



# Shifting Global Economic Forces Shaping the Semiconductor Outlook

Surface Preparation and Cleaning Conference (SPCC)  
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*\*A global outlook based on Consensus Economics, Inc.  
CONSENSUS FORECASTS®*



# Outline

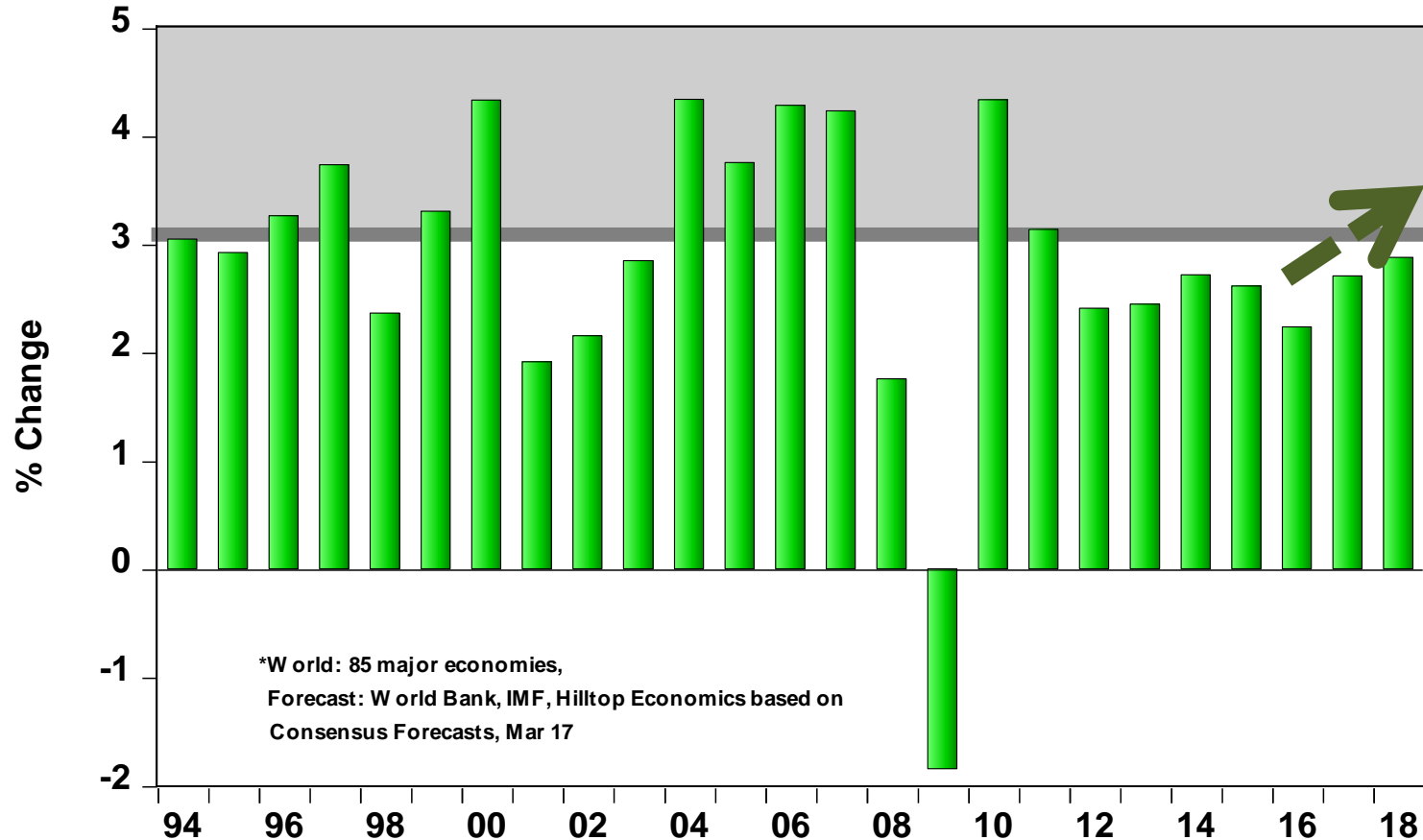
- **Global outlook**
- **Semi MSI outlook (ESF March 2017)**
- **Risks in the economy**
- **A look back at SPCC 2016 forecast**

# Global Economic Outlook Summary: 2017-18

- **Modest growth, faster than 2016**
- **Improving investment climate**
- **Slightly higher inflation, diverging interest rates**
- **Currency turmoil, stronger U.S. dollar**
- **Much higher economic policy uncertainty**

# World Real GDP Growth Slowly Accelerates

Annual Trend: 95-07: +3.2% 11-16: +2.5%  
2016: +2.2% 2017: +2.7% 2018: +2.9%



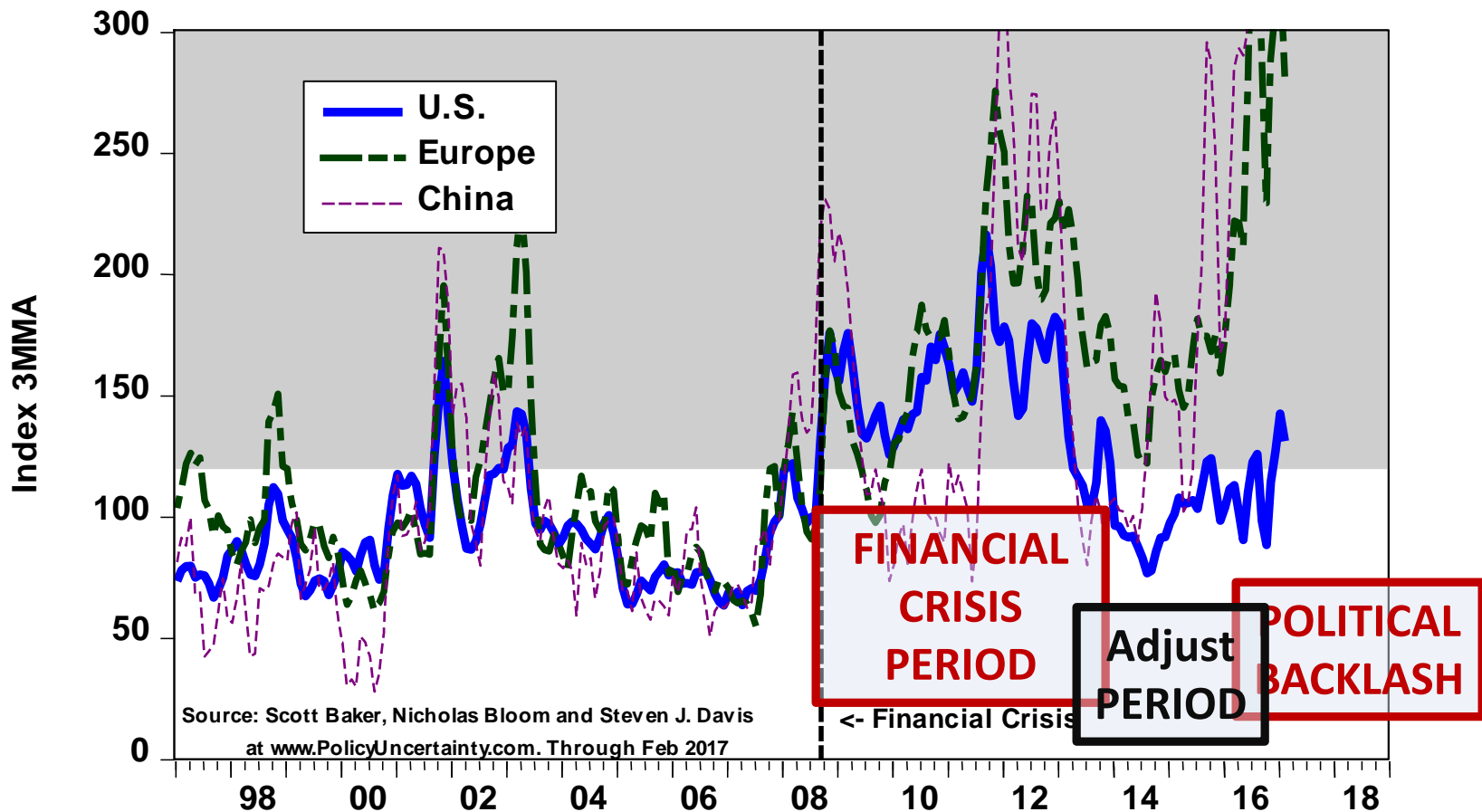
\*World: 85 major economies,  
Forecast: World Bank, IMF, Hilltop Economics based on  
Consensus Forecasts, Mar 17

# Key U.S. & Other Policy Initiatives

## Uncertainty Factor & Most Likely Impact on Growth

- **Monetary Policy: Low Uncertainty (neutral for growth for now)**
  - Interest rates rising
  - Dollar strengthening
  - Regulations in response to financial crisis in place and operational
- **Fiscal (Tax & Spend) Policy: High Uncertainty**
  - Tax reform (important for growth)
  - Budget shift to defense (mixed for growth)
  - Regulatory reform (important for growth)
  - Healthcare reform (now on indefinite hold)
- **International Policy: High Uncertainty (no longer financial crisis-driven)**
  - GLOBAL increase in anti-globalization sentiment negative for growth
  - Immigration (negative for growth)
  - Pull-back from trade agreements: Negative to uncertain impact on growth
  - Brexit impact on EU
  - China policy shift to reforms with a lower growth policy target (& upcoming Communist Party Congress)

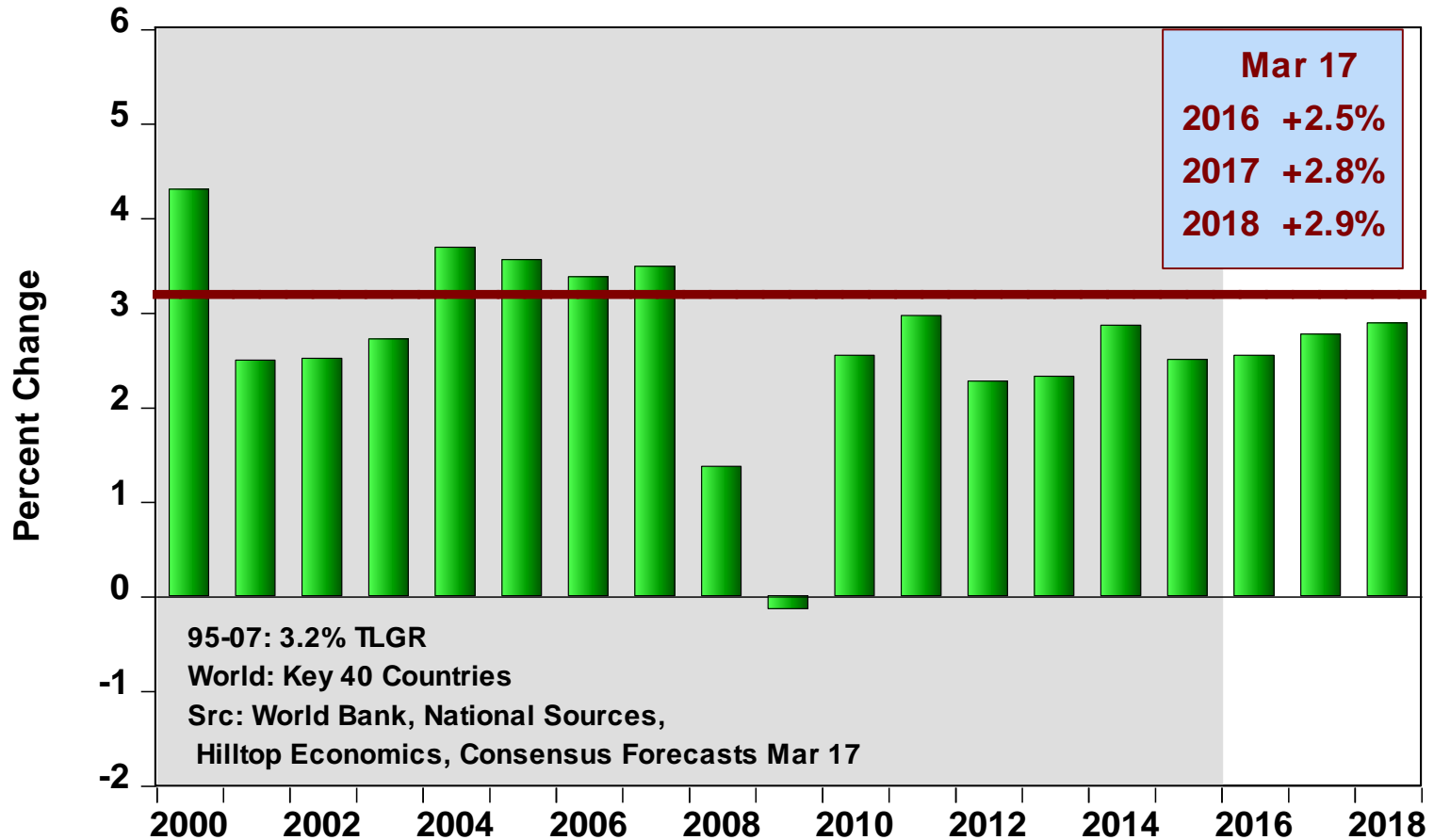
# Economic Policy Uncertainty



*The grey area: Uncertainty is high enough to alter economic decision making (especially investment)*

# Steady Global Consumer Spending Growth

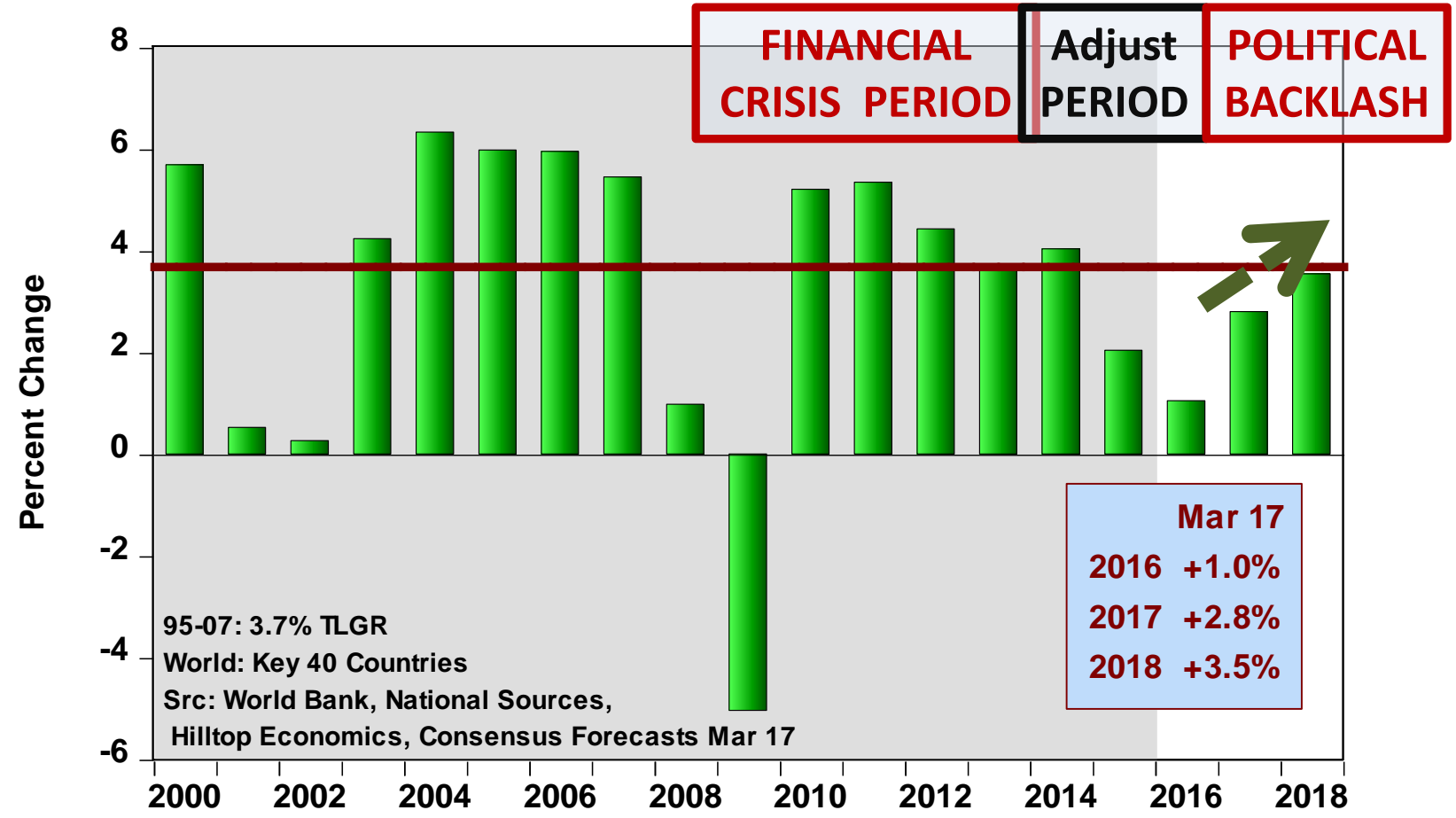
## World\* Real Consumption



**Consumer Spending Roughly 2/3 of GDP Demand**

# Global Investment Climbing Out of a Weak Cycle

World\* Real Investment

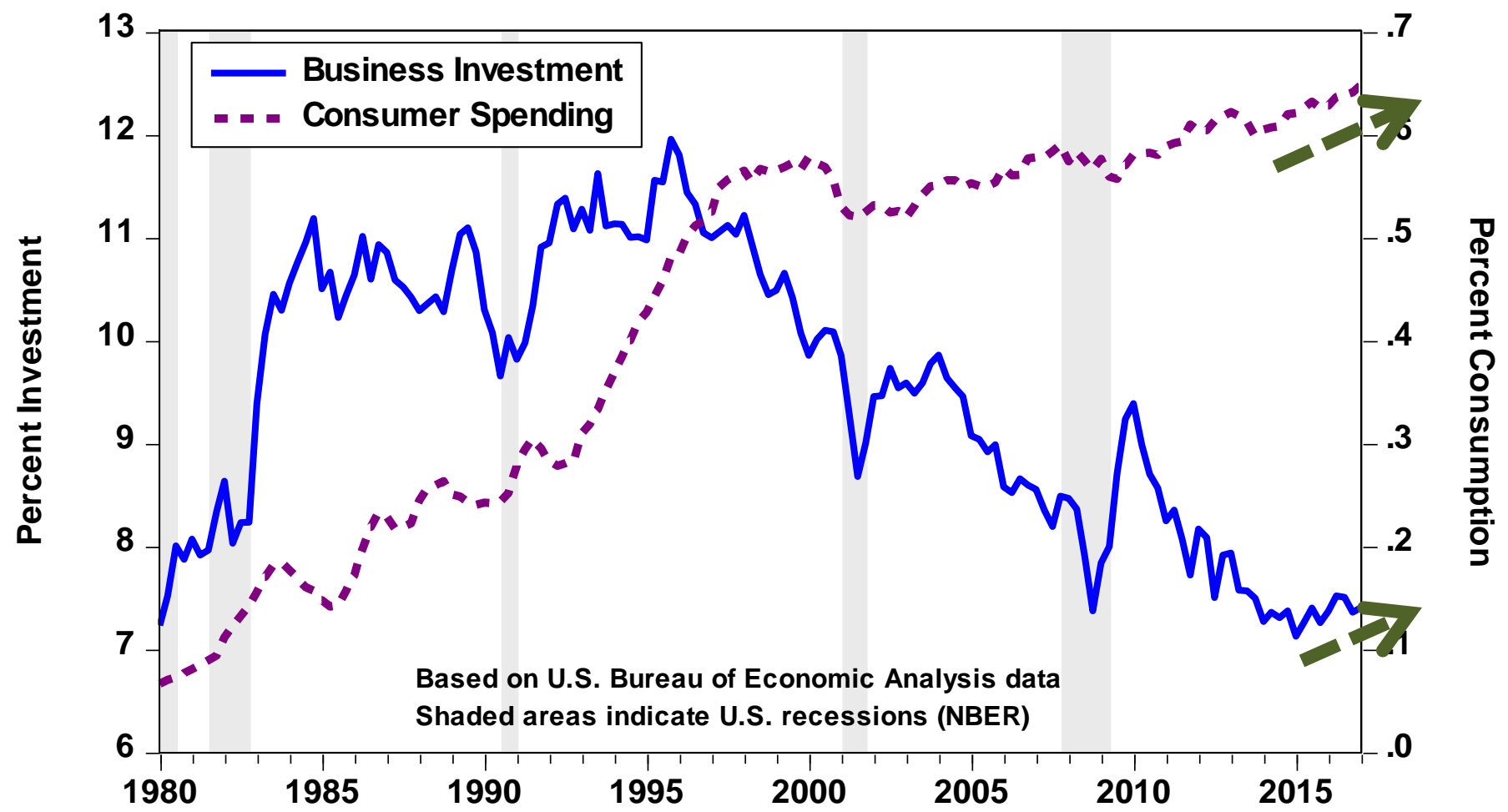


**Investment Roughly 1/4 of GDP Demand**



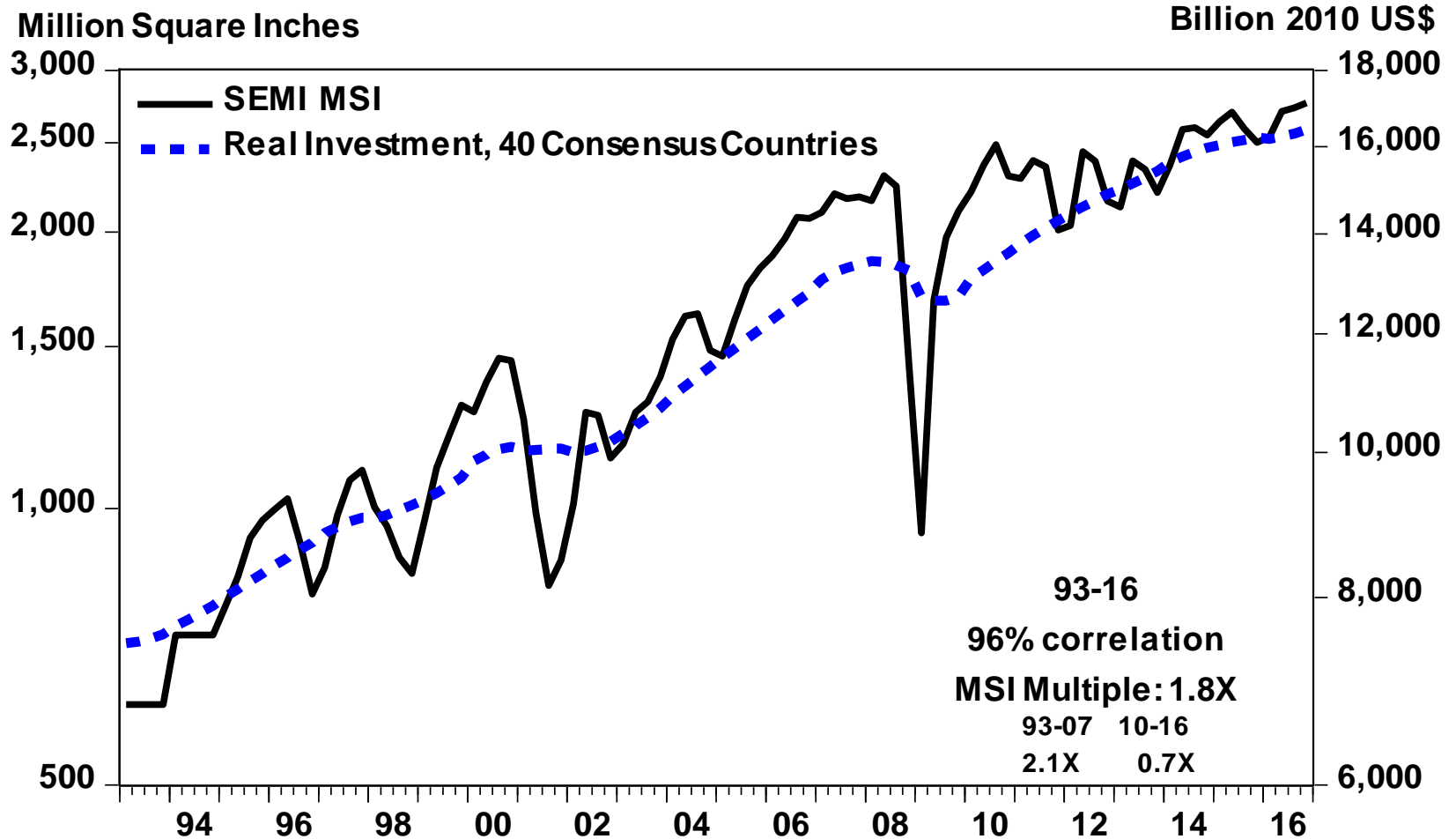
# Spending on Technology Goods

*An small but growing share of consumer spending. Until 2014, a decreasing share of investment in the U.S. Trends likely repeated globally.*



Based on U.S. Bureau of Economic Analysis data  
Shaded areas indicate U.S. recessions (NBER)

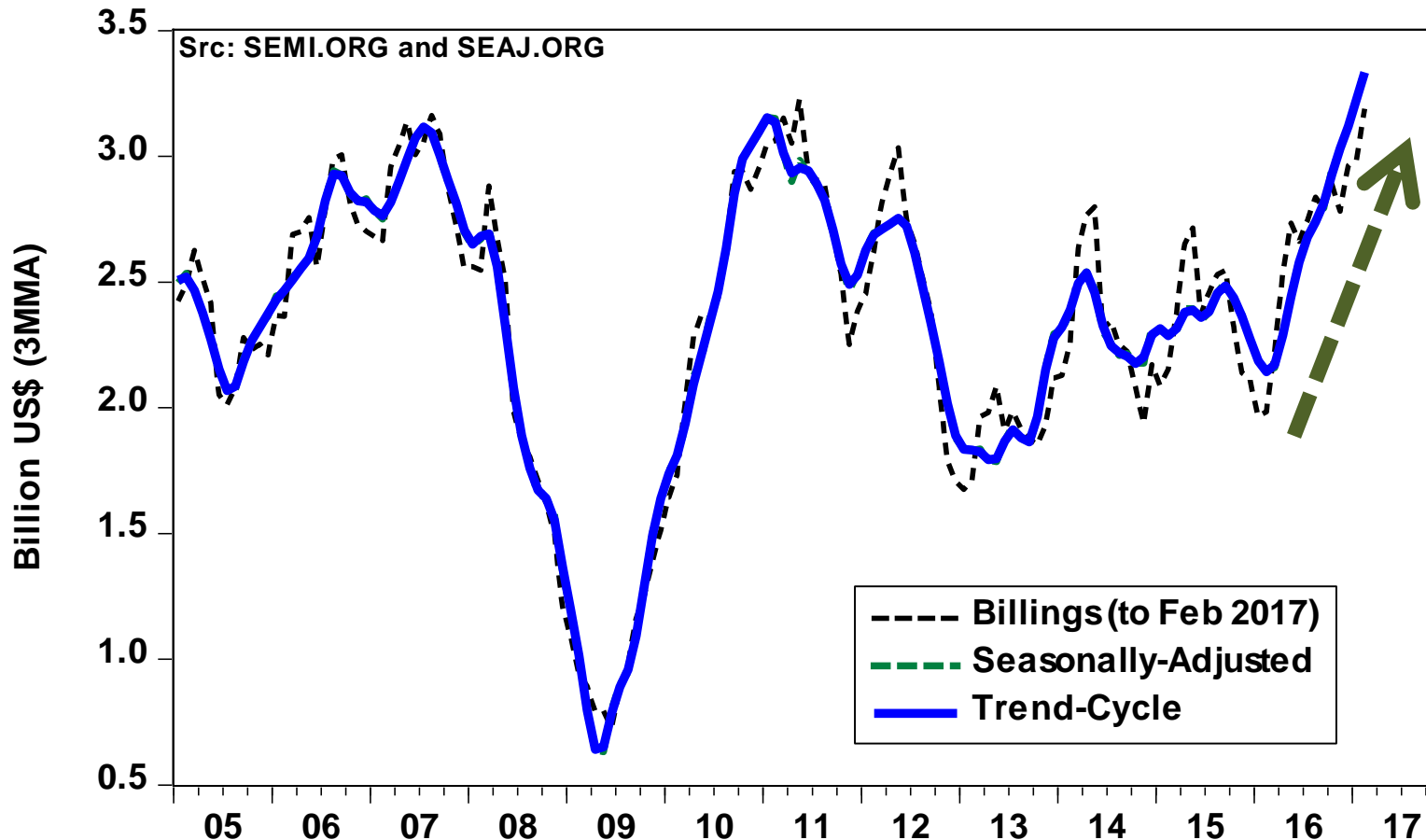
# Real Investment Essential for Semiconductors



*Final spending on fixed investment – plant, equipment & structures - is even more highly related to MSI over the past 23 years than total real GDP*

# Semiconductor Equipment Investment: Ahead of the Rest of the World

North America + Japan Semiconductor Equipment Billed



# CPI Inflation Higher, But Not a Problem

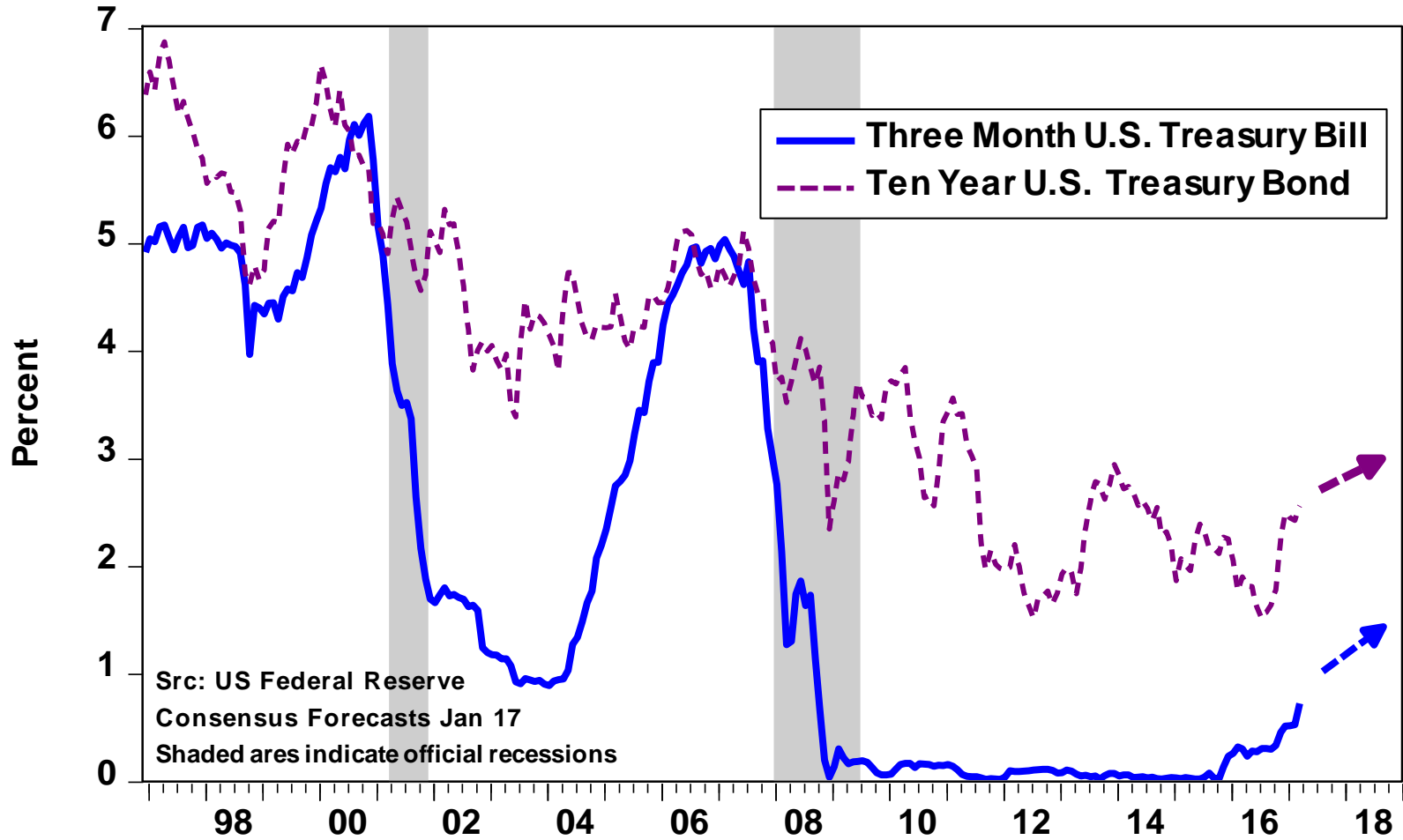
CPI % Change	2015	2016	2017	2018
China	1.4	2.0	2.5	2.3
Japan	0.8	(0.1)	0.7	1.0
South Korea	0.7	1.0	1.8	1.8
Taiwan	(0.3)	1.4	1.5	1.4
Germany	0.2	0.5	1.8	1.7
France	0.0	0.2	1.5	1.3
Italy	0.1	(0.1)	1.3	1.3
UK	0.0	0.7	2.7	2.7
US	0.1	1.3	2.5	2.3

Hilltop Economics, Based on Consensus Forecasts, March 17

***Sign of stronger demand + tighter supply  
Businesses have a chance to get price increases***

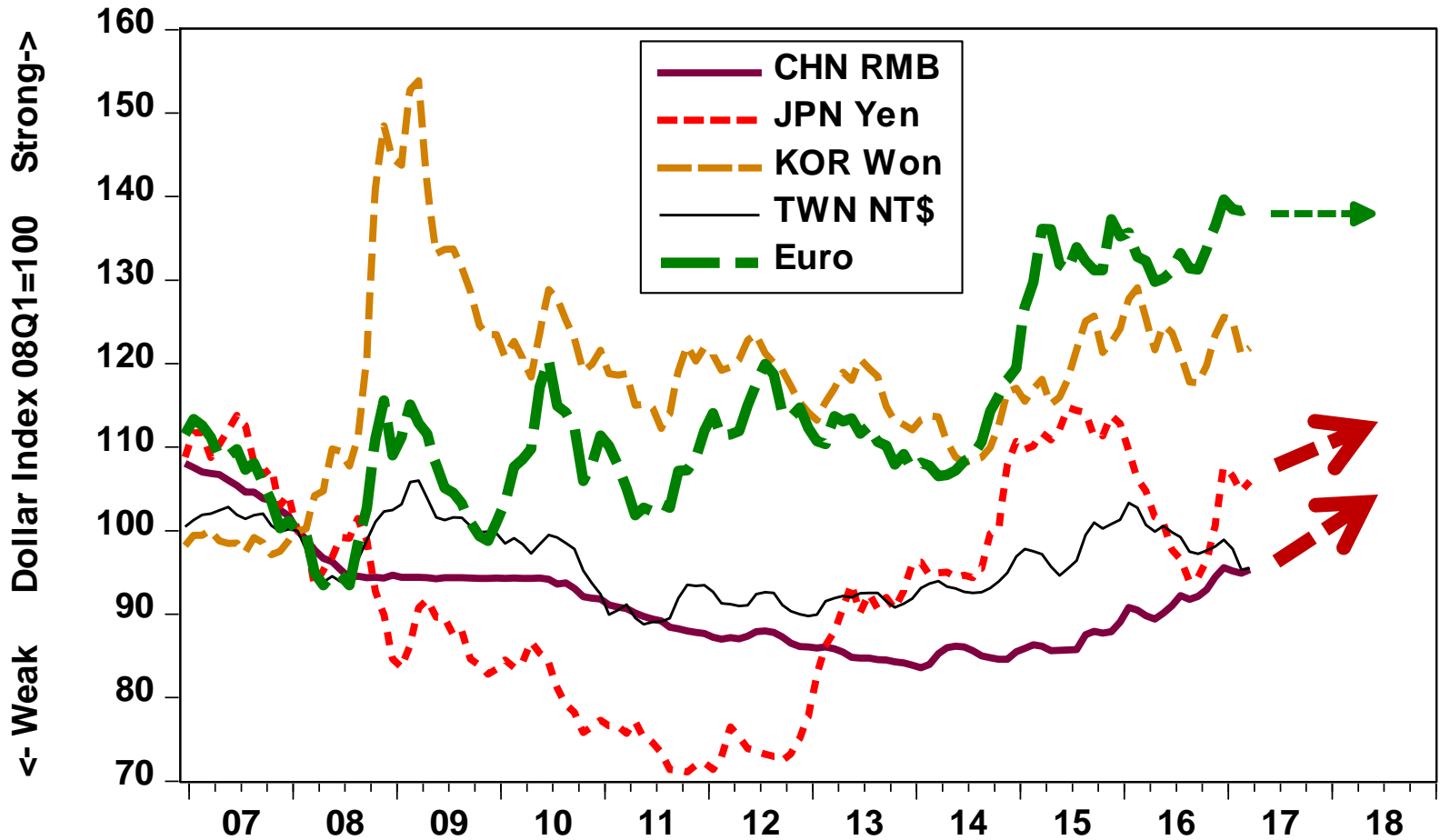
# Improving Economy: Rising Interest Rates

*A sign that we are finally moving back to "normal"*

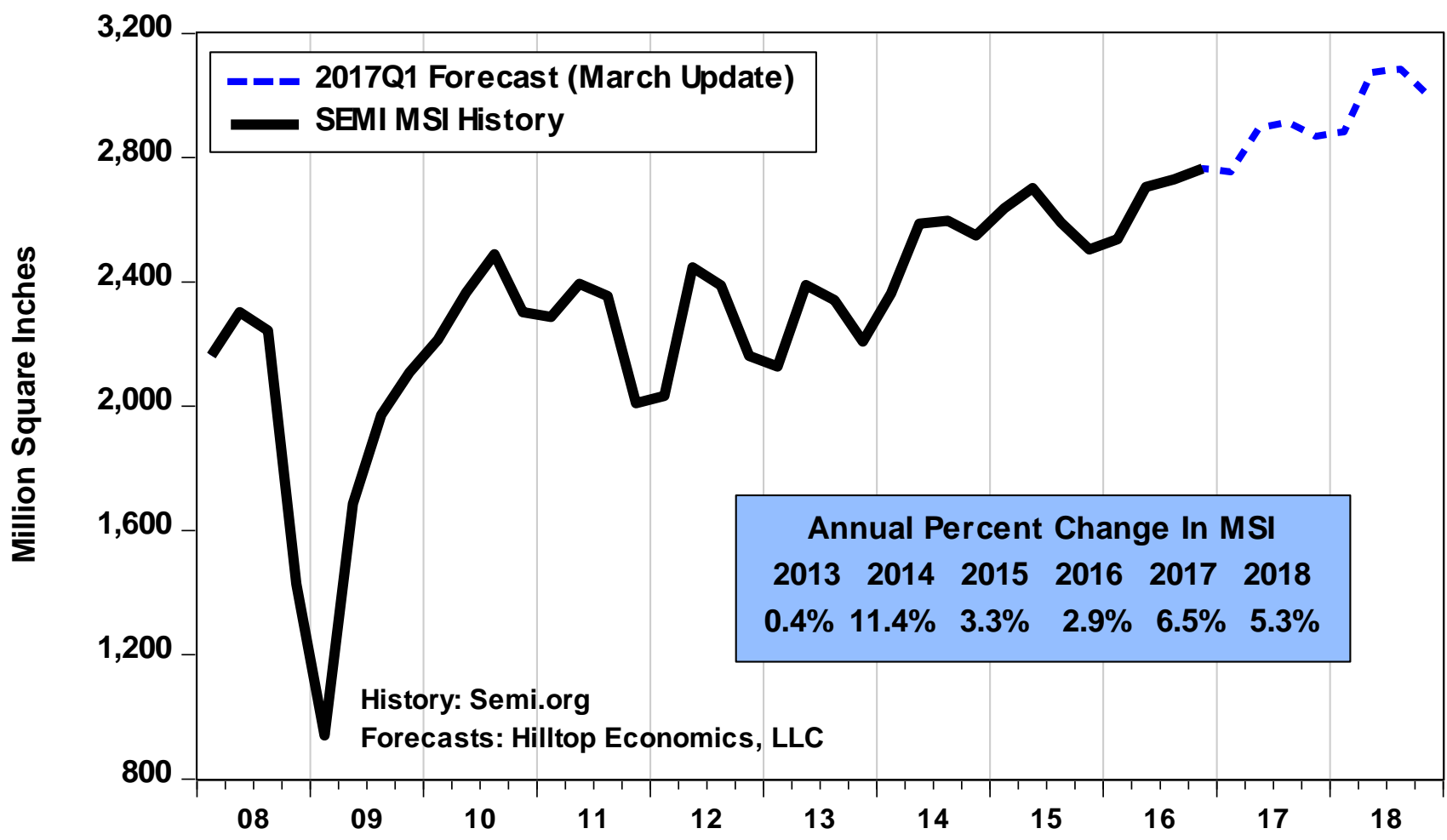


**Sign of optimism: stronger demand + tighter supply  
Not too high to dampen investment (through 18)**

# Dollar Remains Strong



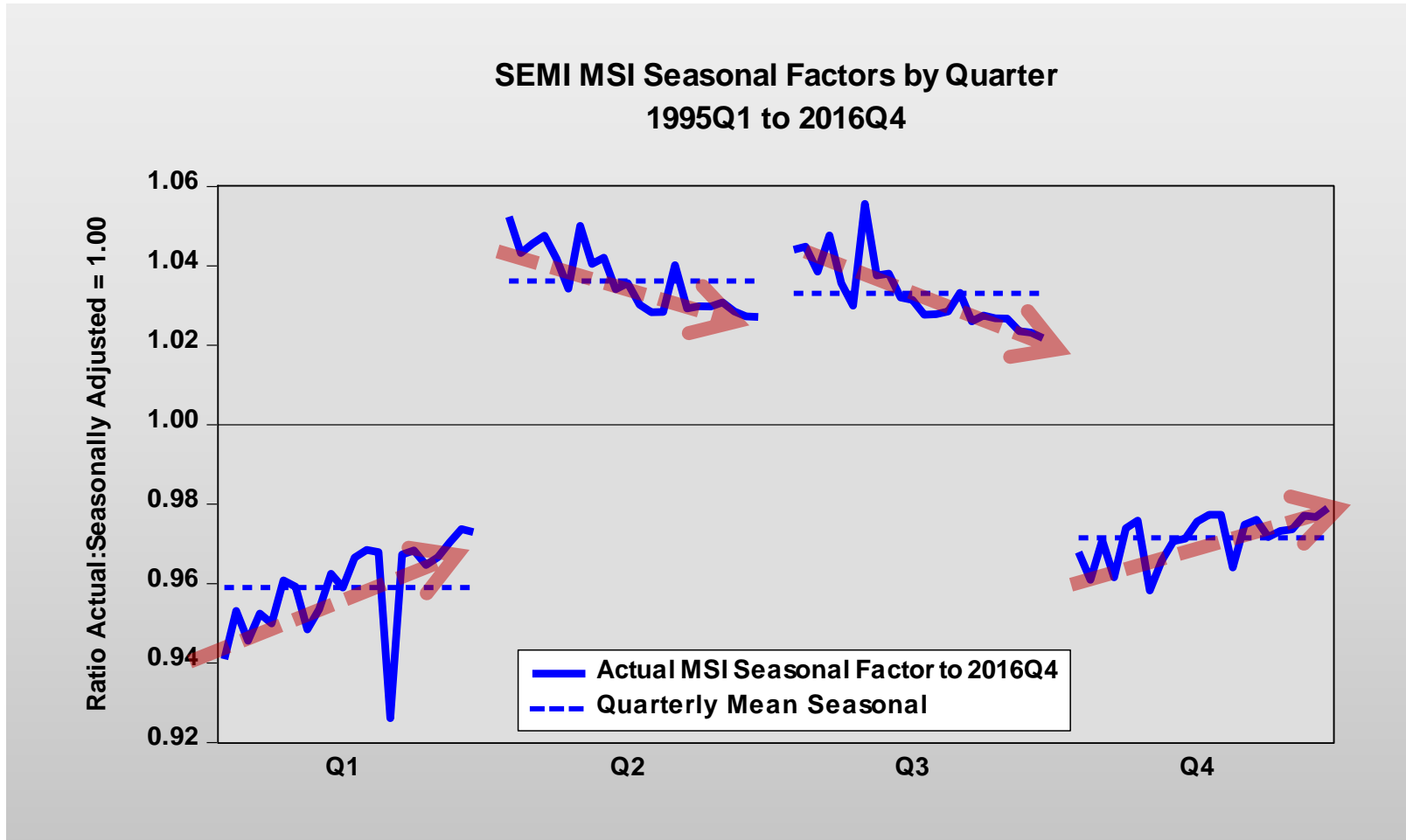
# Semiconductor MSI Outlook



***Despite uncertainty (or maybe because of it), the demand-driven outlook for the semiconductor industry is strong***

# MSI Becoming Less Seasonal

*A plus for suppliers as semiconductors ubiquitous in final demand*





# Semiconductor MSI Outlook Summary

## March 2017 vs March 2016

MSI Forecast	2014	2015	2016	2017	2018
<b>MSI – March 17 Forecast</b>	<b>10,097</b>	<b>10,434</b>	<b>10,738</b>	<b>11,432</b>	<b>12,036</b>
<b>% Change</b>	<i>11.4%</i>	<i>3.3%</i>	<b>2.9%</b>	<b>6.5%</b>	<b>5.3%</b>
<b>Global Real GDP % Change</b>	<i>2.7%</i>	<i>2.6%</i>	<b>2.2%</b>	<b>2.7%</b>	<b>2.9%</b>
<b>MSI - March 16 Forecast</b>	<b>10,097</b>	<b>10,434</b>	<i>10,465</i>	<i>11,264</i>	<i>11,744</i>
<b>% Change</b>	<i>11.4%</i>	<i>3.3%</i>	<i>0.3%</i>	<i>7.6%</i>	<i>4.3%</i>
<b>Global Real GDP % Change</b>	<i>2.6%</i>	<i>2.4%</i>	<i>2.4%</i>	<i>2.8%</i>	<i>3.0%</i>

***This year versus last year:  
MORE SEMICONDUCTORS on SLIGHTLY LOWER ECONOMIC GROWTH***

***HIGHER RISK BANDS AROUND THE FORECAST***



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## This Year

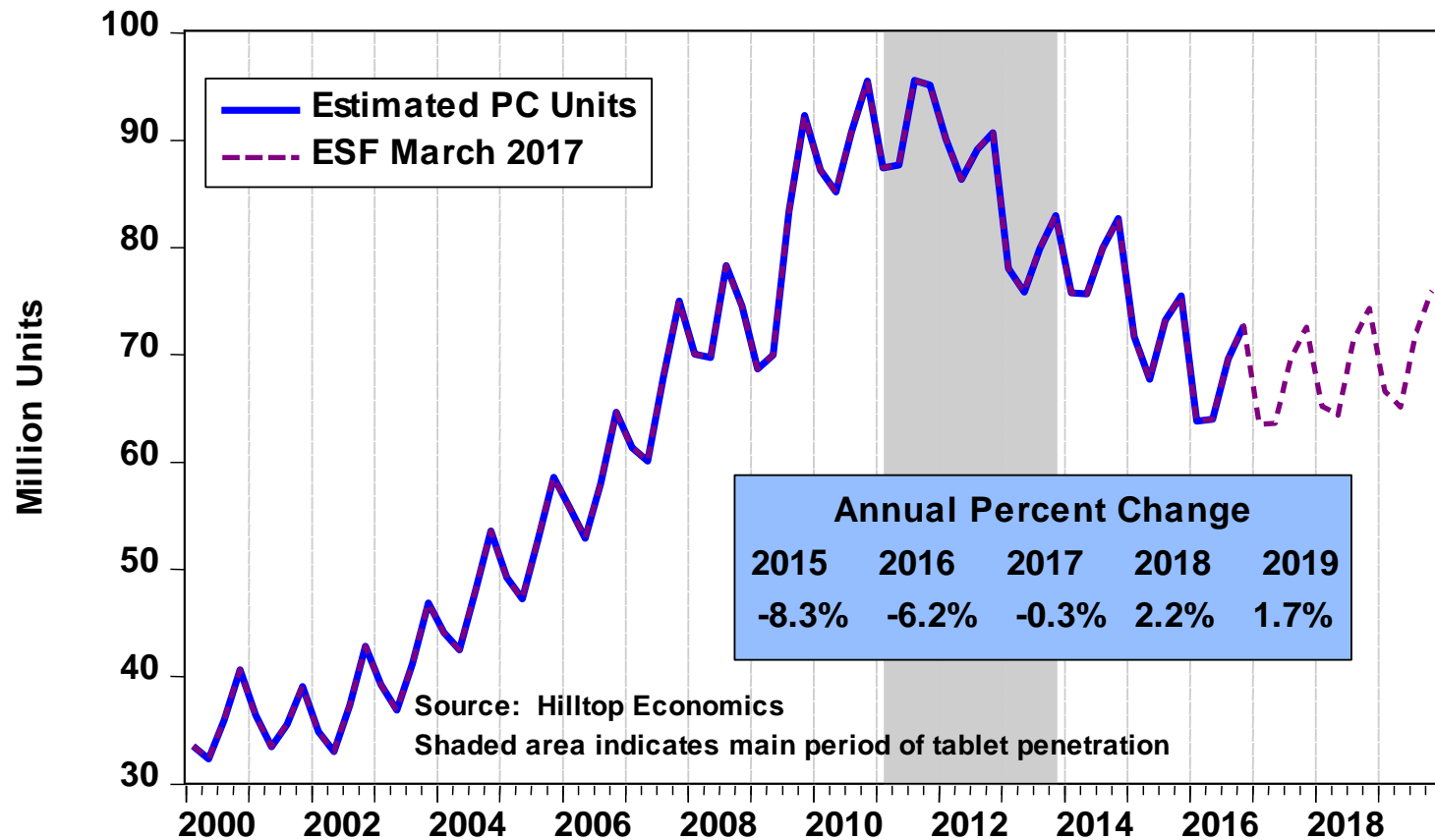
## Versus

## Last Year

- *MSI: Up a little in 2016, rises above trend in 2017, eases to around trend in 2018*
- **Global final demand growth marginally better in 2017 & 2018**
  - Real GDP in 2017 better than 2016, up even more in 2018
  - Business investment stalled in 2016, recovers in 2017
  - Consumer spending rises remains a little below 3% trend
  - PC unit sales fell modestly in 2016; increase slightly in 2017
  - Mobile phone sales growth slowed, now single digits at best
  - No major new markets
- *MSI: Flat in 16 on poor investment outlook, snaps back in 2017, falls to around trend in 2018*
- **Global final demand grows marginally in 2016, better in 2017 & 2018**
  - Real GDP should increase in 2016, reach “trend” by 2017
  - Business investment stalls in 2016, begins to recover in 2017
  - Consumer spending rises back toward trend of 3%
  - PC unit sales down sharply in 2015; down modestly in 2016; increase slightly in 2017
  - Mobile phone sales growth slows
  - **No major new markets**

# PC Market Stabilizes With Investment Uptick (Less important for semiconductors)

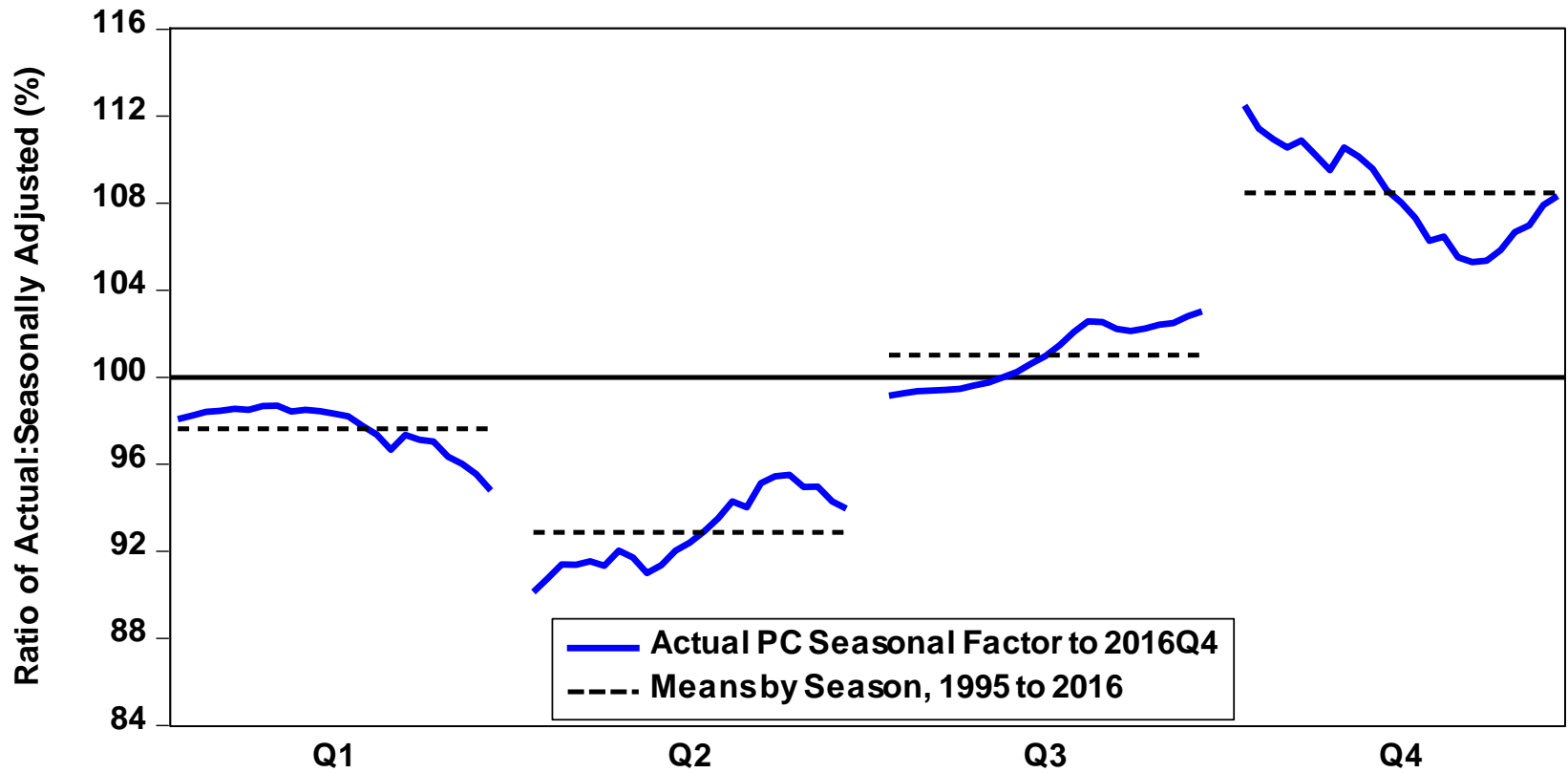
Estimated Global PC Sales



# Seasonal Factors Drive PC Quarterly Change

*Moving AWAY from 100%, Indicating RISING Seasonality of PCs*

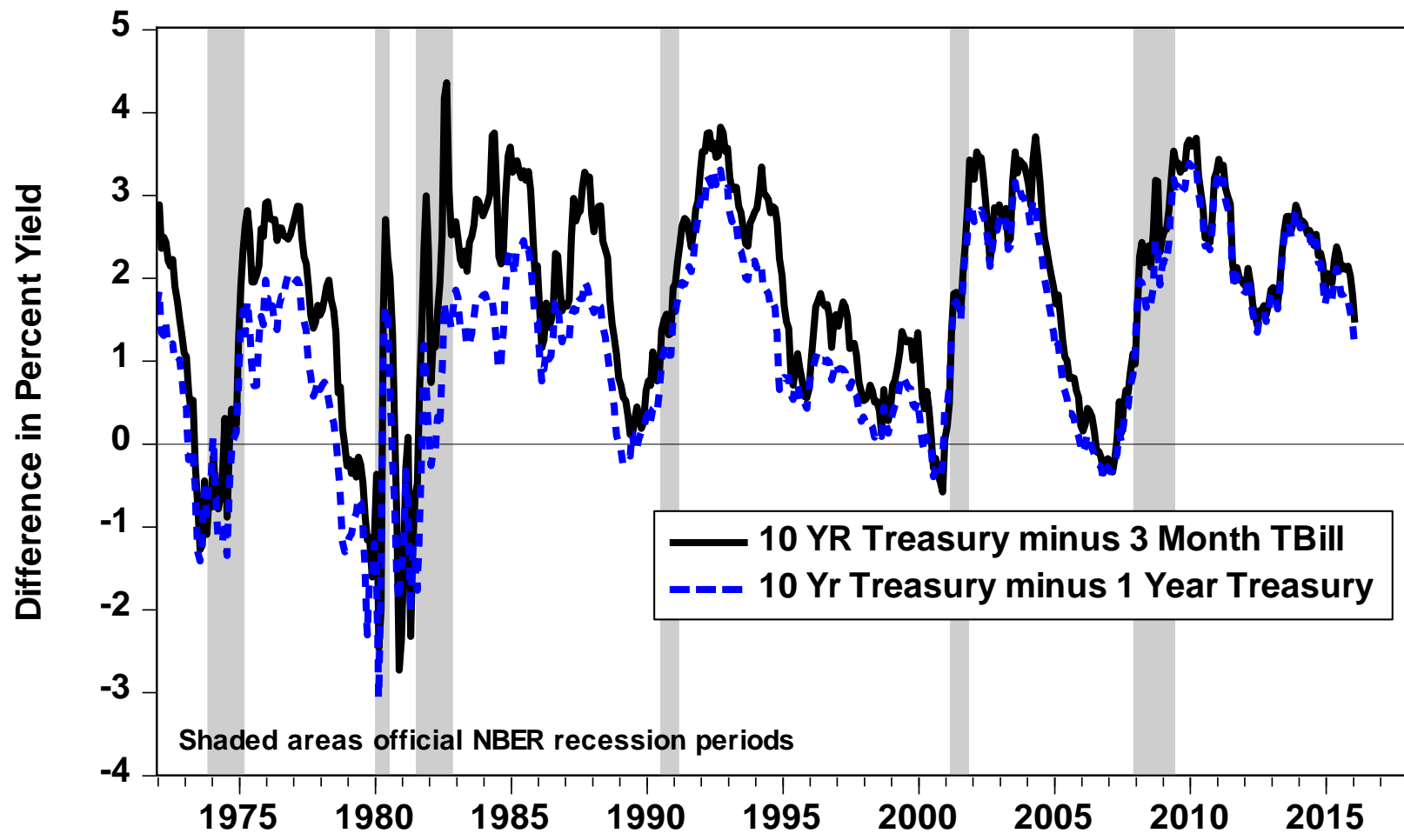
Seasonal Impact On PC Sales Over Time



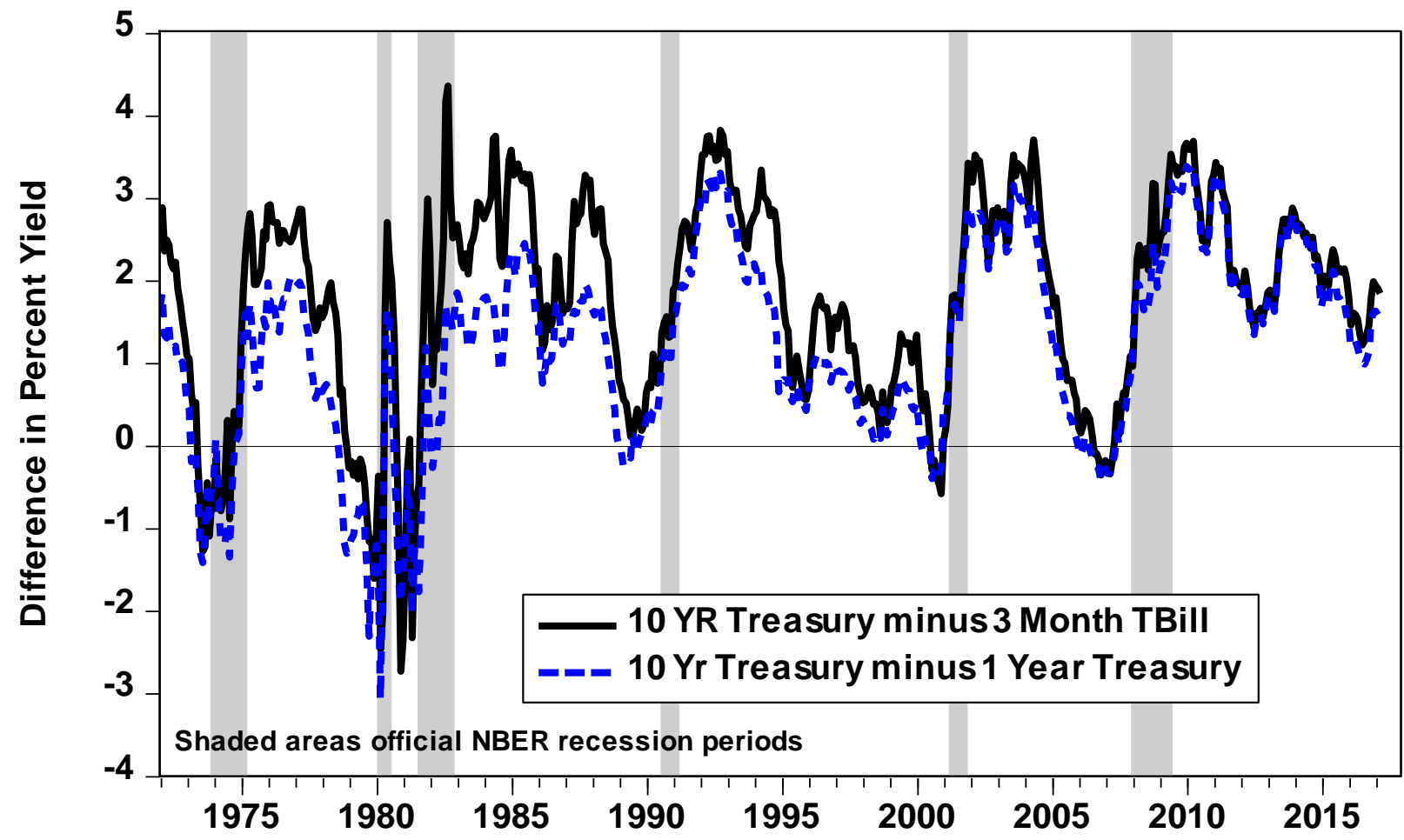
# Things to Watch: Risks

- Yield Curve (expected to stay near current levels)
- Federal Reserve interest rate increases impact on financial markets
  - (forecasters don't expect more than two in 2016)
- Magnitude of oil price increase (expected to gradually rise)
- Value of the Dollar (expect to strengthen modestly)
- Inflation
  - (expected to slowly rise to ~2% in US, lower in other parts of the developed world)
- Jobs keep growing and unemployment rates hold
  - (forecasters expect unemployment rate in US to stay in the range of 4.5% and 4.9% in 2016)
- Forecasts getting lowered in a systematic fashion through the year

# The Best Single Recession Predictor: Treasury Yield Curve Inverts (Short Rates > Long Rates)



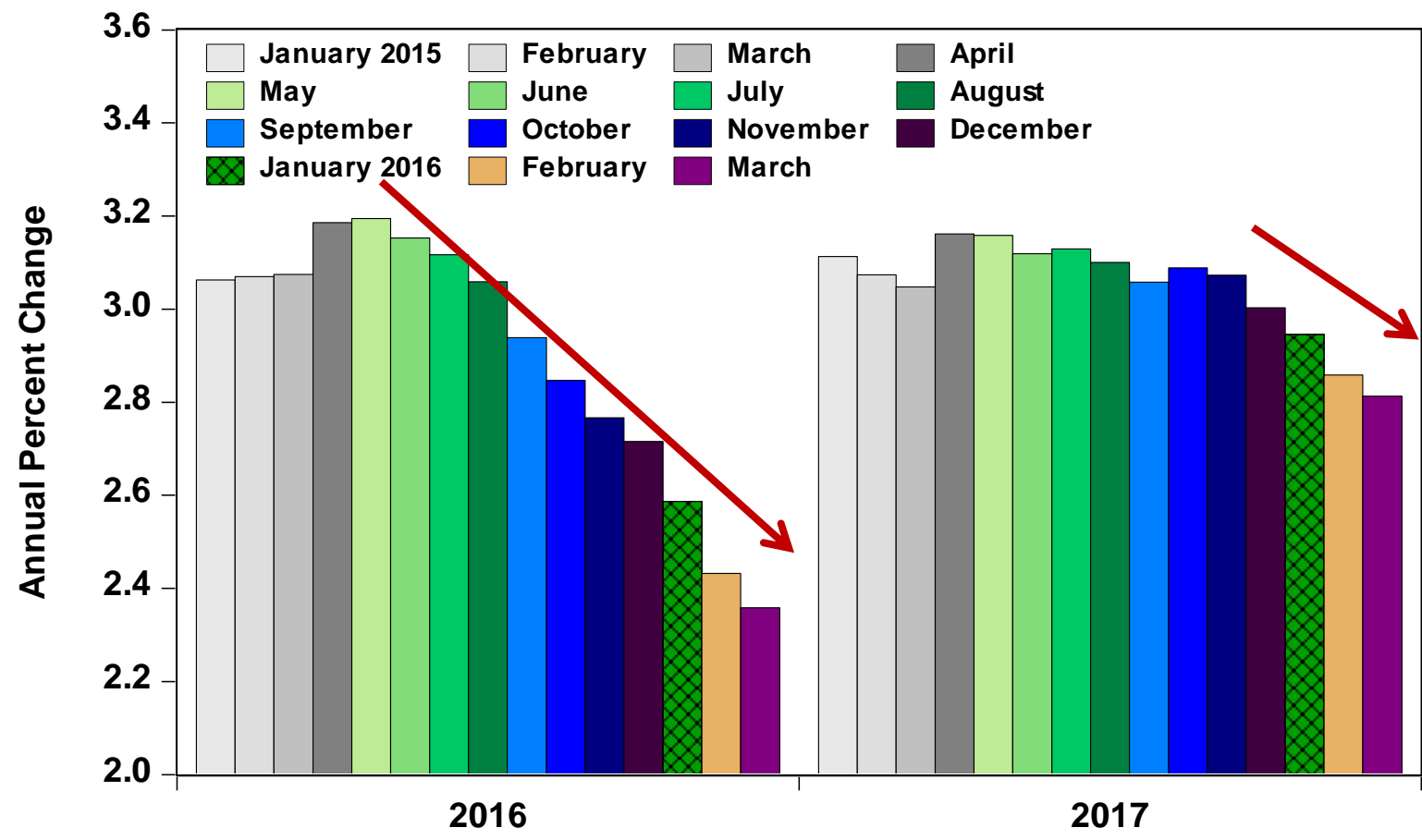
# The Best Single Recession Predictor: Treasury Yield Curve Inverts (Short Rates > Long Rates)





# Steady reduction in '16 and '17 forecasts

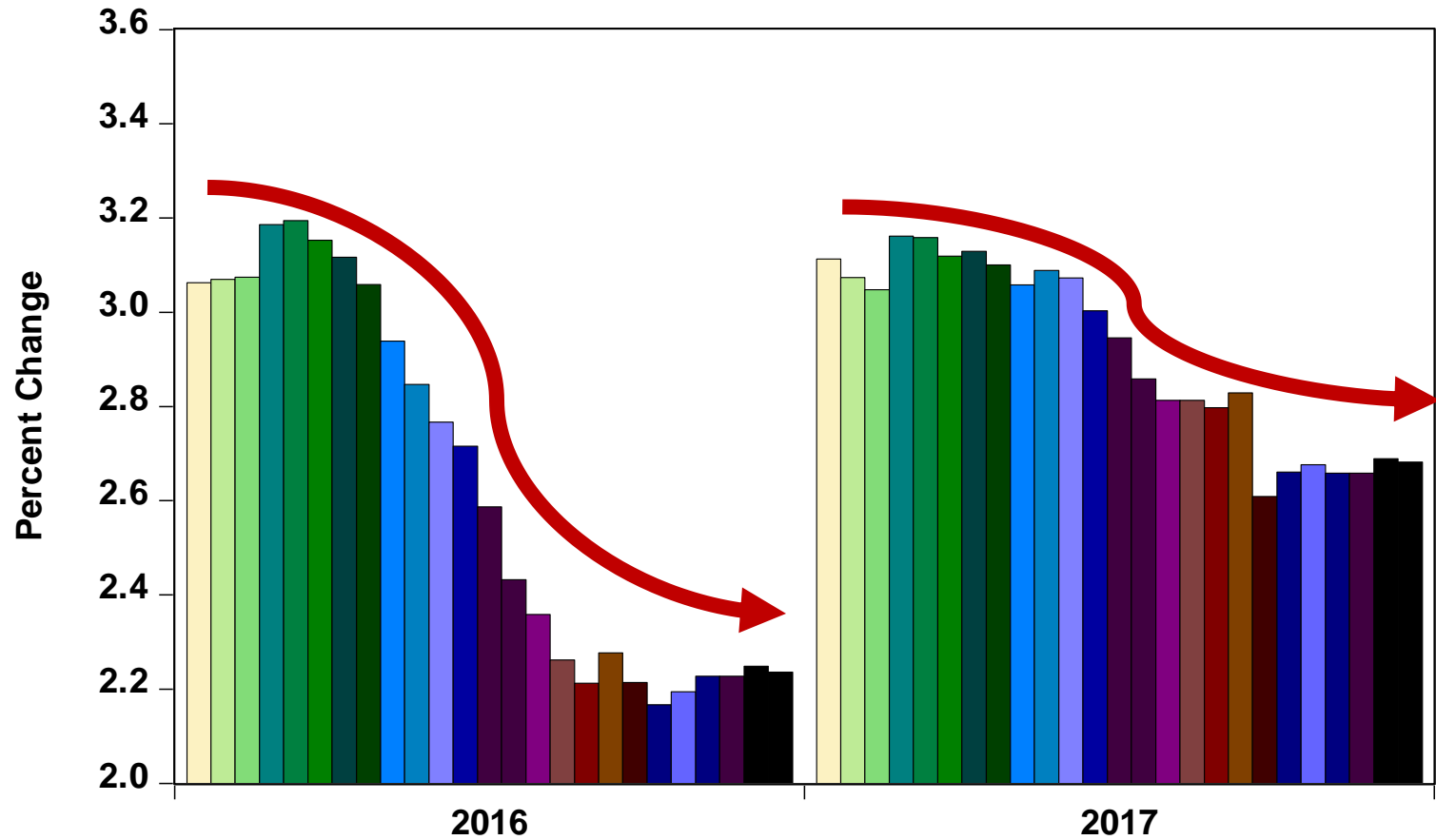
## Global Consensus-based Real GDP Forecasts



Forecast for Year By Month Forecast Made

# Steady reduction in '16 and '17 forecasts

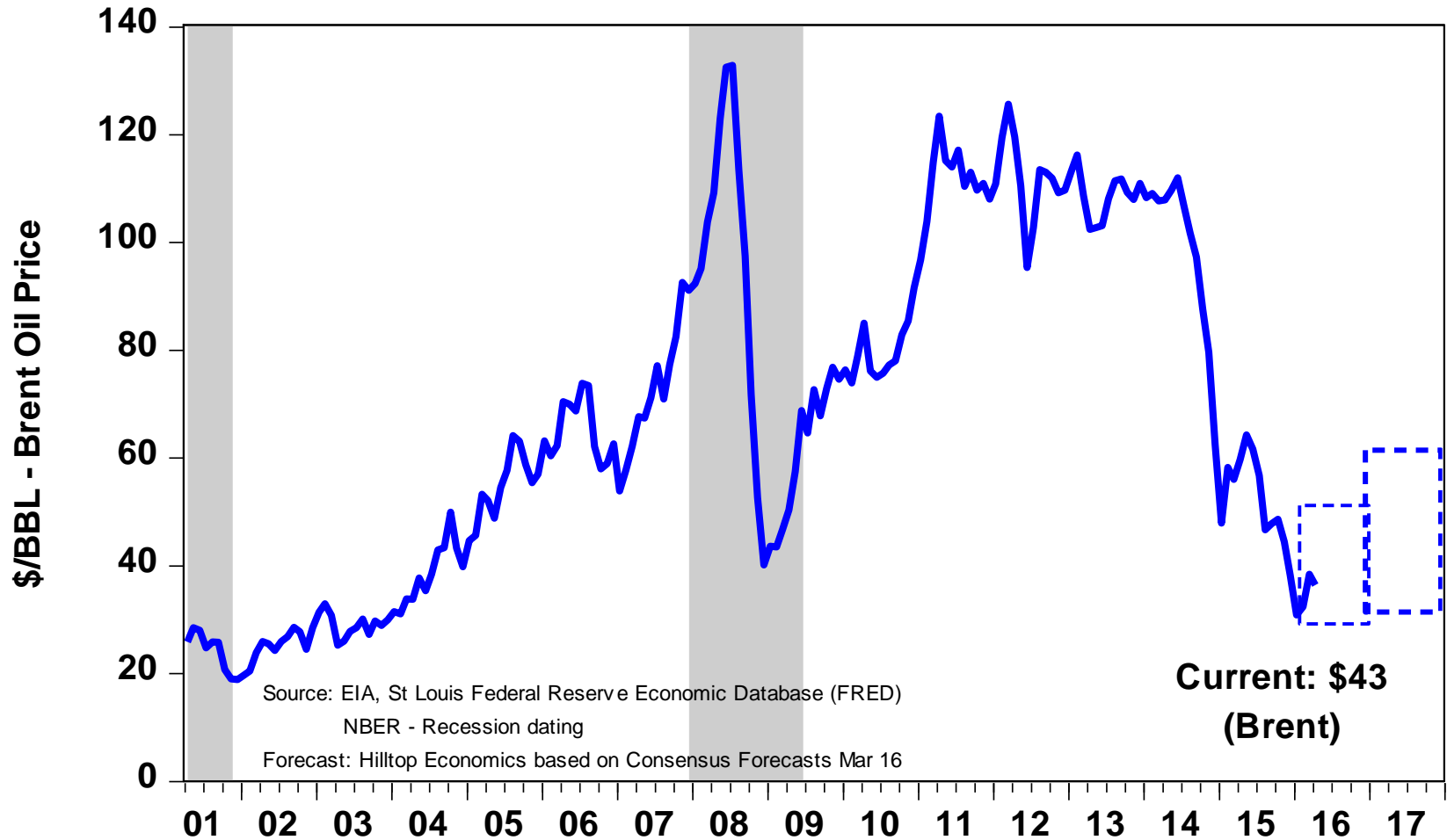
## Global Consensus Real GDP Forecasts



Forecasts from Jan 15 to Jan 17 (left to right)

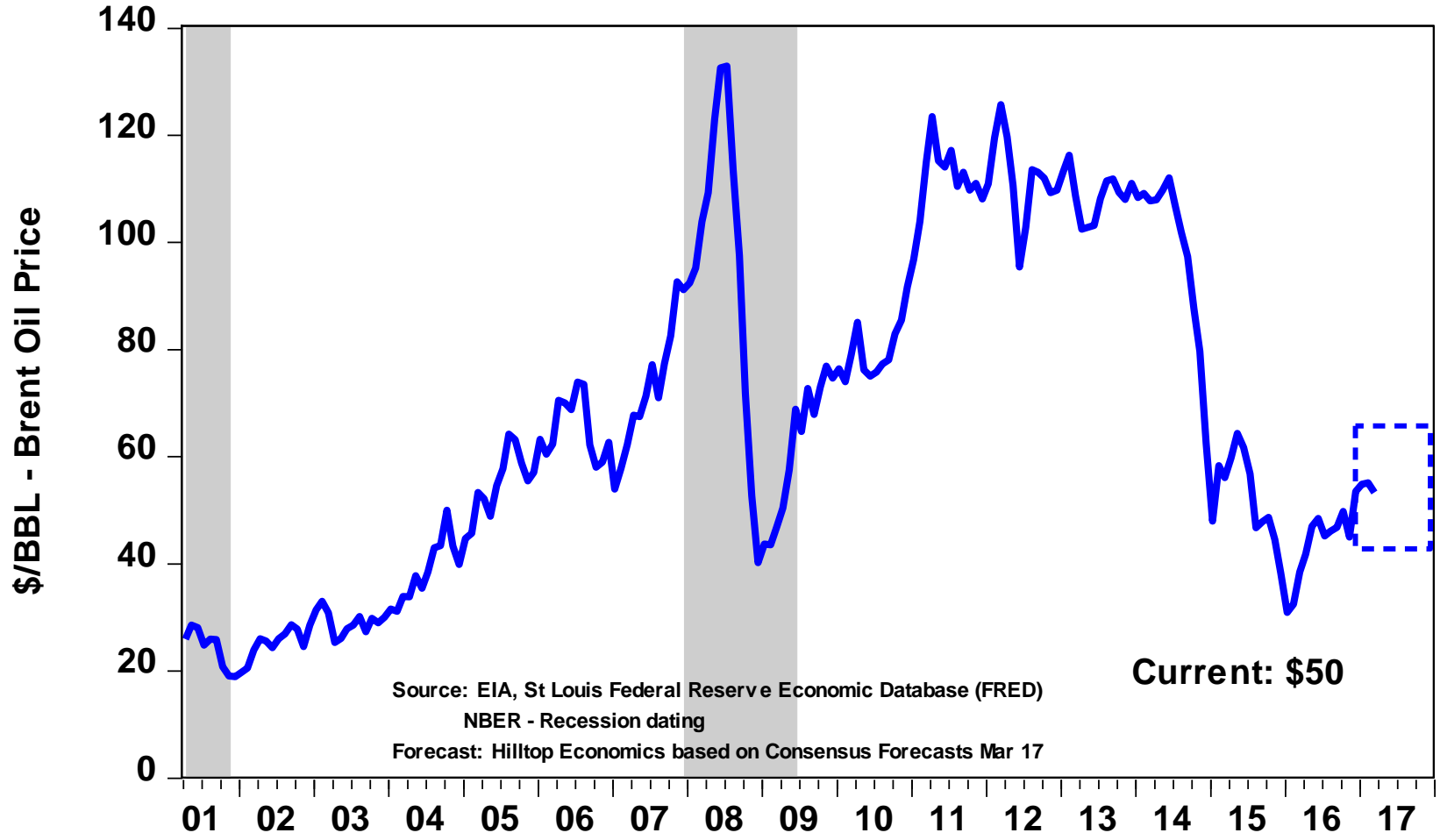
# Oil Prices Rise a Little

*Modest demand growth plus plenty of supply limit increases*



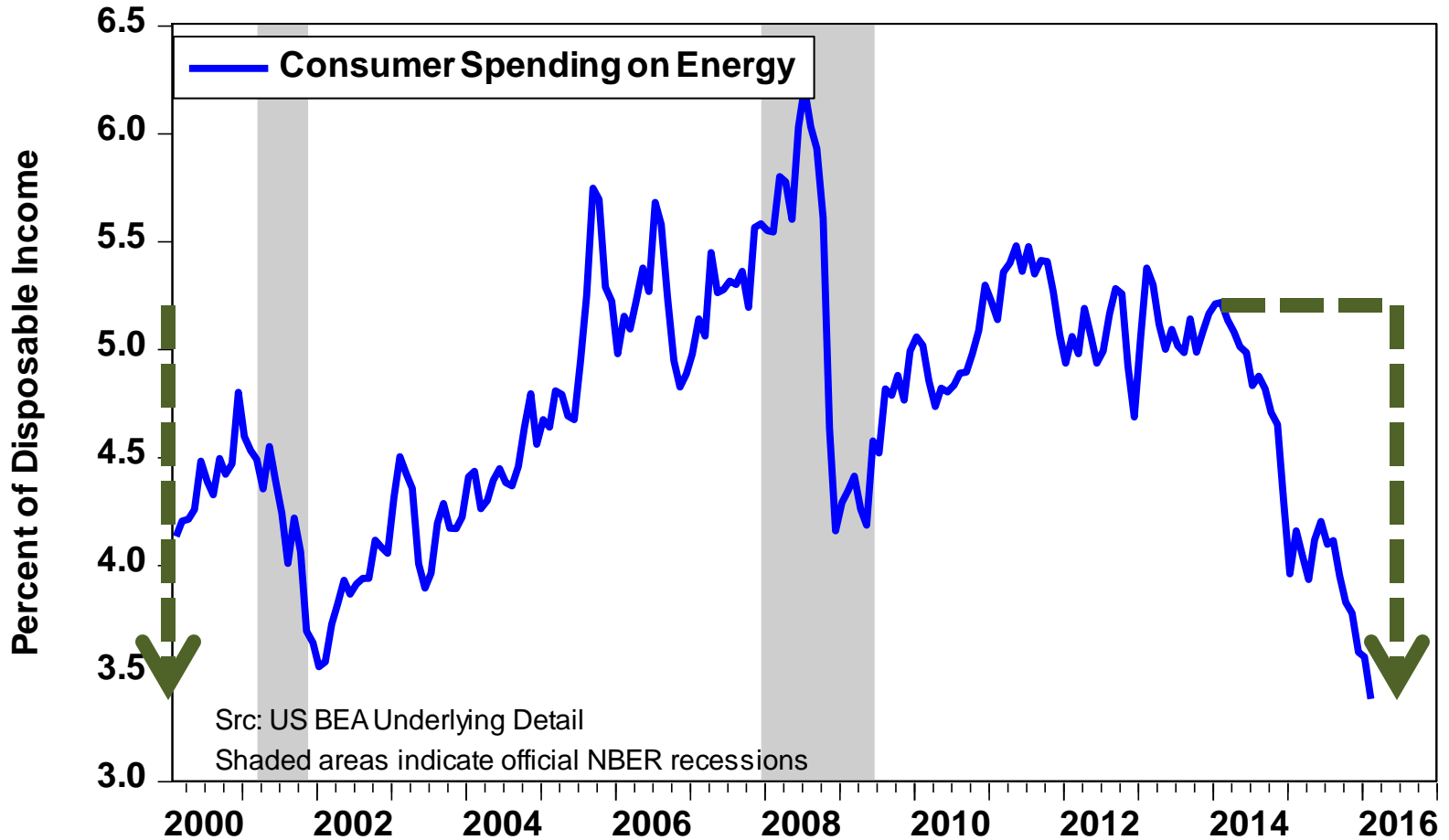
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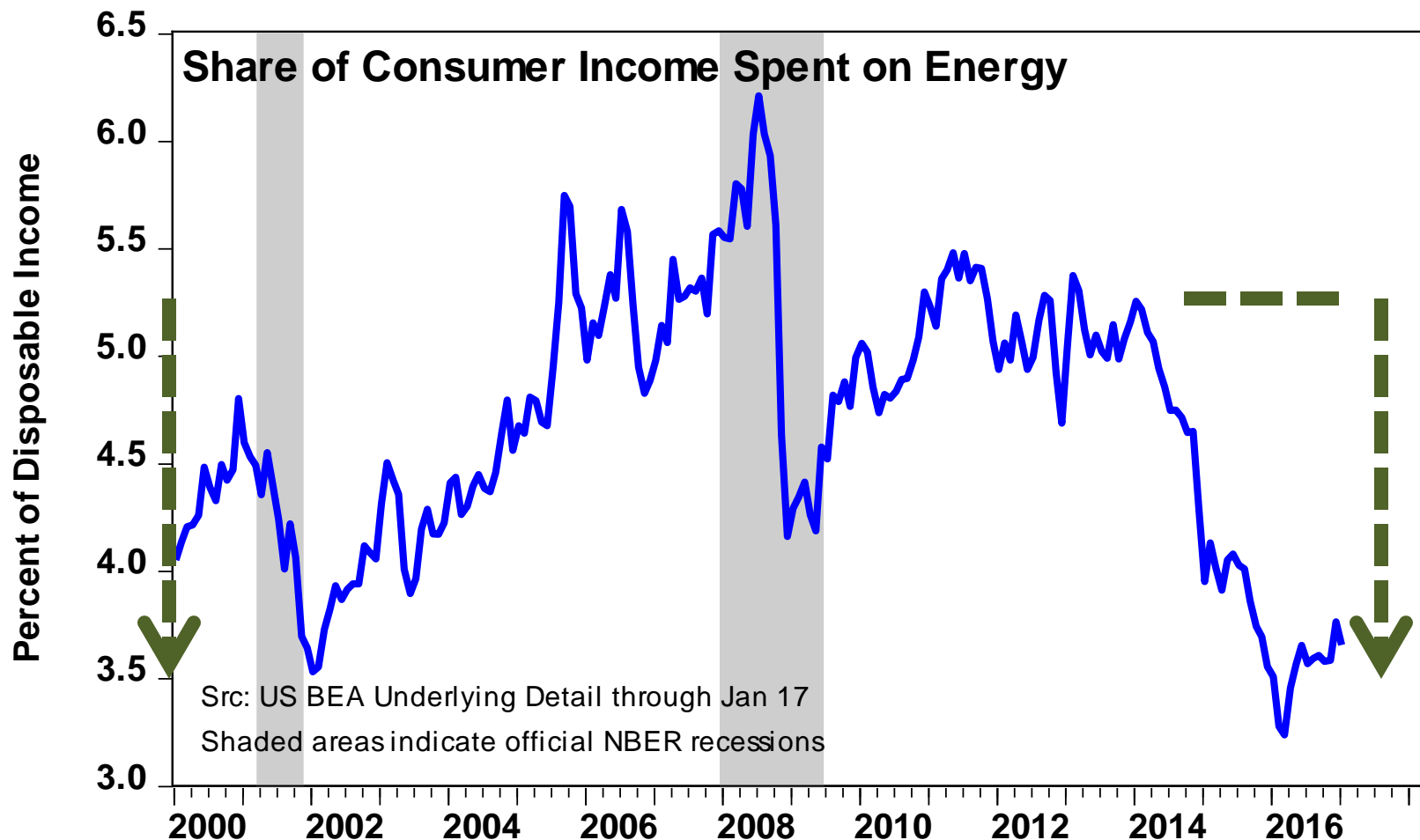
# Consumers Globally Benefit From Low Energy Prices

*(U.S. consumers alone gained almost 2% of disposable income since the end of 2013: almost \$250 BN)*

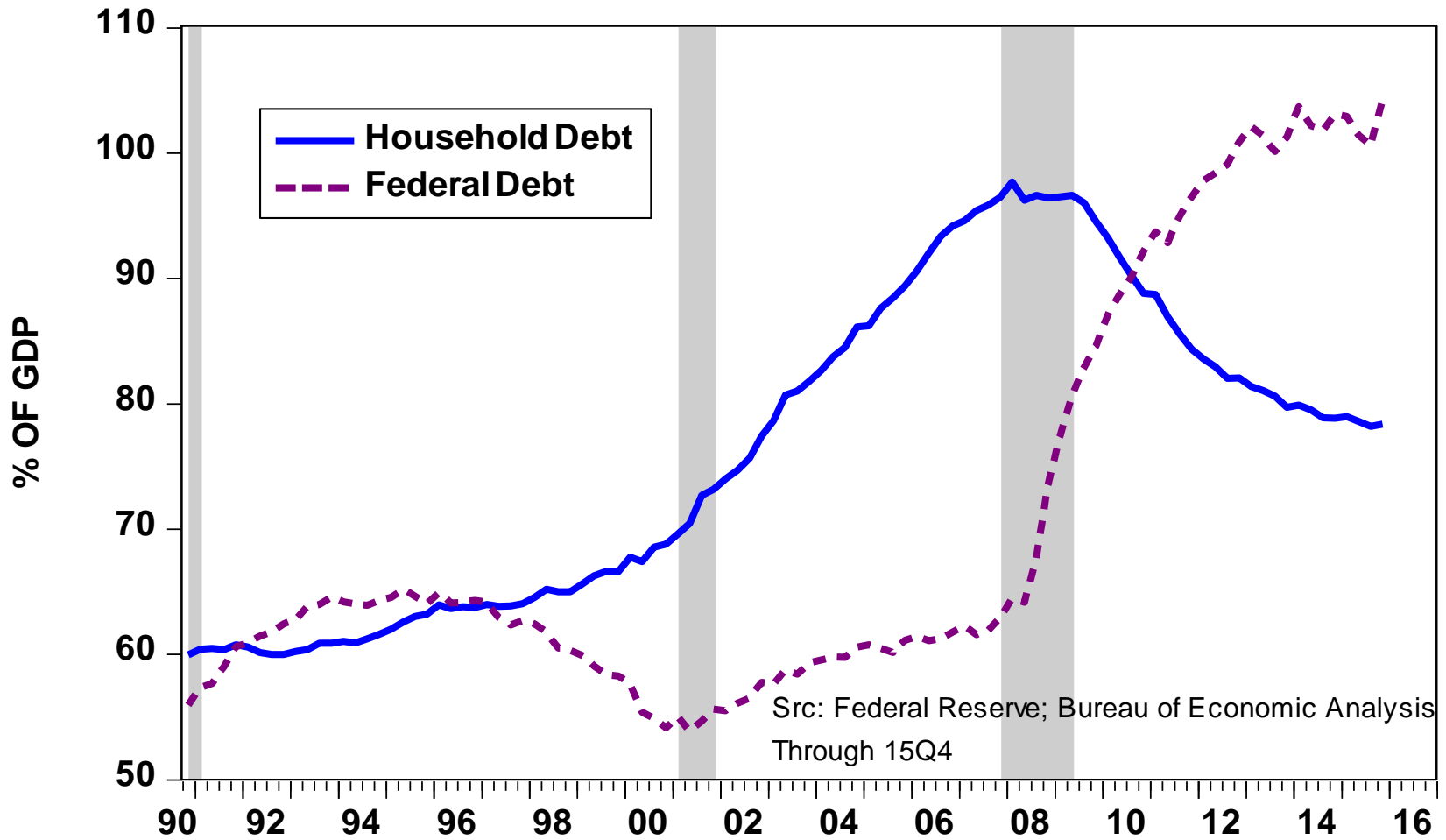


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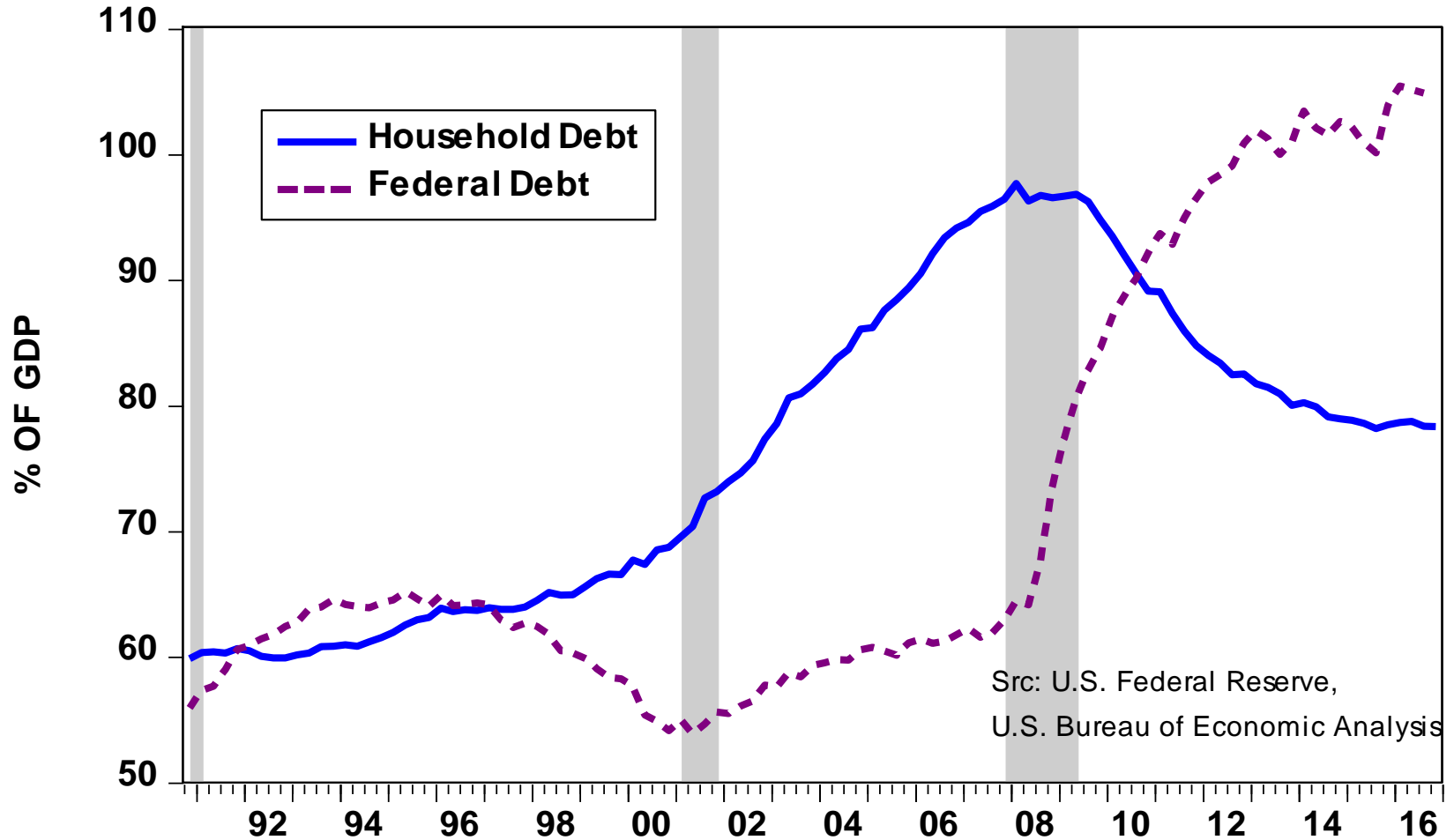


# U.S. Household Debt Drops as Government Rises



Src: Federal Reserve; Bureau of Economic Analysis  
Through 15Q4

# U.S. Household Debt Drops as Government Rises



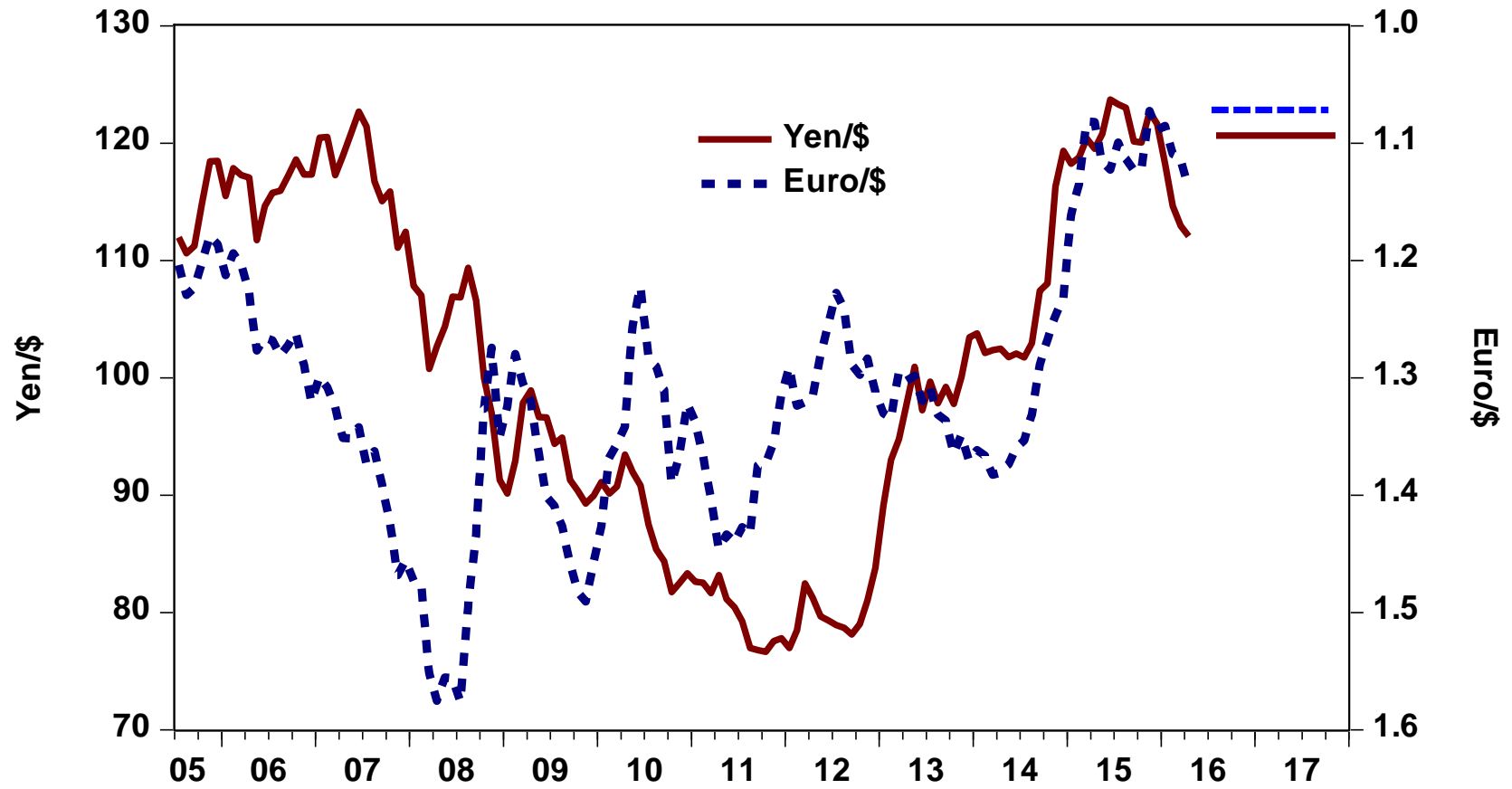
Src: U.S. Federal Reserve,  
U.S. Bureau of Economic Analysis



# Recent Dollar Retreat Expected to Reverse

*U.S. Interest rates are rising, key trading partners (Europe, China, Japan) are keeping rates steady or cutting: capital will flow to U.S., pushing dollar stronger*

### Dollar Strong VS Yen and Euro



SPCC  
April 2016