State of the Life Insurance Industry
There has been steady growth in U.S. GDP, but growth for insurers flatlined


New life insurance direct premiums, despite periods of rapid growth, have lagged GDP growth over the past 15 years.

Source: Life Insurance Statutory Filings (via SNL.com); Bureau of Economic Analysis – US GDP data
1. Calculated as First Year Premiums plus 10% of Single Premiums
2. Growth indices indexed to a starting value of 100 in 2000; Direct Premiums & Considerations – Life include Industrial Life, Ordinary Life, and Group Life. Direct Premiums & Considerations
3. Top-25 companies have been ranked on the basis of Direct Premiums & Considerations in 2015 (shows the growth of the top 25 companies in 2015 over the past 15 years)
The number of individual Life & Annuity policies sold has dropped significantly, while sales to the wealthiest increased.
The life insurance industry is evolving

Simple life insurance formulas for success are not as effective as they used to be...especially among middle Americans¹

- 27% Decrease in the # of policies sold in the last 20 years
- 25% US adult population growth
- 42% Decline in # of policies sold per capita²

Difficult to identify, target, and respond to customers as needs evolve over time due to...

- ✔ Traditional sales methods
- ✔ Older risk assessment tools
- ✔ Unacceptable commissions

²Based on Deloitte analysis of 367 top US insurance company statutory filings sold between 1998 and 2018, and US Census population data.
The time is right to sell, yet consumers are underinsured and not engaged

41% of Americans do not carry any life insurance\(^1\)

48% of households with life insurance have a coverage gap of $200,000 on average\(^2\)

50% of millennials say lack of approach by life insurance agents is a contributing factor to why they don’t have any or more life insurance\(^3\)

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Sources:
1. Life Happens and LIMRA, 2018 Insurance Barometer, April 2018
2. LIMRA, Life Insurance Ownership in Focus, 2016
3. Life Happens and LIMRA, 2017 Insurance Barometer, 2017
Insurance agents need to be compensated fairly – or new distributions need to be developed – or middle America will not be served

4 out of 10 Americans today don’t carry life insurance\textsuperscript{1}

The commission structure of life insurance has not changed much in 50 years

The price of insurance has dropped over that same 50 years

The average payment per hour for a policy under $1m is $15/hr\textsuperscript{3}

Agents need to efficiently sell life insurance to middle Americans or commissions need to dramatically change

\textsuperscript{1}Life Happens and LIMRA, 2018 Insurance Barometer, April 2018.
\textsuperscript{2}"Middle-Market Life Insurance, Findings from Industry Thought Leaders," Society of Actuaries, Nov. 2016. Assumes 20 hours to sale, process and close a policy at average commission of $300.
In the Beginning - Application Triage (AUW)
Protective Value Studies – Detailed Conclusions but on Very Broad Demographic Splits

Table 3
Summary of Best Calculations Separated by Age Group

<table>
<thead>
<tr>
<th>Age Group</th>
<th>$95 Confidence Age 45-64</th>
<th>$95 Confidence Age 65-74</th>
</tr>
</thead>
<tbody>
<tr>
<td>45-64</td>
<td>$12,952</td>
<td>$15,402</td>
</tr>
<tr>
<td>65-74</td>
<td>$18,112</td>
<td>$20,562</td>
</tr>
</tbody>
</table>

Risky Driving History Forecasts a Shorter Lifespan: LexisNexis® Motor Vehicle Record Study Raises a Flag for Motorists and the Insurance Industry

The same motor vehicle driving records already widely used to help determine how much a consumer pays for car insurance can also be used to predict the potential length of an individual’s life. According to the new Motor Vehicle Record (MVR) Morality Study completed by LexisNexis® and RGA Reinsurance Company, motor vehicle records shed new light on lifestyle risk and can help life insurance executives, actuaries and underwriters better structure insurance policies in the U.S.

Table 4
Summary of Best Calculations Separated by Age

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About the Author
Richard L. Bergerson, FSA, MAAA, is CITR’s Actuarial Consultant. He is with Milliman & Robertson, Inc., Seattle, WA. Rick may be reached at rick.bergerson@milliman.com.

Media Center
RGA Turns Rx Research into Improved Underwriting Results for Insurers

St. Louis, Missouri, USA, March 28, 2013 – RGA’s Rx automated scoring system, developed by RGA Reinsurance Company (RGA), is today being successfully utilized by numerous U.S. life insurance company underwriters as an essential element in underwriting simplified issue and fully-underwritten products.

The initial idea behind this scoring system, which scores thousands of prescription and over-the-counter drugs that can appear on insurance applicants’ prescription drug histories, emerged from a prescription history mortality study conducted by RGA in 2008 and published in the Journal of the Academy of Life Underwriting in 2009. The study, the largest Rx mortality study ever performed, compiled Rx history data from 1.1 million insurance applicants, and determined that individual Rx histories are predictive of mortality.
Underwriters are utilizing predictive analytics to triage applications, identifying certain healthy applications for whom selected medical underwriting requirements can be waived.

Application Triage Process Flow

**Application Received**
Initial application for insurance is received.

**Third-Party Databases Queried**
Queries to traditional external data sources, and potentially to non-traditional data sources
- MIB
- Motor Vehicle Records
- Prescription Drug
- Electronic Health Records

**Telephone Interview Conducted**
Trained medical professional conducts telephone interview.

**Application Triage Model Applied**
Data collected to date is processed by predictive model. Each application receives a health score and reason code.

**Policy Issued Without Medical Exams**
Application approved for issue
- 24 – 48 hr turnaround

**Application determined to be not eligible for medical underwriting requirements to be waived. Must order labs and proceed through traditional underwriting process**

Traditional Underwriting Process
Average time to issue is 30+ days
The illustrative eligibility criteria, detailed build chart, and disqualifying major medical conditions criteria provided below are applied in the initial step of identifying eligible and healthy applicants.

### Program Eligibility Criteria (Illustrative)

<table>
<thead>
<tr>
<th>General Qualifications</th>
<th>Ages 22 to 65</th>
<th>Face amounts requested below $1 million</th>
<th>Requested products: Whole Life, Term, Universal Life, Variable Life</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tobacco, Alcohol, and Drugs History</td>
<td>No tobacco or nicotine products within last 5 years</td>
<td>No history of drug or alcohol abuse or treatment within past 10 years</td>
<td></td>
</tr>
<tr>
<td>Health/Medical Qualifications</td>
<td>Build (height and weight) within recommended limits (see next slide)</td>
<td>Major medical condition(s), no disqualifying major medical conditions (see next slide)</td>
<td>Blood pressure, self-reported: below 140/90</td>
</tr>
<tr>
<td>Health/Medical Qualifications</td>
<td>Total cholesterol, self-reported: below 200</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health/Medical Qualifications</td>
<td>Cholesterol/HDL ratio, self-reported: below 5.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health/Medical Qualifications</td>
<td>If age is 55 or above, applicant has a primary care physician and evidence of routine physicals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insurance History</td>
<td>Any previously undertaken coverage was approved at one of the top two underwriting classes</td>
<td>Coverage amount doesn’t exceed 20 times the income</td>
<td></td>
</tr>
<tr>
<td>Insurance History</td>
<td>No life, health or disability insurance has been rated or declined</td>
<td>No prior informed request to the company within the last 12 months</td>
<td></td>
</tr>
<tr>
<td>Family Health History</td>
<td>No biological parent or sibling death from cardiovascular disease, stroke, diabetes, breast, ovarian, or prostate cancer prior to age 65</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Financial</td>
<td>No bankruptcy in the past three years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motor Vehicle Record</td>
<td>No history of DUI or reckless driving within three years</td>
<td>No more than one moving violation within the past two years</td>
<td></td>
</tr>
<tr>
<td>Aviation, Avocation, Sports, and Occupation</td>
<td>No recent participation in hazardous sports, avocations, or aviation under age 65</td>
<td>No recent occupation</td>
<td></td>
</tr>
<tr>
<td>Travel and Residency</td>
<td>U.S. citizen or permanent resident with no recent foreign travel or foreign residence</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Build Chart and Disqualifying Major Medical Conditions (Illustrative)

<table>
<thead>
<tr>
<th>Ages 20 - 64</th>
<th>Ages 65 - 89</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>Weight</td>
</tr>
<tr>
<td>4'5</td>
<td>82 - 133</td>
</tr>
<tr>
<td>4'10</td>
<td>86 - 160</td>
</tr>
<tr>
<td>4'11</td>
<td>90 - 167</td>
</tr>
<tr>
<td>5'0</td>
<td>94 - 174</td>
</tr>
<tr>
<td>5'1</td>
<td>98 - 181</td>
</tr>
<tr>
<td>5'2</td>
<td>102 - 188</td>
</tr>
<tr>
<td>5'3</td>
<td>106 - 193</td>
</tr>
<tr>
<td>5'4</td>
<td>110 - 202</td>
</tr>
<tr>
<td>5'5</td>
<td>114 - 209</td>
</tr>
<tr>
<td>5'6</td>
<td>119 - 216</td>
</tr>
<tr>
<td>5'7</td>
<td>122 - 223</td>
</tr>
<tr>
<td>5'8</td>
<td>126 - 230</td>
</tr>
<tr>
<td>5'9</td>
<td>130 - 237</td>
</tr>
<tr>
<td>6'0</td>
<td>134 - 244</td>
</tr>
<tr>
<td>6'1</td>
<td>138 - 251</td>
</tr>
<tr>
<td>6'2</td>
<td>142 - 258</td>
</tr>
<tr>
<td>6'3</td>
<td>146 - 265</td>
</tr>
<tr>
<td>6'4</td>
<td>150 - 272</td>
</tr>
<tr>
<td>6'5</td>
<td>154 - 278</td>
</tr>
<tr>
<td>6'6</td>
<td>158 - 286</td>
</tr>
<tr>
<td>6'7</td>
<td>162 - 293</td>
</tr>
<tr>
<td>6'8</td>
<td>166 - 300</td>
</tr>
<tr>
<td>6'9</td>
<td>170 - 307</td>
</tr>
<tr>
<td>7'0</td>
<td>174 - 314</td>
</tr>
<tr>
<td>7'1</td>
<td>178 - 321</td>
</tr>
<tr>
<td>7'2</td>
<td>182 - 328</td>
</tr>
</tbody>
</table>

### Disqualifying Major Medical Conditions

- **Alcohol abuse and/or treatment**: Hepatitis
- **Atrial Fibrillation**: Hypertension
- **Heart Disease/Surgery**
  - Kidney Disease
- **Bipolar Disorder**: SLE/Lupus
- **Cancer**: Malanoma
- **Chronic Obstructive Pulmonary Disease**: Multiple Sclerosis
- **Crohn’s Disease**: Parkinson’s Disease
- **Diabetes/Osvegetal Diabetes**: Peripheral Artery Disease
- **Drug abuse and/or treatment**: Rheumatoid Arthritis
- **Epilepsy/Seizure**: Sleep Apnea
- **Gastric Bypass**: Stroke
Data Sources for Application Triage – Traditional UW Data

The baseline inputs for an application triage algorithm are the traditional data sources used today in life insurance underwriting.

- Application Data
- Tele-Interview Data
- Data from MIB Group
- Motor Vehicle Record (MVR)
- Prescription Drug History
Data Sources for Application Triage – non-Traditional UW Data

A variety of data sources are considered by carriers utilizing predictive analytics to determine whether the traditional data listed below is sufficient to make an underwriting decision, or if labs and other invasive underwriting requirements are necessary.

### Sampling of Potential Data Sources for Application Triage

#### Traditional
- Application Data
- Tele-Interview Data
- Data from MIB Group
- Motor Vehicle Record (MVR)
- Prescription Drug History

#### Credit Data
- Length of Credit History
- Amounts Owed
- Credit Mix
- Credit Use
- Bankruptcy
- Foreclosure
- Eviction

#### Public Records
- Property Records – ownership, tax appraisal & fee, etc.
- Recorded Documents – by grantor, grantee, etc.
- Genealogy Records - births, marriages, deaths
- Criminal records, court dockets, jail inmate records
- Meeting minutes from public forums
- Public safety / protective information / recalls
- Local voter and election information – early voting, vote by mail, polling locations

#### Other Internal Data
- Other Business Unit Data
  - Property / Casualty products held
  - Duration of customer persistency
- Advisor Data
  - Agent Production
  - Agent Tenure
  - Agent status
  - Total household premium placed with company
- Deloitte Disease State Models
  - Hypertension
  - Cardiovascular
  - Respiratory
  - Neoplasm - other

#### Marketing Data
- Occupation
- Education
- Income / Current Wealth
- Home – purchase price & current value
- Mortgage amount & lender
- Household composition
- Pet Owner
- Online shopper
- Direct mail responder / buyer
- Runner / downhill skier
- Sports enthusiast
- Crafts / hobbies
- Quantity & age of children in household
- Credit Active
Application Triage - Transparent Algorithmic Solution

A tool that leverages diverse data sources to predict underwriting classification, although there have been different target variables. Historically, AUW algorithmic solutions have been generalized linear models. However, some companies/tools are pushing more advanced and possibly less transparent statistical methods.

Algorithmic Solution – Conceptual Deliverable Structure

\[-3A + 5B - 2C - D - 4E + 3F + \ldots\ldots\]

Where:

A = Age of the individual
B = Reported BMI
C = Number of major MVR violations
D = “Yes” to parent death prior to 65 for cancer
E = Diabetes disease state score
F = Household position

We have found that transparent and open algorithmic solutions provide for a better agent/customer experience as “reason codes” can be easily developed to share algorithm details at the appropriate level to the appropriate person.
Results – Close Approximation of Traditional UW

Applying an Application Triage Algorithmic Solution using application data, MIB, MVR, Rx and other 3rd party data, together with underwriting rules established by the insurer, may provide results that are similar to fully underwritten decisions for a significant portion of the business – predominantly the higher scoring segments. The graph below is illustrative of results based on our experiences but actual results will vary.

1 – Representative results assume an Algorithmic Solution that includes application data, MIB, MVR, Rx and other 3rd party data, with underwriting rules established by the insurer.
Algorithm Results (‘Rainbow Chart’) -- Risk Class as Target

The Rainbow chart, so named because of the “striping” effect illustrated by positive model results, indicates raw model strength; “good” results reflect a slope toward more SPPREF and fewer standard or sub-standard risks in the top groups.

Key Considerations

- This algorithm used risk class as target
- The analysis illustrates the breakdown of underwriting class within each decile
- Decile 1 through decile 3 groups are typically recommended for ‘jet’ – % of apps should align with targets. Bias testing completed within these three deciles
- Business Rules can be ‘tightened’ or ‘loosened’ to balance between % of apps included and % SPPREF
- Business Leadership seeks the right set of tradeoffs to seek to optimize business benefit for deploying the Algorithmic Solution

The Rainbow Chart helps business leadership understand model results across risk classes and sub-segments, to establish confidence in results.
Selected Benefits of an Application Triage Program

An application triage program delivers a wide variety of benefits.

- **Save money** – via reduced medical underwriting requirements
- **Save time** – issue policies faster, pay commissions faster
- **Enhanced customer experience** – fewer invasive procedures, while maintaining underwriting accuracy
- **Resulting increase in application volume** – due to ability to pay commissions commensurate with the work required
- **Resulting increase in placement rates** – due to faster time to issue, and improved customer experience for applicant
- **Resulting ability to optimize underwriter expertise** – deploy underwriter expertise to complex cases that require manual review
Timeline of AUW & Analytics Expansion
AUW has been in the marketplace for over 10 years

AUW Today:
- Most all Large and Mid-Sized Companies have established data analytics practices
- Over a dozen companies have some form of AUW in the marketplace
- Some reinsurers, data vendors and consulting firms are now offering “industry” algorithms and risk scoring
- Electronic Health Records are complementary to AUW

2006
- Innovated Lifestyle Based Analytics
- Life Risk-based Marketing
- New business & Inforce Management (Mortality and Retention)

2008
- First Application Triage program for life insurance underwriting
- Application Triage Models

2010
- Application Triage makes front page of WSJ
- App Triage comes under regulators scrutiny

2011
- Principal coins the term Accelerated Underwriting
- “Underwriting” Terminology starts to blur the lines

2016
- First known program to expand AUW to include EHRs
- EHRs expand accelerated underwriting to 70%+
Expanding Analytics Opportunities in Life Insurance

Sampling of Applications of Data Science in Core Operations for Insurers

**Producer Optimization**
- **Producer Recruitment**
  - Identification of individuals most likely to become a successful producer for a given manufacturer
- **Target Marketing / Lead Generation**
  - Improve quality of leads by identifying those most likely to qualify & most likely to buy

**Product Design & Pricing**
- **Application Triage**
  - Identifying certain healthy individuals for which certain medical exams can be waived

**Sales and Marketing**
- **Customer Lifetime Value**
  - Enable calculation of customized individual CLV; deploy customized proactive tactics for retention, second offers, etc.

**New Business & Underwriting**
- **Producer Retention**
  - Segmenting existing producers and deploying customized tactics to support success and retention
- **Underwriting**
  - Predicting mortality experience on a seriatim basis, using new data sources to supplement or replace certain traditional medical exams

**Inforce Management**
- **Producer-Client Matching**
  - Identify behavioral patterns and personality attributes associated with successful, lasting producer-client relationships; deploy tactics to optimize matches
- **Up-Sell Programs**
  - Identify existing customers whose need for life insurance has increased, and who remain healthy. Offer increased face amount with limited underwriting
- **Cross-Sell Programs**
  - Identify existing customers who are likely to need and likely to buy a second product – an annuity, a P&C product, etc. Deploy customized, targeted offers.

**Claims and Fraud**
- **Claims Management (Active Lives)**
  - For each active life, estimate the likelihood of developing certain cognitive or physical impairments, then proactively encourage healthy policyholder behavior to enable prevention
- **Claims Management (Disabled Lives)**
  - For each disabled life, estimate the likelihood of transitions between type of impairment (physical vs. cognitive) and associated level of care required (home health care, assisted care facility, nursing home), then proactively encourage healthy policy holder behavior
- **Retention Strategy**
  - Use customized, individual estimate of lapse likelihood to enable customized proactive and reactive tactics to improve retention effectiveness

**EHRs**
- Utilize Electronic Health records to speed up the underwriting process, reduce costs and improve customer experience

**Post-Level Term Offers**
- Segment population based on current health risk, current life insurance needs, likelihood to buy. Deploy customized, targeted offers

**Retention**
- **Fraud Detection**
  - Identify potential over-payments of claims

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