Tontine Trust
Live Long & Prosper

TONTINE TRUST
Non-Technical
WHITEPAPER

Retirement Planning
for the 21st Century

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Table of Contents

Abstract

The 20 largest OECD countries have a combined public pension deficit of $78 Trillion.

With over 44% of men and 55% of women now expected to live into their 90s this means that most consumers will outlive their private savings by 5 years and many by at least 10 years.

Current retirement income products such as life annuities are unpopular due to low returns mostly caused by the high costs charged by Insurers which act as centralized "guarantors".

We propose a solution to the costly centralised guarantor problem by creating peer-to-peer *tontine* structures administered by an unbiased, mathematically robust smart-actuary.

Tontines are a 300 year old financial innovation which successfully financed many European countries & states as well as numerous private projects such as roads, bridges and hotels. They make periodic payouts shared amongst their members for as long as they live. In later years, as the number of surviving members declines, the payout per-member rises, often dramatically.

Launched in 1868 in the US, tontines were wildly successful for Insurers with over 50% of households investing the modern equivalent of $170Bn before a 1906 investigation into Insurer malpractice caused sales to halt after revealing multiple improper uses of the capital received from the members. Other reports cited insiders fraudulently adding the names of relatives to the central ledger of members which undermined trust in the whole process.

In the century long absence of tontines, retirement savings rates have plummeted.

2009 saw the emergence of distributed ledger technologies for immutable financial record-keeping which creates a new form of trust between users based upon math. More recently biometric technologies have emerged which can securely authenticate users & prove liveness.

As such, consumers can now safely self-insure the financial risks of living longer by entering into secure cost-efficient peer-to-peer tontines.

This paper proposes a fully regulated peer-to-peer tontine issuing ecosystem which can offer:

- greater financial benefits payouts to the hundreds of millions of global consumers spending ~$350BN per year on retirement income solutions,
- a utility token which incentivizes IFAs & RIAs to take no-load tontines to their clients, and
- an un-biased, self-correcting, autonomous smart-actuary which can be trusted to act to in the best interest of the tontine members.

Case Study: The Problem for Wealthy Savers in the Developed World

George is 65 and has just retired. He owns his home and after taking into account the needs of his family, he has calculated that he has £1m to live on in retirement.

As George does not know how long he will live, he now faces a dilemma as he does not know what his monthly spending budget should be to avoid worrying about his future income levels.

The Original Solution: Cash Drawdown

If he assumes he will only live 20 years and simply draws down from the £1m cash pot each month then this gives him a monthly budget of £4,100 but this strategy has 3 problems;

- It is an amount far below what he is used to living on.
- If interest rates fail to keep ahead of inflation, inflation will erode this income in real- terms.
- If, as is 50% probable, he lives beyond the age of 85, he will run out of cash & become a burden to his children or worse, to an underfunded state pension scheme.

The 20th Century Solution: Life Annuities:

George uses the £1m to purchase a life-annuity from an Insurance company. Depending on interest rates at the time of purchase, he can choose to receive one of the following options on a monthly basis for life:

Annuity Type:	Monthly Payout	Features
Flat Lifetime Rate:	£3,136	The real value of the payment will be eroded by inflation
Inflation Linked Starting Rate:	£1,750	Lowest starting rate which increases by RPI, currently +2.3%
Rate +3% annually:	£2,125	Low starting rate which increases by 3% per year

These standard annuities each solve the Longevity risk problem for George but this still forces him to live on an extremely modest budget for a man with £1m to invest.

The 21st Century Solution: Peer-to-Peer Tontines

George subscribes his £1m for a stake in a Tontine transparently administered through smart contracts on a public blockchain. The Tontine Smart-Contracts are programmed to optimize for zero insolvency risk and they will provide live projections of his expected future monthly payouts for the rest of his life all the way up to his 120th birthday, should he live that long.

The capital in the Tontine is deployed into ultra-diversified portfolio of ETF index funds balanced across global markets and asset classes following classical portfolio design theory for generating relatively consistent *all-weather* net returns of approximately 5% per annum.

This "ETF Tontine" can now be expected to pay George as follows:

- **£4,425 per month at age 65, rising incrementally to £5,730 per month by age 75**

- **By age 80, he can expect to be receiving an estimated payout of £7,300 per month,**

- **By age 90, he can expect to be receiving an estimated payout of £15,000 per month.**

In fact, if George lives to 100, in addition to getting a telegram from the Queen, he can expect to collect over **£23,000 per month** which should provide all of the creature comforts he could wish for, as well as the best healthcare available.

Question: How are these exceptional returns sustainable without taking extra risk?

Firstly, a peer-to-peer Tontine removes most of the overhead of a multi-national annuity issuer and it reduces capital costs including the dividends for the shareholders of the insurance company.

For example, in a "guaranteed" annuity, an estimated 30% of the savers capital is immediately lost to setup costs [Paul Newfield, 2014] meaning that peer-to-peer tontines can expect to deliver a 40%+ higher initial return from day 1.

Furthermore, in a traditional annuity product, when a member passes away, their capital is in essence transferred to the shareholders of the life insurance company.

In a Tontine, this forfeited capital (also known as "mortality redistributions") is fairly re-distributed amongst the surviving members, supplementing their payouts going forward.

Inherently there will be more uncertainty over the level of payouts since they will be variable (depending on investment performance and mortality experience) rather than fixed. Such variability can be managed and kept low however, by

- investing conservatively in a spread of uncorrelated or inversely correlated asset classes,
- creating a large pool of members (the law of large numbers),
- limiting the rate at which capital is paid out to a rate consistent with mortality redistributions arising.

The ETF Tontines generate returns based upon a conservative mix of Bond, Equity, Commodity & Real Estate index funds overlayed for a target net return of approximately 5% per annum.

Is it safe for retirees to be invested in portfolios of ETFs? Why not just invest the tontine in Government Bonds only?

Many high-grade government bonds currently offer less than 1% return per annum and some even offer negative returns. If and when interest rates rise, the market price of some existing long-term government bonds could fall significantly resulting in capital losses when they are liquidated to fund monthly payouts.

In practice, it makes more sense to diversify the portfolio risk exposure across a spread of asset classes across a spread of global markets, a strategy which has traditionally produced reliable, but rarely spectacular, returns in almost all market conditions.

The ETF Tontines will generate returns based primarily upon a conservative mix of Bond, Equity, Commodity, Real Estate index funds as well as some to Private Equity and Absolute Return Funds with a target net return of approximately 5% per annum.

Such portfolios do carry volatility however, we are comfortable that the system can manage this. There is also a body of evidence to suggest that following times of greatest market volatility such as a crash, mortality rates can spike and as such there is a degree of natural hedging inherent in a Tontine.

Therefore, in the rare event of any flat or negative investment years, the Smart Actuary will automatically flatten or even incrementally reduce the payouts until mortality redistributions have occurred or investment returns have improved.

Math & Proof of Reserves ensures Solvency

Perfecting the security of member assets through ultimate transparency using Blockchain & Smart Contracts

The use of distributed ledger technologies enables Tontine Trust members, and even the public generally, to audit the progress & forecasts of the Tontines through publically exposing;

- the location, composition and live value of underlying assets,
- a record of all contributions from & distributions to each of the pseudonymous members,
- a record of all fees charged,
- the projected medium and long-term payouts that each member can expect.

That the composition (but not the identities) of the Tontine members and the underlying assets will be so publicly visible, analysts and other interested parties are free to audit our past & projected returns and even to contribute suggestions to the project overall.

It is our belief that such transparency is the only true guarantee that there is no double counting of assets, no hidden liabilities and that the Tontine, or indeed any financial product, is fully funded for all of the expected payouts.

Blockchain First Custodians

The security, visibility, and efficiency of holding the Tontine assets is absolutely critical.

To this end, we have commenced discussions with major custodians which are able to offer rich APIs which we can integrate to in order to provide the sort of visibility and transparency that members, regulators, and the public in general can take absolute comfort from.

Our preference is to integrate to *blockchain-first* global custody & settlement partners and are investigating integration options with several counterparties in this respect.

The blockchain custodian will enable each Tontine's underlying cash & investments to be held in a permissioned, distributed ledger of ownership & transaction records, simplifying the process of transaction matching, settlement, custody, corporate actions and transaction reporting.

The solution should also facilitate the immediate and riskless settlement of market transactions such as subscriptions or redemption of exchange traded index funds as well as forex trades.

The system will handle cross border, multi-currency settlements operating around the clock including the regular transfers to the TON$ Card accounts of Tontine members. Further details will be announced in due course.

Creating a Global Solution: A World of Tontine Flavours

Once the contracts of the Smart Actuary are audited and integrated with the custodian(s), issuing new Tontines denominated in different currencies and investing in different asset classes is relatively straightforward for different types of consumers.

Tontines for Traditional Investors

Mainstream consumers segmented into narrow age brackets will be able to join ETF Tontines which will invest predominantly in an ultra-diversified mix of the safest, most liquid funds in the world operated by some of the largest asset managers on the planet, for example, Blackrock ($5 Trillion in Assets Under Management), Vanguard ($4 Trillion), State Street ($2.4 Trillion) and others such as ICBC Credit Suisse.

In addition to better servicing the needs of mainstream consumers in developed markets, these types of ETF Tontines can provide a means of securing lifetime incomes for consumers in less developed markets as well as consumers in markets where there is significant exposure to political and/or financial system risks such as Venezuela or Zimbabwe.

CryptoTontines for CryptoCapitalists

A small but growing section of the global population has eschewed the *FIAT* economy and are now partly or wholly managing their financial affairs within the *cryptoeconomy*. This has even led to the development of Bitcoin IRAs and now Ethereum IRAs.

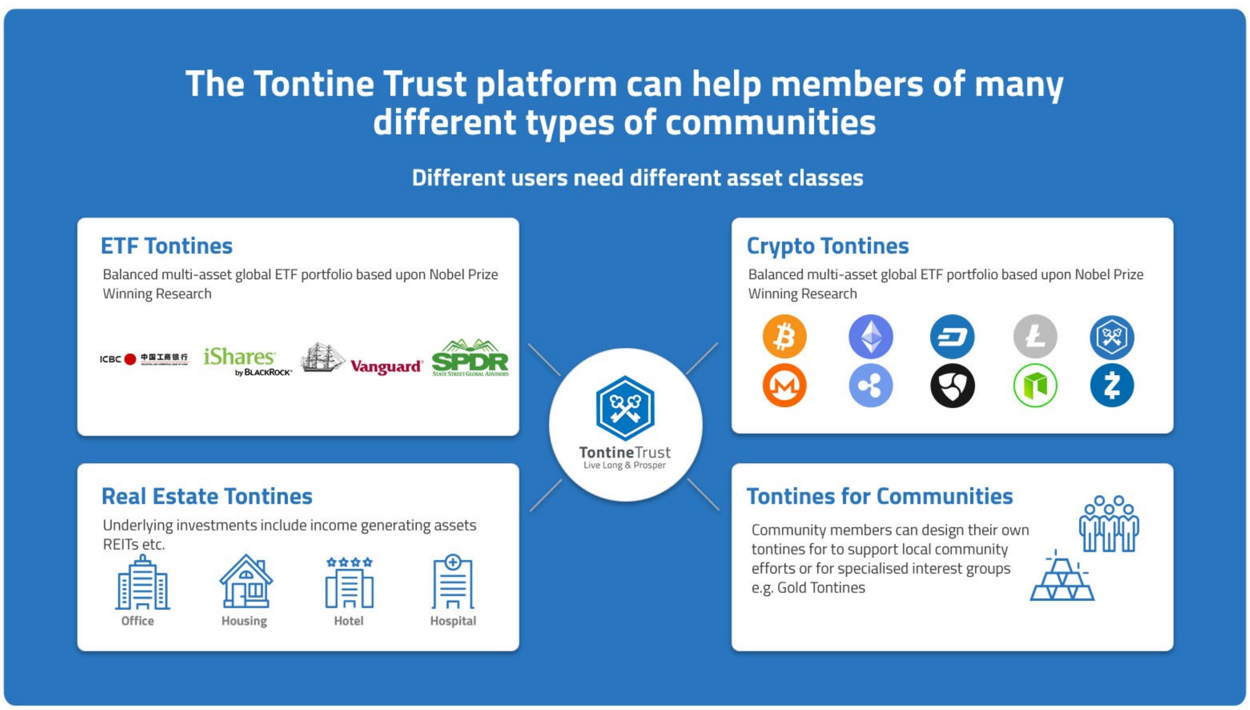
For such cryptocapitalists, other than the IRAs, there are few other financial products and no products that we are aware of which directly address with the longevity risk.

Crypto Tontines can address this problem by allowing such consumers, or the organisations they work with, to contribute towards retirement savings schemes denominated in Bitcoin or whole portfolios of cryptocurrencies. This will ensure that such consumers can put in place a secure crypto denominated lifetime income stream for when they are older.

Specialised Tontines

We have already seen interest from groups around developing specialised Tontines customised around certain asset categories or regional factors. We can anticipate that such interest will in time materialize into specialised Tontines such as:

- Real Estate Tontines,
- Gold Tontines,
- Country Specific Tontines,
- Organisational Pension Plan Tontines,
- Community Tontines (typically targeted around funding the construction or protection of important community assets such as Hospitals etc).



The History of the Tontine

STATE TONTINES

The Tontine was initially developed as a means of raising state finance for the King of France by banker Lorenzo de Tonti. The first Tontine was issued by a Dutch City in 1670. Over the next 200 years, many very successful state-backed Tontines were issued by France, England, Ireland, the Netherlands and several German States.

By the mid-1850s, the state's bodies had reverted to "penny policies" (early pension schemes) which were far more cost effective for the states although they substantially reduced the payouts to scheme members.

PRIVATE TONTINES

In time, private companies started to raise capital using Tontines to build bridges, roads, hotels and other large projects. Notable examples of construction projects funded by these private tontines were the Richmond Bridge in London in 1777 and the "Tontine Coffee House" at 82 Wall Street in 1793. The latter went on to become the primary venue in New York for the trading of shares & commodities and as with the development of the Lloyds Insurance market from a Tea shop in London, the brokers & underwriters frequenting the Tontine Coffee House went on to form what we now know as the New York Stock Exchange.

TONTINE INSURANCE/ANNUITIES

In 1876, Henry Hyde, the founder of Equitable Life in the US, introduced the tontine idea to the US public. The launch was so successful that it was quickly copied by his main competitors such as Mutual of New York and New York Life. By 1905 over $5.77bn of Tontines had been sold by the 4 largest firms equivalent to almost $170BN in today's money.

Henry, however, had died in 1899 and majority control of Equitable Life had been handed to his 23-year-old son James. On 31st January 1905, giddy on the rampant sales success of their tontines, James threw one the most extravagant costume balls that New York had ever seen. It subsequently emerged that the cost of the ball and many other lavish salaries and expenses were being siphoned out of the life company and other financial improprieties across the industry were now endangering the ability of the Insurers to meet their obligations to members.

Shortly after, the newly formed Armstrong commission banned all but 4 types of policies and so the then prevailing tontine format was consigned to history.

Ever since, academics have called for a reintroduction of Tontines claiming that the lack of interest generated by the low-return products on offer has led to a decline in the retirement savings rates.

Tontines were still in operation in the United Kingdom until the 1990s and are still actively used in France.

In many parts of rural Africa, tontines have continued to survive albeit that their modern forms are on a shorter-term basis as, until now, there have been no reliable long-term solutions for keeping records & managing the long-term security of the underlying assets.

As a result of all of this history, certain considerations for the mathematical methodology of our Smart Actuary can be extrapolated from over three centuries and we continue to receive and review numerous old & modern academic research studies which add to the wealth of knowledge and interest in this subject.

Why Re-Introduce Tontines Now?

The key societal factors for re-introducing Tontines now are as follows;

- Savings rates are at historical lows mostly caused by unattractive annuity rates due to
    - Increasing costs for Insurers
    - Low bond yields caused by the monetary policies of central banks, and
    - increases in life expectancy in some markets

- Austerity measures have seen vastly reduced funding for state pensions which has resulted in the top 20 OECD countries having a current pensions deficit of $78 Trillion

- Fitch Ratings recent credit outlook downgrades for US Insurers could be indicative of an increasing systemic risk for private pension products which rely on Insurer guarantees,

- Tontines could encourage a substantially greater level of private retirement saving based upon the fact that in the past they have been shown to outsell annuities by over 5 to 1.

The key technological factors for re-introducing Tontines now are as follows;

- Peer-to-peer products including Tontines systems gain traction more quickly when users believe that they can trust their cohorts more than a centralised counterparty. Distributed ledger technologies provide an immutable, public log that can provide far greater security and transparency to Tontine members, and savers generally, than at any previous juncture in history

- Cryptography obfuscates the real-world identity of Tontine members thereby removing the possibility for members to know who else is in their Tontine

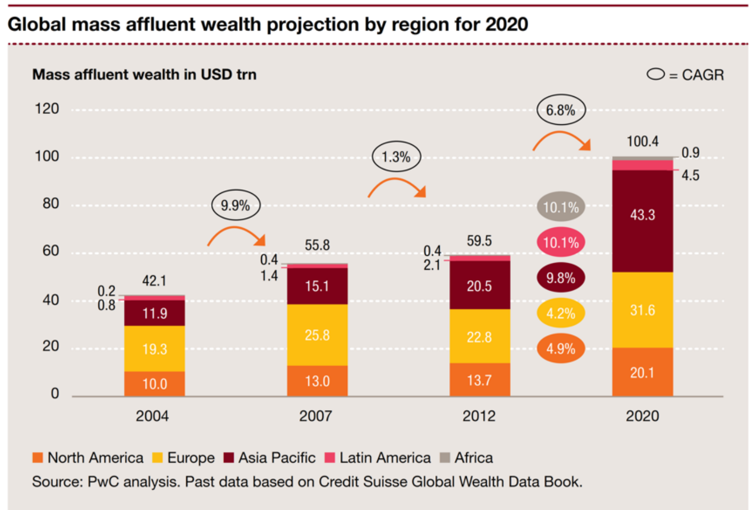
- The availability of Biometric authentication and liveness detection & other complementary identification systems allows enhanced security whilst almost completely eliminating the risk of fraudulent claims on behalf of deceased members

- The ability for a Smart Actuary to autonomously manage the tontine removes the risk of human bias from overriding the mathematically prudent reserving approach

The combined effect of the above factors is that technology now enables a low-cost peer-to-peer Tontine which offers a far more financially rewarding solution for consumers than existing products in the marketplace.

Market Opportunity

Despite the lowest annuity rates since annuities began, consumers seeking greater peace of mind have little alternative to standard annuities resulting in sales of over $235BN per year in the US alone with global total pension assets under management standing at $36,435BN at the end of 2016.



Furthermore, according to PWC, the market for savings solutions is only growing due to 6.8% growth in the global wealth of affluent consumers.

Our Tontines will immediately be able to offer highly competitive products with yields can reasonably be expected to grow faster than inflation, particularly in later years.

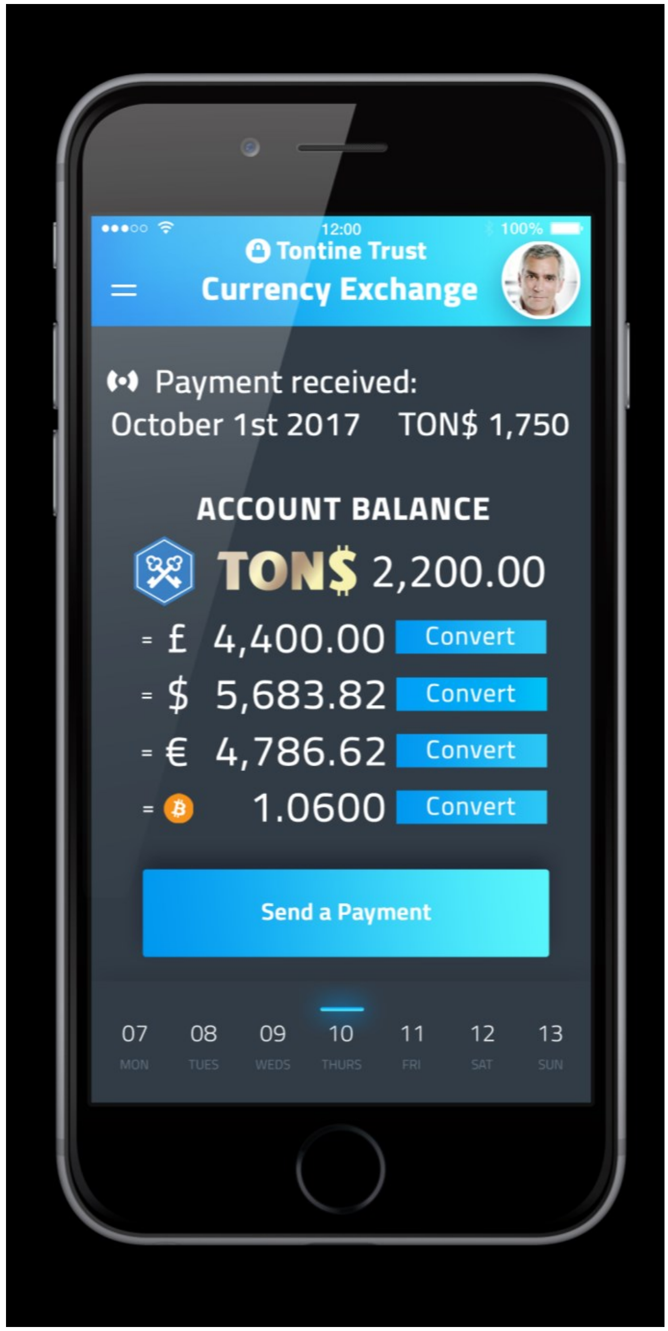
Time To Market

The team is finalizing a prototype robo-actuary using actuarial formulae and investment risk management into a system which can be encoded into smart contracts to form the Smart Actuary decentralized application ("DAPP").

We have identified development groups which have significant experience building distributed ledger based financial institutions which can enable us to rapidly deploy a secure system which can then be integrated to the blockchain custodians and/or execution venues.

Once the Tontine Trust system of record is integrated with the biometric platforms, the Smart Actuary is audited & connected to the custodians/investment execution venues, the first Tontines are likely to be issued in 2018 assuming that the appropriate regulatory permissions are already in place.

The TON$ Card Program



The Tontines will make monthly distributions to members by encashing an appropriate % of the portfolio assets, and then making deposits into each member's TONCard Accounts.

As the portfolio assets can be denominated in a spread of global currencies, and members can be spread across numerous countries and continents, in order for the Smart Actuary to calculate a fairly weighted distribution there needs to be a single intermediate settlement unit for payouts and this is one of the key reasons behind the creation of the TON$ tokens.

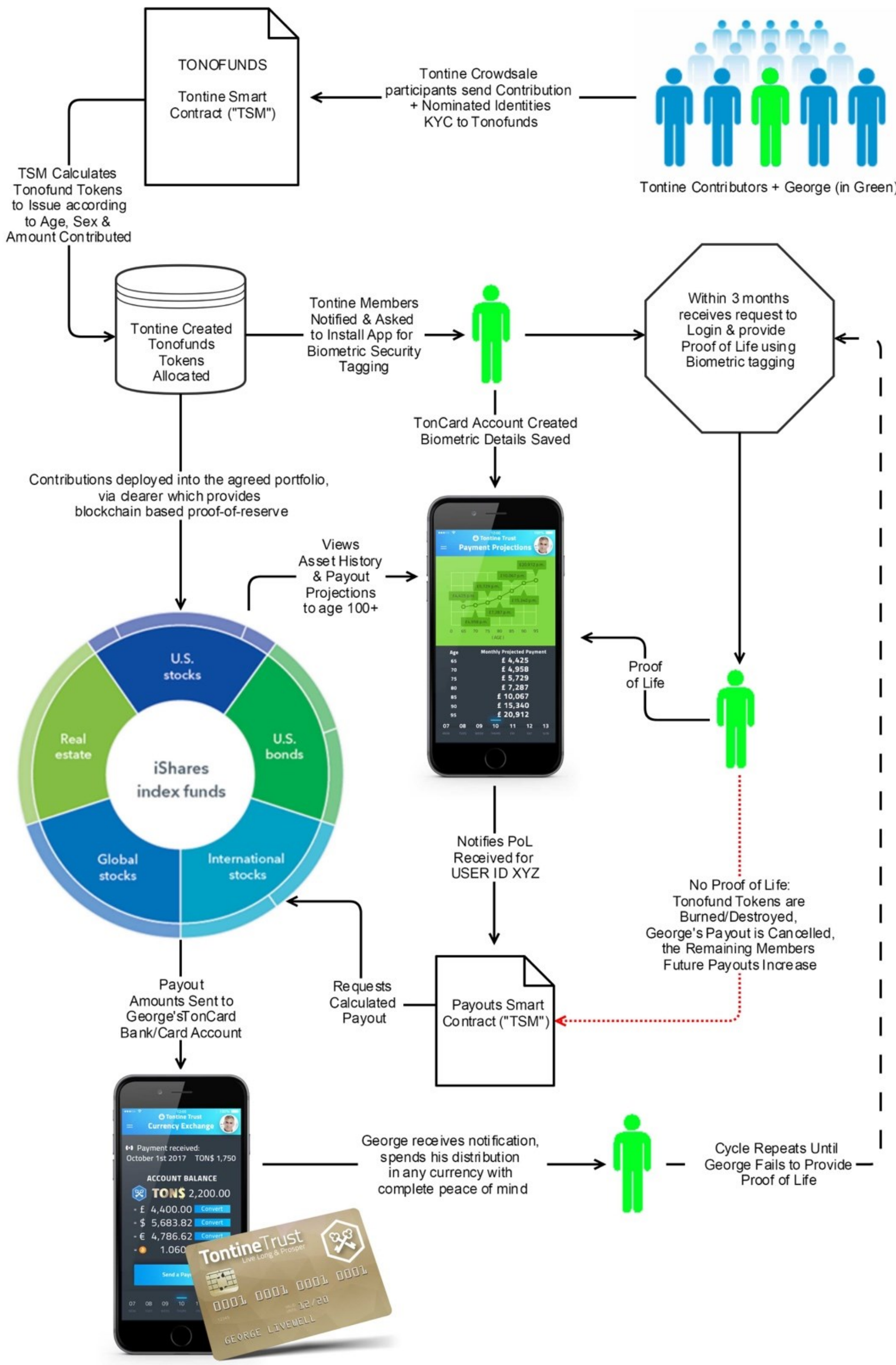
Therefore, once the Tontines reach the point of making payouts, the relevant % of portfolio assets will be encashed and converted to TON$ at best market prices.

The members' TonCard accounts will then be credited in TON$ which, as with any digital currency, can be directly transacted against using the TonCards at Merchants or ATMs. Users may also automatically or manually convert their balances into one or more other currencies as preferred.

From the TONCard Accounts, depending on their regions, members will be able to set up standing orders & direct debits or add supplementary TonCard accounts for family members.

Depending on the level of TON$ (if any) held by members in their TONCard Accounts, special card privileges will be provided in additional to selected promotional offers such as, for example: travel discounts, airport lounge access, discounts on fine wines etc.

Simple User-flow (Tontine Member)



Scaling the Business

As we will delegate or automate the asset management as required, the main costs of scaling the project are:

- Developing & maintaining the DAPP & rolling out Mobile Apps with biometrically secured access, e.g. IRIS & facial recognition including Liveness Detection.
- Initial & Ongoing KYC monitoring of the members.
- Licensing Costs where required to access certain licensed/regulated markets
- Legal & Administration
- Marketing, Internationalisation & other Customer Acquisition Costs
- Integrating to other Distribution Platforms

The Token Sale

Funding the Business Through a Token Sale of TON$, our Utility Token

TontineTrust is preparing a Token Sale (and an Accredited Investor Only SAFT Offering for US contributors) to raise funds for product development and integration and to fund the launch of the first modern-day Tontines.

The capital raised from the sale of the TON$ will be used as follows:

- Development and Management of the DAPPs
- Finalisation of the Regulatory Applications in the Home Market
- Integration with selected Card Issuing Platforms which cover target Regions
- Obtaining Regulatory Approval plus distribution Licenses in target markets as required
- Deployment of the first Tontines
- Increasing Brand Awareness in the Financial Advisory Industry as well as with Consumers
- Engaging with and integrating to a global network of distributors & platforms.
- Development & deployment of the TontineTrust Member apps with biometrically secured access, e.g. IRIS & facial recognition etc., Liveness Detection Etc.
- Marketing & Distribution Costs (other than distributor commissions which are dealt with in the Token Sale section later in this paper)
- Initial & Ongoing KYC & Survival monitoring
- Legal & Administration.

Following release of this non-technical whitepaper which shall be announcing full token sale & SAFT details for the TON$ tokens which are likely to be:

Symbol:	TON or TON$ (as available)
Protocol:	Ethereum ERC20 token
Purchase methods accepted:	BTC, BCH, ETH, GB£, EUR, USD

The Role of the TON$ Token in the TontineTrust Ecosystem

The TON$ tokens will be utilized to fulfill the following functions:

- The Tontines will pay all of their administration & custody fees in TON$ repurchased from the open market and Tontines will generally buy & hold 1 years fees in advance.

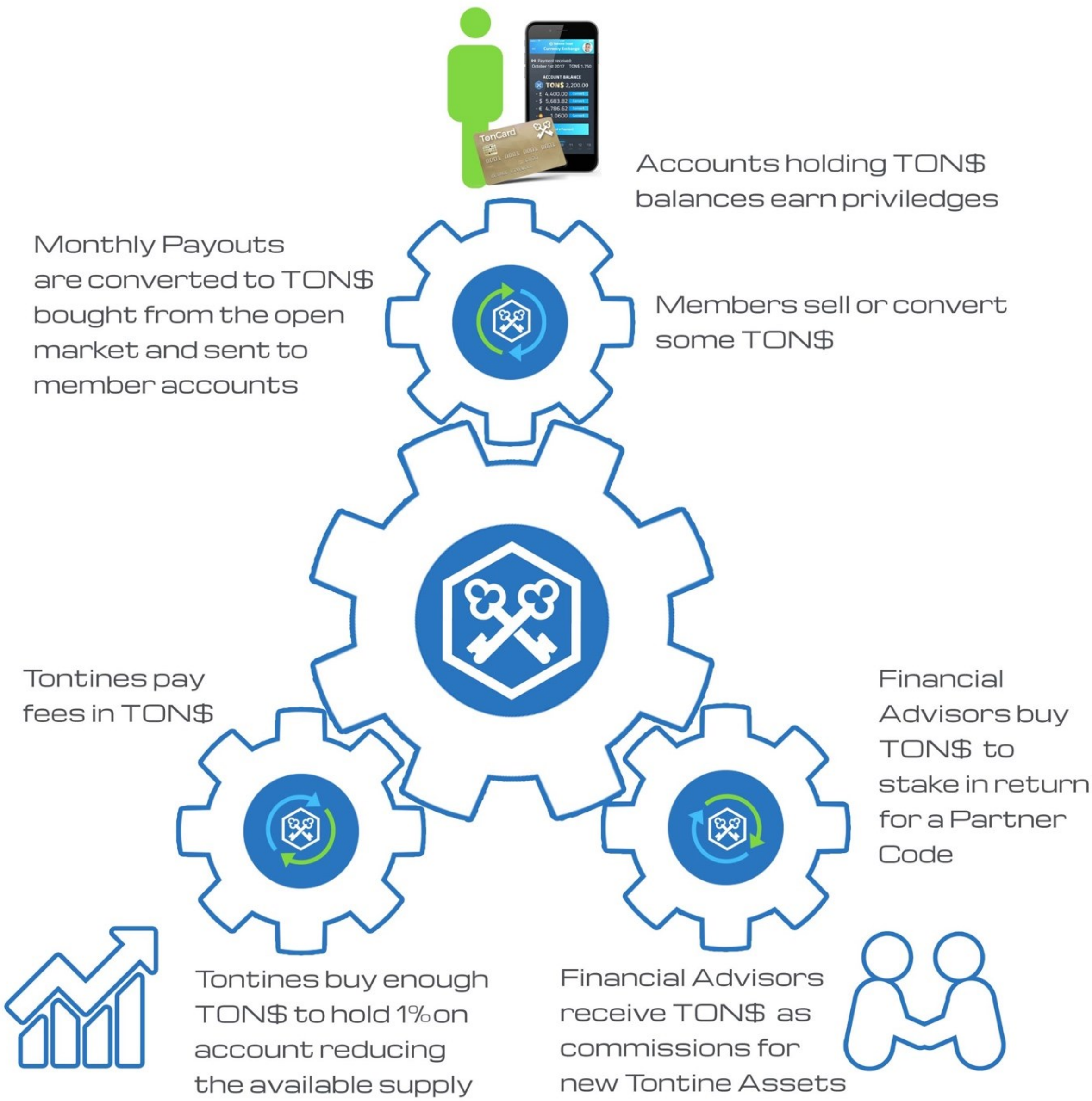
- To facilitate uniform member payouts from Tontines with multi-currency assets, members will receive payouts every month to their TonCard Accounts with the payments being credited in TON$ (again repurchased from the open market) where they can be spent directly by members or automatically exchanged into any other supported TonCard currency.

- At the time of the Token Sale, a substantial Reserve of TON$ will be initiated to reward the global network of financial advisors and distributors to bring our Tontines to all corners of the globe, these financial advisors/distributors are the *miners* in our Tontine ecosystem in that they will help bring critical mass on terms of total Tontine Assets.

- These Global distribution partners seeking to market our Tontines, shall first be required to purchase and lock down TON$ with a value equal to 5% of monthly expected referral volumes. This stake shall act as a surety deposit for Tontine Trust to protect against the risk of advisors miss-selling to members.

- TON$ holders which are intending to invest in the Tontines themselves can utilise this Partner staking system to generate a 5% bonus for themselves by staking their TON$ and using their own partner code when joining the Tontine. This may be the first legitimate retirement product in history where the saver immediately gets more capital value upon investment (105%) rather than seeing their capital value immediately depleted by up to 30% due to fees. Accordingly, TON$ Holders not using an Advisor are rewarded for holding the TON$ if they invest in the Tontines.

- TON$ will also be accepted by the Smart Actuary as one of the permissible contribution method to any Tontines.



- Additionally, TON$ Holders maintaining balances above certain thresholds in their TONCard accounts will qualify for:

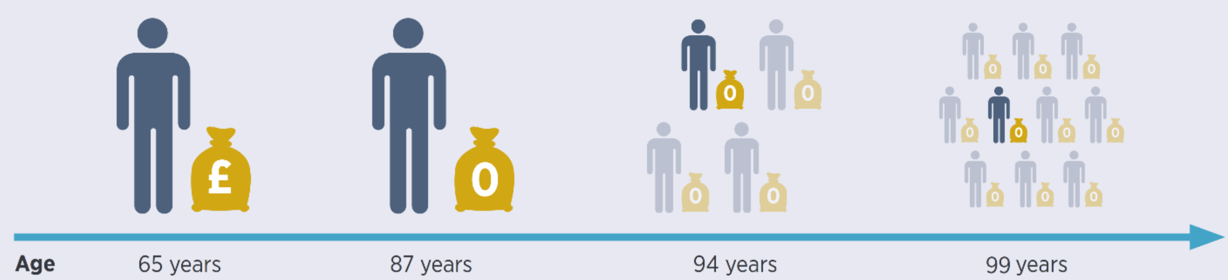
    - Raised privilege levels including premium card offerings
    - Increased levels of fee free transactions,
    - Airport Lounge Access,
    - Access to promotional offerings from selected partners.

Reasons to Participate in the Token Sale

Social Justice

The Token Sale will support the development of an ecosystem which can enhance the lives of hundreds of millions of retirees around the world by directly eliminating the cost structures of having multinational corporations as guarantors and retaining these funds for the benefit of the Tontine Members.

According to the Institute and Faculty of Actuaries in the UK, 25% of current 67 year olds will live to age 94 or more.



A male currently aged 65 has an average life expectancy of 87; however he has a one in four chance of living to 94 and a one in ten chance of living to 99. If individuals in this cohort saved expecting to live to 87 (this is assuming underestimation is not an issue), a quarter will have under-saved and live for a further 7 years, potentially without an adequate income.

(Source: https://www.actuaries.org.uk/learn-and-develop/research-and-knowledge)

A study by MGM Advantage, found that on average males and females aged 55-64 underestimate their life expectancy by 5 and 10 years respectively significantly increasing the chances that their savings will run out.

By sharing the longevity risk through a secure, low fee peer to peer Tontine, the potential for financial worries about living too long can be reduced or even eliminated.

Another potential source of stress is the impact of inflation upon the purchasing power of fixed monthly payments. Subject to investment & mortality experience, our Tontines should be able to incrementally increase monthly payouts at a rate ahead of inflation, reducing this source of stress.

Finally, based upon the expected future payout escalations, the Tontines will provide a monetary incentive to members for taking good care of themselves.

Tradability of TON$

It is to be expected that the demand for the TON$ to be held and traded within the platform will rise in line with the volume of Tontines which are issued. As asset volume starts to grow this will necessitate substantial and rising market activity in the TON$ to facilitate monthly member payouts, to settle fees within the TontineTrust network of service providers and to facilitate the activities of a global network of Distributor Partners.

Therefore, if our modern tontines are even 10% as successful as they were in the past, then this would automatically generate substantial demand for the TON$ in issue and therefore we could in time see the development of an increasingly active secondary market for TON$.

Why Actuarial Smart Contracts:

Actuarial science is a well-established and proven field full which attracts many of the smartest smart people on the planet to highly lucrative positions.

Being forward looking, probability based calculations, actuarial mathematics are only as reliable as their ability to deal with, and be responsive to, stochastical inputs.

As such, any organisation or state which offers forward looking financial guarantees relies for its future existence upon:

- the future accuracy of present actuarial calculations and
- its ability to provide additional capital, should the actuarial models predict a shortfall.

In the event that a shortfall is predicted, and the sponsor(s) are unable to provide additional capital, this can result in a moral hazard for those tasked with managing the actuarial models, investment models and payout strategies of the pensions.

This could put the pension fund in conflict with financial regulators lead or to speculation that one set of stakeholders being favored over another. It is considered that the failure to adapt to the economic reality has already resulted in "*…nearly one million US workers and retirees covered by pension plans on the verge of collapse*"[1] as well as "*big American corporate pensions…now facing their worst deficit in 15 years, with enough money to cover just 76 percent of their estimated $2.1 trillion of liabilities*"[2]

[1] https://www.forbes.com/sites/oliviergarret/2017/06/09/the-disturbing-trend-that-will-end-in-a-full-fledged-pension-crisis/ - 10903926620f

[2] https://www.bloomberg.com/gadfly/articles/2016-09-13/low-rates-put-pension-plans-in-worst-shape-in-15-years

The Case for a Smart-Actuary

In a tontine, the members are the sponsors in which case there is no conflict of interest.

By removing political decisions as well as human emotions & biases from the payout calculations, we no longer have hard and easy decisions, we merely have correct processes to follow and the *Robo* or *Smart* Actuary can follow a set of rules that are designed to ensure that the pension fund can never go insolvent.

The robo-actuary can follow sets of rules designed, for example, to ensure that the pension fund should never go insolvent.

These rules can be implemented into a system of Smart Contracts which draw data from independent & authoritative third-party oracles such that the actuarial models remain wedded to reality and not past assumptions.

TontineTrust is in the process of developing a Smart-Actuary prototype which operates autonomously and which is completely responsive to corrective data inputs from member data, actuarial data and investment return data.

The primary mission of the Smart-Actuary is to effectively auto-pilot the Tontine so as to maximise payouts subject to the condition of always bearing in mind the need to make a *safe landing* such that the payouts should continue for as long as the very last remaining members are expected to be alive.

Summary of the Robo-Actuary Smart Contracts

The Actuarial Smart Contracts will read live investment, actuarial and other actuarial data feeds and to manage the monthly payouts by modelling the following and other criteria;

- Actual mortality of the pool members versus expected mortality;
- Underlying performance of the asset portfolios Vs previously expected performance;
- Changes to the expected mortality rates of the pool members based upon the most recently published actuarial tables for their regions;
- Expected future performance of the asset portfolios.

Identification of Tontine Members

It is critical that we identify the clients of TontineTrust and monitor their survival whilst protecting the identities and obfuscating their membership of any particular Tontines.

Furthermore, we need to ensure the member's share of underlying payout entitlements is tagged to her or him only.

Members admitted to Tontines will have their biometric details and KYC details encrypted into a pseudonymous account ID recorded in the ledger. As the Tontine is funded by the member, they will be issued to a set of Tontine Member Tokens ("TMTs") which will be tagged to their ID.

The Smart Actuary will periodically prompt members to login using the biometric authentication interface to provide proof of liveness and in the absence of contradictory data from other authoritative sources such as social security data feeds, this will be sufficient to automatically authorise distribution payouts to members.

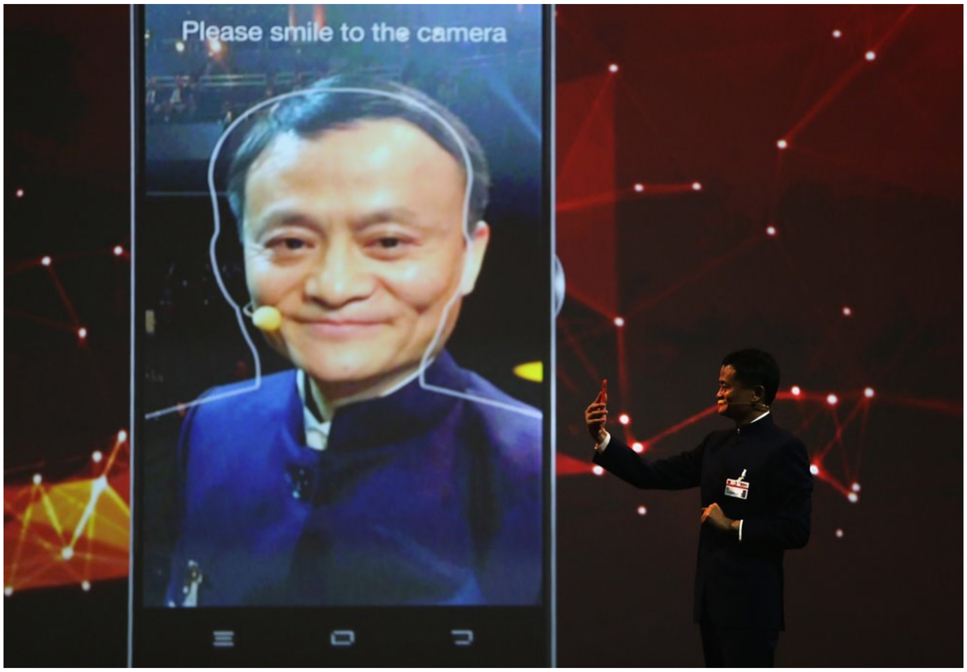
A key consideration of how the platform and biometric interface works is that we need to abstract away the public key cryptography from the end user so as to deliver a cryptographically secure user experience with the same level of simplicity as is now enjoyed by users of widely adopted applications such as Whatsapp & Telegram.

In this respect, we are monitoring the progress of novel blockchain based identity solutions such as uPort, Civic, Yobi (BioSSL) and other members of the Decentralized Identity Foundation.

At the same time, we note that smartphone operators are paying increasing attention to using biometrics to authenticate users an example of which is Apple's recently launched Face ID solution for unlocking iPhones and authorizing transactions in Apple Pay.

ZoOM also has commercial biometric authentication Apps available which track the changing perspective of the user as they move the phone towards their face. During the ~1.5 second natural motion, proprietary algorithms track and process thousands of face data points from upwards of 30 video frames and compares them in milliseconds. Numerous liveness attributes are also compared to the enrollment data to securely authenticate the user.

In China, over 120 million people are already using the "Smile to Pay" feature of AliPay which was launched by Jack Ma as far back as 2015.

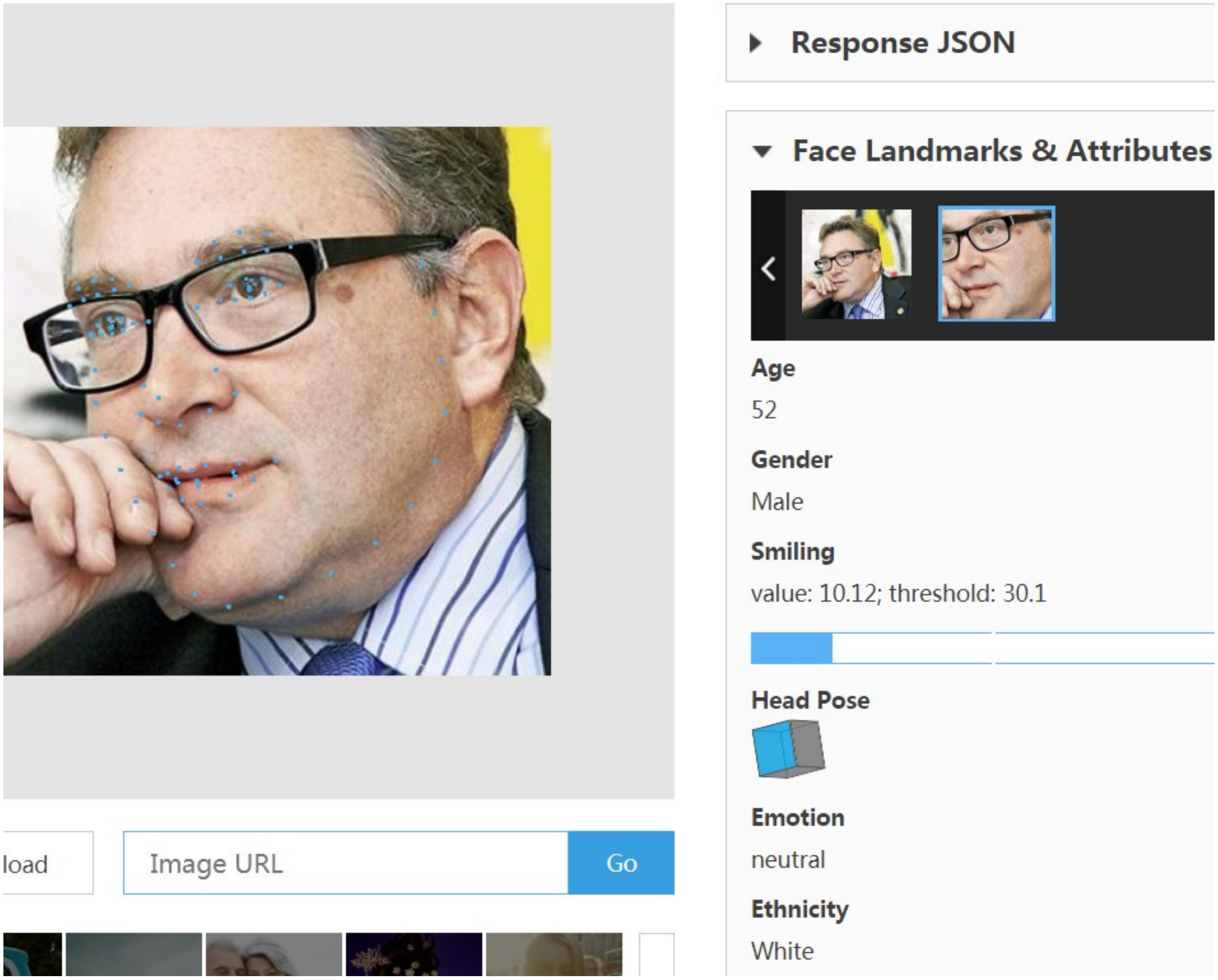


Jack Ma Demonstrating Smile Pay at CeBit Trade Fair

According to Ant Financial, the multistep process of one to two seconds of facial scanning uses a 3D camera and a live-ness detection algorithm to "guarantee" a user's identity. While "Smile to Pay" was the first service of its type, according to Ant Financial, Samsung, PayPal, MasterCard and NEC are among the firms that have also been testing the technology.

The Smile to Pay technology is licensed from Megvii, the company behind Face++, perhaps the world's most widely used biometric solution. Face++ is already used by numerous companies such as Didi Chuxing, the dominant Chinese ride-sharing company, which uses Face++ to verify the identities of its 1.35 million drivers.

Face++ uses AI to enhance the accuracy of biometric authentication as well as to determine other facial attributes. These additional attributes can play an important role in testing the initial and ongoing confidence in the profile data received from the Tontine members by providing age, gender and ethnicity data (such as shown in the image below) which can be compared against the registration data received from the members.



Example Face Recognition Software

Technologies such as Face++ are already being tested for use in healthcare screening and it is to be expected that the Smart Actuary will in time be able to derive actuarial meta data indicators for inclusion in forecasting models.

Additionally, with the approval of the members, it may be possible that if the Smart Actuary detects members as having attributes consistent with illness, the system may alert the member or nominated next-of-kin and/or perhaps even offer to arrange an online medical consultation.

Reducing Uncertainty through Live Updates

On the morning after a global financial crisis, individual stress levels are at their maximum.

It is to be expected that due to the ongoing overnight -recalculation efforts of the Smart Actuary that a TontineTrust member will already be able to login to their App and immediately review the long-term impact, if any, on their projected future monthly payments, thereby providing complete peace of mind.

Regulation

Past Tontine Regulation

In the early 20th Century, corruption and malpractice was rife across the US life industry to the extent that it was endangering the business models and even the existence of many establishment life insurers which at the time were the issuers of the largest tontines.

Many of the $5.7bn of tontines that had been sold up to that point had been designed to offer returns commencing 10 or 20 years from when initial contributions began.

It is understood that members which ceased making monthly payments saw their entitlements lapse completely which clearly disadvantaged poorer members and members which lost their jobs.

An investigation of the insurance industry in New York led to the enactment of regulatory legislation in 1906. Amongst many important new regulations in regards to capital and executive remuneration controls, the legislation prohibited the sale of any savings products which deferred payouts for longer than one year. This single provision would have made it necessary to completely redesign the old tontine-insurance model.

Instead, it seems that the life insurers shifted their focus to life-annuities where the payments began immediately and if a member passed away, the bulk of their assets became part of the shareholder capital of the life insurers.

Current Regulation

Europe

Tontines are regulated in Europe under the Directive 2002/83/EC of the European Parliament: http://eur-lex.europa.eu/legal-content/en/ALL/?uri=CELEX:32002L0083 and are still common in France https://www.conservateur.fr/nos-produits/tontine/, and http://www.telegraph.co.uk/finance/property/international/3363847/Property-in-France-Keep-it-in-la-famille-now-and-for-ever.html

Developing World

Many variations of Tontines e.g. ROSCAs or Credit Associations exist throughout the world regulated more by custom rather than financial supervisory authorities.

According to the World Development Report 1989 by the World Bank, "*The popularity of ROSCAs among low- and middle- income groups shows that people like to save, even under trying circumstances. Research in Bolivia showed that more than 90 percent of the people inter-viewed joined ROSCAs primarily because they wanted to save more and felt that membership forced them to do so.*"[3]

United States

In a seminal 2015 paper "Tontine Pensions" published by Forman & Sabin in the Penn Law Review, it was postulated that despite any impression to the contrary, "*that there are no legal obstacles to issuing correctly structured tontine*"[4]. The paper goes on to establish some key principles for creating actuarially fair Tontine models.

On the basis that legally compliant actuarially fair models are now known, only two key obstacles remained:

- Guaranteeing Member Anonymity so as to avoid the fiction of nefarious plots such as those portrayed in past "*thriller*" movies & an often-cited episode of The Simpsons.

[3] *https://openknowledge.worldbank.org/bitstream/handle/10986/5972/WDR%201989%20-%20English.pdf?sequence=1*

[4] *(Prof. J. B. Forman & M. J. Sabin, 163 U. Pa. L. Rev. 755 (2015), http://scholarship.law.upenn.edu/penn_law_review/vol163/iss3/3*

- Securing Client assets in a manner that would engender at least as much trust, if not more, than handing over your life savings to a 200 year old corporation.

In the Blockchain era, however solutions to combine customer KYC with Anonymity have been proposed[5] and many are now being implemented.

Additionally, many existing solutions are available to securely settle and custody assets which are auditable 24x7x365 on a publicly accessible blockchain.

Distributed Ledger Technology ("DLT") has enabled the return of the Tontines over the blockchain and it is expected that these modern-day cryptographically secured Tontines can be regulated under DLT specific regulations as a form of mutualised peer-to-peer insurance arrangements rather financial guaranteed products issued by legacy institutions.

Accordingly, TontineTrust intends to become a regulated DLT Product Issuing Entity and in this respect, we would expect to have achieved such regulated status in 2018 under the auspices of a forward thinking, internationally recognised regulator such as the Financial Services Commission (FSC) in Gibraltar which has enacted DLT regulatory legislation which comes into force in January 2018.

The Gibraltar Financial Services Commission has been a full member of the International Organisation of Securities Commissions ("IOSCO") since 2005. IOSCO members regulate more than 90% of the world's financial markets and IOSCO is today the world's most important international cooperative forum for financial regulatory agencies.

Furthermore, Gibraltar has signed numerous bilateral memorandums of understanding with international regulator bodies.

As such we are confident that by implementing a fully regulated organisation and a system that ensures correct adherence to the highest standards of integrity and prudence, regulated access to major international markets shall be forthcoming for our products.

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5 https://distributedlab.com/whitepaper/CombiningKYC%26anonymity.pdf

Token Sale Regulation

Gibraltar

In Gibraltar, utility tokens such as TON$ are not classed as investments and our legal counsel is in communication with the FSC to ensure that this remains the case.

United States

The research we have undertaken considers that the TON$ Tokens do not represent securities as defined under the Howey Test.

That said, based upon recent general market announcements from the SEC, it has been agreed with our US attorneys that any US Investors interested in participating in the Token Sale shall be required to

a) prove in advance their credentials as Accredited Investors and
b) enter into a SAFT agreement which will convert to TON$ once the Tontine Trust platform has been launched.

SWOT Analysis

STRENGTHS

- The nature of the Tontine is attractive across all market segments due to its appeal to our inherent optimism regarding our own life expectancy,
- There is a significant & easily demonstrated financial benefit to customers against existing solutions,
- 300 years of history underpins the model & assumptions and product design,
- There are currently no directly competing products,
- The existing global annuity market is estimated at $350BN+ per year.
- In the past, Tontines have proven to substantially outsell traditional annuities meaning that the market for Tontines is possibly larger than the $350BN+ annuity market.
- Unlike many retirement products, our Tontines are, by design, always fully funded.

WEAKNESSES

- Consumers may need to be educated as to the design safety of the Tontines and Distributed Ledger Technologies in general.
- Irrefutable Identity & Proof of Life solutions are emergent & until such solutions are mature, Tontine returns may grow less quickly due to under-reported mortality events,
- Because Tontines financially incentivize healthy living, Tontines could suffer from adverse selection by attracting healthier investors or Tontine members could just live longer than average necessitating the Smart Actuary to include the effect of adverse selection in our mortality tables which could reduce expected future payouts.

OPPORTUNITIES

- We can bring a simple to understand financial solution to consumers on a global scale thereby increasing the level of global retirement saving participation,
- We can partner with private & state level organisations to reduce the cost of corporate and state pension schemes.
- We can create customised solutions with partners or communities to accelerate adoption.

THREATS

- Competitors may enter the marketplace,
- We may have to acquire multiple regulatory approvals to operate in certain target markets,
- The establishment life annuity providers may try to prevent competition from low cost entrants rather than allowing this industry to grow and serve consumers with an alternative product.

The Team

The existing team already has significant entrepreneurial, blockchain, investment, actuarial, fintech and regulatory experience and is likely to expand quickly in 2018.

Chairman

Jon Matonis

Board Member, Strategic Adviser Bitcoin & Blockchain, Entrepreneur

CEO

Dean McClelland

Entrepreneur with experience in Investment Banking, Funds, Insurance, Asset Allocation, FinTech, Blockchain

Director/Advisor

Joerg Platzer

Member of the Board of the German National Bitcoin Association, Strategic Blockchain Advisor to Governments and MultiNationals, Bitcoin & Blockchain Futurist.

Actuarial Strategist/AA Director

Richard Fullmer CFA

Actuarial specialist with experience of designing multi-asset portfolios retirement income products for a global client base on behalf of industry leaders such as Fidelity, T. Rowe Price & Russell Investments.

Technical Architect

Nedda Kaltcheva

Software Architect within the FinTech industry now focused on blockchain and DLT system development

Lead Developer

Marcin Zduniak

Software Architect within the FinTech industry now focused on blockchain and DLT system development

Digital Content Manager

Max Haran Doyle

Ex-UBS advisor to the Russian State, now Digital Strategy & Project Manager

Lead Tontine Engineer

Dr. Michael J Neish Ph.D.

Quantitative Analyst with a Ph.D. in Physics & Astrophysics. He spent much of his career as a rocket scientist at the Japan Space Exploration Agency responsible for monitoring and predicting the orbits of satellites and working on various projects including the International Space Station.

Director/Advisor

Marcus Fuchs

Former Professor at the American University, Prague. Director of several investment firms including at Dexia before establishing his own fund management companies.

Non-Exec/Advisory Board

Eamon Bermingham

Pensions Investment Director, Sovereign Pensions and Trustees

Appendix 1: Notable Recent Calls for the return of Tontines

"A Tontine resembles a simple low-fee annuity with lifetime payments. Yet unlike an annuity… a Tontine can pay a higher yield because of its relative simplicity of structure." "…(a 65 year old retiree) would prefer a simple investment like a Tontine to an annuity which can be quite complicated…"

"Unlike an annuity document which can run to 50 pages, the Tontine is unbelievable simple, you can explain it in 2 pages"
Prof. Moshe Milevsky as quoted in the New York Times

"Although annuities offer a guaranteed lifetime income, they are relatively expensive because their issuers must hold a large capital buffer. Retired people tend not to like them as they pay a low rate. Tontines are simple to understand and could be much less costly than annuities because the risks are not taken onto the balance-sheet of an insurer."…."The eventual disruption (of the annuities/ pensions market) will come not from a traditional asset manager, but from … Silicon Valley…(Or Gibraltar!)"
The Economist Magazine

"…academics even argue that with a few new upgrades, a modern Tontine would be particularly suited to soothing the frustrations of 21st-century retirement. It could help people properly finance their final years of life, a time that is often wracked with terribly irrational choices. Tontines could even be a cheaper, less risky way for companies to resurrect the pension."… "a Tontine is like an annuity in which the middleman has been cut out"…
Jeff Guo
The Washington Post

"… a trust and efficiency engine like blockchain technology has the potential to drive radical change in the insurance industry while improving transparency and outcomes across the entire value chain….this shift will be hardest on the established monoliths in the industry, for it will require uncomfortable transparency and price corrections in their business models. This will be toughest on the portions of the industry that are the least differentiated, where consumers often decide based on price: auto, life, and homeowner's insurance."
D. Disparte
Board Member, Harvard Business Review

"In the banking sector, (Blockchain & smartphones) have enabled a re-invention of old forms of financing, delivered through new channels. Like the Tontines of the old days. "

Samuel Tsien

CEO, OCBC Bank

"...21st-century capitalism will eradicate 20th-century risk-sharing mechanisms like pensions and throw us back on 17th-century ones like Tontines."

Bloomberg View

Further Reading

Academic Studies & Finance Media supporting our Tontine Concept & Methodology:

• The Wealth of Nations: 1723-1790 Adam Smith

• King William's Tontine: Why the Retirement Annuity of the Future Should Resemble its Past: 2015, Moshe A. Milevsky, Professor of Finance at the Schulich School of Business at York University, Toronto

• Optimal Retirement Tontines For The 21st Century: With Reference To Mortality Derivatives In 1693: 2014, Milevsky & Thomas S. Salisbury, Professor, Department of Mathematics and Statistics, York University, Toronto

•When Others Die, Tontine Investors Win, New York Times-2017

•Tontines: Death pools can bring financial security for the long-lived, 2017, The Economist Magazine

• Solution to the Retirement Crisis, 2017, Seeking Alpha

• Vanguard Eating the US Fund Industry, 2017, Financial Times

Appendix 2: The Tontine Trust Model:

Overview for members of the Financial Planning Community

Fundamentally, our mission is to create a source of lifetime payouts for members the growth of which exceeds inflation.

Whilst we have tested mathematical models with theoretically fixed annual returns and zero volatility we realise that in the real world bad things happen, and black swan events can occur.

Due to cycles and evolution in financial markets, even in a well-balanced portfolio, down years can happen and in our opinion any self-respecting tontine should be designed to handle this. Whilst investment performance can influence the performance of a tontine, so can achieved longevity of the members the probabilities relating to which are increasingly variable.

When we think about the financial needs of retirees, whilst some levels of expenditure are likely to fall in later years, inflation will ensure that everything else will cost more in the future and it is likely that medical costs and the cost of home help will continue to rise.

Therefore, whilst we would like to pay all members as much as possible as early as possible, the golden rule for Tontine Trust is that the tontine should be managed in a manner that ensures that it has the highest level of confidence of being able to continue providing monthly income to every member for as long as they live up to a current estimated maximum age of 120.

In assessing the problem of how to maximise payouts whilst adhering to the golden rule we have designed and continue to test various models but to provide a simplified example to the readers of this paper, in essence we structure our thinking on payouts into 3 elements:

1. Investment Returns
2. Capital Drawdowns
3. Adherence to the Golden Rule

Investment Return Payouts
In an ideal world, we would pay out 100% of investment returns as they arise on a monthly basis. In a real-world portfolio, we instead make payouts which are closely tied to a Moving Average Rate of Return computed over the past N months. This enables us to deliver a relatively steady payout which adjusts to market realities and which capitalises any over/under performance. For

the first months of the tontine where a full N months of portfolio returns are not yet available, we use historical returns for the portfolio's asset composition to fill in the missing months of return history.

Capital Drawdown Payouts

In addition to the above payout we start to pay back the capital to the members and essentially we do this based upon the principle of paying the members back their capital in proportion to the probability that they will not be around to enjoy it next month.

This means that when the members are younger, the capital element is paid out modestly and as the members get older, the capital payouts become more progressive so much so that the Tontine starts to unload larger and larger chunks of capital to the surviving members in later years.

As the members capital is returned, the investment return on the reduced balance is smaller and as such the growing capital payout compensates for the smaller return payout.

The Smart Actuary constantly monitors the actual mortality versus expected mortality and the actual returns versus expected returns in reference to the expected remaining life of the Tontine and determines an incrementally higher or lower payout trajectory as a result.

The benefit of managing the Tontine in this manner is that we have found this method to be one of the most effective and equitable ways to distribute the capital whilst always sticking to the golden rule.

In the discussions we have had with investment experts around the globe on this model, we have found ourselves referring to this model as the "Hunger Games" model where the ultimate benefits accrue to those participants which survive longer than their cohorts.

A Simplified Example:

An ETF Tontine is launched which is open to accepting male* members born in the years 1947-1952 (65-70 year olds). The Tontine will close to new members upon the earlier of 10,000 members or 1 year after launch.

New members sign-up on the website or through a mobile app registering their biometric data and providing KYC information such as passport and proof of address.

Once an account is created, the new member is invited to deposit a minimum amount of, for example, $100,000 to the Tontine subscription bank account provided in one lump-sum payment. A maximum amount may also be imposed to ensure that no single investor dominates the pool.

The monies collected form a common pool that constitutes the capital of the Tontine which is then invested by the Smart Actuary according to the pre-determined strategy, in this case the Global ETF Portfolio.

In consideration of the contribution, the Smart Actuary initiates a new token pool and members are issued with a number of tokens which do not simply correspond to the amount invested but rather which create an actuarially fair weighting of token ownership within the pool which depends upon:

a. Exact Age
b. Amount Contributed

The initial weighting is set to the amount contributed divided by the life annuity factor of the member.

On a monthly basis, members are notified that there monthly payouts will be coming up and will receive one (or more if required) notifications or voice-calls to log into the TonCard App using 3D facial recognition to authorise the upcoming payment.

Where no check-ins have happened, the system will escalate the level of contact and/or may alert next of kin.

Where no check-ins are forthcoming for an extended period, or where we have received notification of death via an authoritative data source, the members tokens will be excluded from payouts and marked for cancellation or re-allocation to surviving members.

On the first day of each month, the Smart Actuary will re-allocate the tokens of any lost members (if any) in accordance with the fair weighting methodology.

The Smart Actuary will then calculate the payouts for these surviving members, liquidate the required level of portfolio assets, convert them into the standardised settlement units and then make the distributions to the members TonCard accounts.

This process continues month after month with the Smart Actuary updating its longevity tables from external data sources and adjusting the investment portfolio mix to less volatile assets as the members get older and less numerous at which point the payouts are increasingly capital dominated rather than investment return dependent.

The net effect predicted by our models is that for that significant percentage of members lucky enough to live into their second century starting in 2047, they can expect to be enjoying monthly payouts which have increased significantly faster than inflation rates.

Our back-testing has found that even after major financial events which have effected multiple asset class valuations, that the Smart Actuary has been able to more or less maintain the level of payouts without any material decreases, in order to provide relatively stable payout streams for the surviving members.

There is of course no such thing as a free lunch and the cost of that stability is that in the event of a drop in the capital value of the Tontine assets, the ordinarily rising member payouts are unable to start increasing again until the full margin of safety has been restored whether through a decline in the size of the member pool or through a recovery in portfolio values.

[Show Tontine Total Capital Drawdown Graph, show George's payout rate graph to 120]

We continue to refine the "Hunger Games" model to fairly accommodating more than one type of subscription plan but without diluting the formula which has already generated appeal with some potential future members and which in time we expect to appeal to the broader market.

It is our intention to launch different tontines for different cohorts which would be segregated at entry by age and gender. For married couples, we can envisage that the capital pools will be split with each investing in their own tontine.

We are open to discussing partnerships with other groups that have different approaches which we could operate on the platform or specialist expertise in specific regions or countries.

If this is of interest, please contact us via the details on our website.

Appendix 3: Exclusion of Liability

Nothing in this paper should be constructed as an investment opportunity.

TON$ Tokens (the Tokens) are not available for purchase in prohibited jurisdictions, please refer to Terms and Conditions relating to Token Sale or the SAFT.

Tontine Trust does not guarantee the accuracy of the conclusions and statements reached in this White Paper. The Whitepaper does not comprise any advice by company, the directors, the investment manager or any other person, or recommendation to any receiver, by the virtues of participation in the token sale. This White Paper does not necessarily identify, or claim to identify, all the risk factors connected with the company.

All the participants must make their own independent evaluation, after making such investigations as they consider essential, of the merits of participating in the token sale and Tontine Trust activities. Tontine Trust has the right to change incorporation country and jurisdiction without prior notice in order to seek the most favourable legal treatment and protection. The incorporation and jurisdiction are not limited to the European Union and/or the European Economic Area and can be changed without prior notice.

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The terms of the contribution are not intended to be a financial services offering document or a prospectus. The token offering involves and relates to the development and use of experimental platform (software) and technologies that may not come to fruition or achieve the objectives specified in the white paper. The purchase of tokens represents a high risk to any contributor.

The tokens do not represent equity, shares, units, royalties or rights to capital, profit or income in the platform or software or in the entity that issues tokens or any other company or intellectual property associated with the platform or any other public or private enterprise, corporation, foundation or other entity in any jurisdiction. The tokens are not therefore intended to represent a security or similar legal interest.

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