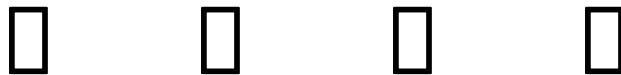




# CANNEX

**CANNEX Payout Annuity Yield (PAY) Index™**

**USA**



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## CANNEX Payout Annuity Yield (PAY) Methodology

### Methodology

Starting in January 2014 the PAY will be calculated weekly for the following three contracts<sup>1</sup>:

Premium	Tax Status	Guarantee Period	Gender	Age	Payout Frequency
\$100,000	Qualified	5 Years	Male	70	Monthly
\$100,000	Qualified	5 Years	Female	65	Monthly
\$100,000	Qualified	5 Years	Joint	70M/65F	Monthly

The weekly PAY values will be determined using the following methodology:

The average payout will be calculated using the quotes of the top 10 carriers listed on CANNEX based on income annuity sales. Each week these quotes will be sorted from highest to lowest for all three contracts. The minimum and maximum quotes will be removed to control for outliers and a simple linear average of the payouts will be taken of the quotes that remain.

The average payout will then be multiplied by twelve (months) and divided by one hundred thousand (premium) to derive an annualized payout yield.

### Determining the Constituent Carriers

The determination of the top 10 carriers to be included in the PAY will be done quarterly. The income annuity sales data used to rank the carriers is provided by the LIMRA Secure Retirement Institute<sup>2</sup>. For example:

As of January 1st of each year, the top 10 carriers to be included in the PAY will be:

- Selected from the carriers listed on CANNEX as at September 30 of the prior year;
- Based on the sales for the 12 month period ending September 30 of the prior year.

The 3 month lag between selecting the top 10 carriers and incorporating them into the PAY calculation is to allow sufficient time for the process of collecting sales data for the period required to be completed by the LIMRA Secure Retirement Institute.

In cases where a particular carrier has been selected for inclusion but decides to delist from CANNEX during a time where it is being included in the index the carrier with next highest sales figure will be used as a replacement. In cases where a new carrier becomes listed on CANNEX during the lag period, the new carrier will not be considered for inclusion until the next point in time where they qualify for inclusion.

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<sup>1</sup> All contracts, both historical and going forward, are based on values from the state of Alabama.

<sup>2</sup> For PAY values calculated prior to July 1, 2015 the determination of the top 10 carriers was based on sales data provided by Beacon Research.

### Historical PAY Values

Weekly historical values will be available as far back as January 2005. For the historical period from January 2005 to December 2013 the calculation method has been adjusted (more information available from the research group at CANNEX if needed) due to limitations in the availability of quote and sales data.

### Historical Single Life Methodology

Each week during the nine year historical period ***all*** of the quotes for that week were sorted from highest to lowest for the three contracts. In other words the criterion of “top 10 carriers by sales” was not applied to determine a subset of carriers. The minimum and maximum quotes for that particular week were then removed and a simple average of the payouts was taken of the quotes that remain for that particular week. All of these results were then multiplied by twelve and divided by one hundred thousand to derive an annualized payout yield.

### Historical Joint Life Methodology

In the case of the joint contract, the same methodology was applied to the carrier selection however, due to the absence of payout quotes for the 70M/65F contract in the historical database the PAY values were interpolated using the methodology below.

First, the weekly quotes were gathered for the following six contracts:

Premium	Tax Status	Guarantee Period	Gender	Age <sup>3</sup>	Payout Frequency
\$100,000	Qualified	5 Years	Male	65	Monthly
\$100,000	Qualified	5 Years	Female	65	Monthly
\$100,000	Qualified	5 Years	Joint	65M/65F	Monthly
\$100,000	Qualified	5 Years	Male	70	Monthly
\$100,000	Qualified	5 Years	Female	70	Monthly
\$100,000	Qualified	5 Years	Joint	70M/70F	Monthly

For each contract the average payout was determined in the same manner as described in the single life methodology. The average payout amounts were multiplied by 12 and divided into one hundred thousand to convert them into the amount of premium or cost required to obtain \$1 of income for life.

In order to calculate the interpolated PAY for the joint 70M/65F contract the implied joint first-to-die annuity factors for both the 65M/65F and 70M/70F contracts were calculated using the formula presented below.

$$\text{Implied Joint Factor}_{\text{First to Die } XX} = \text{Male}_X + \text{Female}_X - \text{Joint}_{\text{Last to Die } XX}$$

*X represents 'Age'*

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<sup>3</sup> In the Joint case – values are based on last to die.

Once these values were calculated a weighted average was then taken to calculate an implied 70M/65F annuity factor.

$$\begin{aligned} \text{Implied 70M/65F Annuity Factor} &= \text{Weight} \times \text{Implied Joint Factor}_{\text{First to Die 65}} + (1 - \text{Weight}) \\ &\times \text{Implied Joint Factor}_{\text{First to Die 70}} \end{aligned}$$

$$\text{Weight} = .36$$

Finally, this value was netted against the sum of the single male 70 and single female 65 factors in order to obtain the final approximation for the 70M/65F last to die factor.

$$\text{Final 70M/65F Annuity Factor}_{\text{Last to Die}} = \text{Male}_{70} + \text{Female}_{65} - \text{Implied 70M/65F Annuity Factor}$$

This value was then inverted to obtain the PAY.

$$\text{Final 70M/65F Yield}_{\text{Last to Die}} = \frac{1}{\text{Final 70M/65F Annuity Factor}}$$

#### Numerical Example (Joint Interpolation)

The following example demonstrates the interpolation for the historical 70M/65F contract. The following data was gathered on December 25<sup>th</sup>, 2013.

Annuity Quotes Dec 25, 2013			
	M	F	J
65	\$568	\$537	\$479
70	\$643	\$604	\$529

First these month quote values were converted to annuity factors using the following formula:

$$\text{Annuity Factor} = \left( \frac{\text{Quote} \times \# \text{ of Months}}{\text{Premium}} \right)^{-1}$$

$$\text{Male 65 Annuity Factor} = \left( \frac{\$568 \times 12}{\$100,000} \right)^{-1} = \$14.67$$

Applying this formula to the table above produced the results presented below.

Annuity Quotes Dec 25, 2013			
	M	F	J
65	\$14.67	\$15.52	\$17.40
70	\$12.97	\$13.81	\$15.77

Once the annuity factors were gathered the Implied Joint First to Die factor was calculated using the following formula:

$$\text{Implied Joint Factor}_{\text{First to Die } XX} = \text{Male}_X + \text{Female}_X - \text{Joint}_{\text{Last to Die } XX}$$

$$\text{Implied Joint Factor}_{\text{First to Die } 65} = \$14.67 + \$15.52 - \$17.40 = \$12.78$$

$$\text{Implied Joint Factor}_{\text{First to Die } 70} = \$12.97 + \$13.87 - \$15.77 = \$11.01$$

After the Implied Joint First to Die factors was calculated for the contracts where the annuitants are the same age, a weighted average was taken in order to get an approximation for the contract where the male and female are 70 and 65 respectively.

$$\begin{aligned} \text{Implied Joint Factor}_{\text{First to Die } 70M/65F} \\ = \text{Weight} \times \text{Implied Joint Factor}_{\text{First to Die } 65} + (1 - \text{Weight}) \\ \times \text{Implied Joint Factor}_{\text{First to Die } 70} \end{aligned}$$

$$\text{Implied Joint Factor}_{\text{First to Die } 70M/65F} = .36 \times \$12.78 + (1 - .36) \times \$11.01 = \$11.66$$

Finally, for consistency purposes this Implied Joint First to Die factor for the 70M/65F scenario was then used to calculate the Implied Joint Last to Die factor.

$$\text{Final } 70M/65F \text{ Annuity Factor}_{\text{Last to Die}} = \text{Male}_{70} + \text{Female}_{65} - \text{Implied } 70M/65F \text{ Annuity Factor}$$

$$\text{Final } 70M/65F \text{ Annuity Factor}_{\text{Last to Die}} = \$12.97 + \$15.52 - \$11.66 = \$16.82$$

As a final step to calculate the corresponding yield the reciprocal of this Final 70M/65F factor was taken.

$$\text{Final } 70M/65F \text{ Annuity Yield}_{\text{Last to Die}} = \text{Final } 70M/65F \text{ Annuity Factor}_{\text{Last to Die}}^{-1}$$

$$\text{Final } 70M/65F \text{ Annuity Yield}_{\text{Last to Die}} = \$16.82^{-1} = 5.94\%$$

### Example

Today there is a myriad of financial products offering a plethora of options and guarantees. Generally speaking these products come at a high cost to the end client. The question then becomes: Is the elaborate product much better than a SPIA? If a hybrid product provides 5% annually yet a SPIA is offering 7% the two percent spread may or may not be in the best interest of the client. Perhaps the former offers a death benefit yet the latter provides longevity insurance. Ultimately, the annuity index can be used to begin a conversation in generating income while in retirement.