

# The Innovative Old-Age Provision Product Tontine: An Instrument to Mitigate the Problems of a Society Experiencing Ever-Increasing Longevity

Demographic change patterns in society in the form of declining birth rates amid simultaneously rising life expectancy are resulting in difficulties in provision for old-age. The number of beneficiaries of statutory old-age pension insurance is growing, whereas the number of contribution payers is declining at the same time.

## The Demographic Challenge and the Retirement Smile

The related increase in what is known as the pension quotient renders the maintenance of pay-as-you-go (PAYG)-based old-age provision systems such as the statutory pension system in Germany more difficult. In contrast, funded pension provision products characterized by individual savings of financial resources for the time after entering the pension phase are gaining increasing importance. This problematic situation of an ever-increasingly aging society structure is being compounded by rising needs for financial resources on the part of senior citizens. Thanks to medical advances made in past decades, meanwhile a large number of illnesses and complaints can be treated that used to be terminal in nature only 50 years ago. However, these medical measures and treatment methods are frequently associated with enormous costs, especially in advanced age, when afflictions tend to become more frequent. This trend is also discernible according to a study carried out by Standard Life in 2013, which shows that on average, the total expenditure of a person aged 85 is six times higher than that of a comparable 65-year-old person. The development of capital needs of senior citizens can be described in a U-shaped development that is also referred to as the Retirement Smile (see Figure 2).

At the beginning of their pensionable age, persons drawing a pension frequently are in good physical shape and now ▶

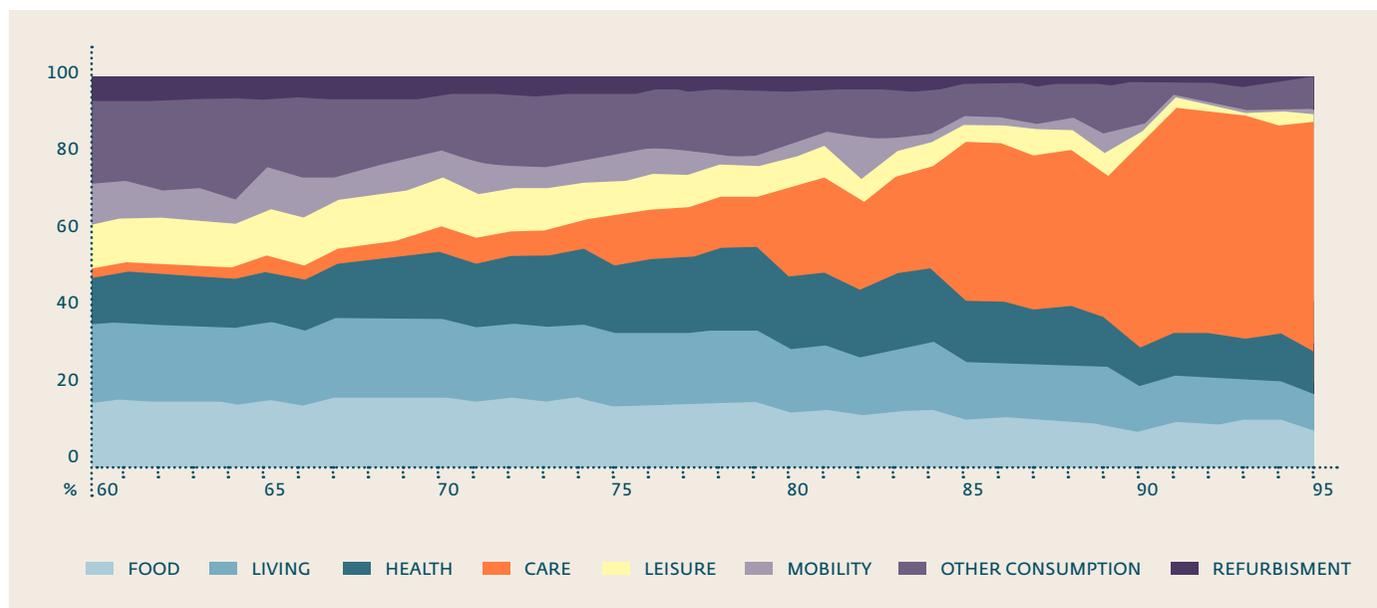


Figure 1: Breakdown of Costs as a Senior Citizen's Age Progresses

have the time to pursue their favorite pastimes. For instance, many pensioners spend their initial phase after retirement on expensive travels or hobbies, resulting in a higher total expenditure level than before they retired. After a number of years in retirement, however, consumer spending declines appreciably. Pensioners no longer take vacations so often, and expenditure on theater tickets, concerts and other leisure activities declines (see Figure 3).

At the same time, their physical condition still is very good on average. This leads to a decline in spending on consumption, while medical costs still remain relatively constant. As a result, total expenditure in this phase of life declines. Frequently, however, the last few years of life are accompanied by severe afflictions and infirmities that call for expensive nursing services or hospitalization, causing an extreme increase in financial resources needed (see Figure 4 and Figure 5).

Accordingly, a costly conversion or extension of senior citizens' own homes may be necessary to enable them to live independently and unassisted in their accustomed environment. Moreover, at an advanced age very high nursing costs may be incurred on average for out-patient and in-patient nursing care (see Figure 6).

From the start of pensionable age, the significance of nursing costs continually increases while consumption spending is increasingly less relevant (see Figure 1). ▶

### Average Cost of Living in Euro per Month



Figure 2: The retirement smile (own figure based on SOEP data)

### Average Expenses on Leisure Activities in Euro per Month

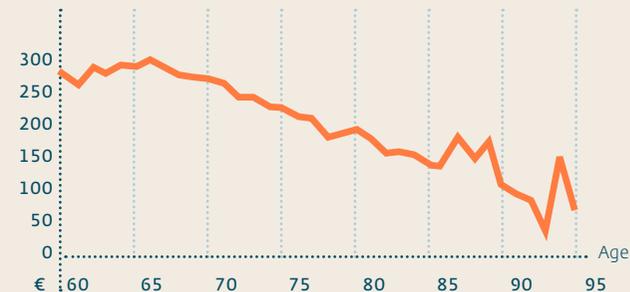


Figure 3: Average costs for out-patient care in euro per year (own figure based on SOEP data)

### Average Costs for In-Patient Care in Euro per Year

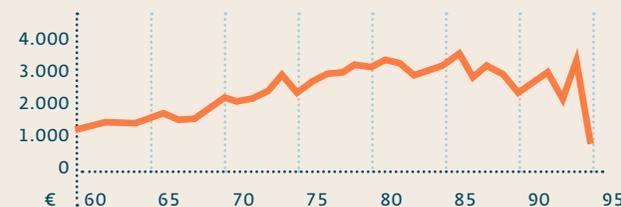


Figure 4: Average costs for in-patient care in euro per year (own figure based on SOEP data)

### Average Costs for Out-Patient Care in Euro per Year



Figure 5: Average costs for out-patient care in euro per year

### Expected Average Costs of Nursing Care

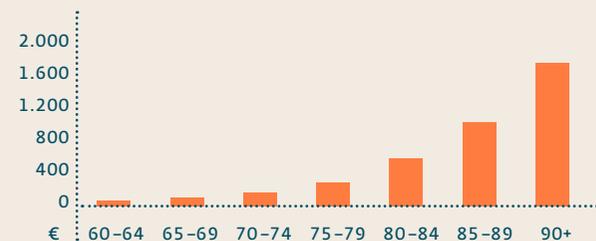


Figure 6: Expected average costs of nursing care (own figure based on SOEP data)



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Apart from these demographic challenges, not only the insurance industry but also individual savers are exposed to the impacts of the current low-interest environment. It is becoming increasingly difficult and expensive to fund the high level of expenditure at advanced age via private pension insurance or general savings products.

### **The Tontine as a Resolving Instrument for the Retirement Smile**

The challenges described raise the question concerning the search for an old-age provision product that delivers sound and well-established answers to these problem scenarios. It would need to be innovative enough to release the insurer from guarantee commitments and the assumption of the risk of longevity and simultaneously provide sufficient insurance benefits to satisfy a further increase in capital requirements of aging pensioners.

These considerations have led to the principle of the tontine that has been known for centuries, a system that can be adjusted to take account of current events and circumstances prevailing from time to time and do justice to the challenges of a world that has entered the 21<sup>st</sup> century.

In their original sense, tontines, named after their Italian inventor Lorenzo de Tonti, can be characterized by a one-off payment by the tontine holder, originally to the

state, which then grants the “tontinist” life-long retirement annuities. The special feature of a tontine, however, is that these pension payments increase as the pensioner grows older since the number of remaining “tontinists” decreases due to deaths, making it possible for one and the same amount of money to be distributed to fewer people. According to this logic, the last survivor receives the pension payments of all others. This circumstance makes tontines appear extremely interesting against the backdrop of increasing costs associated with advanced age.

### **An ever-increasing aging society structure is being compounded by rising need for financial resources.**

Beyond this, it is not the provider of a tontine that bears the longevity risk, but all tontine holders together in the sense that they receive lower than originally anticipated pension payments in the event of unexpected longevity. This, in turn, has the benefit for a tontine provider, e.g. an insurer, that no expensive equity capital needs to be maintained in order to hedge this particular risk. This, and the simple structure of the tontine, leads to the conclusion that tontines would yield a substantially leaner cost structure than conventional life insurance products. On

the other hand, the tontine holder is exposed to uncertain tontine payments in terms of their extent and chronological structure, which means that the pros and cons of the tontine need to be considered and weighed. It is also possible for each “tontinist” to invest the one-off contribution in the beginning in equities, which can be rather risky but rich in opportunities; after all, the insurer is not required to meet any guarantee claims in relation to the tontine holder. Accordingly, on the one hand there are prospects of higher earnings; on the other, capital market losses can be mitigated by the mortality effect of the tontine, i.e. the scheduled increase in benefits payable.

In our research on tontines, we developed a model in which we consider a certain number of tontine holders of any gender and age who pay a desired one-off payment into a tontine product at the beginning. We examine the impacts on the prosperity of a tontinist by comparing the liquidity needs at pensionable age and disbursements from a conventional old-age provision product and those of a tontine. Our model includes individual preferences, age and gender as well as a subjective perception of remaining life expectation.

Let us first of all consider the case of a full investment of the total pension assets available in a traditional life-long annuity, i.e. if we initially dispense with the need to purchase a tontine, the extent of the disbursements will ►



be constant. Increased liquidity needs now therefore result in a growing volume of money in the course of time that will not be available.

Opposite results are achieved by the case of full “tontinization” of the available assets. In this context, the fact that future pension payments depend on the mortality of the members of a tontine pool plays an important role: at the beginning of the disbursement phase, the predominant proportion of these participants are still drawers of tontine payments; however, the more sharply this pool now declines in terms of numbers due to deaths, the higher will own tontine payments turn out to be. In summary, in this case it can thus be said that at the beginning of the pension phase, there is not sufficient liquidity available; however, in the course of time the sum available will increase sharply and will be adequate to finance high illness or nursing costs in very much later years that are not covered by health and nursing care insurance.

The two extreme cases just described, namely of full participation in a conventional pension product or a tontine, illustrate that adequate satisfaction of liquidity needs at pensionable age can only be achieved through a combination of both product types. However, what exactly should such a combination look like? It will be achieved once the benefits offered by a conventional pension product in early pension years can be ideally

combined with the benefits of a tontine in later pension years. The lower the liquidity needs in early pension years and the higher they turn out to be in later years, the more advantageous will a tontine prove to be.

#### Implications for Optimal Old-Age Provision

In summary, therefore, it can be noted that the current problems of an aging society in conjunction with the ongoing low interest phase will call for innovations to be made in the case of pension provision products.

Our results show that a portfolio consisting of a conventional pension product and an innovative tontine provides the maximum benefit for pensioners with average assets. In the process, pension products remaining constant in extent are augmented by growing disbursements of a tontine as a senior citizen's age progresses. A tontine can therefore substantially alleviate the issue regarding adequate for old-age provision. ◆

## Publications and Presentations

### ICIR Working Papers

- Gründl, Helmut, Weinert, Jan-Hendrik  
The Modern Tontine: An Innovative Instrument for Longevity Risk Management in an Aging Society  
ICIR Working Paper 22 / 2016
- Weinert, Jan-Hendrik  
The Fair Surrender Value of a Tontine  
ICIR Working Paper (forthcoming)

### Academic Conferences

- December 12–13, 2016  
LMU Munich, Germany  
CEAR/MRIC Behavioral Insurance Workshop 2016  
The Modern Tontine: An Innovative Instrument for Longevity Risk Management in an Aging Society  
Gründl, H., Weinert, J.-H.
- November 10–12, 2016  
University of Augsburg, Germany  
Tontines and the History of Insurance Law  
Weinert, J., Tontines in Europe Today
- 19–21 September 2016  
Limassol, Cyprus  
43<sup>rd</sup> Seminar of European Group of Risk and Insurance Economists (EGRIE)  
The Modern Tontine: An Innovative Instrument for Longevity Risk Management in an Aging Society  
Gründl, H., Weinert, J.-H.
- March 10–11, 2016  
Vienna, Austria  
Annual Congress of the German Insurance Science Association (DVfVW) 2016  
The Modern Tontine: An Innovative Instrument for Longevity Risk Management in an Aging Society  
Gründl, H., Weinert, J.-H.