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IHS AUTOMOTIVE
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JANUARY 13-14, 2016

2016 NAIAS BRIEFINGS

John Anton, Director of Steel Analytics
Michael Robinet, Managing Director
Jeff Jowett, NA Powertrain Forecast Manager
Jeremy Carlson, Senior Analyst, Automotive Technology
Mike Yakima, Senior Manager, IHS Loyalty

COBO Center, Detroit, MI

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Contents

- Economic and Materials Overview, John Anton
- Key Vehicles Open Panel
 - Michael Robinet – What to see
 - Jeff Jowett– Powertrain
 - Jeremy Carlson/Team - Infotainment/ADAS
- Mike Yakima – New World of Loyalty

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US ECONOMIC AND MATERIALS OUTLOOK

John Anton, Director of Steel Analytics

COBO Center, Detroit, MI

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2016 and 2017 look like slightly better versions of 2015

- US **GDP** will grow slightly faster than 2015, but not much
- **Unemployment** will be low, and so will **inflation**
- **Interest rates** rise from historic lows
- The **dollar** gets a little stronger, helping keep costs down but making imports a bit more competitive
- Basically, the outlook is very good for the auto industry

US Economy by the Numbers ...

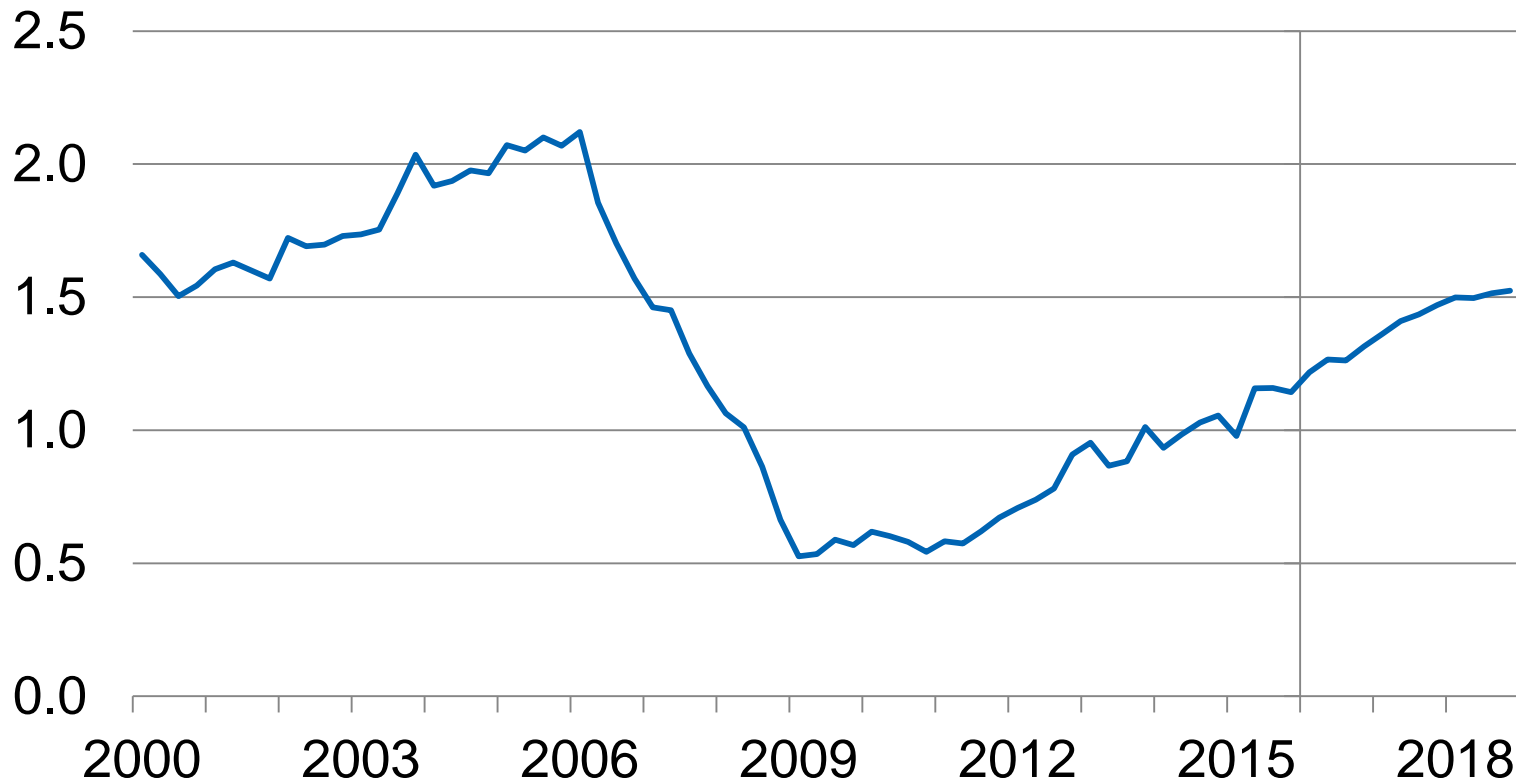
	2015	2016	2017
GDP	2.4	2.7	2.9
Prime rate	3.3	3.9	4.9
Unemployment rate	5.3	4.9	4.9
Inflation	2.4	2.4	2.5

Source: IHS

© 2016 IHS

Rising housing starts mean better income for buyers of light trucks

Housing starts, millions of units



Source: IHS

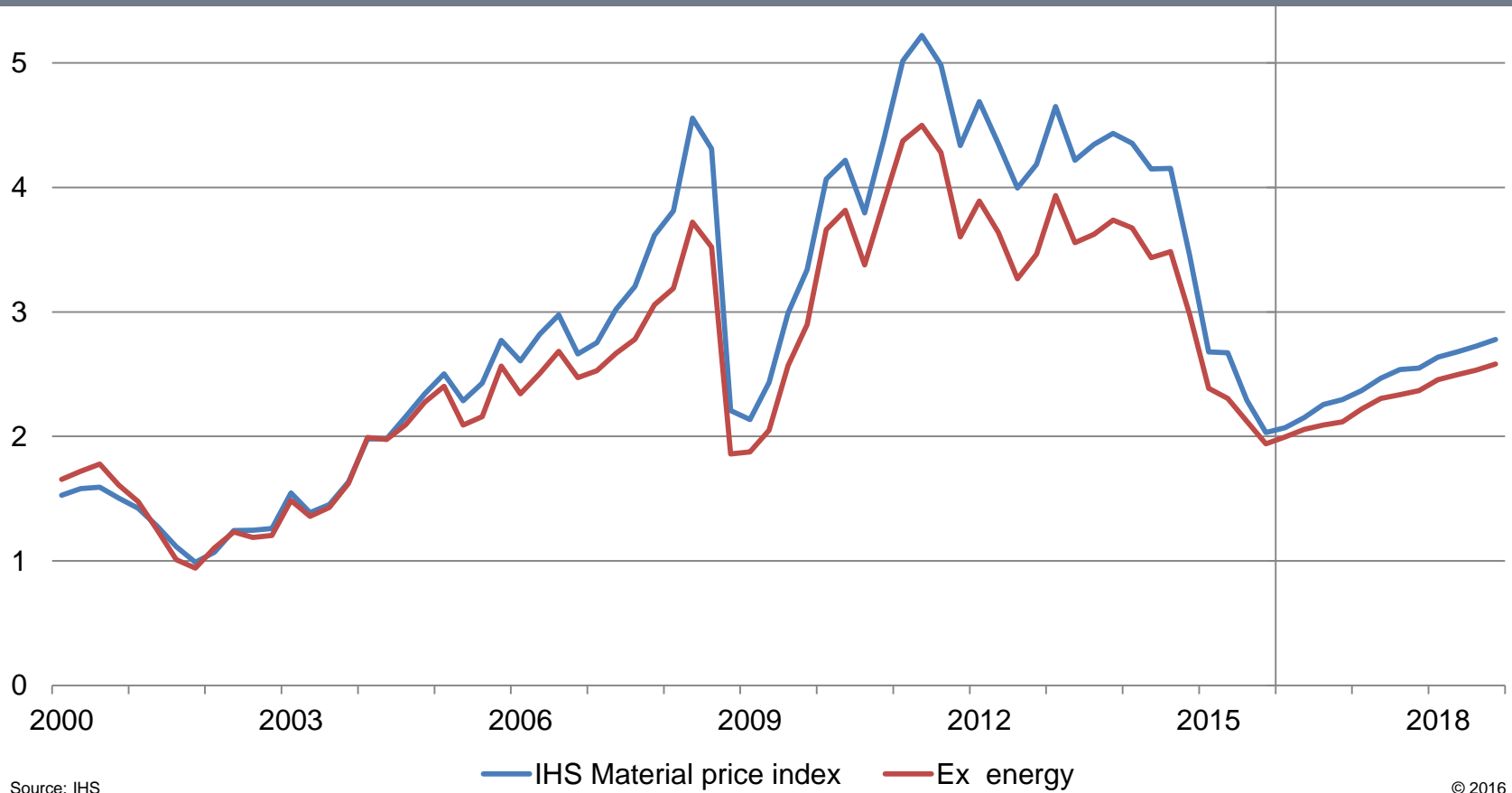
© 2016 IHS

Input costs for vehicles will be very favorable

- Materials costs look more like 2004 than 2014
- The base has been reset, and in your favor
- In 2016, many key input costs are 20% to 40% lower than for most of the past decade
- The change is fundamental, not structural
- Prices for metals and plastics have been elevated for the past decade

Broad basket of industrial materials has reset to 2004

Material Price Index, 2002W1=1.00



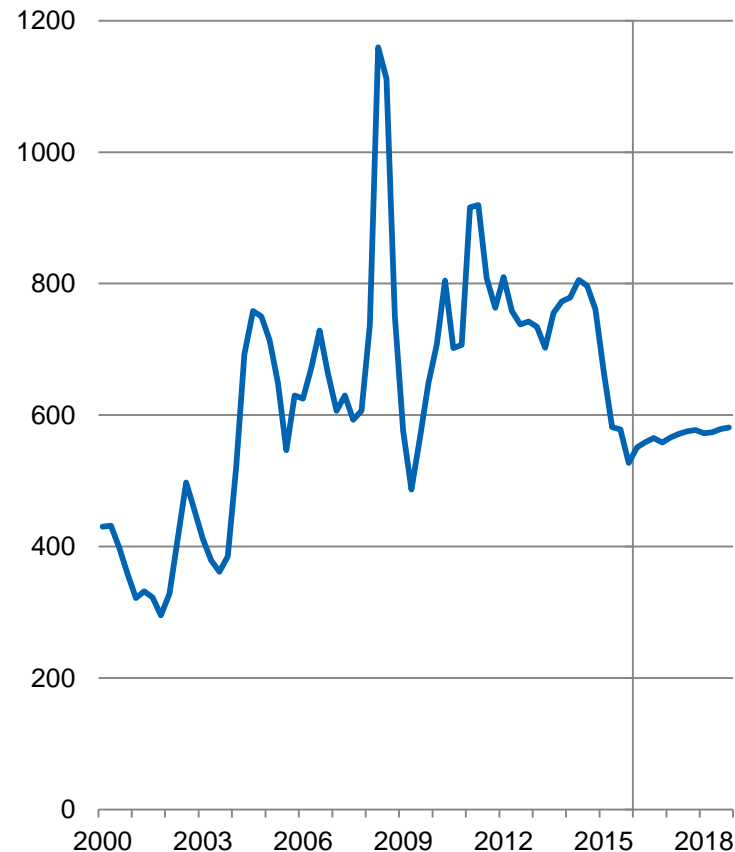
Source: IHS

© 2016 IHS

Your future purchases should show savings

- Don't let a supplier base 2016 upon 2014
 - 2014 is over, done, and **irrelevant**
- “IHS predicts a 7% increase over the remainder of 2016”
 - Yes, but that is after it fell about 25% in 2015
 - Down \$275, rebound \$40

Cold rolled carbon sheet, USD per short ton



Source: IHS

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2016 NAIAS VEHICLE OVERVIEW

Technology and Luxury on Display

Michael Robinet, Managing Director
Jeff Jowett, NA Powertrain Forecast Manager
Jeremy Carlson, Senior Analyst, Automotive Technology

COBO Center, Detroit, MI

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Themes

- Luxury and content reign, fuel economy takes a back seat
- Two Worlds Colliding: low fuel vs. the legislative mandate
- Global interconnections are apparent
- New beginnings on display: Genesis. Lincoln & Volvo
- Off year for CUV reveals
- OEMs and suppliers focus more energy on CES

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Technology Leaders

Focus on Luxury

Other Notables

The Basics

Key Launches Form Our Future



Chrysler Pacifica

- Q2 2016 SOP @ Windsor – RU Platform
- Upgraded Pentastar V-6 mated to a 9AT
- Pacifica Hybrid offers 30 miles EV range, 16kWh battery
- Similar dimensions to outgoing Town & Country though ~320 lbs. lighter
- Styling focused on CUV – the un-minivan
- Significant tech for minivan segment

Chevrolet Bolt

- 200 mile range, 0-60mph 7s, 60kWh batt
- Priced at \$30,000 after incentives
- 60 kWh battery pack weighs ~1,000 lbs.
- 3 in longer wheelbase than Sonic
- Q4 2016 SOP @ Orion
- Global GAMMA Platform
- LG supplies battery pack and motor
- Tech-rich small car unveiled at CES



Key Launches Form Our Future



Cadillac XT5

- Replaces SRX in Cadillac lineup
- Pulls technology content from CT6 and CTS
- Q1 2016 SOP @ Spring Hill
- Purpose-built CUV - Able to better compete against MKX, Grand Cherokee and others
- Nearly 300 lbs. lighter than SRX (CHI Platform)
- Improved interior packaging versus SRX
- Wheelbase: 112.5in. (Shorter than Acadia, but 2" longer than SRX)
- 3.6L HFV6 Gen 2 V-6, DI, Cyl. Deac. Aisin 8AT

Mercedes-Benz E-Class

- MRA Mid-Size Platform
- Q1 2016 SOP @ Sindelfingen (EU)
- +2.6" WB & +2" vs. current E-Class
- 241 hp 2.0L Turbo I-4 mated to 9AT
- Additional engines announced soon
- 2x 12.3 in main display (1st in Segment)
- Software-upgraded autopilot to 130 kph
- First production vehicle licensed for autonomous vehicle testing



Key Launches Form Our Future

Ford Super Duty

- Shift to aluminum following F-150 saves nearly 350lbs. from previous generation
- T3 Platform (F150 and upcoming Exp/Nav)
- Q2 2016 SOP @ Kentucky Truck
- Increased capability with trailer assist
- 2nd Gen 6.7L Powerstroke V-8 Diesel, 6.2L and 6.8L gas engines



GMC Acadia

- Derived from a SWB CHI Platform
- Touted as a true mid-size CUV
- 7" shorter WB and length, 3.5" narrower
- 700 lbs. lighter than previous gen (Lambda)
- Standard 2.5L I-4 Optional 3.6L Gen 2 V-6
- Q2 2016 SOP @ Spring Hill
- Surround view, automatic braking
- 4G LTE, Android Auto, Apple CarPlay std

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Technology Leaders

Lexus LC-500

- Coupe derived from LF-LC Concept from 2013
- Toyota NGA-N Platform – SOP 2017
- Styling precursor to full-size LS 500 sedan
- Pricing near \$100,000
- Carryover 5.0L V8 @ 475 hp
- 12.3-inch display with distinct 'segmented' infotainment real estate zones
- Extensive use of AI and CFRP (Roof)



Toyota FCV Plus

- Concept of next generation FCV offering
- Shown at Tokyo and CES
- Limited PT details – 4 in-wheel motors, a fuel cell stack up front (between wheels) and hydrogen tank behind rear seat
- The FCV Plus is much more about Toyota's vision of a hydrogen society than actual car
- Dual use – car and power plant

Technology Leaders

Acura Precision Concept

- Design, styling & HMI concept vehicle
- Coupe styling but 4 door opposing doors
- Styling exercise to add aggressive styling tone to future Acura vehicles
- Floating center display with driver HUD
- Facial recognition to download driver settings from the cloud



Genesis G90

- Introduction of new Genesis brand
- Replacement for Equus rangetopper
- Styling and content similar to concept from NAIAS 2013 (NCD-14)
- Q2 2016 SOP (Korea)
- M Platform
- 3.3L twin-turbo V6 or 5.0L V8, both w/ 8AT
- 12.3-inch infotainment with wireless charging
- Semi-autonomous piloted driving (Korea only)

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Focus on Luxury



Lincoln Continental

- Lower and shorter & longer wheelbase vs. MKS
- Production version of concept shown last year
- Starting price below \$50,000
- 3.0L twin-turbo Nano V6 @ 400hp /400 lb-ft
- 34-way adjustable seats for “Perfect Position”
- Designed with China market in mind
- Unique exterior styling design to differentiate
- Utilizes e-latches
- Q3 2016 SOP @ Flat Rock

Volvo S90

- Q2 2016 SOP @ Torslanda (EU)
- SPA Platform (same as XC90)
- Replaces S80
- Super + turbocharged 2.0L I-4 standard with plug-in hybrid available
- Standard semi-autonomous Pilot Assist up to 130 kph – rapid extension of XC90 version
- Large format, wide view color HUD



Focus on Luxury

Audi A4 allroad

- 1.4in. More ground clearance over A4 Avant Wagon
- MLB B/C Platform
- Q4 2015 SOP @ Neckarsulm (EU)
- Multiple engines globally, but likely just a 2.0L turbo I-4 for the U.S. with 8AT
- Wireless charging
- Tiered telematics strategy for Audi



Infiniti Q60

- Derived from Q50 and replaces G-Series Coupe
- Production version of the concept car show at 2014 NAIAS
- Comes with 2.0L turbo @ 208 hp or a twin-turbo 3.0L V6 with 2 outputs (400/350 or 300/295)
- Q1 2016 SOP @ Tochigi (Japan)
- FR-L Platform
- Steering customization via drive mode selector
- Adaptive Shift Control observes and learns

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Other Notables

Mercedes-Benz SLC

- Major revision on MRA platform
- I-4 turbo or available V6 biturbo
- Styling designed to work off recently launched C-Class – integrated ‘Dynamic Select’
- Ample ADAS tech but short of full capability introduced in 2013 S/E Class
- Dynamic LED headlamps



Honda Ridgeline

- More truck-like than 1st Gen
- Focusing on F-Series and top end of mid-size pickup market
- Q1 2016 SOP @ Lincoln, AL
- 2SL/2SF Platform (same as Pilot & MDX)
- 3.5L V-6 mated to 6 speed automatic
- FWD standard with torque vectoring AWD available
- 4D cab only – dual action “Country Squire” tailgate
- Carryover rear box concept though outside audio integrated for tailgating applications

Other Notables

Nissan Titan Warrior Concept

- X61B Platform – launched last year
- Aimed at F-150 Raptor and Ram Rebel
- 5.0L V8 diesel and Aisin 6-speed auto
- Maintains Titan XD's wheelbase and length but is raised and widened by 3"
- Concept only – volume challenged in competitive segment



Kia Telluride

- Positioned above Sportage in 7 pass CUV market
- Unibody offering based on Sante Fe Sport
- Plug-in hybrid powertrain with 3.5L GDI V-6
- 400 total hp, 270 from ICE, 130 from elec. motor
- 3D printed interior components and 90 degree suicide rear doors and integrated touch displays
- 9.5in. longer than Sorento
- Within 2 in. of Explorer in every dimension

Final Thoughts

- Worlds Collide – Performance gives way to fuel economy announcements – progress continues behind the scenes
- CES is essentially adding another autoshow to the calendar
- Lack of high-volume car intros is more cyclical not structural
- Debut or extension of several global platforms – Jaguar PLA, VW/Audi MLB & GM Omega
- Reductions in nameplate and platform count enabling and expansion in trim levels to extend to new markets

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Many Global Challenges

Driving Technology Advancements and Evolution

Customer & Competition

- 'Responsibility-driven' vs. 'Economy-driven'
- Strong 'Efficiency-Competition'
- Efficiency with performance



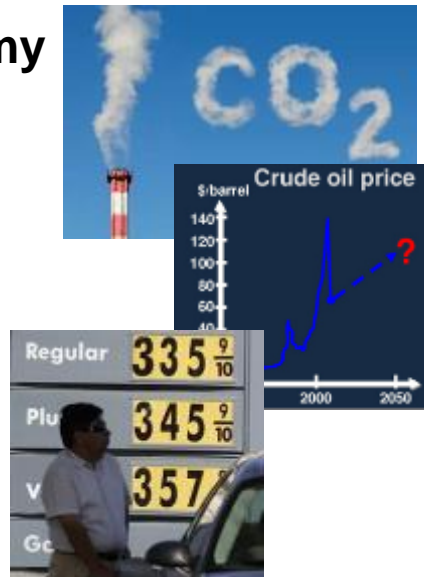
Urbanization & Metropolization

- Less personal car ownership
- Zero-/ Low-Emission Zones
- Urban Individual Mobility
- Demographic Change



Oil Price & Economy

- Traditional shortage of energy resources shifting now to an abundance of undesirable resources
- Oil Price Volatility
- Environmental Damage
- Climate Change



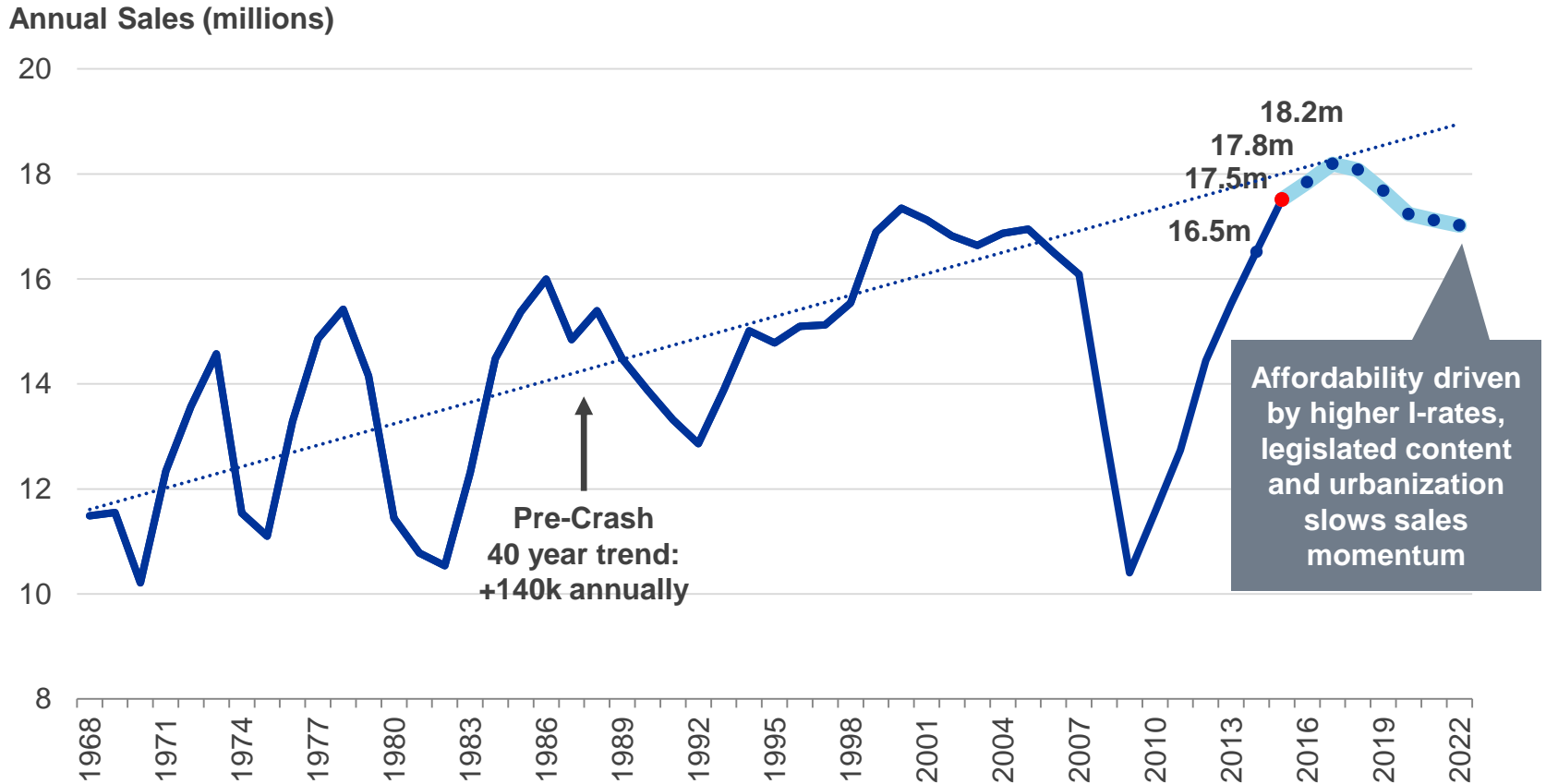
Regulation

- CO₂ Based Taxation
- EU CO₂ Regulation
- Zero-/ Low-Emission Zones
- Emission Standards
- Fuel consumption standards



US: Light Vehicle Sales Forecast

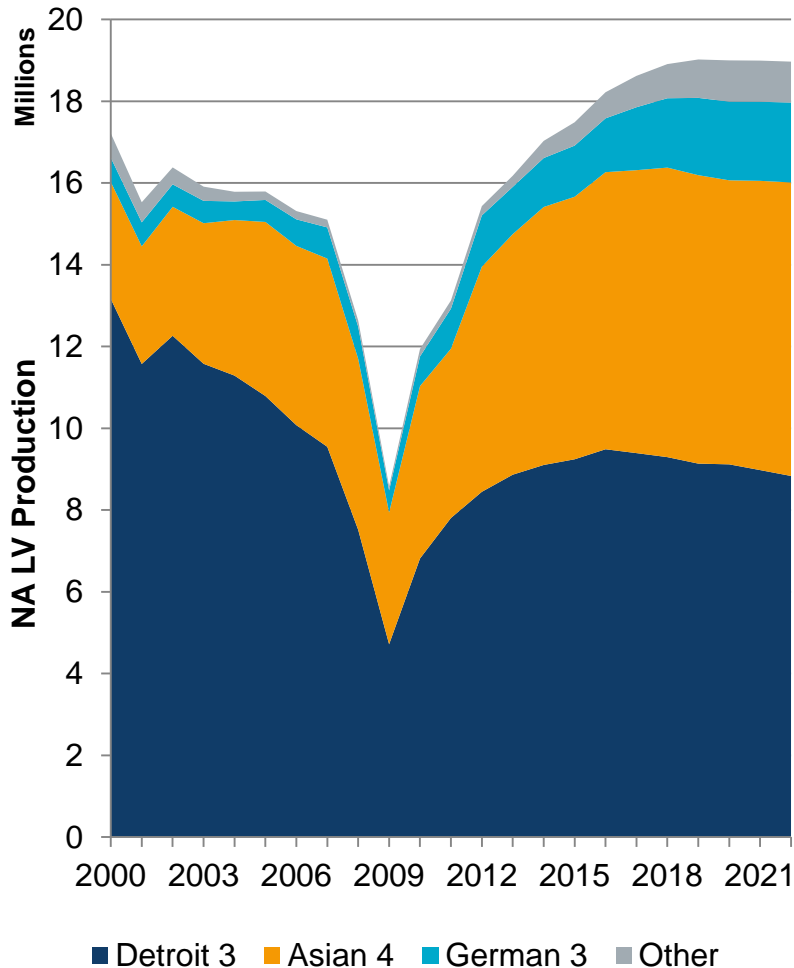
Sales peak approaching; return to previous long-term trend level possible



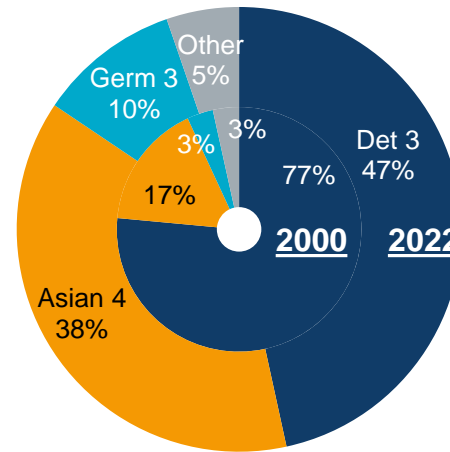
Source: IHS Automotive, current light vehicles sales forecast

NAFTA Production

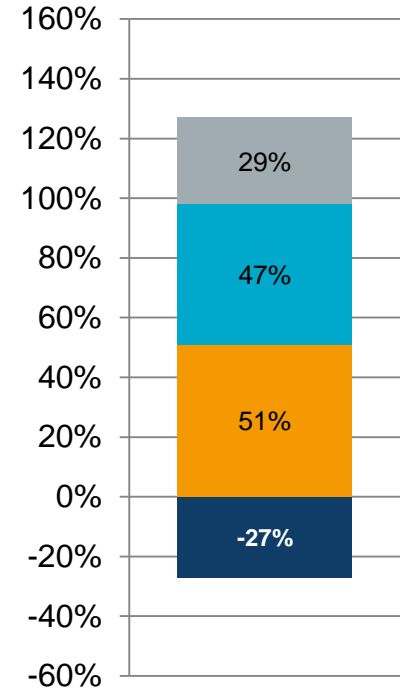
Customer Mix is Changing....



NAFTA Production Share



2015-22 CTG



- German OEMs growing faster than Asian 4 and 'Other' OEMs.
- Detroit 3 may decline due to lack of capacity and competitors shifting of imported offerings to NA output.

Thoughts from CES

Vehicle launches at CES that felt closer to Detroit or Frankfurt than Vegas

- Chevrolet Bolt
- Volkswagen e-Golf Touch (2015 concept, 2016 production)
- Faraday Future

Mobility initiatives starting to form

- Ford Smart Mobility experiments continue
- GM invests \$500M in Lyft

Artificial intelligence & machine learning

- NVIDIA automotive computing platform v2.0
- Toyota \$1B investment

HMI trends

- Gesture, augmented reality, haptic incoming
- New entrants in electronics supply chain (Kyocera, Innolux, LG)
- Display market booming

Map data to support autonomy

- HERE HD Live Maps streaming to vehicle – including base map and behavioral attributes
- Mobileye building Roadbook database with GM, VW, 3rd automaker coming

Lidar suppliers emerging

- Quanergy, Velodyne, TriLumina, Ibeo, Leddartech

Key Trends: HMI & User Experience



Displays

- \$18.6 billion market in 2021 for automotive suppliers
- New display applications (HVAC, mirrors, RSE) growing in interest
- To meet the needs of Smartphone apps integration & new HMI



New HMI Technology

- Gesture recognition, augmented reality & eye-tracking to launch within 2-3 years. Cloud-based speech recognition is already here
- Will partially augment existing controls



Shifting supply chain

- Traditional T1>T2>T3 alignment is not 100% likely to continue
- Competition from high-tech industry is creating disruption
- Only the innovative and aggressive suppliers will survive & thrive



New Automotive User Experience

- In the long-run, automated driving will drastically shift how users experience mobility and spend time in the vehicle
- Moving towards sharing economy and mobility car-as-a-service

Key Trends: Automated Driving



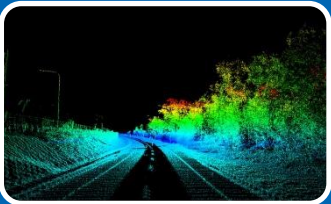
Regulations

- Aggressive activity from NCAP to continue and hasten
- Moving ahead with V2X technology
- US laws on the way on cyber-security, privacy and related topics



Tech Firms & Startups

- Silicon Valley still a hub of activity
- New players preparing for market entry
- EV and mobility opportunities abound



Lidar Sensors

- Big growth ahead for current suppliers
- New market entrants coming soon—Quanergy announcement at CES



Prototypes & Development

- Prototypes and demos from OEMs + Suppliers to be running all over Las Vegas
- Will there be last minute surprises?

Key Trends: Artificial Intelligence



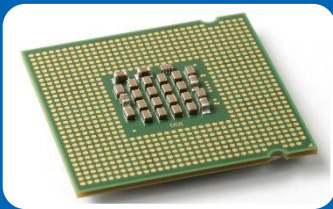
Awareness

- Machine Learning, Neural Networks and Artificial Intelligence have entered the broader automotive technology lexicon



Investment

- OEMs, suppliers and academia are investing in AI with many potential applications, driven in part by application in automotive
- Some usage of AI commercially already



Hardware

- Special purpose chips are designed to accelerate machine vision performance but approaches vary (GPUs, DSPs, others)
- Companies like NVIDIA, NXP, Qualcomm, Texas Instruments involved



Software

- Software companies and startups with proprietary or unique algorithms will be present and should begin to receive well-deserved attention for unique automotive-specific applications and approaches

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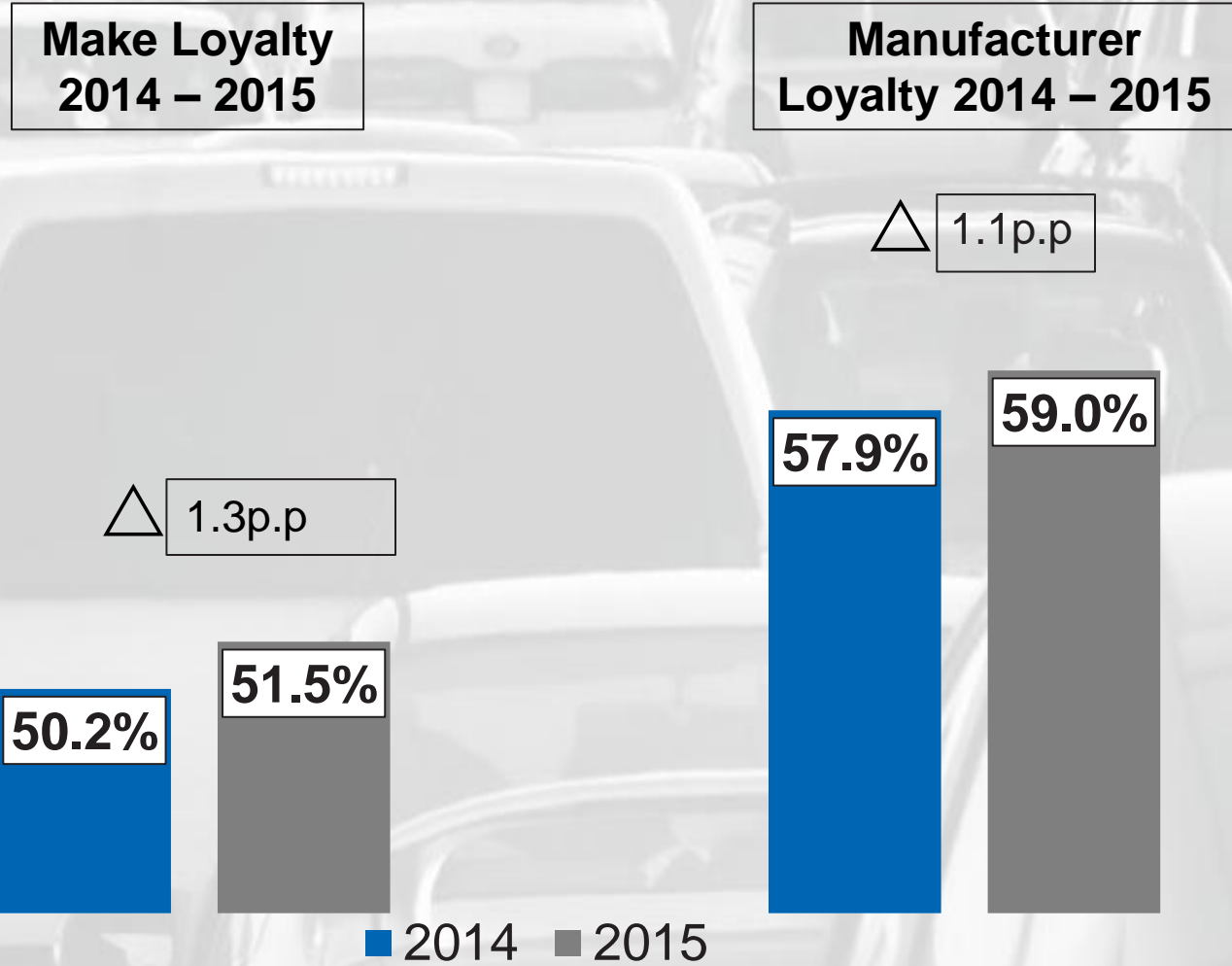
THE NEW WORLD OF LOYALTY

Mike Yakima, Senior Manager - IHS Loyalty

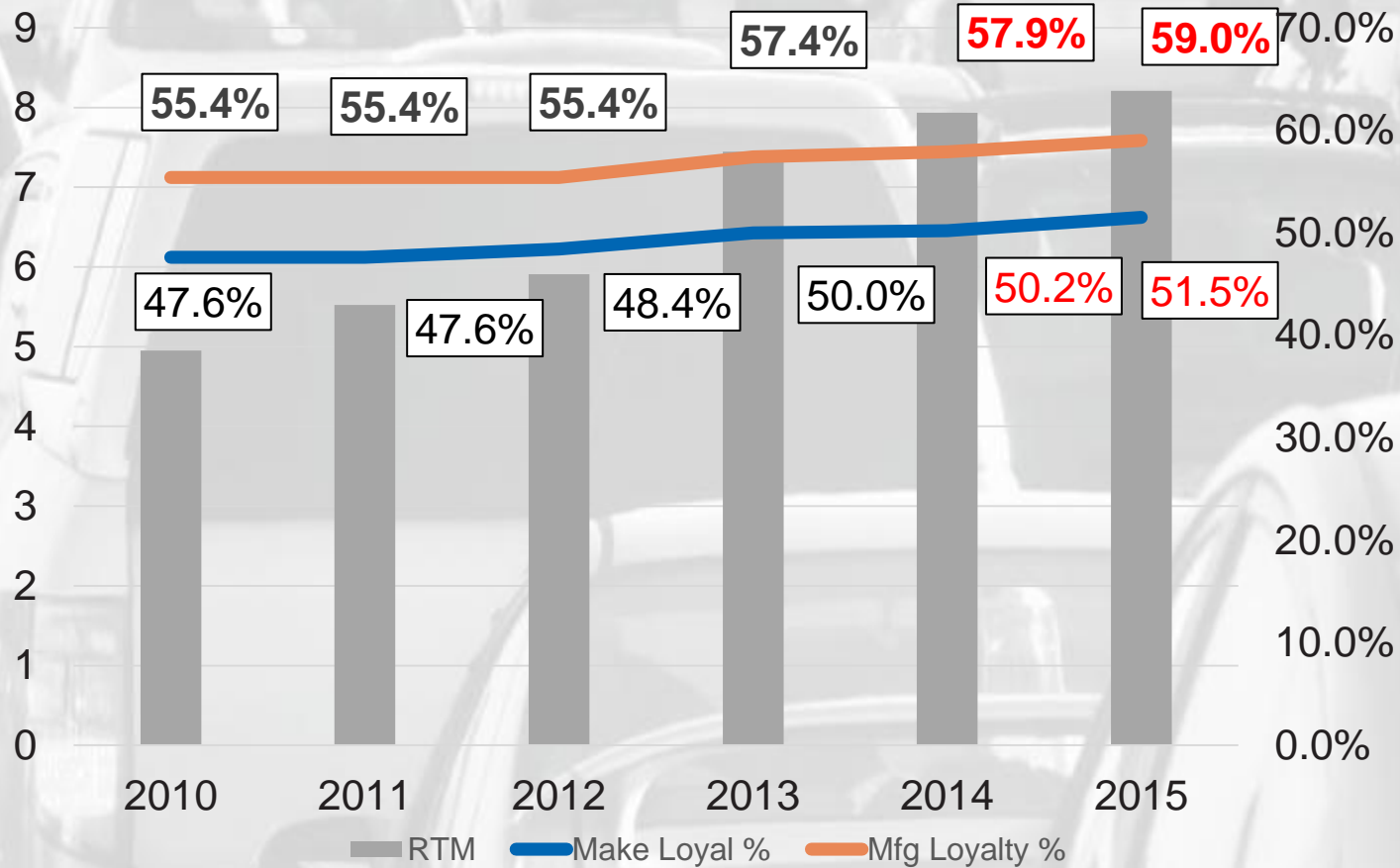
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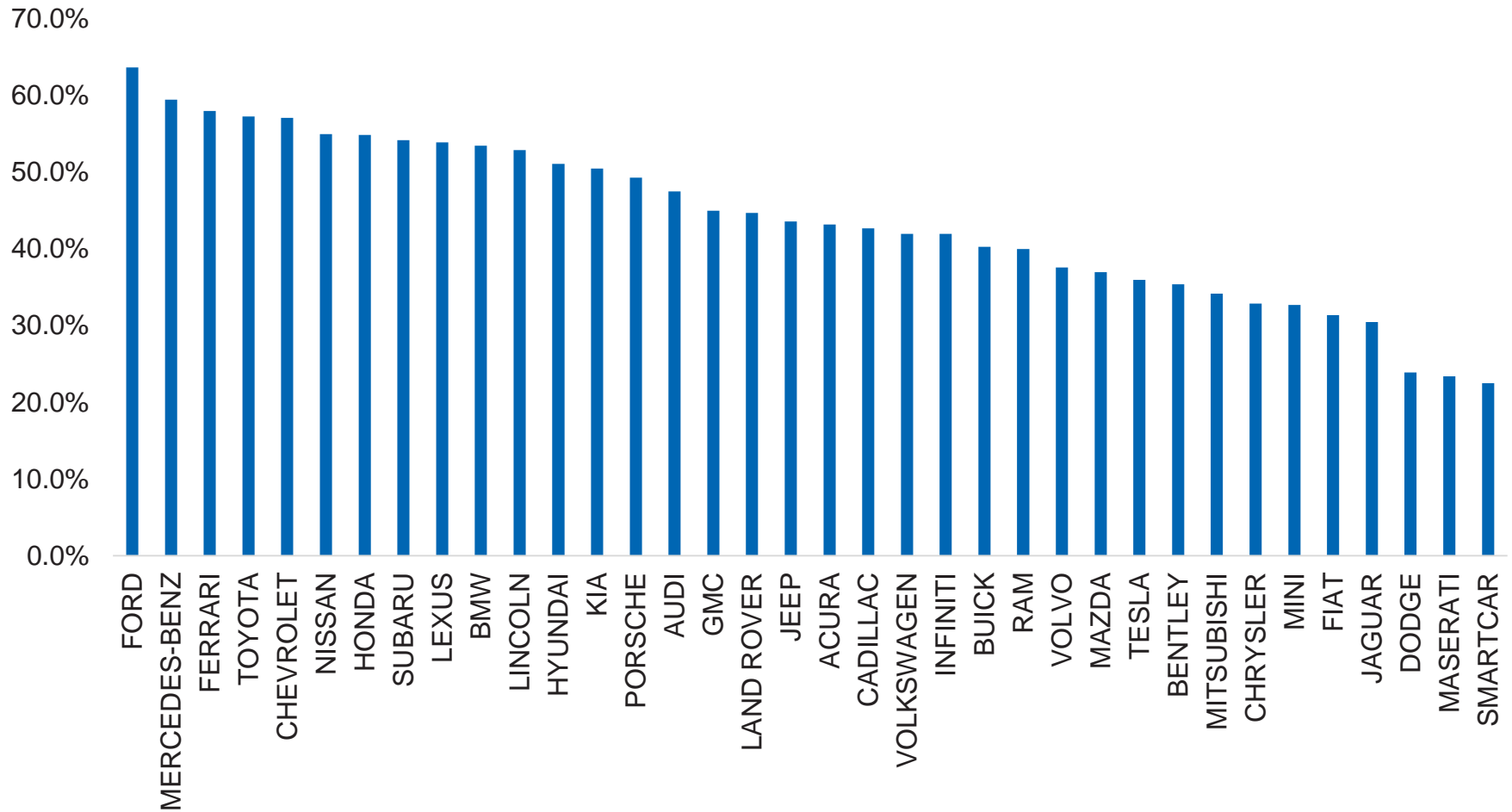
Record Loyalty Rates



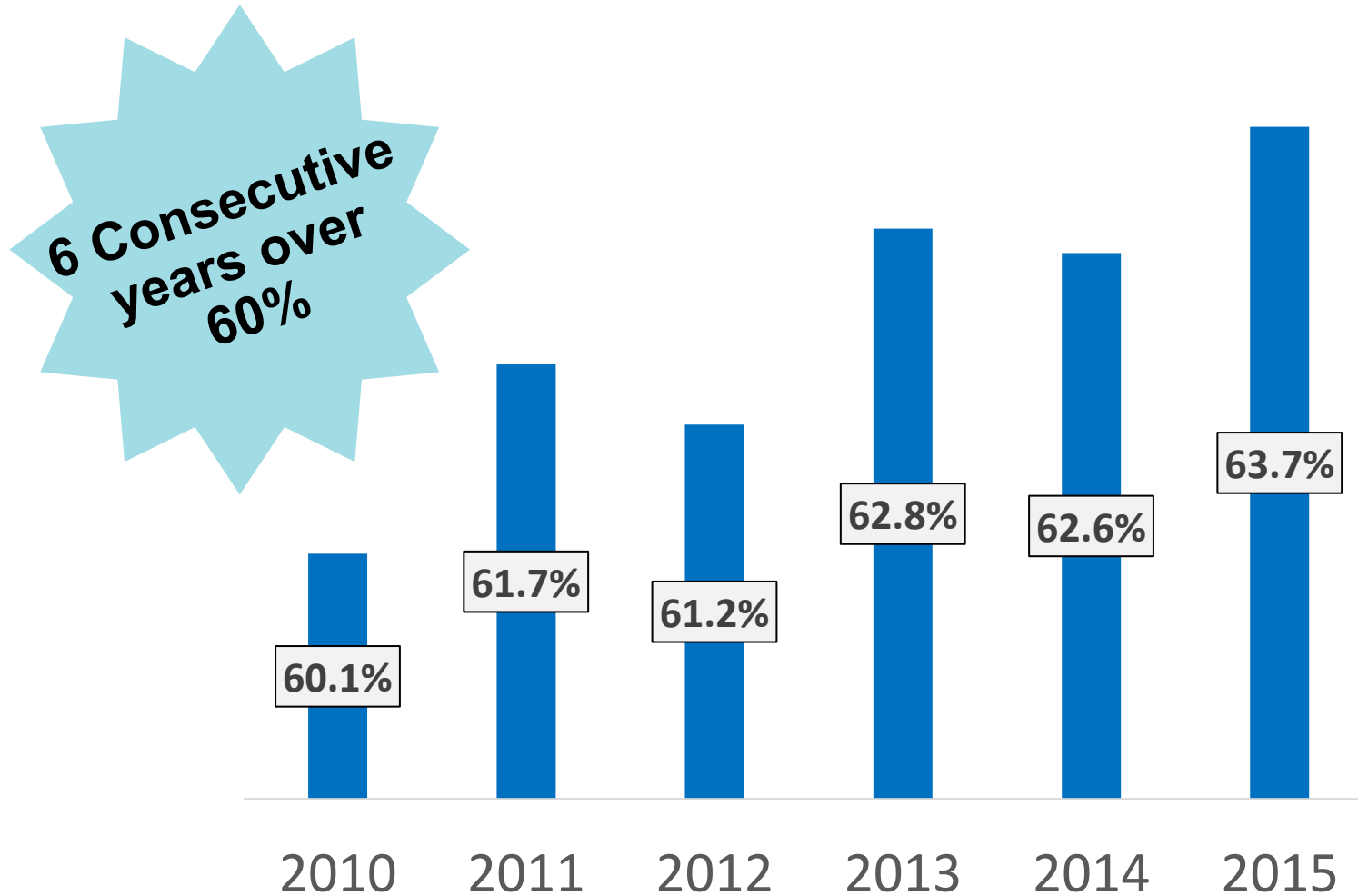
RTM Volume, Brand, and Manufacturer Loyalty Rate



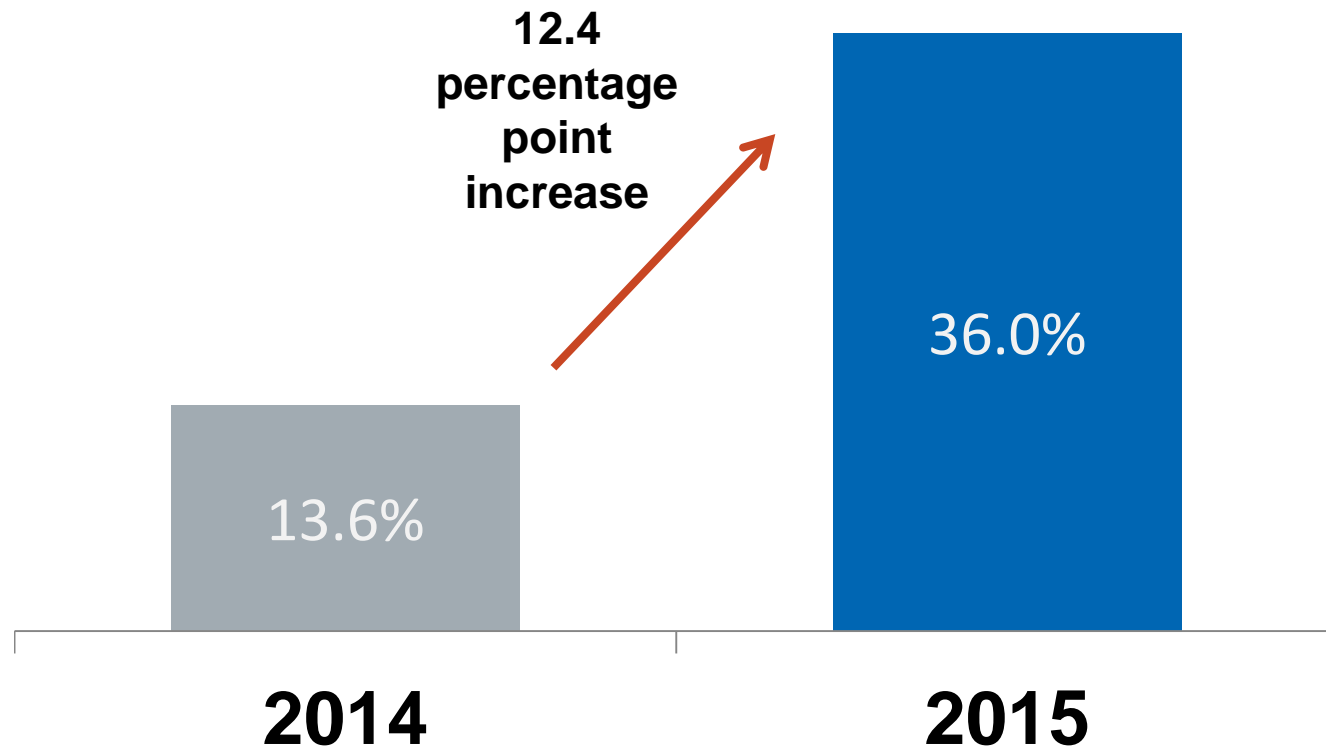
Industry Make Loyalty - 2015



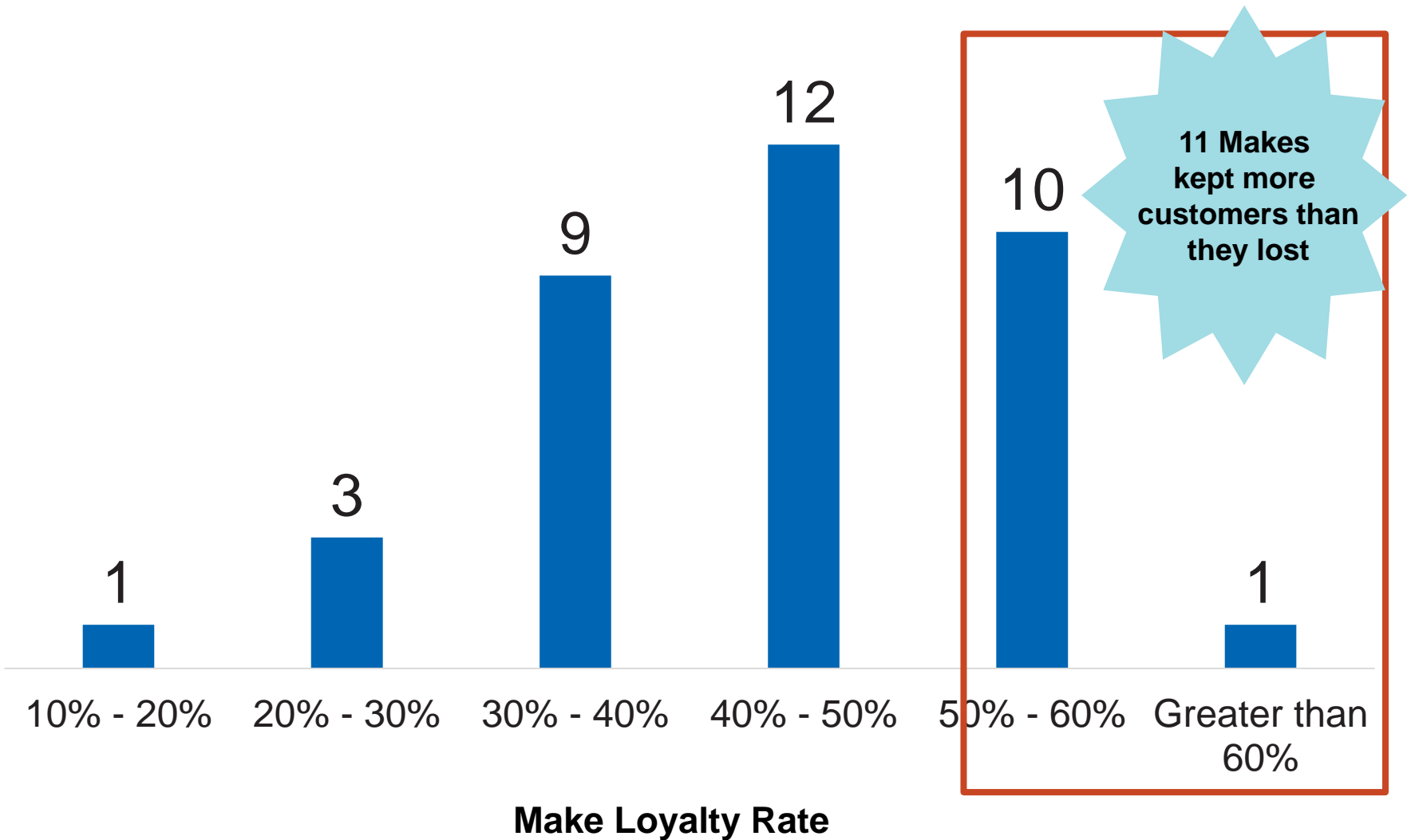
Overall Loyalty to Make – Ford Division



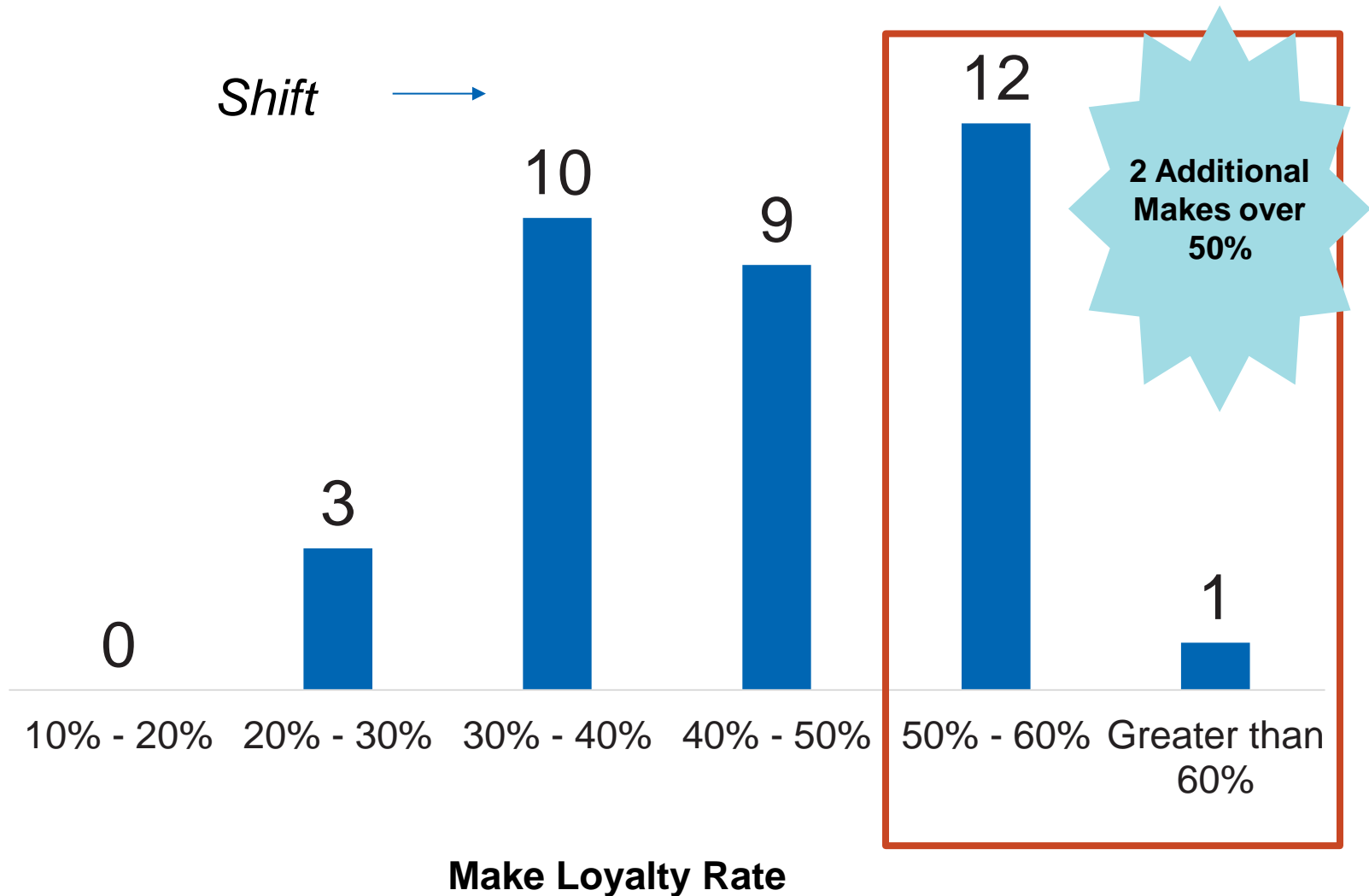
Most Improved Loyalty to Make - Tesla



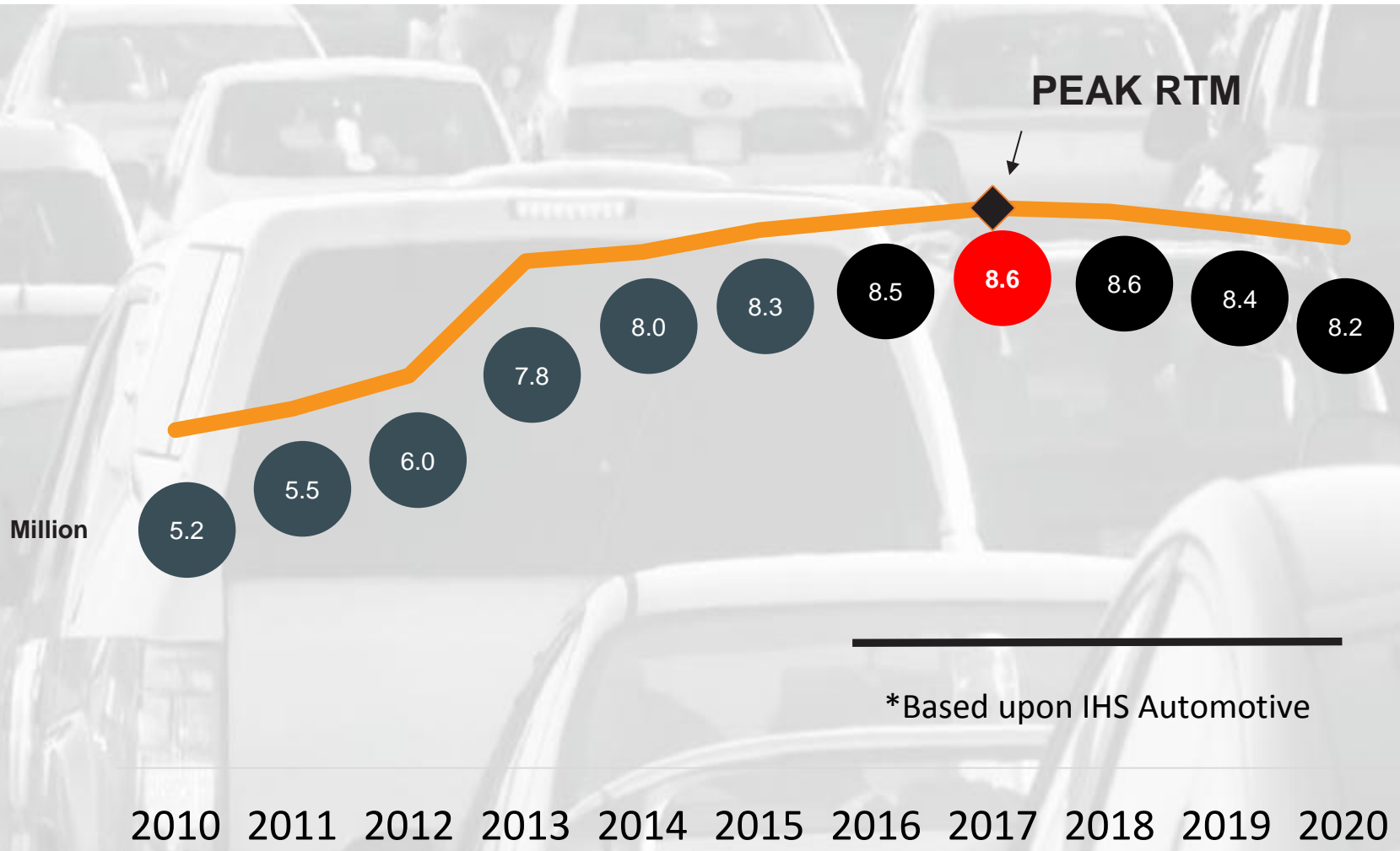
Benchmarking Loyalty Performance – 2014AY



Benchmarking Loyalty Performance – 2015AY



The Rising Return To Market



Calendar
Year

Source: IHS Loyalty Analytics / IHS Automotive
Forecast

Understand Your Customer in Greater Detail

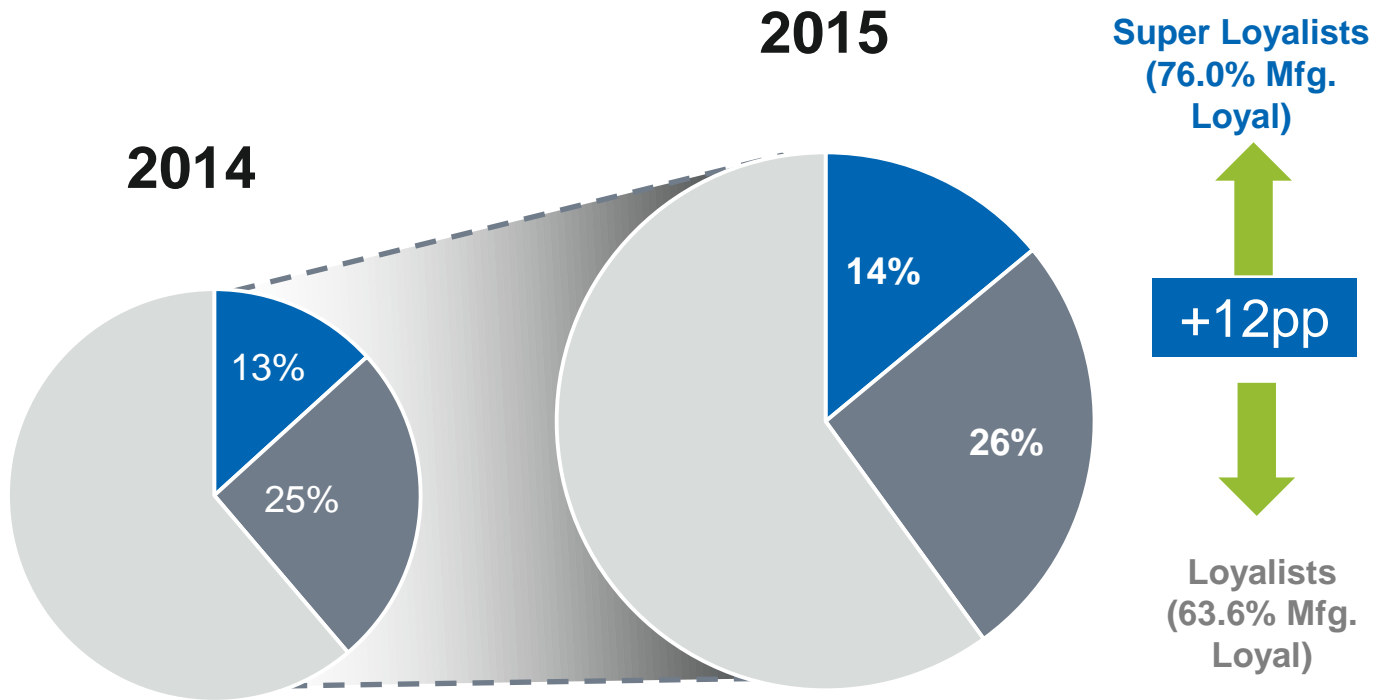
Super Loyalist – 3X Purchases



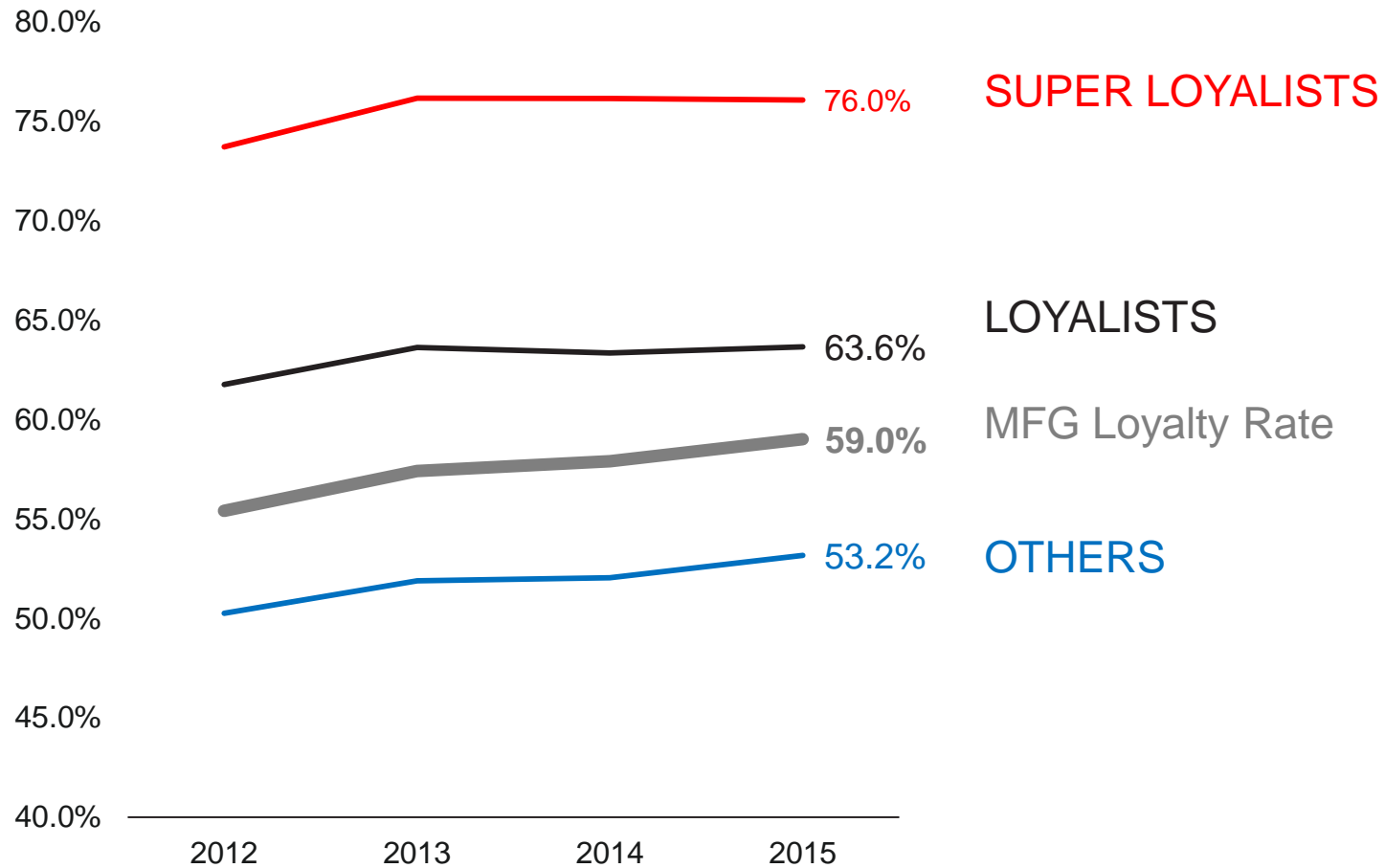
Loyalist – 2X Purchases

Nomad – No Loyal History

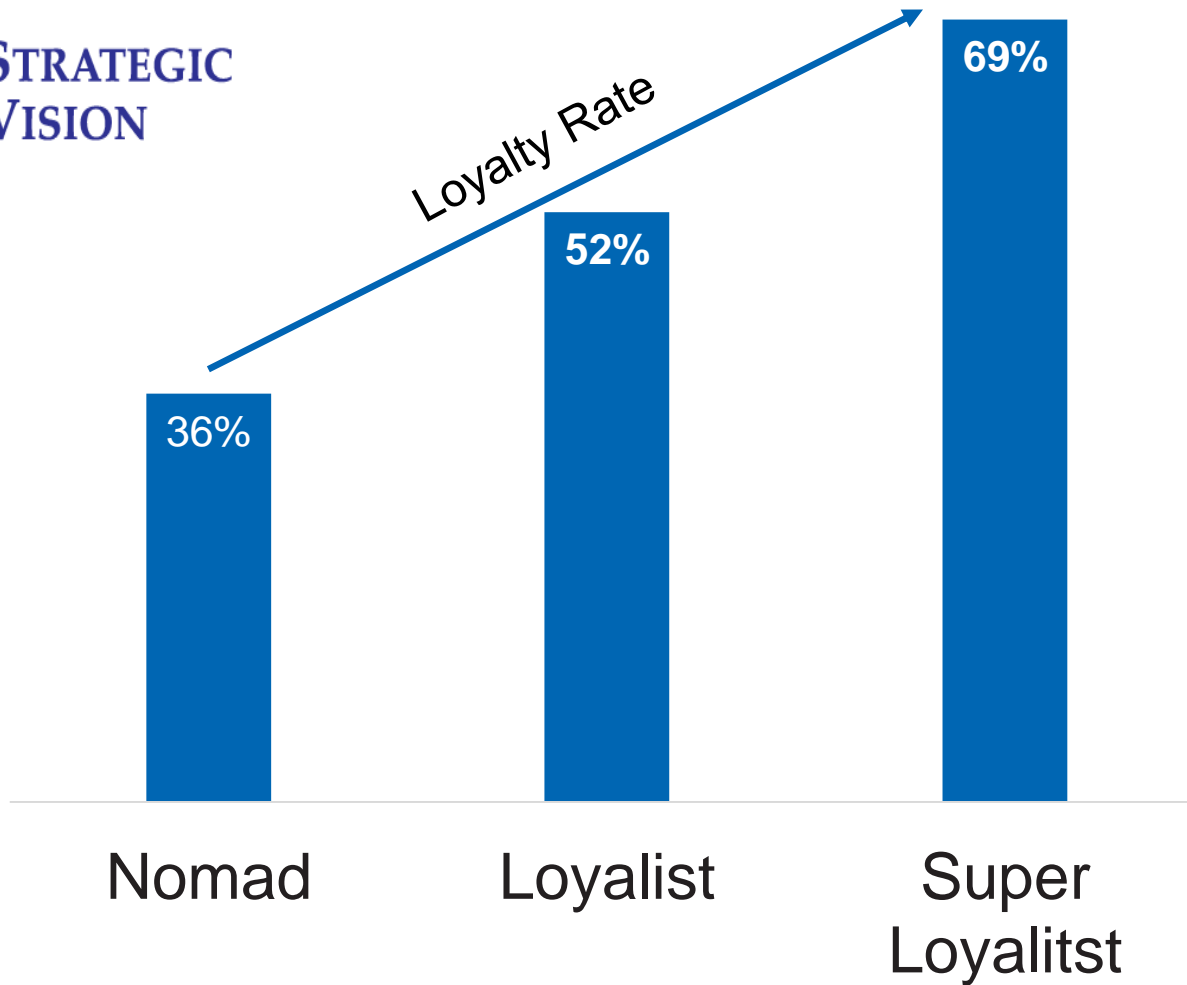
Industry – 2014-15



Understanding The Populations



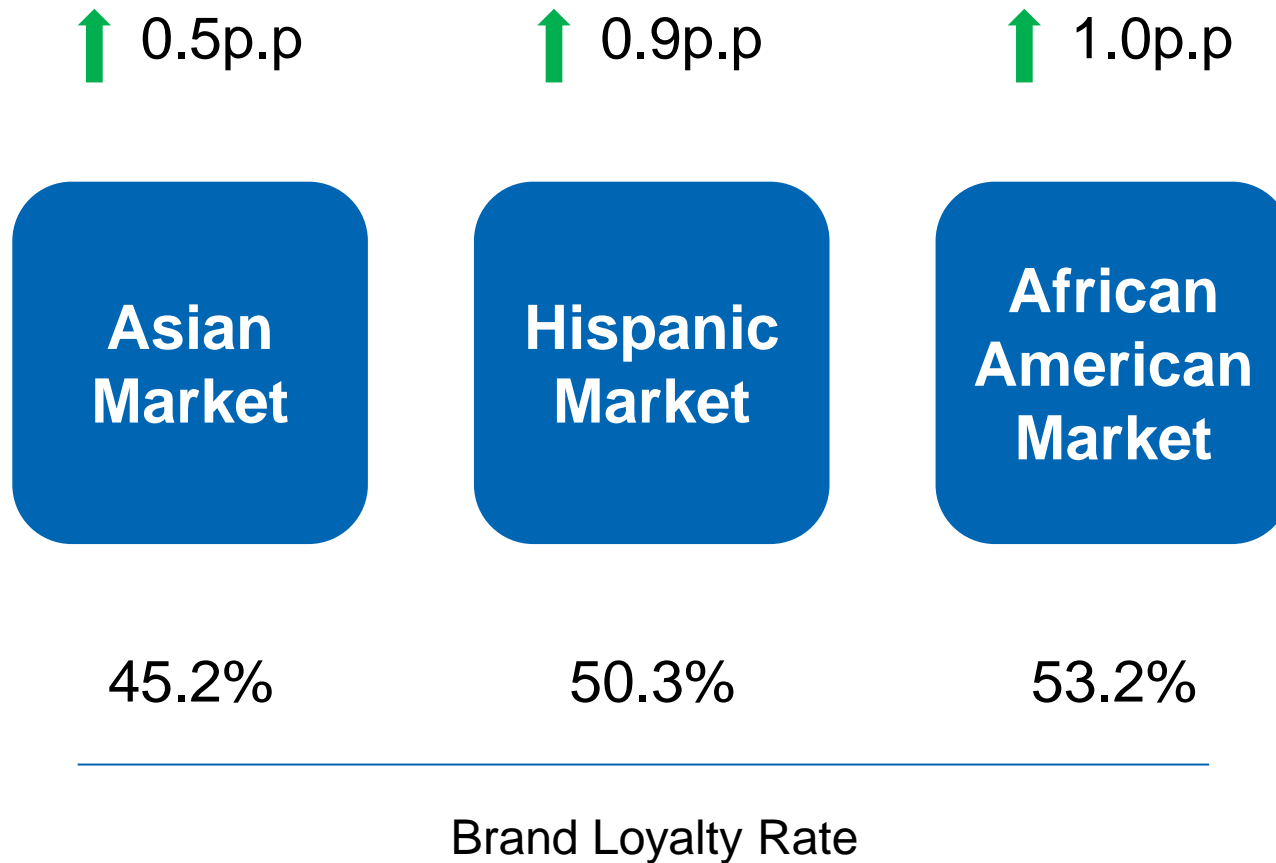
Sensitivity to Customer Satisfaction



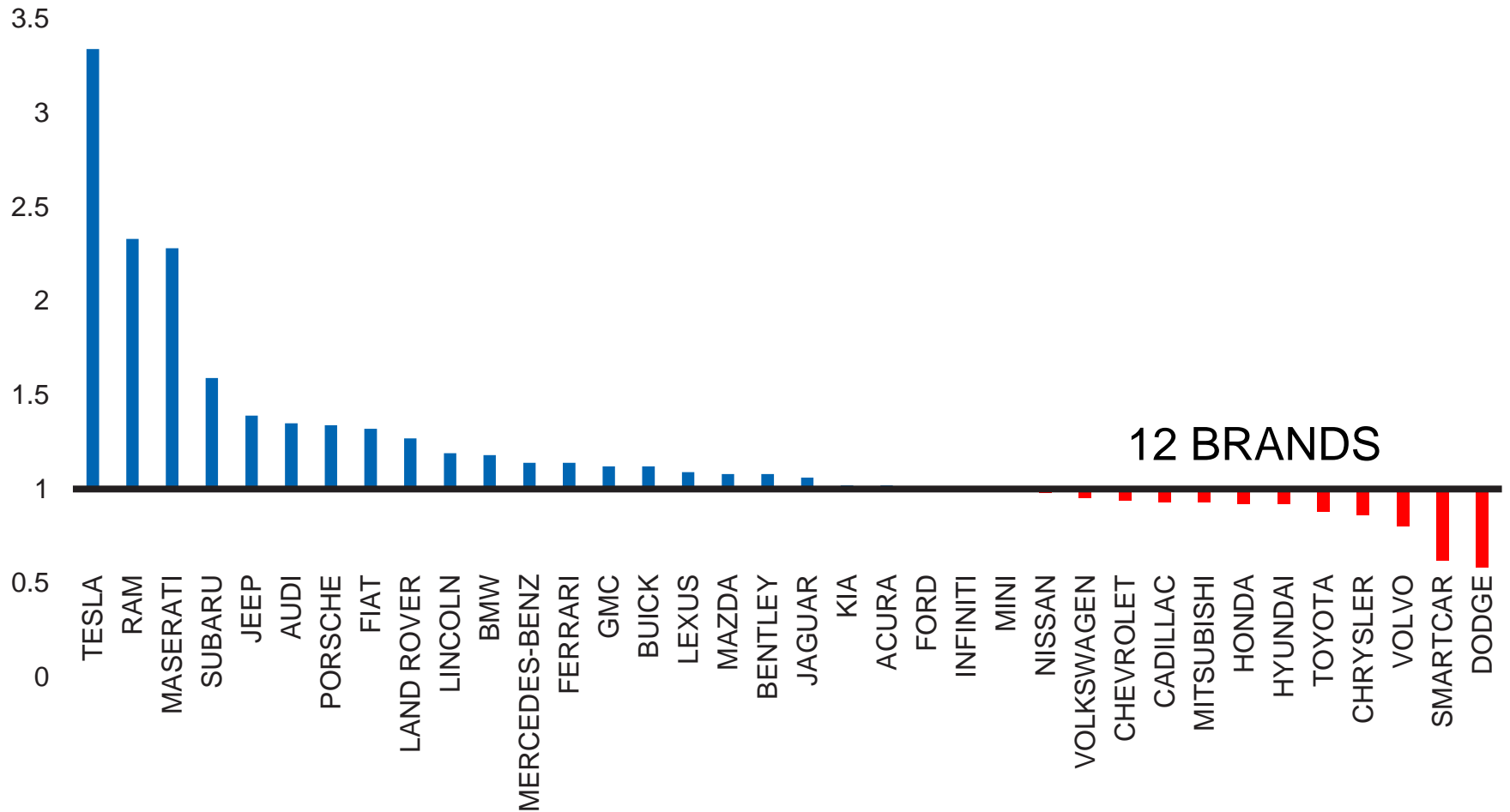
Knowing Customers Beyond Loyalty Scores



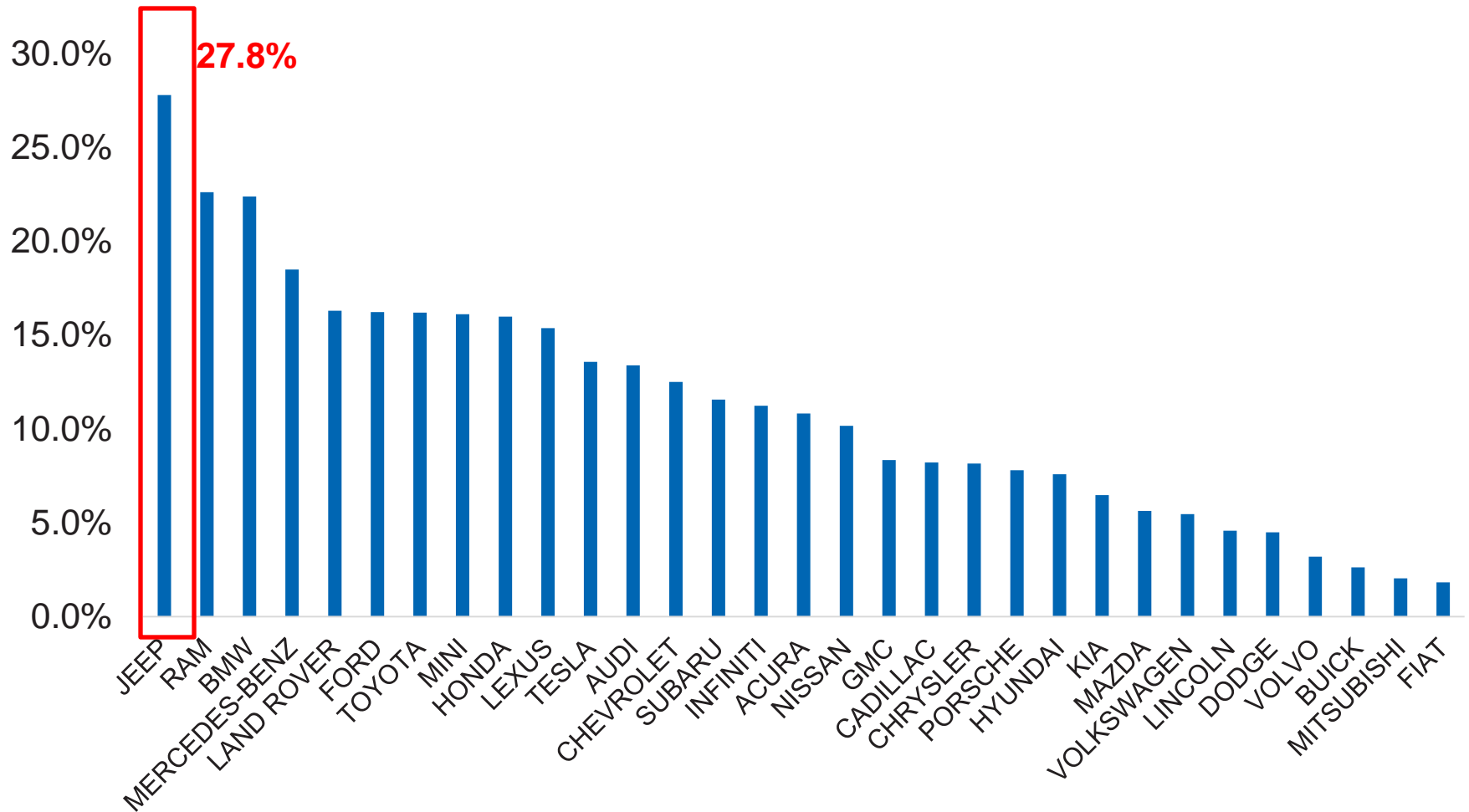
Ethnic Market Loyalty



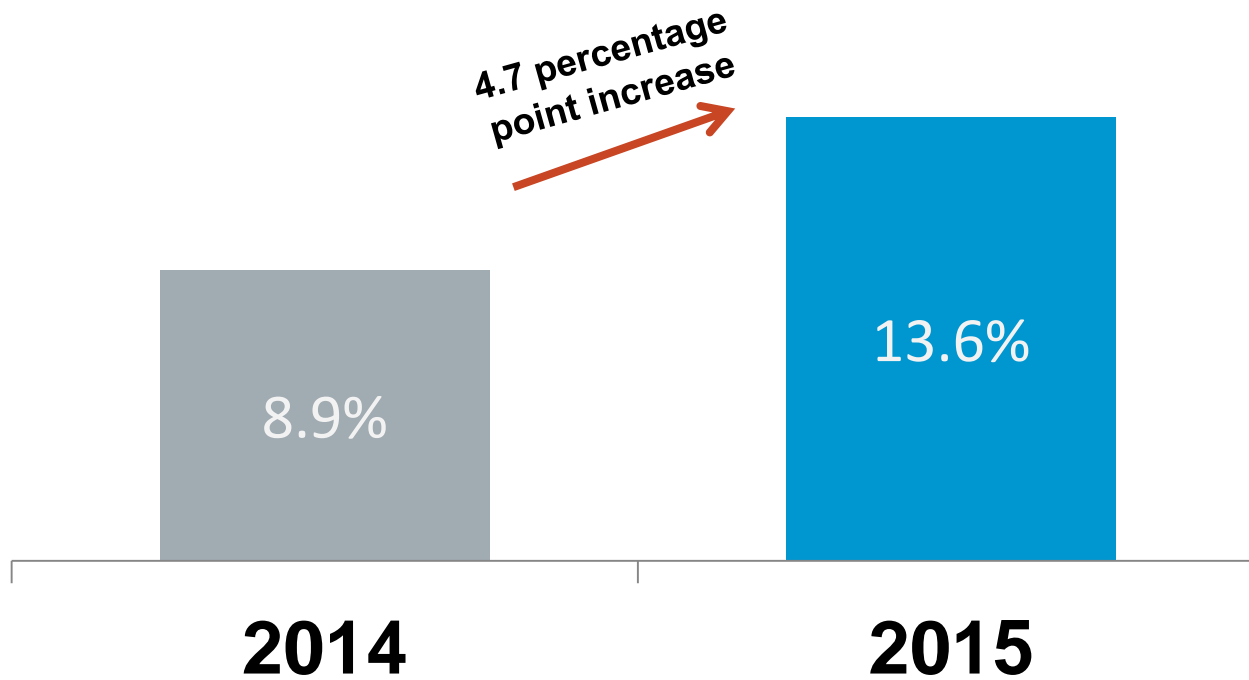
Conquest Defection Ratio



Industry Conquest % - Segment Adjusted



Most Improved Conquest Percent - Tesla




Success in 2016

- Conquest will become even more important
- Incentive spend will need to be controlled
- Customer experience with product and dealer will need to be at its best
- Brands must leverage their captive finance relationship
- Converting used owners to new owners
- Understanding the RTM population will help to communicate the right message

Analyst Contacts

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