# Building α / Managing β

## Arch Investor Day

June 13, 2017

# Informational Statements

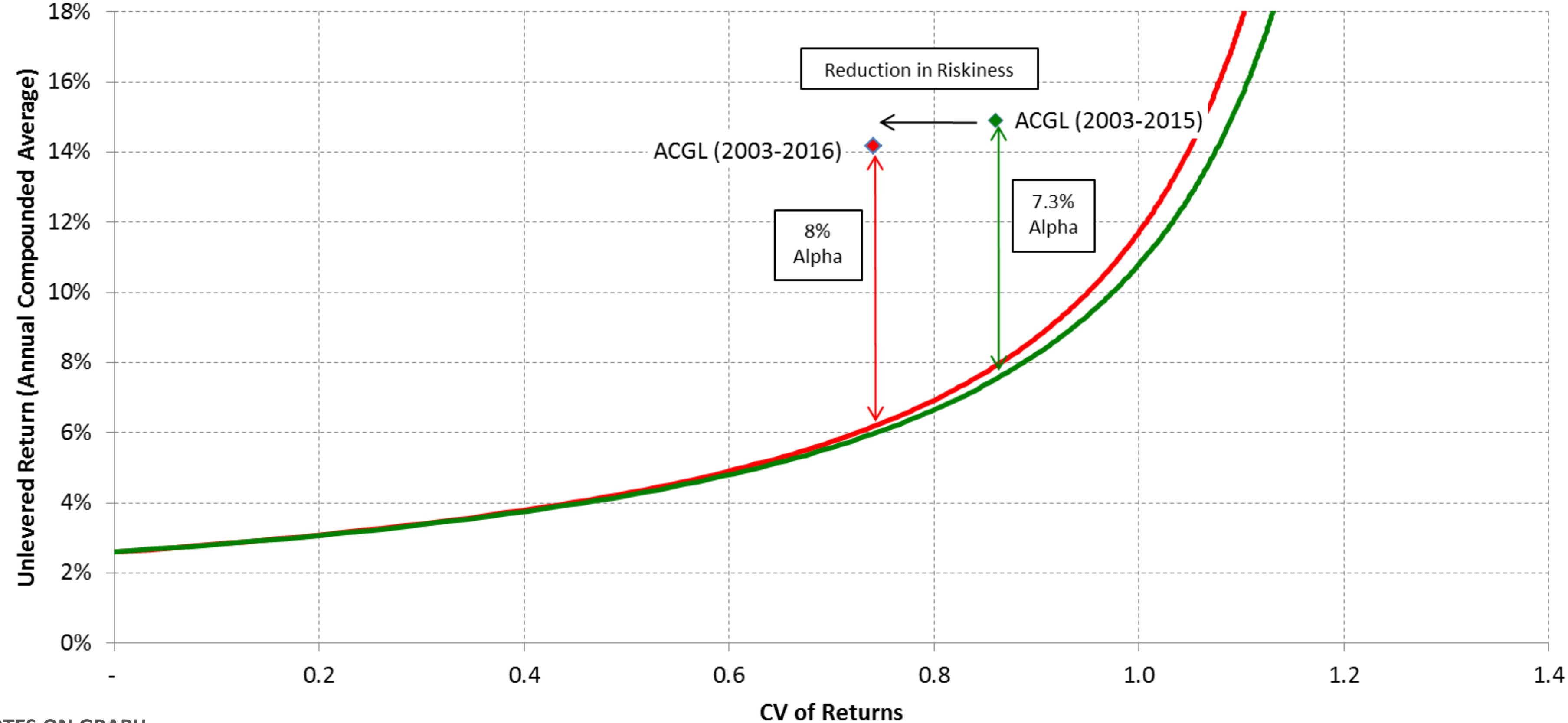
The Private Securities Litigation Reform Act of 1995 provides a "safe harbor" for forward looking statements. This presentation or any other written or oral statements made by or on behalf of Arch Capital Group Ltd. and its subsidiaries may include forward looking statements, which reflect our current views with respect to future events and financial performance. All statements other than statements of historical fact included in or incorporated by reference in this presentation are forward looking statements.

Forward looking statements can generally be identified by the use of forward looking terminology such as "may," "will," "expect," "intend," "estimate," "anticipate," "believe" or "continue" or their negative or variations or similar terminology. Forward looking statements involve our current assessment of risks and uncertainties. Actual events and results may differ materially from those expressed or implied in these statements. A non-exclusive list of the important factors that could cause actual results to differ materially from those in such forward-looking statements includes the following: adverse general economic and market conditions; increased competition; pricing and policy term trends; fluctuations in the actions of rating agencies and our ability to maintain and improve our ratings; investment performance; the loss of key personnel; the adequacy of our loss reserves, severity and/or frequency of losses, greater than expected loss ratios and adverse development on claim and/or claim expense liabilities; greater frequency or severity of unpredictable natural and man-made catastrophic events; the impact of acts of terrorism and acts of war; changes in regulations and/or tax laws in the United States or elsewhere; our ability to successfully integrate, establish and maintain operating procedures as well as integrate the businesses we have acquired or may acquire into the existing operations; changes in accounting principles or policies; material differences between actual and expected assessments for guaranty funds and mandatory pooling arrangements; availability and cost to us of reinsurance to manage our gross and net exposures; the failure of others to meet their obligations to us; and other factors identified in our filings with the U.S. Securities and Exchange Commission.

The foregoing review of important factors should not be construed as exhaustive and should be read in conjunction with other cautionary statements that are included herein or elsewhere. All subsequent written and oral forward looking statements attributable to us or persons acting on our behalf are expressly qualified in their entirety by these cautionary statements. We undertake no obligation to publicly update or revise any forward looking statement, whether as a result of new information, future events or otherwise.

Some non-GAAP measures of financial performance also may be referred to during this presentation. The reconciliation to GAAP and definition of operating income can be found in the Current Report on Form 8-K furnished to the SEC by Arch Capital Group Ltd. (the “Company”) in connection with its most recent earnings press release, and is also available on the Company's website: www.archcapgroup.com. From time to time, the Company posts additional financial information and presentations to its website, including information with respect to its subsidiaries, and investors and other recipients of this information are encouraged to check the website.

# Change in Risk/Return Profile (2016 vs. 2015)




NOTES ON GRAPH

1) The return metric is the annual average unlevered return. Unlevered return is the (Cost of Debt x Debt + Return on Equity x Equity)/(Debt + Equity).
2) The curves represent the average returns for varying levels of risk over the time periods in question. (Green 2003-2015 and Red 2003-2016) based on the performance of the peer group in this period. Theoretically the curve shows the returns that would have been generated by all combinations of the market (peer group) portfolio and a risk free asset.
3) The peer group is made up of the following companies: AFG, AHL, ALL, AWH, AXS, BWINB, CB, CINF, CNA, HIG, IPCC, MCY, MKL, NAVG, OB, PGR, RE, RLI, RNR, SAFT, SIGI, THG, TRV, VR, WRB, WTM, XL, OLD CB (thru 2015), ENH (thru 2015).
4) The measure of risk is the coefficient of variation of returns. This is a standardised measure of volatility of returns. It is the standard deviation of returns divided by the mean (average) return.
5) Alpha is equal to the additional return generated by ACGL over a given period compared to the market/risk free portfolio with the same level of risk.

TAKEAWAY

- ACGL has reduced its level of risk since last year. i.e. CV of returns for ACGL for 2003-2016 is less than CV of returns for ACGL for 2003-2015.
- Although the average return is slightly lower, the amount by which the return exceeds the level of return expected (alpha) has increased.

# Investments

# Asset Class Composition and Portfolio Allocation

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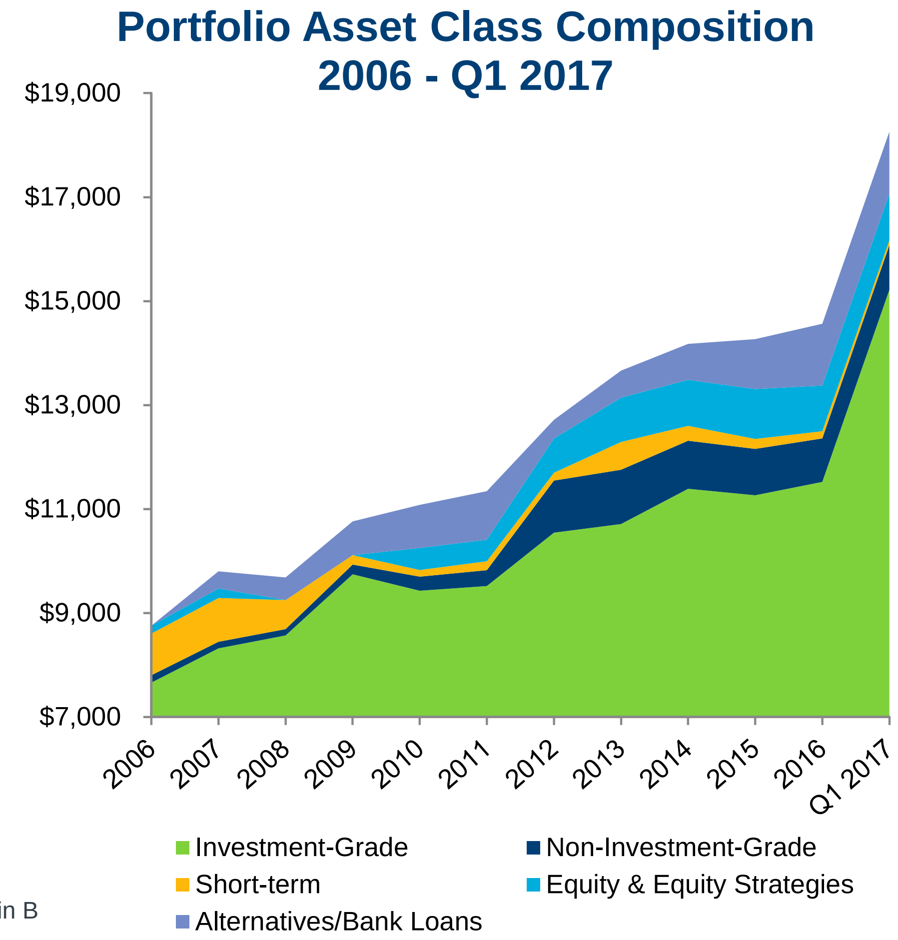


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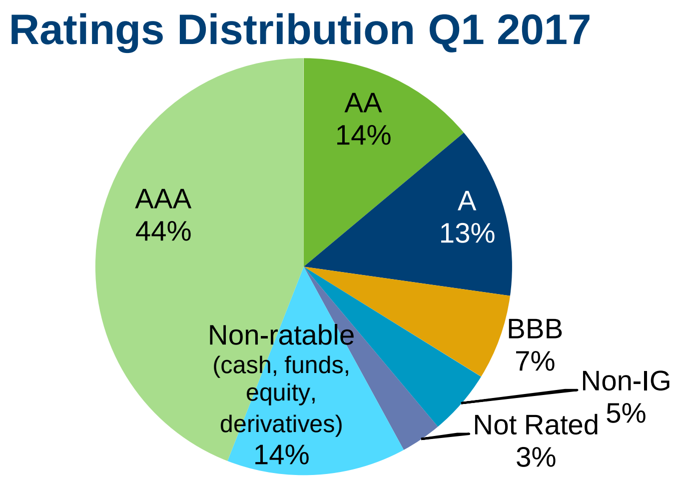
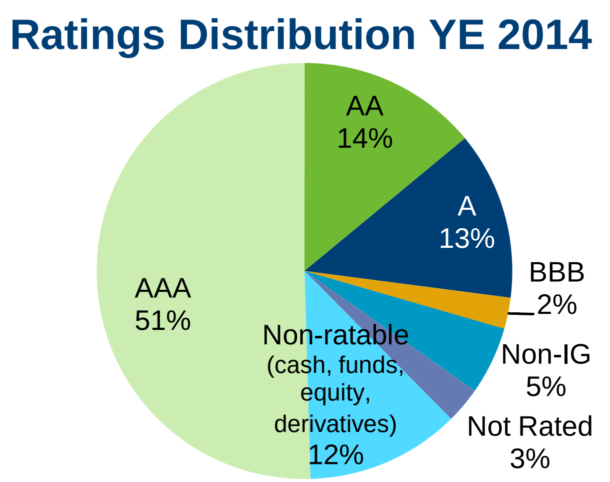
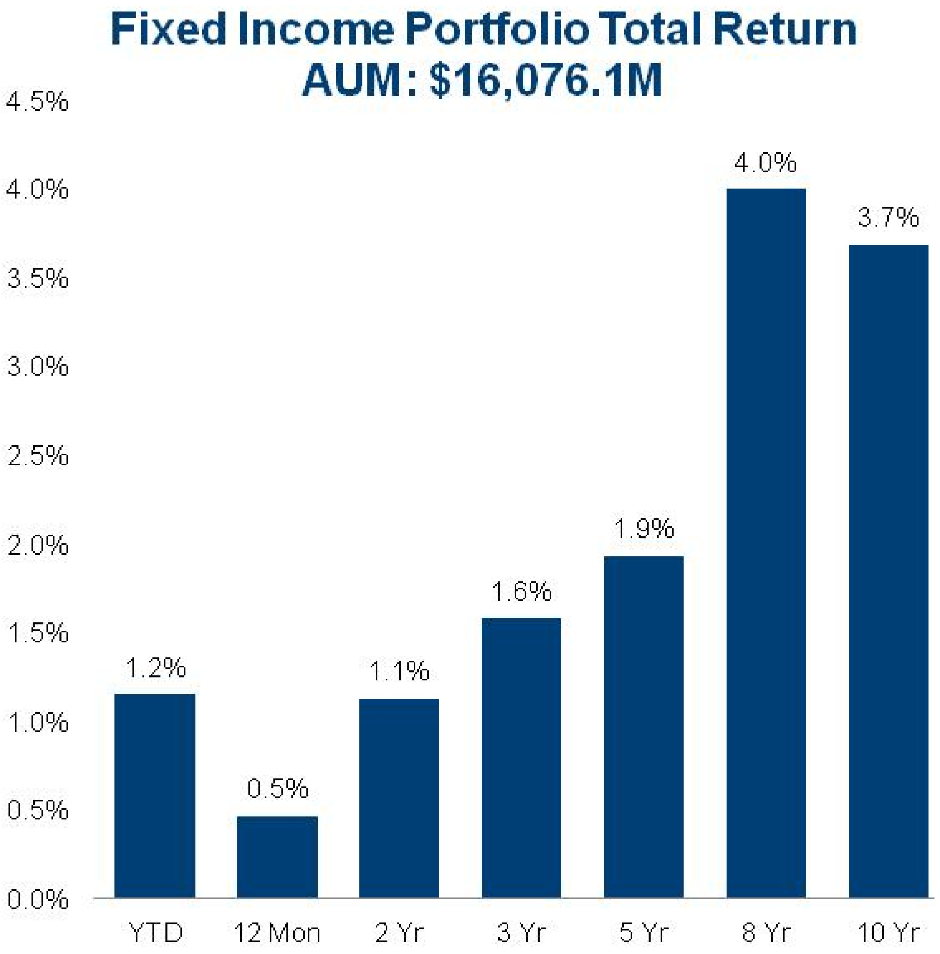
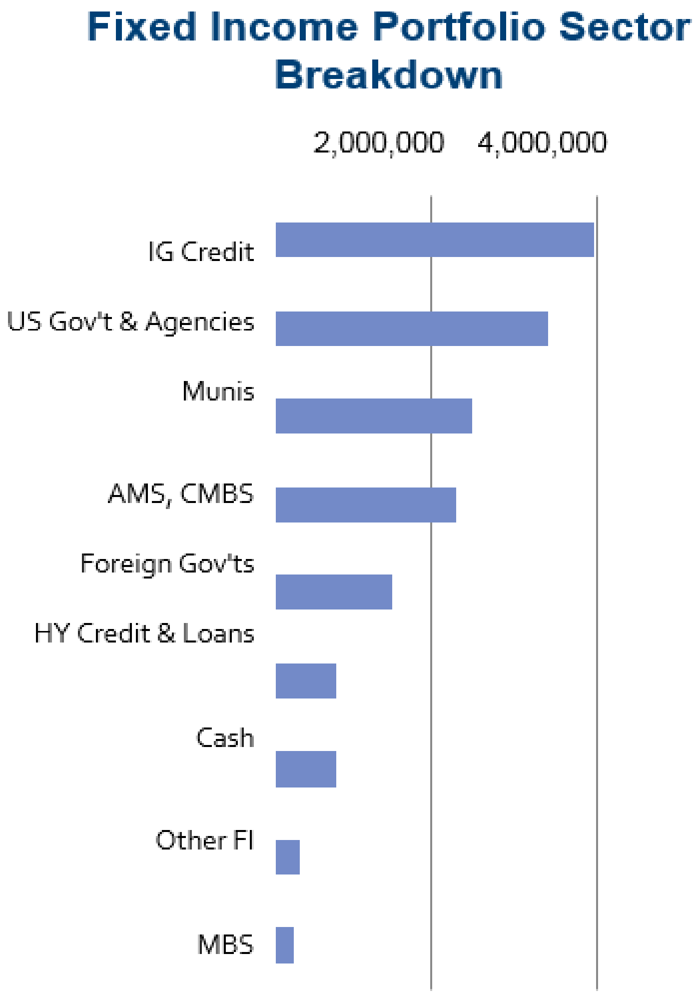



Data as of Q1 2017 unless noted.

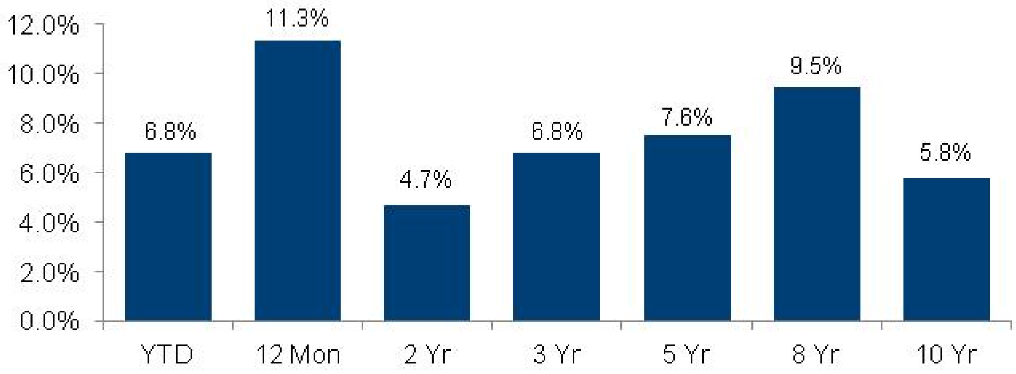


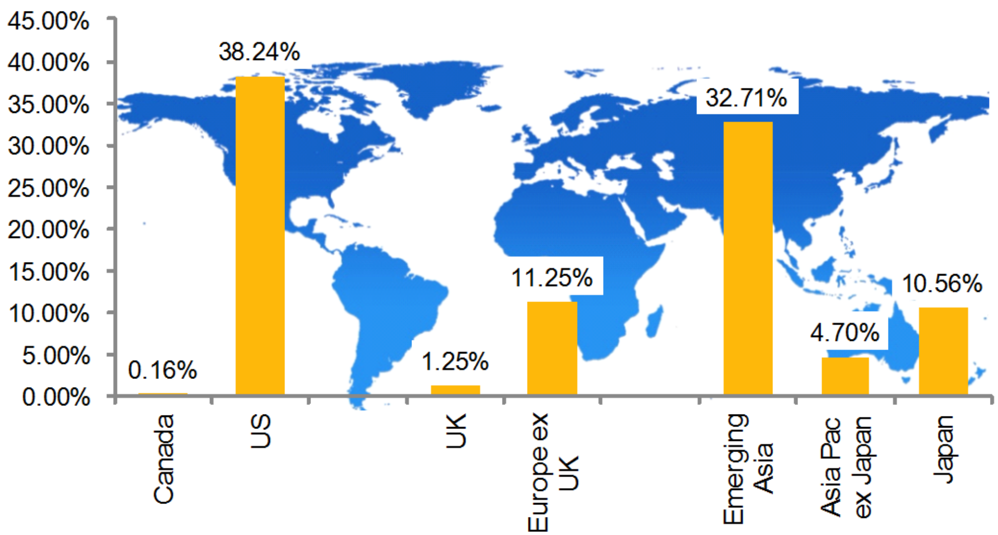

Data as of Q1 2017

# Equities and Equity Strategies Overview

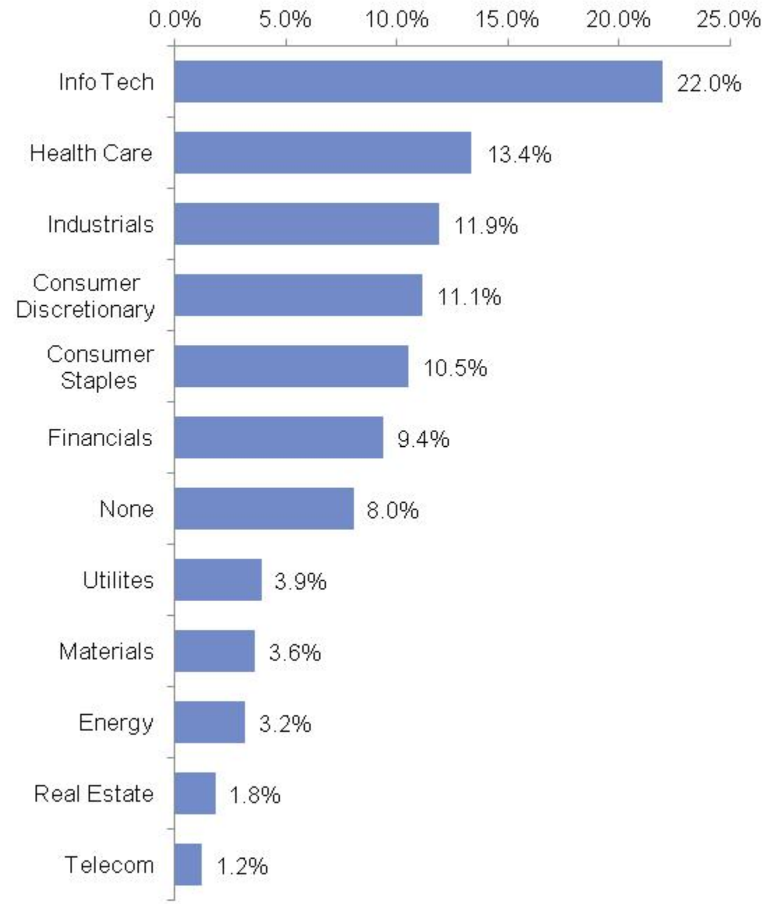
Equity Portfolio Total Return
AUM: $899M




Equity Portfolio Country Breakdown




Equity Portfolio Sector Breakdown



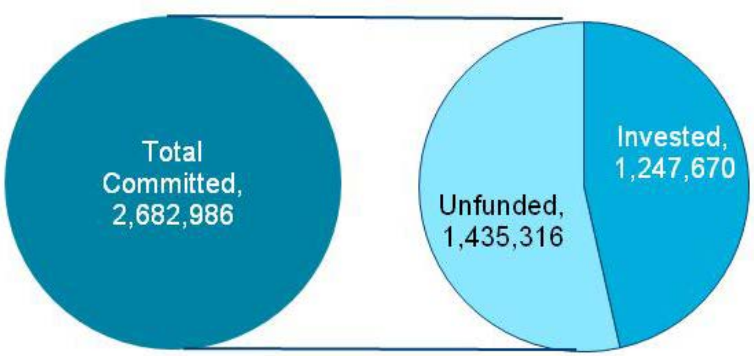

Data as of Q1 2017

# Alternatives Portfolio Overview

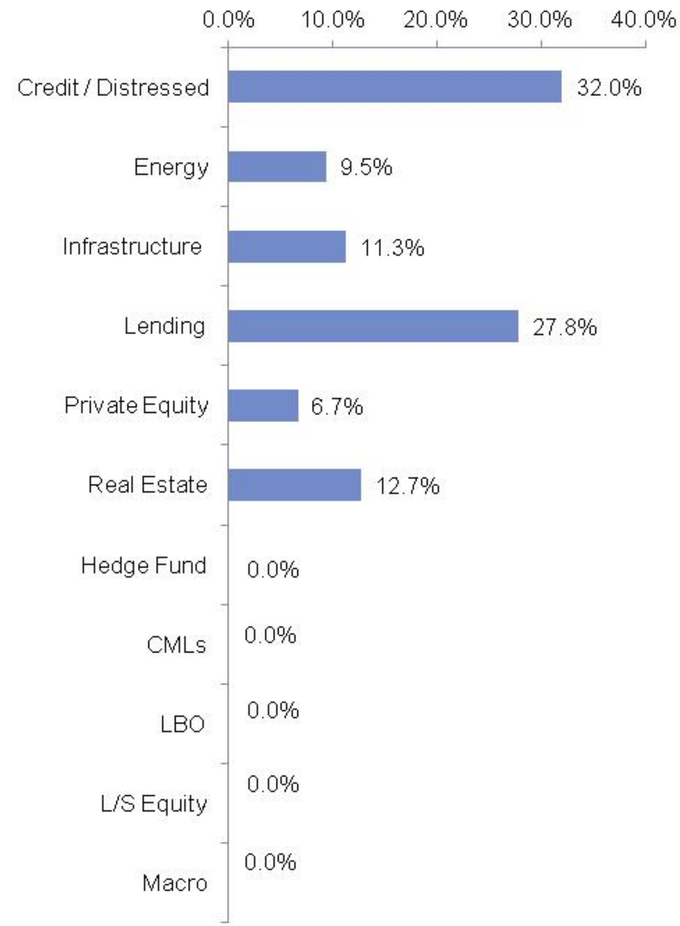
## Alternatives Portfolio by Vintage Year


Note: TVPI (Total value divided by Paid In)

## Invested vs. Unfunded



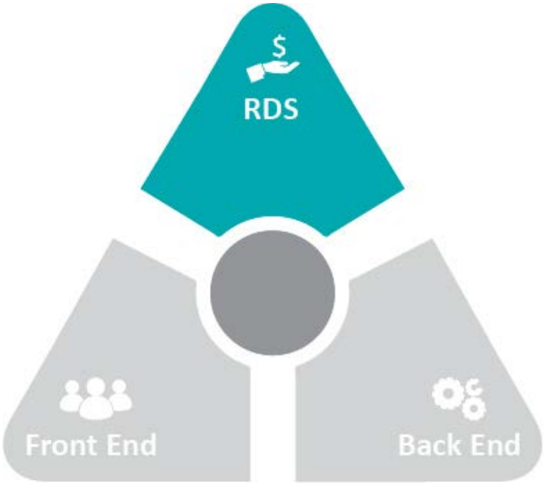

## Alternatives by Sector




Data as of Q1 2017

IRR based on data as of April 10, 2017

# Risk Management



# Arch Risk Management - Core Principles

## Setting Risk Appetite

- Our property catastrophe limit of 25% of shareholders' equity at a 1:250 return period remains in place. Our peak zone PML is currently at 6% of shareholders' equity.
- We have instituted a similar risk limit of 25% of shareholders' equity to a severe stress event for mortgage exposures. We have assigned a probability to this stress which we believe is consistent with the PML for our property catastrophe exposures.

## Underwrite and Price Each Risk Appropriately

- Requires an objective, transparent view of risk.
- Technical accuracy of pricing models is important. Understanding how they're deployed in the field is critical.

## Develop an Effective Methodology for Measuring and Managing Tail Risk

- Stress testing is part of the toolbox.
- Risk transfer strategies are used to the extent they are capital efficient and enhance our ROEs.

# Arch Mortgage Stress and RDS

The Arch Economic Capital Model (ECM) includes three key components:

- A macro-economic realistic disaster stress scenario (RDS).
- An advanced analytic credit risk model that combines the economic stress scenario with loan and borrower information to estimate claim rates.
- A "sources and uses" of cash framework under a 10-year runoff scenario with no new sources of business to generate financial results.

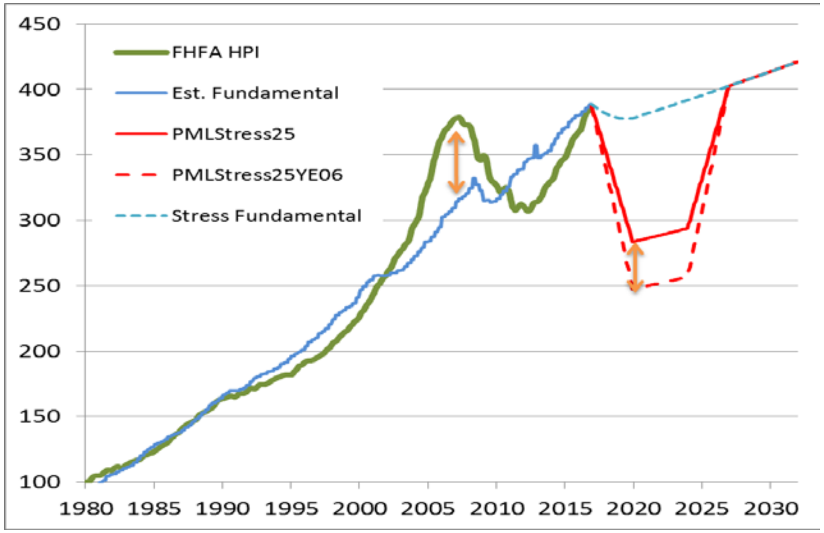
Arch RDS captures the collective impact of adverse conditions for key economic indicators, the most significant of which is a 25% decline in home prices **below fundamentals**.

The Home Price Index follows a "3-4-3" (decline, trough, recovery in years) path.

The ECM is run quarterly on our entire global portfolio of mortgage exposures. Among other things, it incorporates our latest assessment of house prices, unemployment rates, income levels, interest rates. It assumes 100% correlation across all states and geographic regions, U.S. and non-U.S.

## Home Price Index – Stress Conditions

| | Date | Fundamental | Actual | Over / Under |
|---|---|---|---|---|
| Peak | Dec – 16 | 387 | 389 | 0% |
| Trough | Dec – 19 | 378 | 284 | -25% |
| Delta | | -2% | -27% | |



# Our Stress Test

**The Mortgage Group RDS at 1Q17 is $1.2B, or 13.8% of common shareholders' equity available to Arch.**

**Observations:**

- We estimate housing to be fairly valued at end of 2016
- Our RDS tests housing price decline of 25% below its estimated fundamental level in 36 months.
  - Fundamental values are anticipated to fall by approximately 3% during our stress scenario.
  - The overall peak to trough house price decline is 27%.
- In 2006, this method would have resulted in a scenario reflecting a 40% decline in home prices due to the estimated over-valuation of home prices at the time[1].
- The stress happens quicker than in the recent crisis (the trough is 3 years out).
- The pace of recovery of fundamentals (1% a year) is much slower that what we experienced after the recent housing crisis.

(1) Red dotted line on the prior page shows what the stress scenario would be if current home prices were as overvalued as they were back in 2006.

Sources: FHFA, Arch

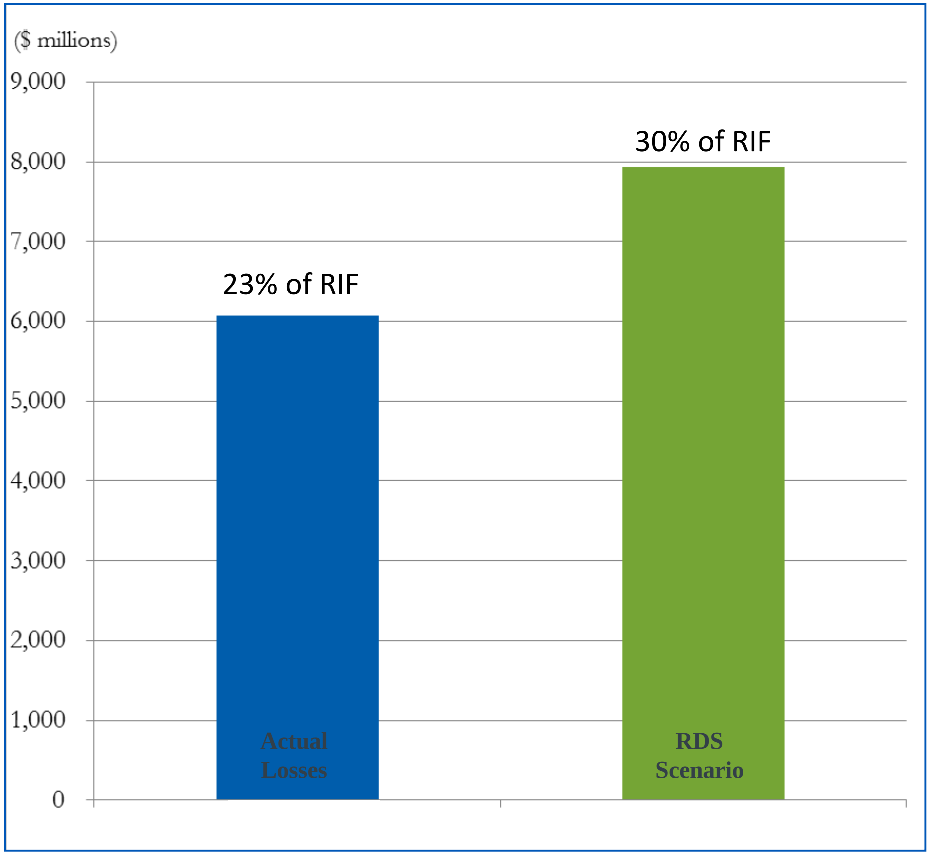
# Arch Stress Scenario More Severe Than Great Recession

**Applying Our Stress Scenario to PMI's Insured Loan Portfolio at Dec. 31, 2006 Results in Gross Losses That Are Significantly Greater Than the Losses PMI Will Actually Incur**

## Observations

- PMI was a U.S. mortgage insurer that regulators placed in runoff in 2011.
  - Arch received data on PMI's insured loan portfolio as part of its acquisition of CMG, an affiliate of PMI which Arch rebranded as Arch MI Co.
- Actual losses (blue bar) represent reported gross incurred losses since Dec. 31, 2006, on loans that were in force on that date plus our estimate of future incurred losses on this segment in our base case.
- Arch stress scenario (green bar) represents gross ultimate incurred losses indicated by our RDS for PMI's insured loan portfolio at Dec. 31, 2006.
- The losses indicated by our stress scenario are $1.9 billion or 31% greater than our estimate of PMI's actual losses.

**Gross Losses**




Recessions and denials have been significantly reduced to reflect terms of new master policies.

Arch

# Mortgage Insurance

# Innovation Drives Alpha

- Building Alpha Through Multiple Sources
  - Primary MI (U.S., Australia, Europe, ongoing international expansion).
  - GSE Credit Risk Transfer (CRT) transactions.
  - Reinsurance (U.S., Australia).
  - Structured Transactions.

- Risk Management Drives Beta
  - Preferred portfolio composition through-risk based pricing.
  - Realistic Disaster Scenario (RDS) analysis and counter-cyclical economic capital model are the foundation for tail risk management.
  - Risk syndication through Bellemeade Re transactions and 3rd party reinsurance drive down net RDS and sustainably manage tail risk through an economic cycle.

# Arch Global Mortgage Group History

## 1960

**1963**

- United Guaranty (now part of Arch MI) founded.

## 1970

**1972**

- PMI founded (key assets acquired by Arch MI).

## 1980

**1987**

- PMI introduces the first automated underwriting system for MI.

## 1990

**1994**

- PMI enters joint venture with CUNA Mutual Group to create CMG Mortgage Insurance Company, to provide MI for credit union loans.

## 2000

**2001**

- Arch Reinsurance Ltd. (Arch Re) formed.

**2009**

- United Guaranty introduces the industry's first risk-based pricing.

## 2010

**2010**

- First of five years United Guaranty is NIW market leader.

**2011**

- Arch Re underwrites its first mortgage reinsurance transaction in Australia.
- Arch opens Irish-authorized MI company.

**2012**

- Arch Re underwrites U.S. MI reinsurance transaction with Radian.
- Arch MI begins writing flow business in the UK.

**2013**

- Arch develops inaugural back-end GSE risk share transaction with Freddie Mac (ACIS).

**2014**

- GSEs approve Arch MI-US.
- Arch closes acquisition of CMG and certain assets of PMI.
- ACGL separates mortgage business into a standalone business group.

**2015**

- Introduces RateStar risk-based pricing.
- United Guaranty conducts first Bellemeade Re capital market risk transfer.

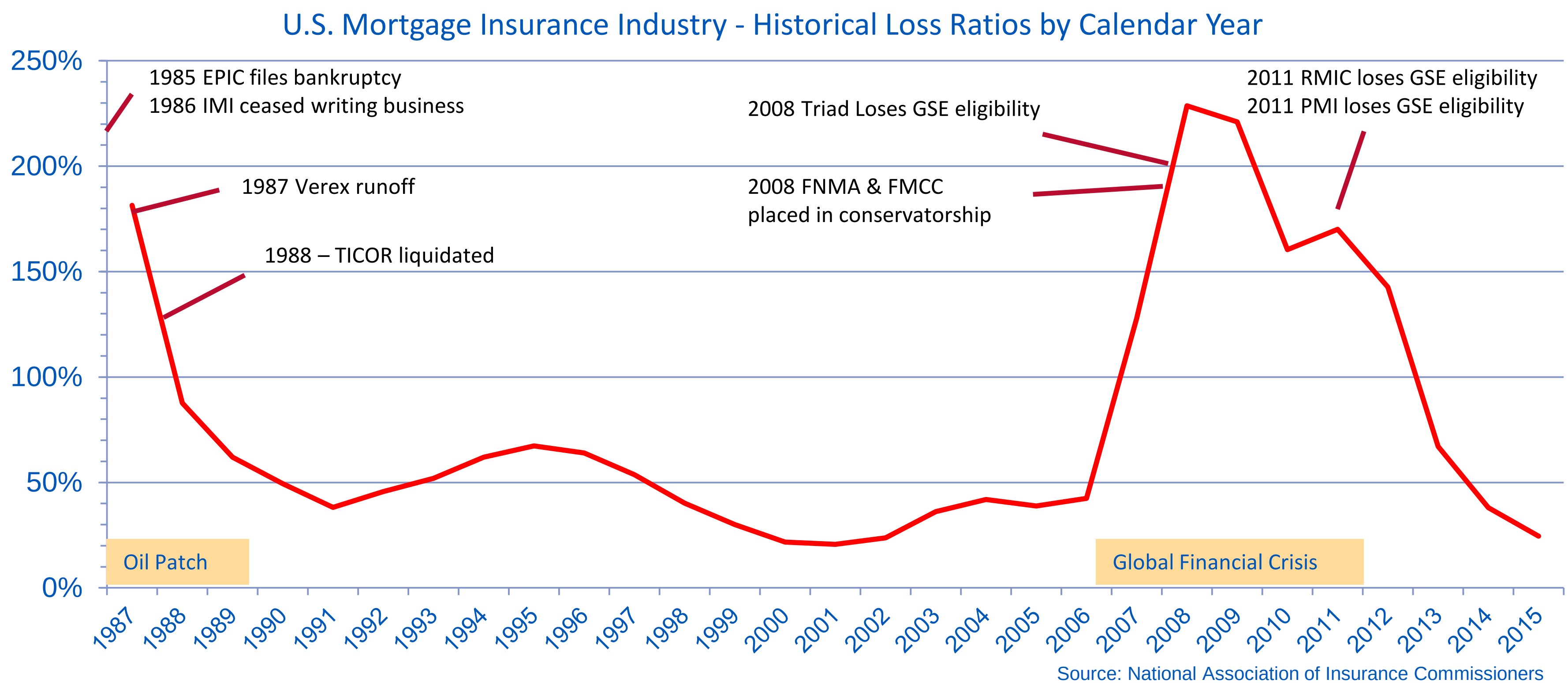
**2016**

- Arch executes front-end risk share through Bermuda reinsurance company.

**2017**

- Arch completes acquisition of United Guaranty, making Arch MI the largest primary MI in the U.S.

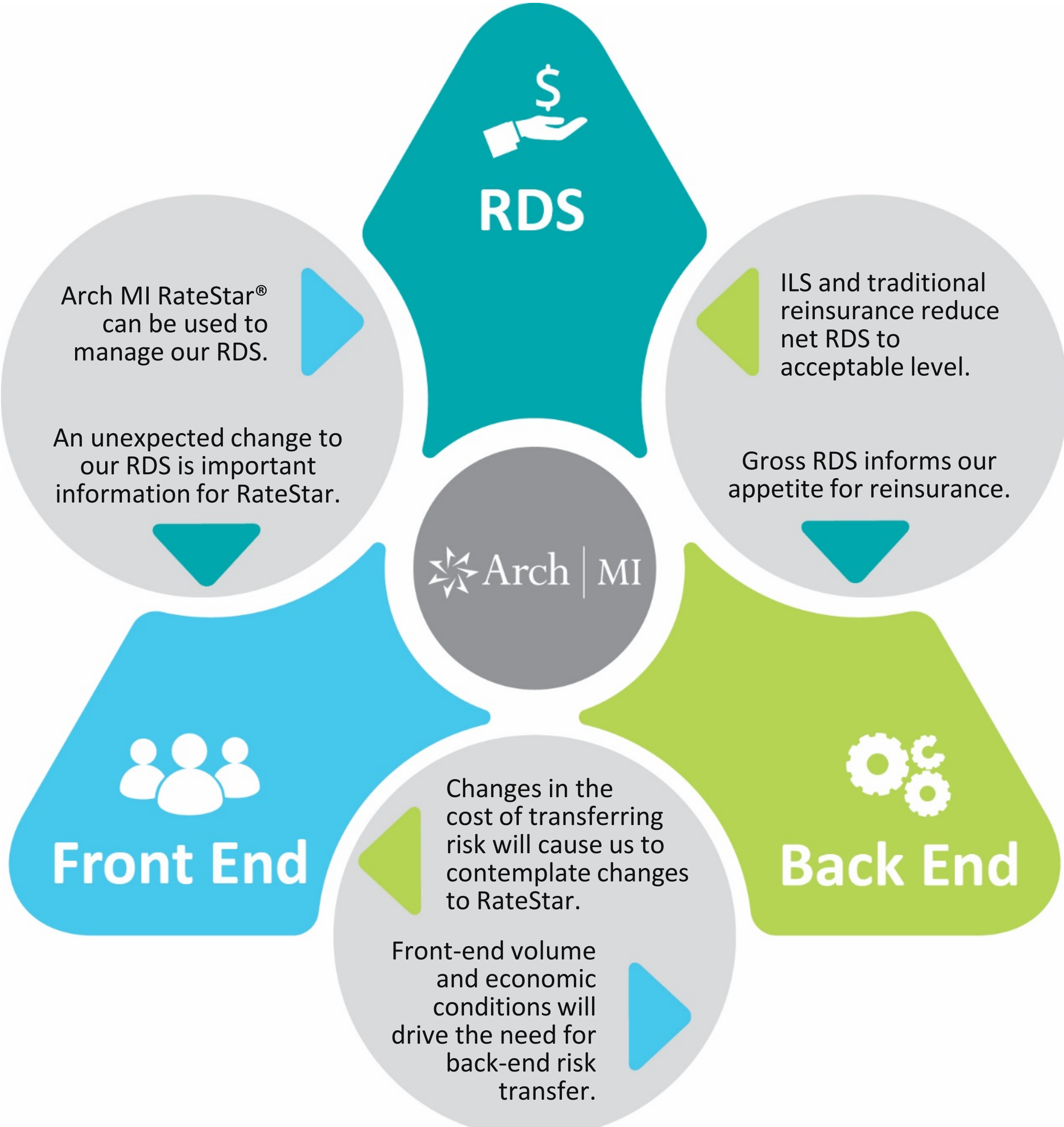
# U.S. Mortgage Insurance Industry History




- Prior to the financial crisis, the majority of residential mortgage credit risk was held by GSEs and private mortgage insurers that followed a "buy and hold" model for mortgage credit risk.
- The private mortgage insurance model was made up of a number of monoline insurers with a similar business model:
  - Aggregate as much risk as they were able to through a narrow channel (lender originated business).
  - Hold all the risk on their balance sheet.
  - Hope that they had reserved enough to withstand any crisis.
- Through the most recent financial crisis, three of the existing MI companies went out of business with at least two others suffering major financial distress and granted exceptions to remain in business.

# Arch MI's Differentiated Business Model

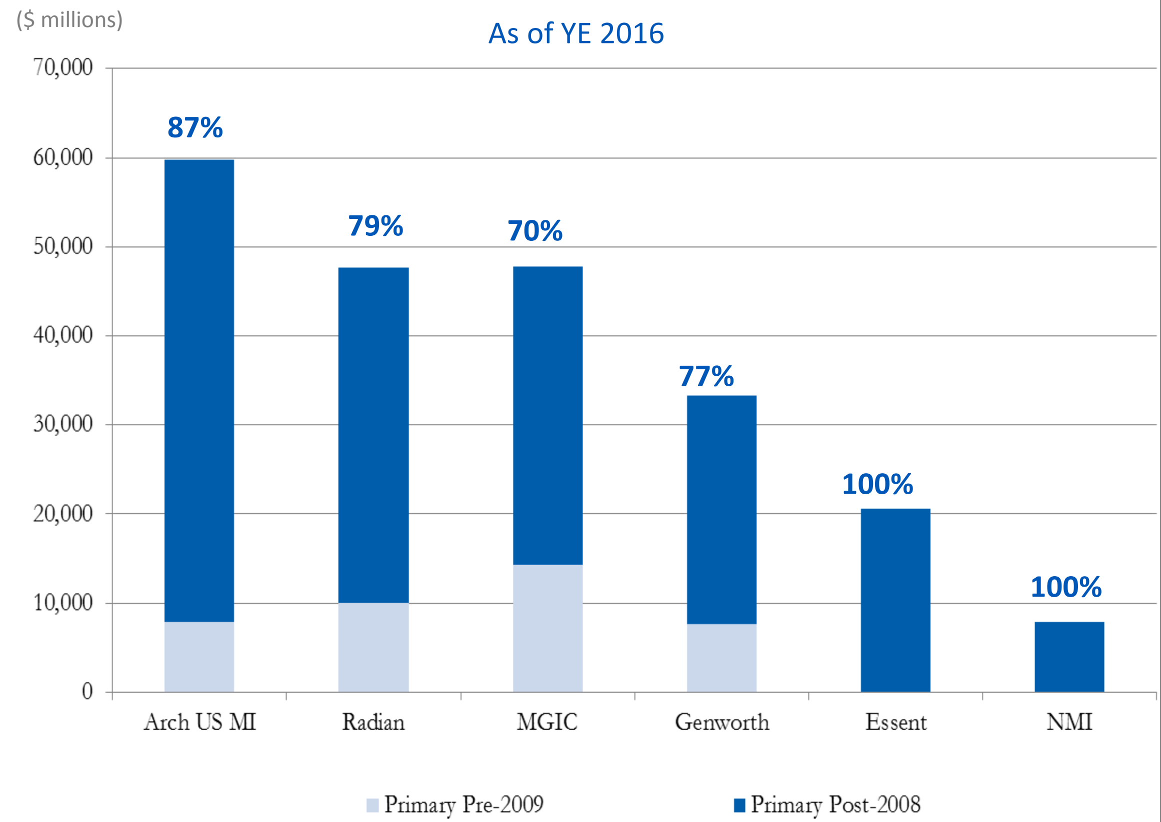
- The Arch model aggregates risk from diversified sources and then maintain a variety of options for syndicating risk on the back end.
- Arch's differentiated business model is sustainable through the economic cycle and positions Arch to deliver consistent, attractive returns to our shareholders.



# U.S. Primary MI

- Our market leading RIF includes a significant embedded value that enhances our ability to manage through an economic cycle.
- Risk-based pricing facilitates better risk selection and alignment of pricing to capital requirements.

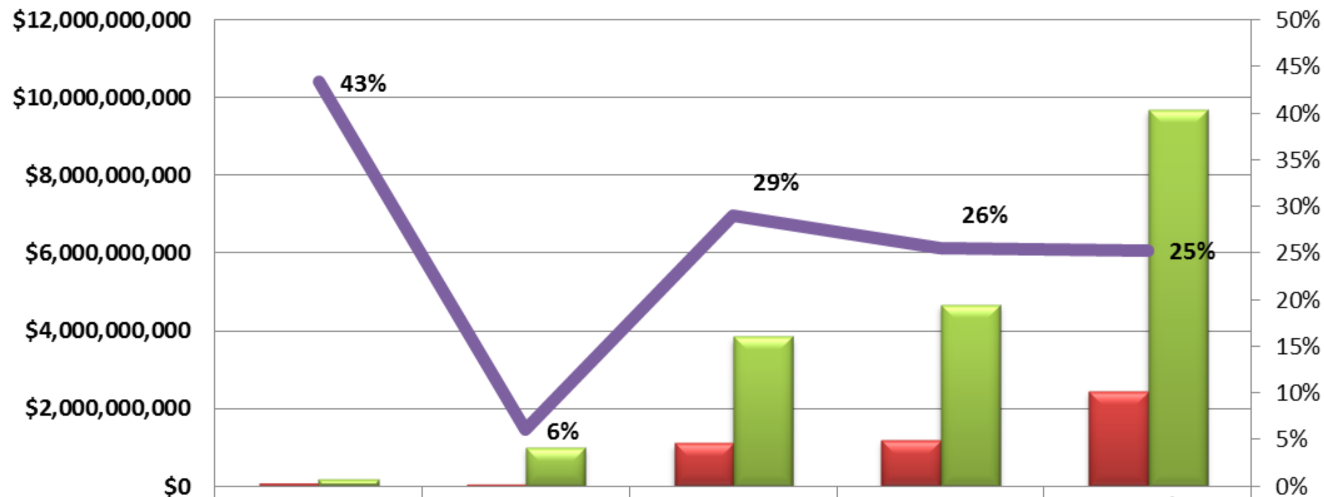
## Risk in Force




**Percentages represent portion of RIF from post 2008.**

# GSE Credit Risk Sharing Transactions

## Arch’s Share of Total Insurance Limit Available




| | 2013 | 2014 | 2015 | 2016 | Total |
|---|---|---|---|---|---|
| Arch's Share | $79,200,001 | $60,390,356 | $1,118,703,118 | $1,193,304,155 | $2,451,597,630 |
| Limit Available to Insurance | $182,722,148 | $997,059,736 | $3,852,551,976 | $4,671,899,899 | $9,704,233,759 |
| % Share | 43% | 6% | 29% | 26% | 25% |

CRT has expanded in terms of both the amount of risk transferred and the number of participants.

- Arch participated in the first CRTs placed in 2013.
- The most recent transactions included 17 participants on 2016-DNA4 and 9 on 2016-HQA4, with up to 40 markets quoting.

# Risk Transfer - Bellemeade Re

Bellemeade ILS transactions were initiated by United Guaranty Corporation (UGC) in 2015 and 2016. These transactions essentially represent an aggregate XOL structure that attaches at approximately 2.0% to 2.5% of loss for about 4% to 5% of excess limit.

The first transaction (8/2015) provided UGC with $298.9 million indemnity reinsurance for a portfolio of MI polices issued from **2009 through 2013**.

- It was the first transaction of its kind in the MI industry in nearly ten years.

In the second transaction (5/2016), UGC obtained $298.6 million of indemnity reinsurance for a portfolio of MI policies issued in **2008 and prior years**.

- It was the first time a mortgage insurer **transferred risk of policies issued before the housing crisis to the capital markets.**

Arch plans to issue two Bellemeade Re transactions for the 2017 book year and annually on a go-forward basis for each future book year.

# Driving Innovation

| | |
|---|---|
| **Risk-Based Pricing** | ▪ Across nearly all segments of our global mortgage business, Arch MI uses the industry's most sophisticated pricing engine, which considers multiple risk attributes to calculate precise base rates and surcharges.<br>▪ Risk-based pricing permits active risk selection and portfolio management.<br>▪ Pricing changes are easier to implement as underlying economic or borrower conditions change. |
| **GSE Credit Risk Transfer** | ▪ Arch has been a key innovator and participant in the back-end CRT market with both GSEs.<br>▪ In 2017, Arch continues innovative work on development of front-end CRT market. |
| **Mortgage Analytics & Underwriting** | ▪ Arch maintains a sustainable competitive advantage by making investments in advanced analytics that lead to better pricing models and risk management techniques to better assess tail risk.<br>▪ Cross company utilization of mortgage underwriting capability through Arch companies (Arch MI, Arch Reinsurance Ltd., Arch Reinsurance Co.). |
| **Risk Syndication** | ▪ Actively manage mortgage portfolio through risk transfer to multiple parties.<br>▪ Third-party risk assessment and risk pricing gained through syndication is an important feedback loop in our business model.<br>▪ Use our expertise to generate fee income without assuming additional mortgage credit risk. |
| **Policy Terms & Conditions** | ▪ Development and introduction of innovative policy terms and conditions to meet customer needs. |

# Insurance

# Insurance Group Model

## An Organically Built, Differentiated Model

### Risk and Cycle Management

- Focus on smaller risks and primary low limit business segments produces more predictable and less volatile results over time.
- Platform provides stability to manage our participation in high volatility/high capacity lines based on market conditions.

### Innovation and Opportunism

- Early investment in Controlling Businesses like National Accounts, Construction, Alt Markets, Surety.
- 27% of our $3.0B in 2016 GWP comes from new product and distribution initiatives commencing in 2009 or later.

### Diversification

- Distribution: Big 3, US Retail, Lloyd’s Syndicate, Wholesale, Binding Authorities, MGAs.
- Product Lines: 50% Low Volatility, 28% Controlling Positions, 22% Cycle Managed [NWP mix].
- Over 40 business segments with no segment representing more than 15% of NWP.
- Geography: 81% USA, 16% UK, 3% Canada/Bermuda.

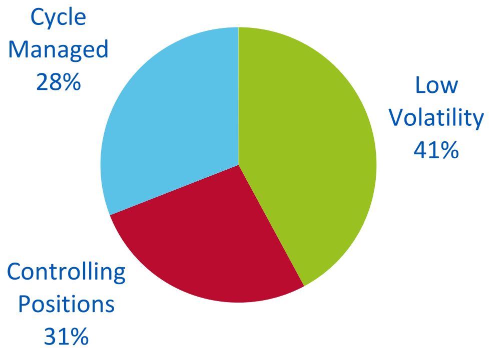
### Specialization

- Smaller Accounts/Low Volatility and Controlling Position business segments are the portfolio drivers in today’s market.
- Talent intensive platform provides resiliency throughout the market cycle.
- Barriers to entry in the form of technology, collateral and regulatory compliance in certain segments mute impact of competition in high capacity/high limit segments.

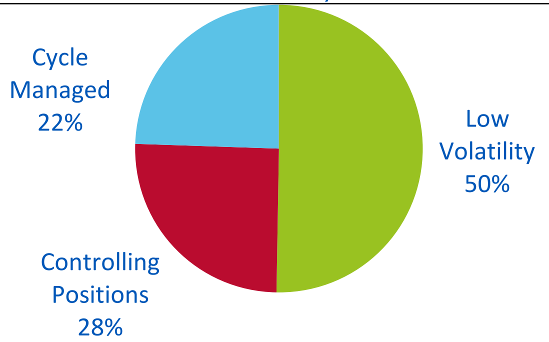
## Emphasis on Small Account (Low Volatility) and Controlling Positions

### 2016

**Gross Premiums Written, FY 2016: $3.0B**

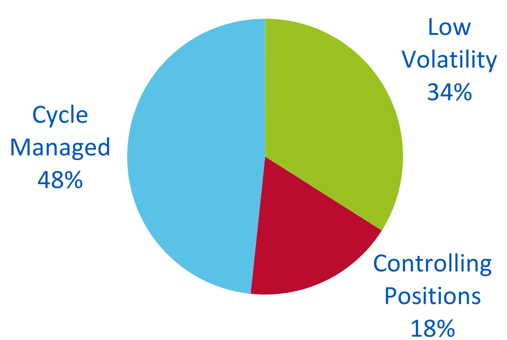



**Net Premiums Written, FY 2016: $2.1B**

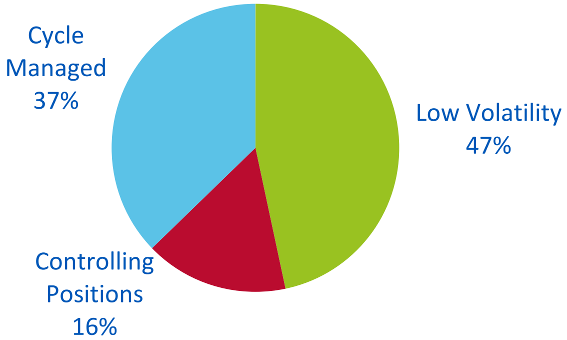



### 2010

**Gross Premiums Written, FY 2010: $2.4B**



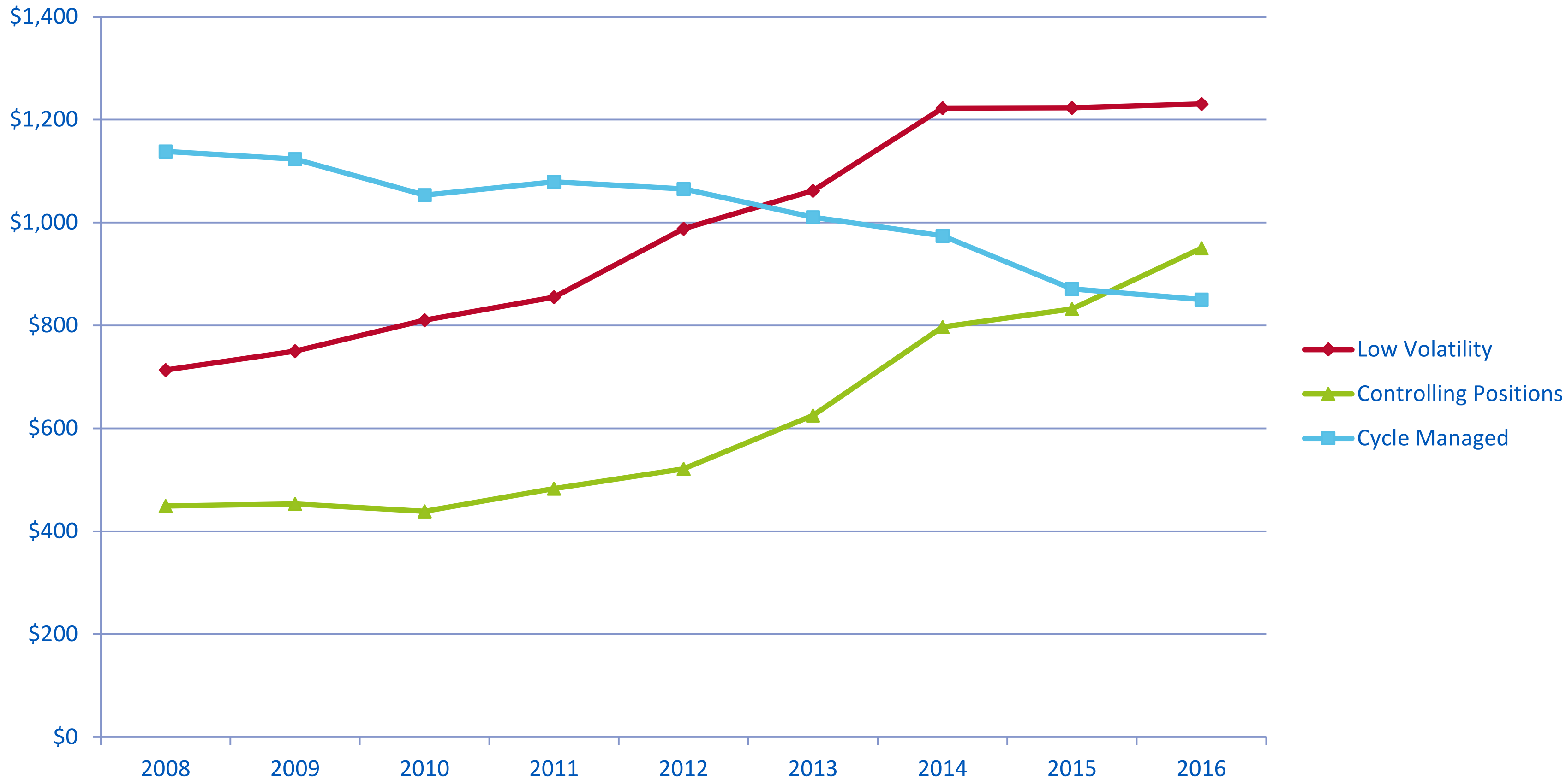

**Net Premiums Written, FY 2010: $1.7B**



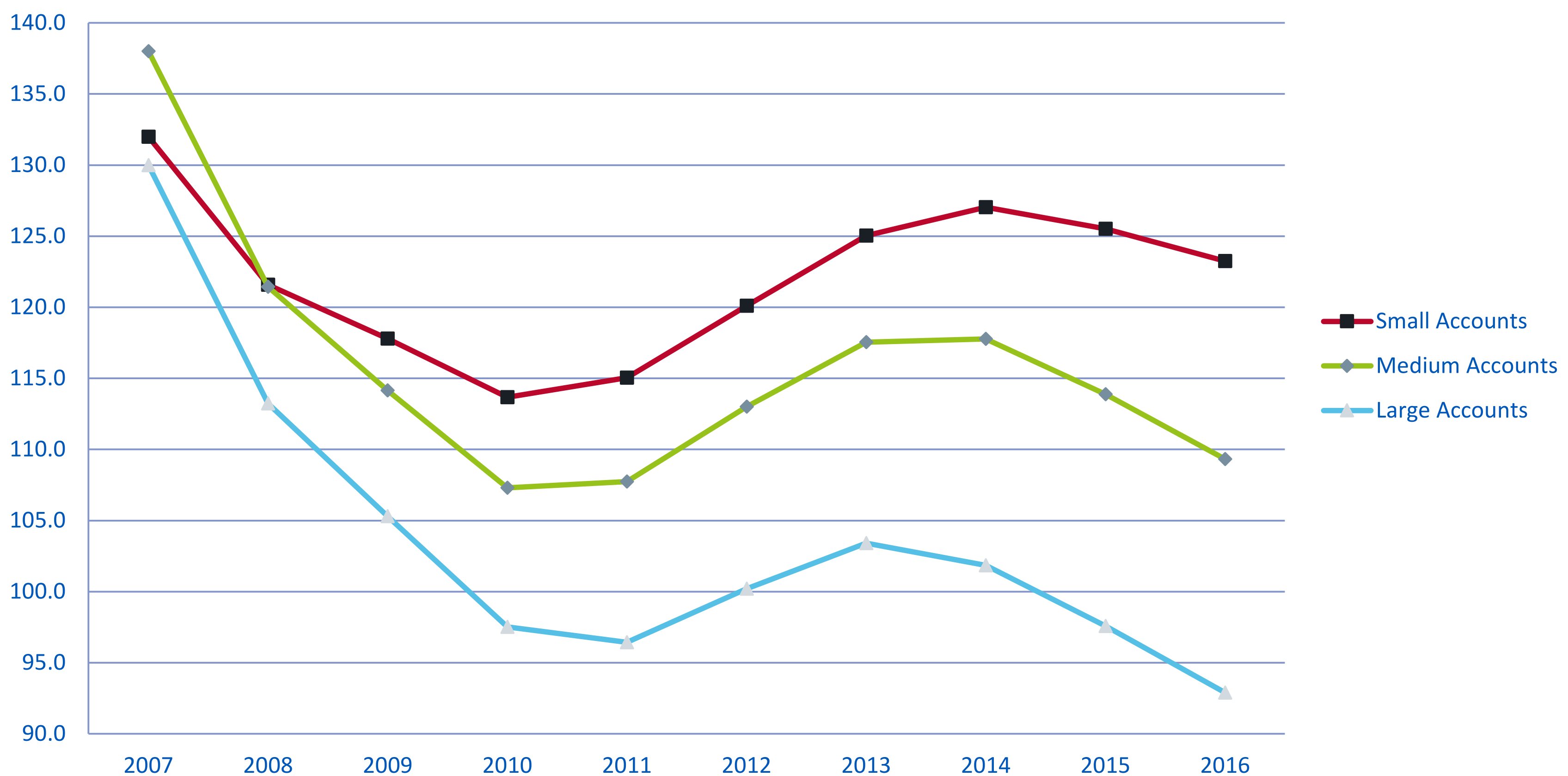

**Low Volatility** includes Programs, A&H, Travel, Contract Binding. **Controlling Positions** includes Construction, Alt Markets, National Accts, Surety. **Cycle Managed** includes Property, Marine, Offshore, Casualty, High Capacity EA, Onshore Energy, Med Mal.

# Insurance Group – Cycle Management

## Worldwide GWP by Calendar Year (M)



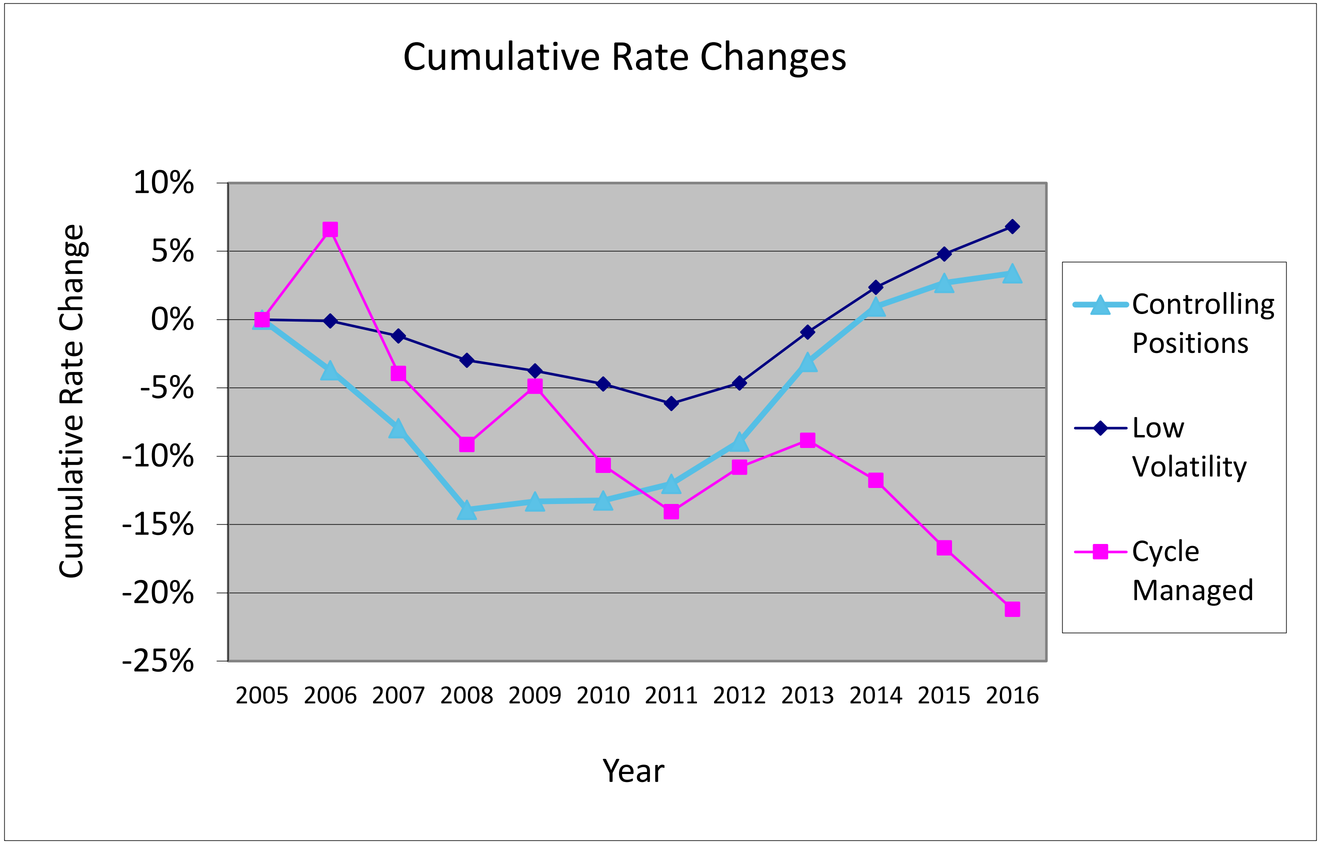
## Cumulative Index of U.S. Industry Rate Changes by Account Size




Source: The Council of Insurance Agents & Brokers

# Insurance Group – Cycle Management

## Cumulative Rate Change Trends – U.S.



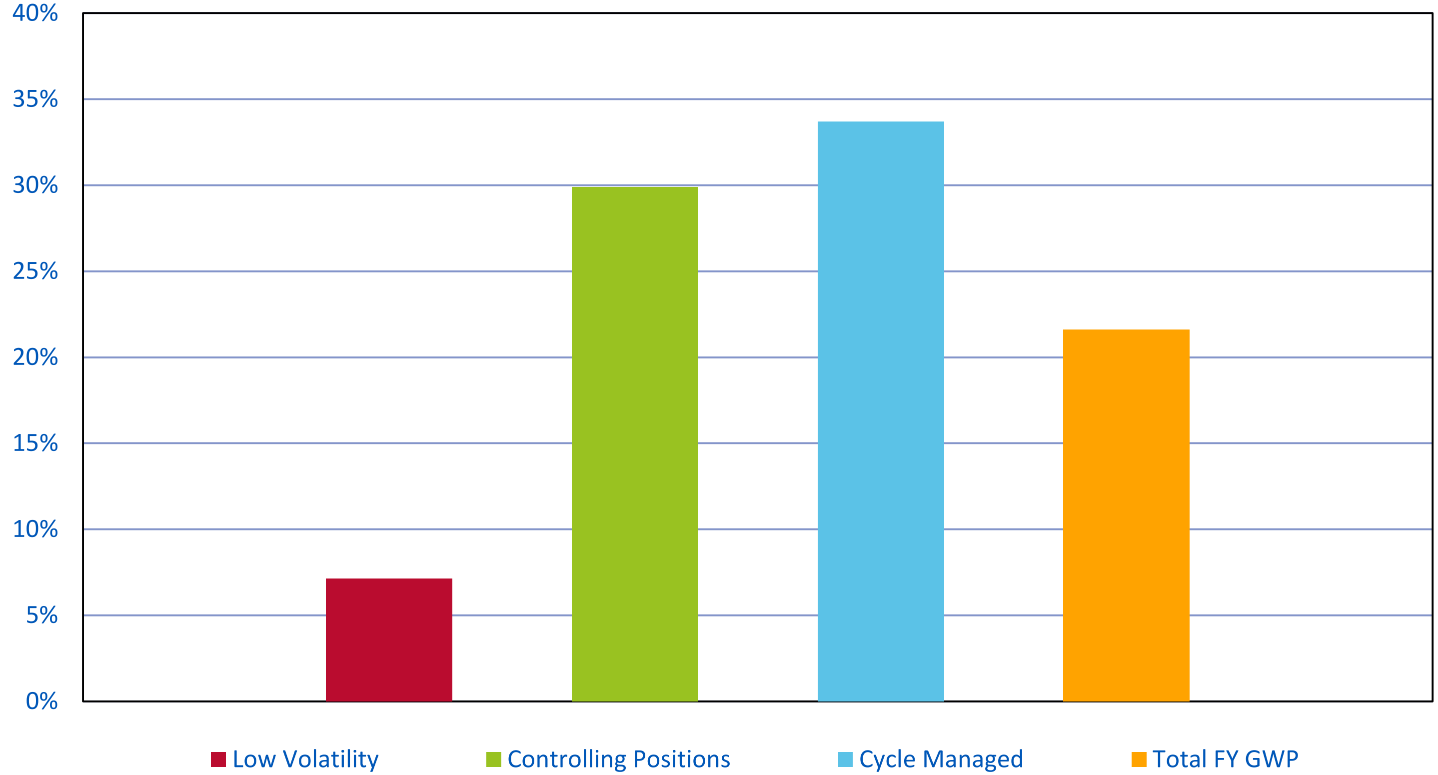

Annual Rate Changes

| Year | Low Volatility | Controlling Positions | Cycle Managed |
|---|---|---|---|
| 2005 | Base | Base | Base |
| 2006 | -0.1% | -3.7% | 6.6% |
| 2007 | -1.1% | -4.4% | -9.9% |
| 2008 | -1.8% | -6.5% | -5.4% |
| 2009 | -0.8% | 0.7% | 4.7% |
| 2010 | -1.0% | 0.1% | -6.1% |
| 2011 | -1.5% | 1.4% | -3.8% |
| 2012 | 1.6% | 3.5% | 3.8% |
| 2013 | 3.9% | 6.4% | 2.2% |
| 2014 | 3.3% | 4.2% | -3.2% |
| 2015 | 2.4% | 1.7% | -5.6% |
| 2016 | 1.9% | 0.7% | -5.4% |

# Insurance Group – Diversification

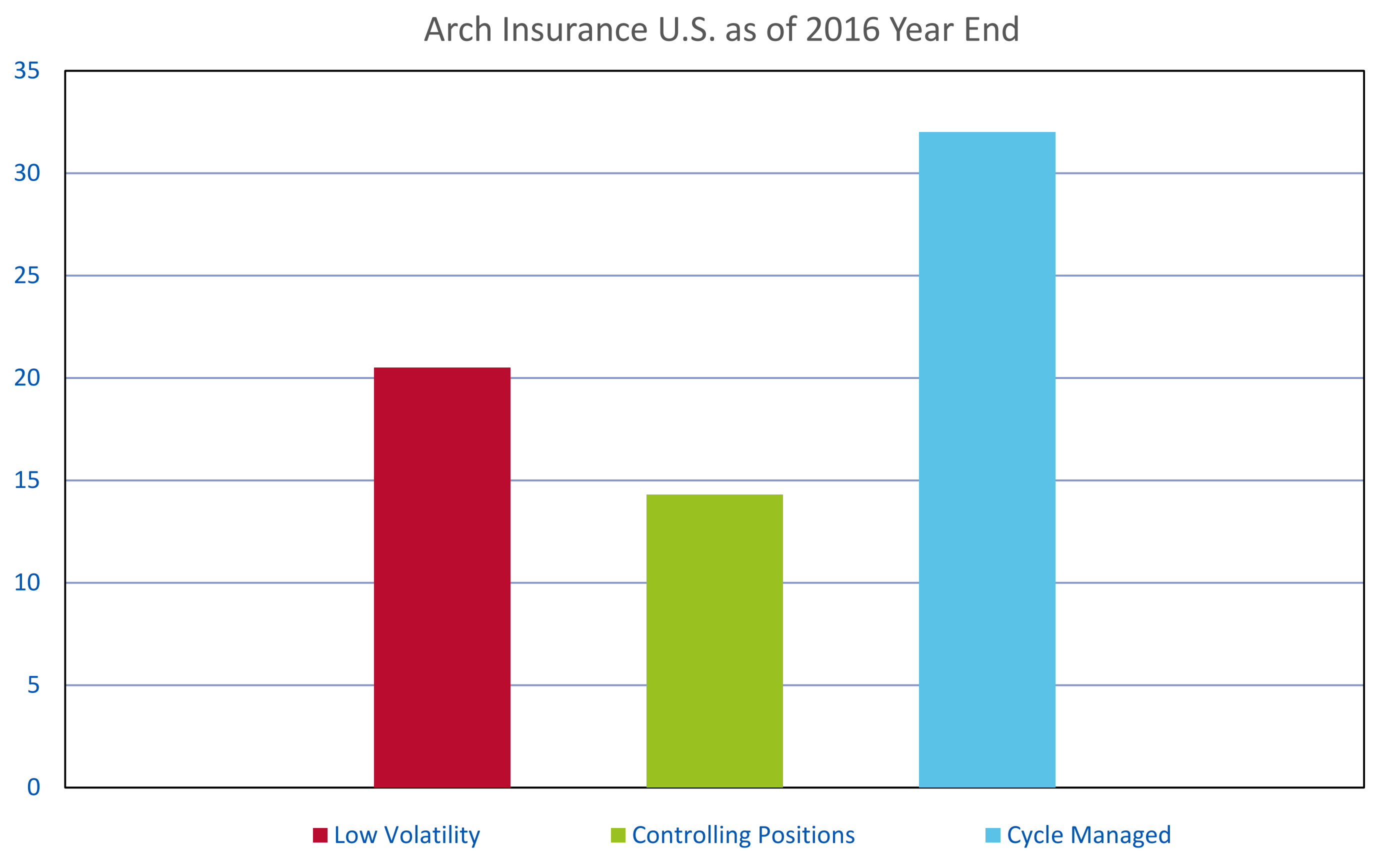
## Arch Insurance Premium Sourced from "Big 3" Brokers

### As of YE2016



# Insurance Group – Diversification

## Average Number of U.S. Competitors by Strategic Segmentation



# Insurance Group – Peer Comparison

Arch

## Product Breadth Drives Superior, Less Volatile Results

| GWP Premium Mix ($000's) | Arch | Axis | Everest | Aspen | Endurance | Allied World |
|---|---|---|---|---|---|---|
| Professional Lines | 664,169 | 845,359 | 242,672 | 479,300 | 461,552 | 635,954 |
| Loss Sensitive Business (1) | 842,420 | - | - | - | - | - |
| Programs | 347,987 | - | - | 198,030 | - | 223,137 |
| Property | 226,229 | 672,891 | 418,792 | 282,570 | 690,507 | 339,417 |
| Liability (2) | 333,511 | 454,961 | 699,530 | 302,630 | 657,558 | 1,161,117 |
| Energy, Marine & Aviation (3) | 117,807 | 316,928 | - | 396,300 | - | - |
| Lenders | 169,831 | - | - | - | - | - |
| Travel / Accident & Health | 229,274 | 430,103 | 135,751 | 23,300 | - | - |
| Surety | 95,822 | - | - | 51,660 | - | - |
| Crop | - | - | 290,279 | - | 760,877 | - |
| **Total:** | **$ 3,027,051** | **$ 2,720,242** | **$ 1,787,024** | **$1,733,790** | **$ 2,570,494** | **$ 2,359,625** |

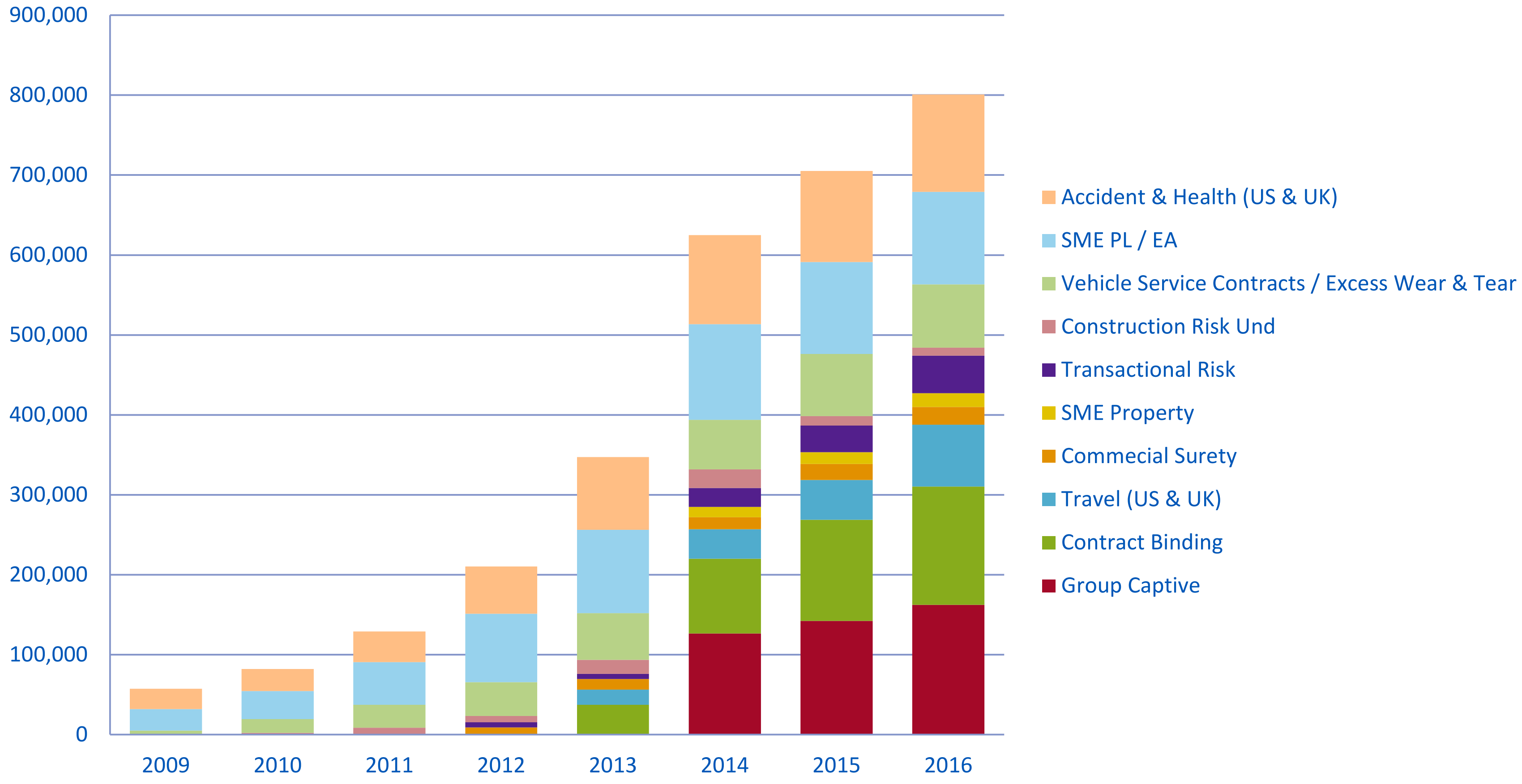
| | Arch | Axis | Everest | Aspen | Endurance | Allied World |
|---|---|---|---|---|---|---|
| Weighting of Short Tail Lines | 24.6% | 52.2% | 47.3% | 40.5% | 56.5% | 14.4% |
| Weighting of Long Tail Lines | 75.4% | 47.8% | 52.7% | 59.5% | 43.5% | 85.6% |

(1) Includes Construction, National Accounts and Alt. Markets; (2) Includes Credit /Political Risk (Axis), and Inland Marine and Surety (Allied World); (3) Includes Terrorism (Axis)

Source: Company disclosures on Insurance Segment results for YE 2016 from 10k, Earnings Release Supplements and Investor Presentations

# Insurance Group – Product Expansion

## Arch Worldwide Insurance New Initiatives since 2009 GWP ($000s)



# Insurance Group – Data Analytics

## Perpetuating Cycle of Improved Performance

### Data Governance

- Drives depth, breadth, and accuracy of data.  Owns "data terminology."
- Governance of rating model and system deployment specifications.

### Systems and Infrastructure Investments

- Investments made during hard market cycle, reaping benefits in current market.
- New claims system, seven new custom underwriting platforms and rating engines, and an advanced reinsurance cessions engine all launched since 2013.

### Pricing and Reserving Refinement

- Ability to price and reserve on the business at more refined levels.

### Enhanced Compliance and Governance

- Scalability in product filings, collateral management, premium audit, claims monitoring.

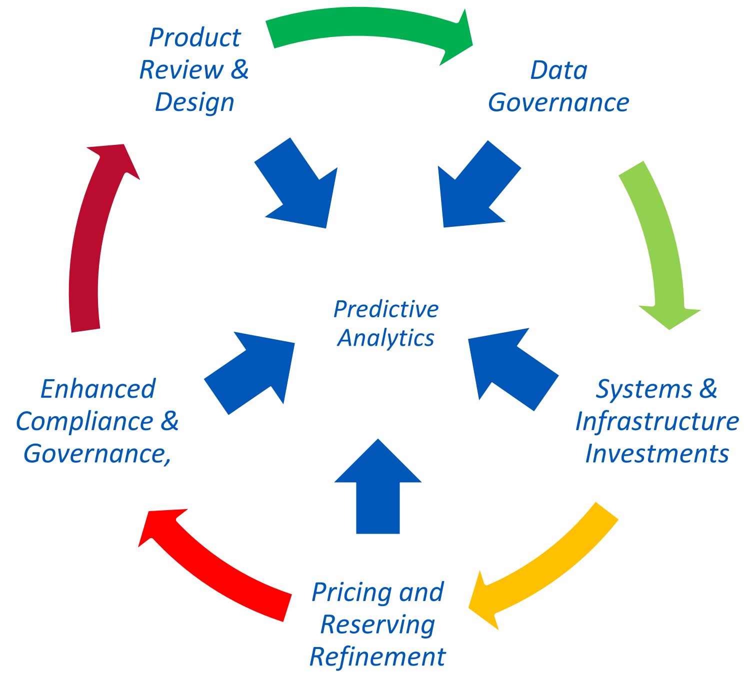
### Product Review & Design

- Fact-based, data-driven decisions propel the strategy.

### Predictive Analytics

- Next dimension of information analysis not possible without core foundational elements.

**Smaller Risks Require Data Focus**



# Reinsurance

# Reinsurance Group Model

Strong Underwriting and Risk Management Culture.

- Diversified Platform.
- Manage the cycle.
- Nimble with the ability to move capital in and out.
- Centralized underwriting decision.

Innovation – the Arch competitive advantage.

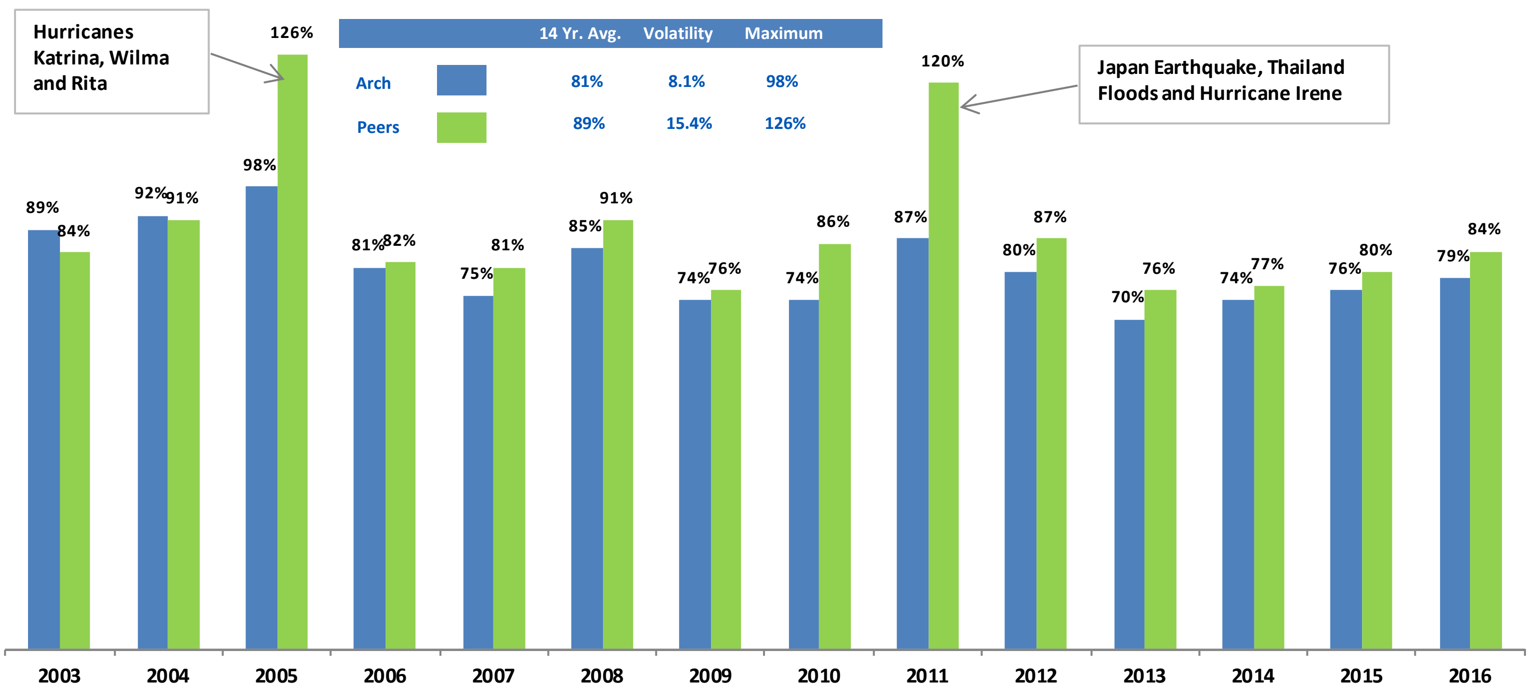
*" Expanding the possible "*

Arch Re model enables us to produce superior risk-adjusted returns.

# Reinsurance – Peer Comparison

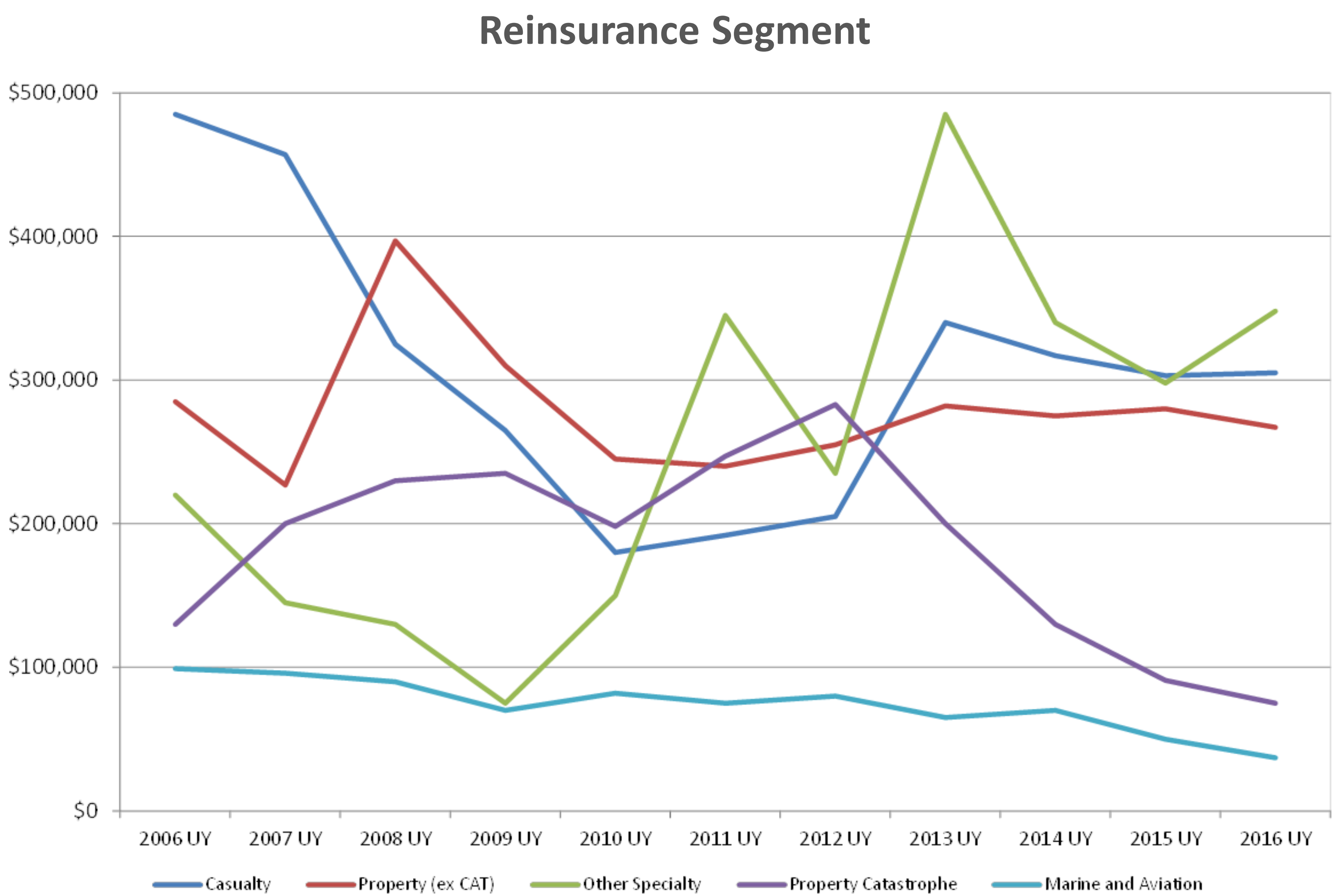
- Arch has demonstrated an ability to outperform its reinsurance peer group through a disciplined underwriting and risk management process.
  - Arch has averaged an 81% reinsurance segment combined ratio over the last 14 years.

**Arch has historically achieved a lower combined ratio from its reinsurance operations than its reinsurance peers**



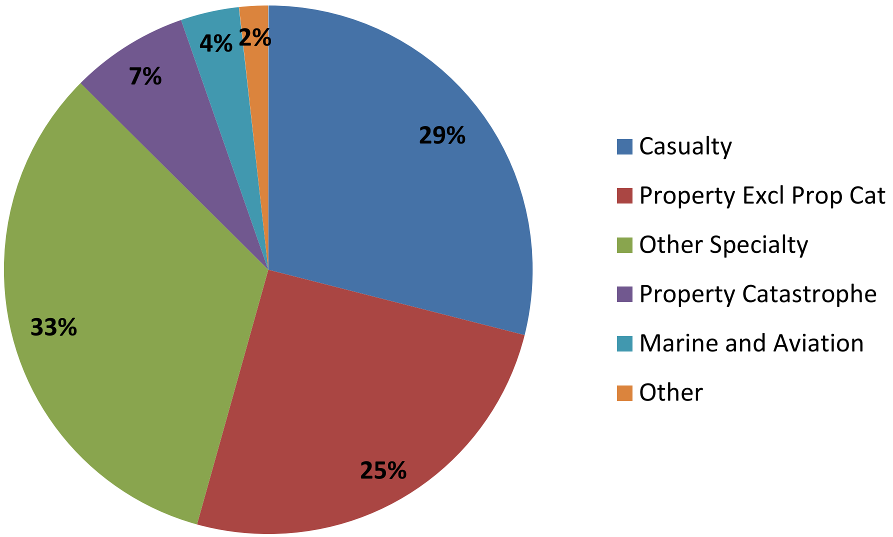

Peers include reinsurance segments of: Aspen, Alterra Capital (pre Markel acquisition (i.e. 2012 and prior), Allied World, AXIS Group, Endurance, Everest Re, Partner Re, Platinum Underwriters (pre Renaissance Re acquisition (i.e. 2014 and prior), Renaissance Re (incl. Platinum in 2015), Validus Holdings, XL Group and Montpelier Re (total company through 2012).

# Cycle Management – Net Premium by Line



# Reinsurance - Platform

- Target 15% ROE on deployed capital.
- 2016 Net Premium Written: $1.1B.
- Cat XOL cut to 7% of premium.
  - Expected returns under pressure.
- About half of the portfolio is in "niche areas."
  - Property Facultative $130M.
  - A&H and Life Business $100M.
  - Credit and Surety $100M.

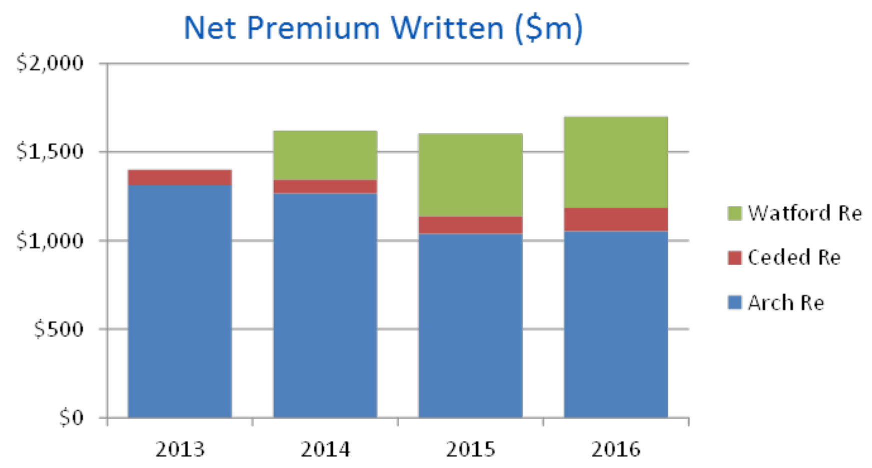



As of YE 2016

- Soft market conditions provide for customized solutions to free-up capital.
  - Surplus Relief Quota Share, Loss Portfolio Transfer, etc.

# Reinsurance - Platform

- 2005: Formed $1B Sidecar Flatiron Re.
- 2014: Created Watford Re.
  - Arch Benefits:
    - Generates fee income.
    - Leverage Arch underwriting platform.
      - Watford targets 15% ROE (higher investment contribution, lower underwriting contribution than Arch).




- 2017: $500M of ILS under management.
- 2017 : Sponsor of Premia Re to access run-off management.

**Advantages: Bigger footprint, relevance and flexibility.**

# Reinsurance - Resilient Through the Cycle

- "Cycle and Risk Manager" is in our DNA.
  - Generate returns not volume.
  - Play defense in soft markets.
- Focus on niche business where skill and experience can differentiate results.
- Leverage Arch Re underwriting platform through third-party capital management (Flatiron, ILS, Watford, Premia).
- Develop new distribution and/or new product offerings.

archcapgroup.com

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