Technical Release Notes – Version 16.0

December 2016
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Table of Contents

The following is a **12-page** detailed description of the changes within the updates, the data sources and methodologies. For additional information regarding the V16.0 Update, please consult:

1. The Technical Release Notes, V16.0 Summary – this is a **five-page**, high-level overview of the key changes for V16.0.
2. The Technical Release Notes, V16.0 Appendices – this is a **53-page** reference document containing updates to data-source items like the SIC / NAICS codes, ZIP Codes, etc.

Who to contact for more information

Please contact Client Services at ms@marketstance.com / 888-777-2587 or your Regional Relationship Director if you have any questions or service needs. We value your business, and thank you for your continued support.

Core sources updated

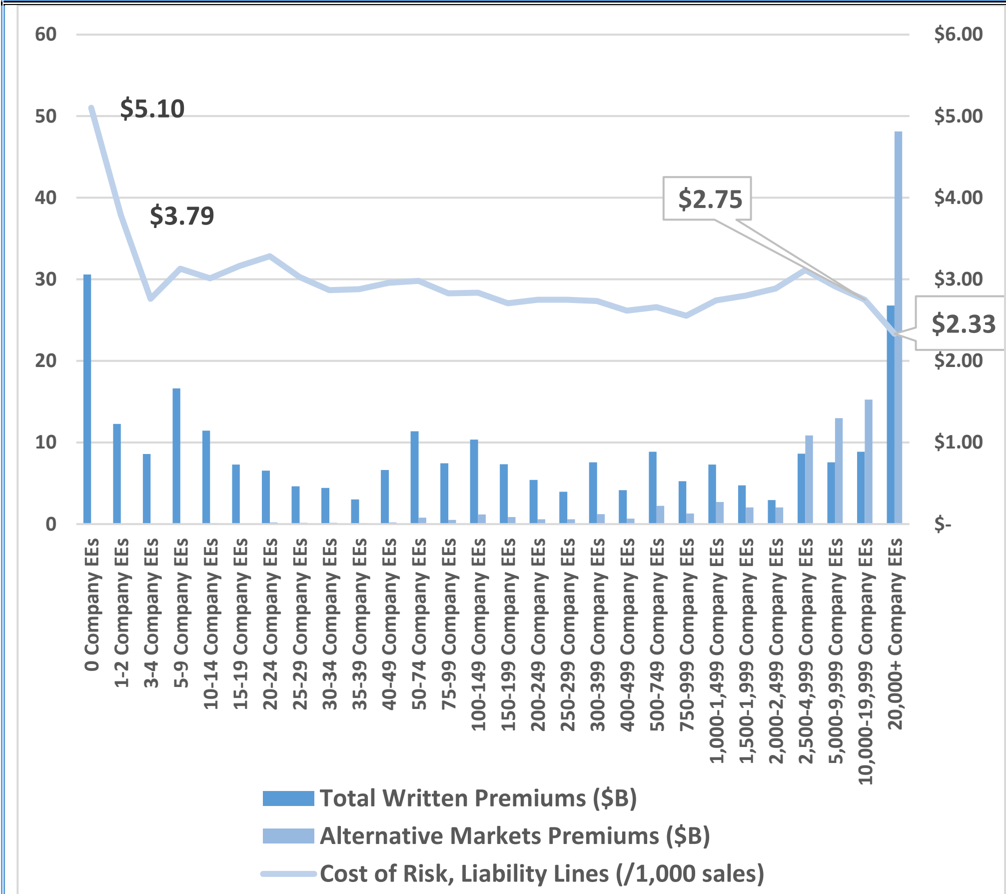
2015 estimates, all major products

MarketStance commercial and personal lines products reflect 2015 calendar year estimates in most products, including: Commercial Insight, ZIP Code Advisor, Special Liability Advisor, Commercial Auto Advisor, Personal Insight, Commercial Habitational Risk Advisor, Agent Broker Database, and New Business Insight.

Our Crime Advisor products reflect calendar year 2014 estimates, as we await the sources and Census demographics required to build our 2015 estimation model in the forthcoming months.

Advanced modeling techniques yield more robust market estimates for our headquarters database

Figure 1: Commercial Insight premiums and cost of risk in liability lines by employee size



Source: MarketStance Commercial Insight HQ Basis Data V16.0 (Development Data, CY 2015).

What is a headquarters database?

A headquarters database reporta premiums, insurable exposures, and loss ratios at the account or company level business class and location, not at the individual risk level.

For example, United Technologies headquarters-basis premiums and exposures would be reported in Hartford County, CT, in its predominant (largest payroll) business class, Aircraft Engines and Engine Parts (SIC 3724).

In contrast, in other Commercial Insight products, operating location and hybrid databases report exposures, forecast exposure growth, and premiums at the business class and location of each cluster of operating locations.

In UTC's case, Aircraft Parts and Equipment, N.E.C. (Except Fluid Power Aircraft Subassemblies, Target Drones, Research and Development) (SIC 3728), Refrigeration and Heating Equipment (SIC 3585), Search, Detection, Navigation, Guidance, Aeronautical, and Nautical Systems and Instruments (SIC 3812), Space Propulsion Units and Parts (SIC 3764), and so forth, wherever located in the U.S.

Why are you calling it a model? Doesn't the US Census Bureau publish headquarters-basis data?

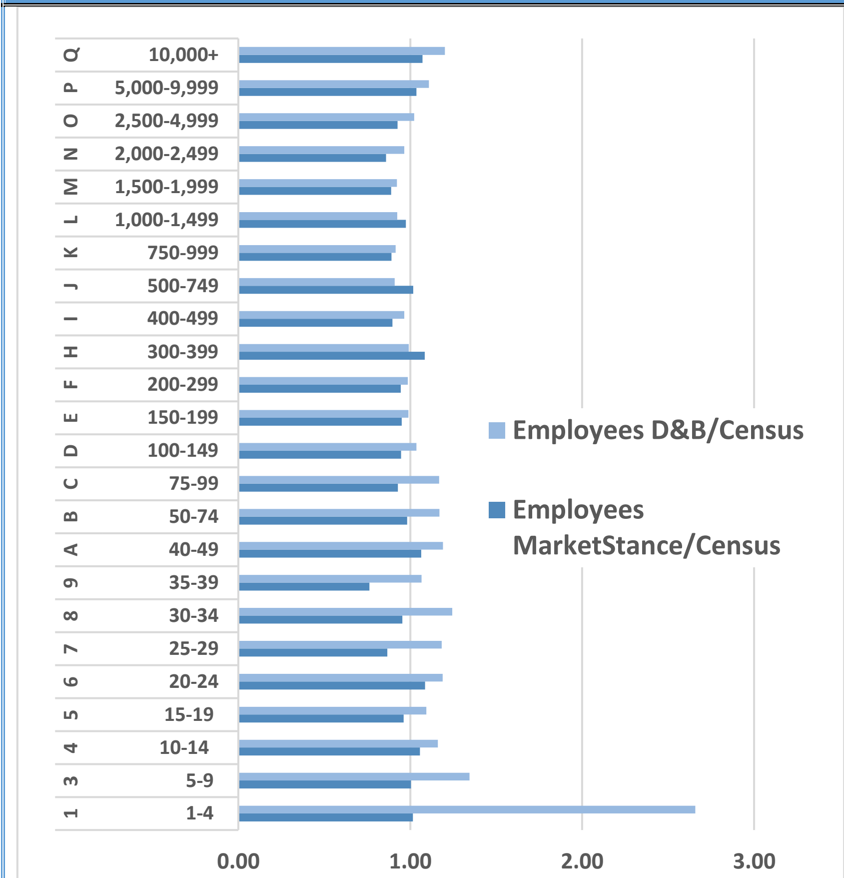
The US Census Bureau publishes very little data at this (what it terms "enterprise") level and nothing as detailed as in MS data products. Census sources include the Statistics of U.S. Business funded by the U.S. small business administration and the Enterprise Statistics program, which was recently suspended for budgetary reasons.

What exactly does the headquarters model provide that advances it beyond Census or any other source of commercial market data?

The Census economic programs provide unmatched coverage of private sector risks: exposures at the county, employee size, and business class.

In modeling terms this is our "bedrock"—a nearly complete enumeration of risks at their payroll reporting location, easily the most comprehensive available expression of commercial market exposures from a statistically credible data source.

Figure 2: Commercial Insight Employees and D&B employees versus Census Statistics of US Business by employee size classification



Sources: MarketStance Commercial Insight HQ Basis Data V16.0 (Development Data, CY 2014); D&B (May 2015); SUSB 2014.

But advanced modeling techniques[1] were required to answer six additional questions:

1. How many employees of each risk, given the employee size range reported in Census data (e.g. 32 employees, when Census reports 20-49 employees)?
2. What's the likely size of the company, given each risk's characteristics?
3. Is the risk a headquarters or an operating location that reports to a higher-level headquarters?
4. If it is a headquarters, how many operating locations report to it?
5. If it is a headquarters, what are the likeliest characteristics of each risk that reports to it?
6. What is the predominant business class of the company as a whole?

[1] Monte-Carlo simulations, based on Dun & Bradstreet linkage data, for the most part, supplemented by Statistics of U.S. Business.

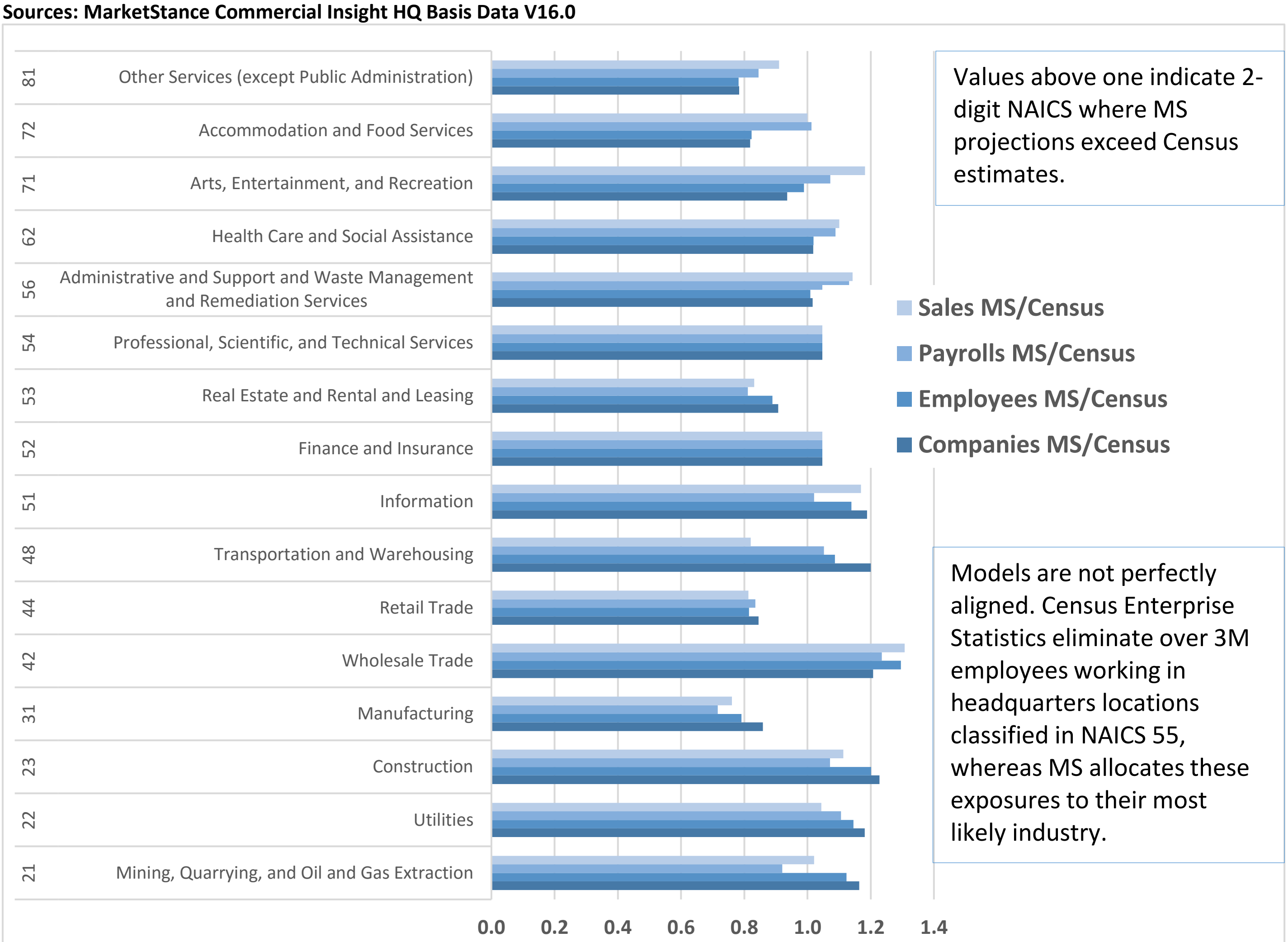
How does the MarketStance HQ basis model of exposures perform relative to the Census and other sources?

The MarketStance model outperforms private sources such as the Dun & Bradstreet (D&B) marketing file, which generally tends to overstate the number of small commercial exposures as well as the number of employees of 10,000+ employee companies (**Figure 2, prior page**).

However, the most telling comparison examines the percent composition of Commercial Insight exposures relative to Census Enterprise Statistics for 2012 (published June 2016). **Figure 3** compares the percentage composition of the market in Commercial Insight data projected back to 2012 with the Census, for all companies with employees.

Figure 3: MS versus Census, 2-digit NAICS composition ratio—all sizes

Sources: MarketStance Commercial Insight HQ Basis Data V16.0



(Development Data, CY 2012, released December 2016); Census Enterprise Statistics, 2012 (June 2016).

What was wrong with the model that powered your headquarters databases prior to V16.0?

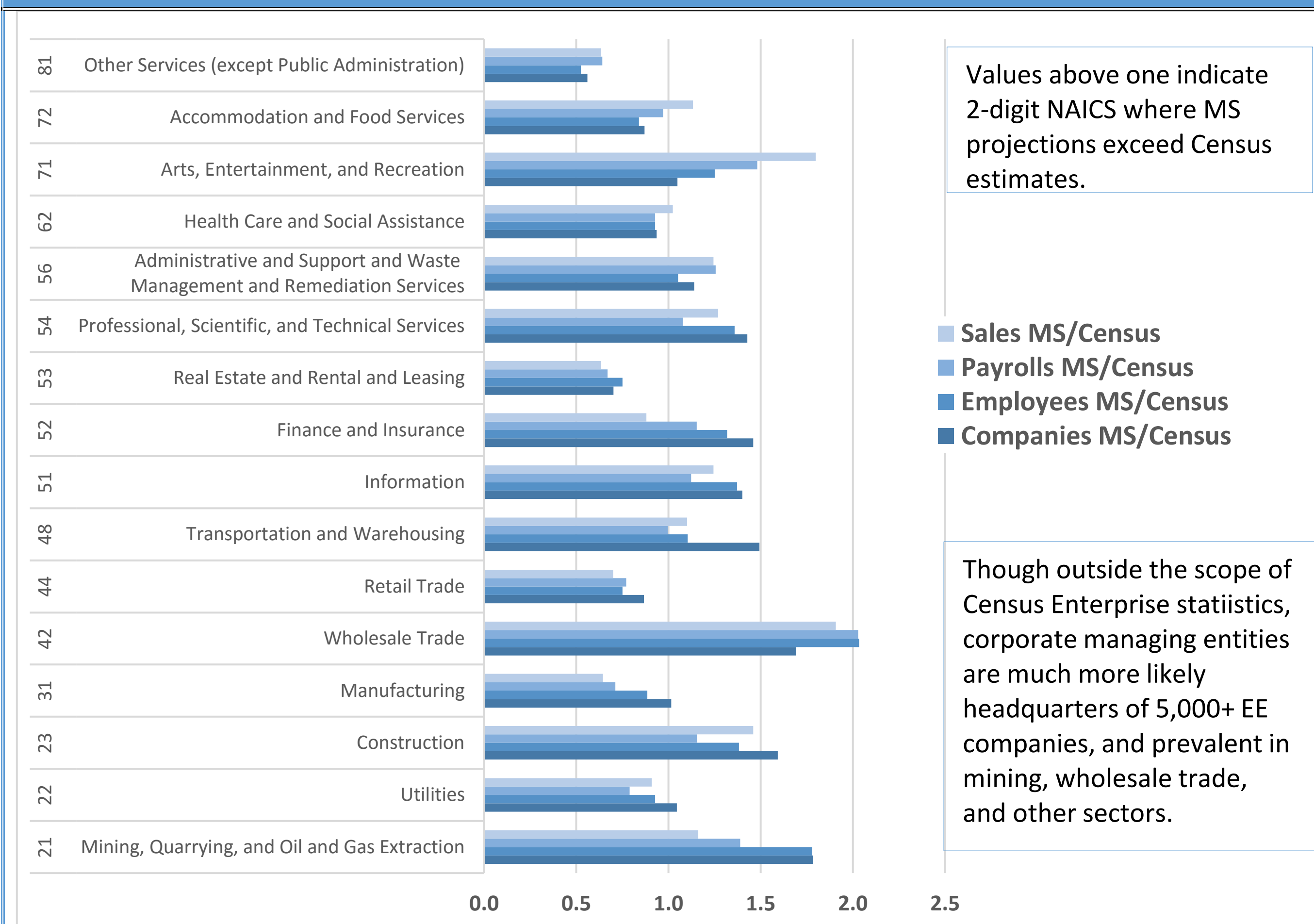
The legacy model (V15.2 and earlier) was not “wrong” – it just didn’t address the full range of questions. In fact, we conserved several of the modeling techniques and routines used since we invented the headquarters basis data more than a decade ago, such as the model of company size and headquarters status, given each risk’s characteristics.

However, the legacy model fell short in several areas.

For one, it didn’t address the need for finer employee size segmentation in all size segments.

Accounts with 22 employees differ fundamentally from accounts with 48 employees, but were lumped in the same category – ditto the overly broad categories in middle markets and national accounts where 1,000 and 10,000+ employee companies were lumped in the same category. Moreover, the legacy model simplified matters by assuming each company operated within a single 4-digit SIC. This produced a reasonable result for small commercial risks, less so for middle-market and national account risks difficult to reduce to a single business class in most cases.

Figure 4: MS versus Census, 2-digit NAICS composition ratio—companies with 5,000+ employees



Sources: MarketStance Commercial Insight HQ Basis Data V16.0 (Development Data, CY 2012, released December 2016); Census Enterprise Statistics, 2012 (June 2016).

OK, great, but why is this better for me and for MarketStance products?

Six reasons:

1. **Finer risk segmentation** enabled greater precision in modeling take-up rates, effective rates by line of coverage, and alternative market utilization. Twenty-eight employee size categories were used in all modeling for V16.0, and that level of segmentation will soon become available for clients in all products (January 2017) as opposed to the thirteen segments now available in our standard databases;
2. **More accurate cost of risk**. As Figure 1 reflects, the new model enabled fundamental changes in the effective rates paid by risks of different sizes. In other words, the cost of risk in small commercial liability lines is typically 2-4 times greater than it is in national accounts, a difference enabled by the new modelling approach.
3. **Truer account characteristic linkages.** Moving up the employee size spectrum, each account is modeled from the ground up as an industrially and geographically diverse portfolio of linked risks. For example, manufacturers linked to risks in mining, or wholesale/retail distribution; supermarkets and supercenters linked to trucking risks; casino hotels linked to restaurants and racetracks; accounts headquartered in California linked to risks in Arizona, Michigan, and Washington, and so forth. Forecasted exposures and premiums are simply rolled-up from risk level data.
4. **More accurate small commercial market opportunity**. The headquarters model released premium previously absorbed by national accounts, where excessive aggregation of 5,000+ employee companies overstated market shares, to the detriment of the smallest accounts.
5. **Unmatched identification of account-level characteristics**. The new model enables our products to report industry classification and account location with unmatched reliability. While no model is perfect – otherwise it would not be a model – we believe ours surpassed anything available in the public or private domain, combining Census risk classification, employee sizing, and reported exposure values, with a statistically robust model based primarily on the family tree linkages built by D&B for prospecting larger accounts.
6. **Faster pace of innovation**. The MarketStance R&D team archived about 40,000 lines of code that had proven a significant barrier to innovation under the legacy model, making it far less burdensome to add lines of coverage, additional exposure forecast and loss experience measures than ever before.

Account minimum premiums

Clients requested and in V16.0 Commercial Insight, we implemented expanded line of coverage minimum premiums in many lines:

- Property (buildings & personal property minima established independently)
- Equipment breakdown/boiler and machinery
- Premises and operations liability
- Workers' comp
- Employment practices, fiduciary, and D&O liability
- Commercial auto (liability and physical damage minima established independently)

We based the thresholds on policy minima published in current rate filings and program marketing materials. The minima reported in our products reflect the composite influence of estimation routines and benchmarking to statutory and other sources.

As would be expected, raising the effective floor for many lines redistributed premiums from larger to smaller accounts. Certain lines of coverage such as BOP, E&O/professional liability, umbrella liability, excess liability, medical professional liability, and inland marine already reflected account minimum premiums and were not direct targets of this change.

Special liability take-up rates and loss costs

Clients requested and in V16.0 Commercial Insight, we updated take-up rates and loss costs in special liability lines. EPLI loss costs were brought in line with market trends in states such as California, where cumulative loss costs grew thirty or more percent over the last five years.

Additionally, we began implementing 2013-15 exposure data from Form 5500 filings made by retirement, health and welfare benefit plans regulated under the federal retirement statutes (ERISA). Notably, the new data reflected much greater small commercial fiduciary lines exposure, as reflected in our current estimates.

Growth forecast

V16.0 Commercial Insight and Growth Advisor products feature our current exposure growth forecasts for operating locations, companies, employees, payroll, and sales, based upon the August 2016 Moody's Analytics forecast. With forecast updates, we re-classify each cluster of accounts in the commercial market as either "Growing," "Neutral," or "Stressed" relative to the long-run employment growth over all industries and account sizes (**Figure 5**).

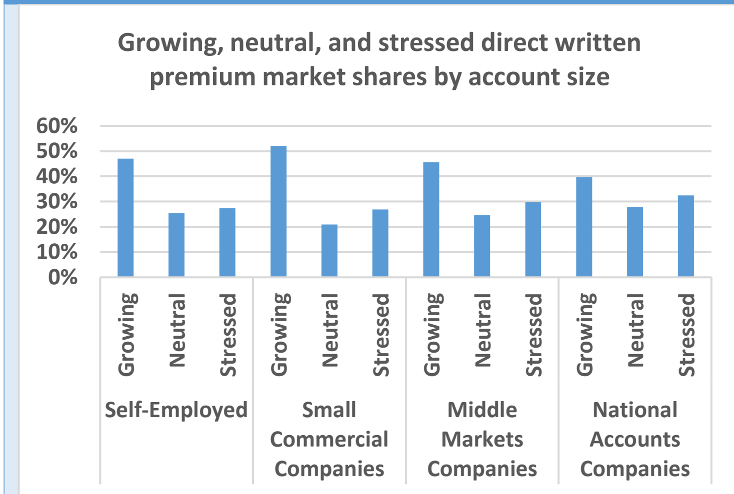
Figure 5: Growth Advisor version 16.0 Growing, Neutral and Stressed Premium Designations*

	Current period (2016-17) employment growth	2-year forecast period (2018-19) employment growth
Growing	Above 1.69% growth per year	Above 1.62% growth per year
Neutral	Between -0.04% growth per year and 1.69% growth per year	Between -0.11% growth per year and 1.62% growth per year
Stressed	Below -0.04% growth per year	Below -0.11% growth per year

***+/- 0.5 relative standard deviation (RSD) from US trend employment growth, 1970-2019. For example, premiums written are classified as "Growing" in the current period if 2015-19 employment growth > 0.5 x RSD Employment Growth + US trend employment growth, 1970-2019.**

This three-way classification provides a reliable, stable means for reporting the share of the commercial market where growth is most likely to occur – and where the market is stressed.

Figure 6: Small commercial leads the market through 2017



Source: MarketStance Growth Advisor V16.0 (December 2016).

Smaller accounts with fewer than 1,000 EEs will drive growth in the 2017 commercial market, as sectors such as construction, accommodation and food services react to consumer demand.

Fiscal policies of the incoming administration remain a big unknown, however, as does the status of Obamacare and the expanded overtime already implemented ahead of schedule by several major employers (**Figure 6**).

In contrast, larger accounts, more heavily concentrated in the stressed manufacturing and mining sectors, face headwinds from abroad in the form of weak foreign growth, continuing migration of operations outside the US, technological change, and stronger dollar.

Discerning users of MarketStance Growth Advisor products will nevertheless find growing opportunities lurking within local and regional economies

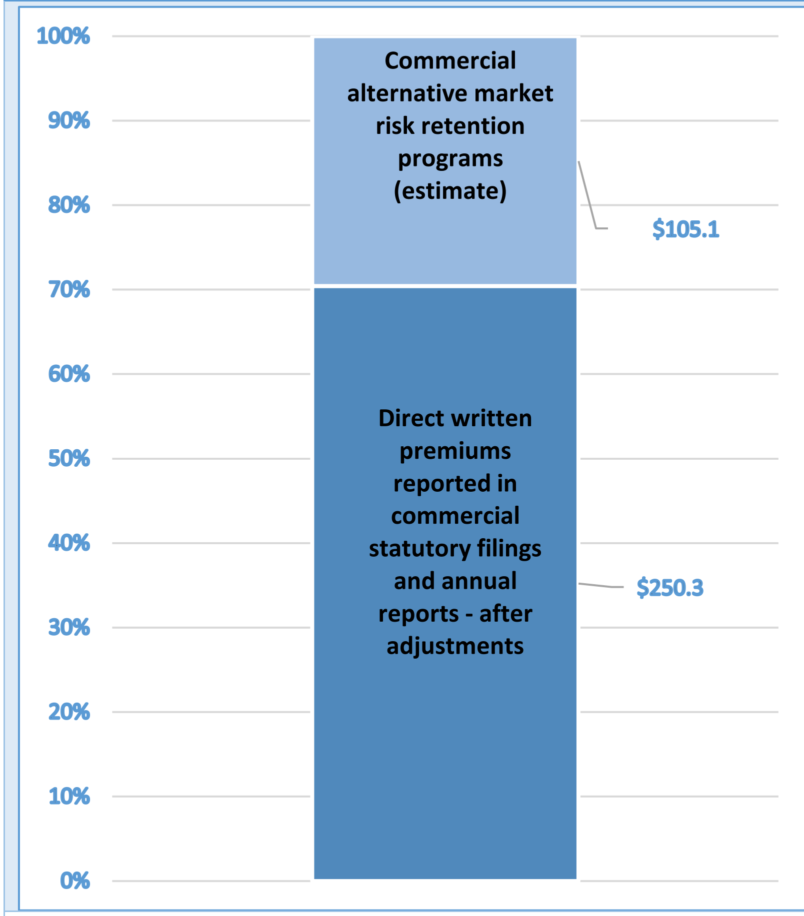
Commercial market benchmarks update: NAIC D&O and alien premiums

The following series of charts exhibits the major areas of difference between MarketStance and traditional tabulations of commercial market premiums derived from domestic statutory data sources. MarketStance removes personal inland marine and umbrella liability from statutory data, using our proprietary models of each market. We also subtract premiums in

Most importantly for V16.0 we integrated two data sources from the National Association of Insurance Commissioners (NAIC): The Directors and Officers Insurance Supplement, which we for the first time could process at the underwriting carrier level of detail; and, the NAIC Insurance Market Resource report of alien premiums by state. Given the level of detail of these sources, our new benchmark models gained greater accuracy.

What follows on the next page provides a look at the benchmark 2015 estimates and range of adjustments made for V16.0.

Figure 7: Commercial cost of risk approaches $355B after adjustments



Source: MarketStance Commercial Insight V16.0 (December 2016)

Figure 7 presents the two, primary commercial market underwriting segments, as adjusted by MarketStance.

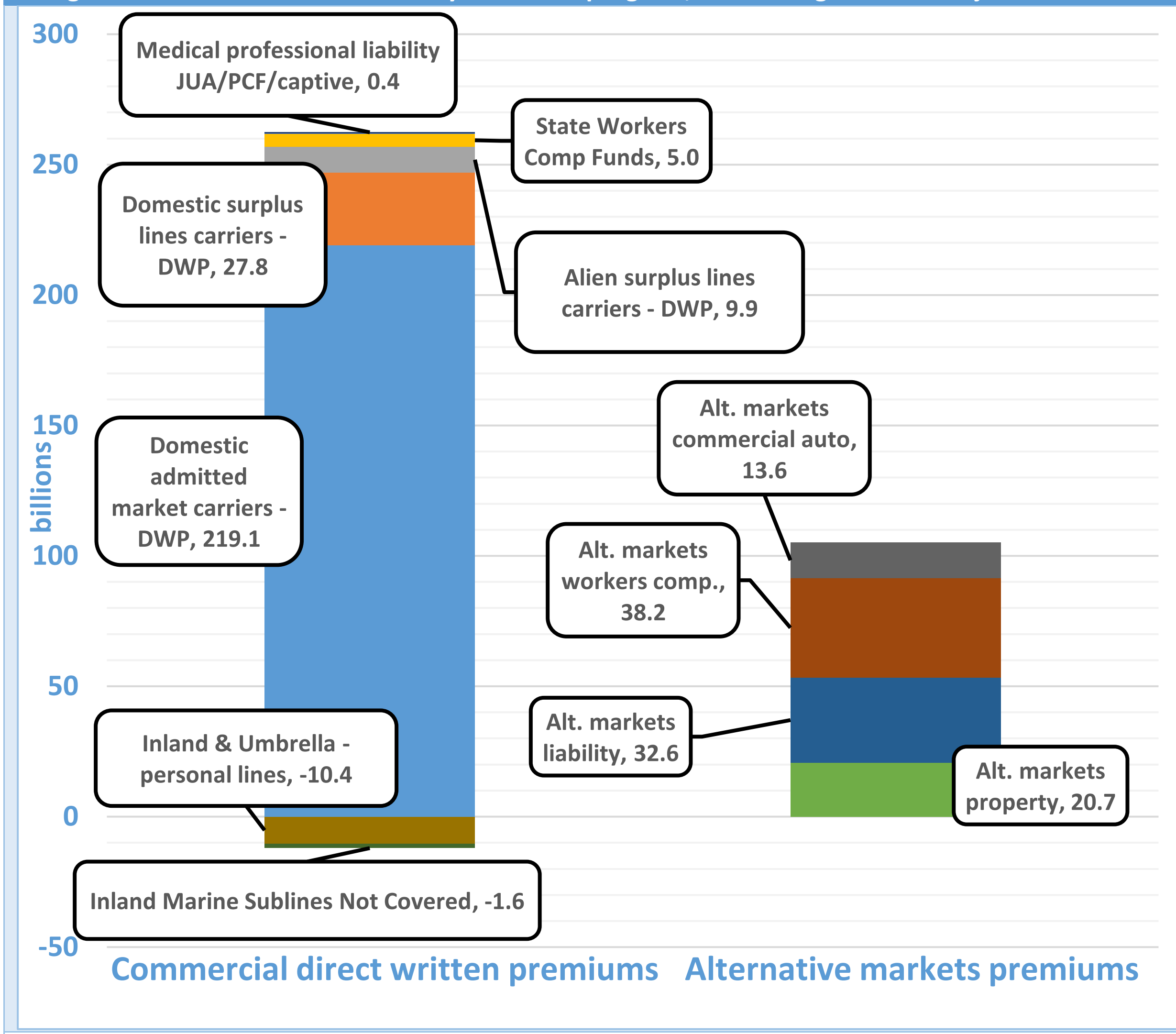
Additions to P&C premiums reported in statutory data:
In addition to the Commercial alternative market premiums (estimates) the additions include:

- ❑ Premiums written by alien (foreign domiciled) carriers such as Lloyd's on surplus lines
- ❑ State workers' compensation funds.
- ❑ Medical professional liability joint underwriting authorities and patient compensation funds.
- ❑ Texas Windstorm Insurance Association inland marine and property premiums.

Subtractions from P&C premiums reported in statutory data:

- ❑ Personal lines premiums in state by line totals (estimates)
  - Inland marine
  - Umbrella liability
- ❑ Premiums reported in statutory data by pure captive entities.
- ❑ Inland marine premiums in sublines not covered by MarketStance (e.g. event insurance).

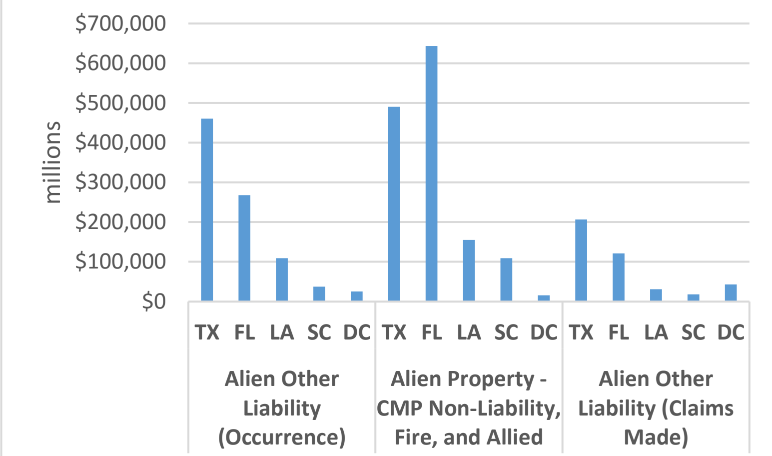
Figure 8: Commercial cost of risk by insurance program, market segment and adjustment detail



Sources: A.M. Best, NAIC, state patient compensation funds, Texas Windstorm Insurance Association, MarketStance estimates.

Figure 8 provides a view of the relative magnitudes of each adjustment by market segment. Note that the combined surplus lines carrier market share in commercial lines exceeds $37 billion – about 15 percent of the direct premiums written.

Figure 9: Alien premiums state by line concentrations vary widely—Top 5 states by alien carrier market share, select lines

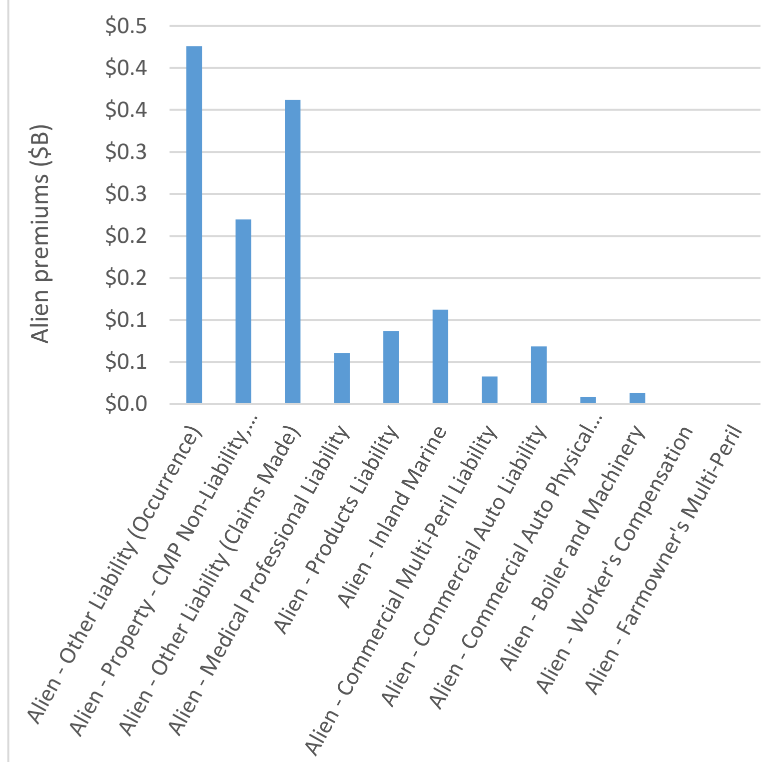


Sources: A.M. Best, NAIC, state patient compensation funds, Texas Windstorm Insurance Association, MarketStance estimates.

At present, we estimate that alien carriers wrote over $2.8 billion in direct written premium on property lines in 2015 (**Figure 9)**.

Though alien premiums are heavily concentrated in liability lines, the relative concentrations in liability vary considerably by state, where states with large coastal and energy exposures such as Florida, Louisiana, South Carolina, whereas claims made liability dominates DC, which as the largest alien carrier share of market, at 11 percent (**Figure 10**).

Figure 10: Alien premiums by line concentrated in general liability and special liability lines



Sources: A.M. Best, NAIC, state patient compensation funds, Texas Windstorm Insurance Association, MarketStance estimates.

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Appendix A: Updated data sources

- **U.S. Census**
  - County/ZIP Business Patterns and Nonemployer Statistics business demographics.
  - Economic Census industry payrolls, revenues, fixed assets, and 8-digit lessors' exposure detail.
  - Services Annual Survey inventories and revenues.
  - American Community Survey census tract and public use microdata area housing and demographics.
- **U.S. Bureau of Labor Statistics** industry employment, hours worked, occupation and wage series.
- **U.S. Bureau of Economic Analysis** replacement cost, investment, payroll, and gross output by industry series.
- **NCCI/state rating bureaus** WComp base loss costs, incorporating 2015 classifications for all states.
- County by industry employment forecast from **Moody's Analytics** (August 2016)
- State by line premiums and losses
  - **A.M. Best** state by line reporting for all carriers.
  - **A.M. Best** Key Rating Guide.
  - **Ohio Bureau of Workers Compensation** and other monopolistic workers' compensation funds
  - **Pennsylvania MCARE** and other medical joint underwriting associations & patient compensation funds.
- **IRS Statistics of Income**, rental income by industry
- **Dun & Bradstreet** August 2016 marketing file
- 2015 state DOI agent/broker license and appointment data **10 states**
- **New Data Source:** NAIC Insurance Market Resource report 2013-15
  - Alien Premiums by State
- **New Data Source:** NAIC Property Directors and Officers Supplement
  - Written Premiums by Underwriting carrier

(Other appendices contained in the Appendices document accompanying this technical release note.)