Big Data and Insurance: Threat & Opportunity

Analytics Insights Conference
Stephen J. Mildenhall
July 23, 2015
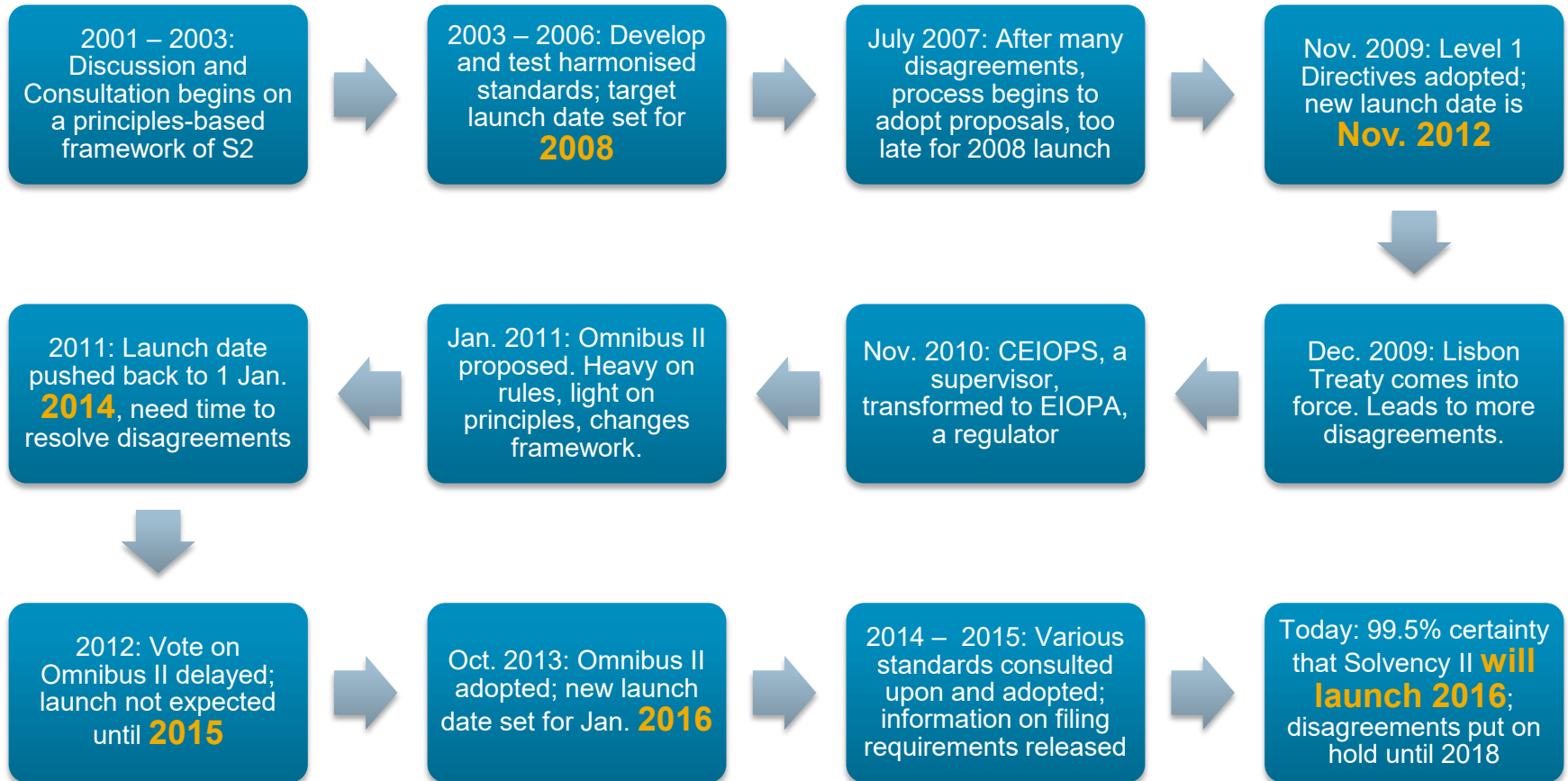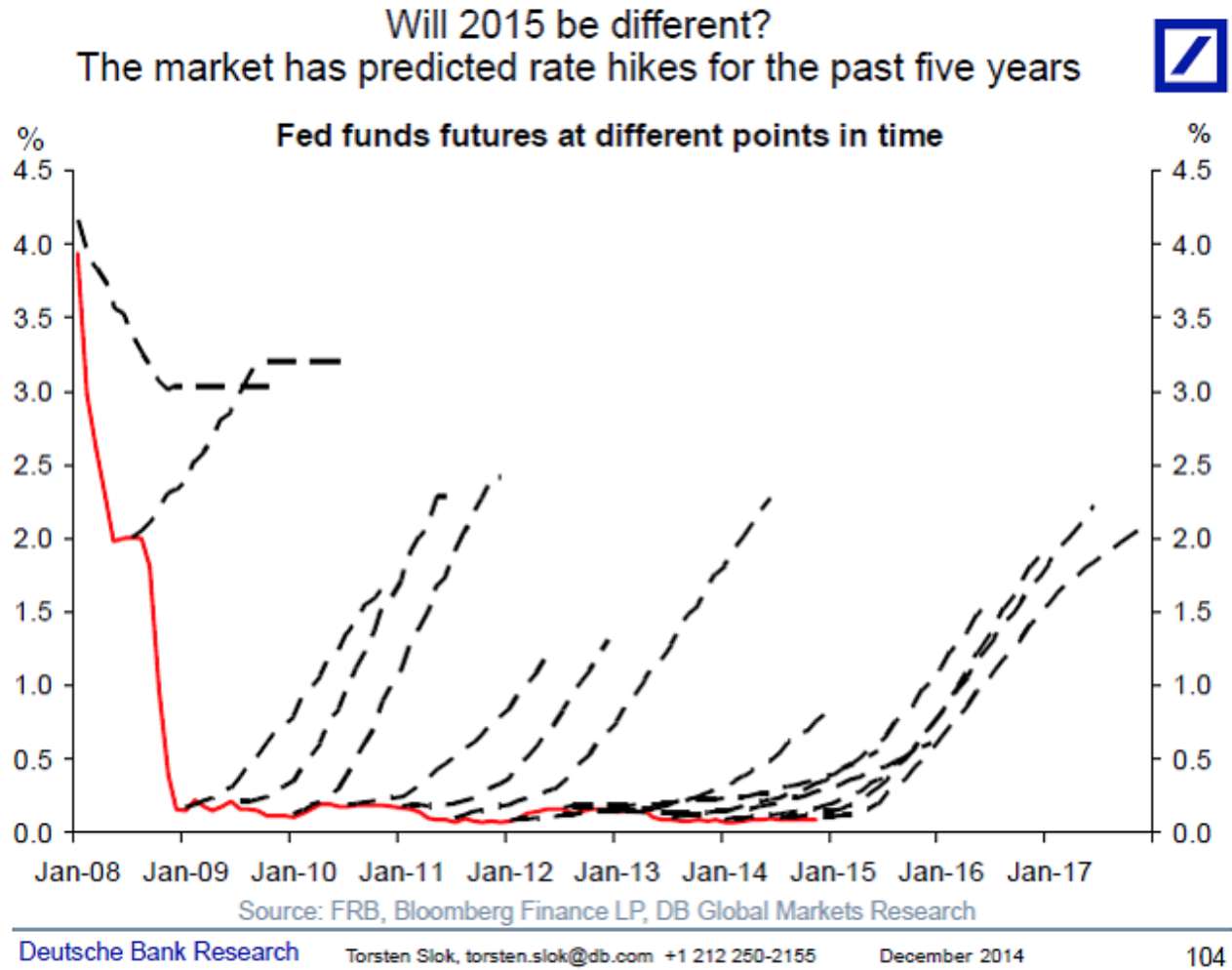
Aon Benfield Analytics

Prediction is very difficult, especially if it's about the future.

Niels Bohr

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Regulators in error: predicting Solvency II implementation date

2001 – 2003: Discussion and Consultation begins on a principles-based framework of S2

→

2003 – 2006: Develop and test harmonised standards; target launch date set for **2008**

→

July 2007: After many disagreements, process begins to adopt proposals, too late for 2008 launch

→

Nov. 2009: Level 1 Directives adopted; new launch date is **Nov. 2012**

↓

2011: Launch date pushed back to 1 Jan. **2014**, need time to resolve disagreements

←

Jan. 2011: Omnibus II proposed. Heavy on rules, light on principles, changes framework.

←

Nov. 2010: CEIOPS, a supervisor, transformed to EIOPA, a regulator

←

Dec. 2009: Lisbon Treaty comes into force. Leads to more disagreements.

↓

2012: Vote on Omnibus II delayed; launch not expected until **2015**

→

Oct. 2013: Omnibus II adopted; new launch date set for Jan. **2016**

→

2014 – 2015: Various standards consulted upon and adopted; information on filing requirements released

→

Today: 99.5% certainty that Solvency II **will launch 2016**; disagreements put on hold until 2018

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Markets in error: predicting future interest rates

Will 2015 be different?
The market has predicted rate hikes for the past five years

Fed funds futures at different points in time

Source: FRB, Bloomberg Finance LP, DB Global Markets Research

Deutsche Bank Research   Torsten Slok, torsten.slok@db.com +1 212 250-2155   December 2014   104

Source: http://johnhcochrane.blogspot.com/2014/12/1994.html

Experts in error: weather losses are manageable as a proportion of GDP

Global Economic & Insured Loss as % of GDP
(Weather Events)

■ Economic % of GDP   ■ Insured % of GDP
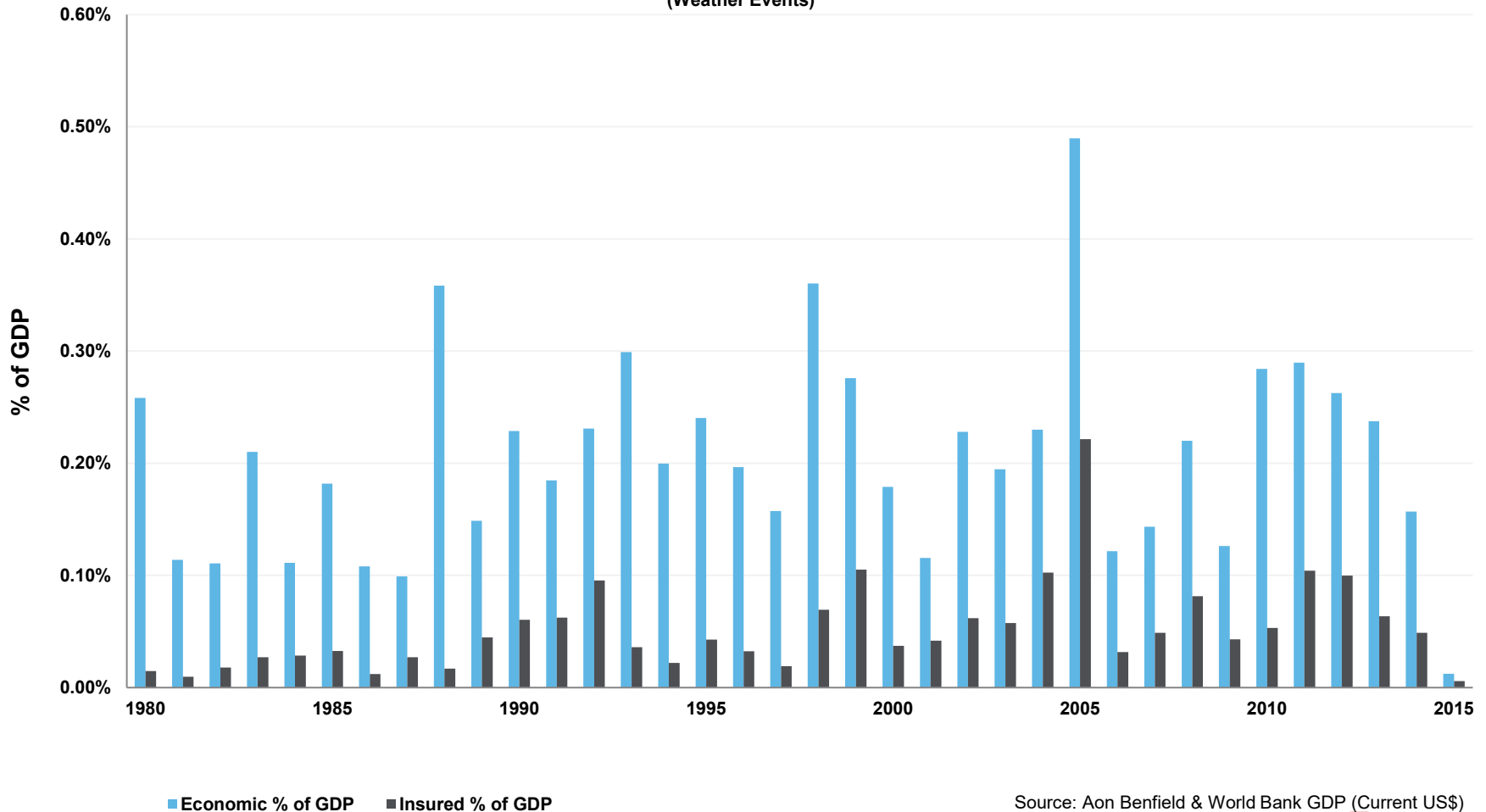
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Recap of the Big Data journey…

Data

Information

Insight

Action

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[Big] Data

Three Vs
Volume
Variety
Velocity
Value | Veracity

BIG = hard to manage on existing technology

B = Behavioral

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Data: the raw ingredient of decision making

data

Big Data
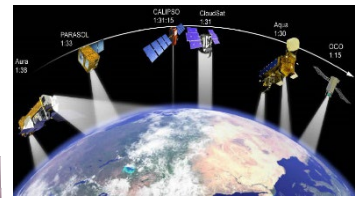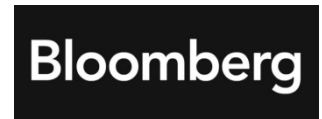
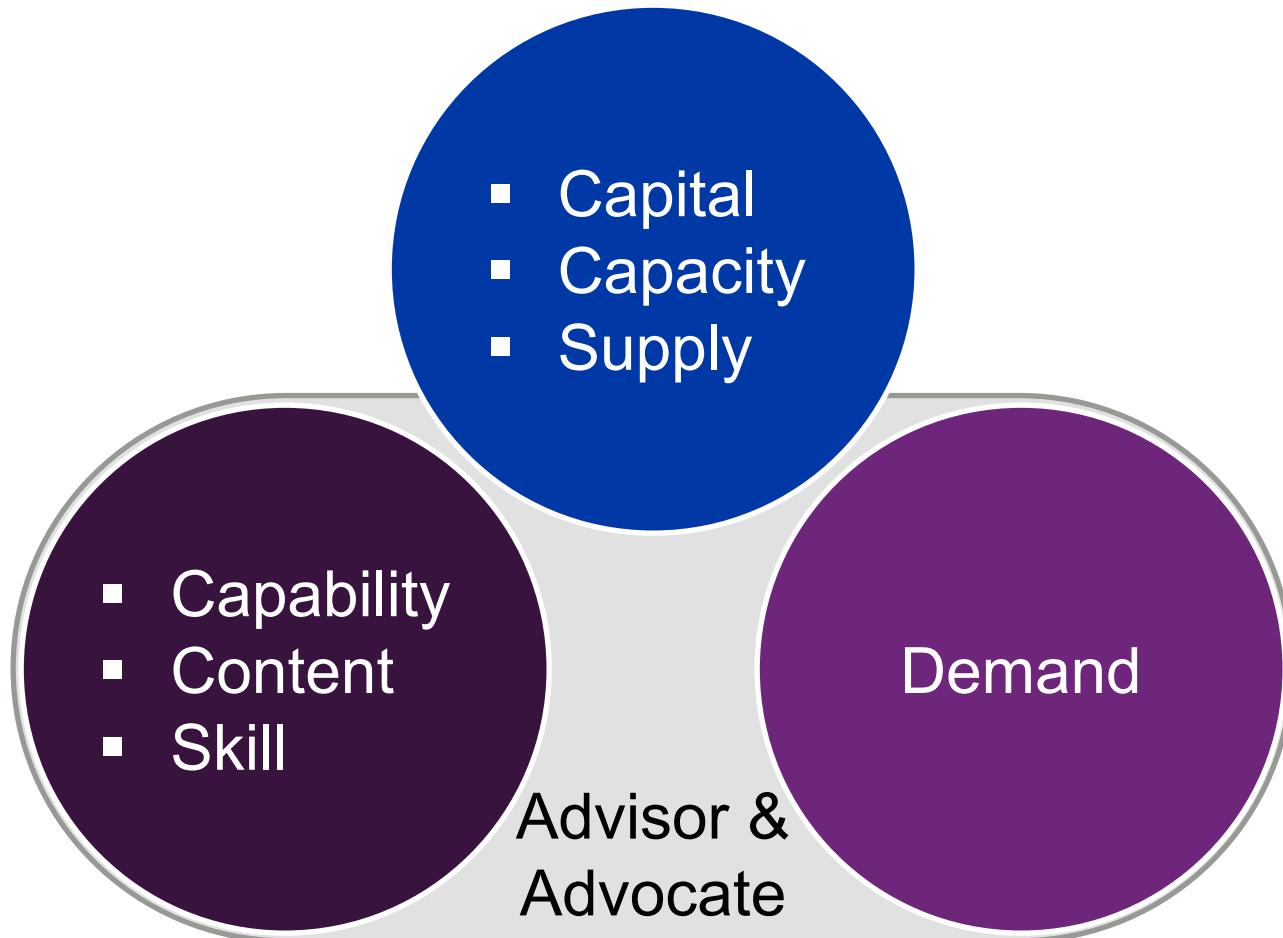# Three components of a market, each with favorable dynamics
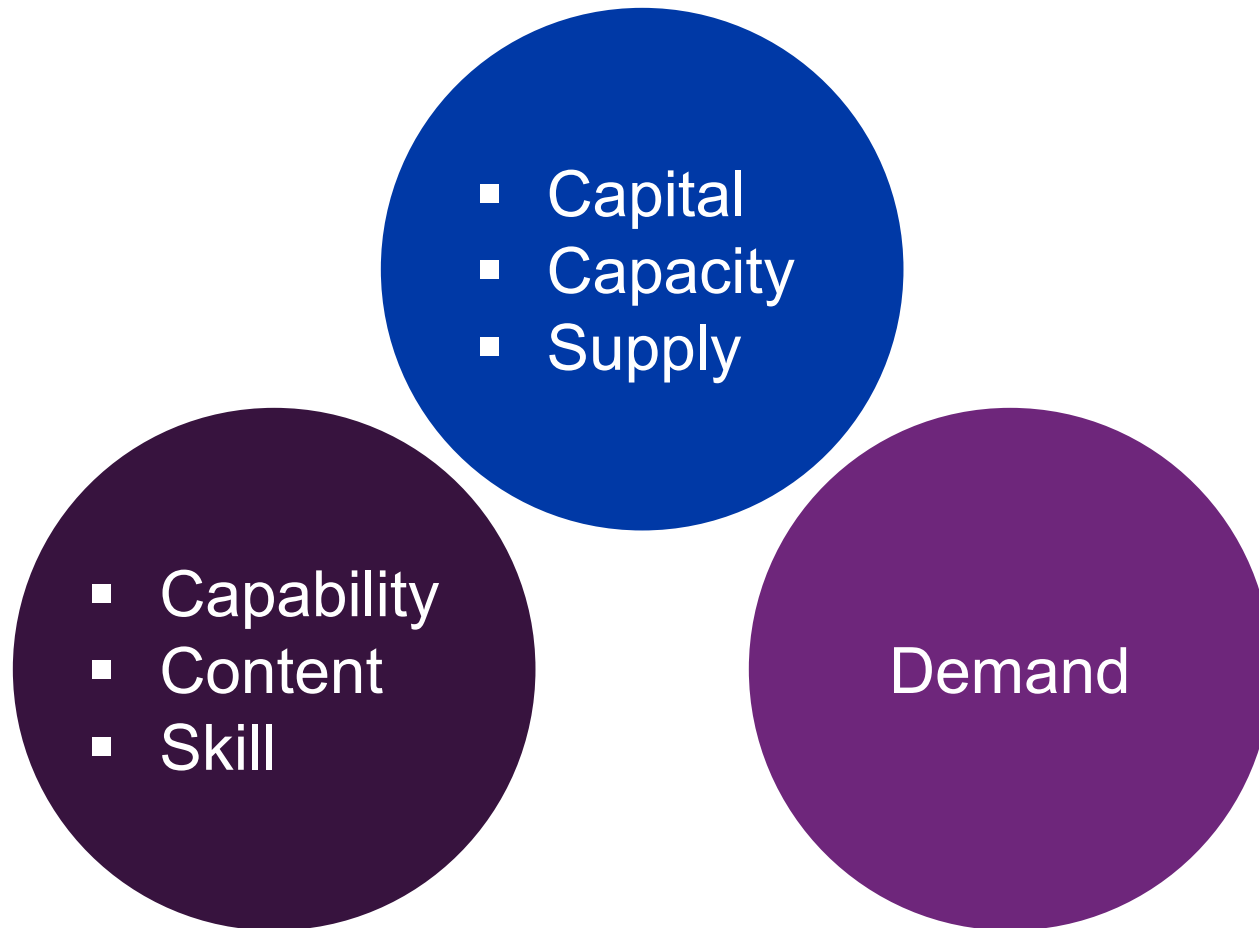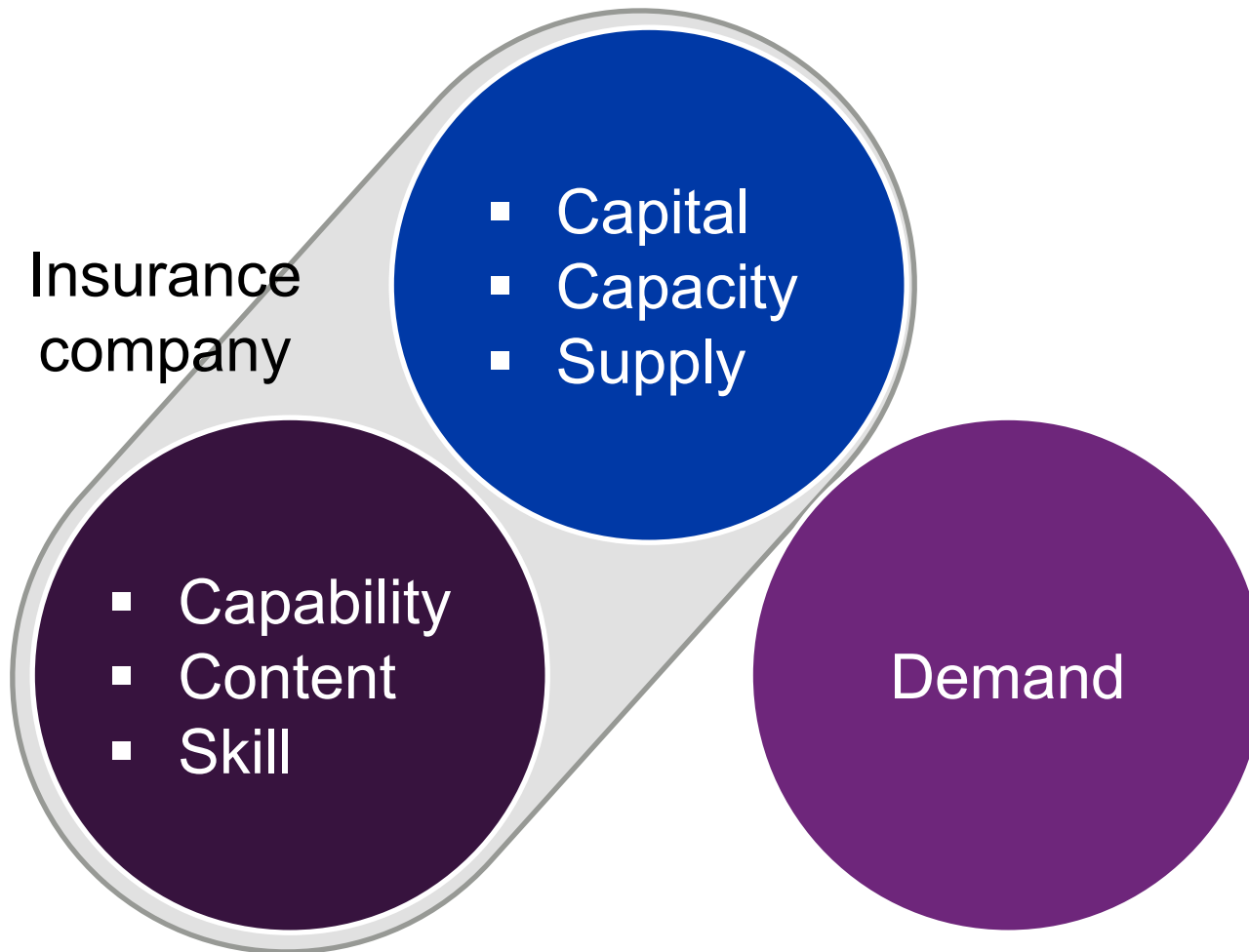
- Capital
- Capacity
- Supply

- Capability
- Content
- Skill

Demand

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Two aggregations of the value chain operating in the market

Insurance company

- Capital
- Capacity
- Supply

- Capability
- Content
- Skill

Demand

Two aggregations of the value chain operating in the market

- Capital
- Capacity
- Supply

- Capability
- Content
- Skill

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Advisor & Advocate

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Three favorable dynamics create opportunities

- Capital
- Capacity
- Supply

- Capability
- Content
- Skill
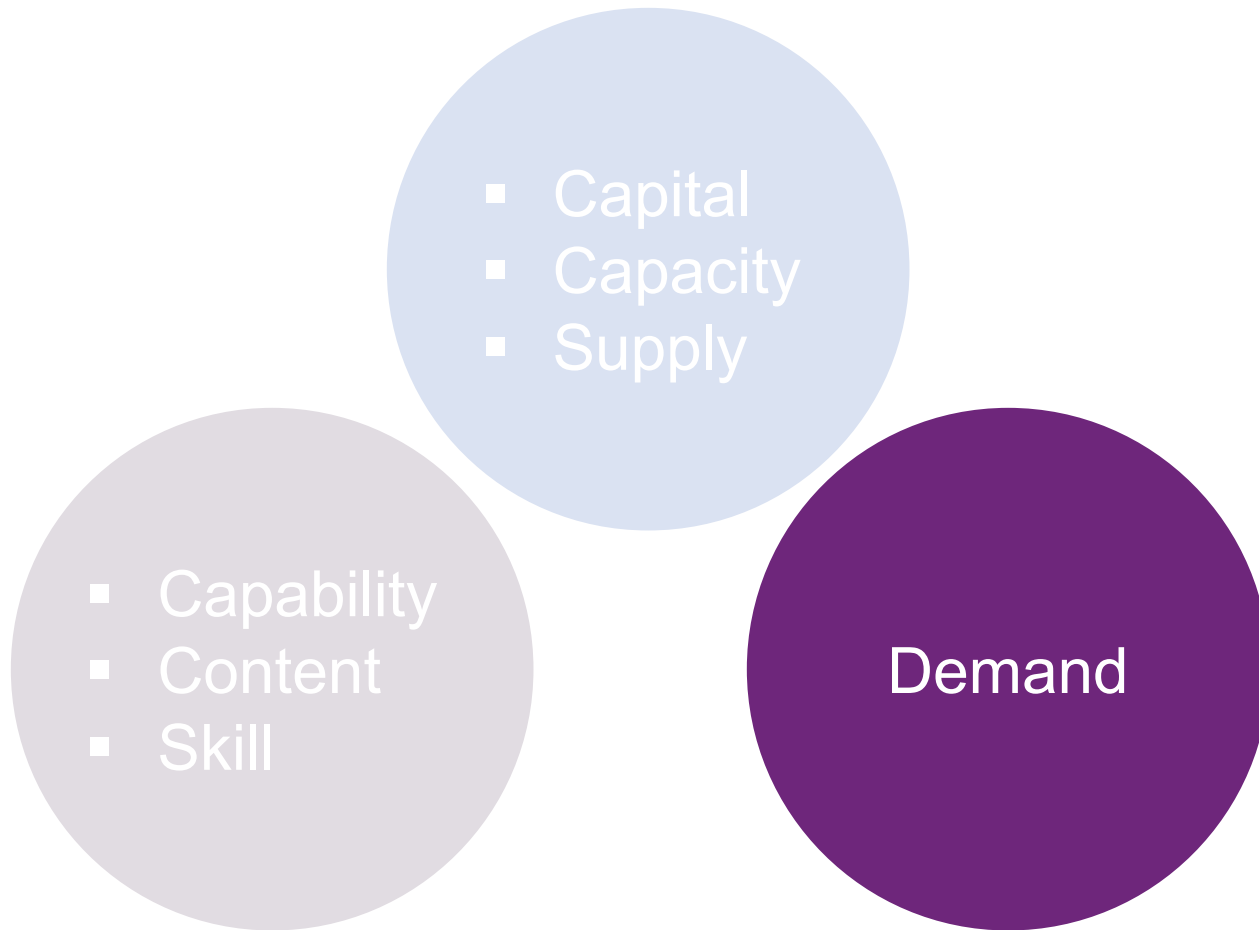
Demand

Demand: ARS 2015 global risk manager's top 53 risks

Damage to reputation/ brand	Economic slowdown/ slow recovery	Regulatory/ legislative changes	Increasing competition	Failure to attract or retain top talent	Failure to innovate/ meet customer needs	Business interruption	Third-party liability	Computer crime/ hacking/ viruses
Property damage	Commodity price risk	Cash flow/ liquidity risk	Technology failure/ system failure	Distribution or supply chain failure	Political risk/ uncertainties	Corporate governance/ compliance burden	Exchange rate fluctuation	Weather/ natural disasters
Capital availability/ credit risk	Directors & Officers personal liability	Failure of disaster recovery plan	Corporate social responsibility/ sustainability	Injury to workers	Crime/ theft/ fraud/ employee dishonesty	Loss of intellectual property/ data	Failure to implement or communicate strategy	Counter party credit risk
Merger/ acquisition/ restructuring	Environmental risk	Inadequate succession planning	Lack of technology to support business needs	Workforce shortage	Product recall	Accelerated change in market & geopolitics	Aging workforce and related health issues	Globalization/ emerging markets
Interest rate fluctuation	Outsourcing	Unethical behavior	Natural resource scarcity	Terrorism/ sabotage	Asset value volatility	Understaffing	Pandemic risk/ health crises	Climate change
Social media	Absenteeism	Joint venture failure	Share price volatility	Pension scheme funding	Sovereign debt	Kidnap and ransom/ extortion	Harassment/ discrimination	

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Demand: where are the new product opportunities?

General Business Risk		Insurable & Generally Insured	Insurable & Not Enough	Insurance Design Challenges	Social or Global Risk	Financial Risk	
Economic slowdown/ slow recovery	Inadequate succession planning	Third-party liability	Business interruption	Damage to reputation/ brand	Environmental risk	Commodity price risk	Pension scheme funding
Regulatory/ legislative changes	Lack of technology to support business needs	Property damage	Computer crime/ hacking/ viruses	Failure of disaster recovery plan	Accelerated change in market & geopolitics	Cash flow/ liquidity risk	Sovereign debt
Increasing competition	Workforce shortage	Weather/ natural disasters	Technology failure/ system failure	Corporate social responsibility/ sustainability	Aging workforce and related health issues	Exchange rate fluctuation	
Failure to attract or retain top talent	Outsourcing	Directors & Officers personal liability	Distribution or supply chain failure	Loss of intellectual property/ data	Globalization/ emerging markets	Capital availability/ credit risk	
Failure to innovate/ meet customer needs	Unethical behavior	Injury to workers	Political risk/ uncertainties	Social media	Natural resource scarcity	Counter party credit risk	
Corporate governance/ compliance burden	Understaffing	Crime/ theft/ fraud/ employee dishonesty	Product recall		Pandemic risk/ health crises	Interest rate fluctuation	
Failure to implement or communicate strategy	Joint venture failure	Kidnap and ransom/ extortion	Terrorism/ sabotage		Climate change	Asset value volatility	
Merger/ acquisition/ restructuring			Absenteeism			Share price volatility	
			Harassment/ discrimination				

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Demand: comparative advantage rationale for business insurance

Risk assessment and risk management

- **Lower loss cost**
- PML assessment, construction
- Risk control: WC, auto, liability, med mal, …
- Building engineering
- Monitoring: surety, credit, political risk
- Insurance

Claims Handling

- **Lower cost of LAE**
- Lower ultimate cost of indemnity
- Insurance or reinsurance

Risk Financing

- **Lower cost of capital**
- Reinsurance

Non-market motivations

- Rating agencies & regulation "price" cat risk
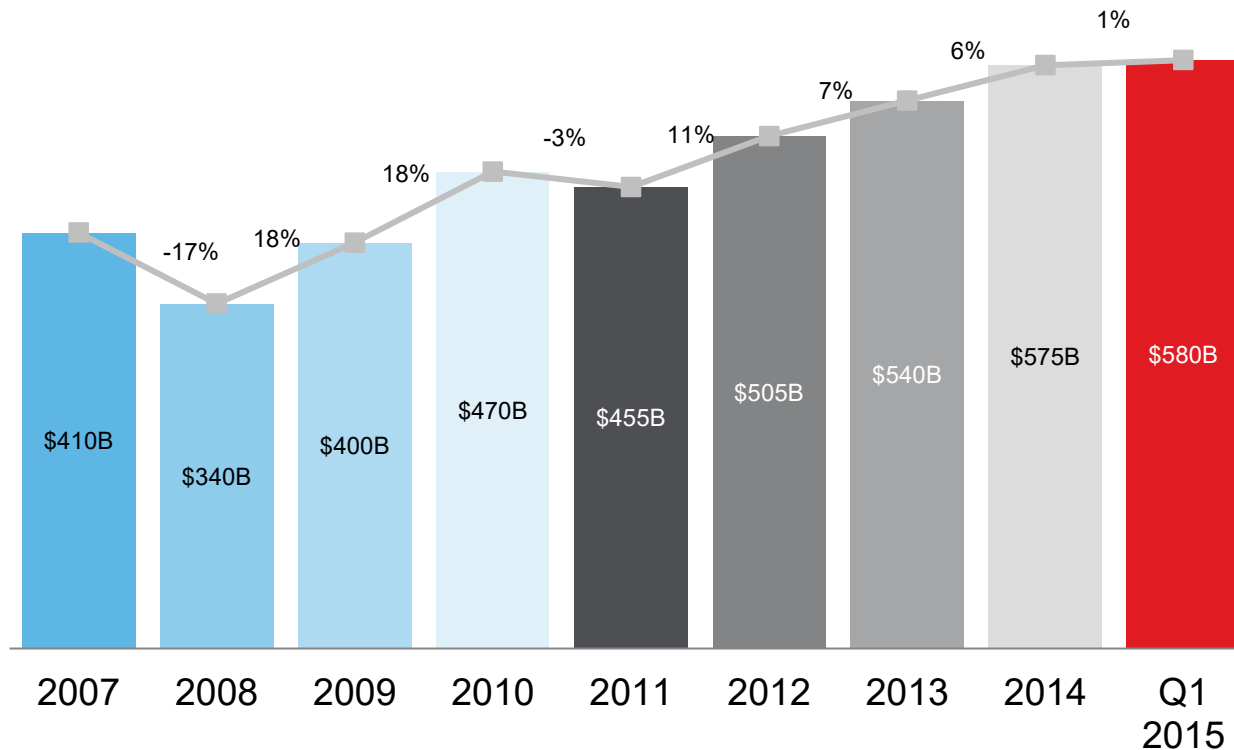- Regulation spurs demand for mortgage credit

Terrorism

CYBER

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Three favorable dynamics create opportunities

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- Capacity
- Supply

- Capability
- Content
- Skill

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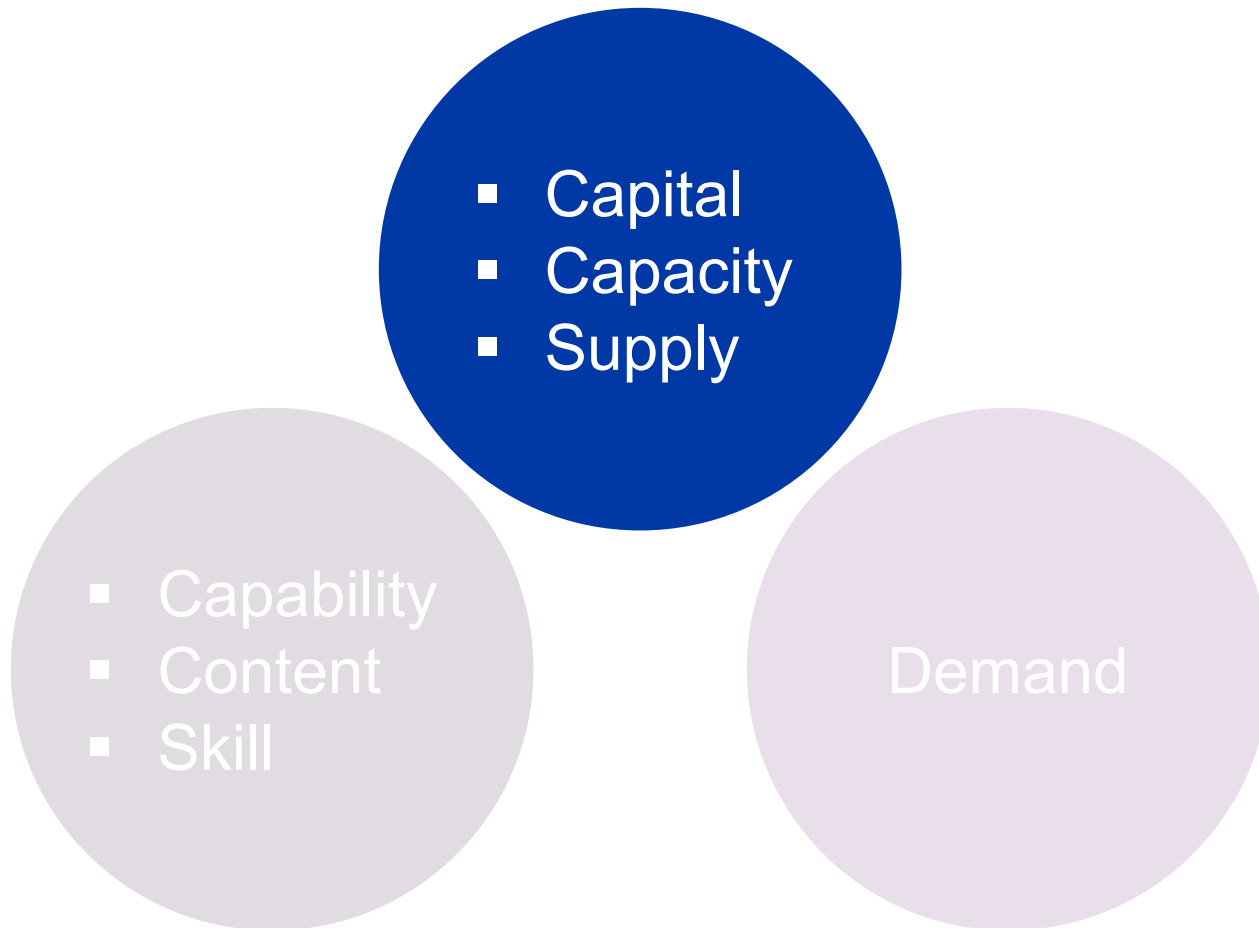
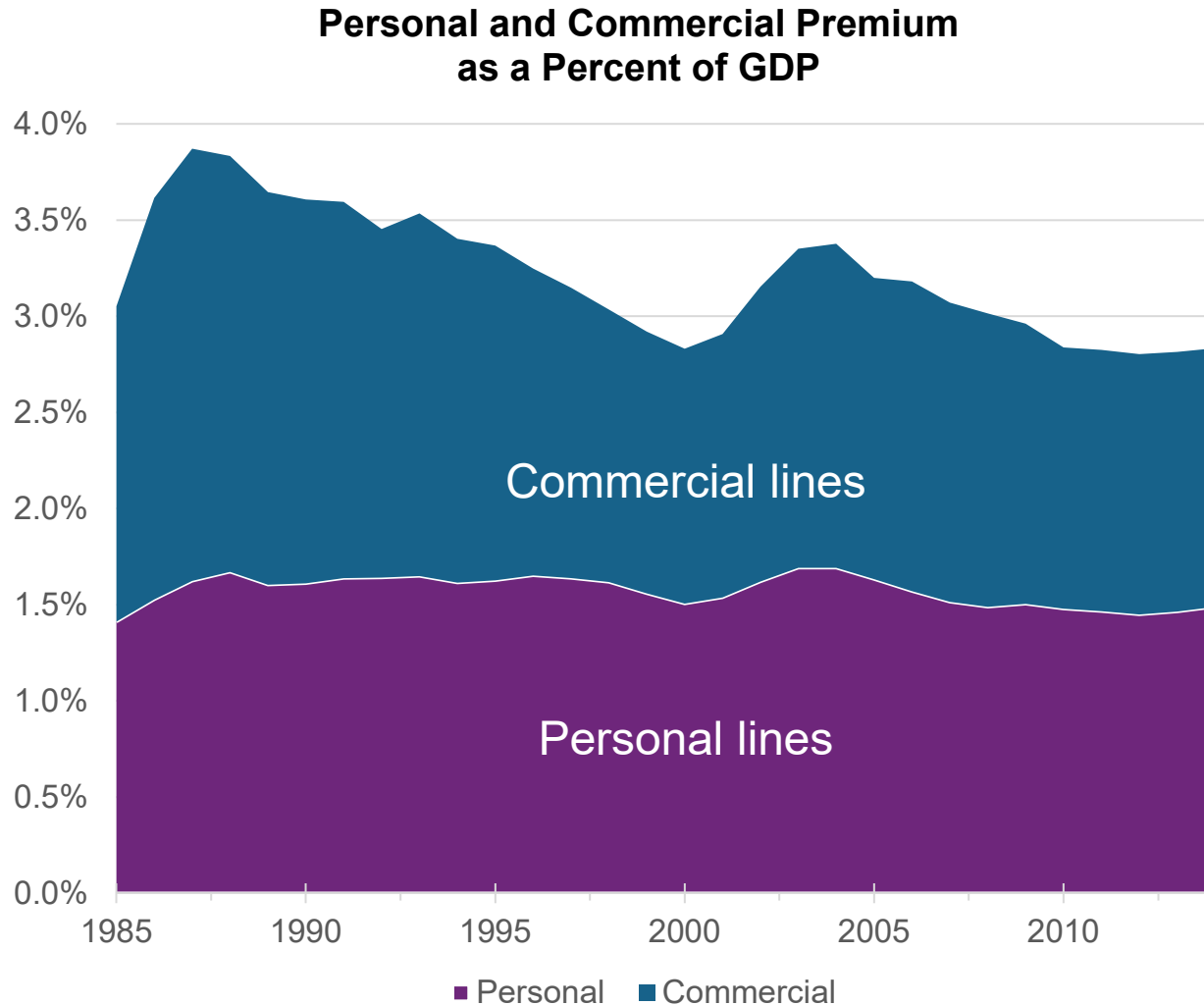# Capital: Changes in global reinsurance capital

- Traditional capital growth rate: 6% p.a. in nominal terms vs. 5% GDP growth since 2007

- Capital stands at 0.75% of global GDP, global economic cat losses average 0.3% of GDP per year

- Existing and new reinsurance capital available to support insurer growth plans

Alternative capital partially responsible for changing nature of relationship between P&C Net Premium and GDP

Period since 2008 is new territory over last ~50 years
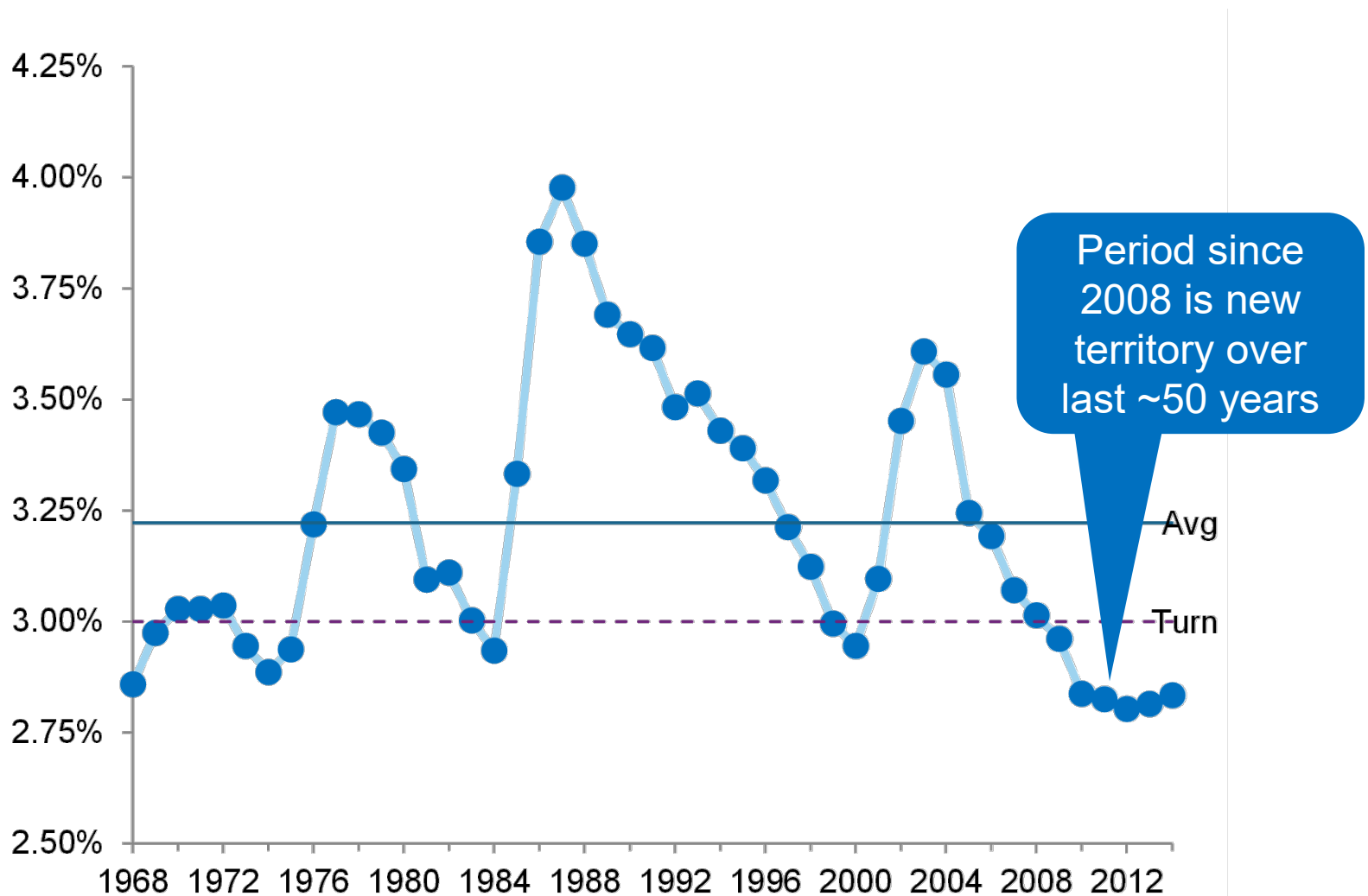
Since 1985 personal lines premium steady, but commercial lines premium has shrunk substantially from over 2% to around 1% of GDP

**Personal and Commercial Premium
as a Percent of GDP**

Commercial lines

Personal lines

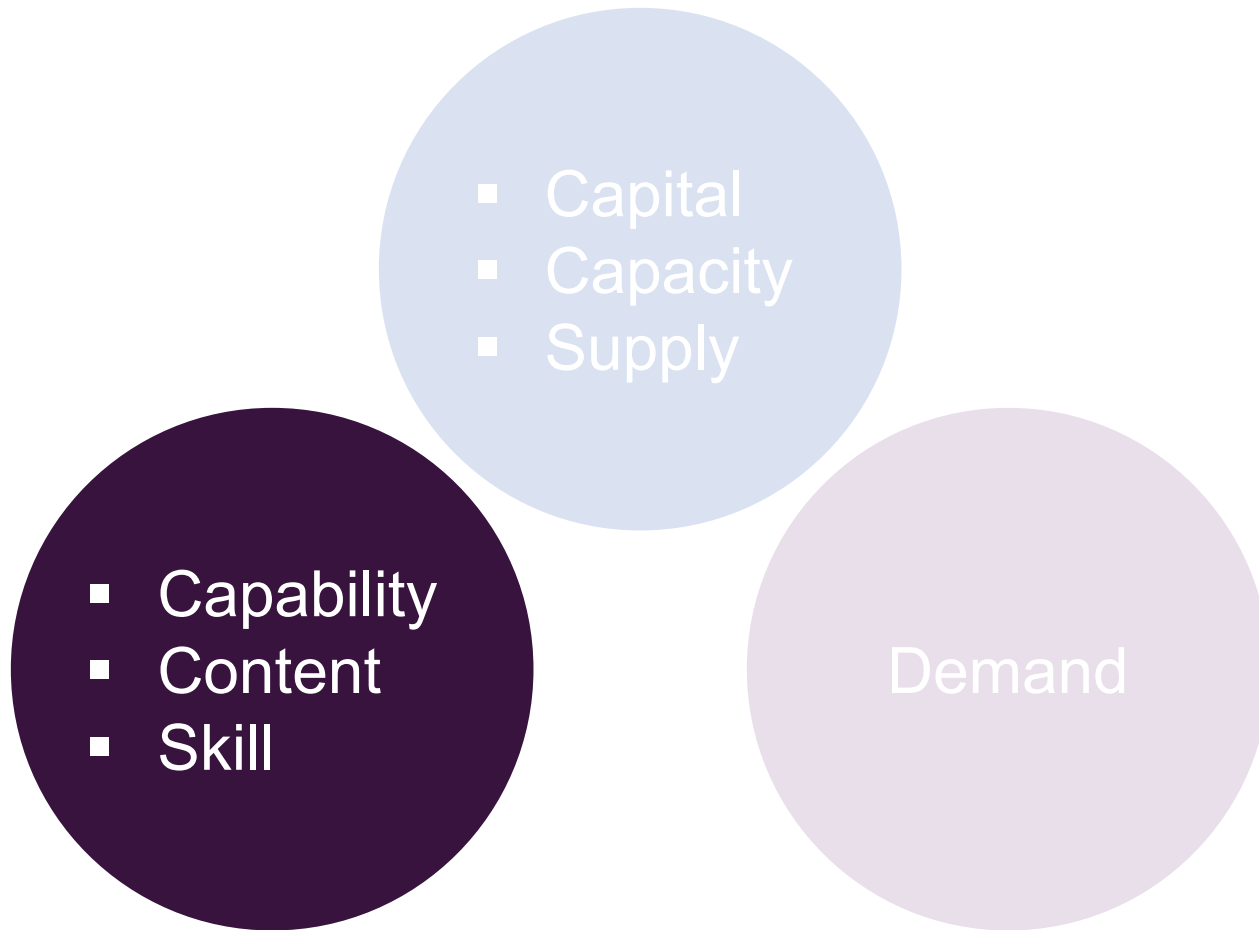Legend: ■ Personal ■ Commercial

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Homeowners premium has outstripped GDP since 1996 and commercial property has broadly matched it…
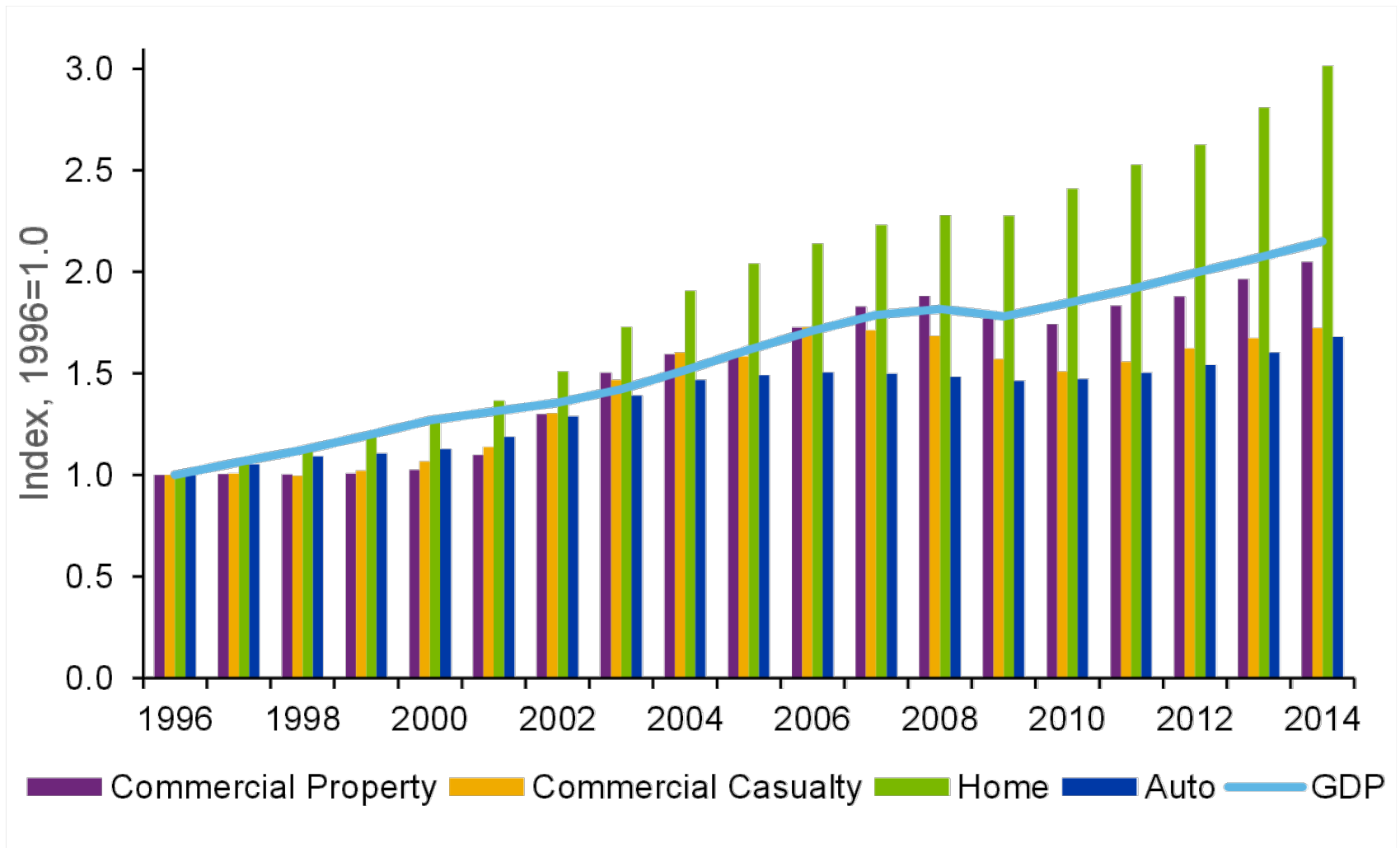
…while "existing-risk" personal auto and commercial liability have both lagged GDP growth

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Three favorable dynamics create opportunities

- Capital
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Five ways Big Data – broadly defined – will impact insurance

Threats

Opportunities

Time period?

For whom?

Customization

Veracity & Fraud

Safety & Risk Management

Blue Ocean "Emerging-Risk"

Creative Destruction

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Opportunity #1

Customization

Customization: personalize the service and disaggregate the risk pool

Customized Service

Veracity Anti-Fraud

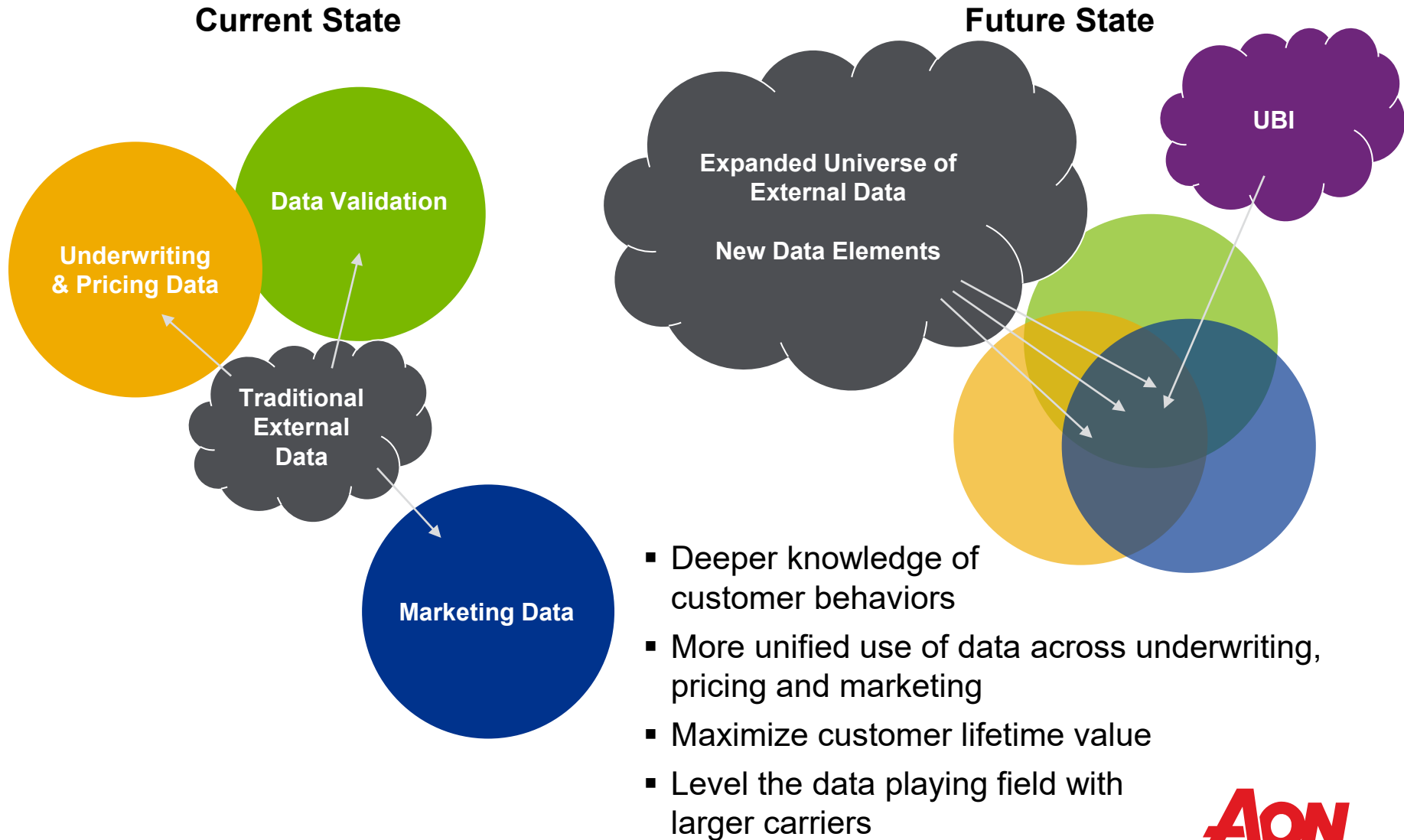Personalized Coverage

Customized Pricing

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Customization: Aon Benfield predictive data streams project

Current State

Data Validation

Underwriting & Pricing Data

Traditional External Data

Marketing Data

Future State

Expanded Universe of External Data

New Data Elements

UBI

- Deeper knowledge of customer behaviors
- More unified use of data across underwriting, pricing and marketing
- Maximize customer lifetime value
- Level the data playing field with larger carriers

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Greatly expanded universe of external data providers

Traditional Insurance Data Providers

verisk Analytics

acxiom

CoreLogic · D&B

FICO · IBM

Experian — A world of insight

LexisNexis

MARKETSTANCE

TransUnion

AB Uncovers Broad Universe of Potential New Insurance Data Providers

Skybox Imaging · comScore · DATALINE · LiveRamp

towerd@ta (Formerly Rapleaf.com) · iBehavior · IXI SERVICES · AddThis

bluekai · bizo · infogroup · V12 group · Alliant

IRi Growth delivered. · peekyou · i360 · quantcast

id:analytics · arcametrics · datalogix Real audiences. Real results.

LOTAME · factual · CORTERA · neustar Real Intelligence. Better Decisions.

PROFOUND NETWORKS · INTELIUS Live in the know. · TruSignal

Colligent · Recorded Future CREATING AN INSIGHTFUL WORLD · eBureau

relevate · HARTE HANKS CONNECTIONS MADE IMPACT DELIVERED

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Insurance customer interactions: lacking quantity…

% of respondents

Legend:
- Many times a day / Daily
- Weekly
- Monthly/Quarterly
- Yearly
- Less than once a year
- Never

Categories: Search Engine, Social Media Website, Banks, Online Retailer, Mobile Company, Energy Utility Co, Insurance Broker, Insurer
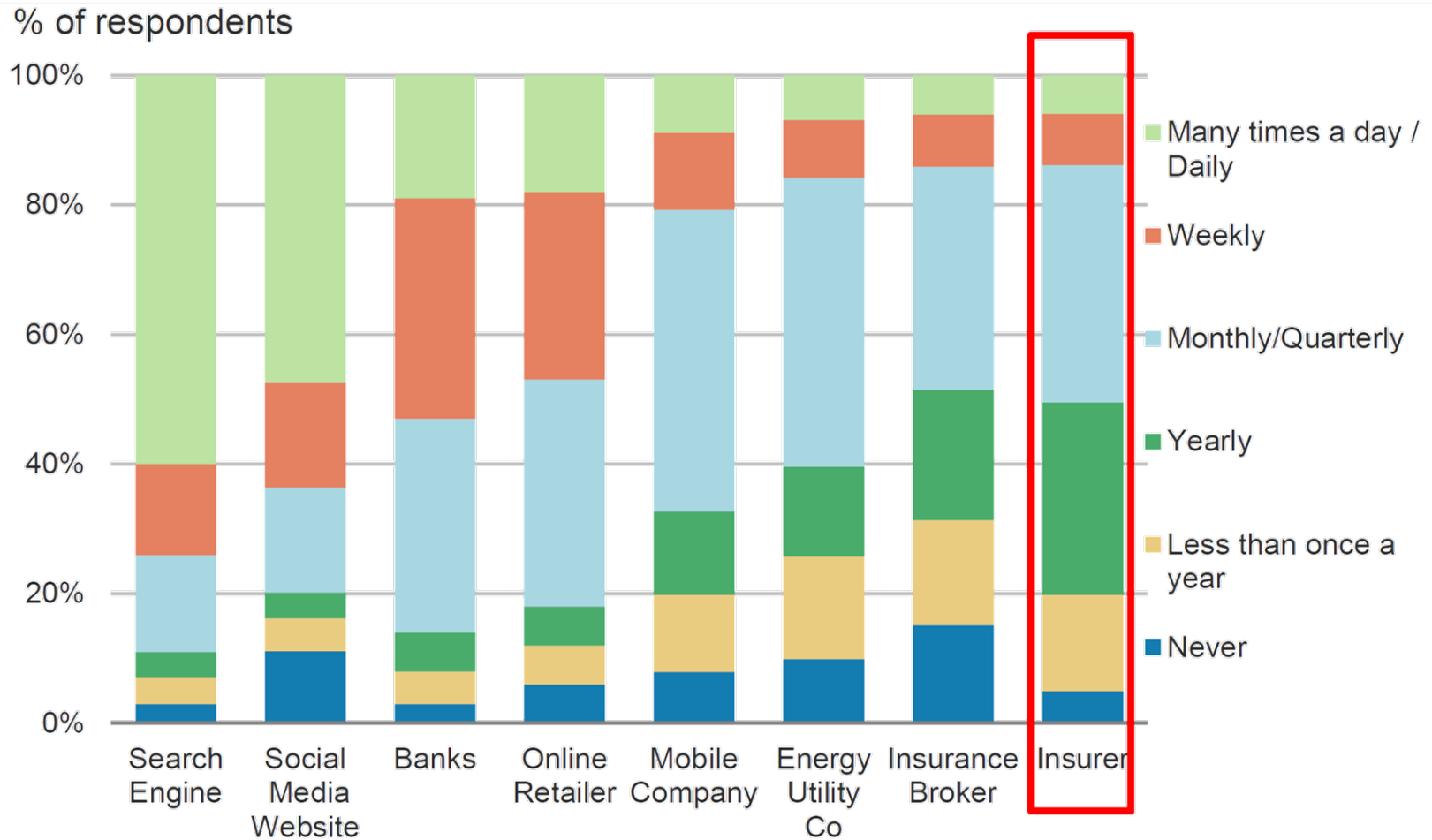
Source: Morgan Stanley/BCG Global Consumer Survey 2014, BCG e-intensity index

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…and quality

Insurance online experience lags other industries

Consumer satisfaction with online experience, by industry

Relative satisfaction utility score
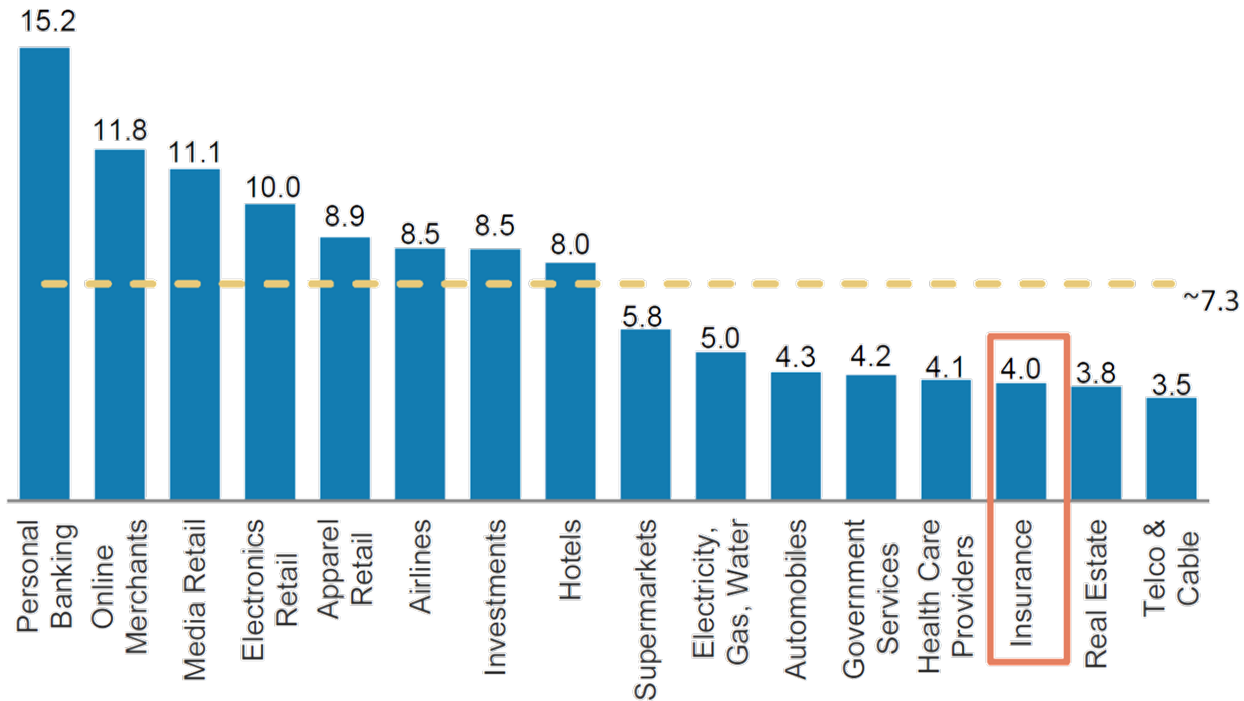
Source: BCG digital satisfaction survey March 2013, Morgan Stanley Research.
Note: Relative satisfaction utility score based on MaxDiff technique: consumers distributed 100 utility points across segments according to how positive they felt their online experiences were.

Disaggregate the pool: be careful what you wish
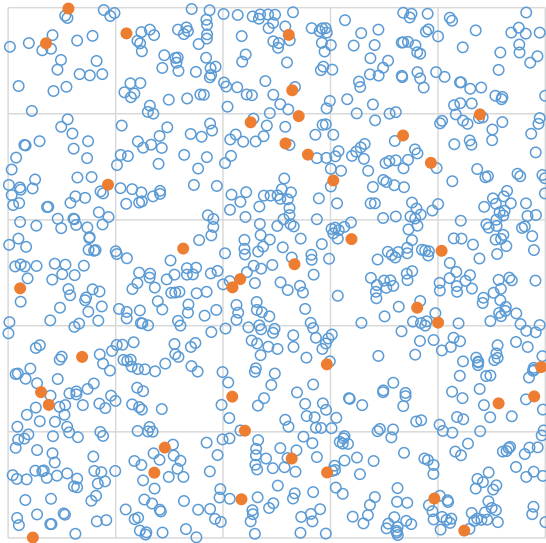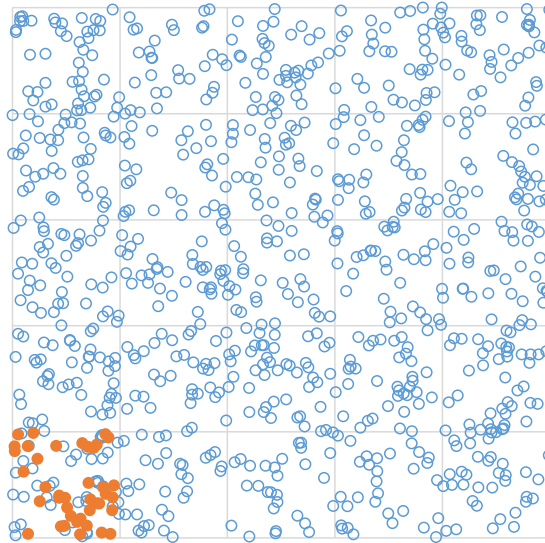
Insurable	Insurable, but expensive	Not Insurable
Old School	Flood	Genetics
4% of 100%	50% of 8%	100% of 4%

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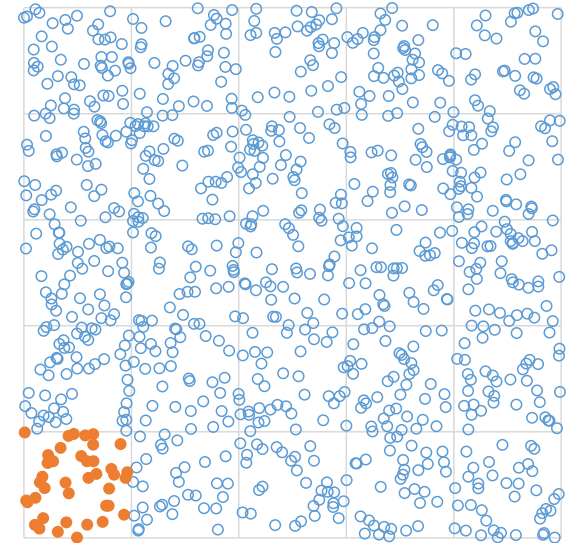
Safety & Risk Management

Workers compensation lost time frequency down 59% since 1990

**Workers Compensation
Lost-Time Claim Frequency**
1990=1.00

59%

Source: Lost-Time Claim Frequency: NCCI 2015 State of the Line Analysis of Workers Compensation Results
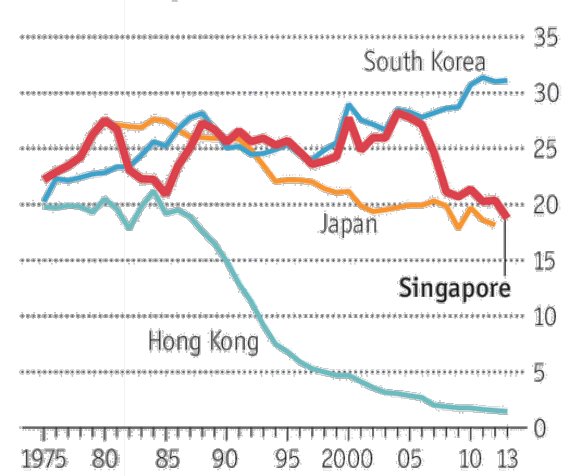
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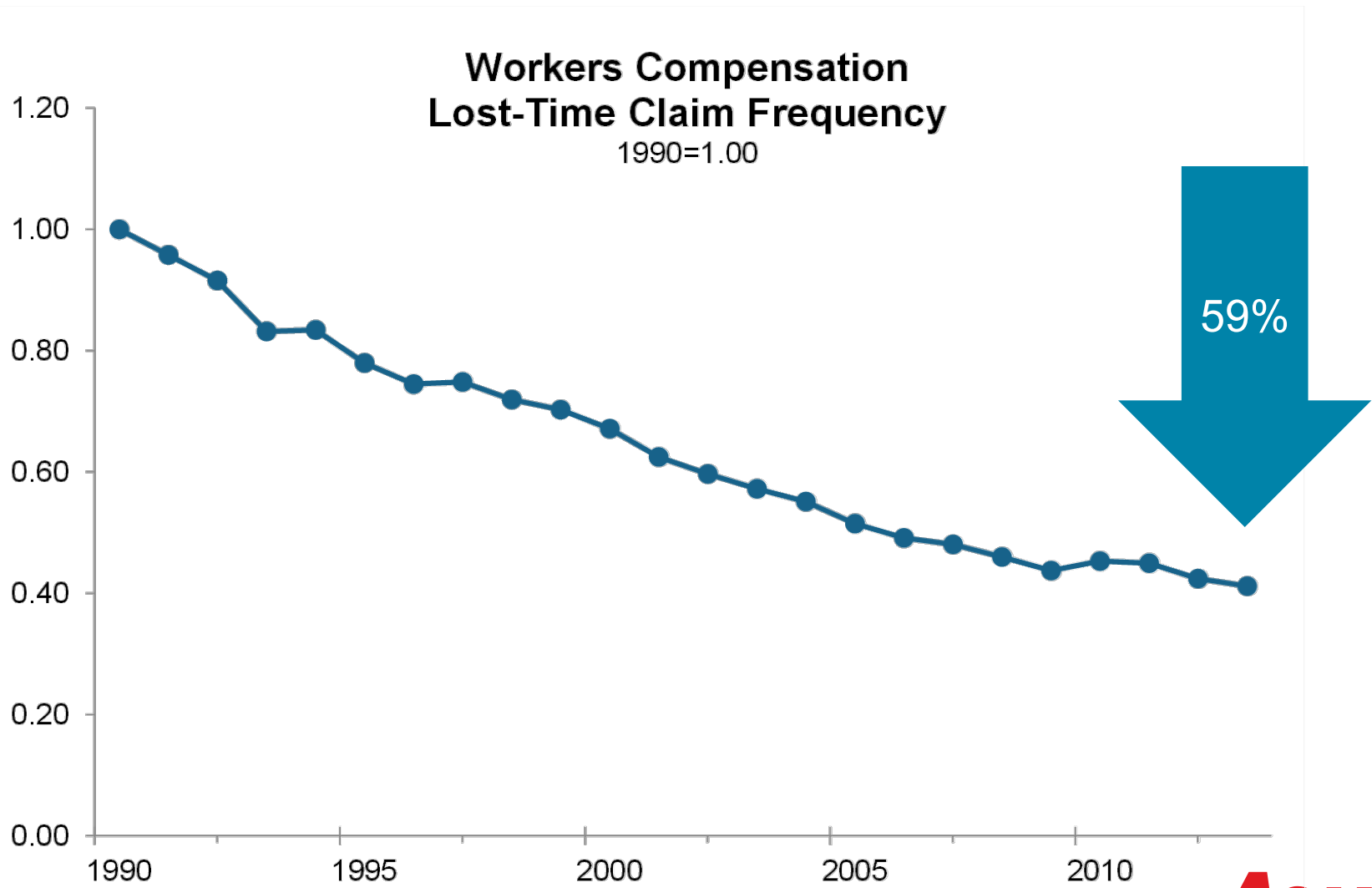
Partial driver of lower frequency: "lighter" nature of commerce

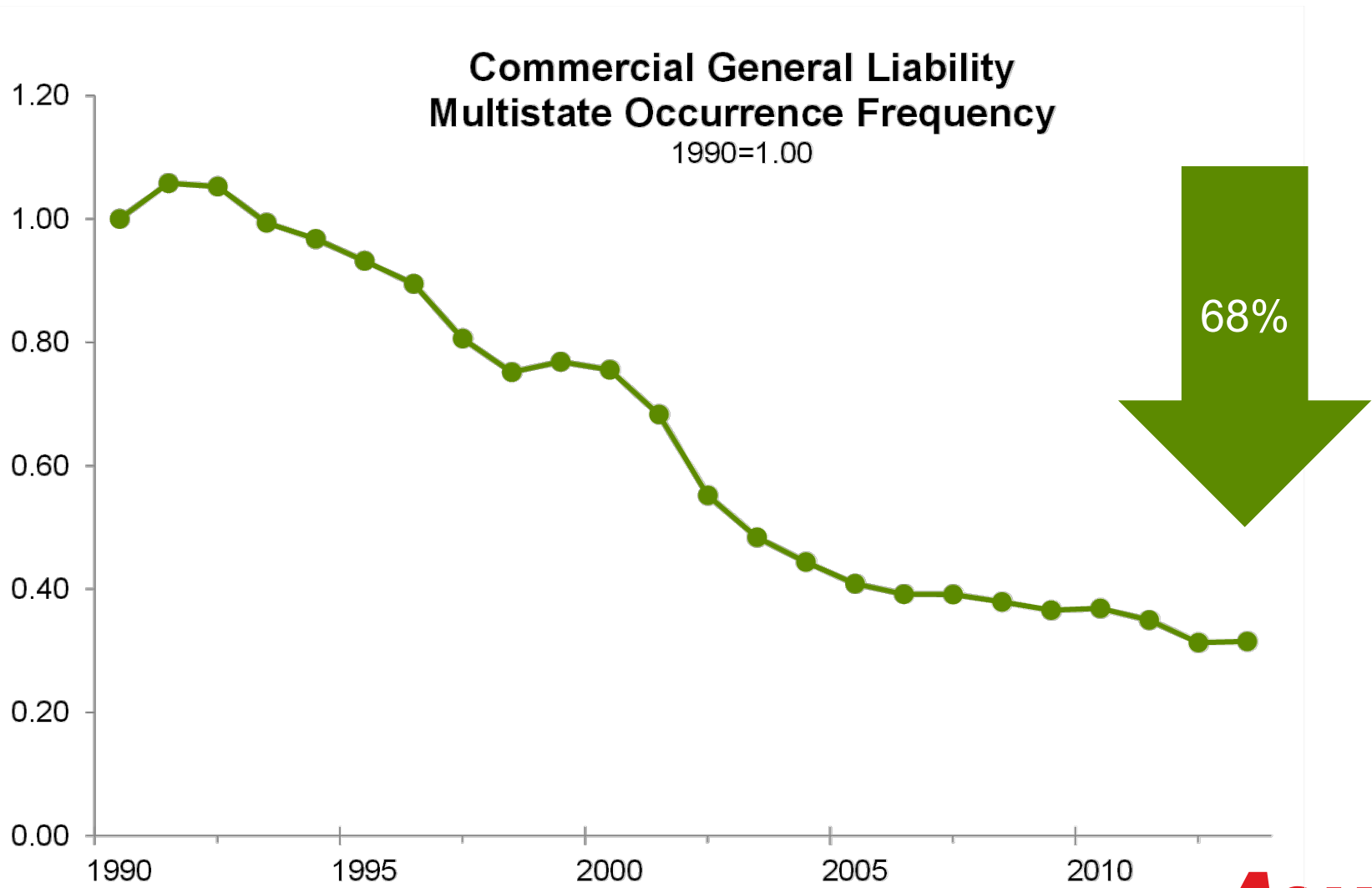**Proportion of Employment in Goods Producing Industries**
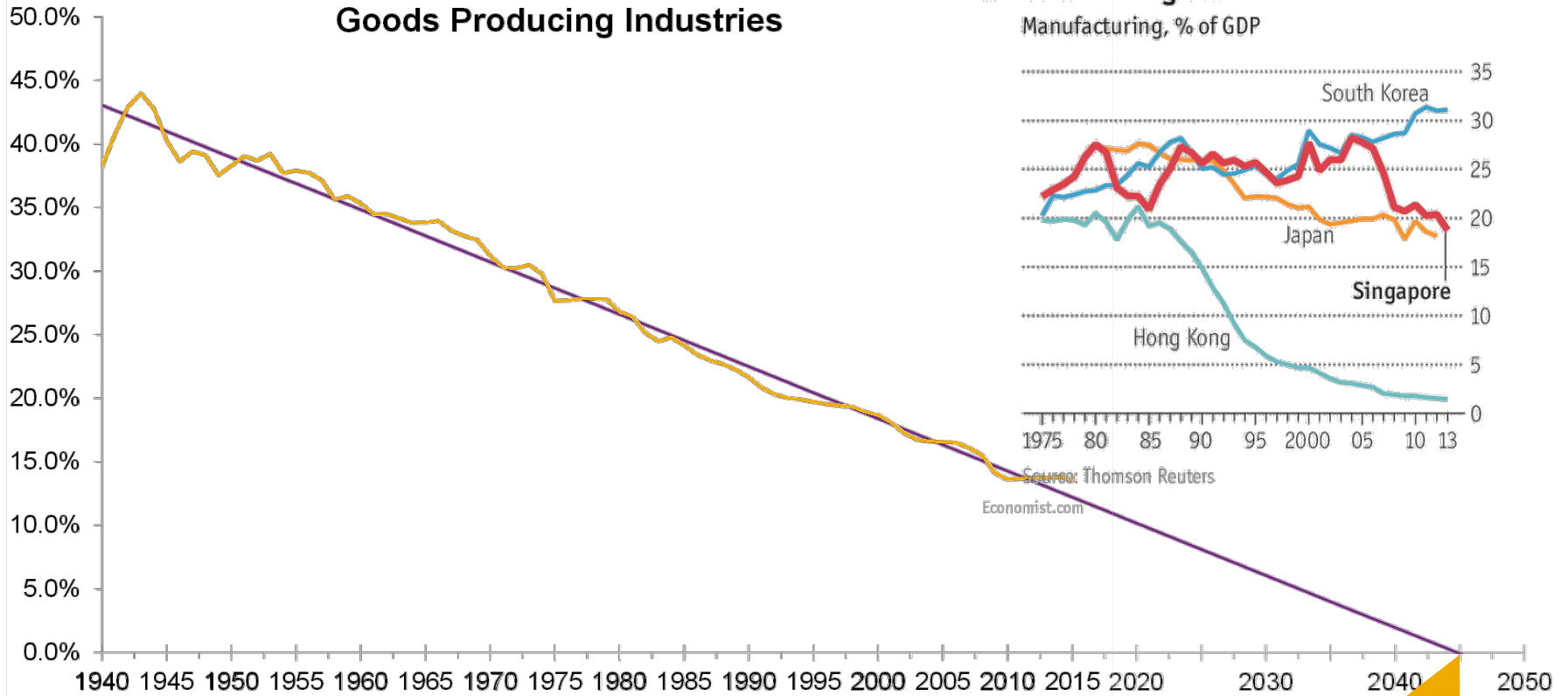
Still making stuff
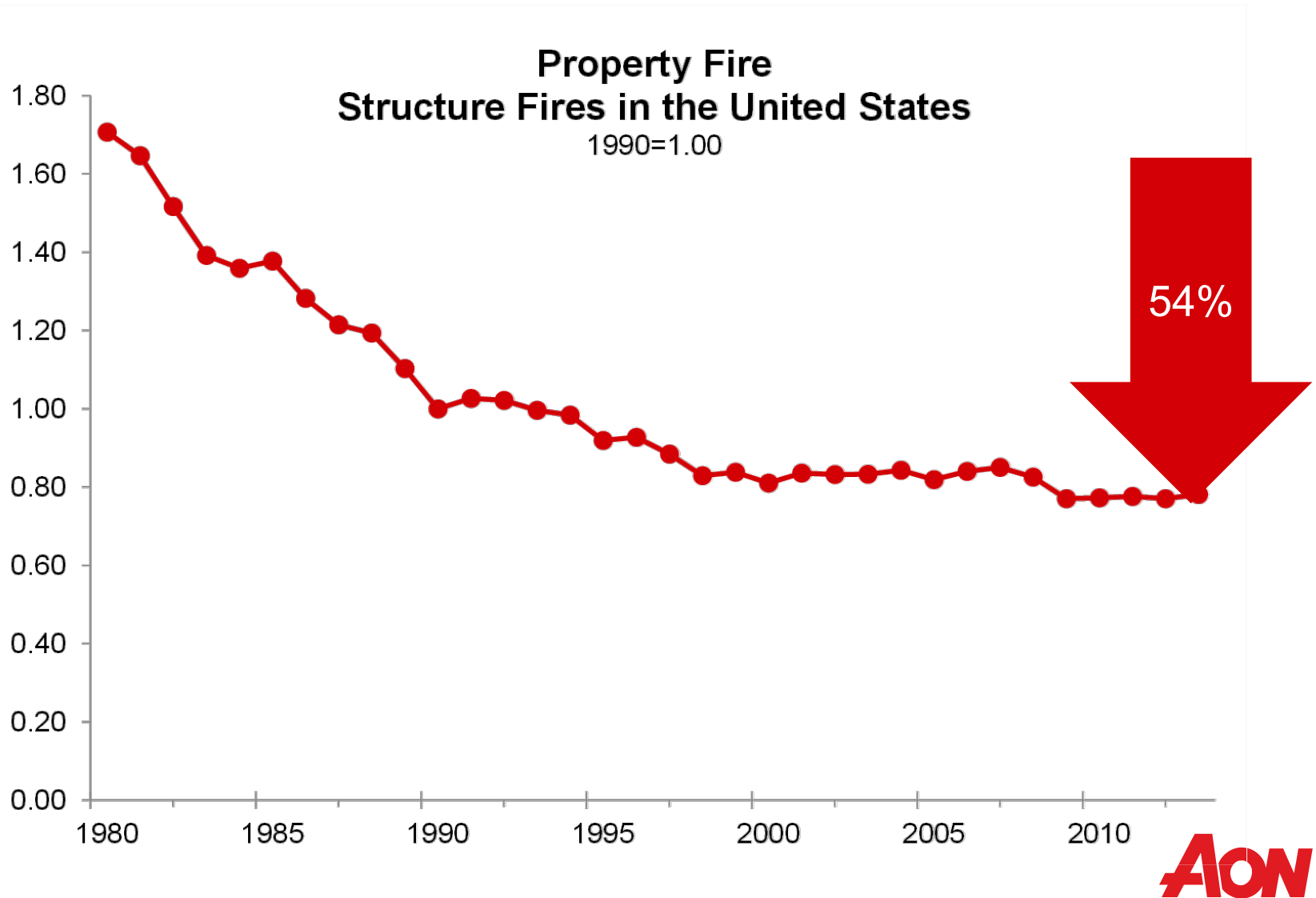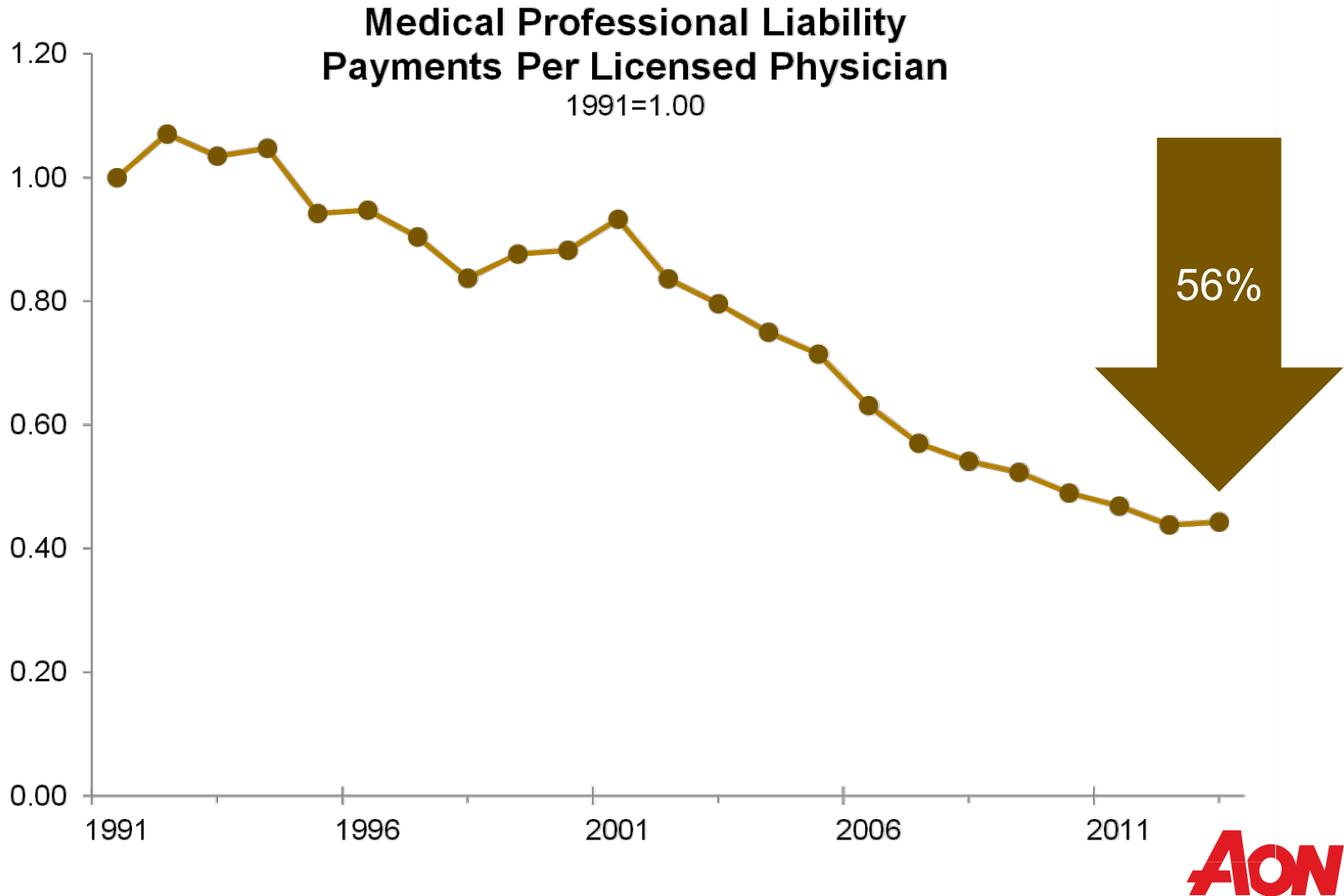Manufacturing, % of GDP

South Korea
Japan
Singapore
Hong Kong

Source: Thomson Reuters
Economist.com

Last US manufacturing job disappears: 2045

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General Liability frequency down 68% since 1990

**Commercial General Liability
Multistate Occurrence Frequency**
1990=1.00

68%

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Structure fire loss frequency down 22% since 1990, and 54% since 1980

**Property Fire
Structure Fires in the United States**
1990=1.00

54%

Source: Structure Fires in the United States: National Fire Protection Association Report on Fire Loss in the United States During 2013

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Medical Professional payment frequency down 56% since 1991

Medical Professional Liability
Payments Per Licensed Physician
1991=1.00

56%

Source: Payments per Licensed Physician: National Practitioner Data Bank Public Use File, 12/31/2014, U.S. Department of Health and Human Services, Health Resources and Services

Auto severe accident frequency down 47% since 1990 and 67% since 1980

Automobile Liability
Fatalities Per 100M Vehicle Miles Traveled
1990=1.00

67%

Source: Fatalities per 100M VMT: 2005-2010 FARS Final File, 2011 FARS Annual Report File, FHWA December 2014 Traffic Volume Trends, February 2015
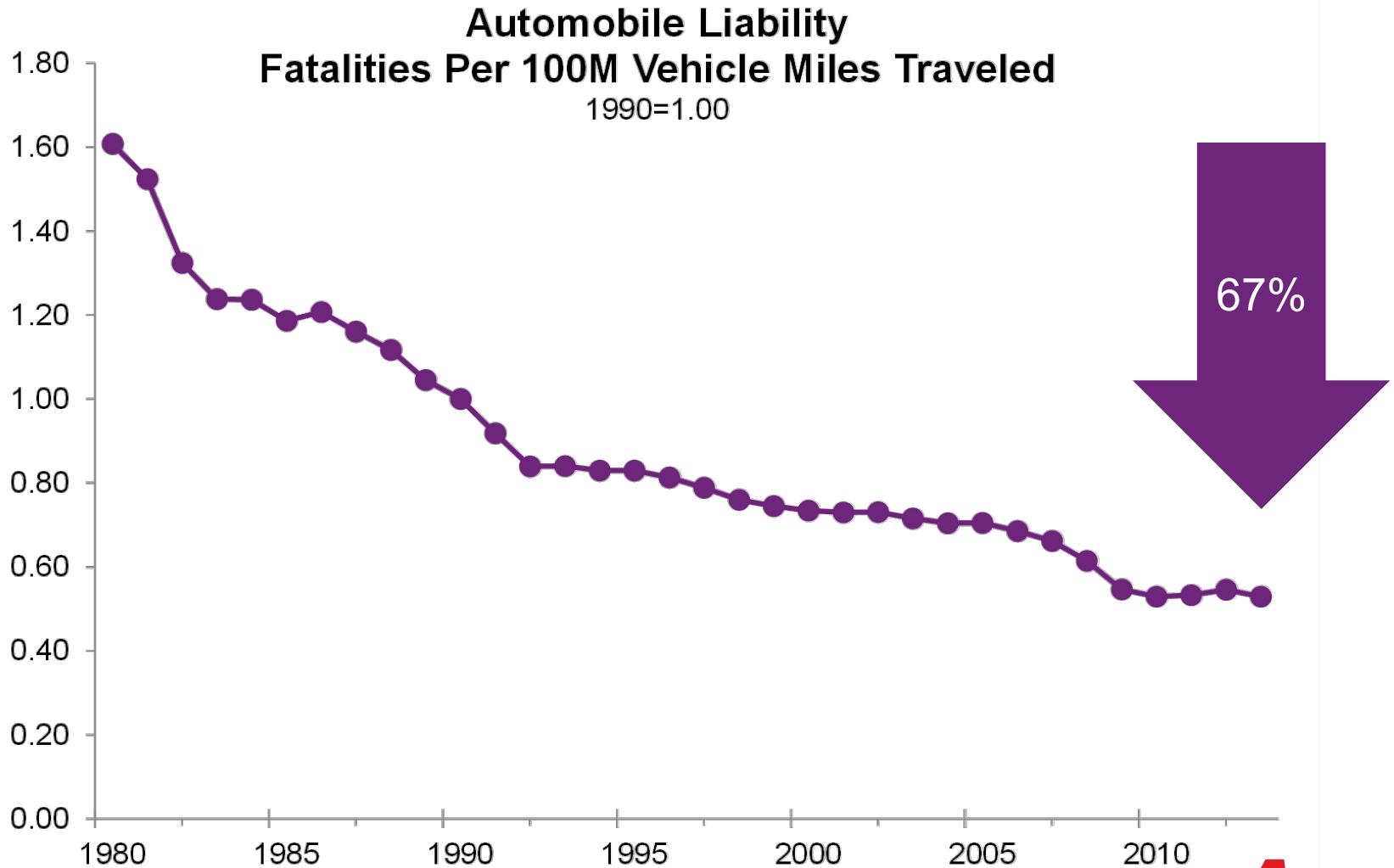
European motor fatalities down 58% since 2000

EU Country Road Fatalities
per 100K vehicles, indexed 2000=100

58%

Legend: United Kingdom, Netherlands, Germany, Spain, Italy, France, Belgium, Total CEE
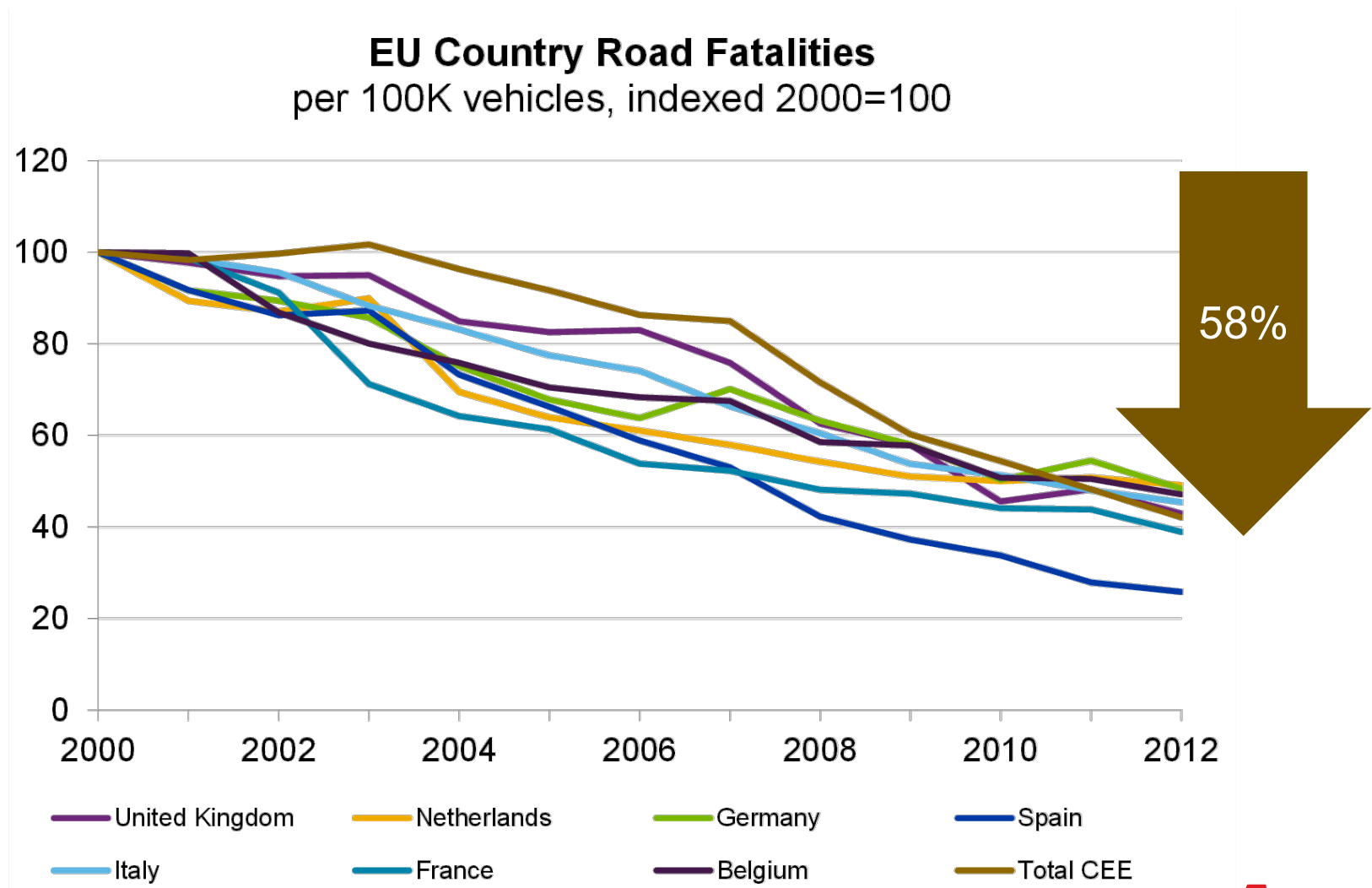
European motor injuries down 42% since 2000

EU Country Road Injuries
per 100K vehicles, indexed 2000=100

42%

Legend:
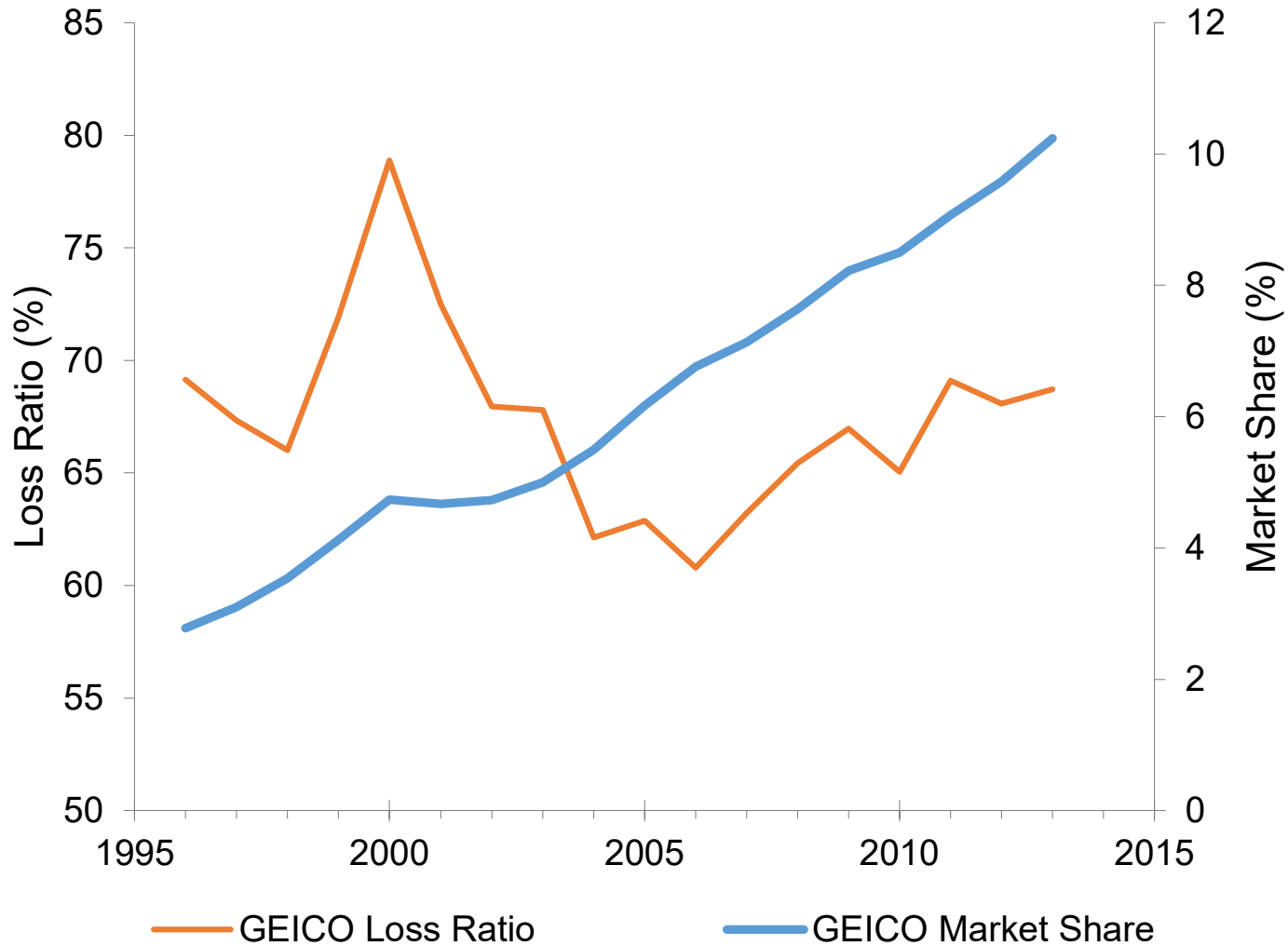- Germany
- United Kingdom
- France
- Italy
- Spain
- Portugal
- Netherlands
- Belgium
- Total CEE

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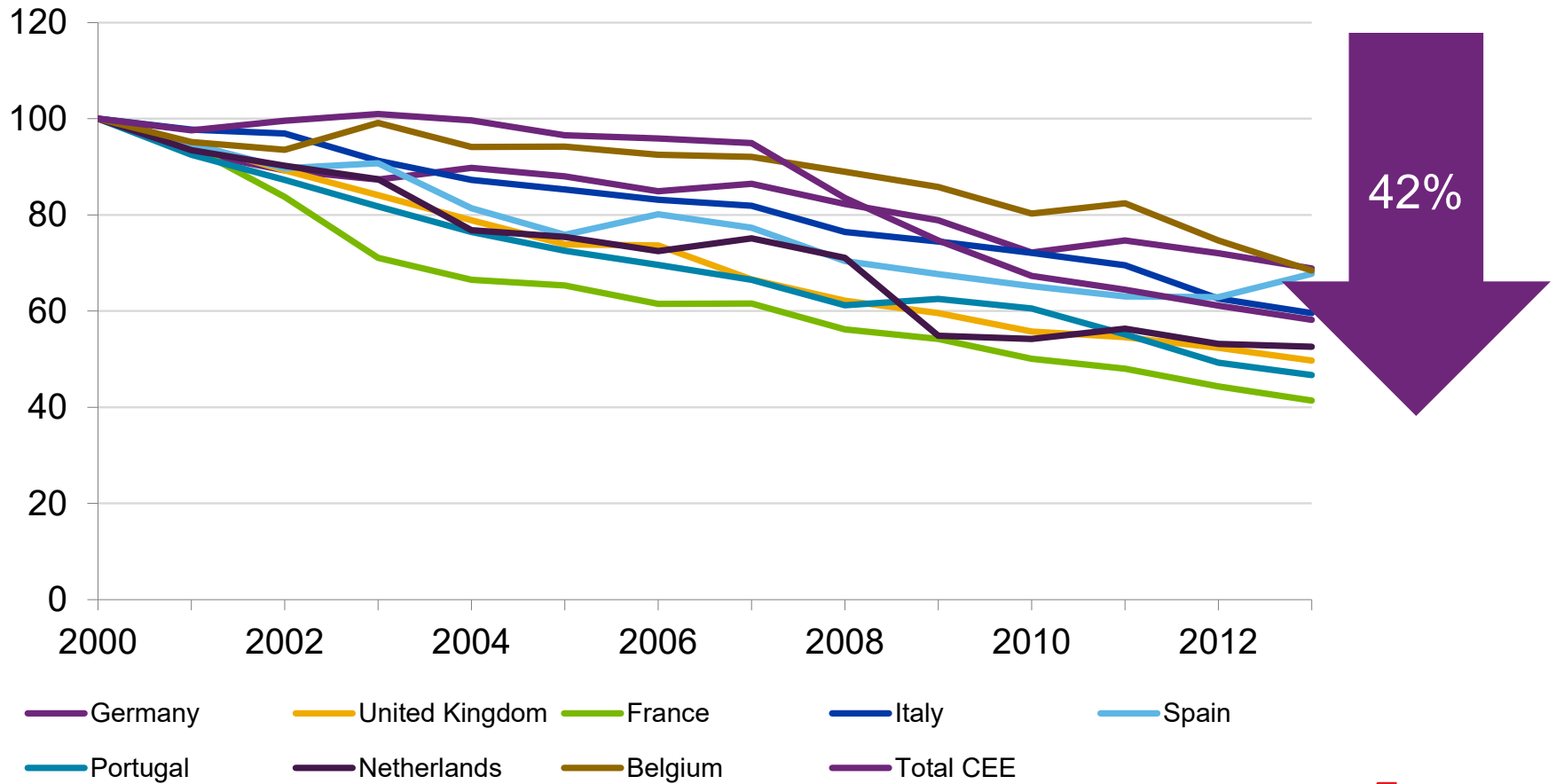
Threat #1

Creative Destruction Existing-Risk

US auto market, 1996-2013
GEICO becomes #2 ranked carrier
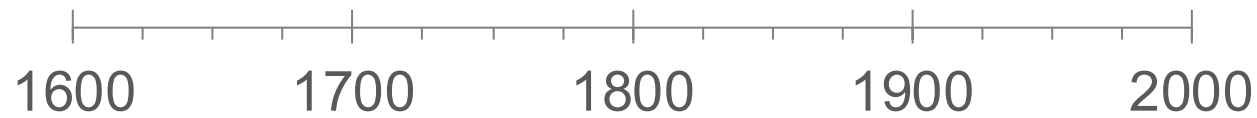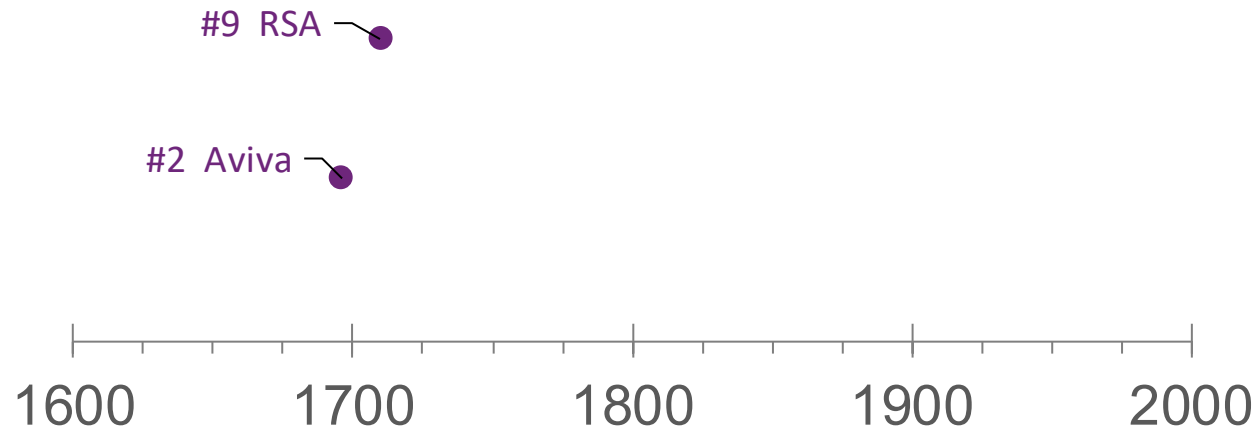

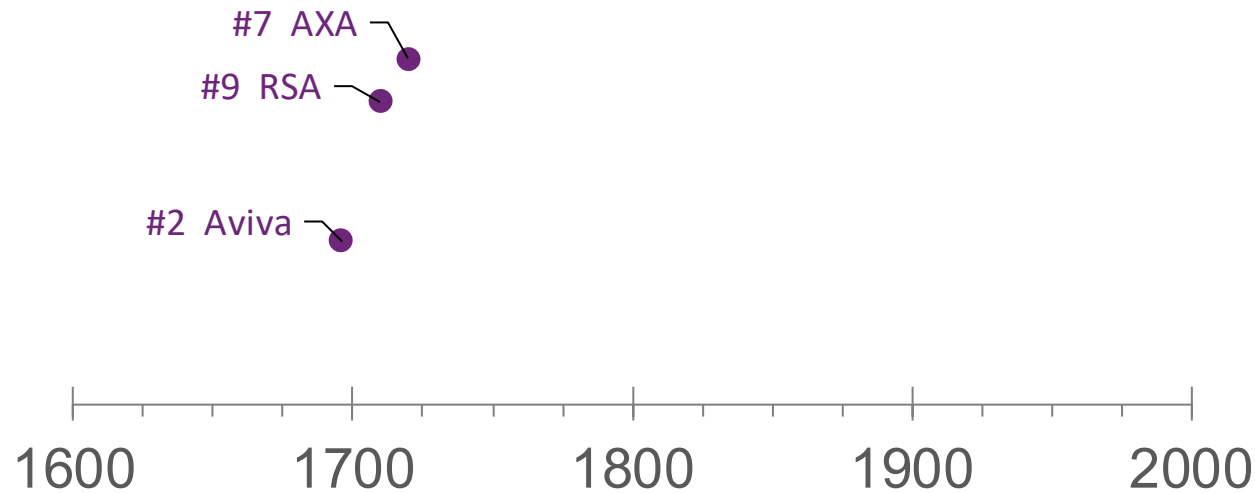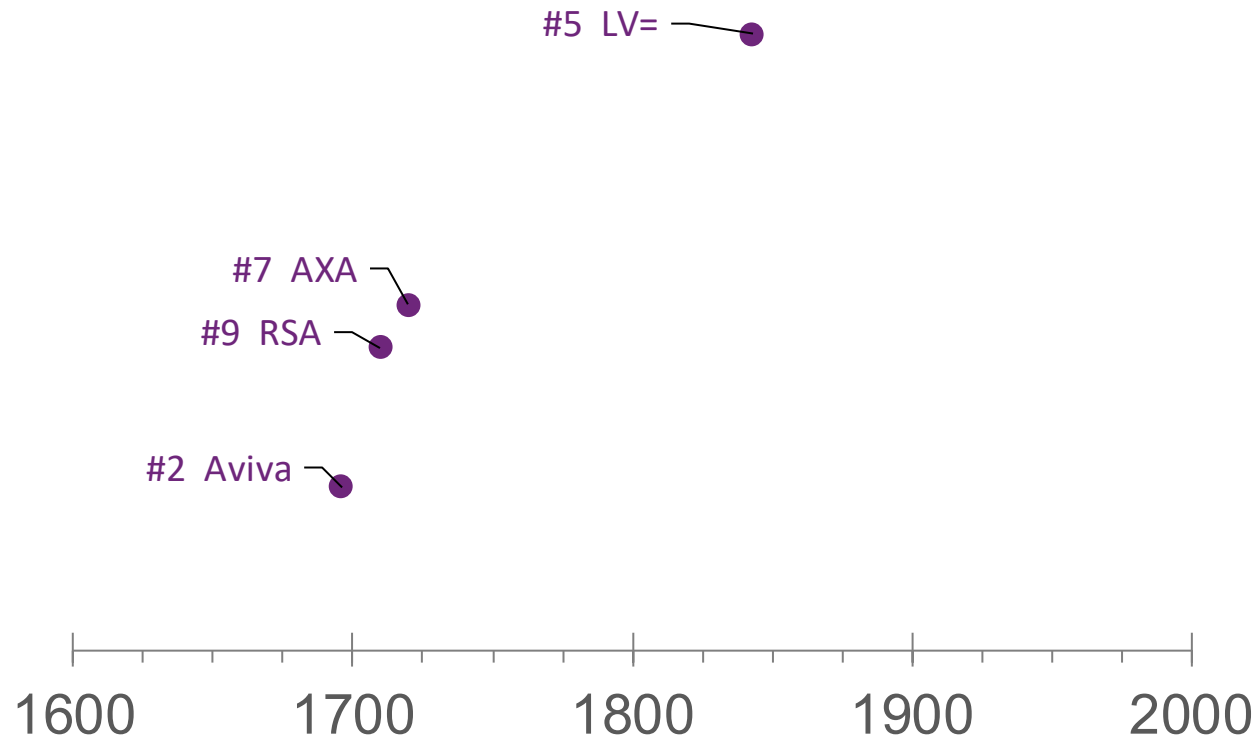GEICO Loss Ratio   GEICO Market Share

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Top ten UK motor and US personal auto companies by date founded

Top ten UK motor and US personal auto companies by date founded

1600   1700   1800   1900   2000

Empower Results®

Top ten UK motor and US personal auto companies by date founded

#9 RSA

#2 Aviva

1600   1700   1800   1900   2000

Empower Results®

Top ten UK motor and US personal auto companies by date founded

#7 AXA

#9 RSA

#2 Aviva

1600   1700   1800   1900   2000

Empower Results®

Top ten UK motor and US personal auto companies by date founded

#5 LV= ●

#7 AXA ●
#9 RSA ●

#2 Aviva ●

1600   1700   1800   1900   2000

AON
Empower Results®

Top ten UK motor and US personal auto companies by date founded

#5 LV=

#9 Travelers

#7 AXA

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Empower Results®

Top ten UK motor and US personal auto companies by date founded

#6 Great Lakes Re

#5 LV=

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#9 Travelers

#3 Allstate

#7 Farmers

#10 American Family

#8 Nationwide

#6 USAA

#1 State Farm

#7 AXA

#9 RSA

#2 Aviva

1600   1700   1800   1900   2000

Empower Results®

Top ten UK motor and US personal auto companies by date founded

#10 Allianz

#6 Great Lakes Re

#5 LV=

#5 Liberty
Mutual

#9 Travelers

#2 GEICO

#3 Allstate

#7 Farmers

#10 American Family

#8 Nationwide

#6 USAA

#1 State Farm

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1600   1700   1800   1900   2000

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Top ten UK motor and US personal auto companies by date founded

#10 Allianz

#6 Great Lakes Re

#5 LV=

#4 Progressive

#2 GEICO

#3 Allstate

#7 Farmers

#10 American Family

#5 Liberty
Mutual

#8 Nationwide

#9 Travelers

#6 USAA

#1 State Farm

#7 AXA

#9 RSA

#2 Aviva

1600   1700   1800   1900   2000

Empower Results®

Top ten UK motor and US personal auto companies by date founded

#1 Direct Line

#10 Allianz

#4 Progressive

#2 GEICO

#6 Great Lakes Re

#3 Allstate

#5 LV=

#7 Farmers

#5 Liberty Mutual

#10 American Family

#8 Nationwide

#9 Travelers

#6 USAA

#7 AXA

#1 State Farm

#9 RSA

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1600   1700   1800   1900   2000

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#3 Ageas

#1 Direct Line

#4 Progressive

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#2 GEICO

#6 Great Lakes Re

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#9 RSA

#2 Aviva

1600   1700   1800   1900   2000

Top ten UK motor and US personal auto companies by date founded

#4 Admiral
#3 Ageas
#1 Direct Line
#10 Allianz
#4 Progressive
#2 GEICO
#6 Great Lakes Re
#3 Allstate
#5 LV=
#7 Farmers
#5 Liberty Mutual
#10 American Family
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1600   1700   1800   1900   2000

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Top ten UK motor and US personal auto companies by date founded

#4 Admiral
#8 esure
#3 Ageas
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#10 Allianz
#4 Progressive
#2 GEICO
#6 Great Lakes Re
#3 Allstate
#5 LV=
#7 Farmers
#5 Liberty Mutual
#10 American Family
#9 Travelers
#8 Nationwide
#6 USAA
#1 State Farm
#7 AXA
#9 RSA
#2 Aviva

1600   1700   1800   1900   2000

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UK motor: a fast changing environment

1985-1995 Telephone Revolution

0% phone
100% face to face
0% online

1999-2003 Brand Assurer Growth

80% phone
20% f2f
2% online

2004-2007 Price Comparison Growth

78% phone
5% f2f
10% online

2008-2011 Claims Farming & Ancillary Income

42% phone
2% f2f
51% online

2012-2015 Market Reform, Telematics & Pricing Sophistication

40% phone
<1% f2f
60% online

2016+ Big Data

UK motor: a challenging environment for insurers

ABI Association of British Insurers

UK Insurance KEY FACTS 2014

MOTOR INSURANCE

£53m

The UK motor insurance market made a £53m underwriting loss in 2013. The motor insurance industry last made an underwriting profit in 1993.

Average premium paid for private motor insurance*, £

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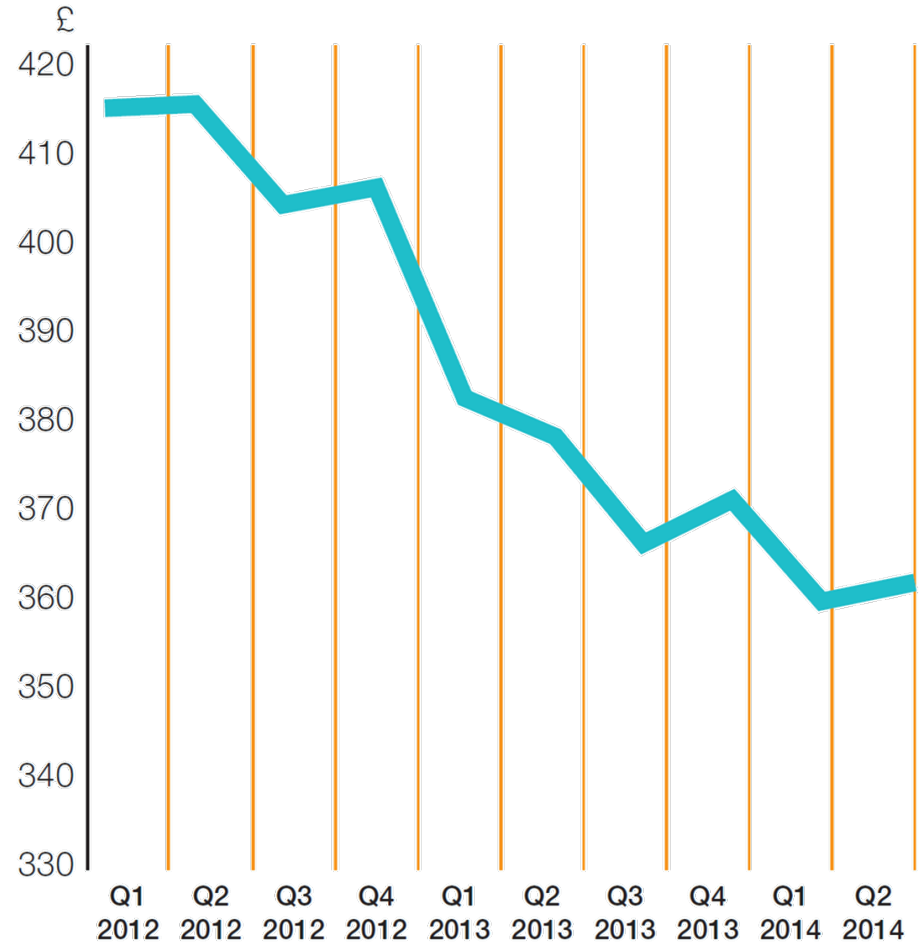
Opportunity #3

Blue Ocean Emerging-Risk

Blue Ocean creation: market creation does not imply market destruction

"Red ocean traps…anchor managers in…**crowded market spaces** where companies engage in bloody **competition for market share** and prevent them from entering…**previously unknown and uncontested market spaces** with ample potential"

Red Ocean Traps
W. Chan Kim
Renée Mauborgne

Target non-customers

De-segment De-niche

It's more than technology

Not either-or… both-and

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Can the old value chain produce new ideas?

"Advocates of the strategy calculate that, by providing a **better service** than incumbents, and by portraying their critics as defenders of **vested interests**, they can **mobilise public opinion and get the rules changed**"

"A striking number of innovative companies have business models that flout the law"

The Economist
May 2nd 2015

Technology, Big Data, & analytics are changing everything

Features of the new world
- Cheap or free data, free distribution and free duplication
- Mobil connectivity, location aware
- Cheap and scalable cloud computing

Product excellence is paramount, not
- Control of information
- Stranglehold on distribution
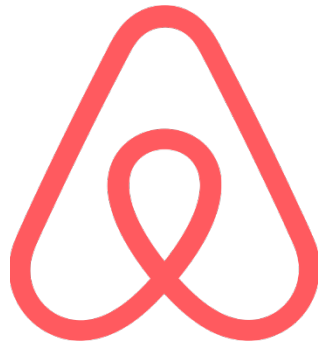- Overwhelming market power
- Vested interest

Go

How Google Works

Eric Schmidt & Jonathan Rosenberg
with Alan Eagle, foreword by Larry Page

- Success = "10X" a product…not 10% growth

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Product excellence is paramount

To Uberize…

To "Uberize", remove the middleman, theme of the times.
Nassim Nichol Taleb, tweet, 2014

Surge pricing

Supply competition is the key to reaping the benefits of markets.
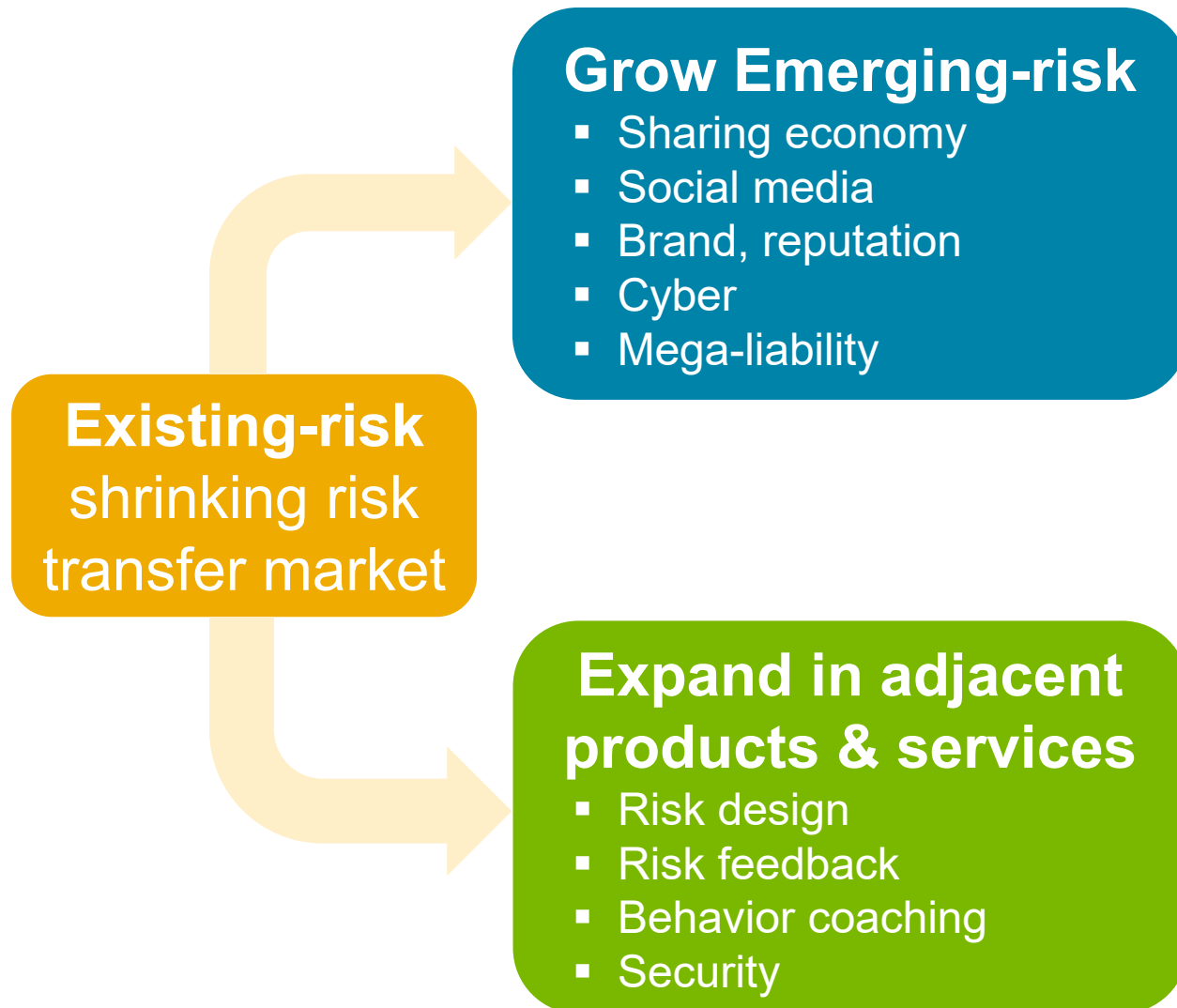John Cochrane, Grumpy Economist blog

We got there first
$66B
Alternative Capital

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Strategic responses to shrinking risk base

Grow Emerging-risk
- Sharing economy
- Social media
- Brand, reputation
- Cyber
- Mega-liability

Existing-risk shrinking risk transfer market

Expand in adjacent products & services
- Risk design
- Risk feedback
- Behavior coaching
- Security

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Behavior monitoring and risk-feedback, stable, recurring non-risk income…and a reason for regular customers interact

"Safety, control and protection for themselves, their loved ones, their homes and businesses"

IP Access Control

Fire Alarms

Intrusion Alarms

Event Management

Energy Management

Connected world >$70B market by 2020

Only 19% market penetration today

Selling security…just like insurers

Target same customer behavioral traits

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Predictions for the next five to ten years…

Property cat losses will dominate the headlines and be well-managed by private industry

Aggregators pose a far greater threat to insurers than driverless cars in the short-term

Casualty market leaders will use alternative data & analytics, alternative capital to cover emerging-risk

Cyber insurance submissions will contain more data than today's property cat submissions

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Thank you!

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Contact information

Stephen Mildenhall
Global Chief Executive Officer of Analytics
stephen.mildenhall@aon.com
Singapore   +65 6872 7668
US   +1 312 381 5880

Stephen Mildenhall is global CEO of Analytics for Aon. He leads the Aon Center for Innovation and Analytics in Singapore, which leverages Aon's data assets to provide analytically driven solutions for clients across all of Aon's businesses.

Steve joined Aon in 2003. Prior to Aon, he held various actuarial positions at Kemper Insurance, CNA Re Facultative and CNA Personal Lines, all in Chicago. He started in the insurance industry in 1992.

Steve is a Fellow of the Casualty Actuarial Society, an Associate of the Society of Actuaries and a Member of the American Academy of Actuaries. He is a Chartered Enterprise Risk Analyst. He received his Masters and PhD degrees in Mathematics from the University of Chicago, and a BSc in Mathematics from the University of Warwick in England.

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About Aon Benfield

Aon Benfield, a division of Aon plc (NYSE: AON), is the world's leading reinsurance intermediary and full-service capital advisor. We empower our clients to better understand, manage and transfer risk through innovative solutions and personalized access to all forms of global reinsurance capital across treaty, facultative and capital markets. As a trusted advocate, we deliver local reach to the world's markets, an unparalleled investment in innovative analytics, including catastrophe management, actuarial and rating agency advisory. Through our professionals' expertise and experience, we advise clients in making optimal capital choices that will empower results and improve operational effectiveness for their business. With more than 80 offices in 50 countries, our worldwide client base has access to the broadest portfolio of integrated capital solutions and services. To learn how Aon Benfield helps empower results, please visit aonbenfield.com.