Product Matters
March 2017
Issue 106

Term Conversions: Pricing and Reserves

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Most term products in the U.S. offer policyholders the option of conversion to a permanent policy, typically without additional underwriting. To some extent, convertibility of a term contract is similar to a swaption in that a policyholder has the option to swap premium for the death benefits of permanent life insurance. In a term conversion, the "moneyness" of the conversion option is not tied to any trading asset or index. The conversion decision is generally one of self-selection: based only on information known to the policyholder, of which none is known to the insurer. Insurers do not have a general consensus on how to account for the cost of convertibility.

Figure 1

Reproduction of Chart 19 in the SOA Report on the Survey of Conversion Assumptions and Product Features for Level Premium Term Plans 2015.

Conversion Philosophy	
Cost of Conversions	**Responses**
Implicitly built into the term policy	5
Explicitly built into the term policy	7
Implicitly built into the permanent policy	5
Explicitly built into the permanent policy	2
Not built into either term or permanent policy	1
Conversion has no cost	1

Per Figure 1, more than half of the companies surveyed (12 of 21) indicated they built their conversion costs, either explicitly or implicitly, into their term policies. Meanwhile, seven built it into their permanent products. Different companies are likely to have their own assumptions, histories, and conversion pricing philosophy. Let's first exam two hypothetical situations.

SITUATION 1: THE NET COST OF CONVERSION TO THE INSURER IS ZERO.

If at the point of time of a conversion, the slope of expected mortality matches that of the gross premium for a permanent policy through conversion, the converted policy is perfectly priced. For example: a reinsurance treaty could be structured so that yearly renewable term (YRT) rates follow point-in-scale mortality (PISM). Since there is no prefunding for conversions, there would be no need for an insurer to charge extra premium or to set up reserves for a convertibility option for the term product.

Although Situation 1, if exists, is a bit wishful thinking and not necessarily preferable. To avoid cross-subside, the rate scales for permanent policies from term conversions have to vary by many policy characteristics and it is highly likely that they will need to be separated from other permanent products. Direct companies insurers frequently push back on developing rate scales specifically for converted policies due to administrative concerns. According to *Report on the Conversion Experience Study for the Level Premium Term Plans* (SOA Conversion Experience Report), the mortality experience of converted permanent policies can vary significantly, depending on when in the term policy's duration it converted. To make the hypothetical situation real, an insurer might have to charge different premium rates for the converted policies that would depend on the timing of the conversions. Once the pricing and administrative challenges are carefully considered, this hypothetical situation might be less appealing.

SITUATION 2: AN INSURANCE COMPANY HAS SUBSTANTIAL EXPERIENCE WITH TERM-TO-PERMANENT POLICY CONVERSIONS. ITS EXPERIENCE IS MATURE AND NOT EXPECTED TO CHANGE.

For these companies, if the rate of conversion, and post-conversion mortality and lapse experience is mature and not expected to change, many think that there is no need to institute a separate charge for the conversion option, as the deterioration in mortality of the converted permanent policies would have been accounted for in the experience study of permanent products, assuming conversions have not been separated from the study. In other words, the premium for permanent products would already reflect the additional death experience due to conversions.

It is not entirely fair for the permanent product to include the converted policies' mortality experience. Since converted permanent products generally have higher mortality experience than permanent policies bought outright, blending the experience of the two might make overall mortality for a given product appear artificially high.

In addition, without knowing the motivation of the policyholders who exercise the conversion option, experience could change significantly in the future. For example, for a company new to the 10-year term market, the first nine years of experience would likely see very low conversion rates and therefore minimal impact on mortality experience in their permanent policies. However, year 10 could see an approximately 10-fold jump in conversion rates, making the mortality of permanent products suddenly spike.

None of those two hypothetical situations is as desirable as it first appears. Convertibility should cost both insurers and as a result, consumers. That being said, how should the charge occur? Should it be attached to the term or the converted permanent product? How much should the charge be, and how should insurers reserve for experience if the option is exercised?

The cost to insurers of exercising the convertibility option stems from the additional mortality experienced after conversion. The optionality of incurring such excess mortality, however, is built in the term policy. To align risk and revenue, it would make economic sense to charge only the term policies. It is the product on which the swaption exists. There should be an internal transfer pricing, from the term product into permanent product, when a policy converts. The amount transferred makes the permanent product indifferent to whether the policy was acquired through term conversions, or bought outright. The overall process is similar to how we price certain health products, such as long term care insurance, where an insurer charges active lives and build up active life reserves. There, when a policyholder disables, the active life reserve is released through incurred claim costs to cover the newly-setup disabled life reserves.

I propose a two-stage model to price term-to-permanent convertible policies. In the first stage of the calculation, we determine, at the time of conversion, how much the excess mortality due to a conversion might cost. We do this by calculating the present value of future benefits (PVFB) of a converted policy and, for the sake of comparison, the PVFB of an otherwise

Figure 2
Permanent Life Single Premium

Dur_ Since_ CV	Duration	Attained Age	$q_x^{(lapse)}$	Base Mortality	Mortality Multiple	Perm Mortality	$q_x^{(total)}$	p_x	Continuous Const. Force $a^{bar\ bar}_{x1}$	Death Benefit per $1,000	EOY PVFB
			1	2	3	4	5	6	7	8	9
0								1	0.9760		261.56843
1	10	64	0.049798	0.005260	0.90	0.004734	0.0543	0.9457	0.9495	4.49	285.4250
2	11	65	0.046734	0.006060	0.90	0.005454	0.0519	0.9481	0.9506	5.18	310.3706
3	12	66	0.026846	0.006950	0.90	0.006255	0.0329	0.9671	0.9600	6.00	330.4677
4	13	67	0.015039	0.007940	0.90	0.007146	0.0221	0.9779	0.9653	6.90	347.4184
5	14	68	0.012947	0.009040	0.90	0.008136	0.0210	0.9790	0.9658	7.86	364.1780
6	15	69	0.012947	0.010280	0.90	0.009252	0.0221	0.9779	0.9653	8.93	381.4312
7	16	70	0.012947	0.011700	0.90	0.010530	0.0233	0.9767	0.9647	10.16	399.1534
8	17	71	0.012947	0.013330	0.90	0.011997	0.0248	0.9752	0.9639	11.56	417.3128
9	18	72	0.012947	0.015240	0.90	0.013716	0.0265	0.9735	0.9631	13.21	435.8513
10	19	73	0.010060	0.017470	0.90	0.015723	0.0256	0.9744	0.9635	15.15	453.3535
11	20	74	0.010000	0.020060	0.90	0.018054	0.0279	0.9721	0.9624	17.38	470.9022
12	21	75	0.010000	0.023050	0.90	0.020745	0.0305	0.9695	0.9611	19.94	488.4269
13	22	76	0.010000	0.026500	0.90	0.023850	0.0336	0.9664	0.9596	22.89	505.8179
14	23	77	0.010000	0.030430	0.90	0.027387	0.0371	0.9629	0.9579	26.23	522.9716
15	24	78	0.010000	0.034910	0.90	0.031419	0.0411	0.9589	0.9560	30.04	539.7703
16	25	79	0.010000	0.040010	0.90	0.036009	0.0456	0.9544	0.9537	34.34	556.0835
17	26	80	0.010000	0.045840	0.90	0.041256	0.0508	0.9492	0.9512	39.24	571.7540
18	27	81	0.010000	0.051120	0.90	0.046008	0.0555	0.9445	0.9489	43.65	587.1173
19	28	82	0.010000	0.056920	0.90	0.051228	0.0607	0.9393	0.9463	48.48	602.1312

identical non-converted permanent policy, again, at the time of conversion. The difference between the two PVFBs represents the severity of the excess mortality, and will be defined as "claim costs per conversion," by duration at conversion. The second stage looks at the term life side of the conversion. The aforementioned claim costs per conversion is multiplied by the conversion rate, to get a series of claim costs per policy in force by policy years. With those factors, we can price the cost of convertibility and establish reserving schedules.

Let's look at an example: a 10-year convertible term policy held by a male non-smoker, issue age 55, preferred class, and 5 percent discount rate. We want to calculate the cost of excess mortality if the policy were to convert to permanent in duration 10. Figure 2 shows how to calculate the single premium of a permanent policy issued at the same time as a converted term policy was originally issued. Note that at the time of conversion, the policyholder is age 64.

In Figure 2, the lapse assumptions in column 1 are from the SOA Conversion Experience Report, indexed by duration since conversion. The base mortality rates in column 2 are from the 2008 Valuation Base Tables' Select Ultimate Table, gender and smoking status distinct version. For this exercise, we arbitrarily assigned a 70 percent mortality multiple factor for a super preferred life, a 90 percent factor for a preferred life and a 110 percent factor for a standard life. Calculations after attained age 82 were omitted for presentation purposes, but continue to age 100. In this example, the single premium of a regular permanent policy that was issued at the same time as an equivalent convertible term policy would be $261.57 in duration 10.

Figure 3 uses a similar method to calculate the single premium of a term conversion.

The calculation is largely identical to that performed in Figure 2, with the addition of the conversion mortality multiples in column 1, which is the PISM in the SOA Conversion Experience Report.

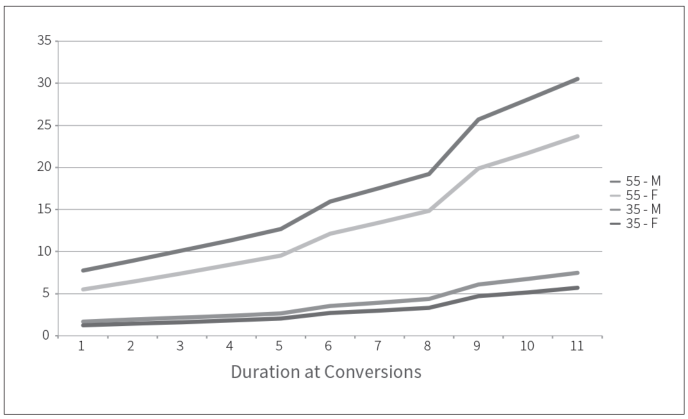
Figure 3
Conversion Single Premium

Dur_ Since_ CV	Duration	Attained Age	Con-version Multiple	Con-version Mortality	$q_x^{(lapse)}$	$q_x^{(total)}$	p_x	Continuous Conts. Force $a^{bar\ bar}_{x1}$	Death Benefit per $1,000	EOY PVFB	Reserve per $1K @ CV
			1	2	3	4	5	6	7	8	9
0							1	0.9760		289.62536	28.0569
1	10	64	1.849387	0.008755	0.049798	0.0581	0.9419	0.9476	8.30	313.6227	28.1977
2	11	65	1.956586	0.010671	0.046734	0.0569	0.9431	0.9482	10.12	337.9087	27.5381
3	12	66	1.758423	0.010999	0.026846	0.0375	0.9625	0.9577	10.53	357.1548	26.6872
4	13	67	1.720997	0.012298	0.015039	0.0272	0.9728	0.9628	11.84	372.6994	25.2810
5	14	68	1.512863	0.012309	0.012947	0.0251	0.9749	0.9638	11.86	388.6312	24.4532
6	15	69	1.512863	0.013997	0.012947	0.0268	0.9732	0.9630	13.48	404.7417	23.3105
7	16	70	1.512863	0.015930	0.012947	0.0287	0.9713	0.9621	15.33	420.9557	21.8023
8	17	71	1.512863	0.018150	0.012947	0.0309	0.9691	0.9610	17.44	437.1818	19.8690
9	18	72	1.512863	0.020750	0.012947	0.0334	0.9666	0.9597	19.91	453.2830	17.4317
10	19	73	1.193468	0.018765	0.010060	0.0286	0.9714	0.9621	18.05	470.4634	17.1098
11	20	74	1.200000	0.021665	0.010000	0.0314	0.9686	0.9607	20.81	487.4625	16.5603
12	21	75	1.200000	0.024894	0.010000	0.0346	0.9654	0.9591	23.88	504.2344	15.8076
13	22	76	1.200000	0.028620	0.010000	0.0383	0.9617	0.9573	27.40	520.6357	14.8178
14	23	77	1.200000	0.032864	0.010000	0.0425	0.9575	0.9553	31.39	536.5253	13.5536
15	24	78	1.150000	0.036132	0.010000	0.0458	0.9542	0.9537	34.46	552.4571	12.6868
16	25	79	1.150000	0.041410	0.010000	0.0510	0.9490	0.9511	39.39	567.6748	11.5913
17	26	80	1.150000	0.047444	0.010000	0.0570	0.9430	0.9481	44.98	581.9803	10.2263
18	27	81	1.150000	0.052909	0.010000	0.0624	0.9376	0.9455	50.02	595.7144	8.5971
19	28	82	1.150000	0.058912	0.010000	0.0683	0.9317	0.9425	55.53	608.7916	6.6605

The conversion mortality in column 2 is the product of column 1 and the permanent mortality in column 4 of Figure 2. The single premium for a term conversion is $289.63. The difference between the PVFBs of the term conversion and the regular permanent policy issued at the same time is $28.06 (i.e., $289.63 – $261.57). This difference reflects the cost of excess mortality due to conversion if a term policy converts in policy year 10. Let's call it claim costs per conversion at duration at conversion 10. If this amount is transferred from the term policy into the permanent policy, it could cover the excessive mortality expected from the term conversion. In another words, the product manager of the permanent product becomes profit-neutral to the term conversion.

For a convertible term policy, we can look at different durations at conversion to generate a series of costs associated with the conversions. Figure 4 graphs four policies, two issued to males and two to females at issue ages 35 and 55, preferred non-smokers, and shows claim costs per $1,000 converted face amount by duration at conversion. Unsurprisingly, policies issued to older males who convert at a later stage of the level term period tend to have higher claims costs.

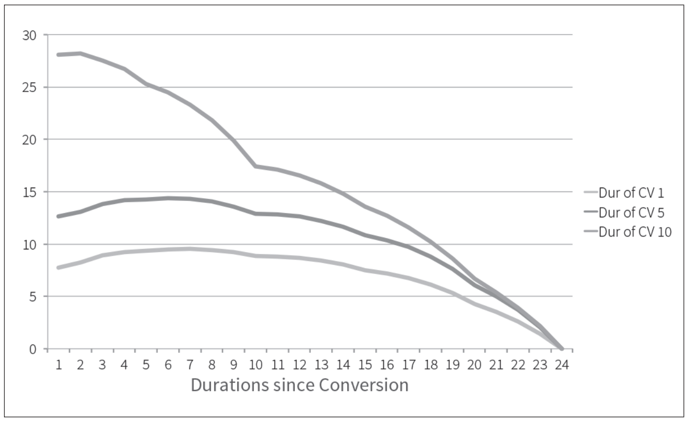
Figure 4
Claim Costs per $1,000 Converted Face Amount



With the projections of PVFBs post conversion, we can not only look at the claim cost at conversion, but also how the cost of excessive mortality is released. The last column of Figure 3 contains the projection of reserves once a term policy converts. It is the differences between the PVFBs of a converted policy and that of a regular permanent policy issued at the same time as the original term policy. This reserve, as mentioned earlier, is similar to disabled life reserves for some health products, and generally decreases throughout the life of a permanent policy.

Figure 5, below, shows the reserves for the same sample policy, (male non-smoker, issue age 55, preferred class), converting at durations 1, 5, and 10. Conversions that occur at later stages of the level term period have higher overall levels of reserves. PISM after duration since conversion 10 is low. As a result, the trajectories of the graphs appear to bend at year 10. For conversions that occur in the first few years, excess mortality is low. Reserves actually increased slightly due to interest earned.

Figure 5
Permanent Reserves for Conversions



Equipped with the claim costs per conversion from the permanent life model, we next switch our attention to the second stage model, the term life projection. Figures 6 and 7 project the sample policy during the term life stage. Most assumptions, including the arbitrary mortality multiple for different classes, are identical to what is being used for permanent life projection. The mortality select factors in column 33, term lapse rates in column 5 and term conversion rates in column 6 are from the SOA Conversion Experience Report.

Column 10 shows claim cost per policy converted, which were calculated in Figure 3. Note the number $28.06 we got from the Figure 3 is used in column 10 for duration 10. Claim costs per $1,000 face amount in force in column 11 are defined as conversion rate times column 10. Column 12 is the present values of claim costs per $1,000 face amount in force. In column 13, we chose $1 as the gross premium during the level term period and $5 for the premium in duration 11 and later. The beauty of setting those levels is for mathematical simplicity. The net level premium ratio works out to be the annual net premium for convertibility during the level term period. For the purpose of calculating convertibility costs, we did not use a full-length premium projection, but only of the segment of time when conversions would take place. It is conservative to shortened amortization period to avoid negative reserves after duration 11.

In the example above, the single premium for convertibility is $0.94 per $1,000 face amount (as seen in the column 12), and

Figure 6
Term Life Projection

Duration	Attained Age	Base Mortality	Mortality Multiple	Select Factor	Term Mortality	$q_x^{(lapse)}$	$q_x^{(conversion)}$	$q_x^{(total)}$	p_x	Const Force $\bar{a}_{x1}$
		1	2	3	4	5	6	7	8	9
									1	
1	55	0.000830	0.90	0.907102	0.000678	0.093146	0.005792	0.0990	0.9010	0.9272
2	56	0.001340	0.90	0.860118	0.001037	0.074088	0.010196	0.0845	0.9155	0.9345
3	57	0.001770	0.90	0.850015	0.001354	0.064540	0.009203	0.0744	0.9256	0.9395
4	58	0.002160	0.90	0.842955	0.001639	0.059327	0.009098	0.0694	0.9306	0.9420
5	59	0.002530	0.90	0.824281	0.001877	0.057961	0.013708	0.0726	0.9274	0.9404
6	60	0.002940	0.90	0.823767	0.002180	0.054100	0.007172	0.0629	0.9371	0.9452
7	61	0.003390	0.90	0.805842	0.002459	0.051230	0.006971	0.0602	0.9398	0.9466
8	62	0.003930	0.90	0.862190	0.003050	0.052192	0.006977	0.0617	0.9383	0.9458
9	63	0.004550	0.90	0.804303	0.003294	0.058428	0.007702	0.0688	0.9312	0.9423
10	64	0.005260	0.90	0.863699	0.004089	0.603525	0.045495	0.6231	0.3769	0.6257
11	65	0.006060	0.90	1.700753	0.009276	0.267457	0.036784	0.3009	0.6991	0.8216
12	66	0.006950	0.90	1.700753	0.010638	0.267457	-	0.2753	0.7247	0.8356
13	67	0.007940	0.90	1.700753	0.012154	0.500000	-	0.5061	0.4939	0.7022
14	68	0.009040	0.90	1.700753	0.013837	0.750000	-	0.7535	0.2465	0.5281
15	69	0.010280	0.90	1.700753	0.015735	1.000000	-	1.0000	-	-

Figure 7
Term Life Projection—Continued

Duration	Attained Age	Single Prem Due to Conv.	per 1,000 Converted Undercrmted Claim Costs	EOY PVFB	Gross Prem to Amort CV BOY	EOY PVFP($1)	Net Lvl Prm Factor	Terminal Reserve
		10	11	12	13	14	15	16
				0.9389		6.5218	14.40%	
1	55	7.7271	0.0448	1.0459	1.00	6.4350	0.1440	0.1194
2	56	8.9215	0.0910	1.1020	1.0000	6.2333	0.1440	0.2046
3	57	10.1174	0.0931	1.1509	1.0000	5.9367	0.1440	0.2962
4	58	11.3556	0.1033	1.1887	1.0000	5.5702	0.1440	0.3868
5	59	12.6605	0.1735	1.1611	1.0000	5.1745	0.1440	0.4162
6	60	15.9503	0.1144	1.1799	1.0000	4.6776	0.1440	0.5065
7	61	17.5463	0.1223	1.1888	1.0000	4.1086	0.1440	0.5973
8	62	19.2347	0.1342	1.1883	1.0000	3.4786	0.1440	0.6875
9	63	25.7107	0.1980	1.1294	1.0000	2.7947	0.1440	0.7271
10	64	28.0569	1.2764	0.9216	1.0000	5.0000	0.1440	0.2018
11	65	30.4962	1.1218	-	5.0000	-	0.1440	-
12	66	-	-	-	-	-	0.1440	-
13	67	-	-	-	-	-	0.1440	-
14	68	-	-	-	-	-	0.1440	-
15	69	-	-	-	-	-	0.1440	-

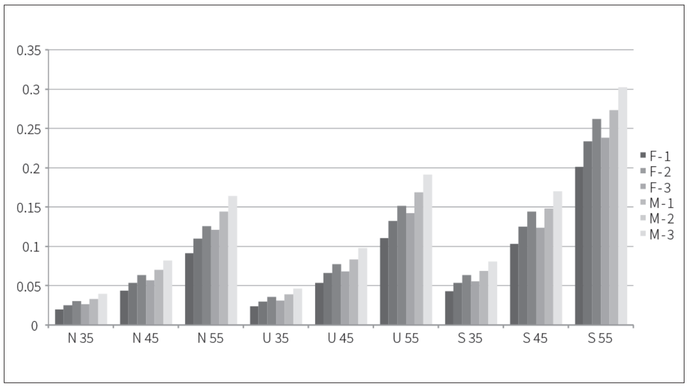
the annual charge for the conversion option is $0.14 per $1,000 face amount (column 15).

OBSERVATIONS

With those simplified assumptions, the higher the base mortality, the bigger the difference in PVFB between converted term policies and regular permanent policies; therefore, the higher the cost of convertibility.

Figure 8 summarizes the convertibility net premium for 54 sample policies, by gender, risk classes, smoker status and issue ages. Net premium ranges from $0.02 per $1,000 face amount for a female super-preferred nonsmoker at issue age 35 to $0.30 per $1,000 for a male standard class smoker at issue age 55.

Figure 8
Convertibility Net Premium

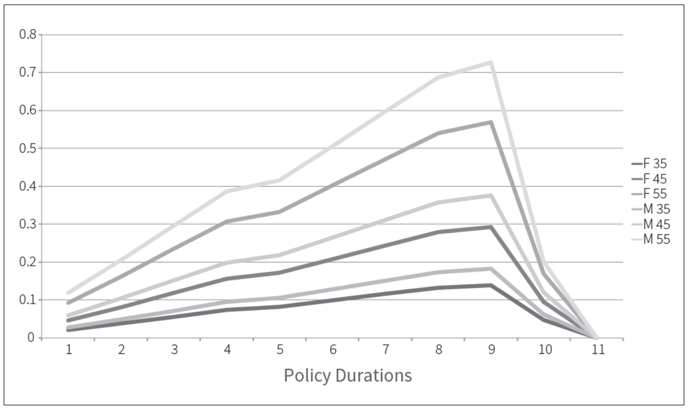


Note that the Figure 8 shows dollar amount of net premium. If converted to the percentage of gross premium of a term policy, the shape of the chart might look very different.

Figure 9 depicts reserve projections for six convertible term policy for preferred nonsmokers. The graph shows the projection for males and females, issue ages 35, 45 and 55. Reserves build slowly during the first nine years due to generally low conversion rates and relatively low PISMs. In duration 10, however, significant portions of the reserves are released due to both the high likelihood and potential severity of experience for the conversions. The male policyholders in each age group have the highest reserves throughout. Older issue ages, which are associated with higher net premium for convertibility, also require higher reserves.

Clearly, the cost of convertibility for these policies is rear-heaped. This reserving pattern for convertible term products makes it difficult to manage the profit in the term products. When we realize our base assumptions of conversion rates and PISM are inadequate, there is not much time to take actions.

Figure 9
Term Reserve for Conversions

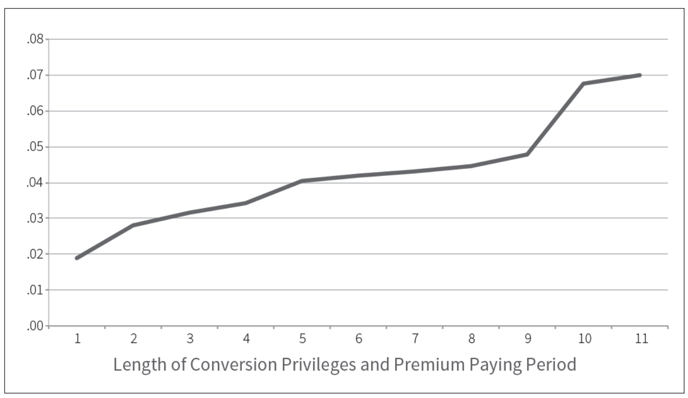


When that happens, it makes economic sense for the term product to absorb the shock, and transfer assets to what the revised assumptions suggest, instead of what is available from the built-in release of reserves. However, the actual accounting could still be tricky.

Shortening the conversion privileges for the term policies might provide some relief. We used the same method described in this article to test different length of conversion privileges. To be fair and to avoid negative reserves, the premium payment period was set to match the duration of the conversion privileges for the term policy.

Figure 10 shows the annual premium for a convertible term policy held by a male, standard class and issue age 45, by the length of conversion privileges and premium paying period. If there is no restriction on conversions, the annual premium for the convertibility will be $0.07, payable for the life of the term contract. If, however, conversion privileges are restricted to the first seven policy years, the additional premium cost for the convertibility decreases to $0.04 a year, payable for seven years.

Figure 10
Annual Premium by Conversion Privileges

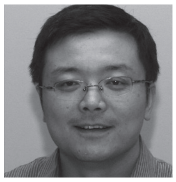


Generally speaking, we noticed that if conversions are disallowed in year 10 and beyond, annual premium for the convertible term product can be reduced by roughly 30 percent. The calculation is based on the assumptions that policyholders do not alter their behavior to adapt to the new policy feature. In reality, when conversion privileges are shortened, it would be reasonable to expect policyholders to accelerate their conversion decisions while they still have the option.

In the calculations above, it is assumed that conversions would occur throughout all policy years. Year 10, however, is clearly unique, as claim costs due to conversion as well as shock lapse levels are both high. Uniform distribution might not be prudent, especially during Year 10, when conversions are likely to occur around the end of the policy year. To quantify the impact of this timing assumption, we changed the timing of the conversions and lapses to the end of each policy years. Conversions were calculated after continuous death but before lapsation. The resulting net premium for convertibility rose by about 25 percent.

To sum up, revenue should match risks. An insurer should charge and establish reserves specifically for conversions at the issuance of a convertible term policy. With each term conversion, the company would calculate a claim cost to cover future excess mortality. That reserve becomes the asset that transfers from the term product to the permanent product.

The article is not intended to offer a valuation guideline. There are many questions companies still need evaluate. For example: should insurers follow Financial Accounting Standard 60 (FAS 60—Accounting and Reporting by Insurance Enterprises) to lock in assumptions related to conversions? Or, should Statement of Position 03.1 (SOP 03-1—Accounting and Reporting by Insurance Enterprises for Certain Nontraditional Long-Duration Contracts and for Separate Accounts) be followed for the release of deferred acquisition costs? How are conversions not explicitly charged for incorporated into the term reserve under principal based reserve framework? For policies already converted, when we update our PISM assumptions, should we unlock the reserves due to conversions? These, and other questions, would need careful analysis and discussions with valuation actuaries and auditors. ■



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