AUTOMOTIVE OUTLOOK SYMPOSIUM
FEDERAL RESERVE BANK OF CHICAGO – DETROIT BRANCH
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North American Economic and New Vehicle Sales Outlook

Is There Reason to Remain Optimistic?

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Economic and Industry Overview

Global

- Modest global growth (i.e., < 3%) likely to persist into 2017-18
  - No major driver of global growth, such as China during 2002-13
- Global trade largely supporting synchronized global manufacturing recovery
- Inflation generally contained; pause in global reflation
  - Lower commodity prices
- Policy accommodative; but, on balance, becoming more neutral
- Structural reforms – following end of commodity super-cycle and China slowdown – needed for emerging economies to achieve faster, sustainable growth
- Global economy vulnerable to geo-political and geo-economic shocks
  - Risks biased to the downside

North America

United States

- Below-target inflation and (marginal) labor market slack supporting gradual policy rate normalization
- Automotive activity outpacing housing sector in this recovery
- Low risk of recession in 2017-18
  - Current cycle unlikely to end as a result of a commodity price shock or aggressive policy tightening

Canada

- Growth supported by household consumption; investment contracting for 8 quarters; export growth is soft

Mexico

- Weak MXN contributing, in part, to high inflation, policy rate hikes
- Presidential election in 2018

Automotive

Global

- 17 markets posted new record highs in 2016
- Growth in global new vehicle sales largely dominated by North America and China
- Emerging markets and new mobility options are an upside opportunity

North America

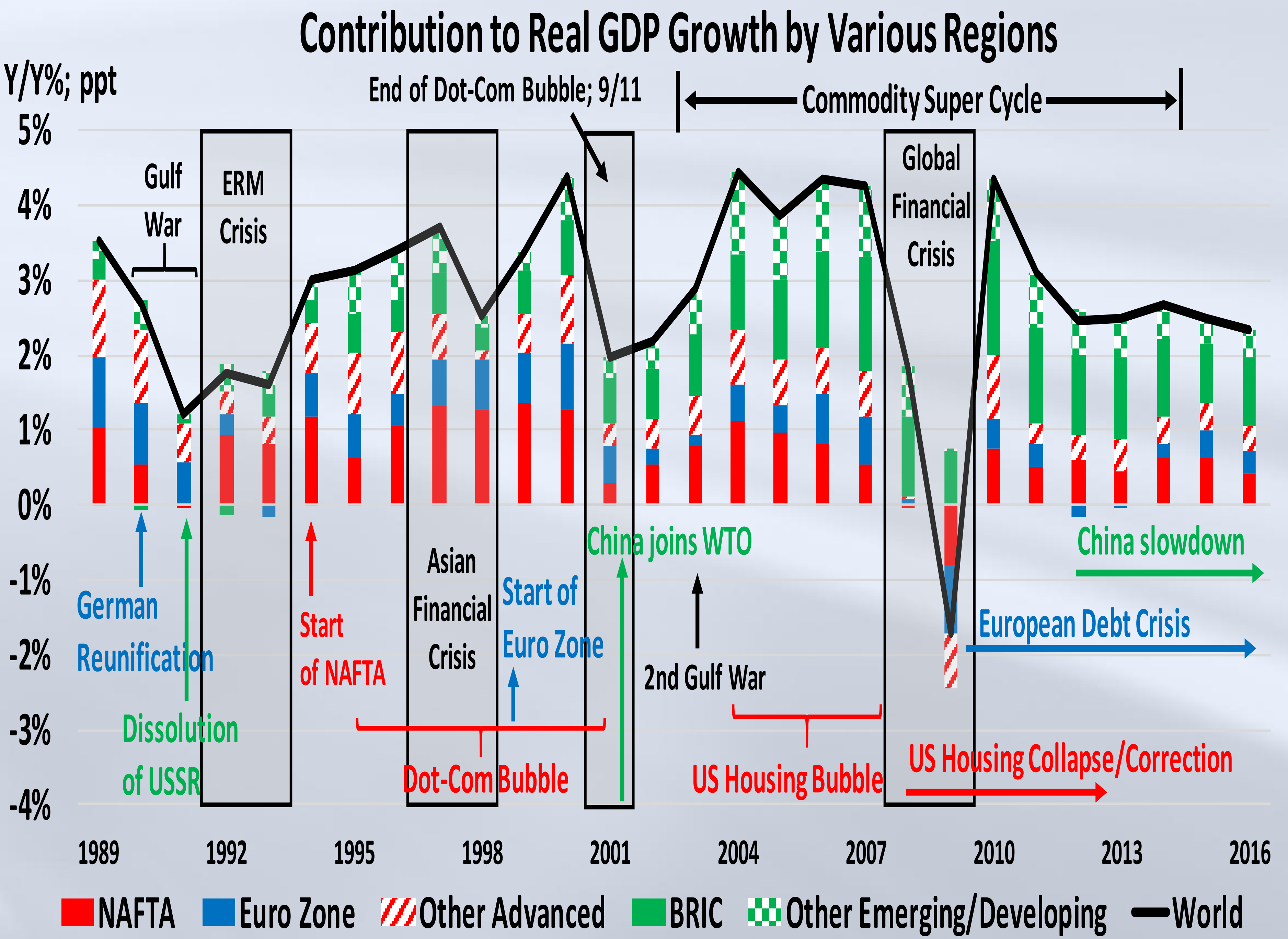
- Fundamentals indicating that new vehicle sales are at a peak in the current cycle

United States

- Sales growth during the current cycle – while largely supported by pent-up demand – is unsustainable
- Sales to adjust in line with real GDP growth

Global growth < 3% during the past five years – longer than 1990-93

- **Advanced economies – NAFTA, Euro Zone, and Other Advanced Economies – were a major contributor to global growth until 2001**
- **China's entry into WTO in late 2001 marked a point where the BRIC and other emerging/developing economies became larger contributors to global growth**
- **China's economic/industrial development – via its demand for commodities – contributed to faster growth among commodity exporters, most of which were emerging or developing economies**
  - **From 2004 to 2007, contribution to global growth was roughly balanced between advanced and the BRIC/emerging economies**
  - **This period of synchronized growth gave rise to the US housing bubble and Commodity Super-Cycle**
- **After the Global Financial Crisis, emerging economies were the majority contributors to global growth, at least until the end of the Commodity Super-Cycle in 2014 where China maintained the dominant influence**
- **Several factors have been noted as contributing to sub-3% global growth as of 2012**
  - **Cyclical factors: deleveraging, weak investment spending due to excess capacity and technological uncertainty, and weaker global demand resulting in softer international trade and low commodity prices**
  - **Structural factors: low productivity growth, deceleration in the growth of working-age population, and slow implementation of structural reforms especially among commodity exporters**



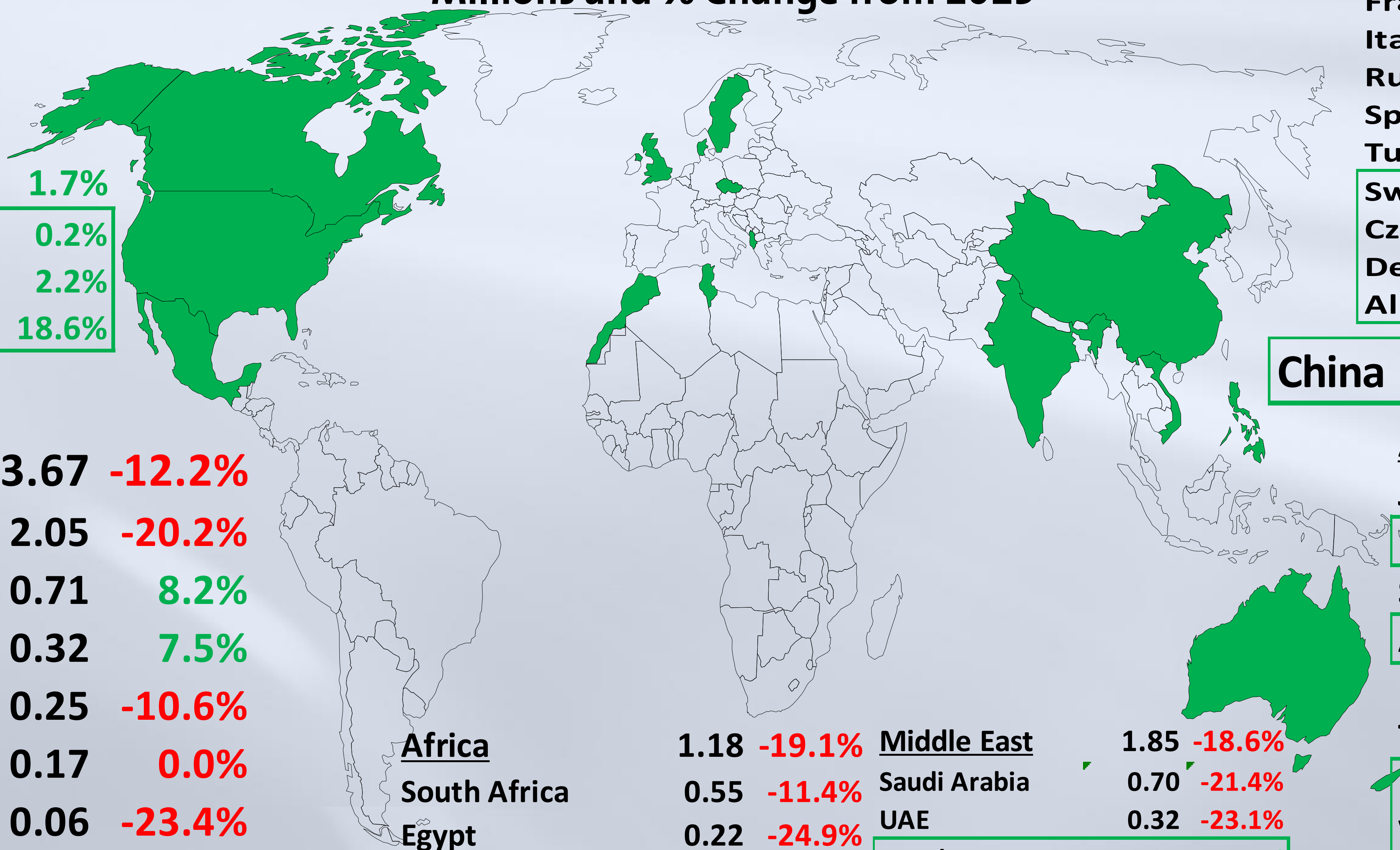
Sources: World Bank, Haver Analytics, GM Economics Team; Calculations: GM Economics Team

Despite subpar global growth backdrop, 17 countries posted record-high new vehicle sales in 2016

- Record new vehicle sales largely dominated by North America, European, and Asian markets
- Significant sales declines posted in South America, Africa, and Middle East as economic adjustments mainly from the collapse of commodity prices continue

2016 Global New Vehicle Sales

Millions and % Change from 2015



North America	21.88	1.7%
United States	17.89	0.2%
Canada	1.98	2.2%
Mexico	1.65	18.6%

South America	3.67	-12.2%
Brazil	2.05	-20.2%
Argentina	0.71	8.2%
Chile	0.32	7.5%
Colombia	0.25	-10.6%
Peru	0.17	0.0%
Ecuador	0.06	-23.4%
Venezuela	0.003	-82.9%

Europe	20.38	4.9%
Germany	3.71	4.8%
United Kingdom	3.13	2.2%
France	2.48	5.7%
Italy	2.06	18.5%
Russia	1.45	-11.0%
Spain	1.35	11.0%
Turkey	1.01	-0.3%
Sweden	0.43	8.9%
Czech Republic	0.39	11.8%
Denmark	0.27	8.3%
Albania	0.003	5.6%

China	28.75	12.6%

Asia-Pacific	15.26	1.7%
Japan	4.97	-1.6%
India	3.67	7.1%
South Korea	1.83	-0.4%
Australia	1.18	2.0%
Indonesia	1.07	3.3%
Thailand	0.77	-3.9%
Philippines	0.40	25.1%
Vietnam	0.30	23.5%
New Zealand	0.15	9.5%

Africa	1.18	-19.1%
South Africa	0.55	-11.4%
Egypt	0.22	-24.9%
Morocco	0.16	23.6%
Tunisia	0.06	3.0%

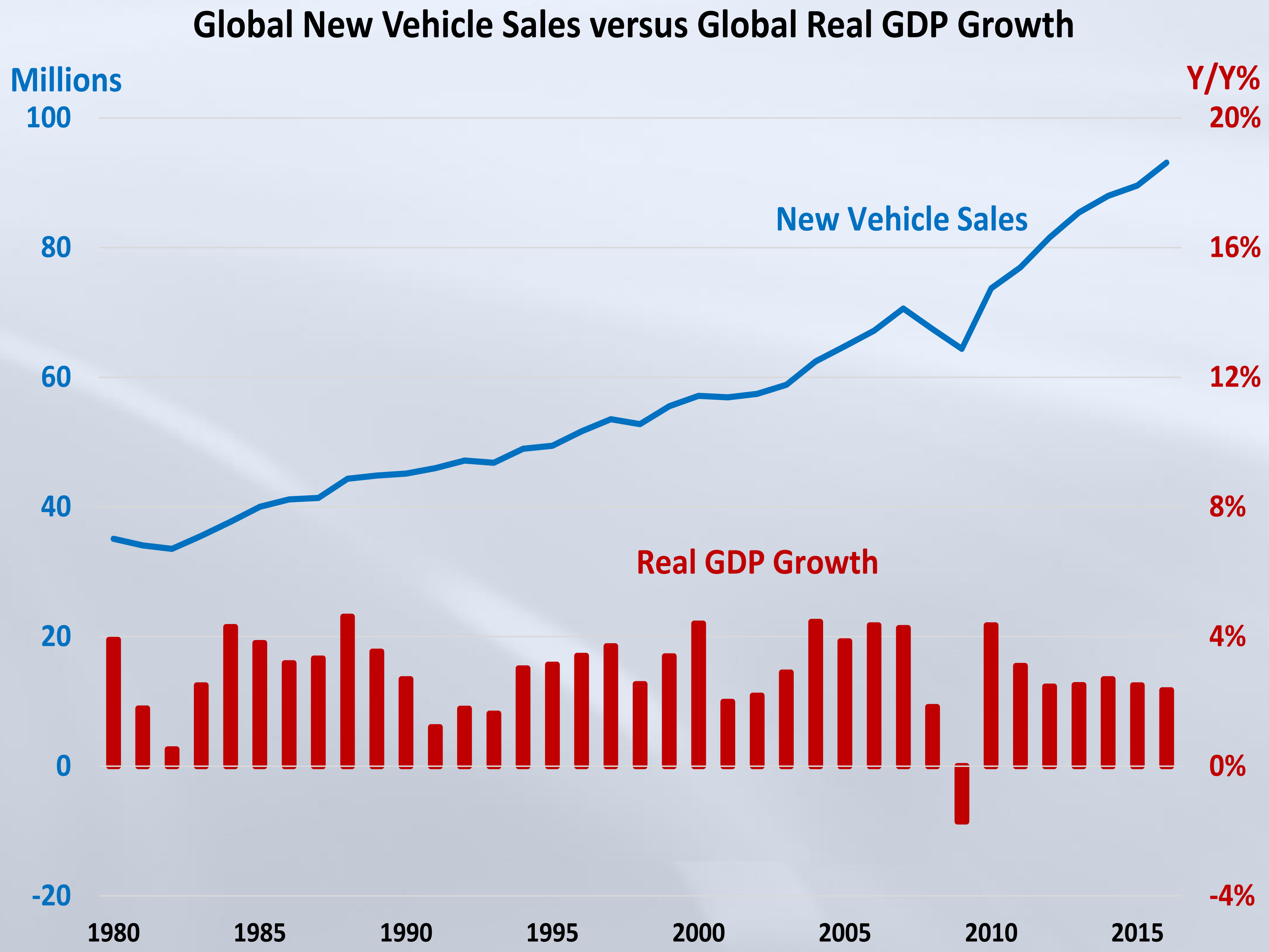
Middle East	1.85	-18.6%
Saudi Arabia	0.70	-21.4%
UAE	0.32	-23.1%
Israel	0.31	12.5%
Kuwait	0.12	-25.8%

Source: General Motors

Notes: Green shading and green outlines denote countries posting record sales in 2016
China = wholesale sales

Global new vehicle sales increased 3.8% in 2016 to reach a record-high 93.1 million units

- In 2016, the Top 20 markets represented 88% of total new vehicle sales – unchanged from 2000. Although the ranking of individual markets has changed, the countries representing the Top 15 markets remain the same



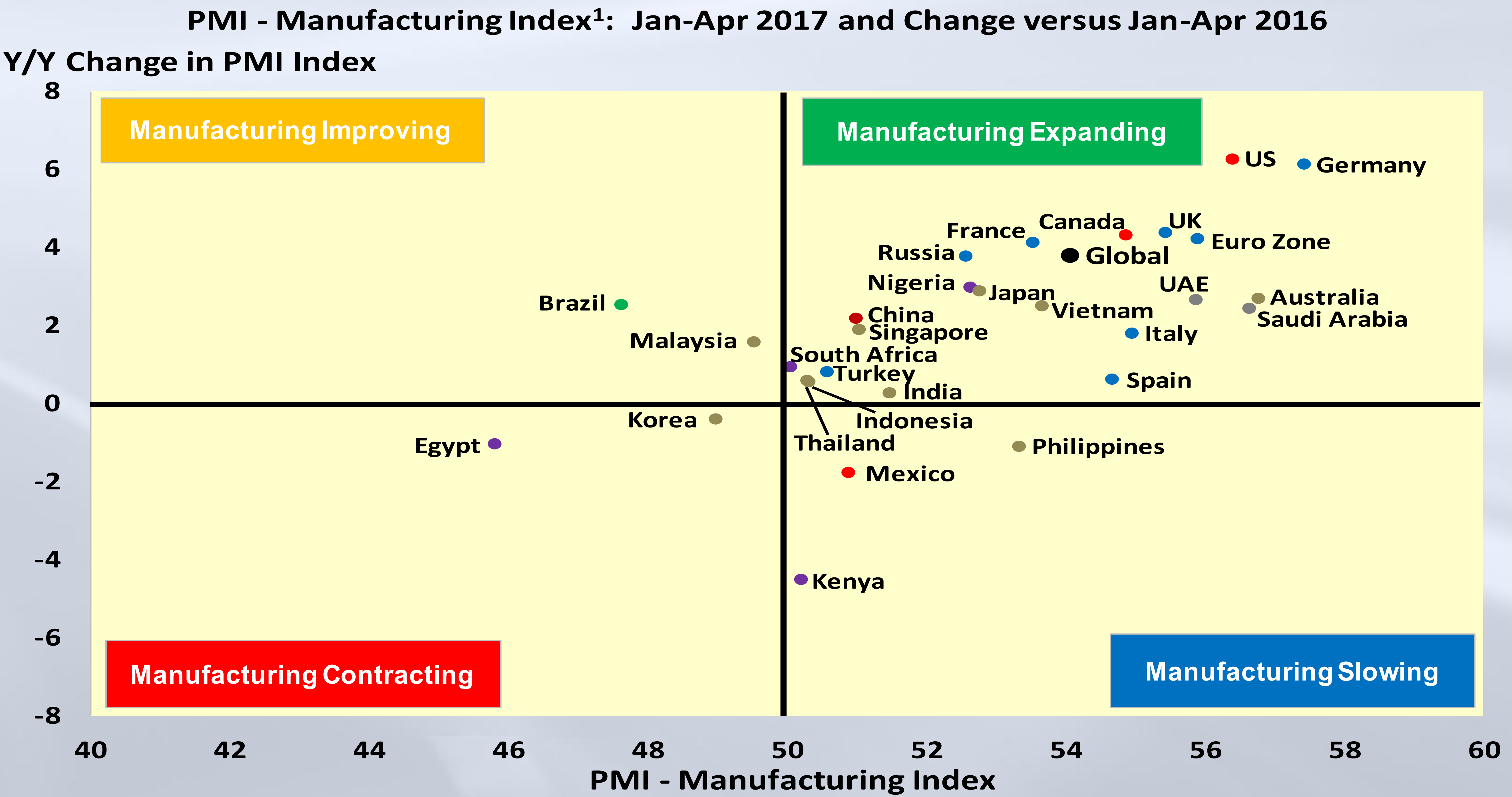
Sources: General Motors, World Bank, National Statistics Agencies, Haver Analytic; Calculations: General Motors

Top 20 Vehicle Markets
Millions of New Sales

	2000		2016
United States	17.814	China*	28.274
Japan	5.970	United States	17.886
Germany	3.694	Japan	4.966
Italy	2.692	Germany	3.709
France	2.611	India	3.667
United Kingdom	2.523	United Kingdom	3.129
China*	2.190	France	2.478
Spain	1.713	Italy	2.064
Canada	1.587	Brazil	2.050
Brazil	1.459	Canada	1.984
South Korea	1.433	South Korea	1.825
Russia	1.065	Mexico	1.646
Mexico	0.887	Russia	1.454
India	0.844	Spain	1.347
Australia	0.787	Australia	1.178
Netherlands	0.712	Indonesia	1.065
Turkey	0.632	Turkey	1.008
Belgium/Lux.	0.628	Thailand	0.769
Poland	0.520	Argentina	0.712
Taiwan	0.427	Saudi Arabia	0.699
% of Total	87.9%	% of Total	88.0%

* China = wholesale sales

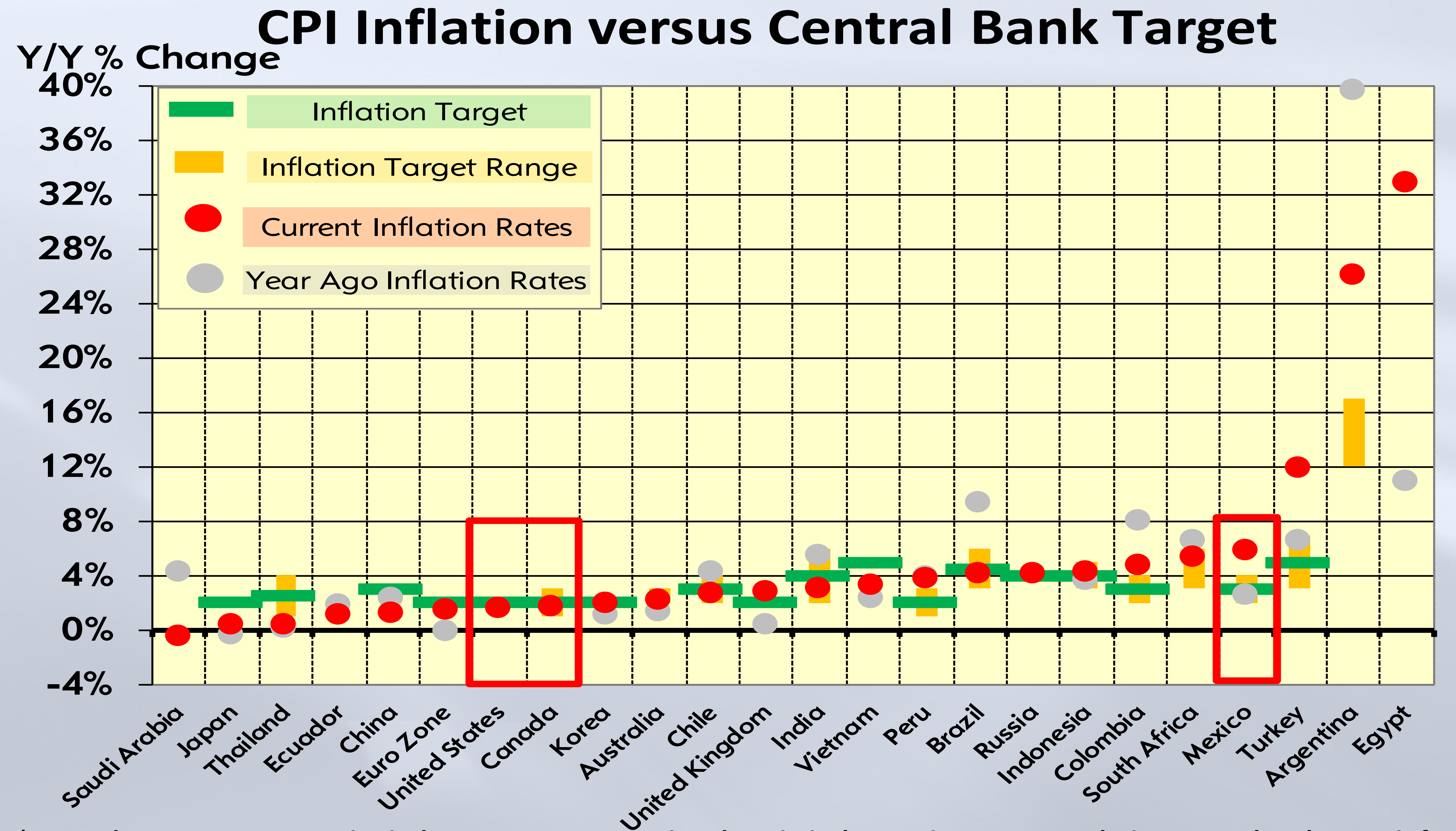
Although there are some exceptions, manufacturing activity is broadly expanding



[1] Key exceptions include Egypt, Kenya, Nigeria, Saudi Arabia, and UAE where the data pointrefers to the Total Economy PM Iindex.
Sources: Markit, ISM, National Statistics Agencies, Haver Analytics; Calculations: General Motors

Inflationary pressures largely contained …

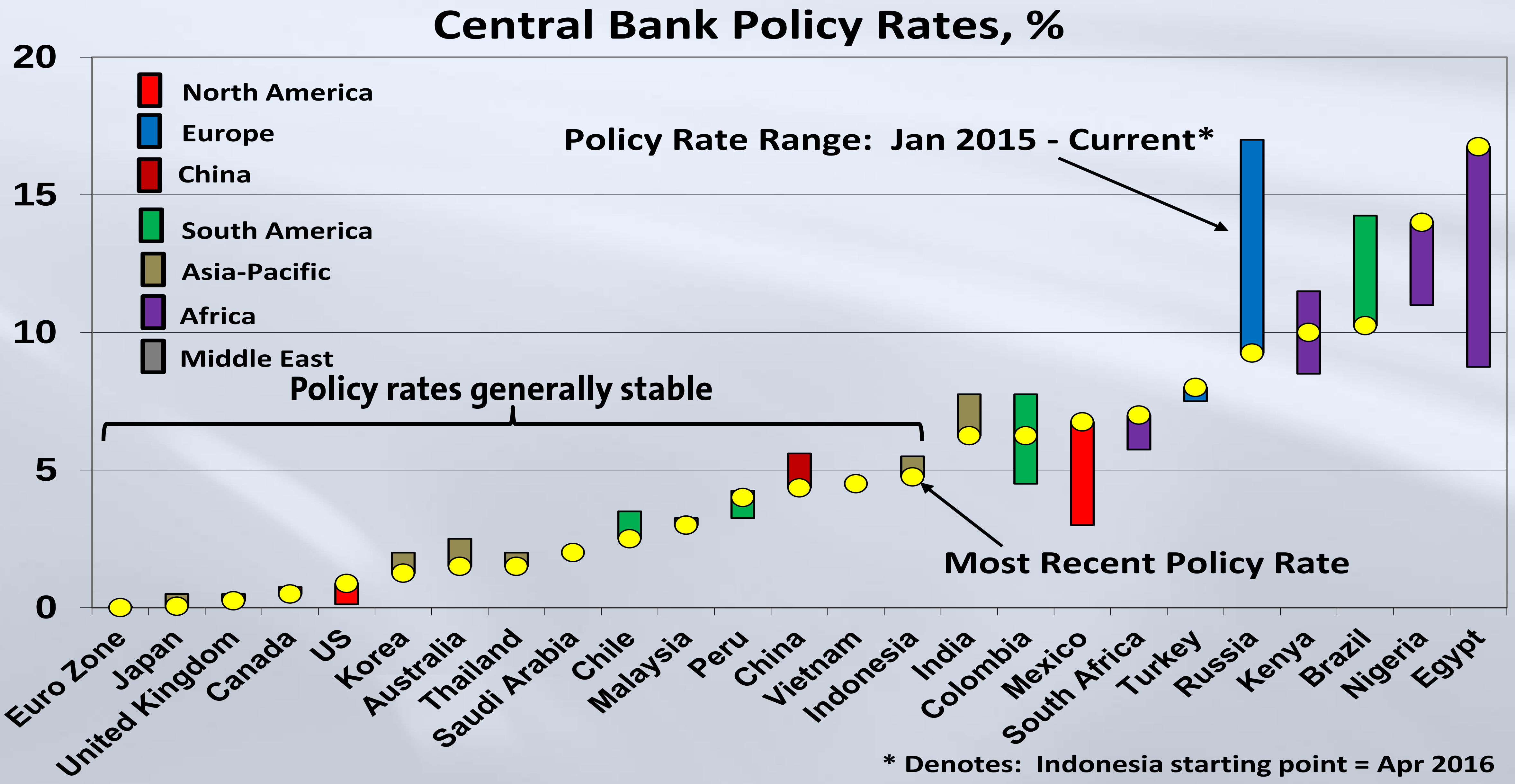
- U.S. and Canadian inflation currently below central bank's baseline target
- Depreciation of the MXN has contributing, in part, to inflation rising above the central bank's target range



* US Fed targets core PCE price index Sources: National Statistical Agencies, Haver Analytics, CentralBankNews.info

… supporting generally accommodative monetary policies

- Since December 2015, the U.S. Federal Reserve has increased the policy rate by 75 bps as part of its rate normalization process
- Canada, by contrast, has lowered the policy rate 50 bps since January 2015
- During the past 18 months, rising inflation has pressured Mexico's central bank to increase the policy rate 375 bps to 6.75%

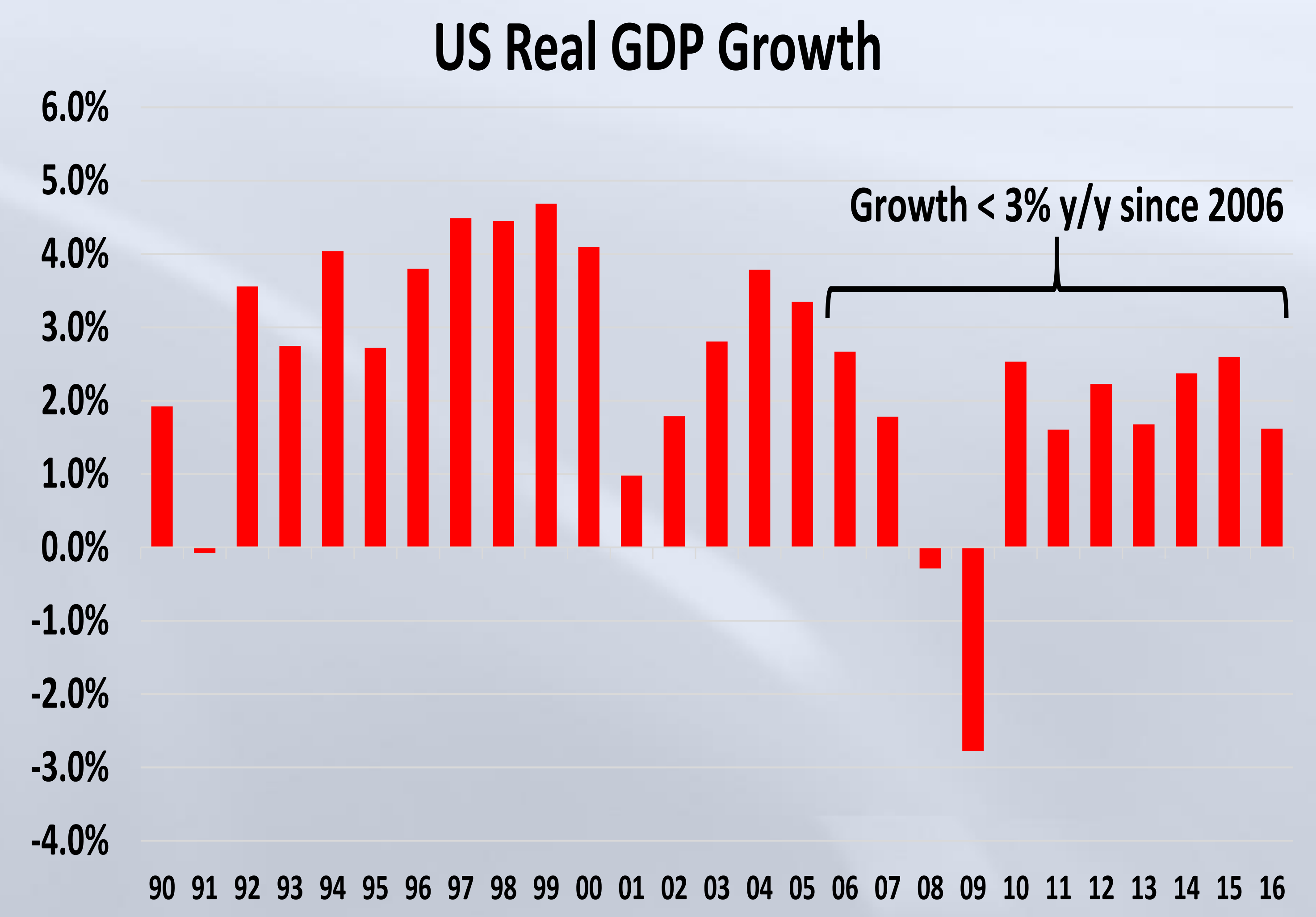


* Denotes: Indonesia starting point = Apr 2016

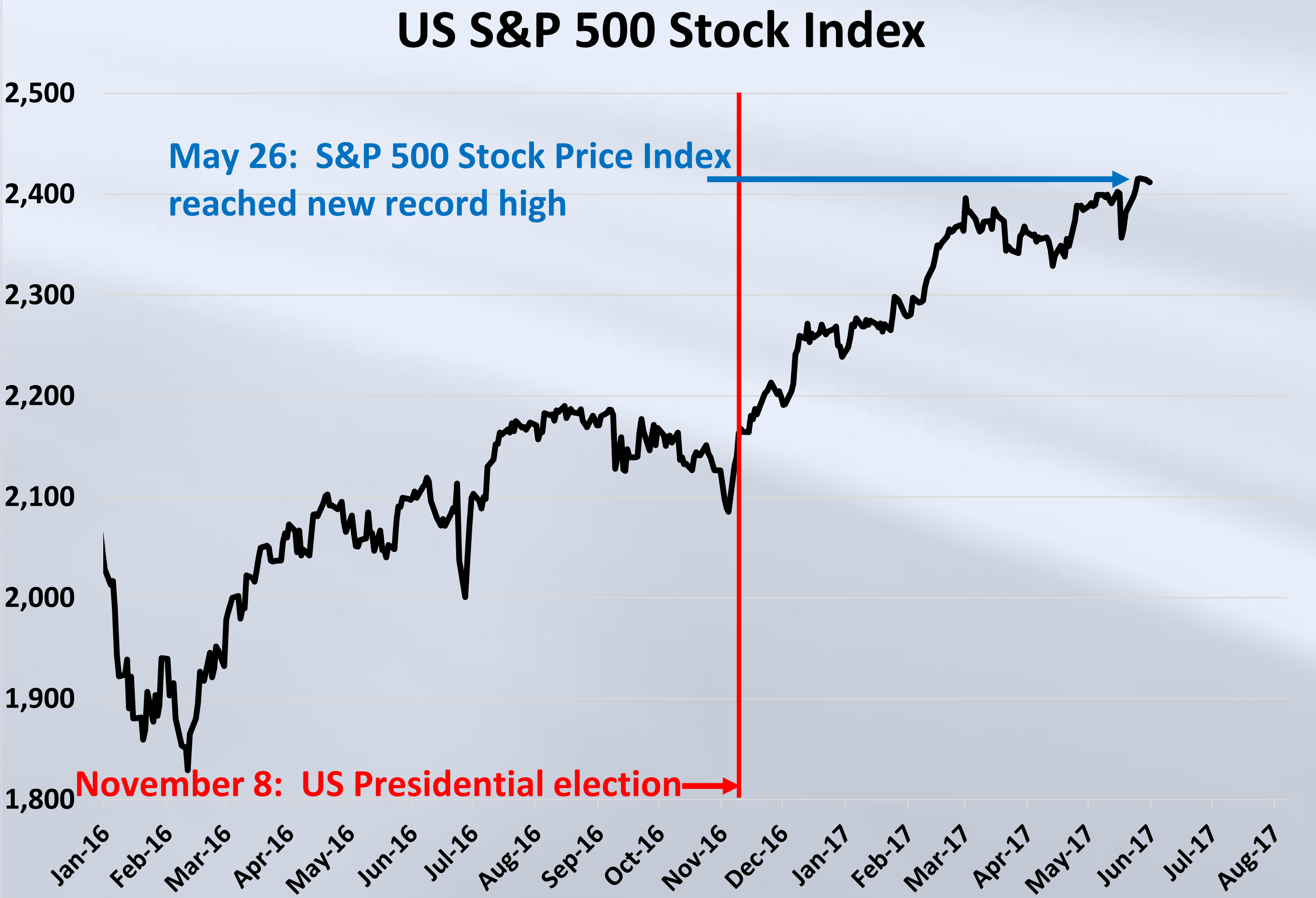
Sources: National Central Banks, Haver Analytics; Calculations: GM Economics Team

U.S. market optimism following presidential election

- Since 2006, the pace of US economic growth has been below 3% on a y/y basis
- More recently, stock markets have reflected rising optimism regarding the U.S. economy – reaching new record-highs – on expectations of infrastructure and defense spending, tax cuts, and reduced regulations
- In addition, factors that have contributed to past recessions – oil price shocks and aggressive monetary tightening – appear less likely to end the current expansion



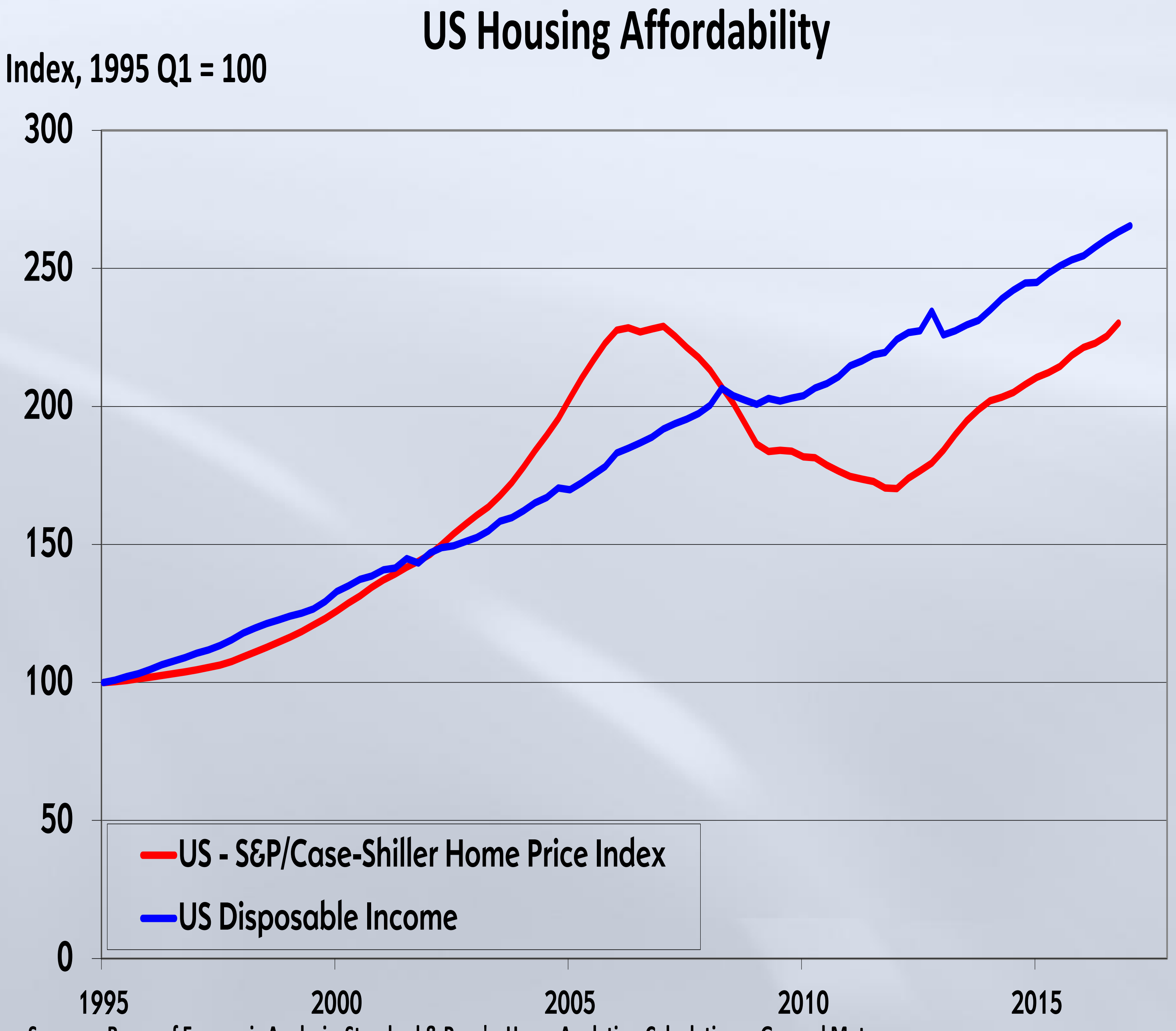
Sources: Bureau of Economic Analysis, Haver Analytics; Calculations: General Motors



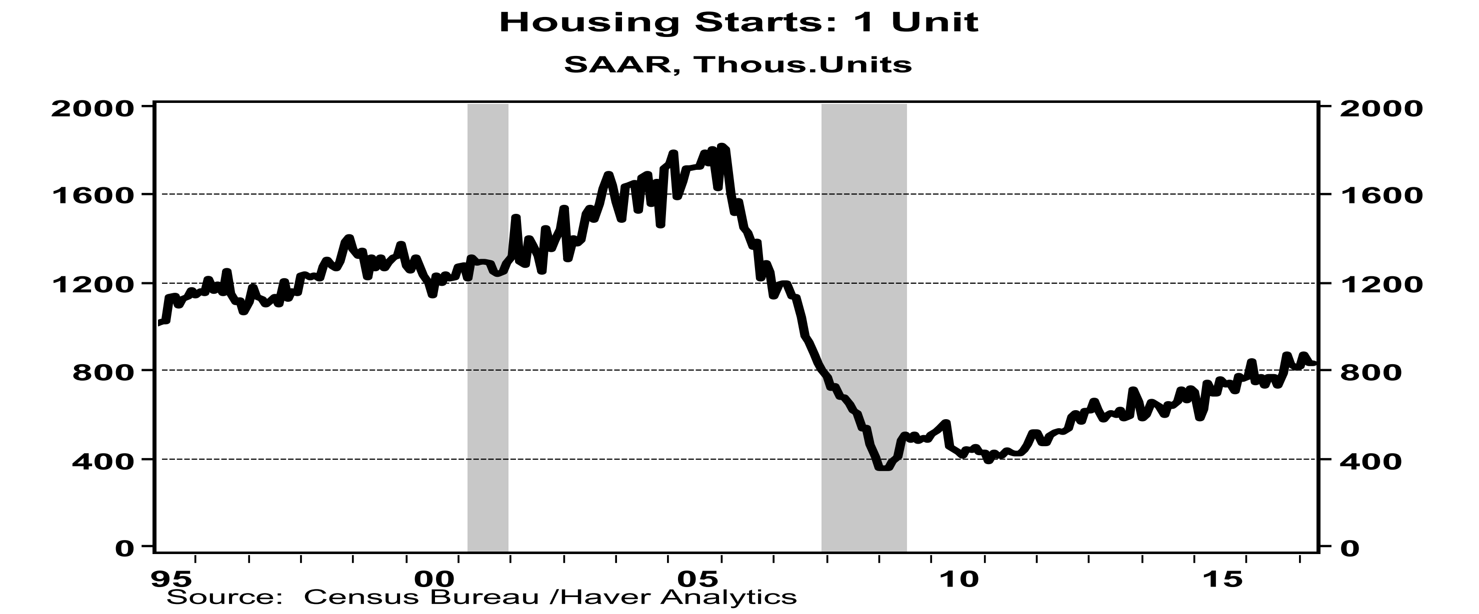
Sources: *The Wall Street Journal*, Haver Analytics

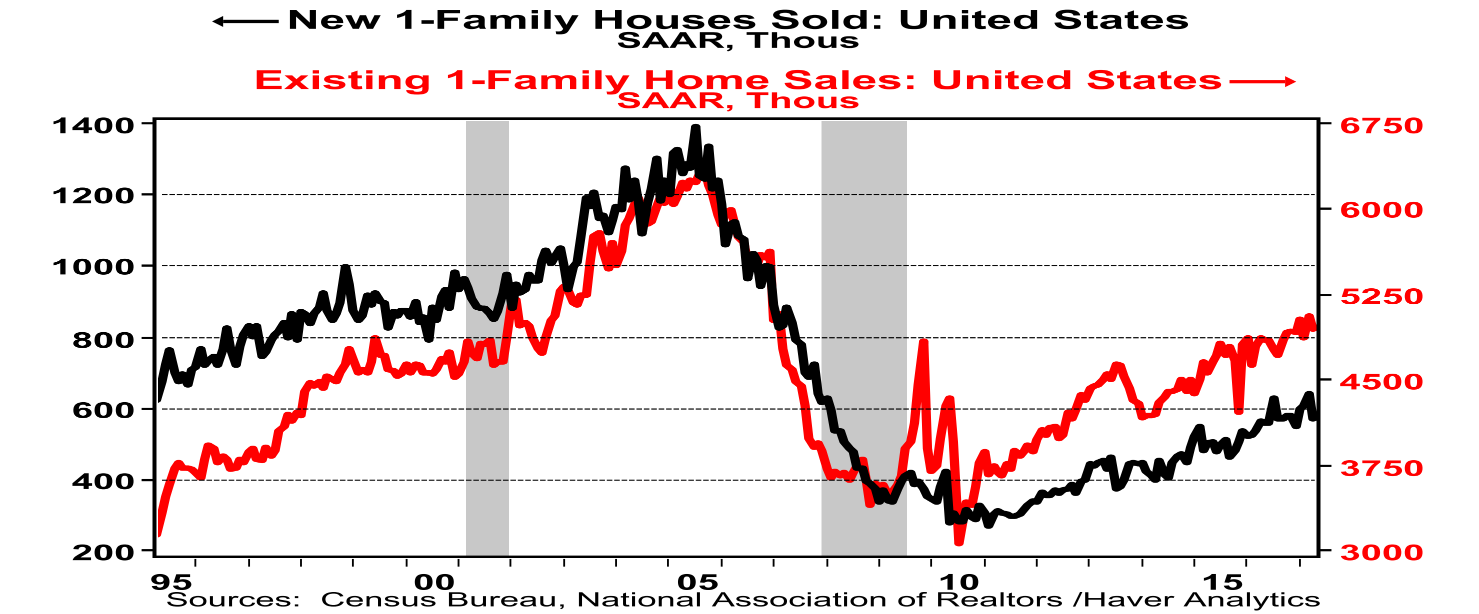
While there may be differences among U.S. states/regions; in the aggregate, favorable affordability suggests upside opportunity to the U.S. housing market

- **Weak recovery of the housing sector is one contributing factor to slower post-crisis US growth**



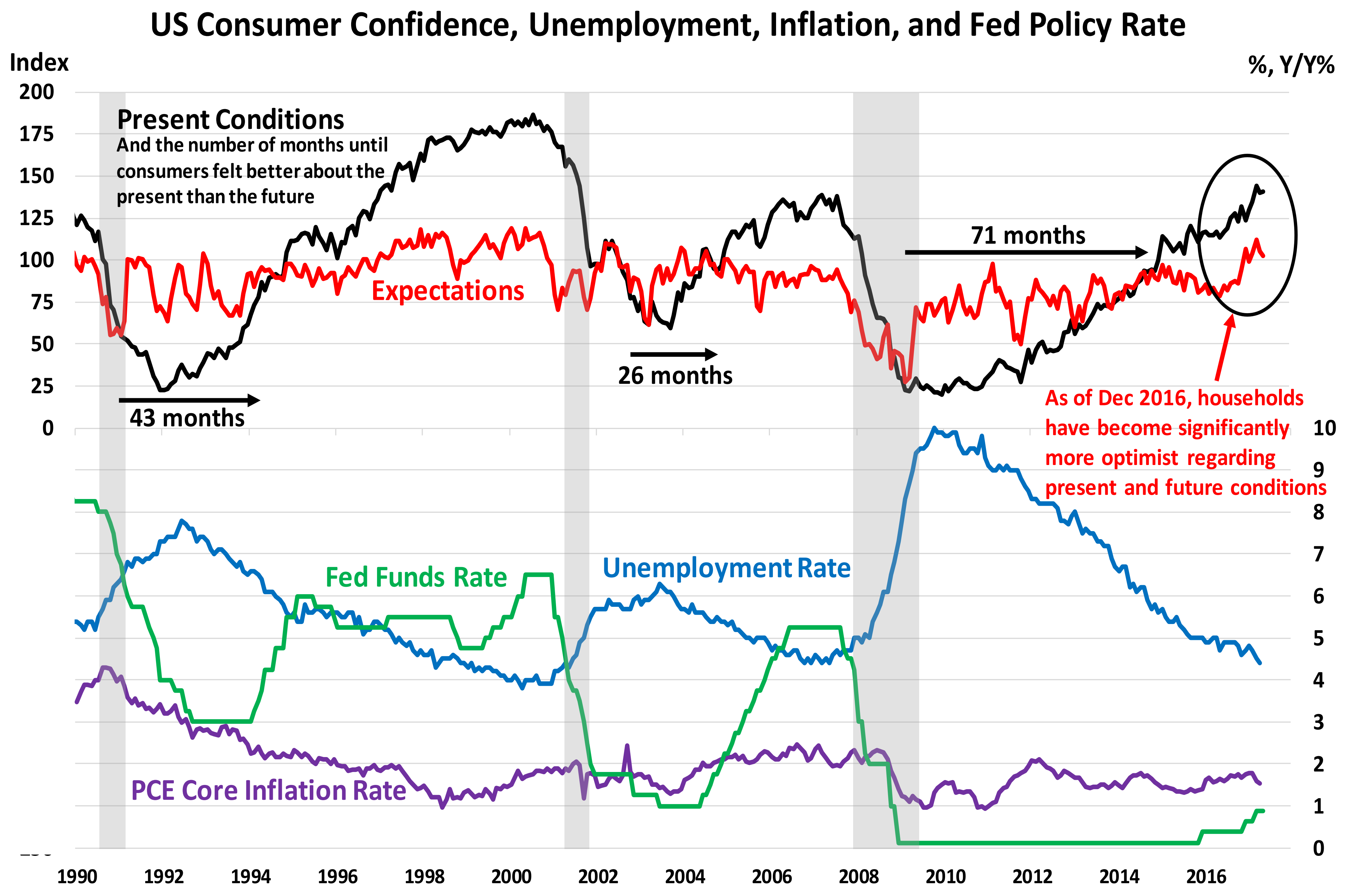
Sources: Burea of Economic Analysis, Standard & Poor's, Haver Analytics; Calculations: General Motors





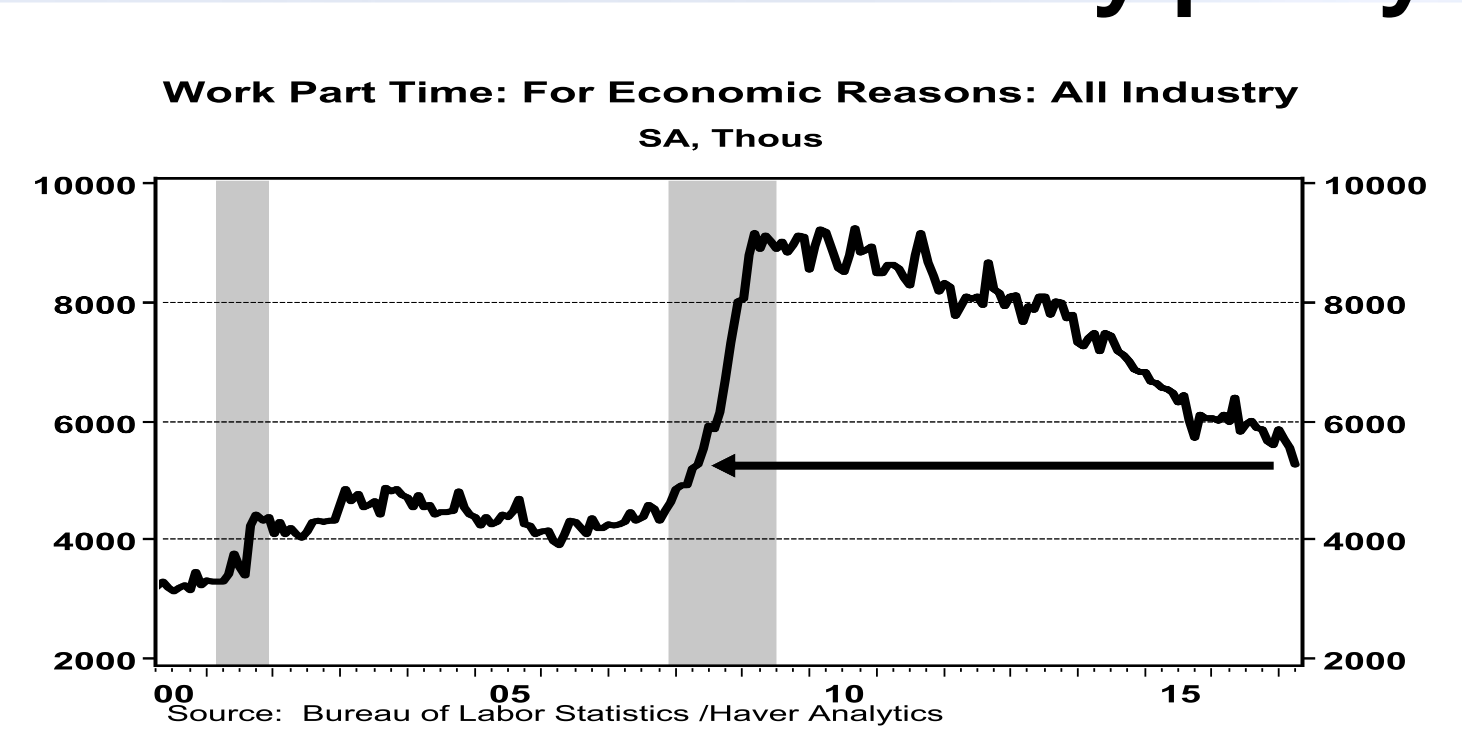
In the current cycle, it has taken US consumers longer to feel better about the present relative to the future – reflecting the limited build-up of imbalances, and helping to sustain the current recovery

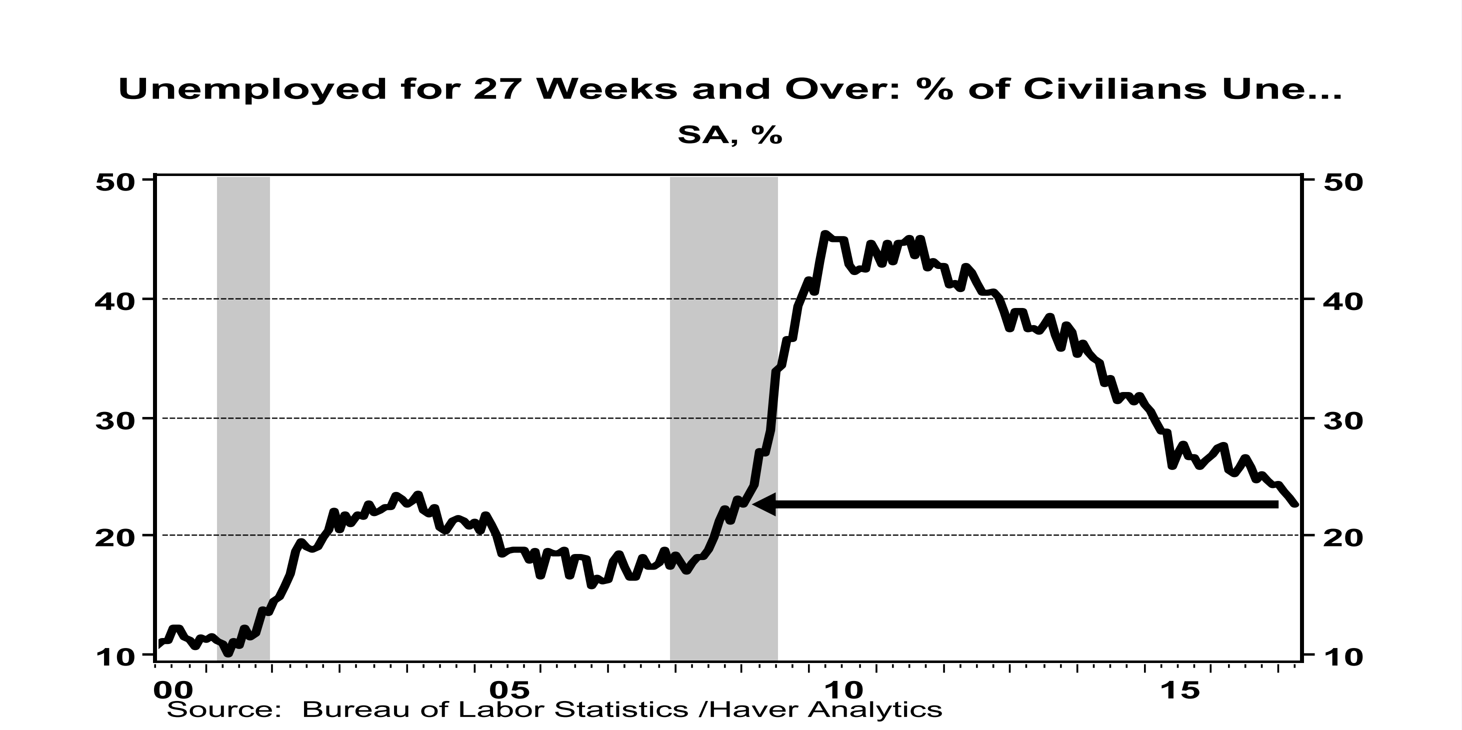
- The 2008-09 post-recession years were a period of significant private sector deleveraging
- Despite the low unemployment rate, inflation does not appear to be a threat – perhaps due to underlying labor market slack
  - Core PCE inflation is up 1.5% y/y in April – below 2% target
- With data suggesting that consumers feel less favorable about the future relative to the present highlights possible risks in the event of an economic shock
  - To be sure, aggressive rate increases during previous periods when households had already felt increasingly pessimistic about the future helped contribute to the end of the expansion

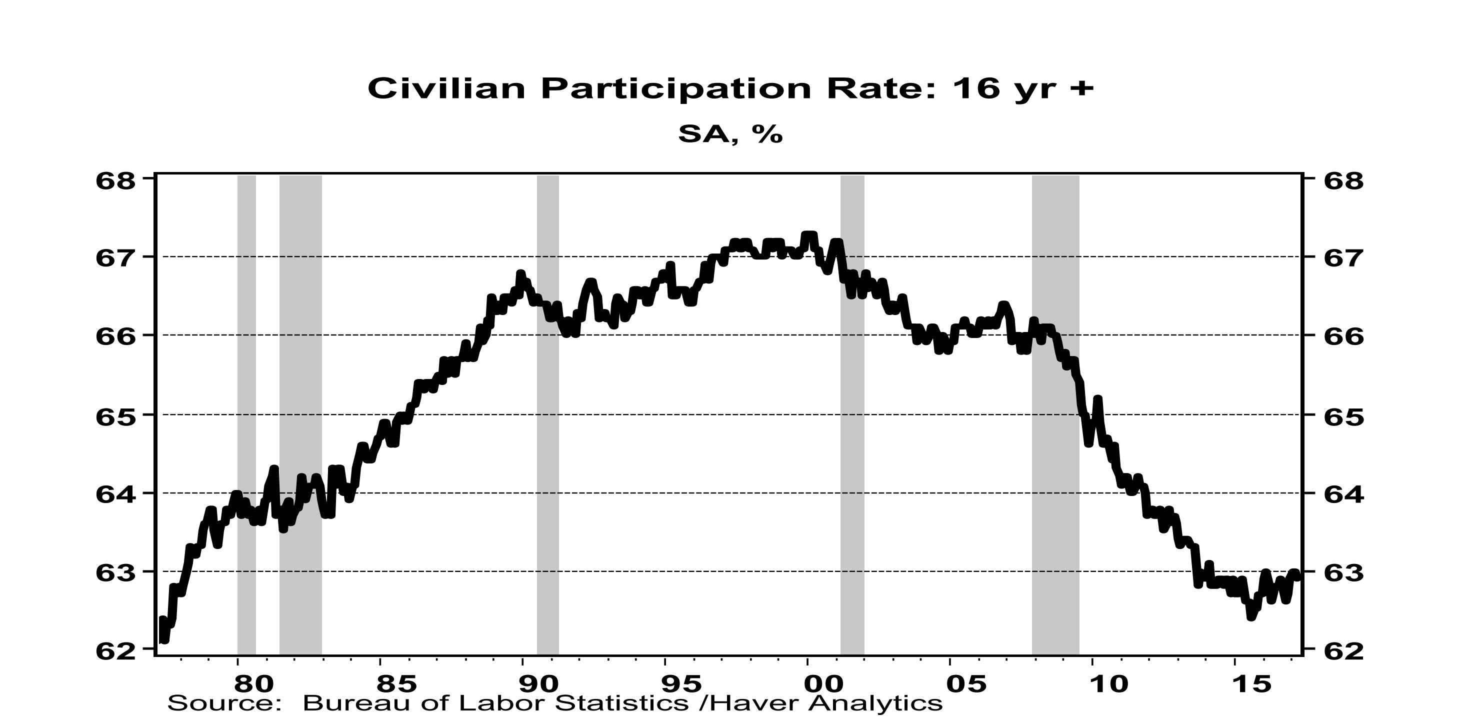


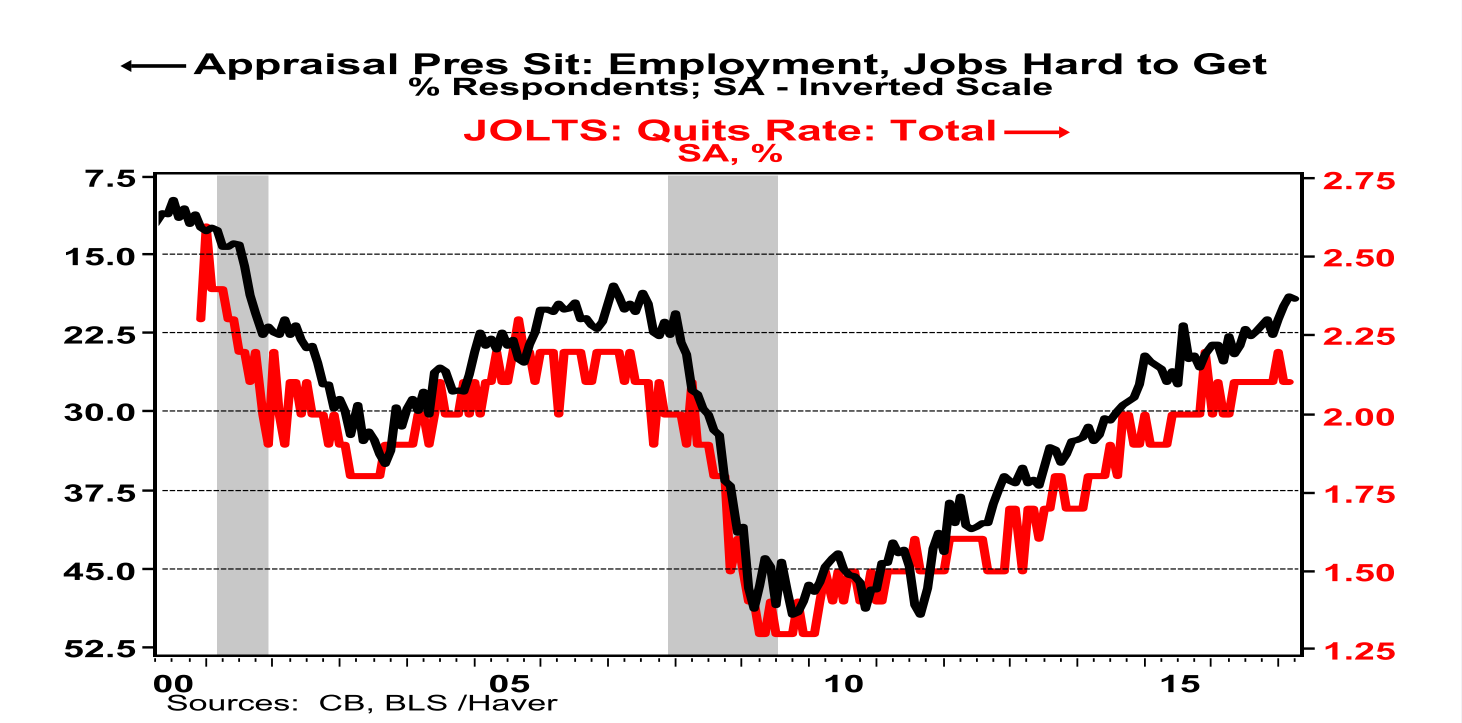
Sources: The Conference Board, Bureau of Economic Analysis, Bureau of Labor Statistics, Federal Reserve Board, and Haver Analytics; Calculations: General Motors

Labor market slack has narrowed, but still exists – supporting accommodative monetary policy



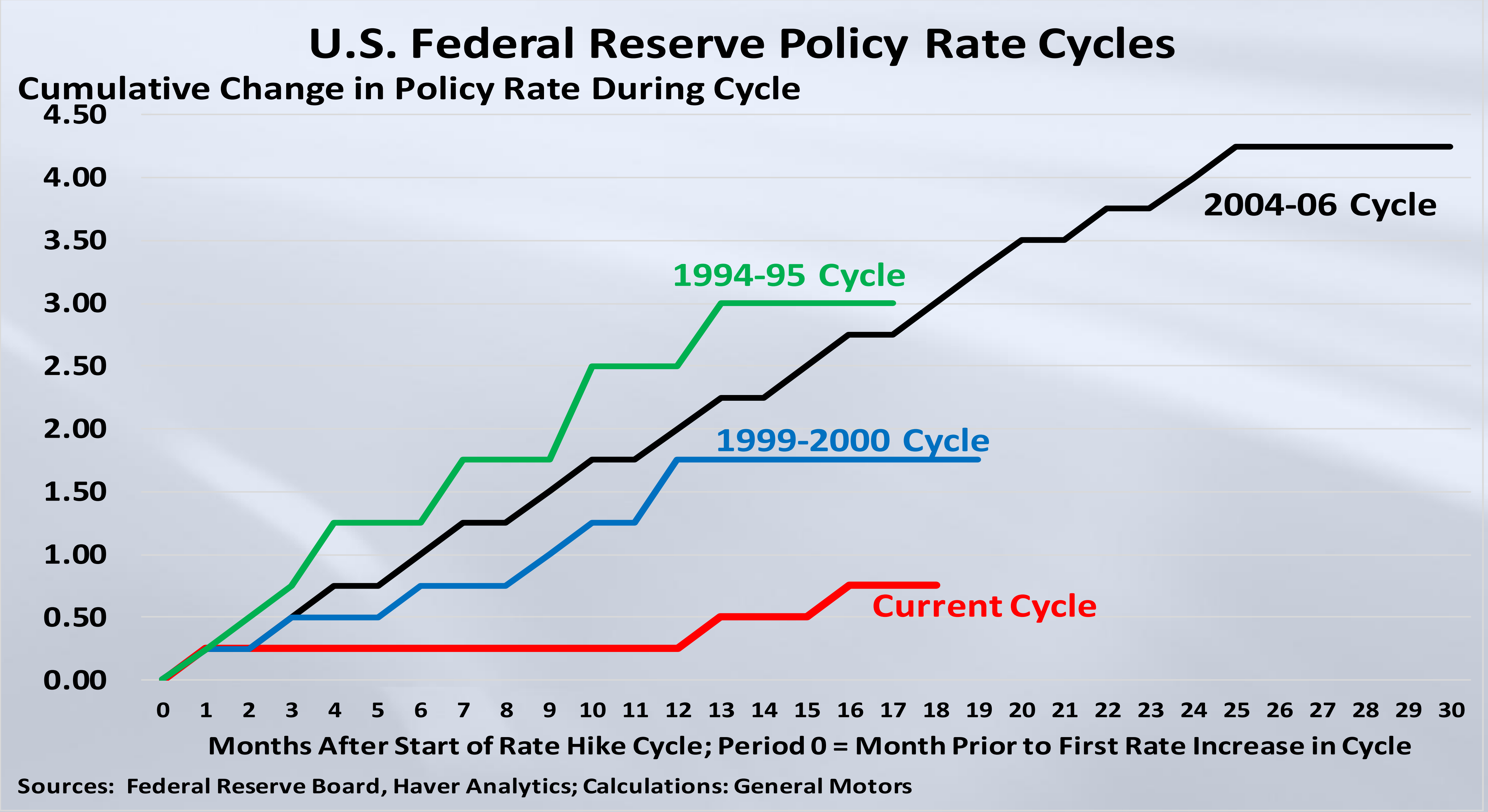




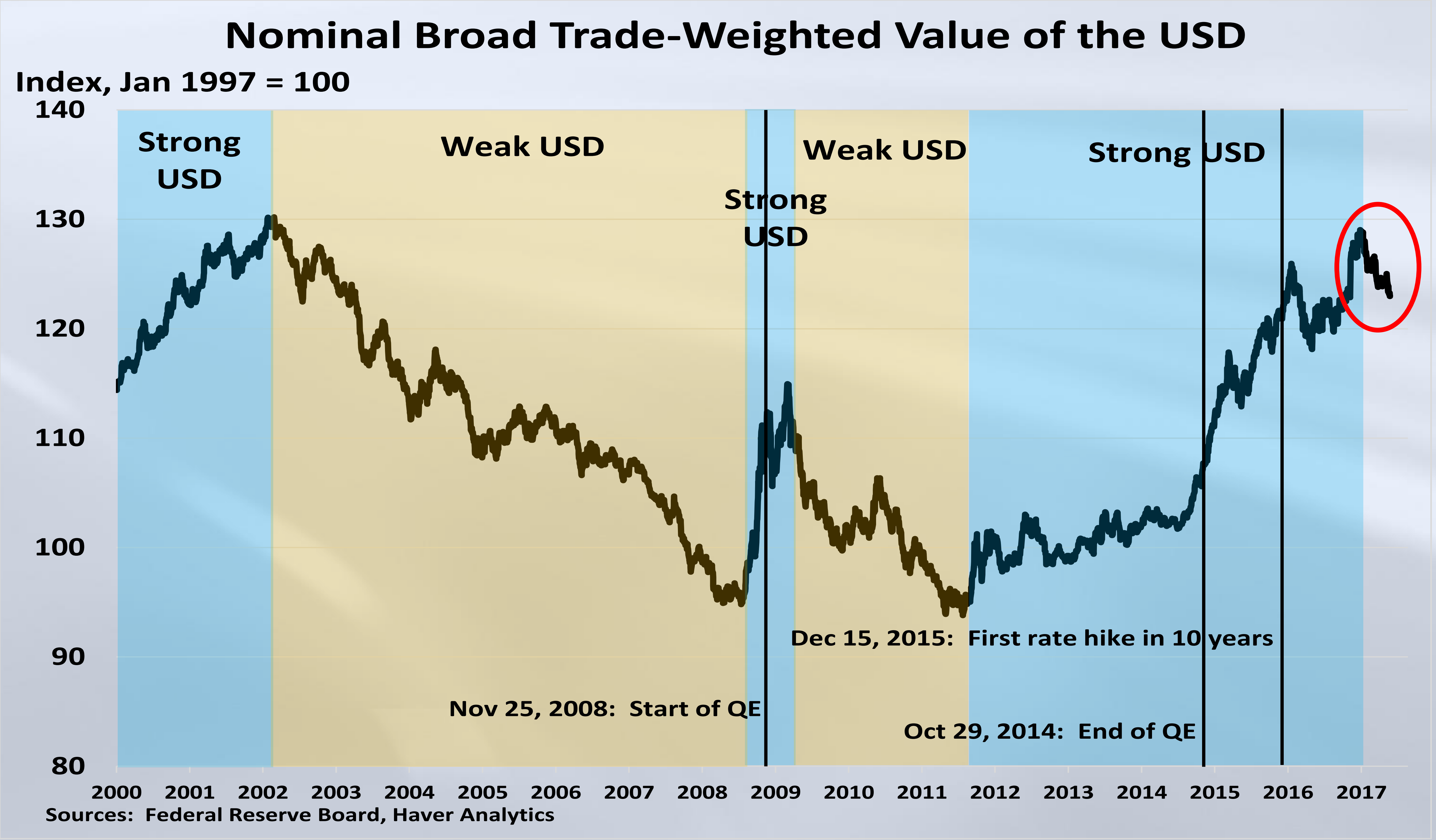


Current Federal Reserve rate increase cycle is the slowest compared to the three previous cycles

- While heightened inflationary risks could force the Federal Reserve to increase rates more aggressively, current communication from the Federal Reserve suggests that rate normalization will occur gradually



Latest USD weakness reflecting the pricing out of a more aggressive rate increase cycle. Too early to tell if latest weakness is start of a trend, or a pause in the ongoing strengthening cycle



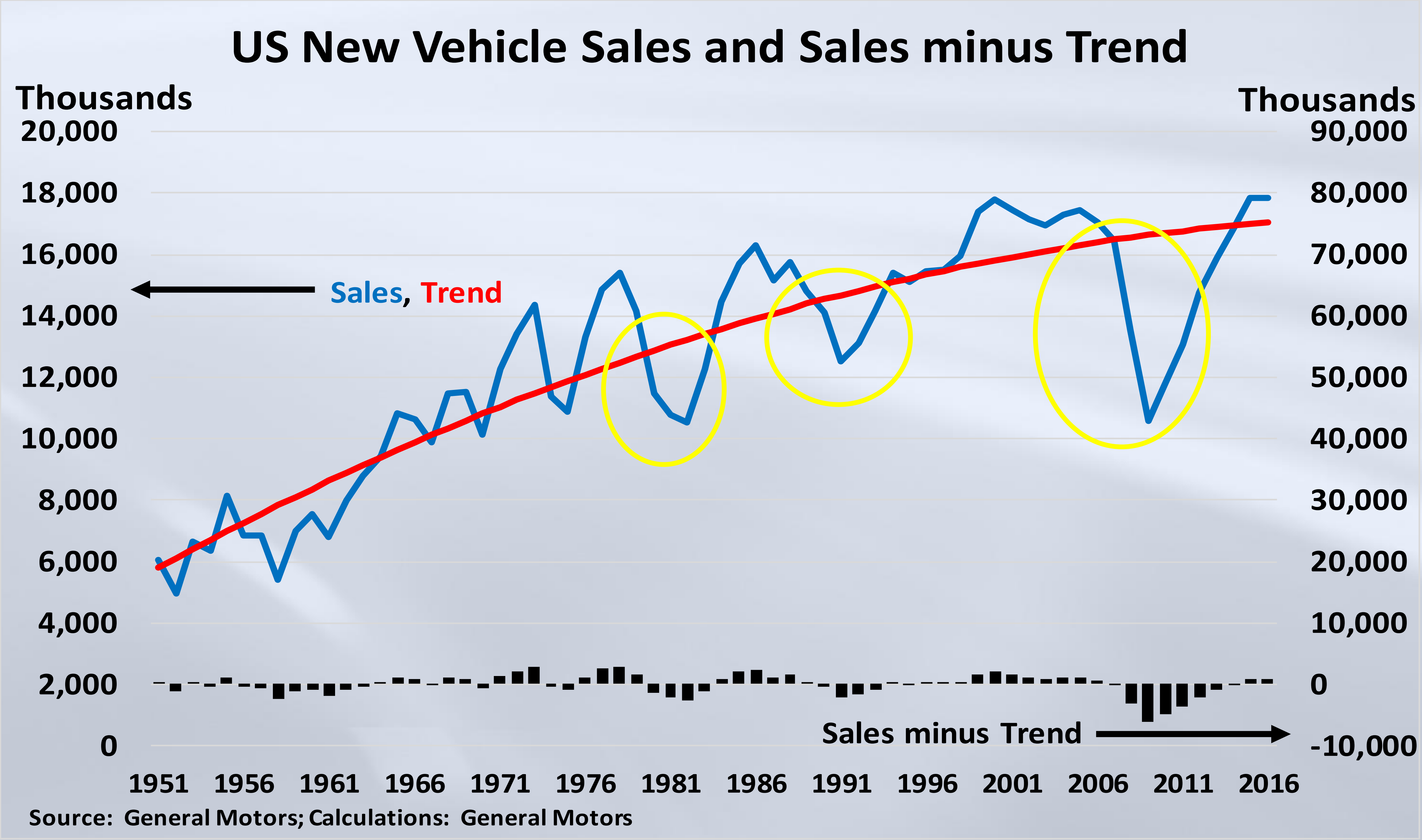
Katona framework* for assessing drivers of new vehicle demand

- **Consumer Spending**
  - **Ability to Spend**
    - Credit Availability
    - Prices
    - Income
  - **Willingness to Spend**
    - Confidence
  - **Need to Spend**
    - New demand
    - Replacement Demand
    - Complementary Spending
    - Gift Buying
  - **Opportunity to Spend**
    - Seasonal Demand
    - Incentives
    - New Model / Technology
    - Pent-up Demand

* Components are not necessarily mutually exclusive

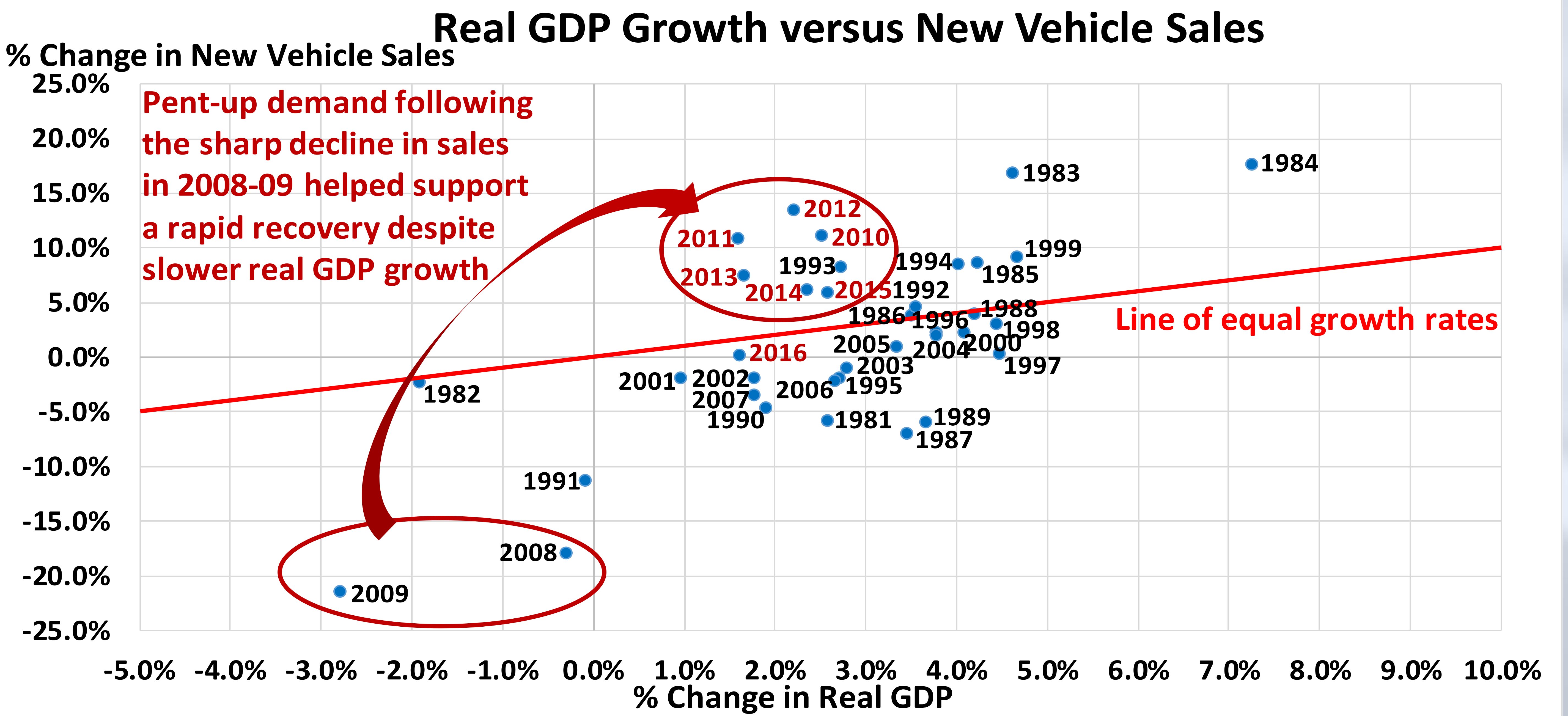
Historically, pent-up demand has been key source of stimulus for new vehicle sales

- Still, the release of pent-up demand depends on supportive fundamentals



Compared to recent history, new vehicle sales during the period 2010-15 have increased at the fastest pace based on the slowest growth in real GDP

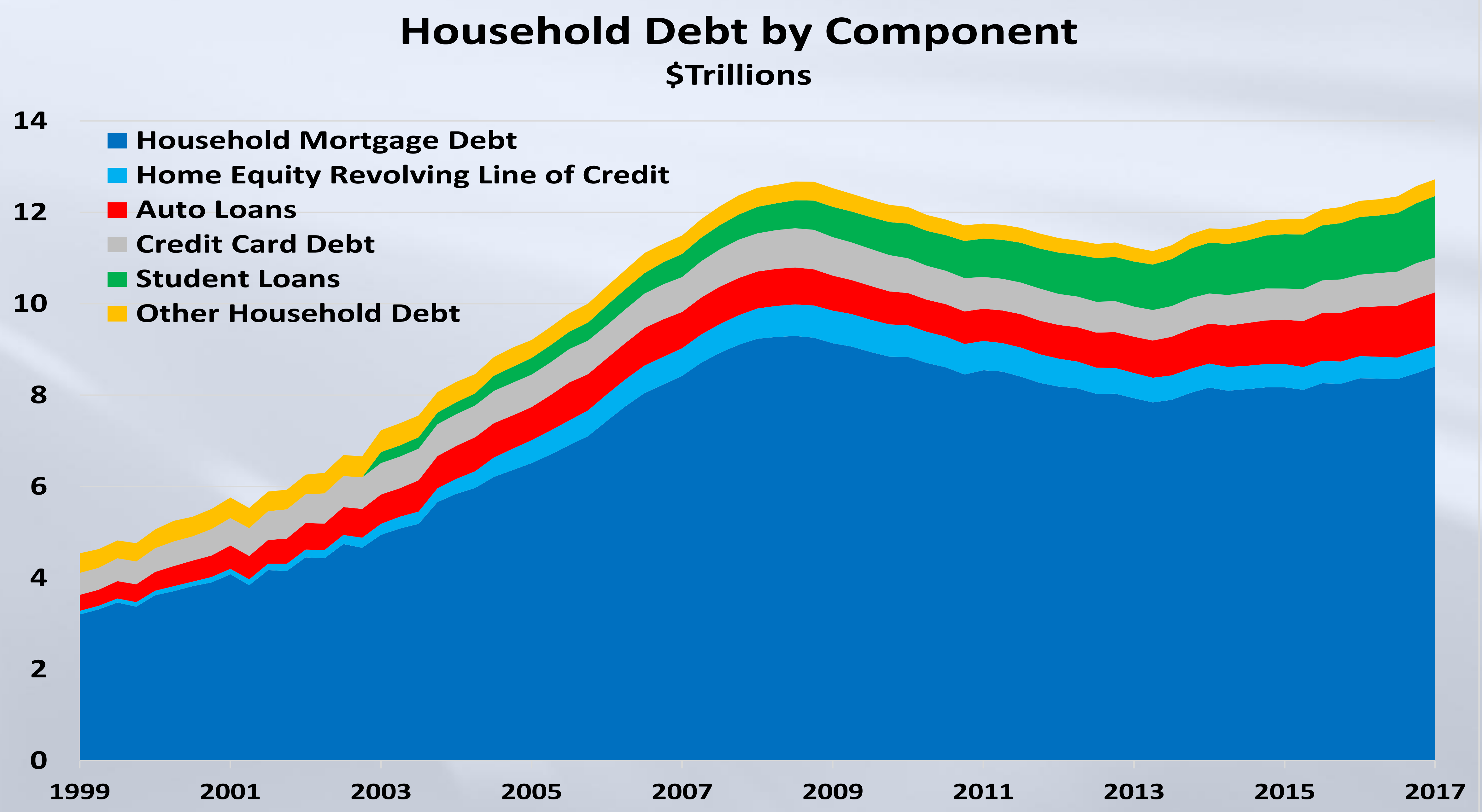
- With 1993 as an exception, prior to 2010, positive growth in new vehicle sales would have required at least 3% growth in real GDP
- 2016 reflects the starting point of a gradual “correction” to a more sustainable growth rate of new vehicle sales relative to real GDP growth



Sources: General Motors, World Bank, National Statistics Agencies, Haver Analytics; Calculations: General Motors

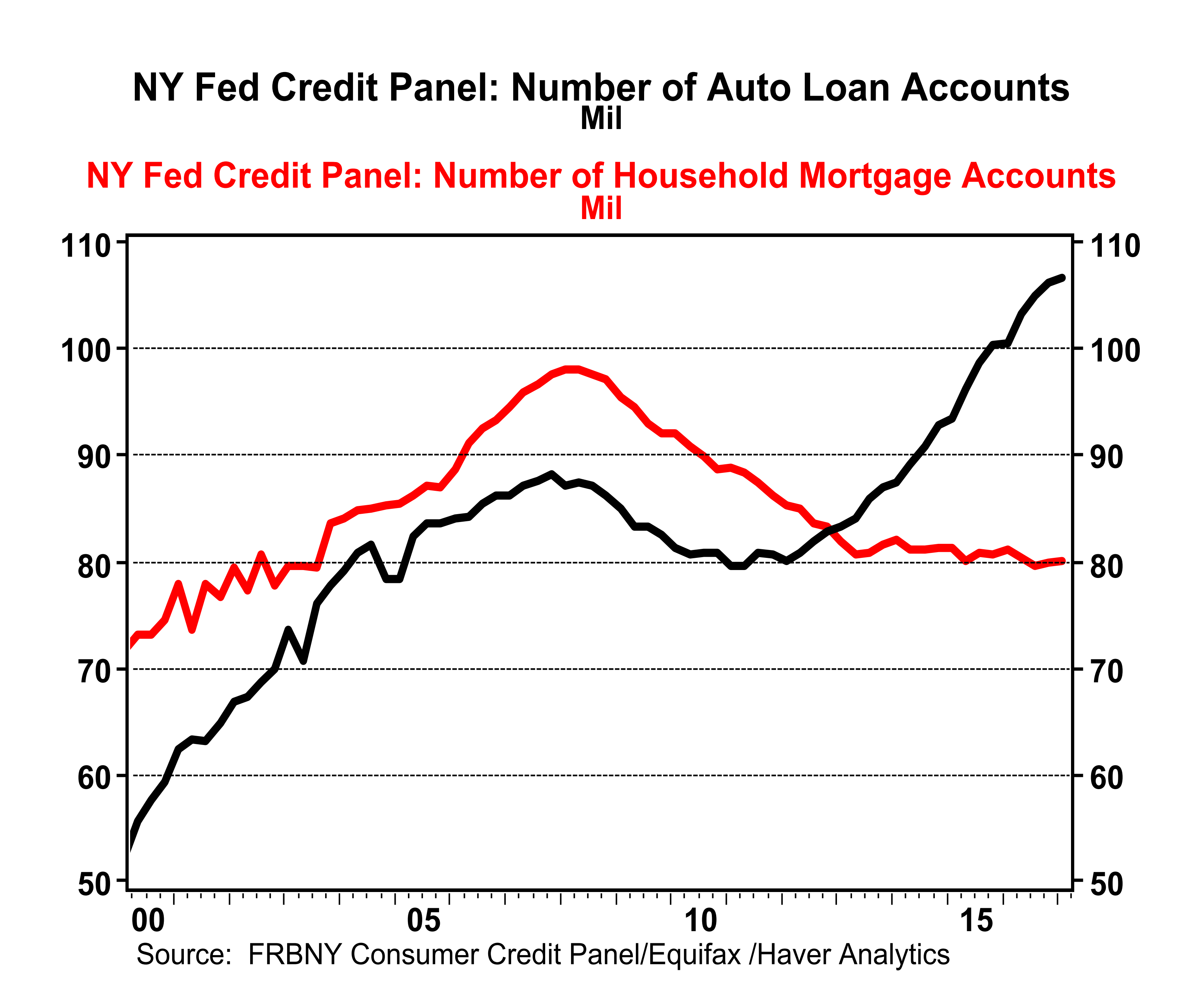
Auto loans account for $1.167 trillion, or 9.2%, of total household debt in 2017 Q1 – up from $0.7 trillion, or 5.9%, in 2010 Q2

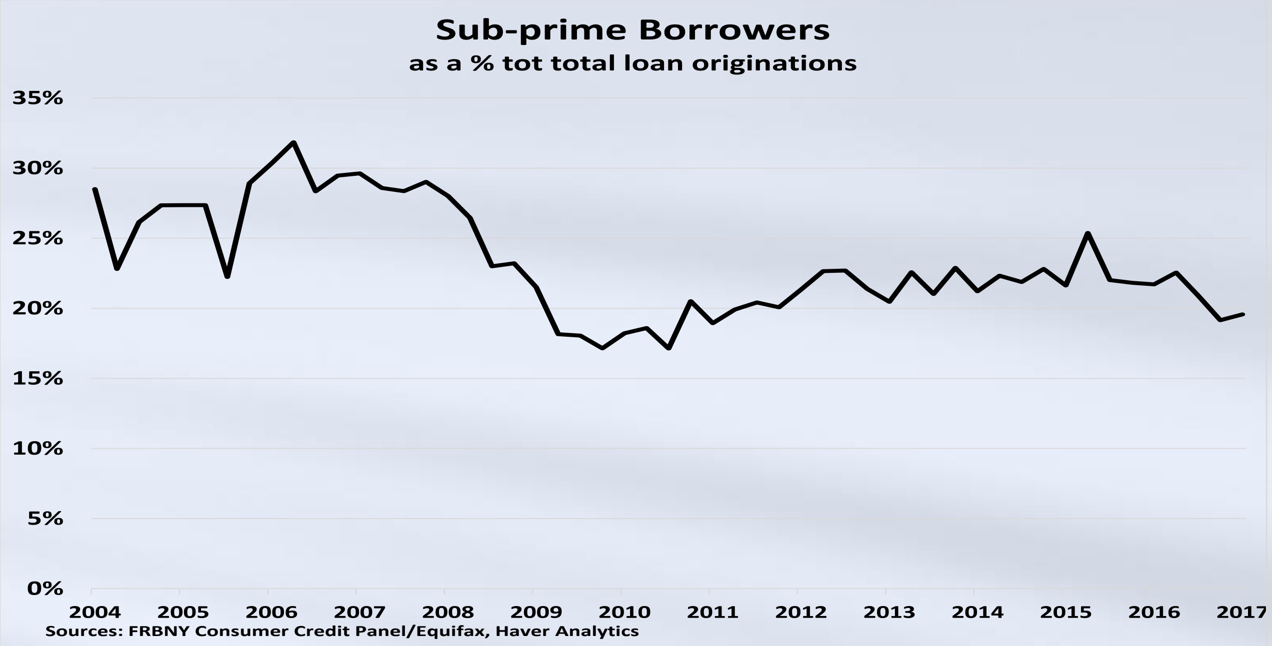
- Weak growth of mortgage debt is consistent with the slow recovery of the housing market

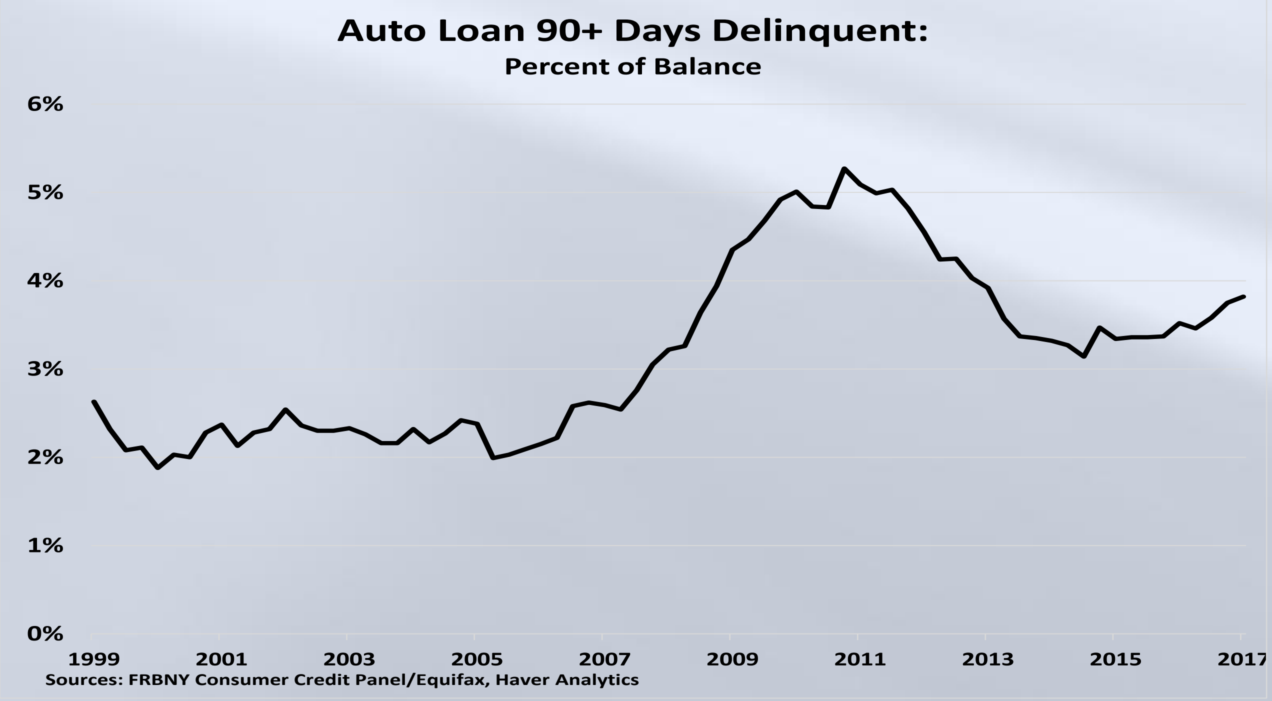


Sources: FRBNY Consumer Credit Panel/Equifax, Haver Analytics

As of 2013 Q1, the number of auto loan accounts have exceeded household mortgage accounts

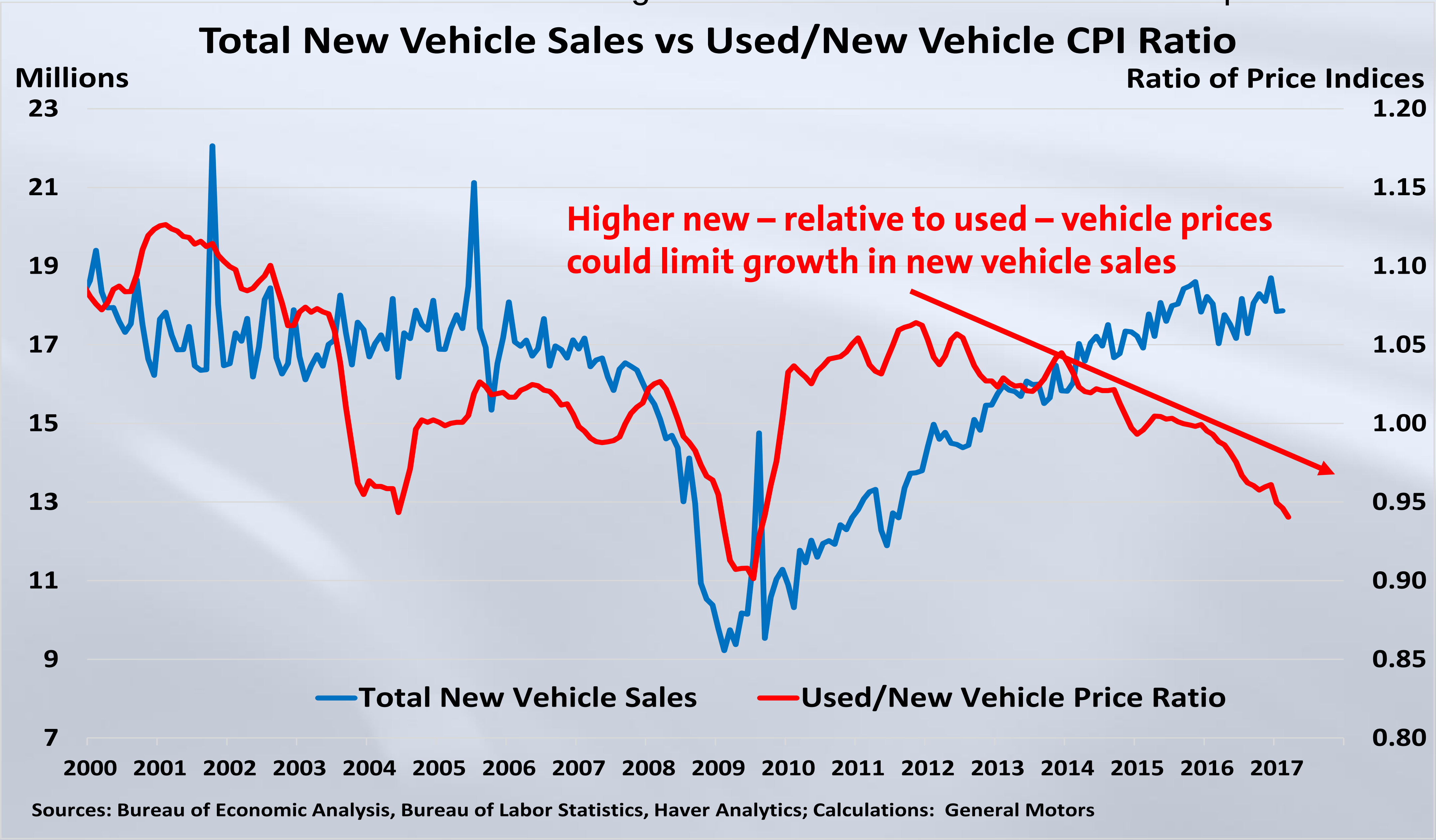






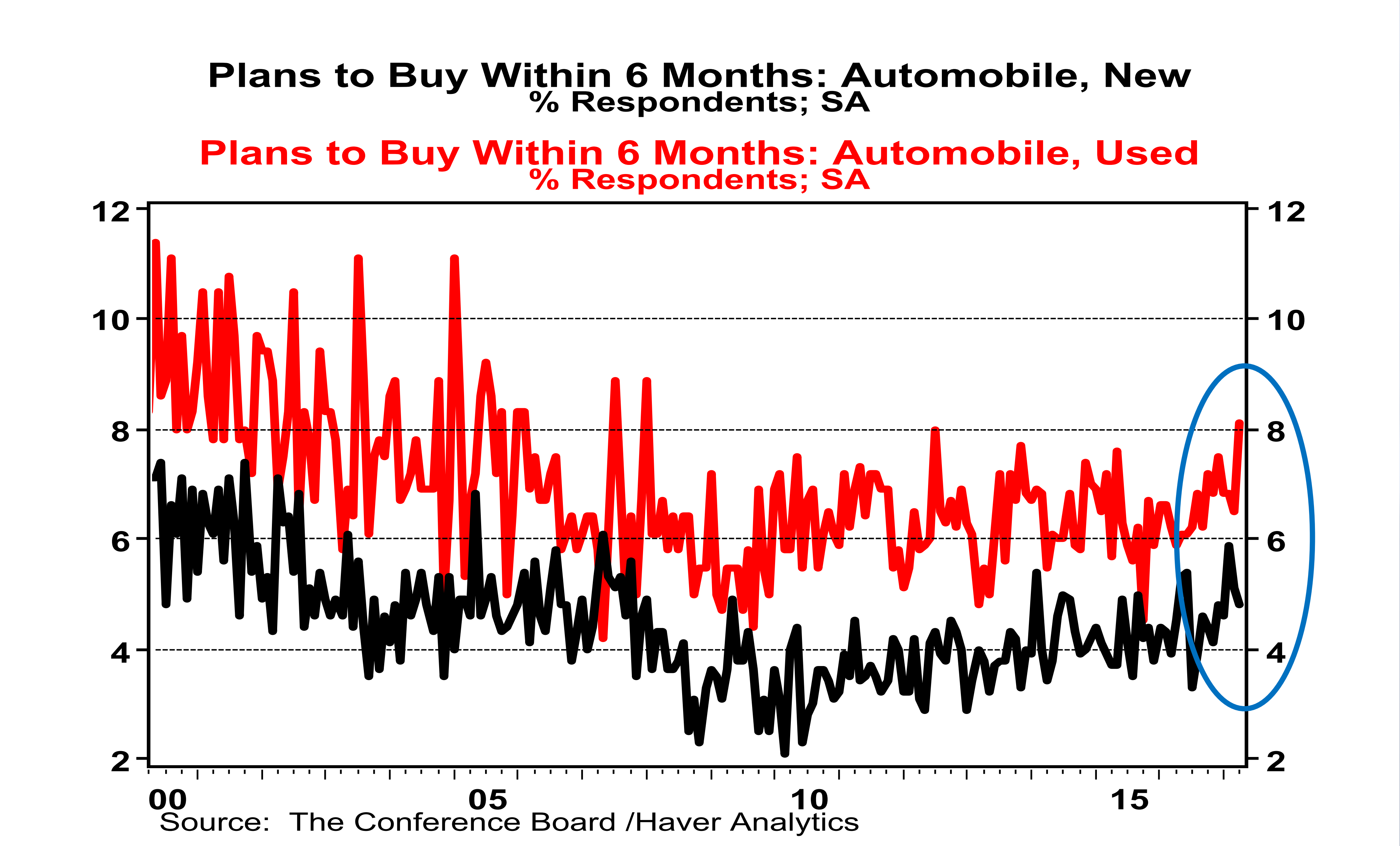
Relationship between new vehicle sales and vehicle prices has become less direct

- Despite rising relative new vehicle prices, low interest rates, low gasoline prices, and rising incomes are providing important offsets
- The large number of off-lease vehicles is a contributing factor to the decline in used vehicle prices



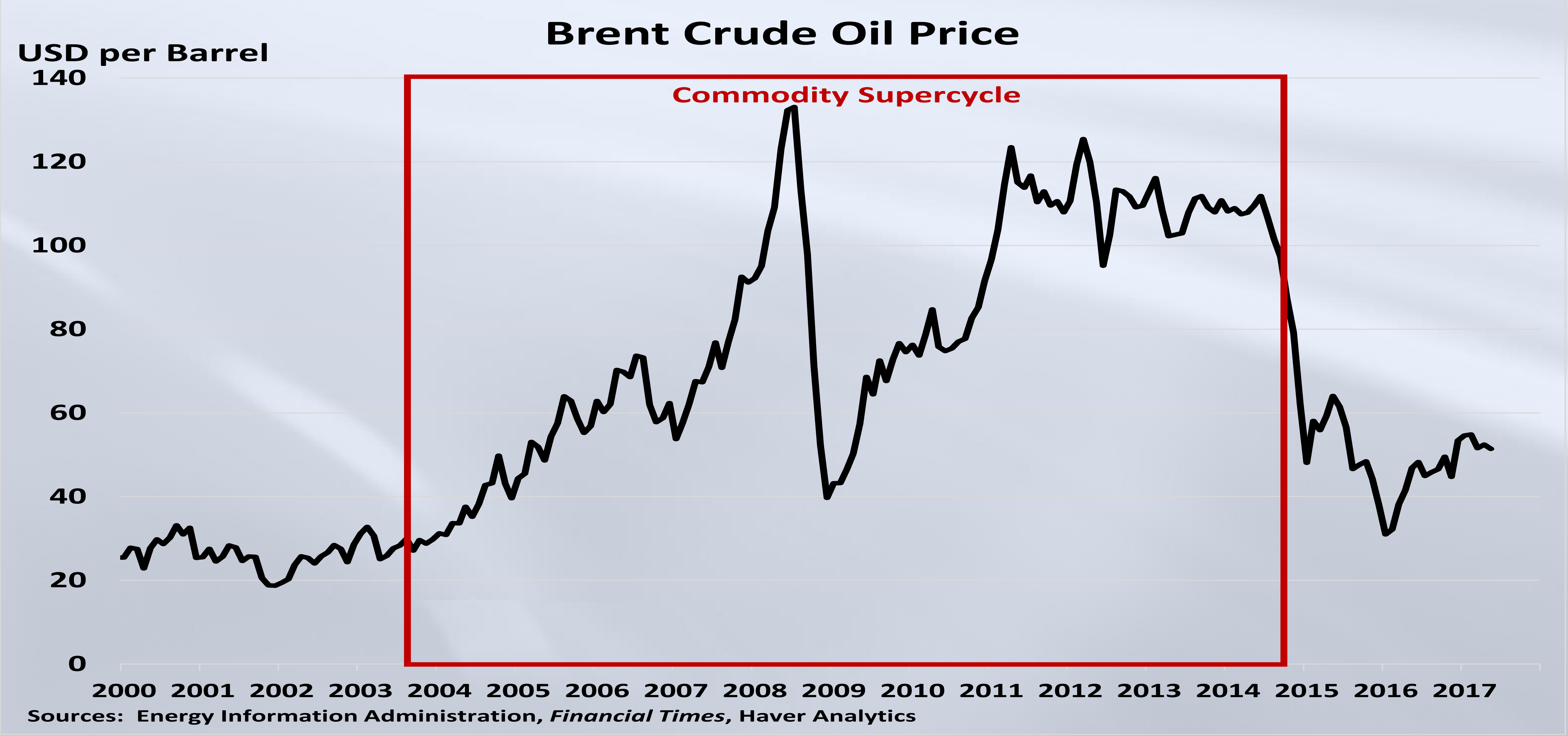
In line with the relative price development for new and used vehicles, new vehicle sales face a threat from increased purchase consideration for used vehicles

- A rising number of vehicles coming off-lease has contributed to lower used vehicle prices relative to new vehicles – thus supporting increased consideration for used vehicles purchases

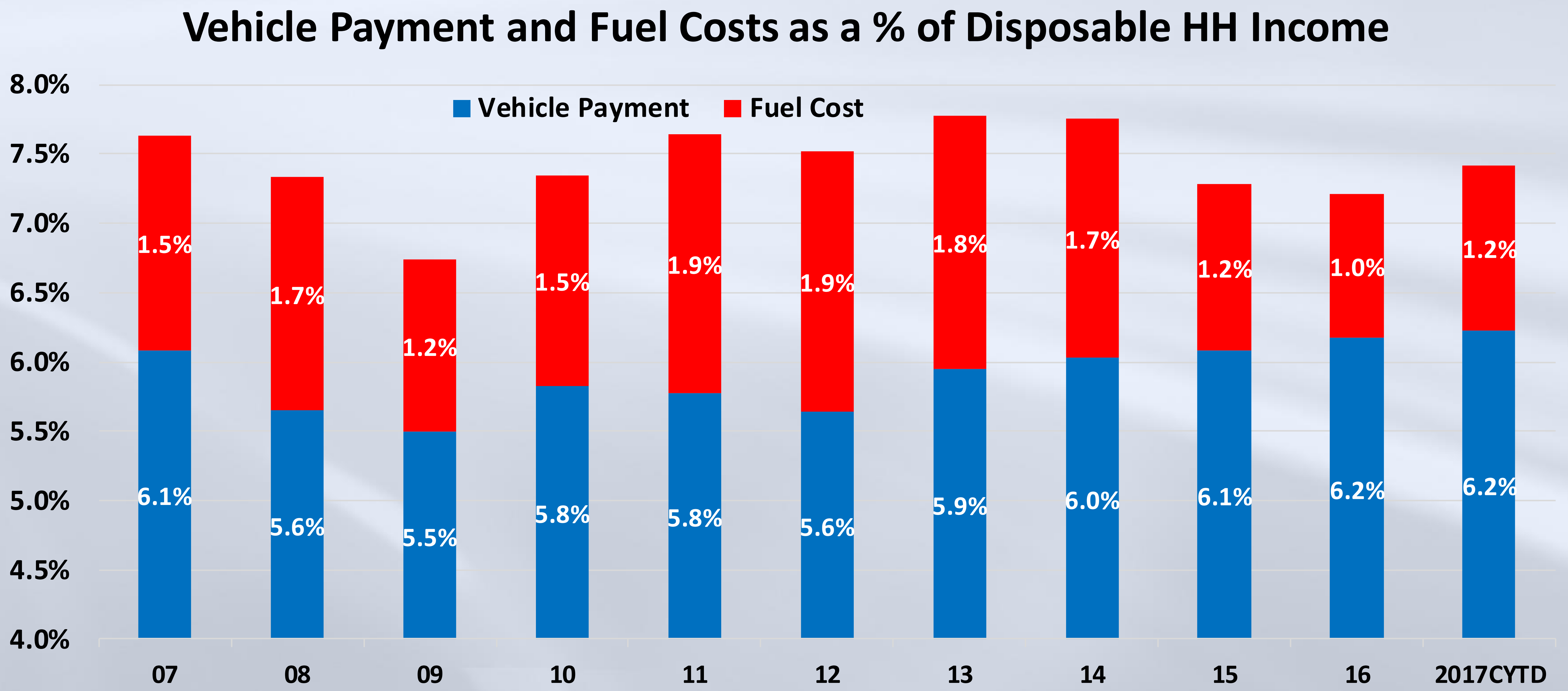


Supply and demand fundamentals largely supportive of "lower for longer" crude oil prices

- Historically, major events such as U.S. industrialization, European postwar reconstruction, and Chinese infrastructure development were major drivers of commodity prices, including energy prices
- Looking ahead, it is currently difficult to identify such a dominant source of energy demand that would push prices to levels last seen during the commodity super-cycle

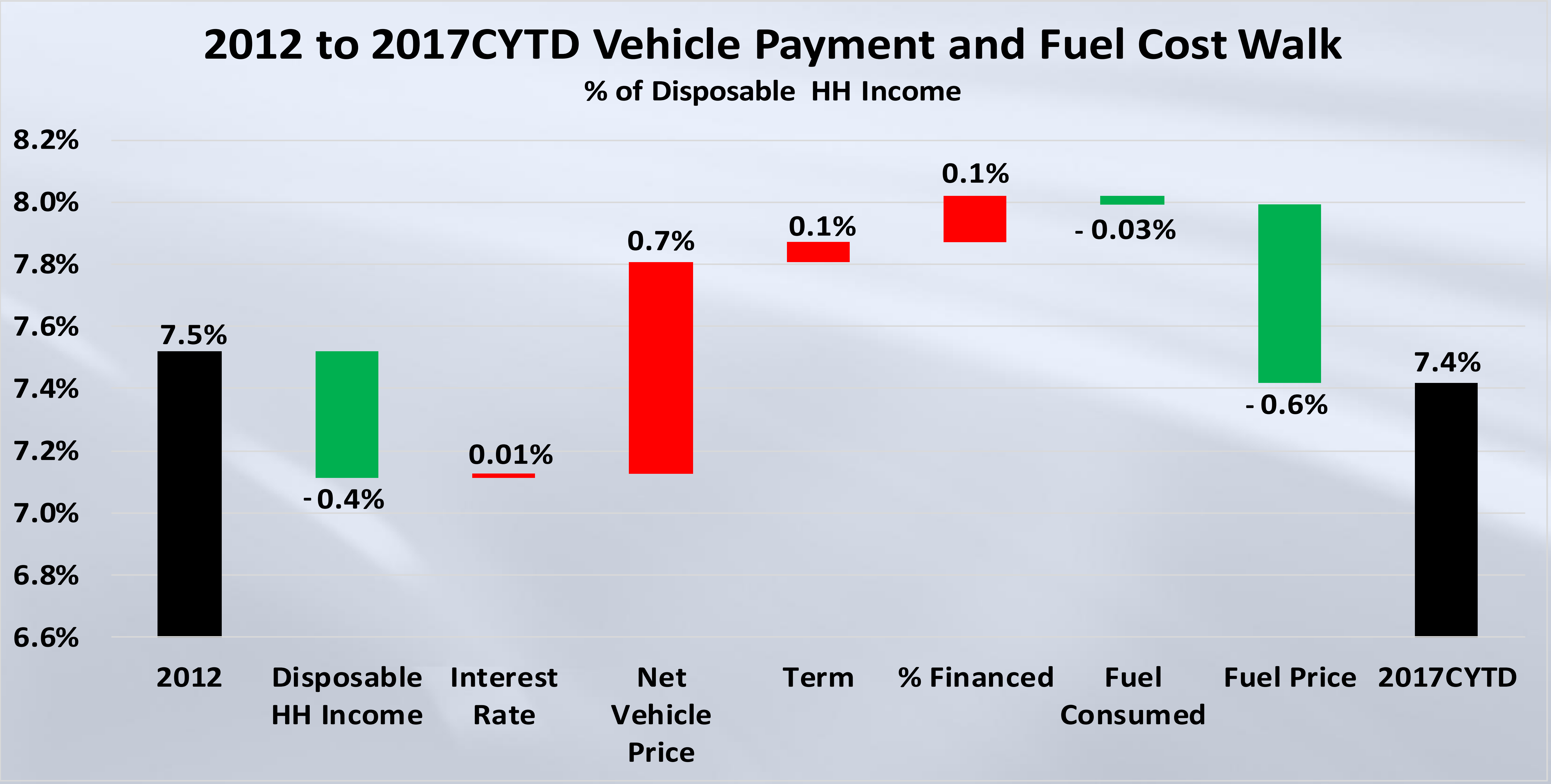


From 2012 to 2017CYTD, lower fuel cost share has offset the impact of higher vehicle payment share of disposable household income

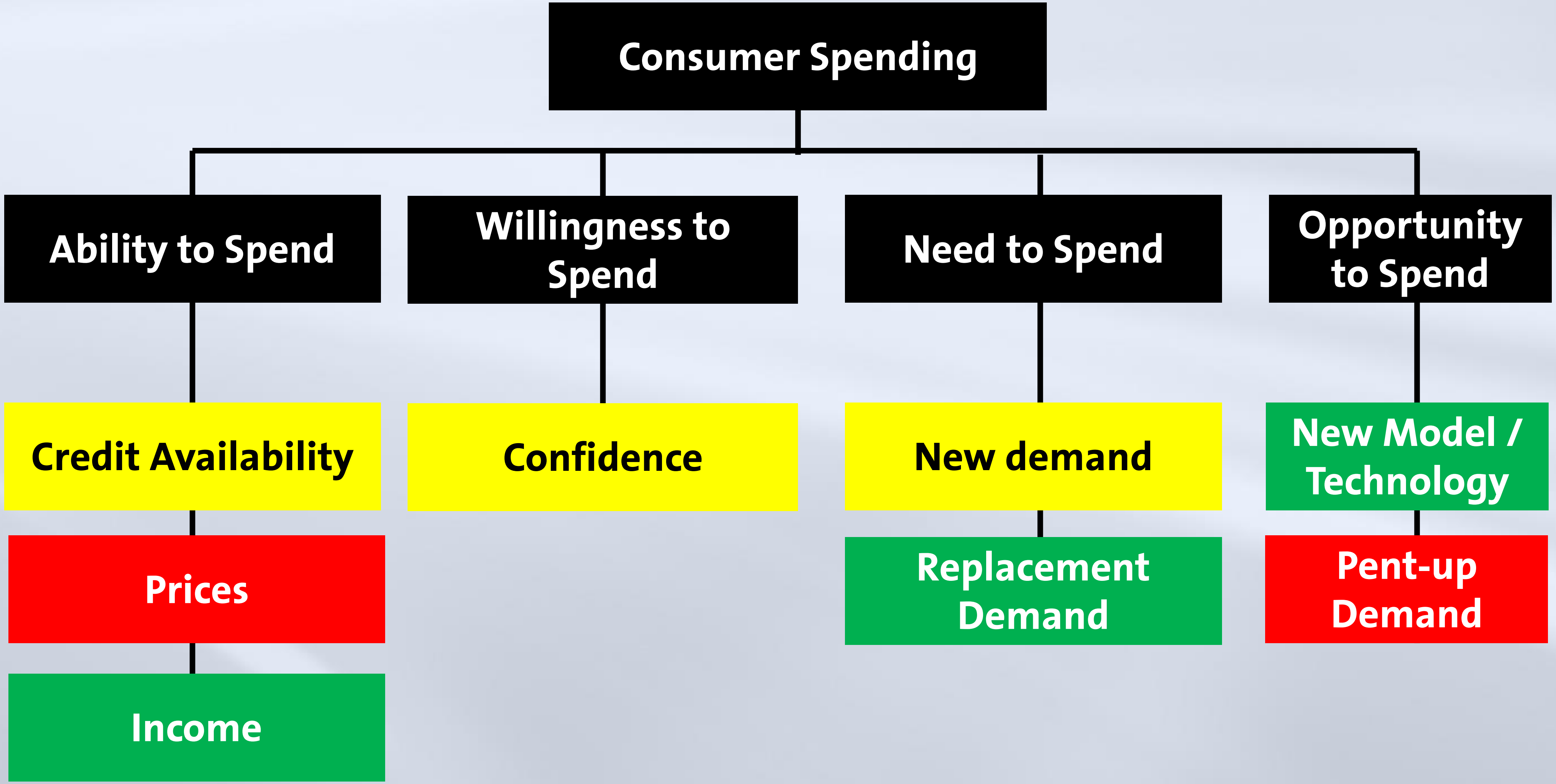


Sources: Bureau of Economic Analysis, Census Bureau, Federal Highway Administration, Energy Information Administration, Haver Analytics, JD Power PIN
Calculations: General Motors; Note: 2015 statistics on average annual fuel consumed — the latest available — was carried over to 2016 and 2017.

Higher disposable household income and lower fuel prices are key factors that have offset higher net new vehicle prices – helping to maintain a roughly constant vehicle payment/fuel cost ratio



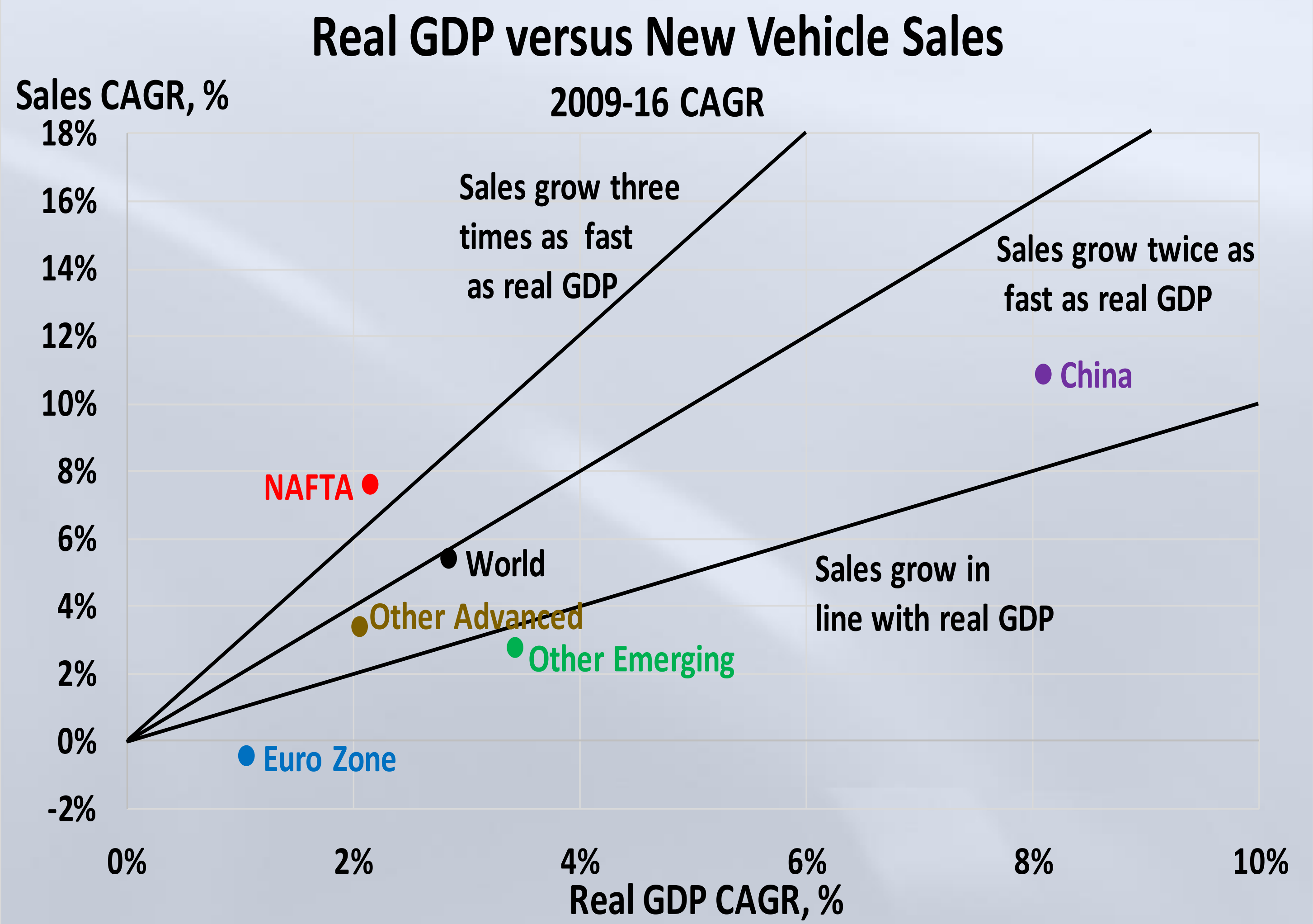
U.S. fundamental drivers of new vehicle demand are broadly mixed



Growth of NAFTA sales during 2009-16 were unstainable, and is forecasted to correct to a pace in line with real GDP growth. If structural reforms can be successfully implemented, a greater contribution to the growth in new vehicle sales are likely to come from emerging markets with additional upside potential also likely in Europe

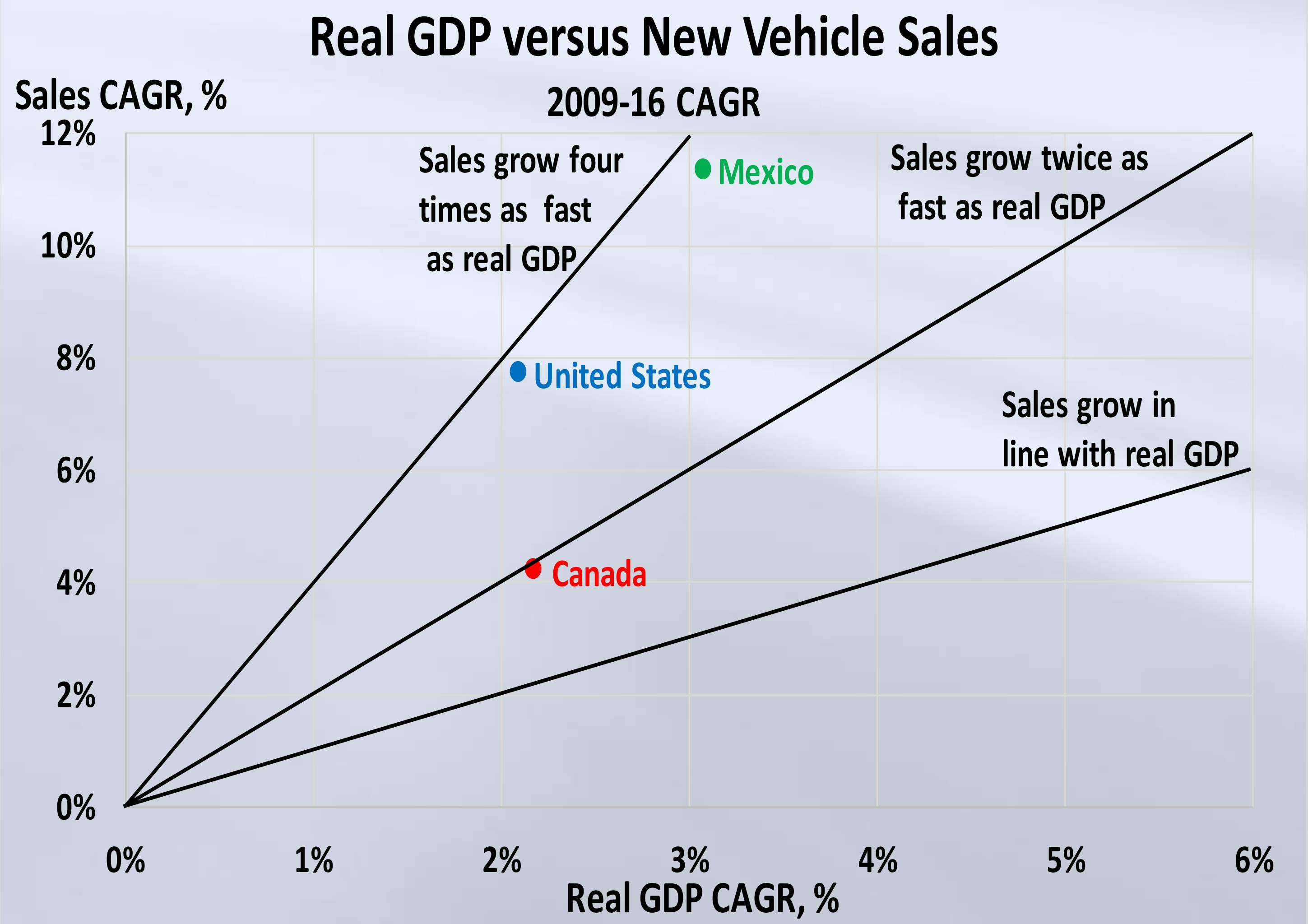
- While each of the NAFTA economies saw sales grow faster than real GDP during the period 2010-16, Mexico posted the strongest sales growth among the NAFTA economies
- Mexico's lower vehicle ownership and favorable demographics – 53% of the population under the age of 30 as of 2017 (source: United Nations) – supports strong upside growth opportunity for new vehicle sales

Global



Sources: World Bank, National Statistics Agencies, Haver Analytics, General Motors; Calculations: General Motors

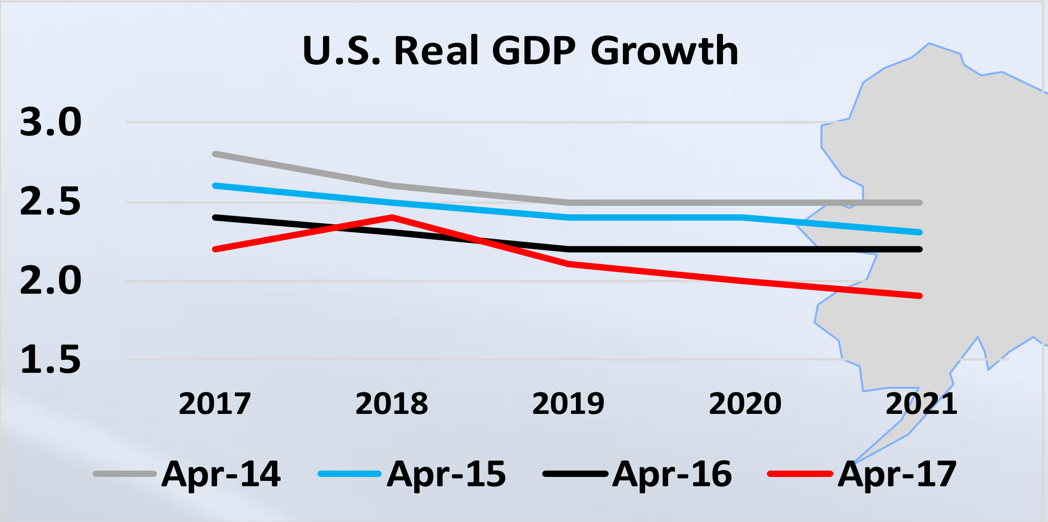
North America

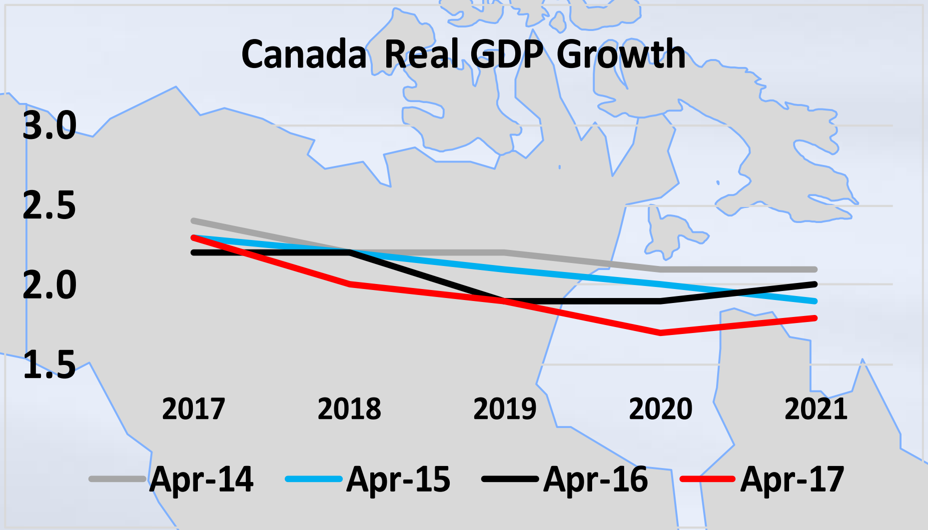


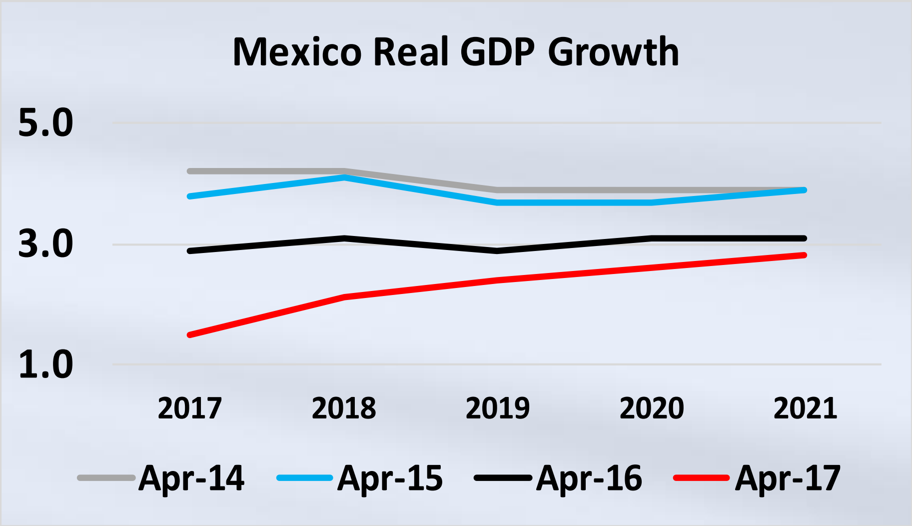
Sources: World Bank, National Statistics Agencies, Haver Analytics, General Motors; Calculations: General Motors

Since 2014, the growth outlook for the U.S., Canada, and Mexico have been downgraded

Real GDP Growth, y/y%







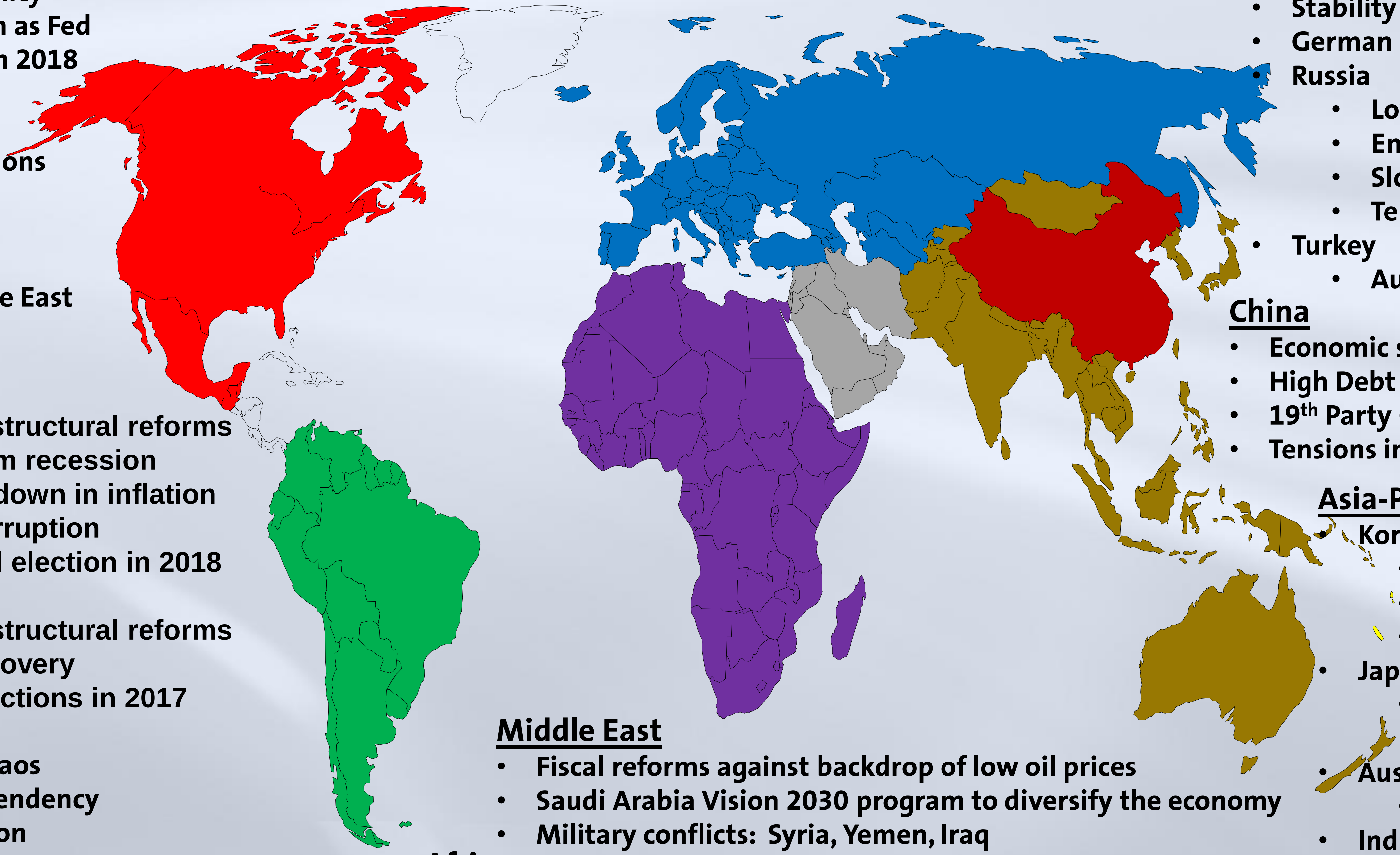
United States	2017	2018	2019	2020	2021
Apr-14	2.8	2.6	2.5	2.5	2.5
Apr-15	2.6	2.5	2.4	2.4	2.3
Apr-16	2.4	2.3	2.2	2.2	2.2
Apr-17	2.2	2.4	2.1	2.0	1.9

Canada	2017	2018	2019	2020	2021
Apr-14	2.4	2.2	2.2	2.1	2.1
Apr-15	2.3	2.2	2.1	2.0	1.9
Apr-16	2.2	2.2	1.9	1.9	2.0
Apr-17	2.3	2.0	1.9	1.7	1.8

Mexico	2017	2018	2019	2020	2021
Apr-14	4.2	4.2	3.9	3.9	3.9
Apr-15	3.8	4.1	3.7	3.7	3.9
Apr-16	2.9	3.1	2.9	3.1	3.1
Apr-17	1.5	2.1	2.4	2.6	2.8

Source: Consensus Forecasts, various issues

Key Geo-Economic and Geo-Political Risks



North America

- Federal Reserve Policy
  - Yellen's term as Fed Chair ends in 2018
- Trade barriers
- Direction of USD
- International tensions
  - Syria
  - Russia
  - N. Korea
  - Other Middle East

South America

- Brazil
  - Fiscal and structural reforms
  - Emerge from recession
  - Rapid slowdown in inflation
  - Political corruption
  - Presidential election in 2018
- Argentina
  - Fiscal and structural reforms
  - Gradual recovery
  - Midterm elections in 2017
- Venezuela
  - Economic chaos
  - High oil dependency
  - Hyperinflation
  - Default risk
  - Political crisis
  - Presidential election in 2018

Europe

- United Kingdom
  - Brexit
  - Snap election
- Stability of EU/Euro Zone
- German elections
- Russia
  - Low oil prices
  - Emerge from recession
  - Slowing inflation
  - Tension with US
- Turkey
  - Authoritarian rule

China

- Economic slowdown
- High Debt
- 19th Party Congress in Oct/Nov
- Tensions in South China Sea

Asia-Pacific

- Korea
  - High HH debt
  - Weak mfg activity
  - Threat from N. Korea
- Japan
  - Kuroda's term ends in 2018
- Australia
  - Housing bubble
- India
  - Structural reforms
- Thailand
  - New Constitution

Middle East

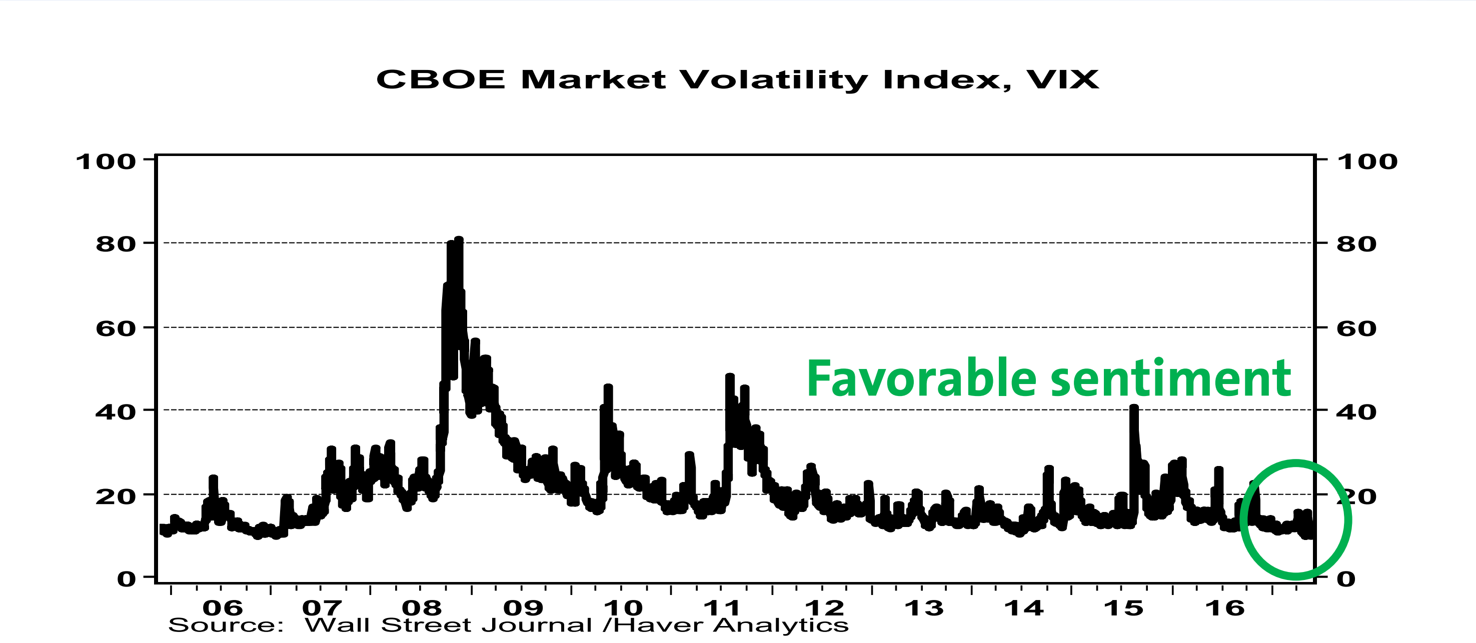
- Fiscal reforms against backdrop of low oil prices
- Saudi Arabia Vision 2030 program to diversify the economy
- Military conflicts: Syria, Yemen, Iraq

Africa

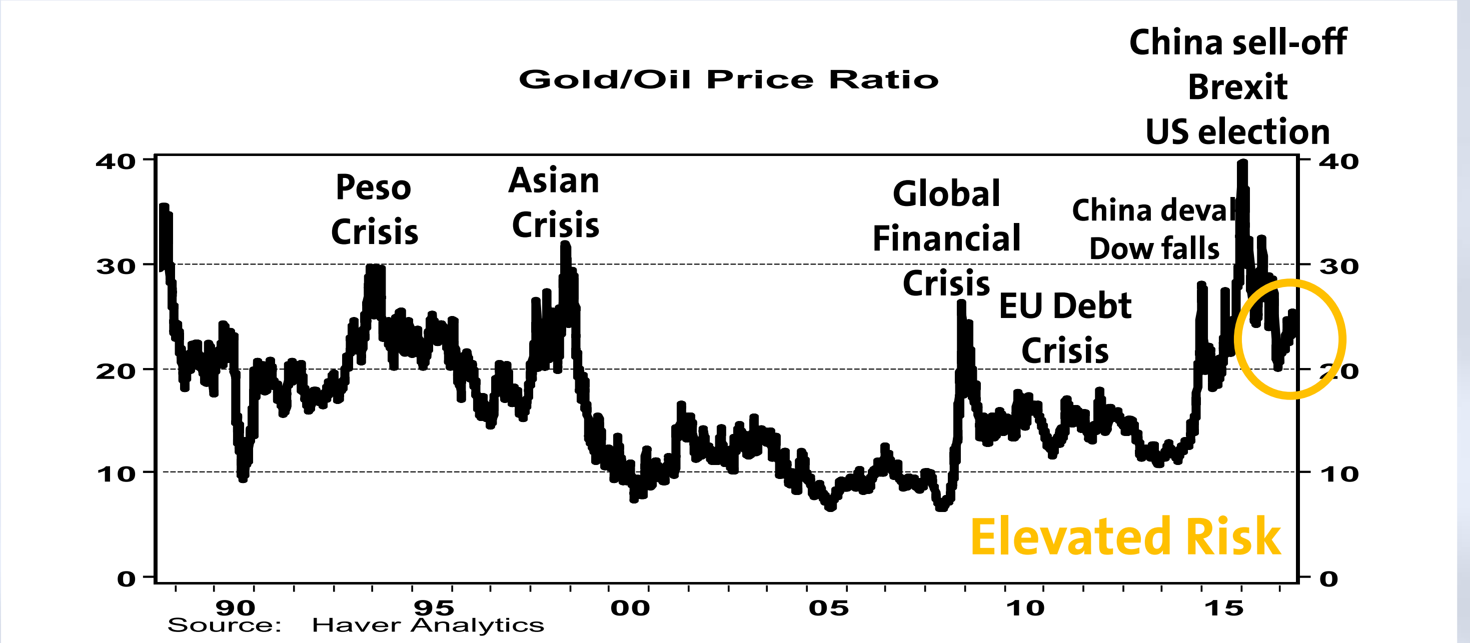
- Egypt: Fiscal and structural reforms; terrorist attacks
- South Africa: Slow growth, low commodity prices, political crisis

While geo-political tensions are on the rise, most risk indicators remain favorable

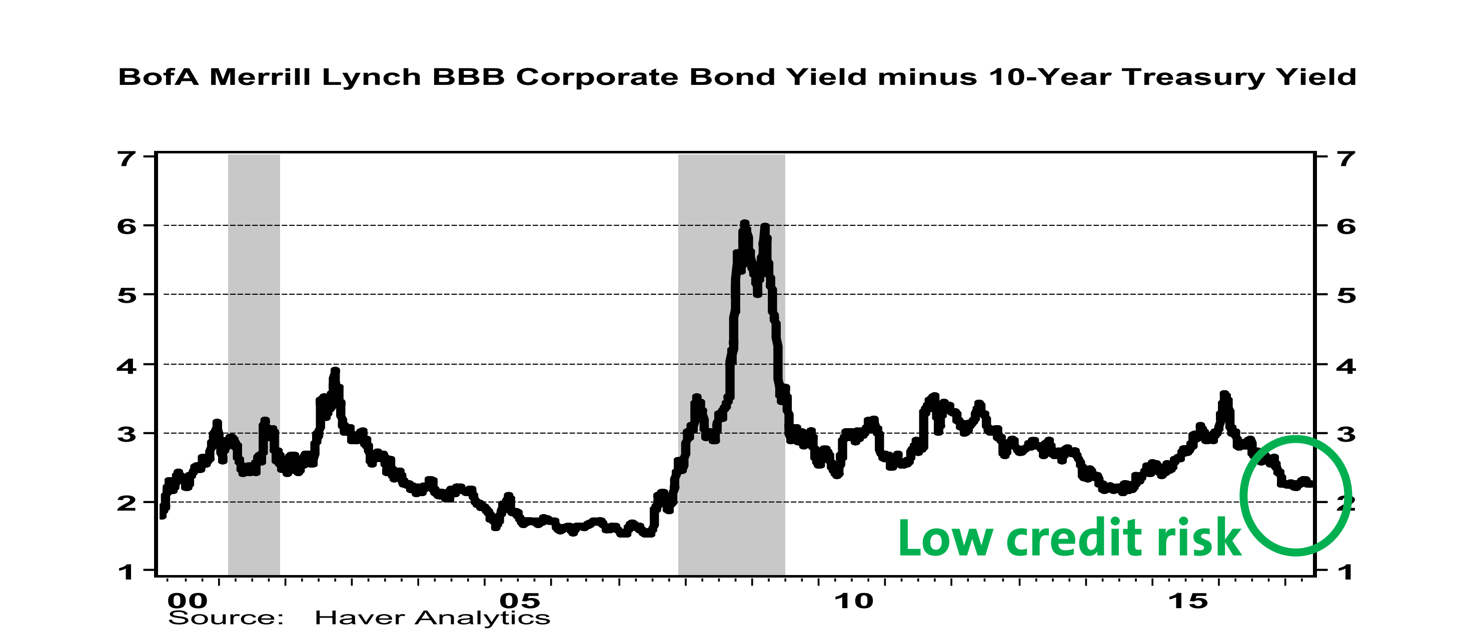
VIX: Investor Sentiment



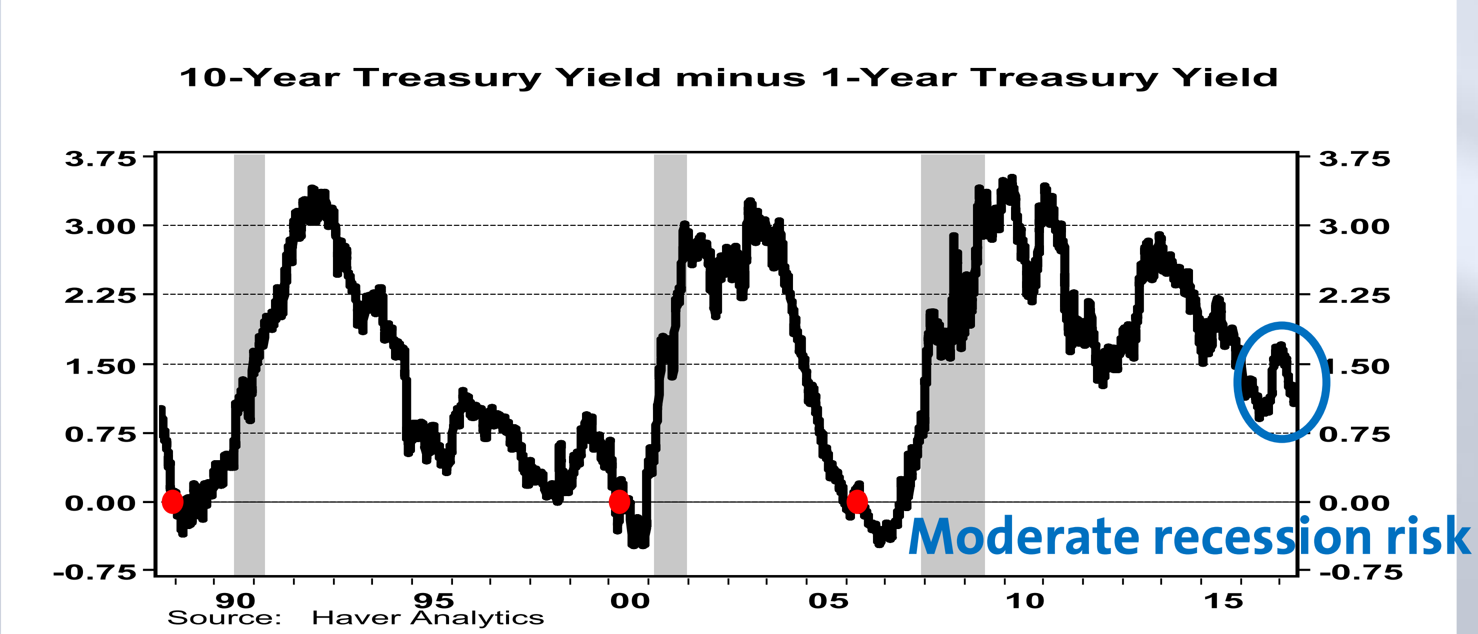
Gold/Oil Ratio: Crisis Risk



Corporate Bond - Treasury Yield Spread: US Credit Risk



Yield Curve: US Recession Risk



Based on the March 2017 NABE Outlook survey, the risk of a recession in the U.S. is well below 50% for 2017 and 2018

- Panelists assess trade protectionism and the strong USD as key downside risks to the U.S. Economy

Please estimate on a scale of 0 to 100 the probability of a recession in the U.S. in 2017 and 2018.

	2017	2018
Probability	**Percent of Respondents**	
0%	8.2%	0.0%
1 - 25%	81.6%	61.2%
26 - 50%	10.2%	36.7%
51 - 75%	0.0%	2.0%
76 - 99%	0.0%	0.0%
100%	0.0%	0.0%

5. Rank the following downside risks to the U.S. economy through 2018, considering both probability of occurrence and potential impact.
   - Strong dollar
   - Higher interest rates
   - Substantial stock market decline
   - Trade protectionism
   - Immigration restrictions
   - Weak wage growth
   - Other

Top Catalysts Ranked 1, 2, or 3

Percent of Respondents	Downside Risk
83.0%	Trade protectionism
67.9%	Strong dollar
41.8%	Substantial stock market decline
41.6%	Higher interest rates

Source: NABE Outlook, March 2017

Summary

- Global economy forecasted to remain on a modest, but steady, growth path
  - Risk of U.S. recession remains low during the 2017-18

- While the Top 15 global vehicle markets have been largely unchanged, we can expect changes to those rankings in the medium to long term, with the strongest upside opportunities for India, Brazil, and Mexico

- While the NAFTA markets face short-term cyclical challenges, the underlying long-term new vehicle demand fundamentals remain positive

- While each region faces unique economic, political, and structural challenges, the dynamic and adaptive nature of the global economy in general, and auto industry in particular, suggests there is reason to remain optimistic regarding the outlook

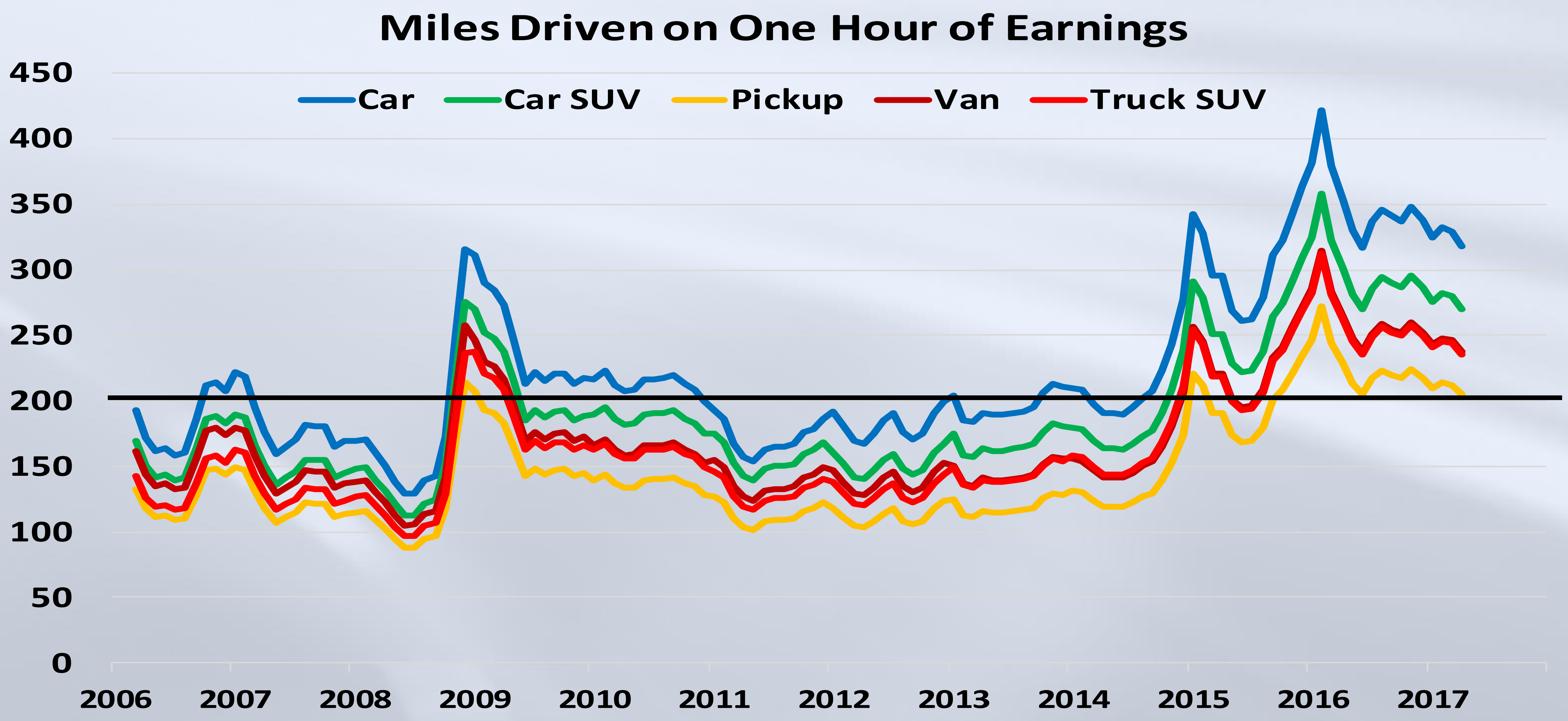
Questions?

"Let me get back to you. We're still checking the fundamentals."

Bernard Schoenbaum for Barron's

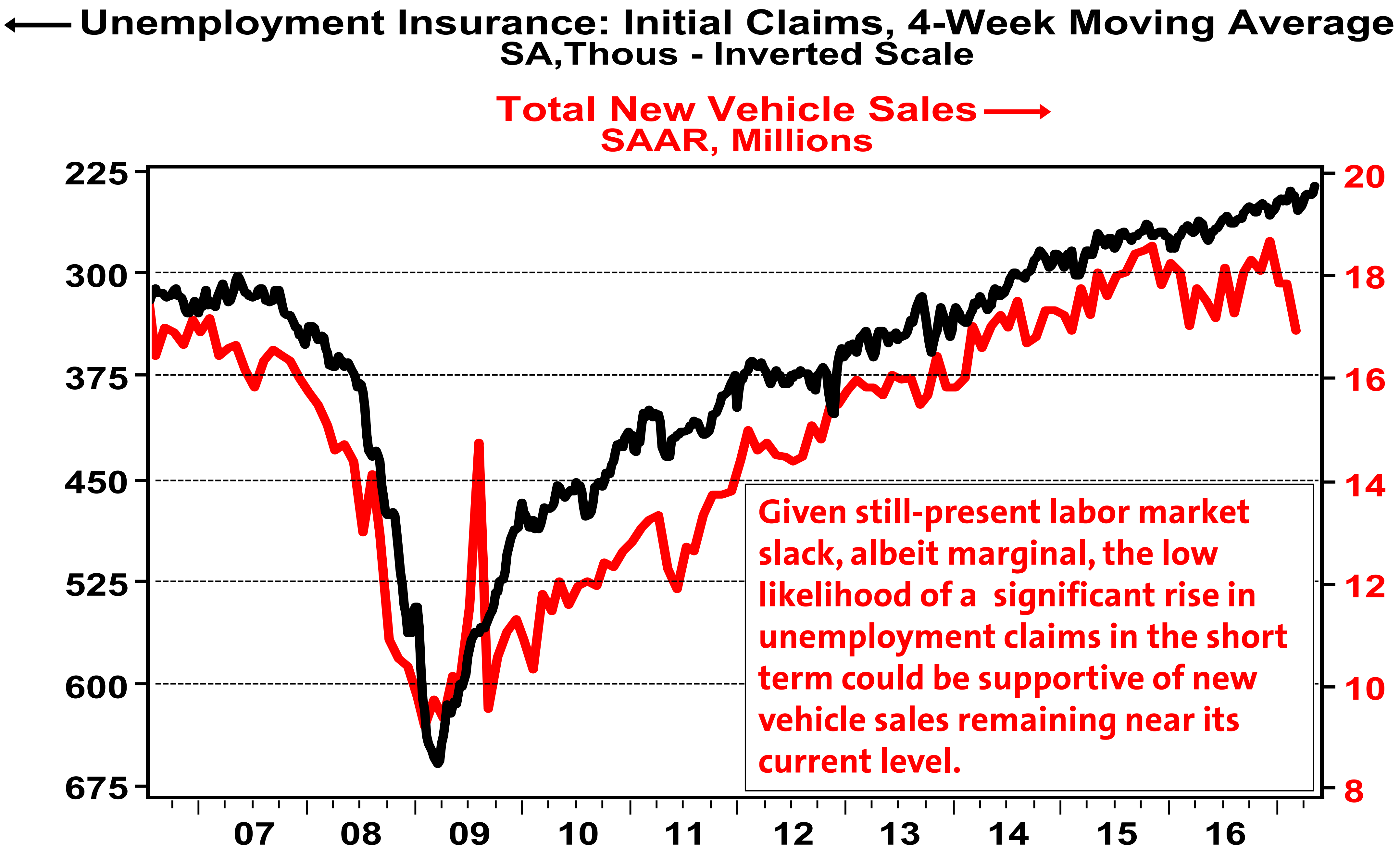
Back-up Charts

Rising earnings, low gasoline prices, and improved fuel economy have encouraged buyers to purchase Pickups, Crossovers (i.e., Car SUV), and SUVs – providing the ability to drive more miles on these vehicles today on an average hour's earnings compared to miles driven using a car during most of the pre-2015 period



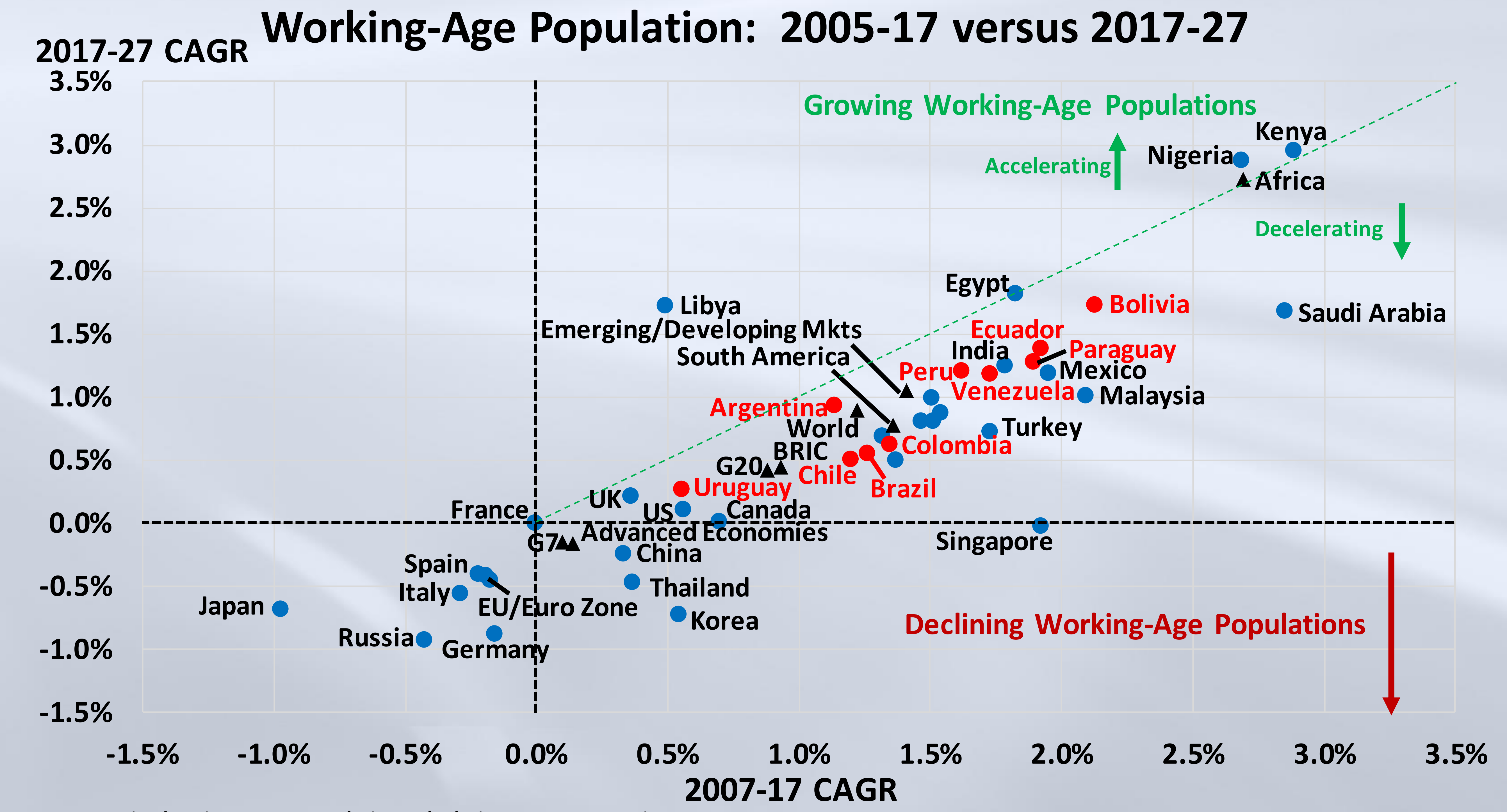
Sources: Bureau of Labor Statistics, Energy Information Administration, Bureau of Transportation Statistics, Haver Analytics
Calculations: General Motors

Stabilization of unemployment claims supporting new vehicle sales



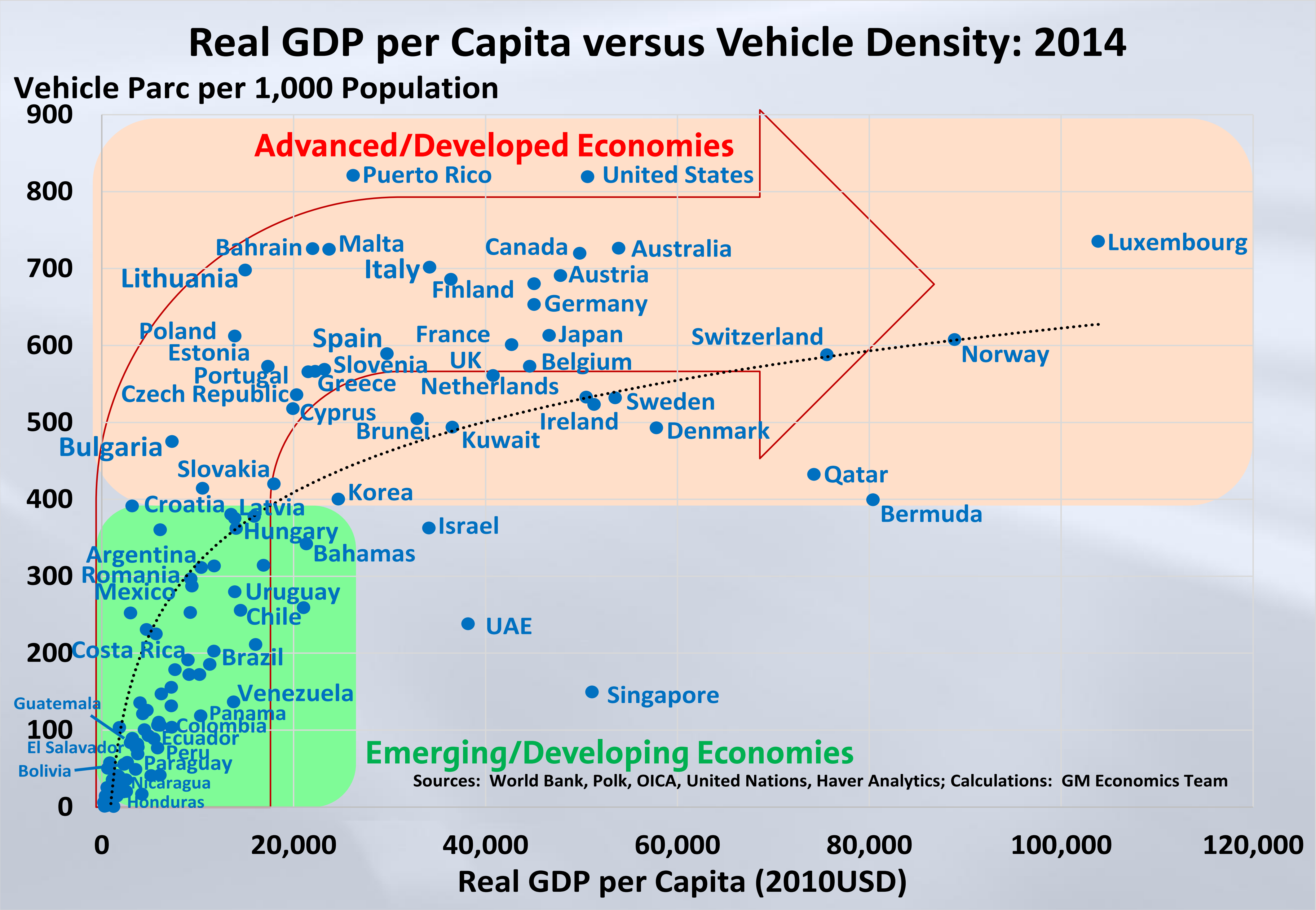
Sources: Haver Analytics

Global Working-Age Population

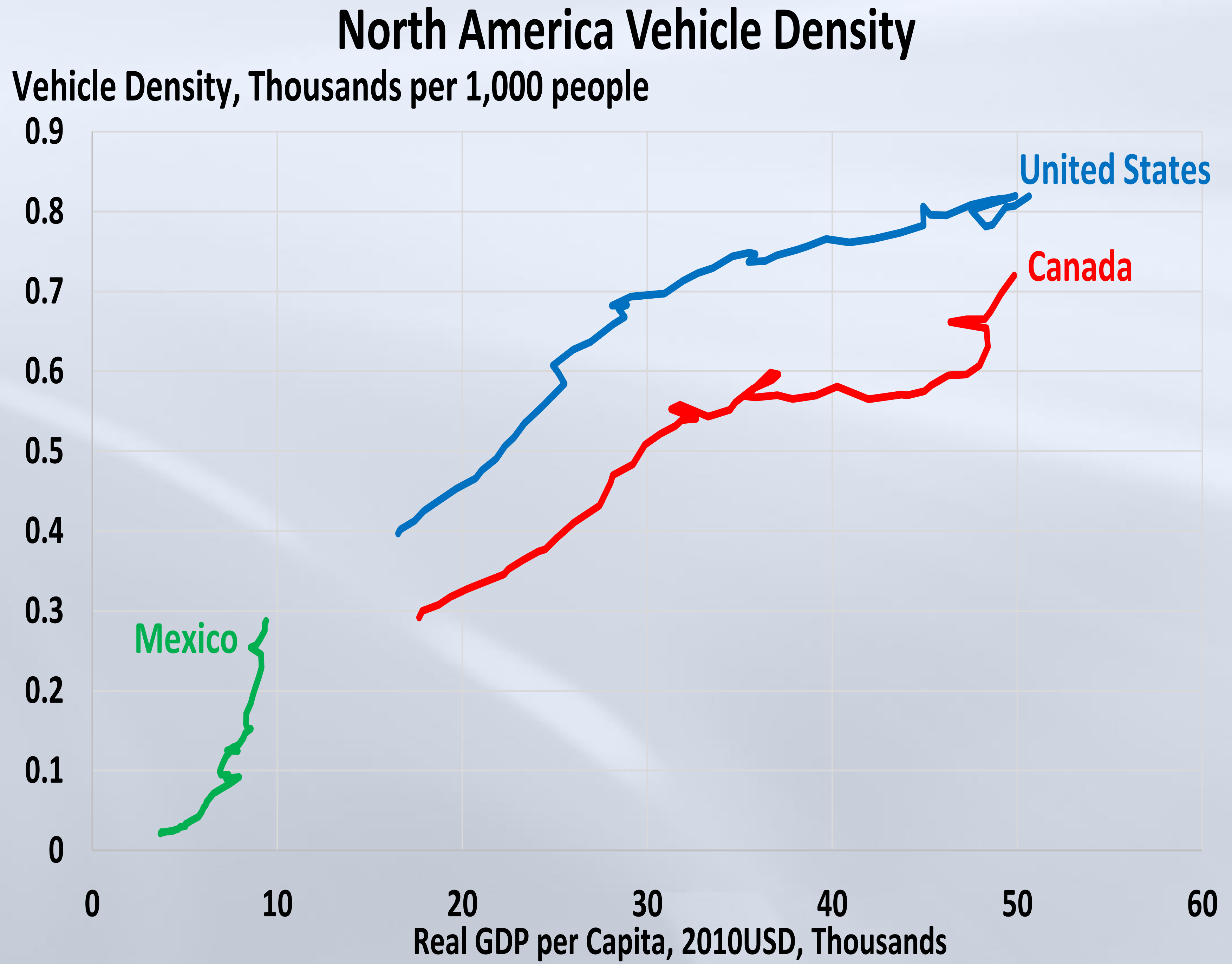


Sources: United Nations, Haver Analytics; Calculations: GM Economics Team

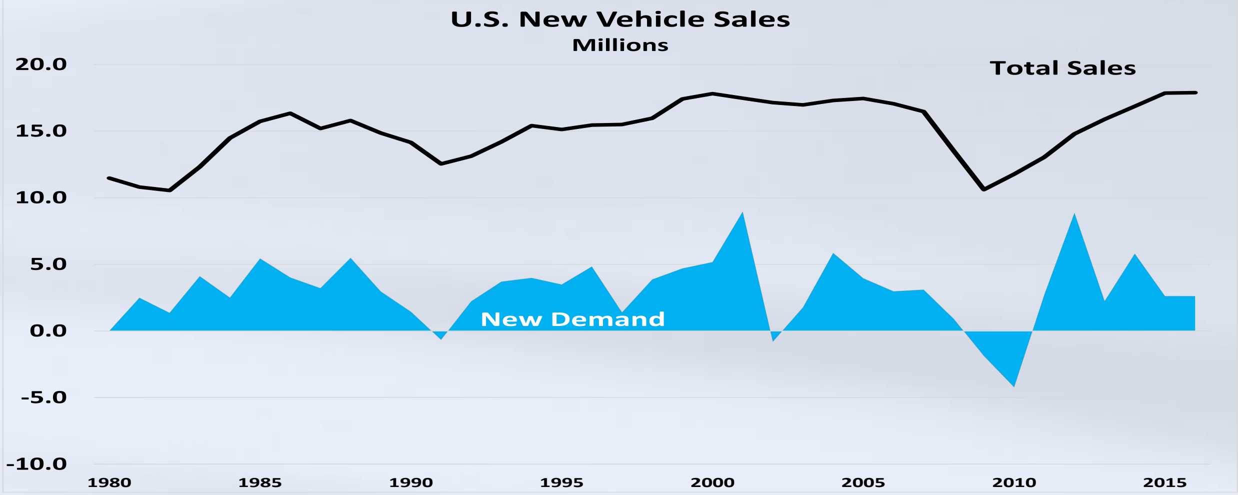
Global Vehicle Ownership

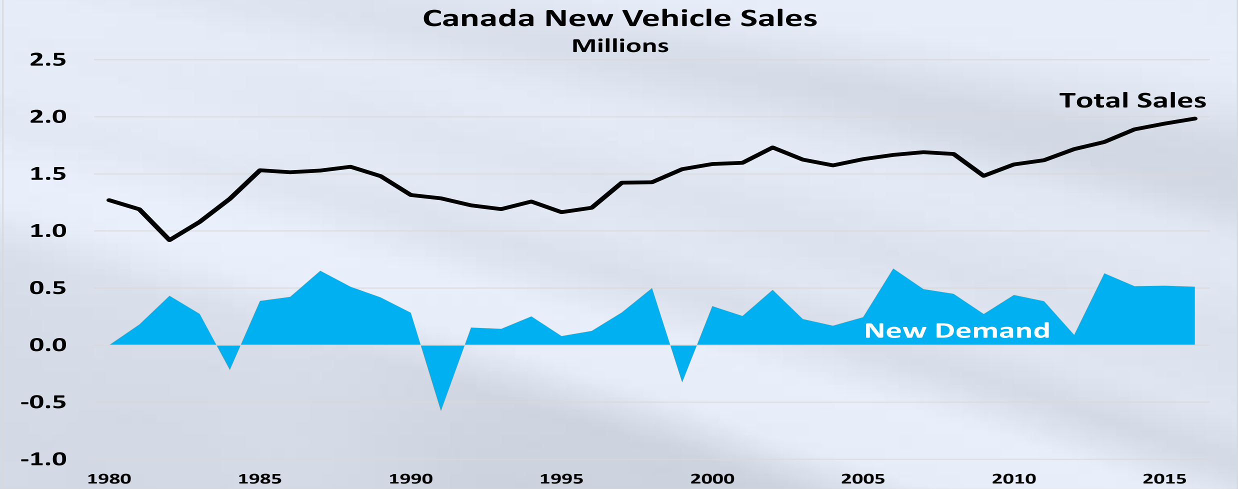


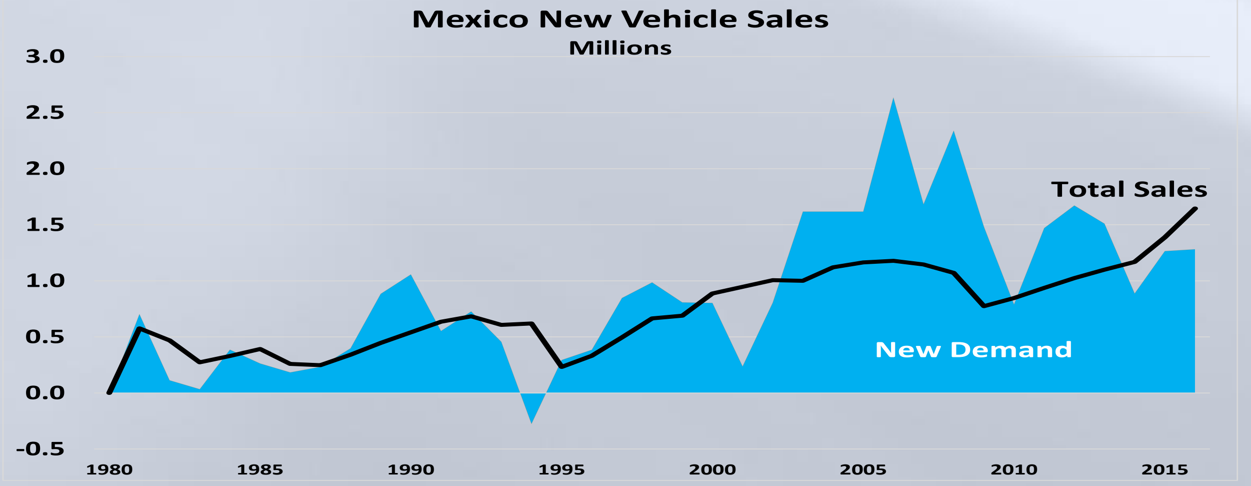
Replacement demand is the key driver of new vehicle sales in U.S. and Canada while new demand – given the lower vehicle density – is the main driver of new vehicle sales in Mexico



Sources: Polk, Ward's Automotive, World Bank, United Nations, National Statistics Agencies, Haver Analytics
Calculations: General Motors

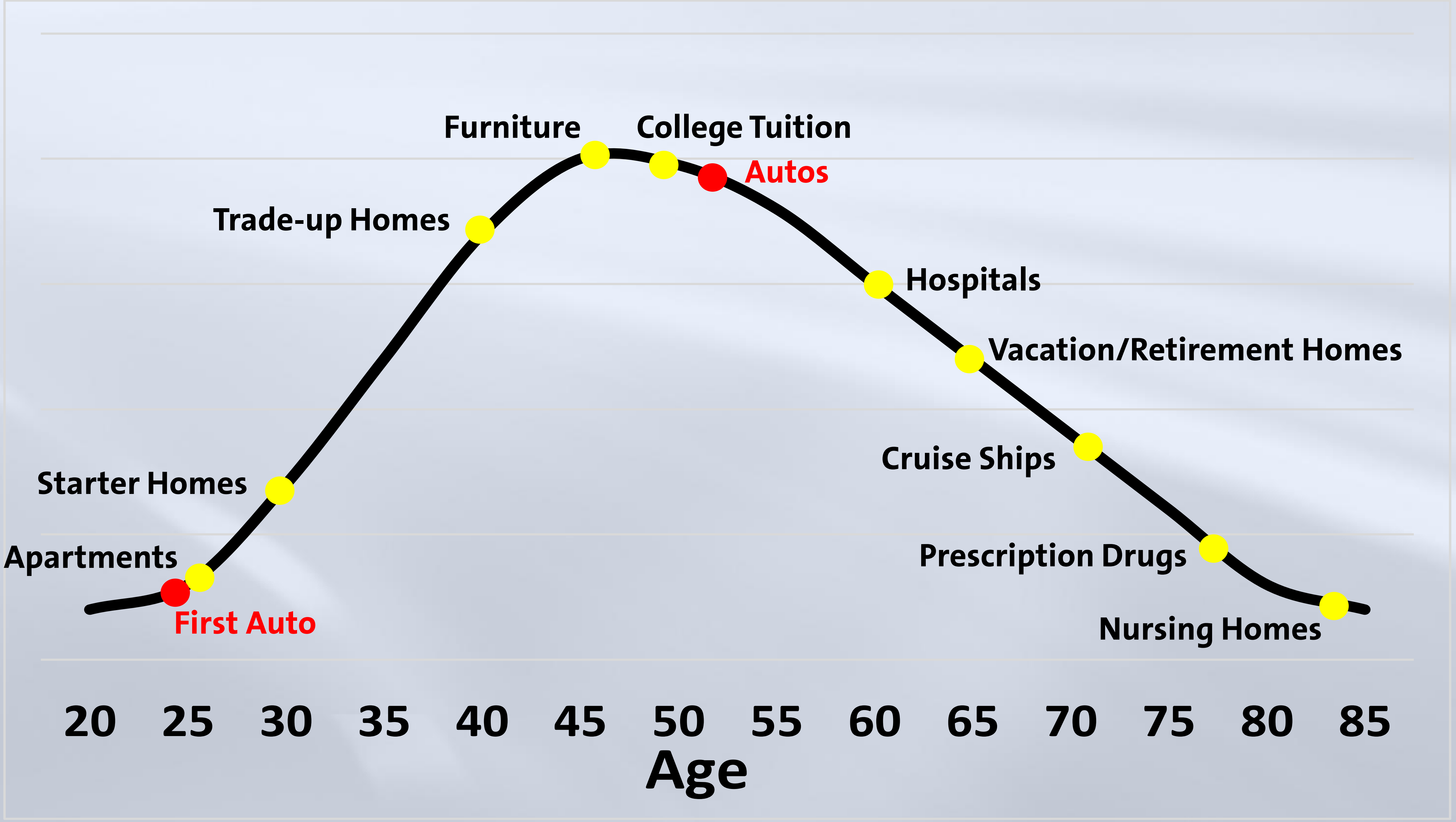






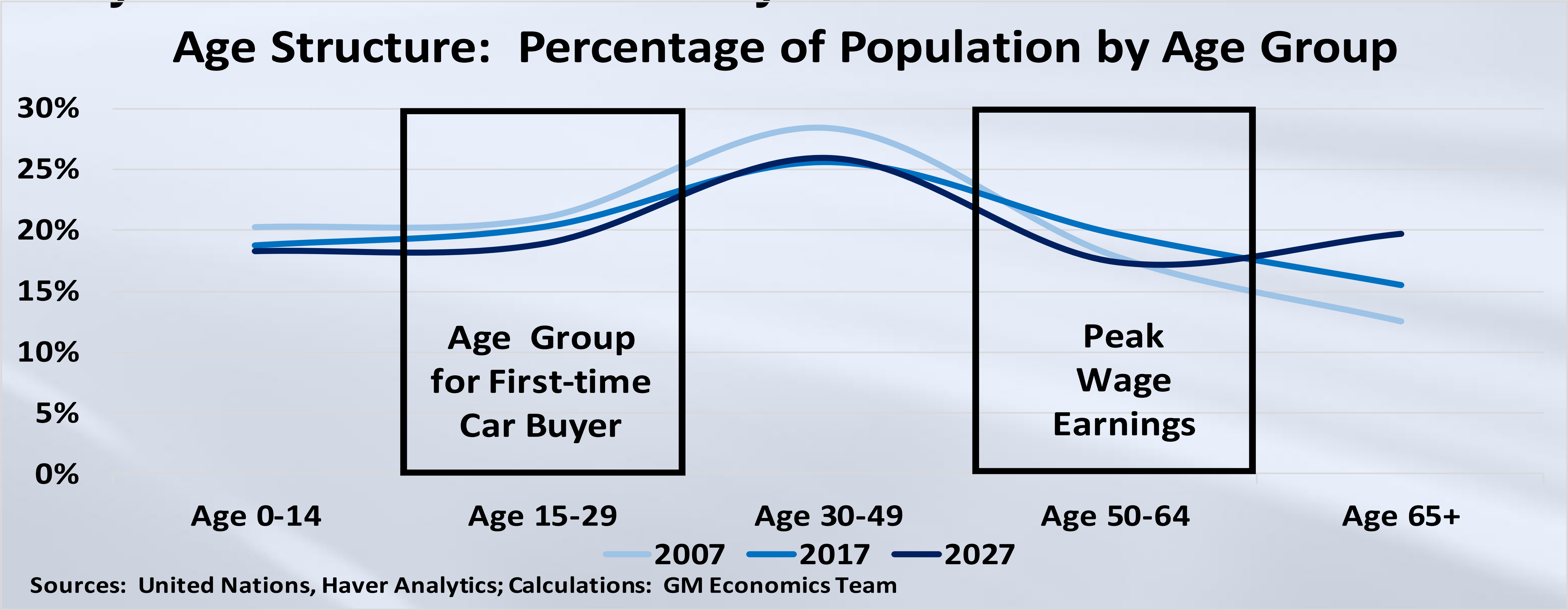
The tradition Consumer Life Cycle "model" of purchase behavior highlights new vehicle purchases occurring in the range of 25 and 55 years of age

- New mobility technologies have the potential to expand this range of vehicle demand, or "demand for miles travelled"



Adapted from Dent, Jr., Harry S., The Demographic Cliff: How to Survive and Prosper During the Great Deflation Ahead, Portfolio/Penguin, 2015, page 14.

US working-age population profile reflects challenges to underlying vehicle demand whereas the growth of the Age 65+ population suggests an upside opportunity for the automotive industry



Working Age Population

Thousands

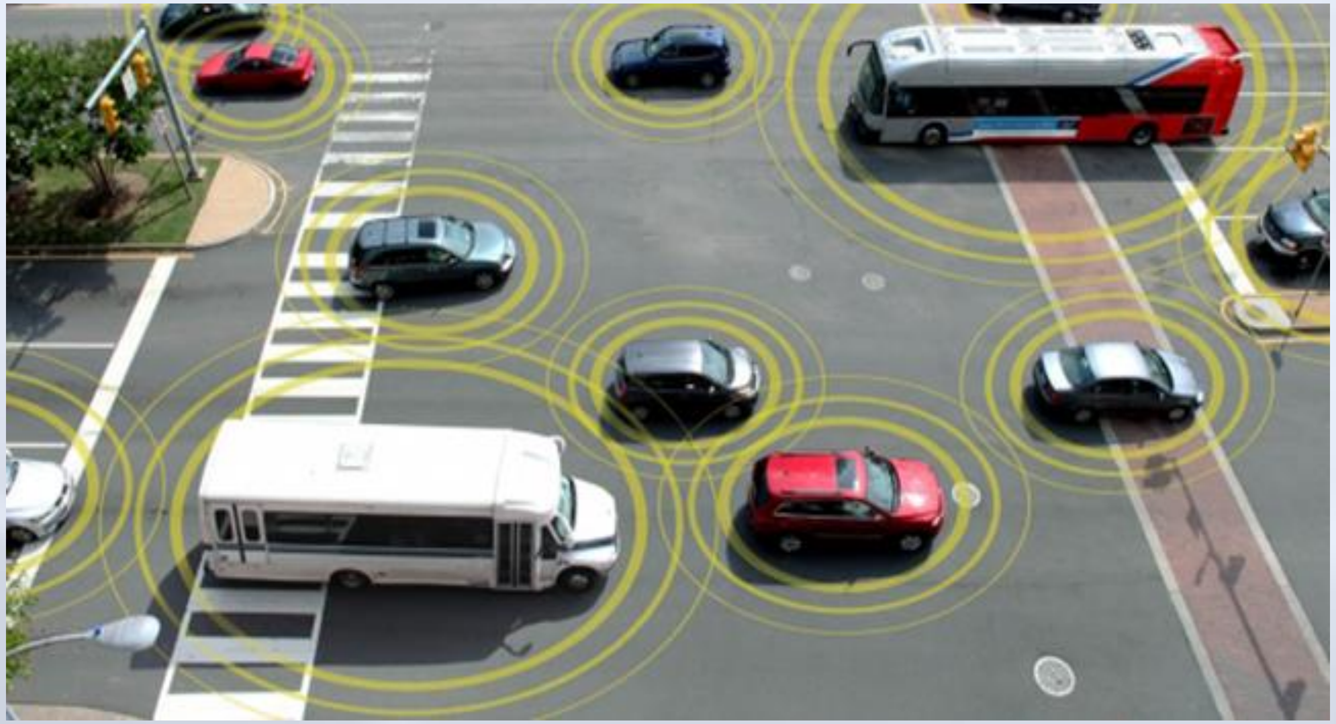
	Age 0-14	Age 15-29	Age 30-49	Age 50-64	Age 65+	Total
2017	61,344	66,235	83,704	64,507	50,683	326,474
2027	63,740	65,788	90,562	60,667	68,731	349,486
Difference	*2,395*	*(447)*	*6,857*	*(3,841)*	*18,047*	*23,012*

Mass communication, mass automation: Isaac Asimov's vision of 2014, written in 1964

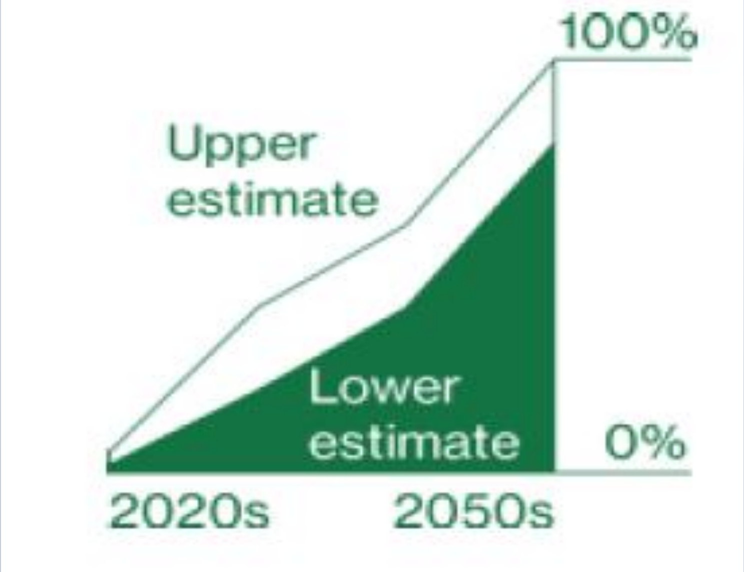
"Much effort will be put into the designing of vehicles with 'Robot-brains,' vehicles that can be set for particular destinations and that will then proceed there without interference by the slow reflexes of a human driver."

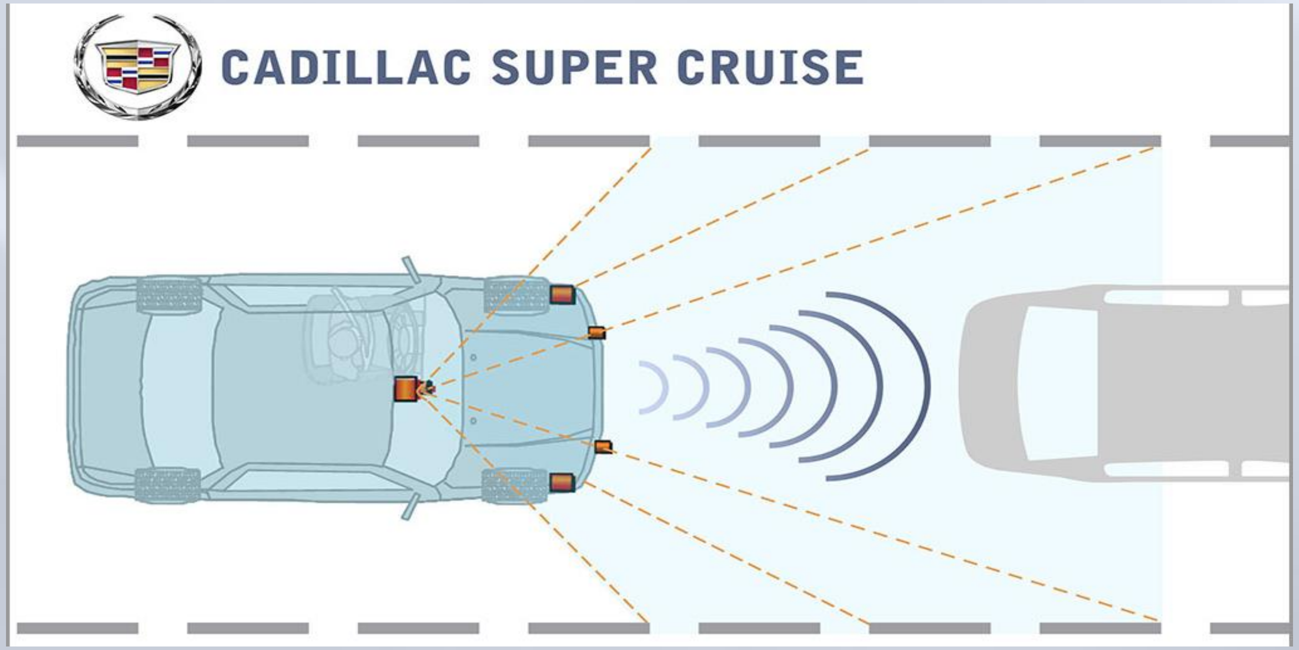
http://www.smartplanet.com/blog/bulletin/isaac-azimovs-vision-of-2014-written-in-1964/

While the impact of new and innovative mobility opportunities on the automotive industry, such as ride sharing and autonomous vehicles, is uncertain ...



AV Sales as a % of Total Sales*





… one can postulate that, with the rise in global mobile phone ownership, new technologies will increase access to transportation – possibly reaching those that would not otherwise have access to transportation services

- This development could also change the way we forecast the industry – from focus on new units sold to number of miles traveled

Countries with low vehicle density but high mobile phone ownership could provide an upside opportunity for the vehicle industry