me wonder: "What could I possibly add?"

But then, during a visit to the National Archives in London, I stumbled on the details and old documents from the first English tontine launched in 1693 (i.e., King William III's tontine). Here was something different that might provide me with a new and unique entry point to the topic. I thought it was a great place in history from which to launch the journey, even though according to most insurance historians it isn't considered the most successful tontine.

I then rescaled my objectives to offer readers a careful and rigorous but entertaining appreciation of tontines and their colorful history as well as to explain why the underlying tontine sharing principle, or simply "tontine thinking," is quite relevant in twenty-first-century retirement income planning.

The fuel that kept this project going were the many comments after a brief article I wrote about the possibility of resurrecting tontines, published in the *Wall Street Journal*, cited as Milevsky (2013). With an inbox full of encouraging emails, I was satisfied that I wasn't the only person who cared about these long-forgotten products. The final "kick in the pants" came from Professor William Sharpe, when I was at a conference he was co-organizing at Stanford University in the summer of 2014. His first words to me were: "Hey Moshe, when are you going to finish the tontine book?" Well, I felt like a young graduate student being admonished by his thesis supervisor. I went into full production mode and for the next six months I was living, eating, and breathing tontines.

As far as help is concerned, I would like to acknowledge financial support from a Schulich Research Fellowship (during Fall 2013), which gave me the time off from teaching to delve into the topic and visit the National Archives and library in London. A research grant from NETSPAR (awarded during Winter 2014) as well as ongoing funding from the IFID Centre at the Fields Institute helped with many of the direct and indirect costs.

The members of the editorial team, including Nishanthini Vetrivel at Newgen Knowledge Works, as well Karen Maloney, Kate Gavino, Phil Good, and Chris Harrison at Cambridge University Press, have been a pleasure to work with. The editor of the *Financial History Review* – where parts of Chapter 4 previously appeared – Stefano Battilossi, was very encouraging and forced me to think carefully about the historical context behind the first English tontine.

This project would have been impossible to complete (let alone survive) without able help from research assistants. I would like to thank Rejo Peter (YorkU), Dajena Collaku (YorkU and IFID), Minjie Zhang (YorkU), Daniel Tut (YorkU), and Alexa Brand (IFID) for help with many aspects of the manuscript. I am also indebted to staff at the British Library as well as the National Archives in London and, in particular, Paul Carlyle and Gavin Walsh. Also David Raymont, the librarian at the Institute and Faculty of Actuaries (UK), alerted me to documents pertaining to King William's tontine that I had not been aware of. He was extremely sympathetic about the entire project. I also thank David Raymont for permission to use the cover image of the list of tontine nominees.

Moving on, I would like to thank the many individuals who offered advice and comments during the research and writing of this book. In particular, I would like to call out Lowell Aronoff, David Blake, Jorge Bravo, Forrest Capie, Narat Charupat, Jonathan Forman, Ed Furman, Steven Haberman, Faisal Habib, Huaxiong Huang, David Laster, Sandy Mackenzie, Jonathan Milevsky, Anthony Neuberger, Jens Perch Nielsen, Ermano Pitacco, Steven Posner, David Promislow, Joshua Rauh, Mike Sabin, Bill Sharpe, Pauline Shum, Bob Toth, Steve Vernon, and Geoffrey Wood.

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A special thanks goes out to my colleague, friend, and mentor Tom Salisbury, for the many educational and entertaining conversations we have had over the last quarter of a century about probability, mathematics, and finance, and more recently about tontines. I'm fortunate that I was able to "infect" him with the tontine "bug." A number of ideas about the optimal design of tontines and the concept of the "natural" tontine (which I discuss in Chapter 8 and label Jared's tontine) were jointly developed. He was also kind enough to read the manuscript and offer great suggestions for improvement.

Finally, no thank you is complete without acknowledging my lifetime partner, supporter, promoter, and mate. As with my (eleven) previous books and numerous articles and papers, she diligently read, commented on, and helped improve every aspect of this project. Thank you, my dear Edna.

Permissions: Some of the material in this book has appeared (in early or "raw" form) elsewhere. The relevant permissions have been obtained and noted wherever texts or tables appear verbatim. In particular, a much shorter version of the story from the early part of Chapter 2 was published in *Research Magazine* in the fall of 2013. Also, a summary of the high demand for annuities in Chile, which is described in Chapter 8, appeared in *Research Magazine* in May 2013. I thank the editor, Gil Weinreich, for permission to use extracts from both. An academic version of Chapter 3 was recently published in the *Financial History Review*, in 2014. The main idea presented in Chapter 8, which is the structure of a "natural tontine," was first described in my joint paper with Thomas Salisbury (available as SSRN at http://ssrn.com/abstract=2271259). The Gompertz mortality model and annuity pricing formula is mentioned briefly in the appendix, but is described in much greater detail in Milevsky (2006, 2012).

The figures of King William III and William Henry Duke of Gloucester are used with permission from the National Portrait Gallery, London. The cover image is used with permission from the Institute and Faculty of Actuaries, London.