

Variable annuities: A closer look at ratchet guarantees, hybrid contract designs, and taxation

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Abstract

Retirement income and its demand is influenced by taxation laws within each jurisdiction. Indeed, taxation can explain the mismatch between theoretical and empirical values of variable annuity (VA) contracts [3, 4, 1]. Providers, with this in mind, try to disincentive adverse policyholder behavior by adding product features, such as free death benefits in presence of taxation [2]. Not only the presence of taxation matters, but also its timing. Ulm (2018) [5] highlights that, for the same taxation regime, the timing of tax affects VA policyholder's value, with taxation at maturity being more advantageous than taxation whenever proceeds are earned.

Recently, providers of VA contracts have launched products which offer potentially higher guaranteed benefits through a ratcheting mechanism in conjunction with an array of investment options, including a cash fund. Traded VA contracts are often packaged with guaranteed death benefit (at an added cost). The ratcheting takes place at each policy anniversary date; the guarantee benefit base is set equal to the prevailing guarantee benefit base or the value of the underlying investment account, whichever is larger.

The cash fund offered by the provider is a cash or term deposit account that earns interest at a rate benchmarked against cash rates offered by central banks. The cash fund functions as an intermediate repository of earnings from the VA contract:

- In the case of a maturity benefit, if the benefit base (or “protected capital”) G_T exceeds the value of the underlying investment asset X_T at maturity T , then the policyholder obtains X_T in the investment account and the insurer pays $G_T - X_T$ into the policyholder's cash fund.

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- In the case of a withdrawal benefit, suppose g_t is the guaranteed withdrawal amount and w_t is the actual withdrawal made by the policyholder. If the policyholder withdraws $w_t < g_t$, the remainder $g_t - w_t$ will be deposited into the policyholder's cash fund.

With a withdrawal benefit, assuming the policyholder does nothing else with the cash fund, it then functions as an intermediate savings account if the policyholder decides to reduce their consumption (as manifested by a withdrawal that is less than the guaranteed amount). However, a policyholder observing a static withdrawal strategy does not benefit from the cash fund. In addition, the advantages offered by the cash fund under a maturity benefit is less clear, assuming that the entire position will be liquidated at maturity (i.e. the cash fund balance is fully withdrawn and the investment asset is sold upon maturity).

However, when taxation is considered, the cash fund also plays a more prominent role. Under Australian taxation rules for instance, the withdrawals may be taxed as ordinary income (to which a marginal tax rate applies), but the cash fund is only taxed through interest earnings. Therefore, the cash fund serves as some sort of “tax shield”.

We consider the valuation of a VA contract with a GMWB rider in which the policyholder has access to a cash fund. Assuming a ratcheting mechanism for the guarantee, we determine the optimal withdrawal strategy and provide numerical examples of cash flows emanating from the contract. We also investigate the implications of taxation on the value of the VA contract.

Keywords: taxation; retirement income; policyholder behaviour; pricing; method of lines; surrender; variable annuity

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