

What I Built

Annuity smart contract:

- An MVP smart contract for a fixed, immediate, annuity-due, annuity certain contract.
 - This means that after an annuity buyer makes a large upfront purchase which sets the principal amount, then they'll immediately receive their first annuity payment which comes from their principal. The rest of the principal will remain in the smart contract, growing with compounding at a fixed interest rate for a fixed period (as the insurer makes payments), while simultaneously declining in value until it reaches zero (because it's being used for the periodic payments made to the annuitant).
 - There are many varieties of annuity contracts but I'm only doing one specific type for my MVP. You can read more about them on wiki. [[1](#)]
- I hard-coded the interest rate.
 - Future implementations will use a formulaic interest rate based on the demand from annuitants and supply from insurers.
- I require the insurer to lock up the future value of payments (which is always more than the principal) in the smart contract, to be used as collateral in case the insurer misses a payment.
 - If the insurer misses a payment, then they lose all their collateral, but they keep the original principal that they're using as a loan. Over time, this builds up surplus capital in the smart contract if the insurer already made their first payment before losing their collateral. Because of this, future implementations may let insurers under-collateralized their loans if there is a

large enough surplus in the contract to take on the additional risk.

- I require that the insurer make their first payment immediately after borrowing the annuitant's principal.
 - Future implementations will let the insurer delay their first payment on the loan (and thus change the interest rate they pay) so long as the new (higher) interest rate and duration of payments will amount to the future value that the annuitant is guaranteed to end up receiving.
- I initialize the contract with some money.
 - Insurer's deposit money and immediately expect to receive a long-term loan. Annuitant's deposit money and quickly expect an insurer to pay interest after the first payment period. If there is no insurer, and there's no surplus in the contract, then the annuitant will drain the principal and the future value won't be reached.
- I don't allow early withdrawal from the annuitant.
 - This is a too complex to implement for my MVP.
- I require that everyone use cUSD.

Annuity spreadsheet:

- A spreadsheet for an annuitant and insurer to use to help them get the most out of my smart contracts.
 - Annuitants input: desired monthly income and the number of years they want the guaranteed income. Annuitants can then see the principal required to achieve their desired fixed income.
 - Insurers input: collateral and loan term. Insurers then see the principal they can borrow and the annual interest rate. Insurers may also input their loan amount (or a different amount) into a

mock index fund with a fixed rate of return. This shows insurers how they can make a profit by using my smart contracts.

References:

[1]: <https://en.wikipedia.org/wiki/Annuity>