



BAUER
COLLEGE OF BUSINESS
UNIVERSITY of HOUSTON

**INSTITUTE FOR
REGIONAL FORECASTING**

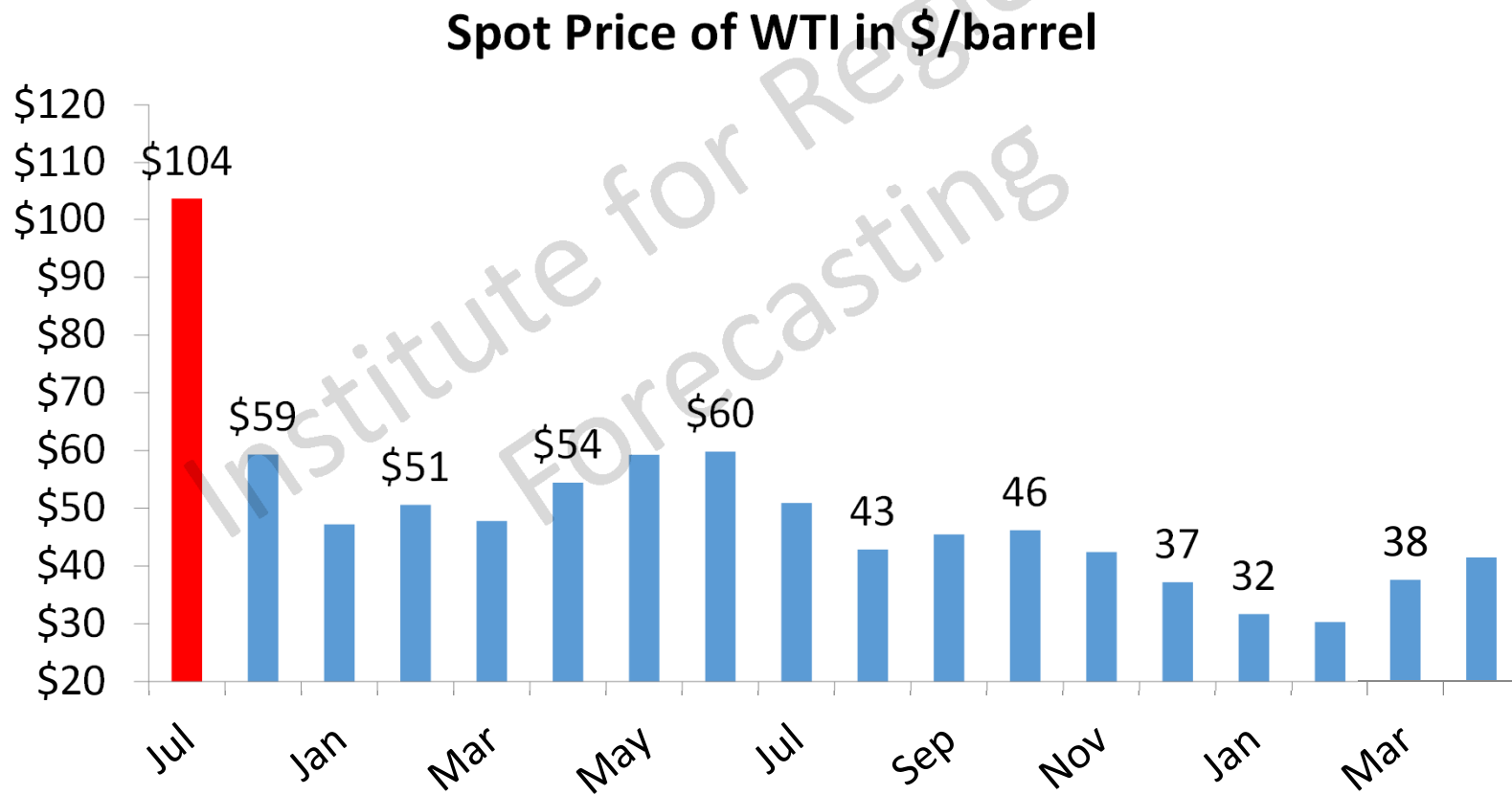
**Houston Absorbs the Big Blow
from Oil in 2015:
*Who Shares the Pain in 2016?***

Robert W. Gilmer, Ph.D.
C.T. Bauer College of Business
May 17, 2016

Overview of the Houston Economy

- We just finished what may be the worst quarter ever for American oil, and the drilling rout continues. In important ways the drilling downturn is worse than 1982-87.
- As a result, any recovery in oil markets and in the Houston economy will begin from a lower point and start later than previously anticipated.
- If we want to avoid significant job losses in Houston, it is growing late. Oil prices must stabilize soon. This year will probably see small job losses, where we previously forecast small gains.
- But in 2017, eastside petrochemical construction winds down rapidly. If upstream E&P is not back and hiring again, the downstream construction layoffs will bring a growing chance of moderate 2017 recession. Job losses of one or two percent become more probable.

Oil Makes the Difference in Houston



*Through May 4, 2016

How Did 2015 Turn Out? Very Slow, But No Recession ... So Far

	December to December Changes	
	Jobs	Change
2012	118,600	4.3%
2013	89,800	3.2%
2014	117,800	4.0%
2015	15,200	0.8%
Spring 2015 Forecast	12,900	0.5%

Texas Workforce Commission, seasonal adjustment by IRF

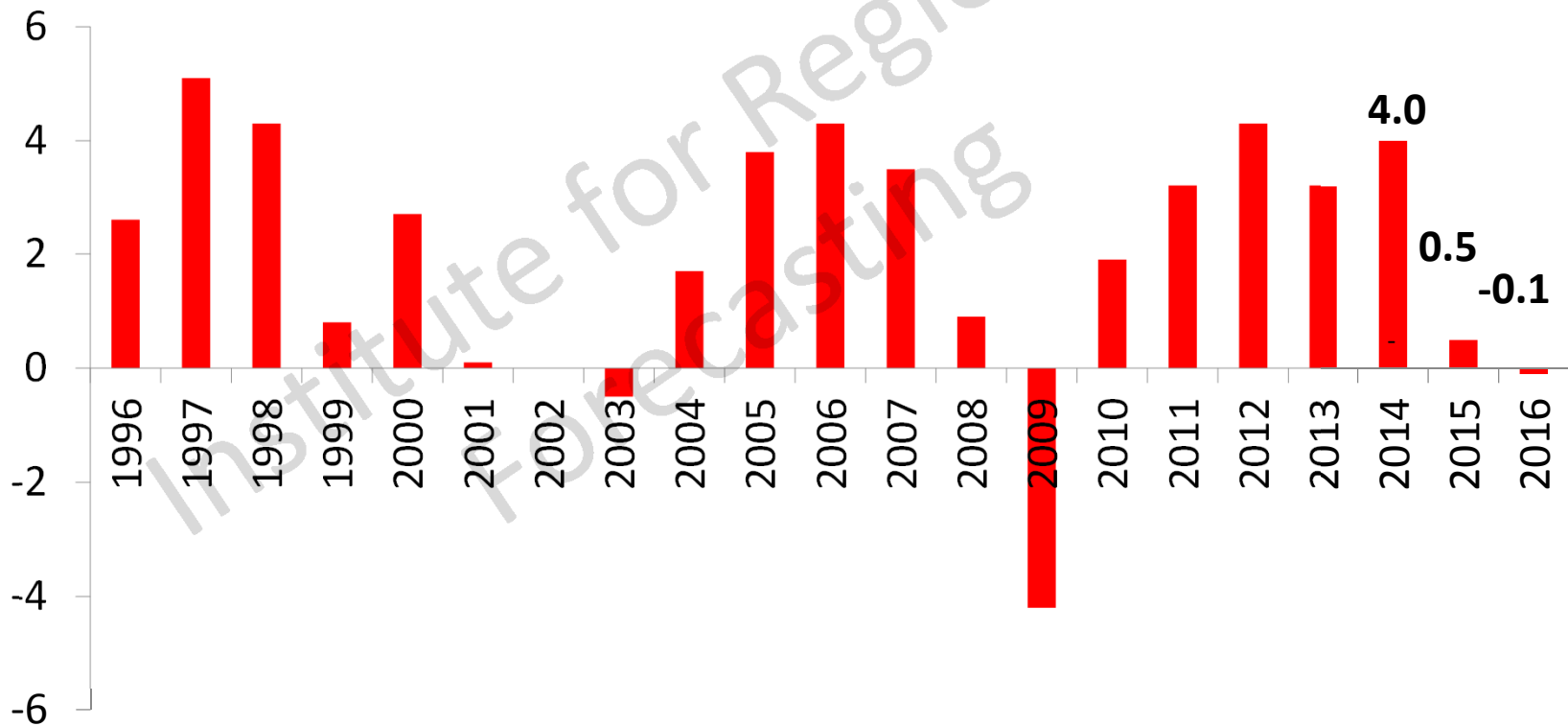
Job Losses Are Driven By Energy

(Net Change in Jobs)

Sector	Since Oil Bust Began Dec 14 – Mar 16		So far in 2016 Dec 15- Mar 16	
	New Jobs	Percent	New Jobs	Percent
Total Payroll	10,300	0.4%	-4,400	-0.1%
Mining	-19,200	-17.3%	-1,600	-1.7%
Construction	4,200	2.0%	-8,300	-3.7%
Manufacturing	-25,500	-9.8%	-1,700	-0.7%
Machinery	-13,500	-20.5%	-1,700	-2.8%
Fab Metal	-13,000	-21.6%	-2,900	-5.3%
Wholesale Trade	-1,400	-0.8%	-1,300	-0.1%
Prof/Buss Services	-12,500	-2.6%	-5,800	-1.2%

Job gains of 38,550? Concentrated in Healthcare, Leisure and Hospitality, Retail Trade, and Local Government

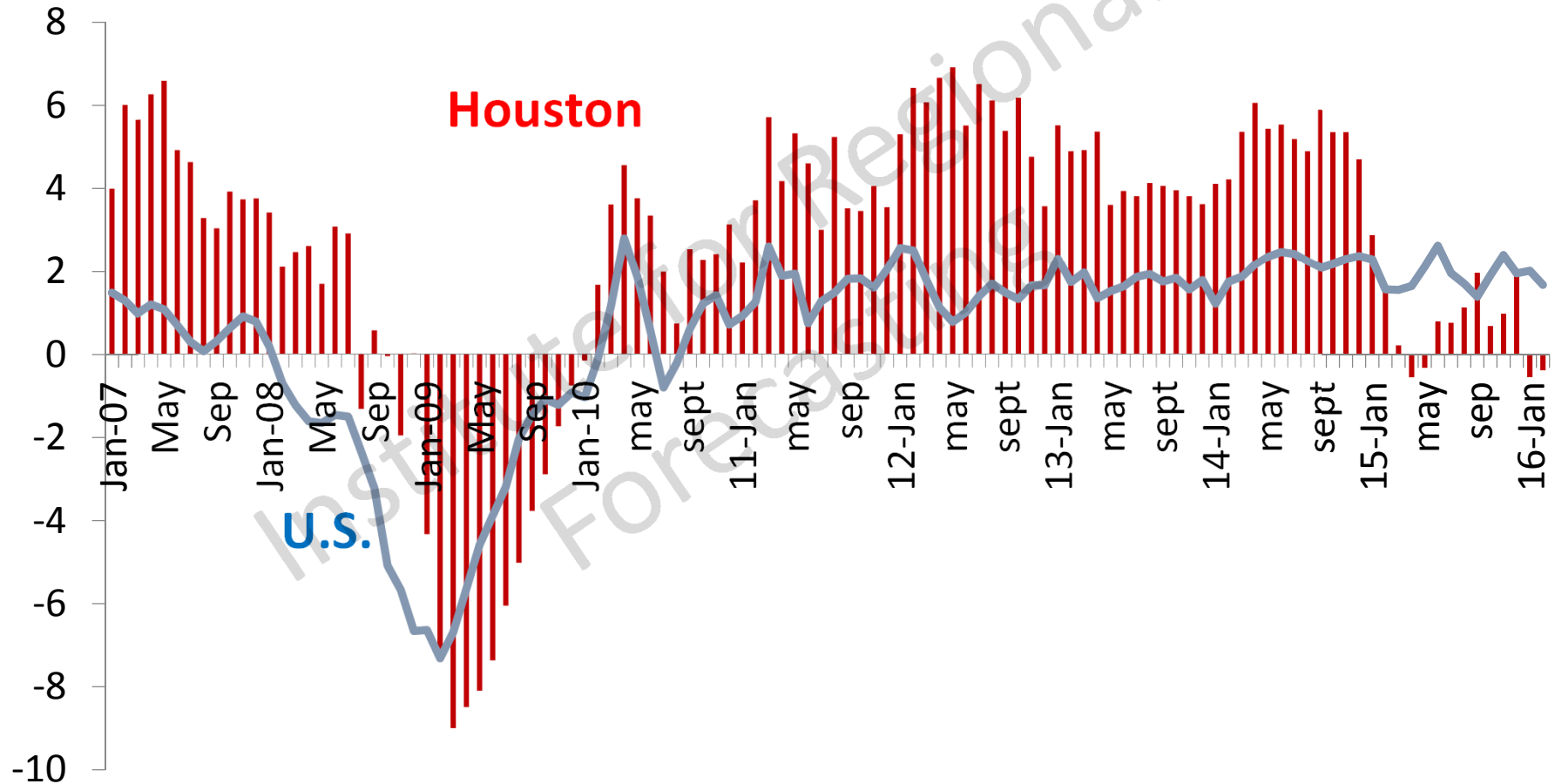
Houston Employment: Percent Change By Year



Note: December to December changes, except 2016 which is year-to-date, annualized and seasonally adjusted

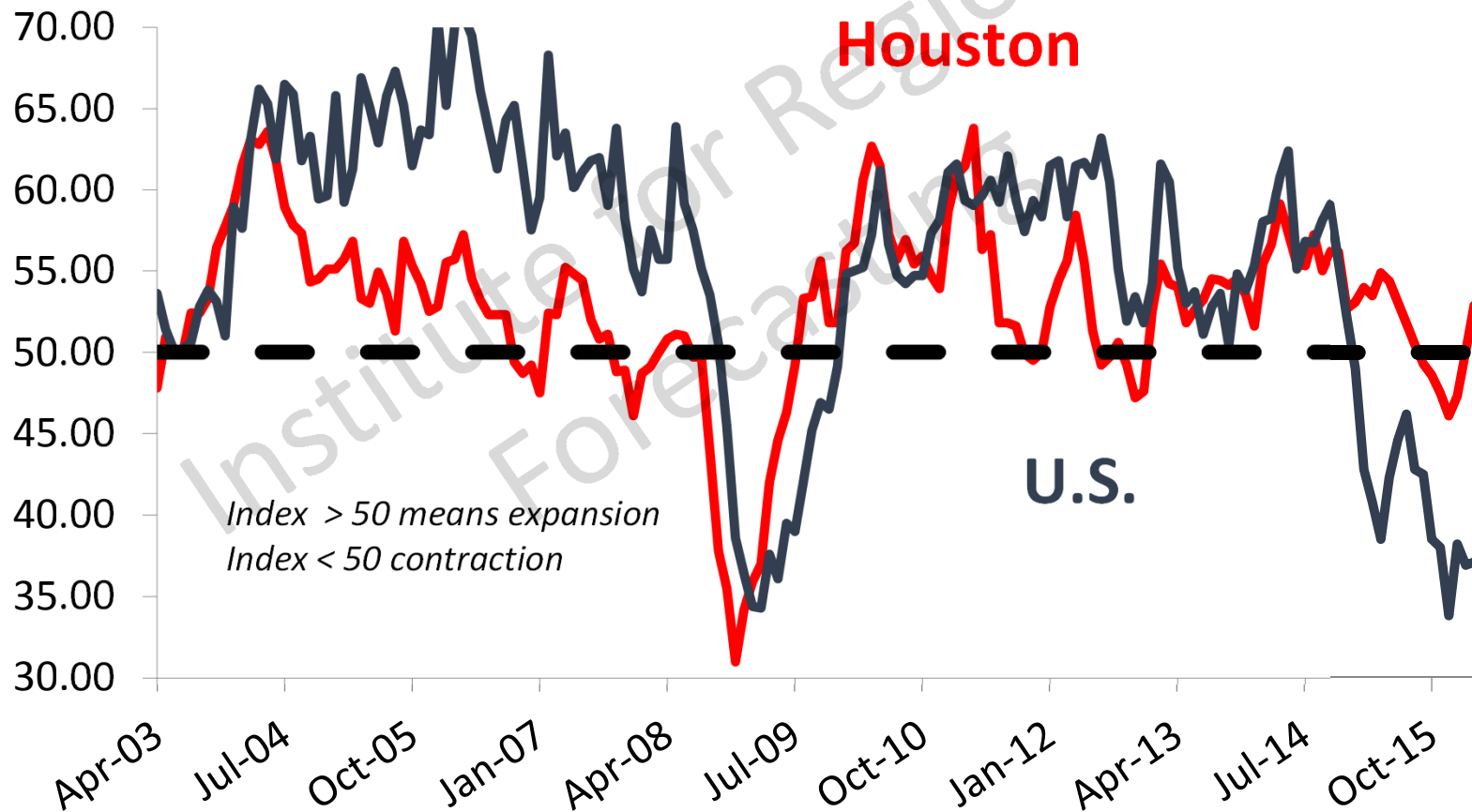
Houston's Job Growth Machine Broke Down in Early 2015

(3-month percent change at annual rates)



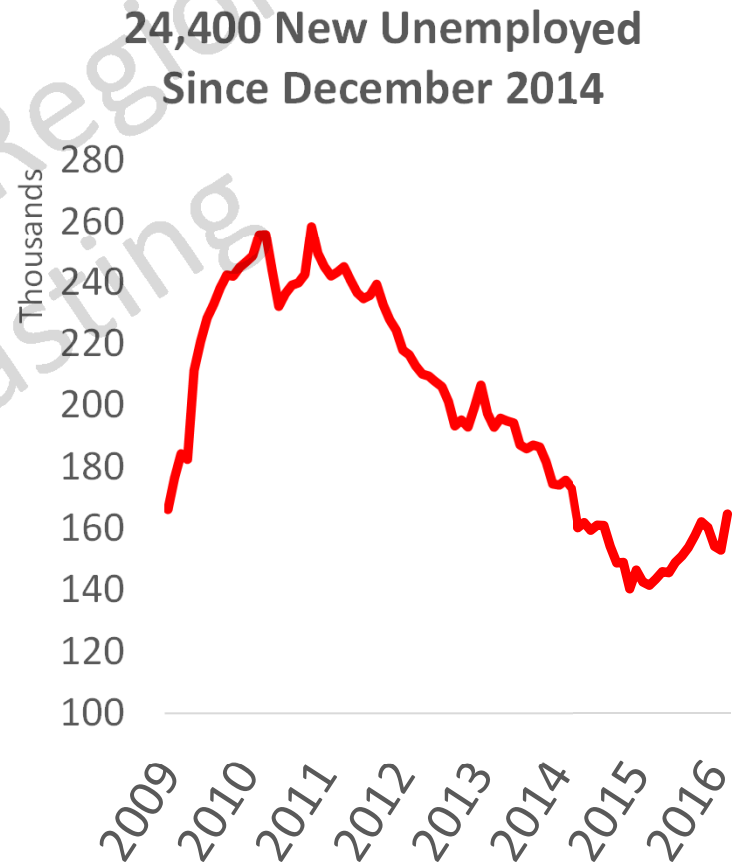
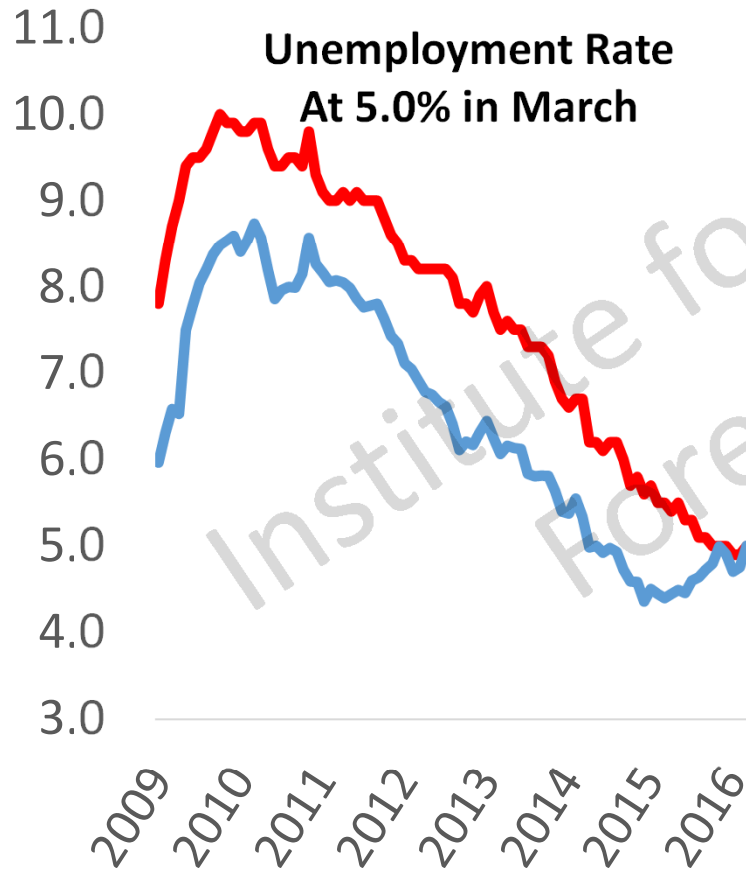
Texas Workforce Commission and Bureau of Labor Statistics

Purchasing Managers' Index U.S. and Houston Compared (s.a.)



Houston Unemployment Now Rising

(percent unemployed, s.a.)



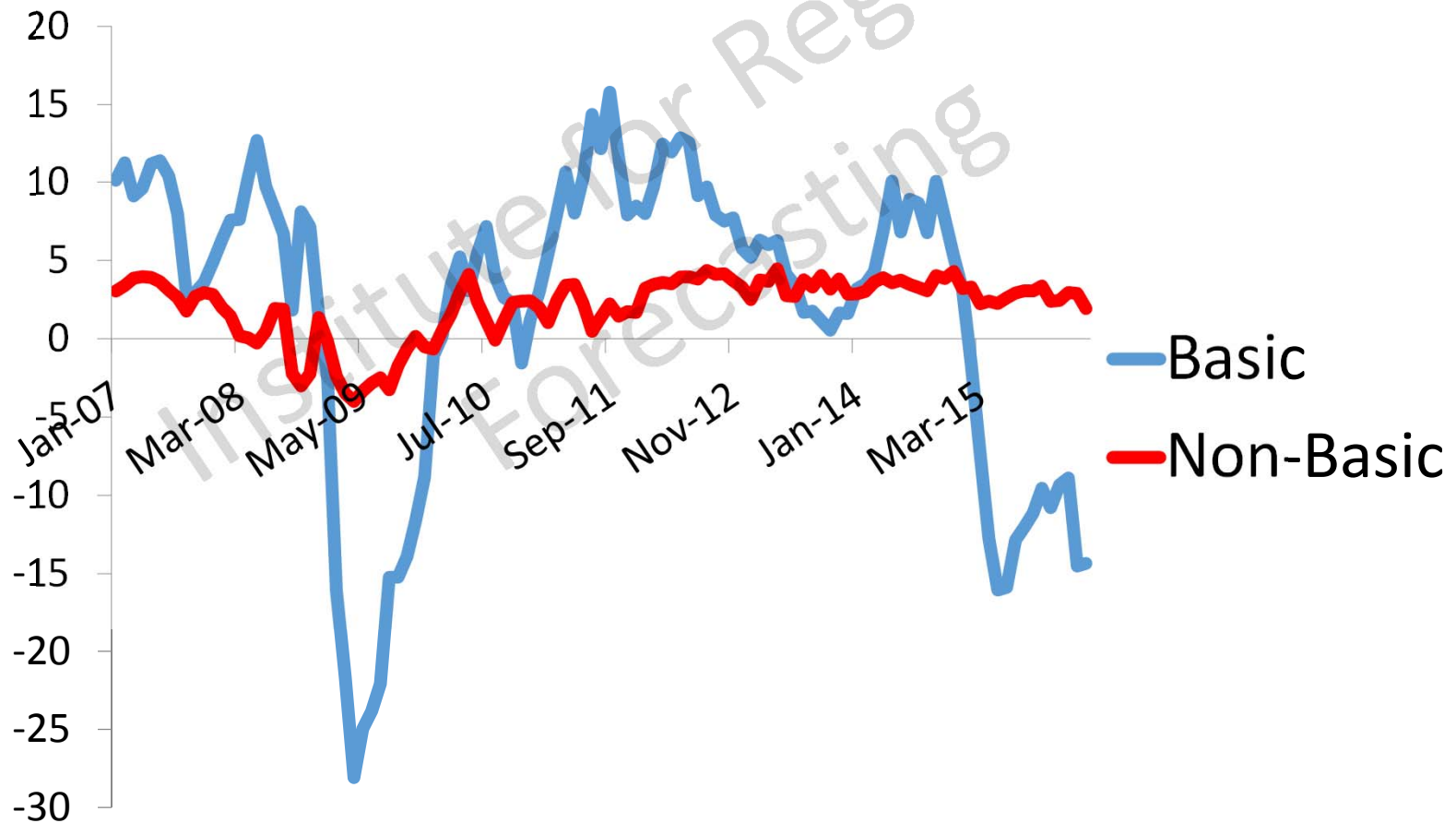
Bureau of Labor Statistics

How Are You Feeling?

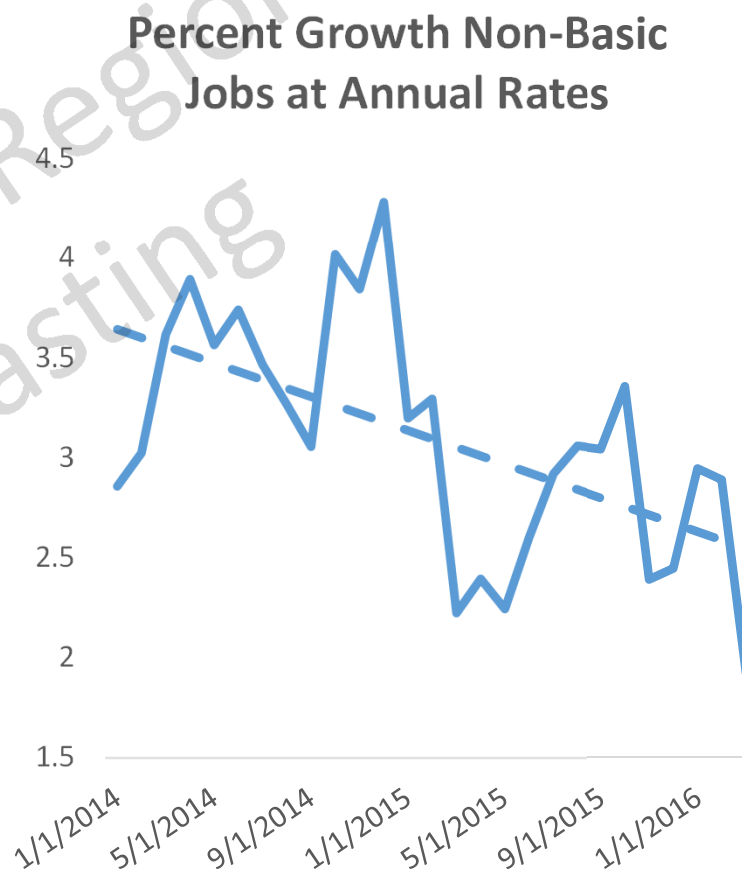
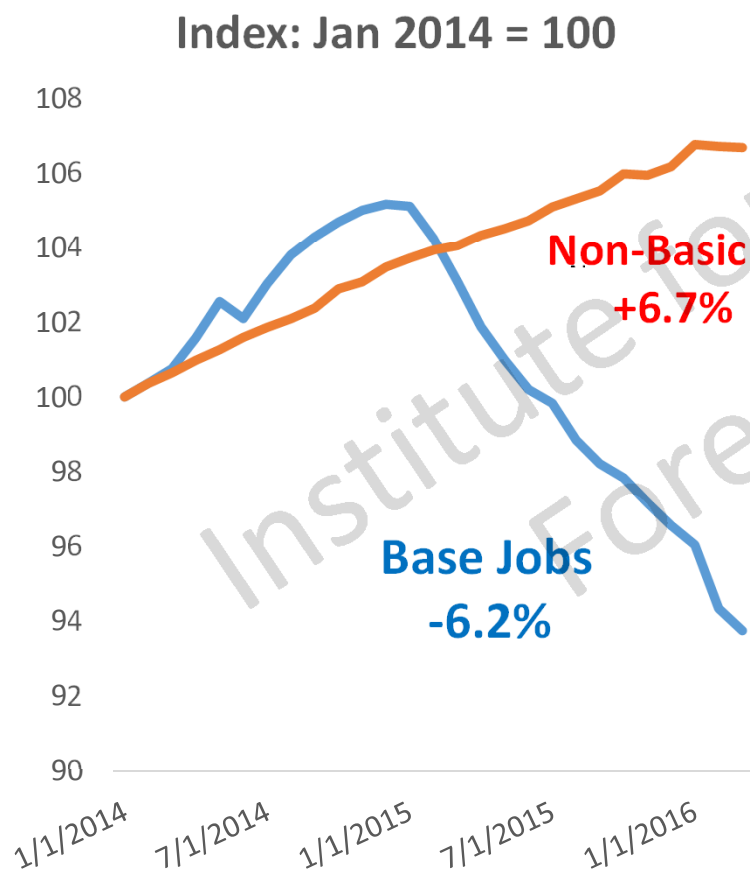
- Many sectors of Houston have not felt much pain from this downturn yet. What oil bust?
- How can this be?
 - Maybe they sell into strong national markets: United Airlines, Sysco, AIG, HP, ...
 - Maybe they live in East Houston
 - Maybe they are living off of past momentum. Houston added 680,000 jobs from 2004-2014
 - Population stays strong for usually stays strong for several quarters after job growth slows
 - Most damage has been confined to oil producers, oil services, and manufacturing ... so far
- BUT another slow year in Houston gives time for the slowdown to spread to many sectors that have felt immune so far – healthcare, retail, restaurants, real estate, leisure, and government

Basic Jobs Still In Reverse, Non-Basic Jobs Running Out of Momentum

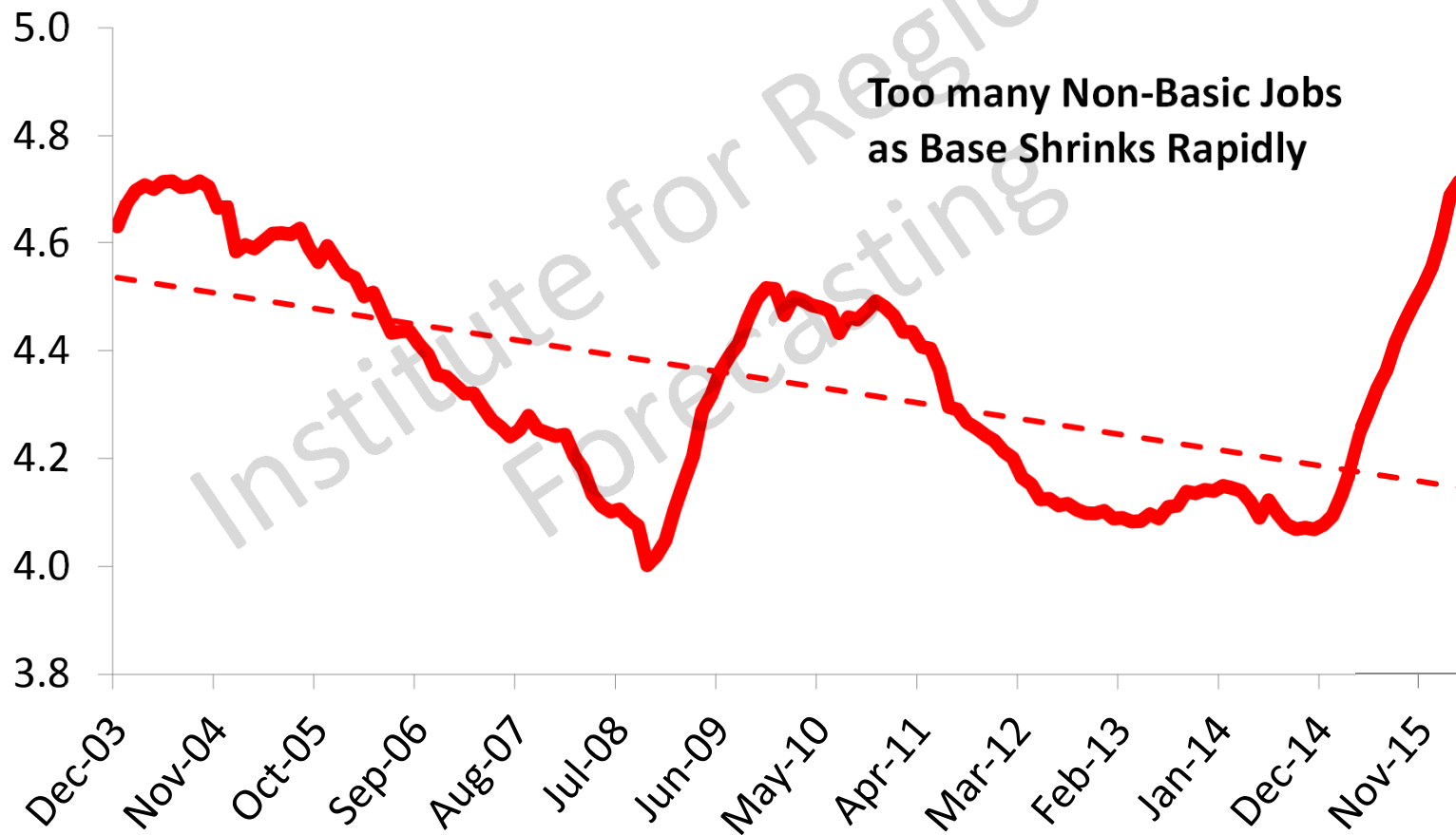
(3-mo percent change at annual rate)



Non-Basic Jobs Still Growing -- But the Rate Is Slowing



About Four Non-Basic Jobs in Houston Supported By Each Base Job



Oil Markets and Oil Price

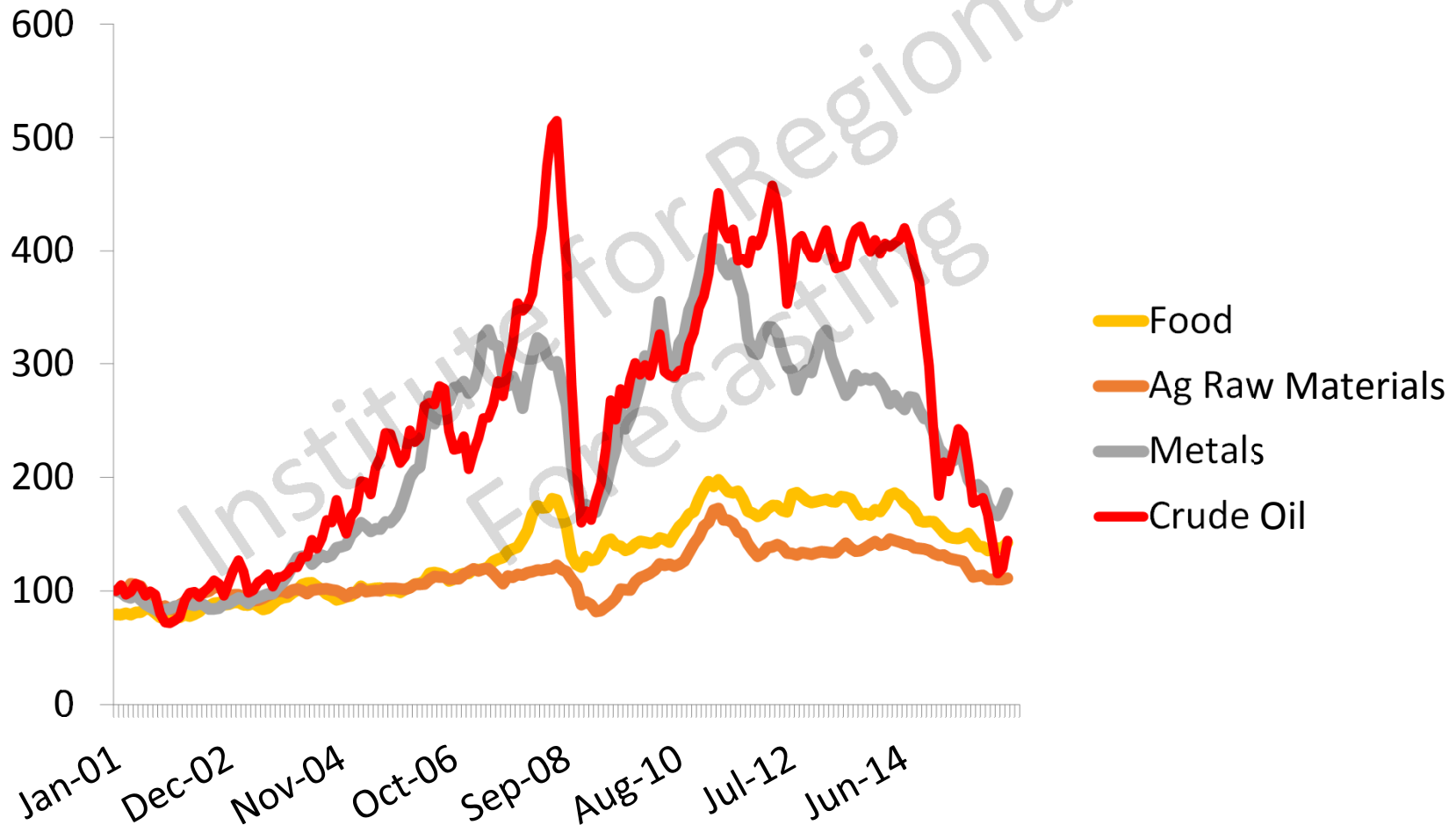


Where Did the Oil Bust Come From? How Did We Get Here?

- The Commodity Super Cycle Comes to an End
 - Oil, metals, food, agricultural raw materials see price soar after 2004 and stay high for a decade
 - Primarily driven by a surge in growth by emerging markets, especially China
 - \$100 oil was the market signal to expand capacity, and as the Super Cycle ended we returned to long-run price near \$65 last spring and early summer
- Overshoot \$60, and wind up below \$30 per barrel?
 - In July, the Iran Nuclear Agreement is signed and promises a return of quick 1.2 million bbl/d to export markets
 - The August devaluation of the Chinese Yuan distills concerns about China into fear about how bad things *might* be
- The last quarter was brutal for U.S. oil, with drilling falling to record lows week after week.

Is the Commodity Super-Cycle Over?

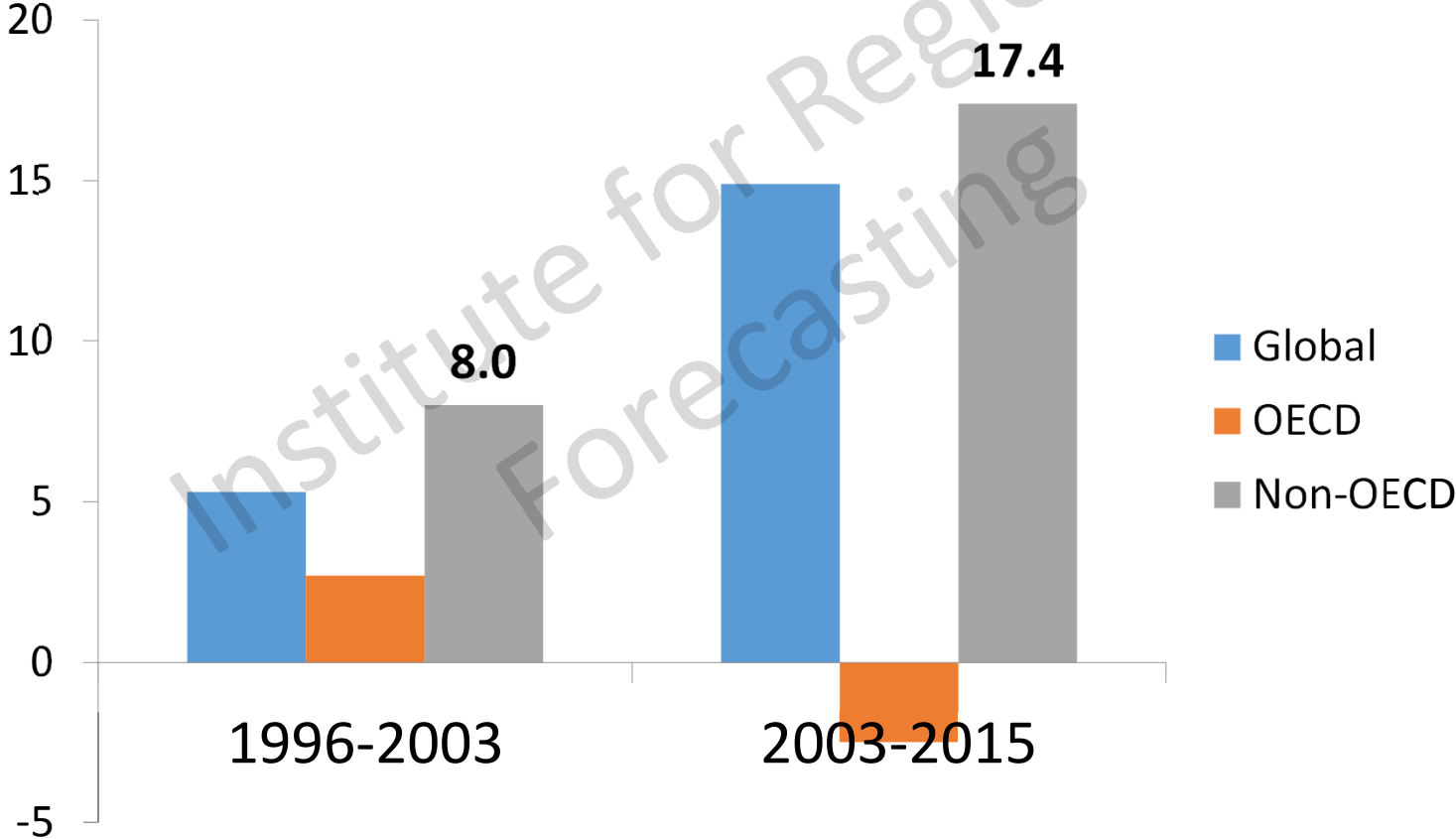
(price index: Jan 2001 = 100)



International Monetary Fund

Growth in the Demand for Oil Comes From Emerging Markets

(million b/d)



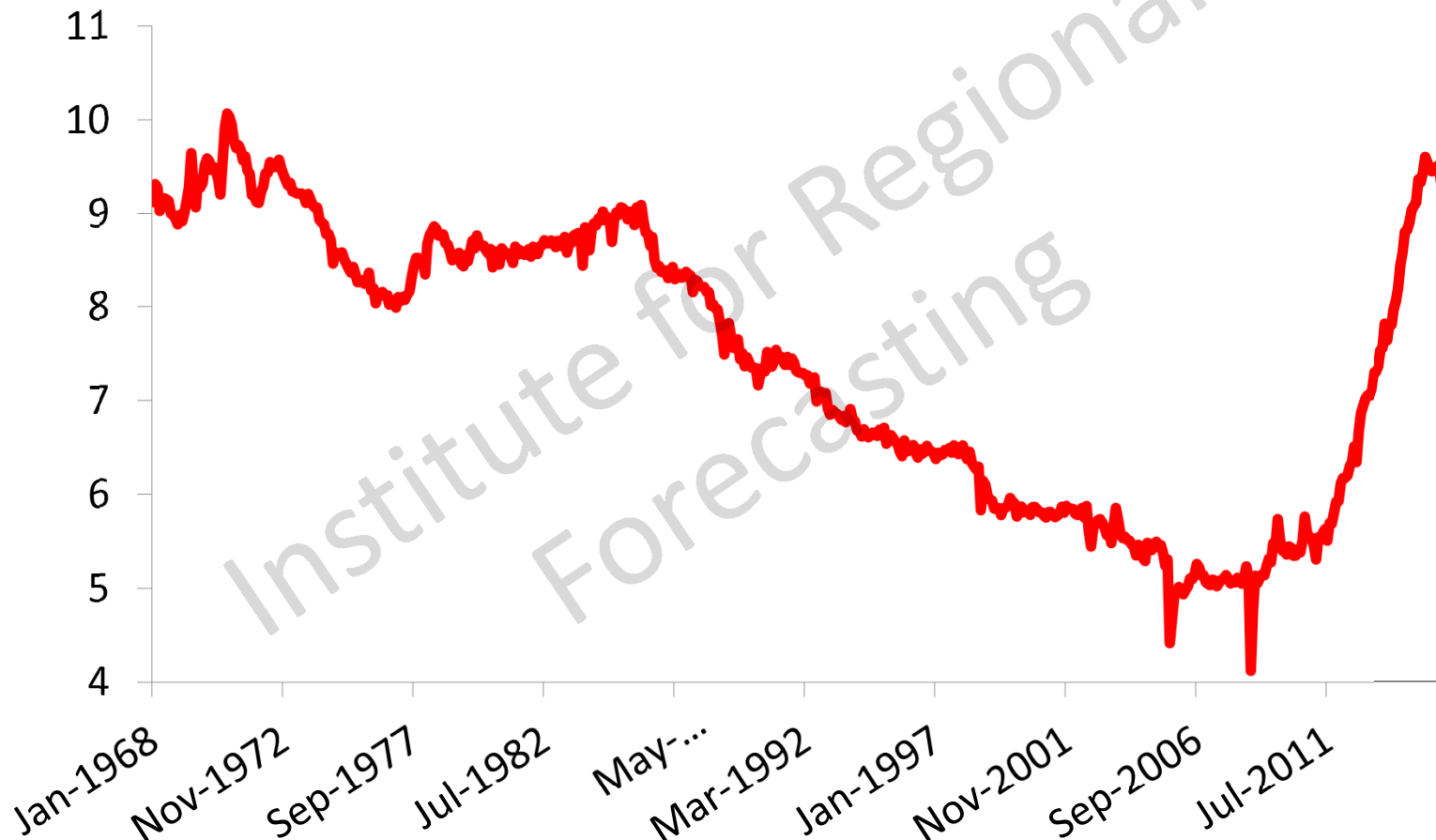
Global Growth Sluggish In 2015-16

(% GDP Growth)

	2013	2014	2015	2016	2017
World	3.3	3.4	3.1	3.2	3.5
U.S.	1.5	2.4	2.4	2.4	2.5
Euro Area	-0.3	0.9	1.6	1.5	1.6
Japan	1.6	0.0	0.5	0.5	-0.1
	---	---			
China	7.7	7.3	6.9	6.5	6.2
India	6.9	7.3	7.3	7.5	7.5
Brazil	2.7	0.1	-3.8	-3.8	0.0

Source: IMF *World Economic Outlook*: April, 2016

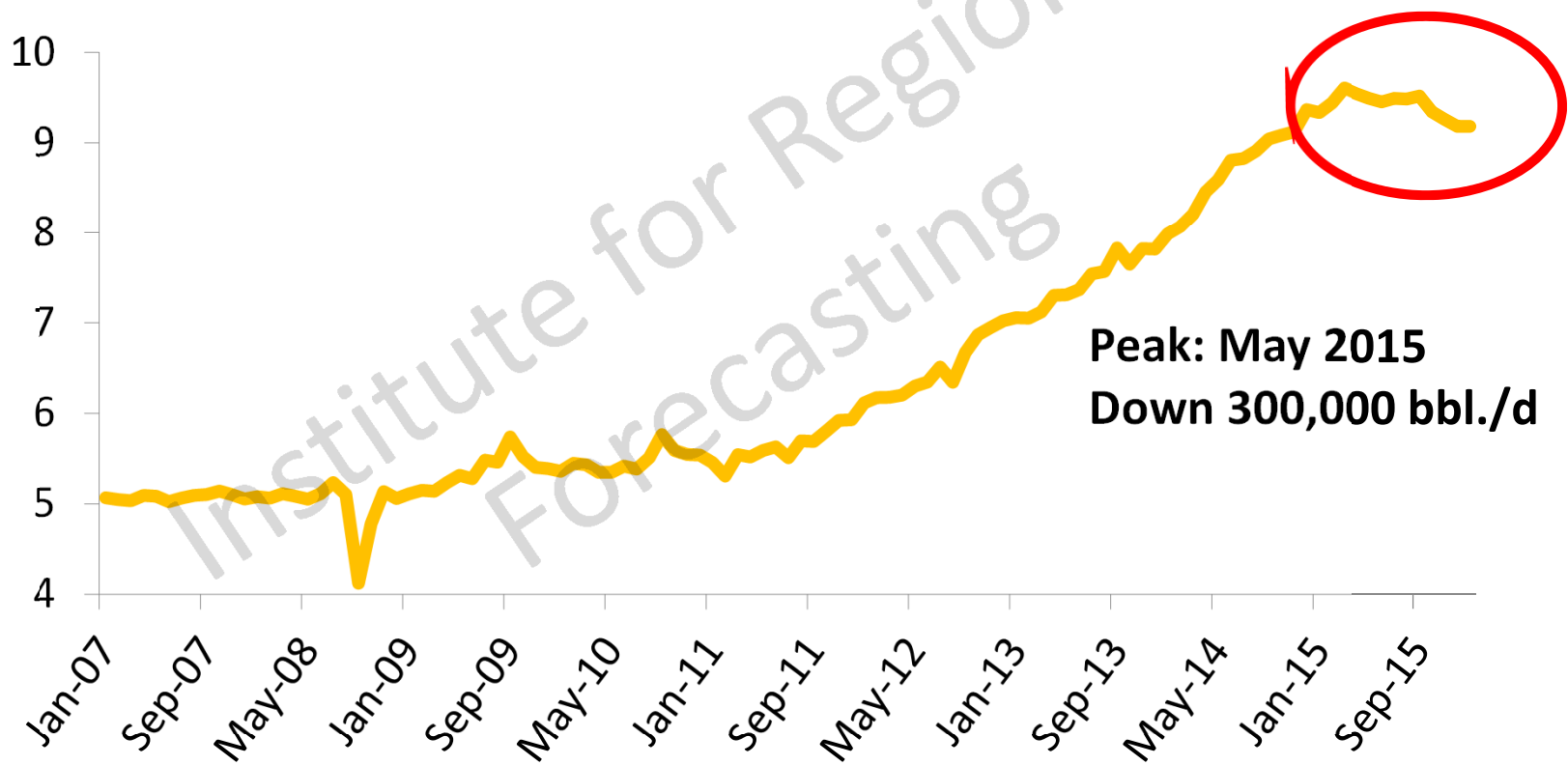
On Supply Side? U.S. Shale Reversed 40 Years of Declining Oil Production (million barrels/day)



DOE/EIA, Seasonally adjusted by IRF

U.S. Oil Production Finally Slowing

Million bbl/day, s.a. data



Peak: May 2015
Down 300,000 bbl./d

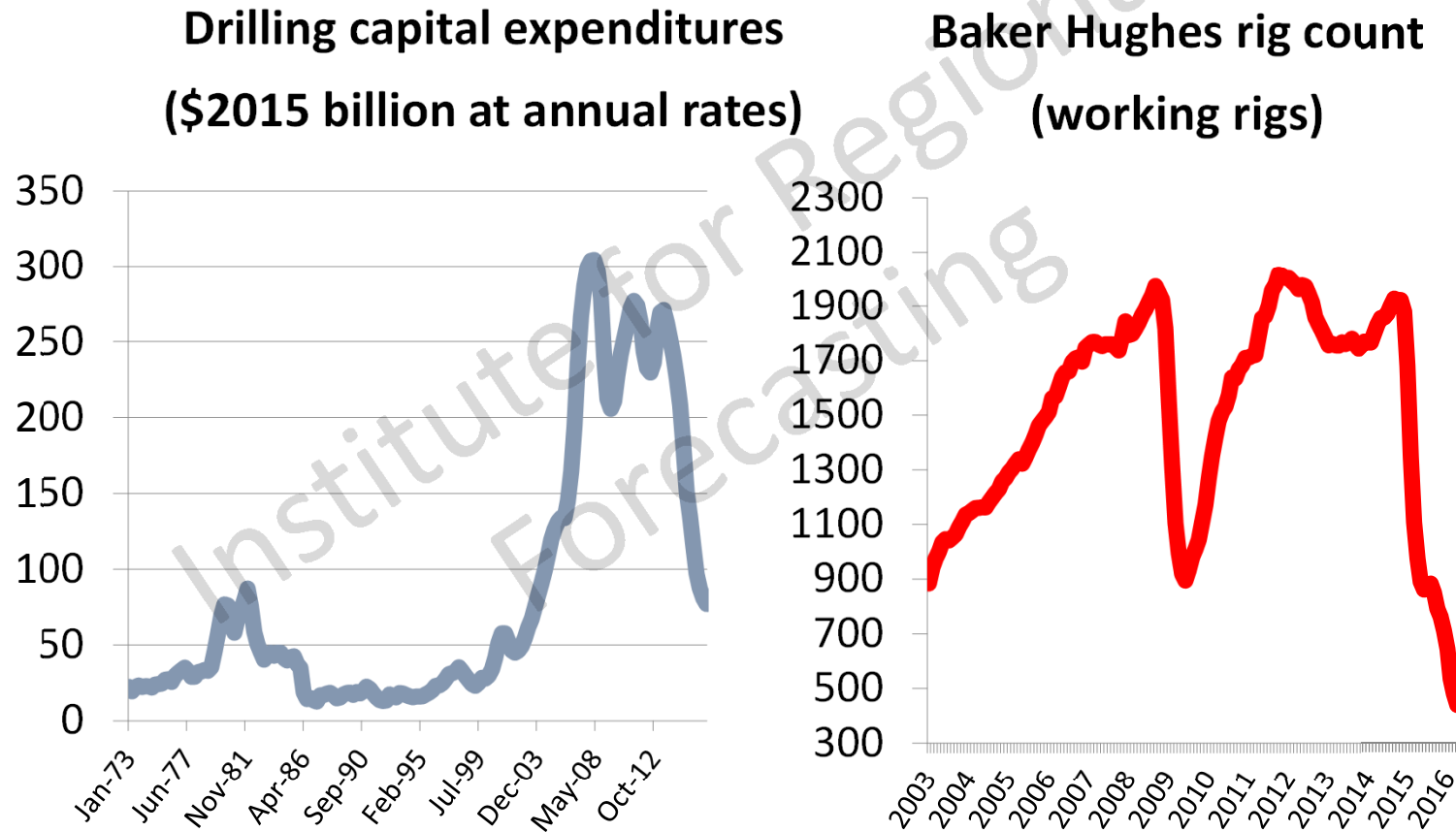
DOE/EIA, seasonally adjusted by IRF

The Saudi Revenue Dilemma

- Raise price/lose market share **OR** cut price/keep market share
 - *Implement lessons learned the hard way from 1980's*
 - *Force U.S. shale into the role of the swing producer*
 - *Defend their market share, not the price*
- Mix in an aggressive and powerful new crown prince, Sunni-Shiite politics, and a healthy dose of Saudi paranoia about their future.



The Greatest Oil Boom Is Over ... Now Time for Recovery?



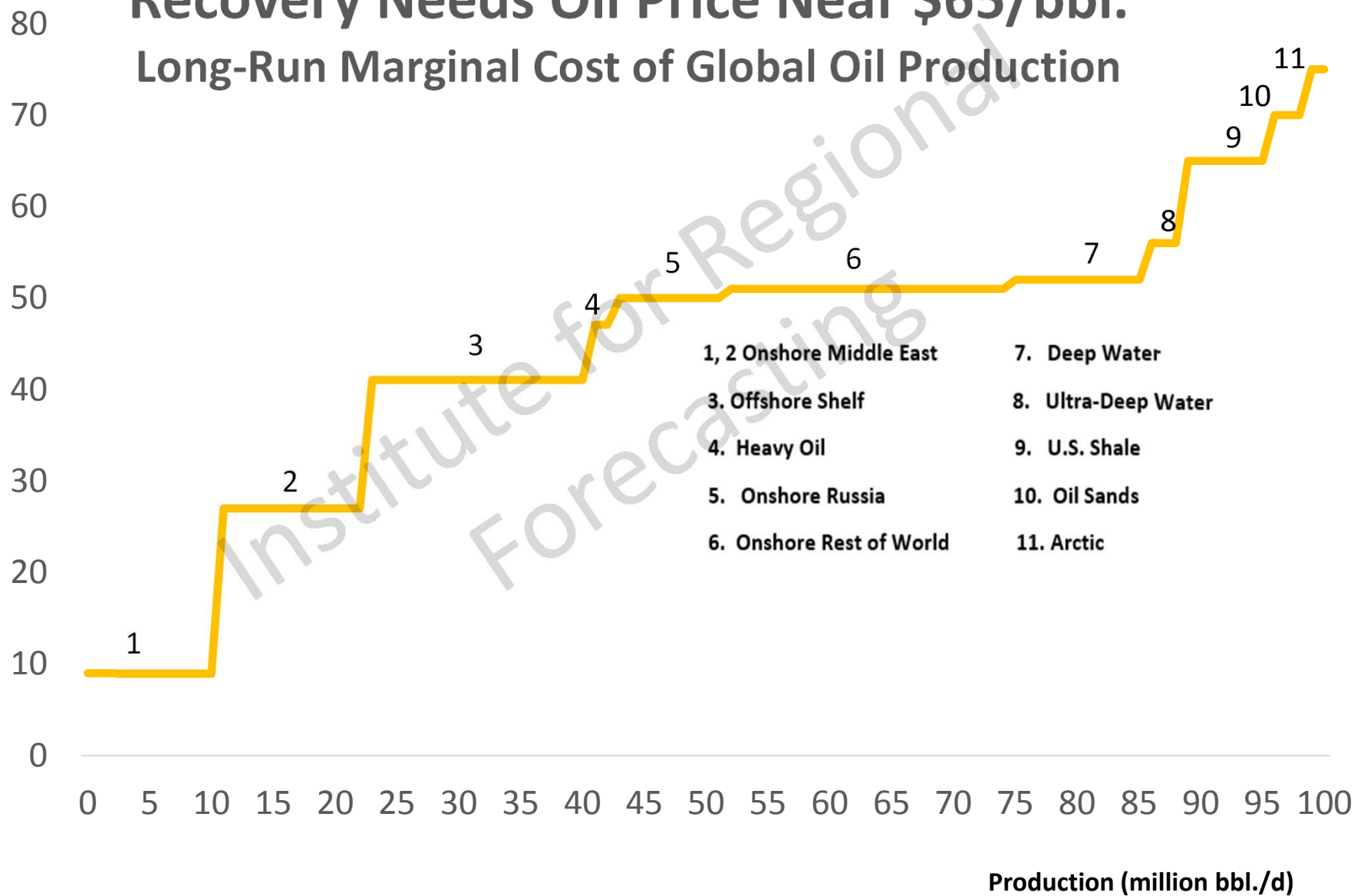
Capital expenditures for E&P from Oil and Gas Journal, calculations of IRF

Thinking About Recovery In the Oil Patch



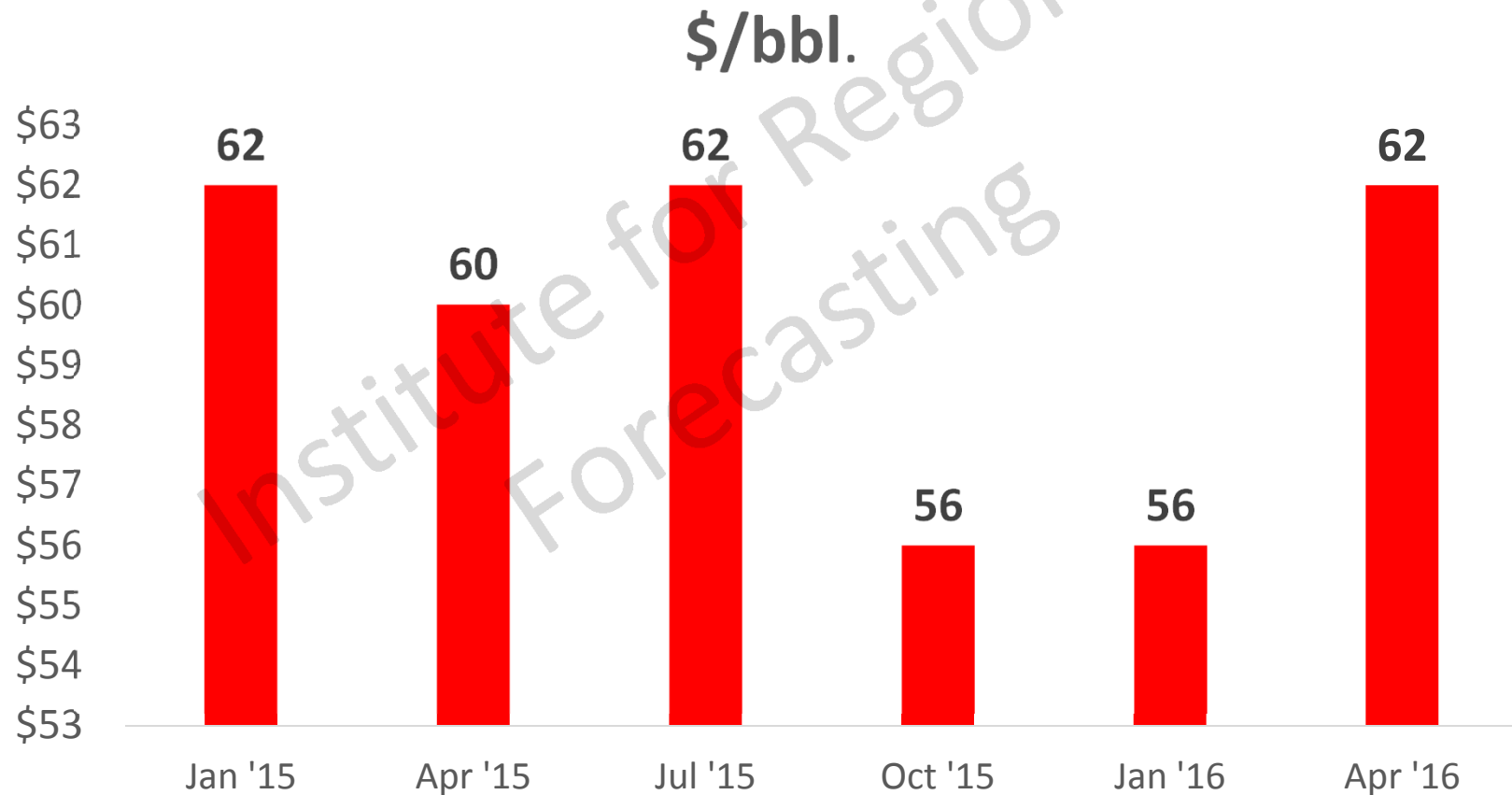
\$/bbl.

Recovery Needs Oil Price Near \$65/bbl. Long-Run Marginal Cost of Global Oil Production



Production (million bbl./d)

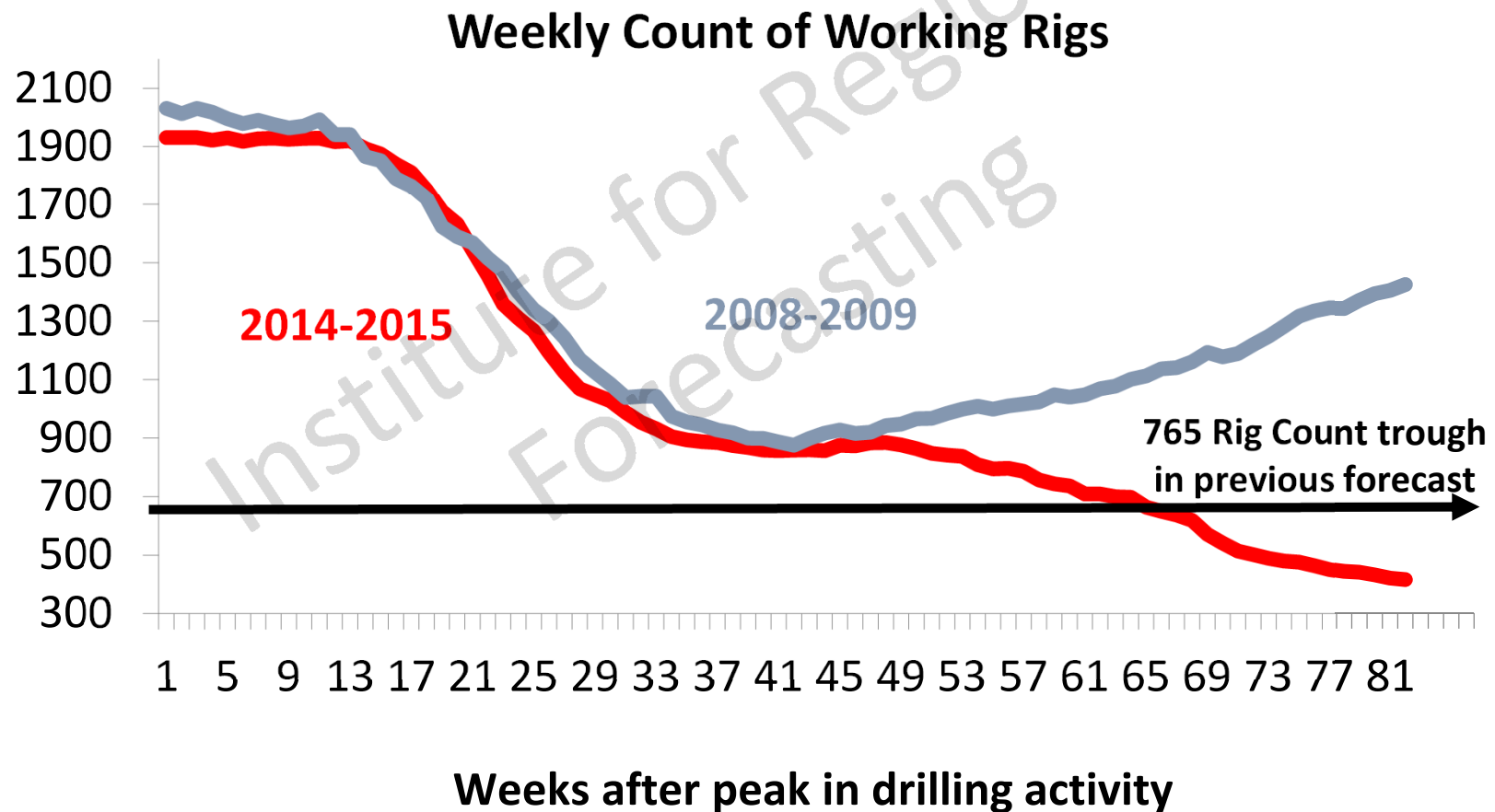
Price of WTI Oil As Implied by Valuation of the Stock of 40 Producers



Goldman Sachs Research, at first week of each quarter

Where the Prior Forecast Went Wrong

We Still Are Looking for the Trough in U.S. Drilling Activity

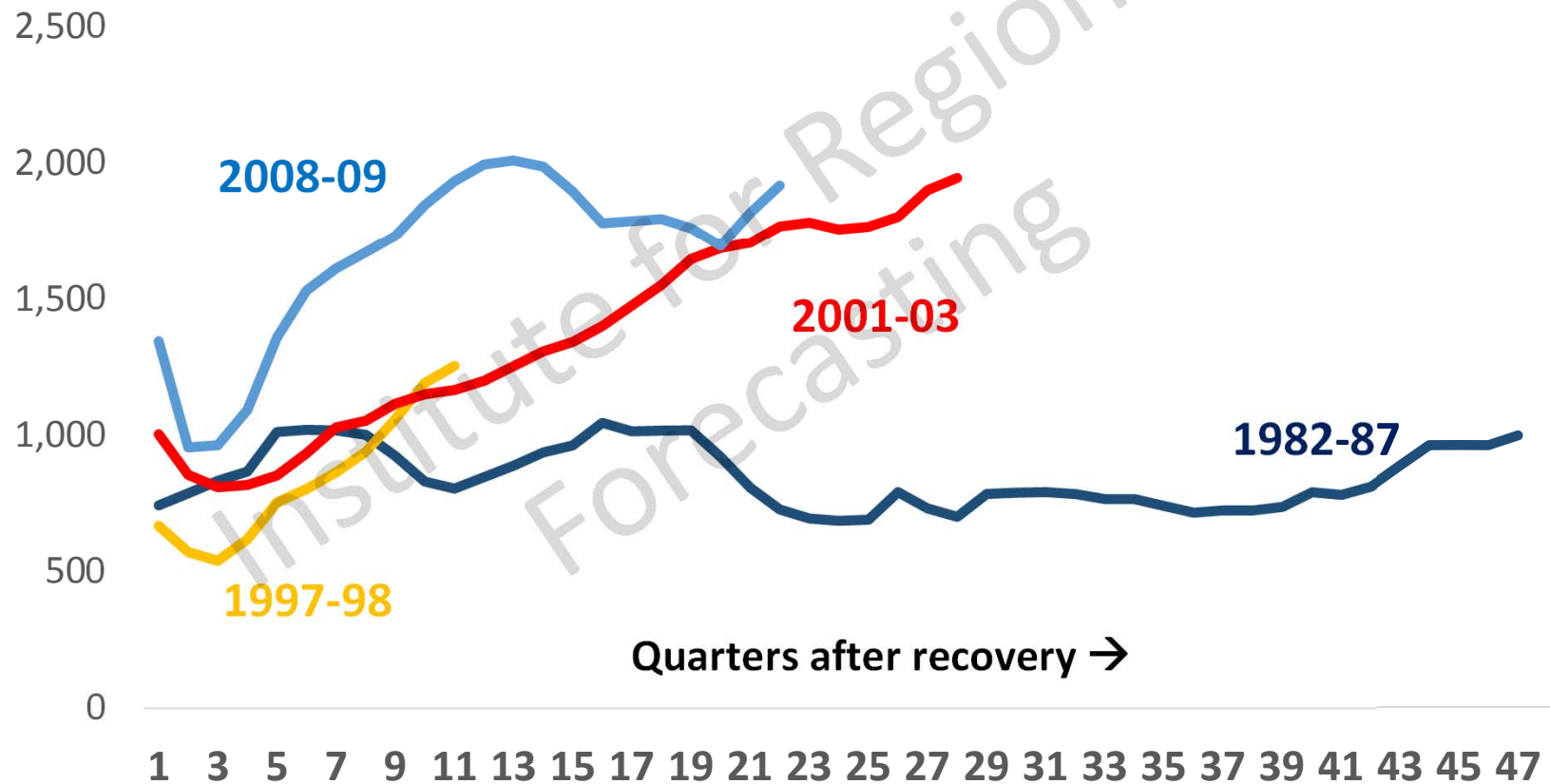


Three Scenarios for Recovery in Oil

- When will oil prices hit bottom?
- When will the rig count turn up?
- When do energy jobs begin to come back?
- How high will the rig count go in this recovery?
- How long before the rig count reaches these highs?

Recovery in Rig Count After Oil Market Improves

(working rigs by quarter after oil prices begin to rise, s.a.)



Baker Hughes, calculations of IRF

Drilling Recovery After the Price of Oil Hits a Low

Quarters Until:	Past Recoveries				Forecast		
	1982-87	1997-98	2001-03	2008-09	High	Medium	Low
Rig Count Bottoms Out	0	2	2	1	2	2	3
Energy Jobs Make a Low	2	4	4	3	5	6	7
Prior High Rig Count	never	8	8	11	10	11	12

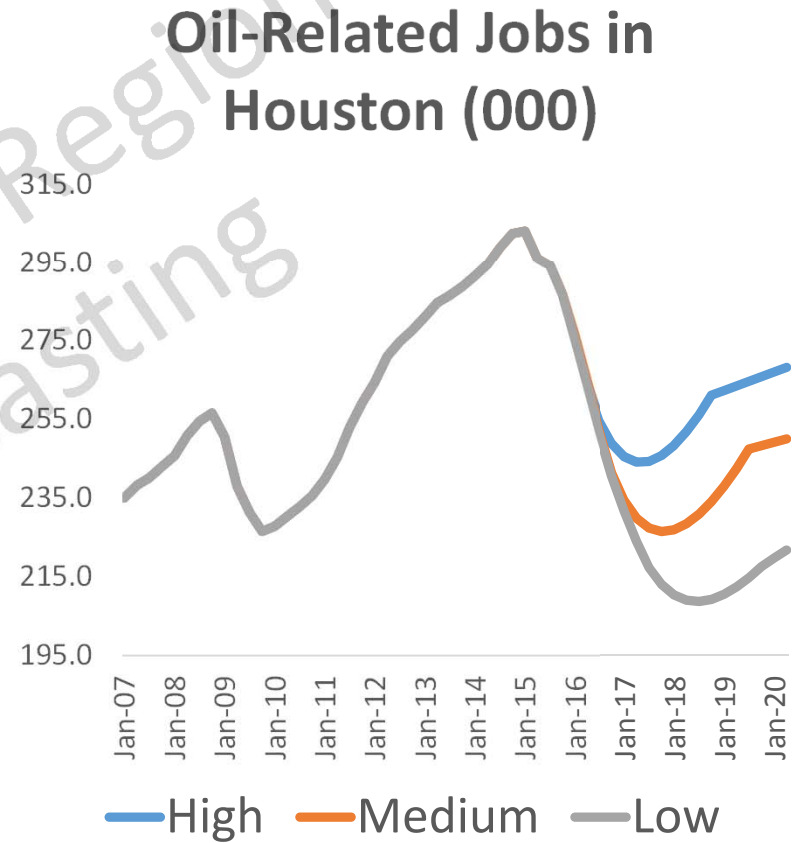
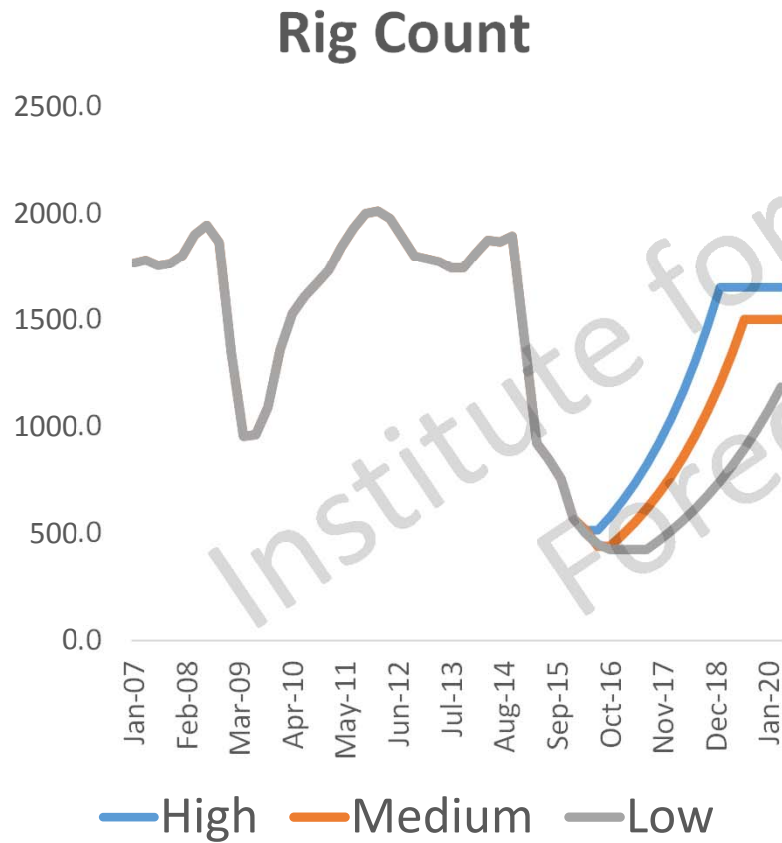
Note: For the high, medium and low forecasts, it is assumed that the rig count returns to 1650, 1500, and 1300, respectively.

Other Key Assumptions

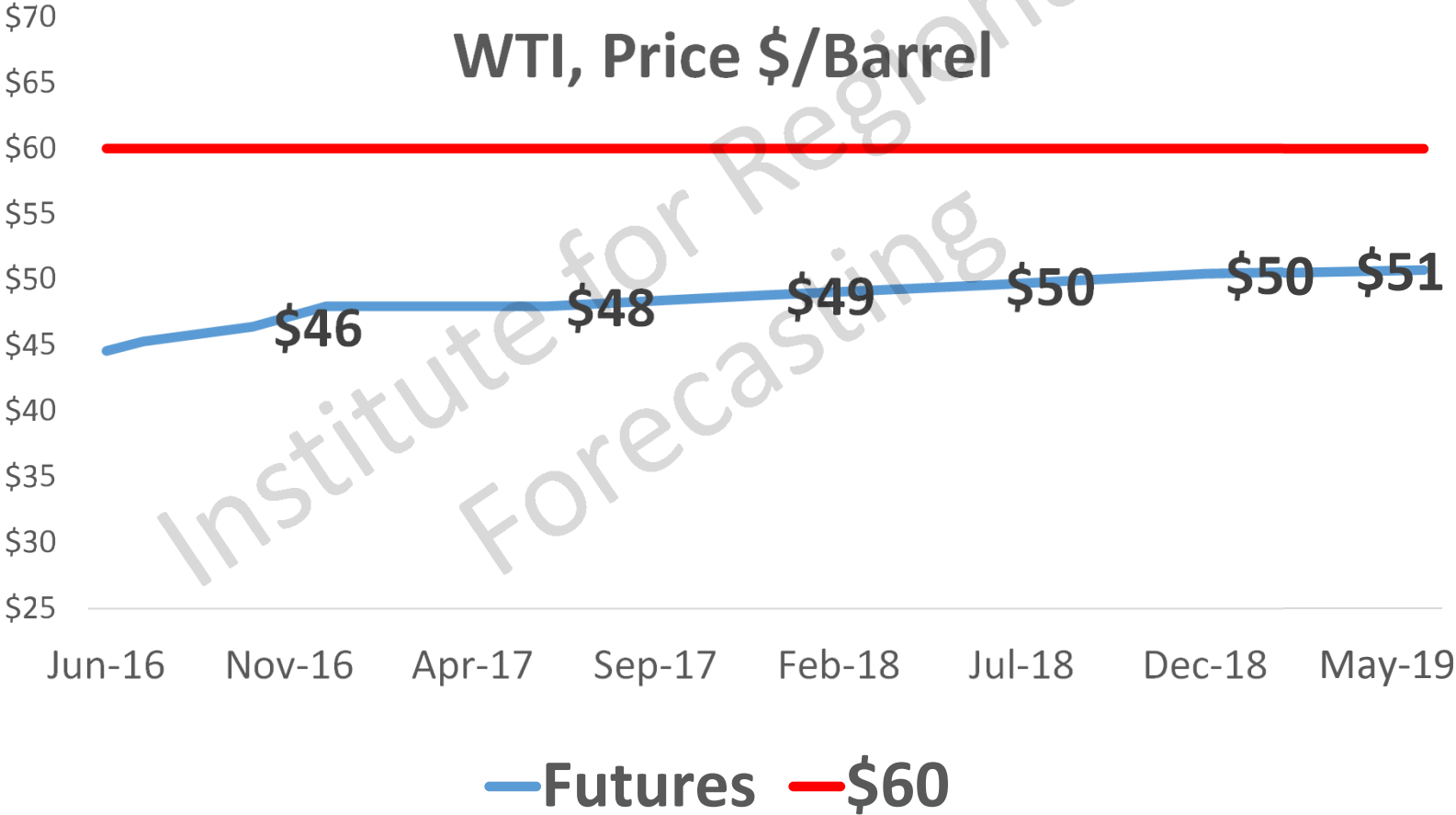
- **Oil Price Bottoms Out?**
 - High Scenario: 2016 Q1
 - Medium Scenario: 2016 Q2
 - Low Scenario 2016Q4
- **Rig Count Max After Recovery?**
 - High Scenario: 1650
 - Medium Scenario: 1500
 - Low Scenario: 1300
- **Return of Energy Jobs**
 - Follow the rig count
 - Allow for complexity of fracking, productivity trends
 - Never returns to previous highs in any scenario



Rig Count Scenarios and the Return of Oil Employment in Houston

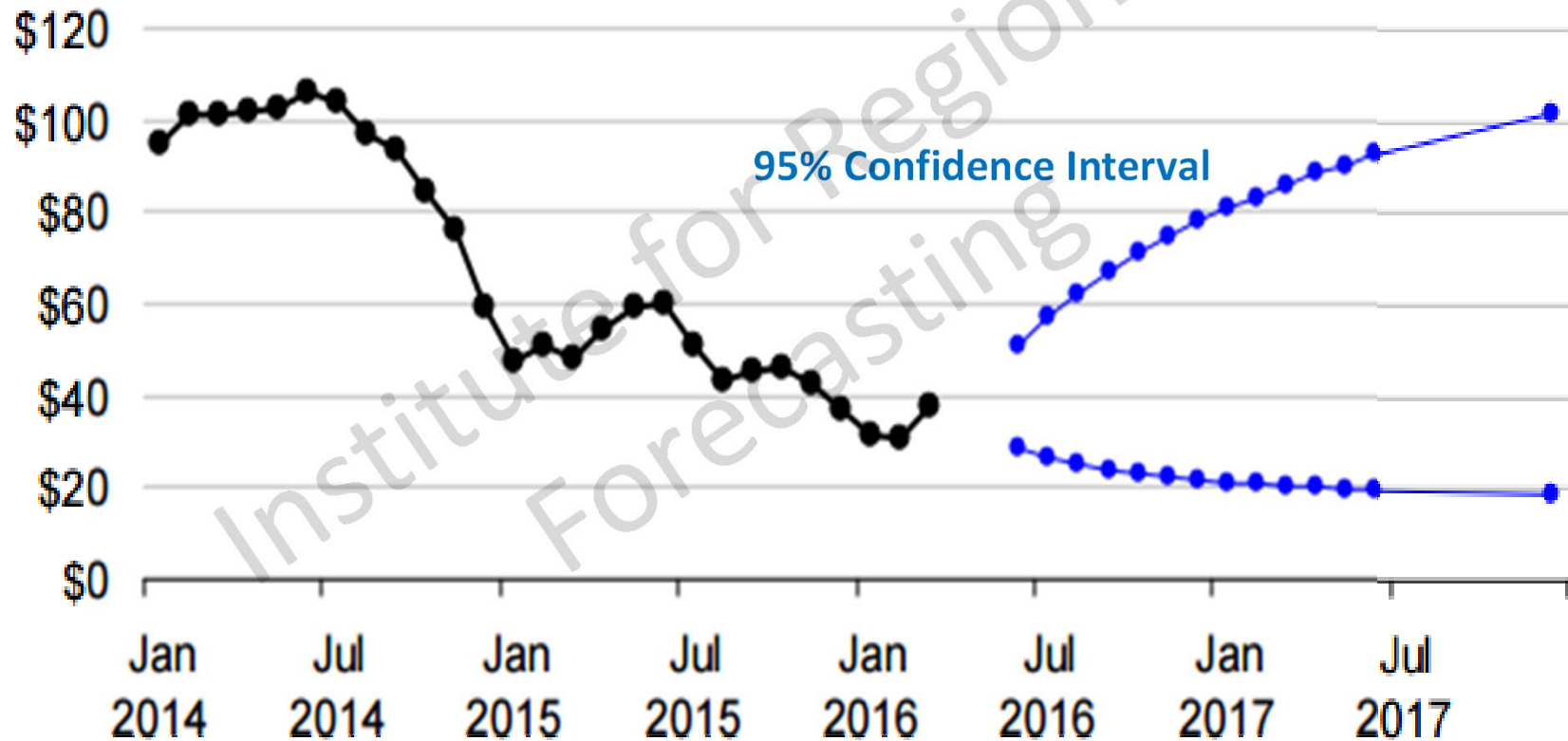


What the Futures Market Thinks About WTI Oil Price



As of May 6, 2016

WTI Price: Historical and Futures Price In April 2016 (\$/Barrel)



Energy Information Administration, *Short-term Energy Outlook*, April 2016

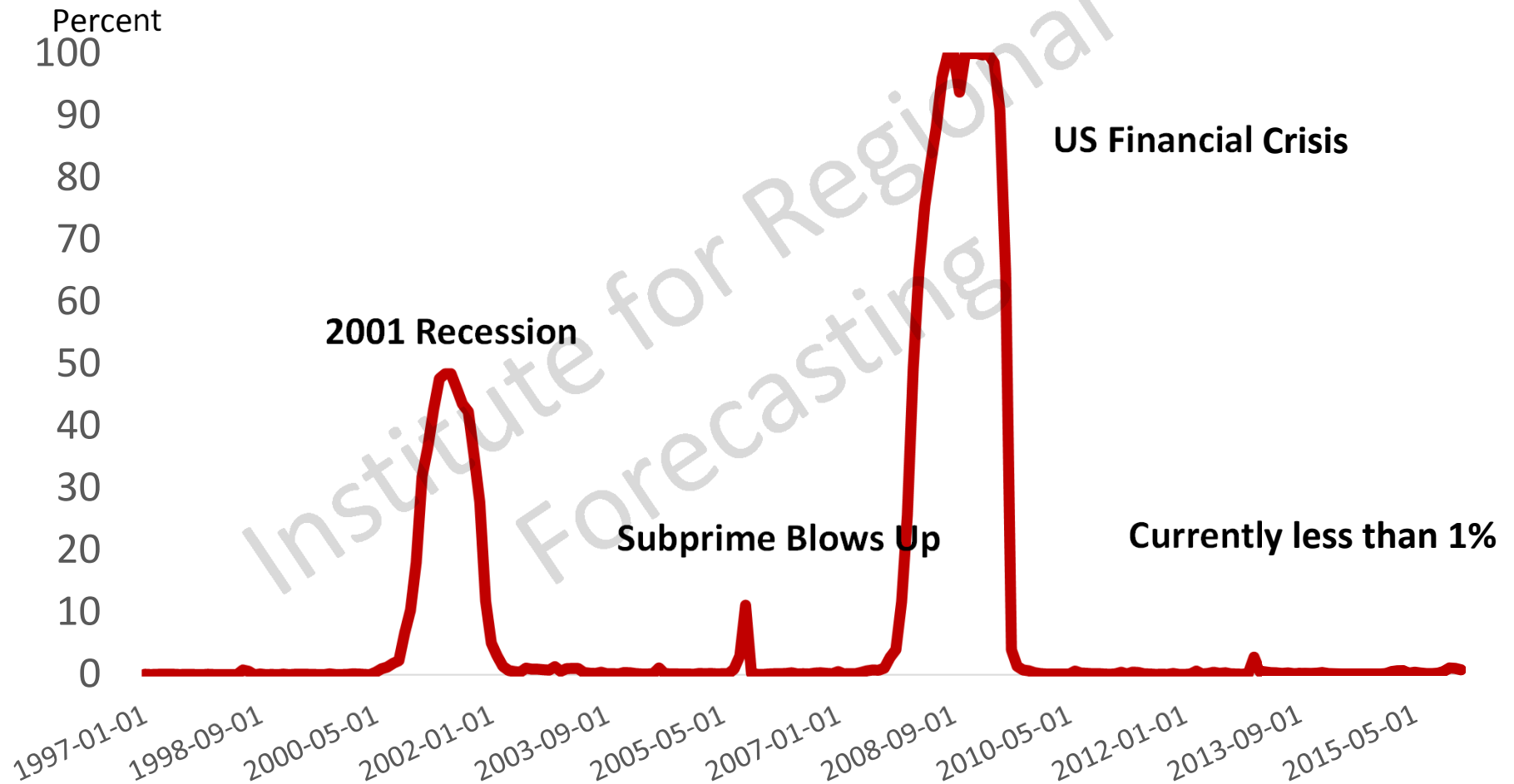
U.S. Economy Continues to Work for Houston



U.S. Economy Continues to Grow Strongly and Create Jobs

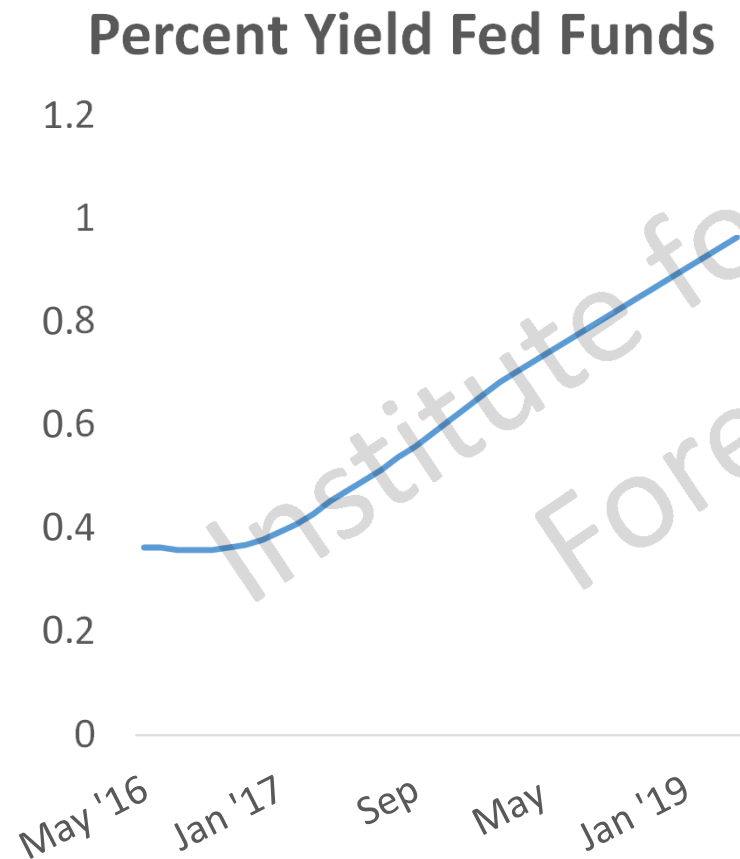
- Assume in all scenarios that the U.S. economy has put the Great Recession behind it
- Consumer has deleveraged; state and local governments are collecting revenues at a healthy rate and spending; the housing market has returned to close to normal
- U.S. job growth is at 1.7 percent or about 200,000 jobs per month throughout the forecast horizon
- Negative outlook of early this year behind us: China and other emerging markets look better, dollar is weaker, stock market correction behind us, leading indicators point to moderate growth

Smoothed U.S. Recession Probabilities (percent chance of recession)



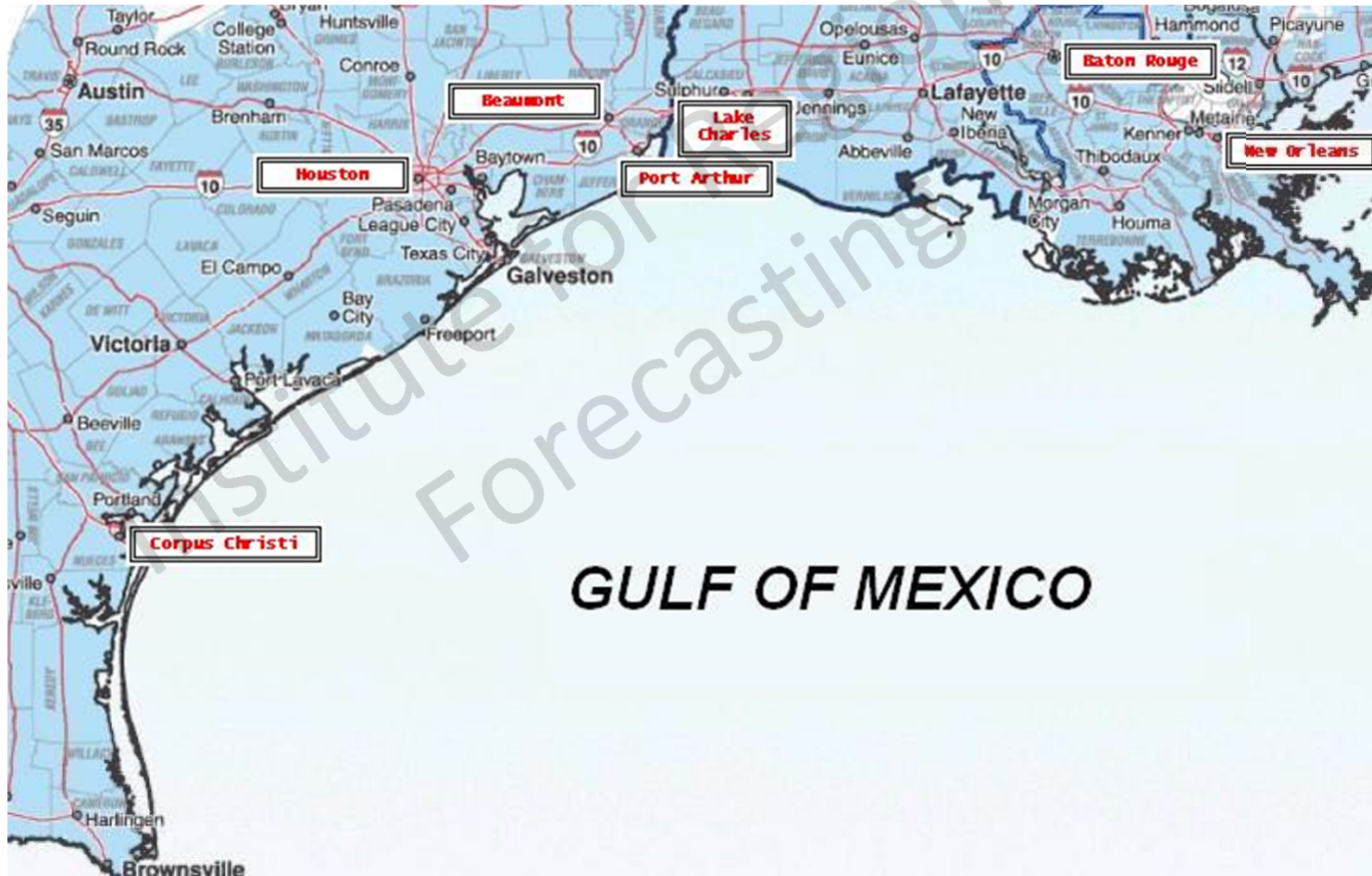
Source: Chauvet and Piger smoothed recession probabilities, FRED, St. Louis Fed

Futures Market Sees Fed Funds Rate Rising Very Slowly



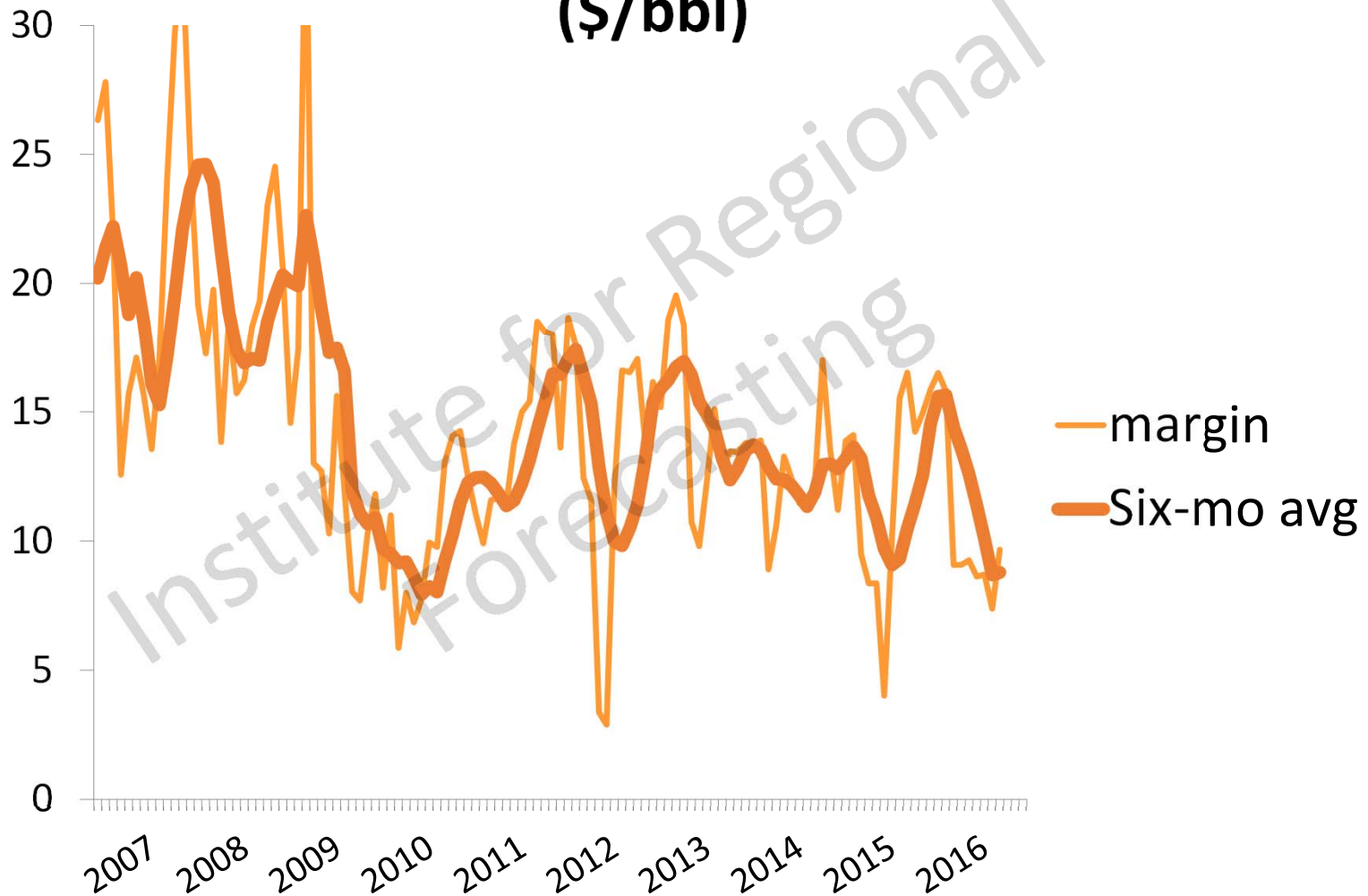
- Virtually no chance before of rate hike before December 2016 says futures market
- Not even one increase is fully priced in before November 2017
- Headed (someday) for fed funds in a 3.0-3.5 percent range
- With current 10-year treasury yield near 2.6%, market opinion is only 2.3% by year-end 2017 and 2.6% by year-end 2018

Downstream Boom Offsets Upstream Bust



Low Oil Prices Keep Gulf Coast Refining Margins Strong

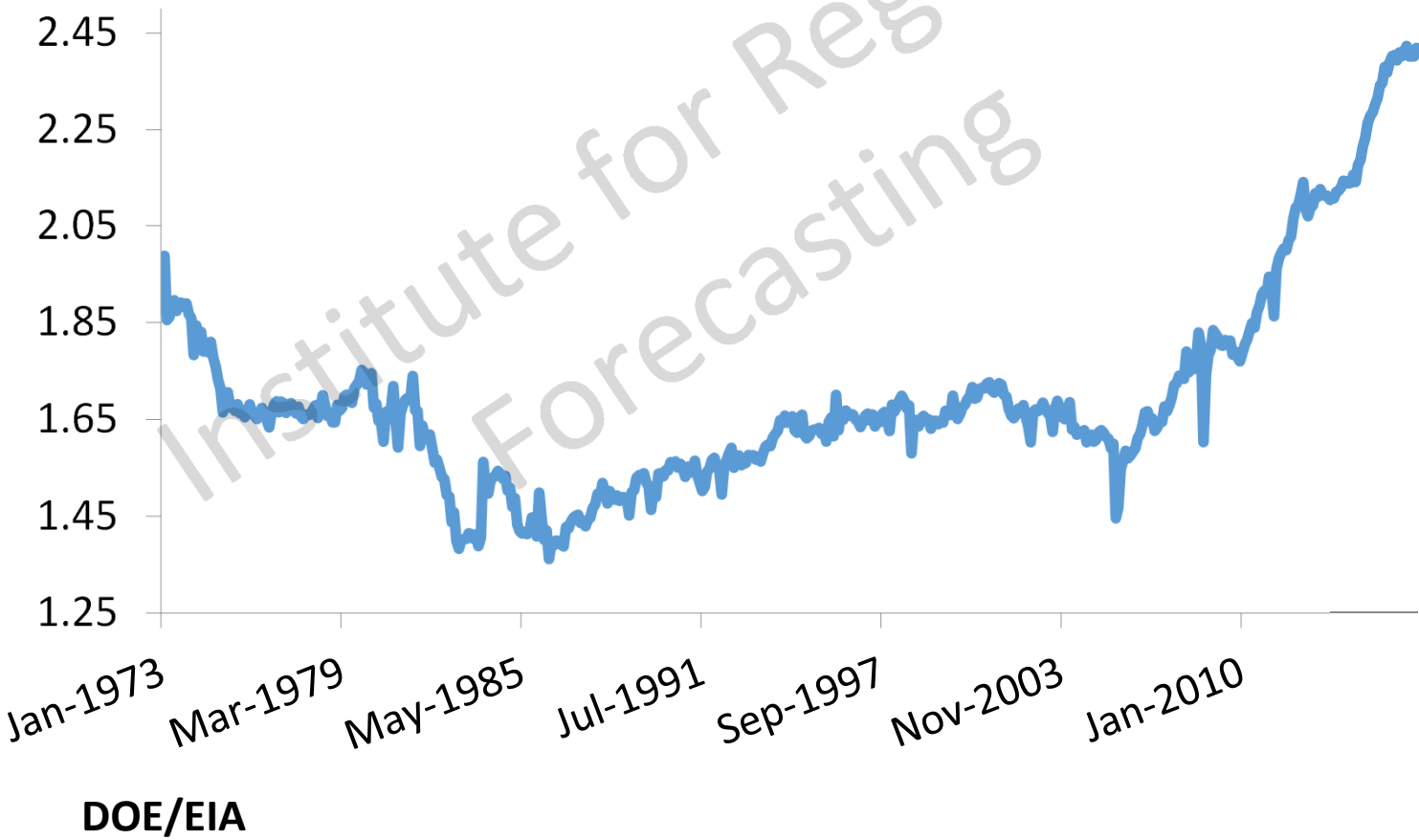
(\$/bbl)



Pace refining margins, *Oil and Gas Journal*

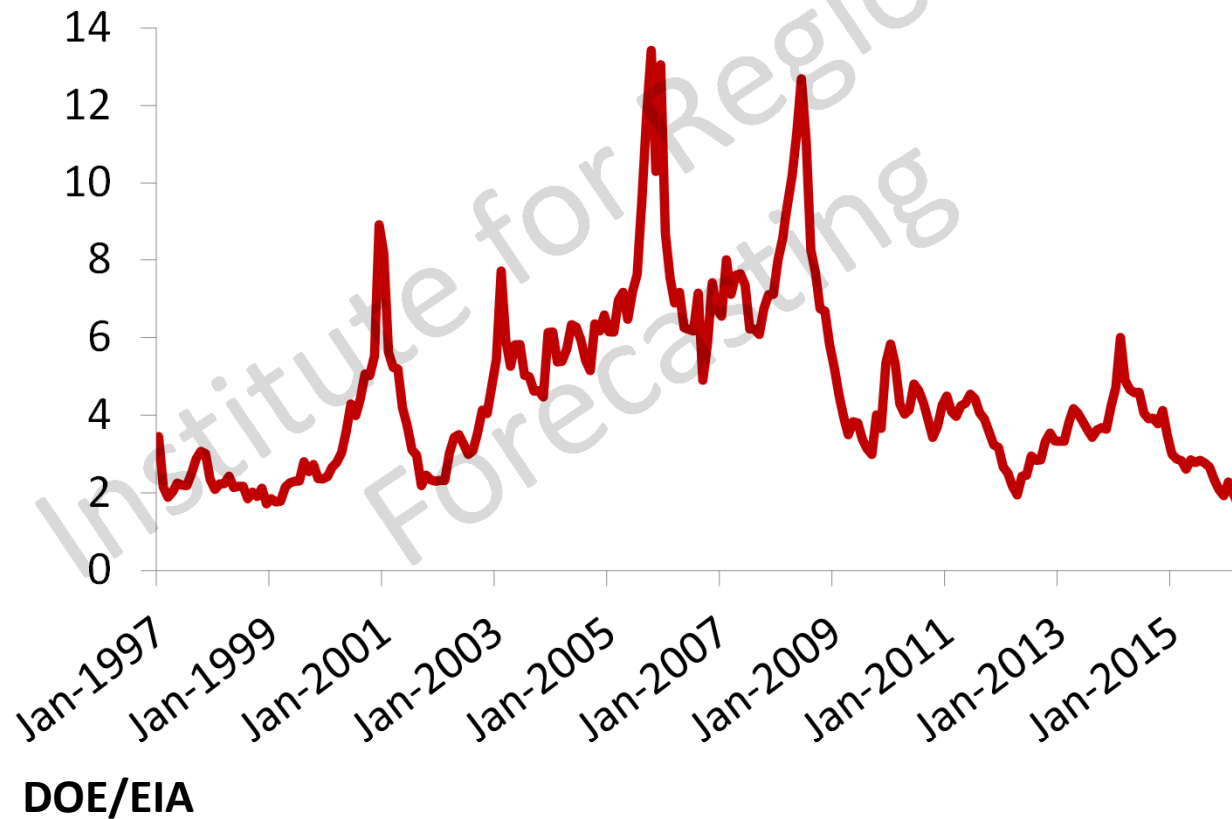
Natural Gas Shares Oil's Hockey Stick Surge in Production

Marketed production, Bcf/mo, seasonal adj



Natural gas prices collapsed in late 2011

(\$/mcf)

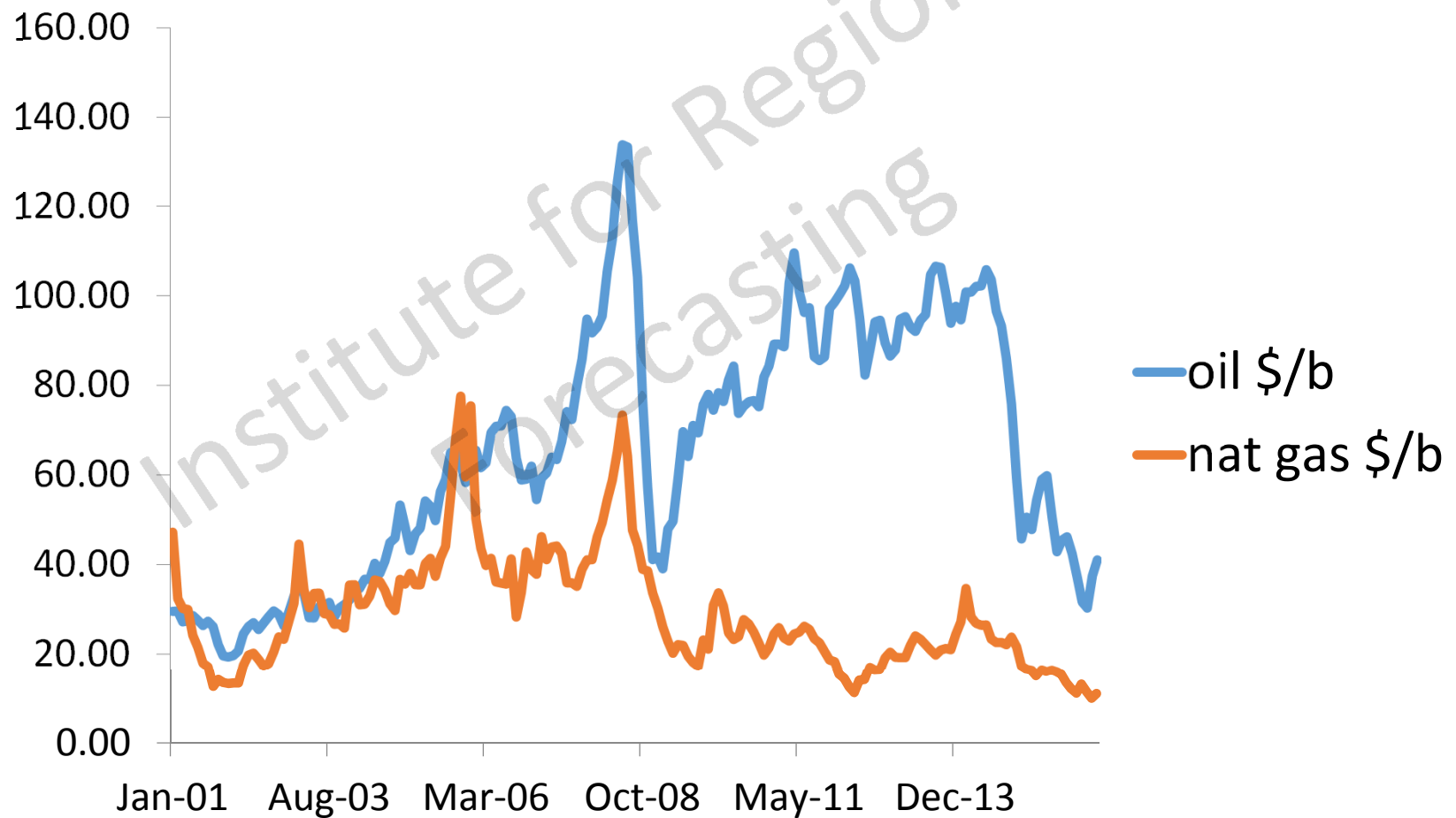


\$164 Billion U.S. Construction Boom is Based on Cheap Energy

- This \$153 total includes many industries and all of the U.S.
- New ethylene crackers, more ethylene-related expansion in PE, PVC and other derivative plants
- LNG export terminals to sell surplus natural gas into global markets
- Refiners have joined in with additional expansions

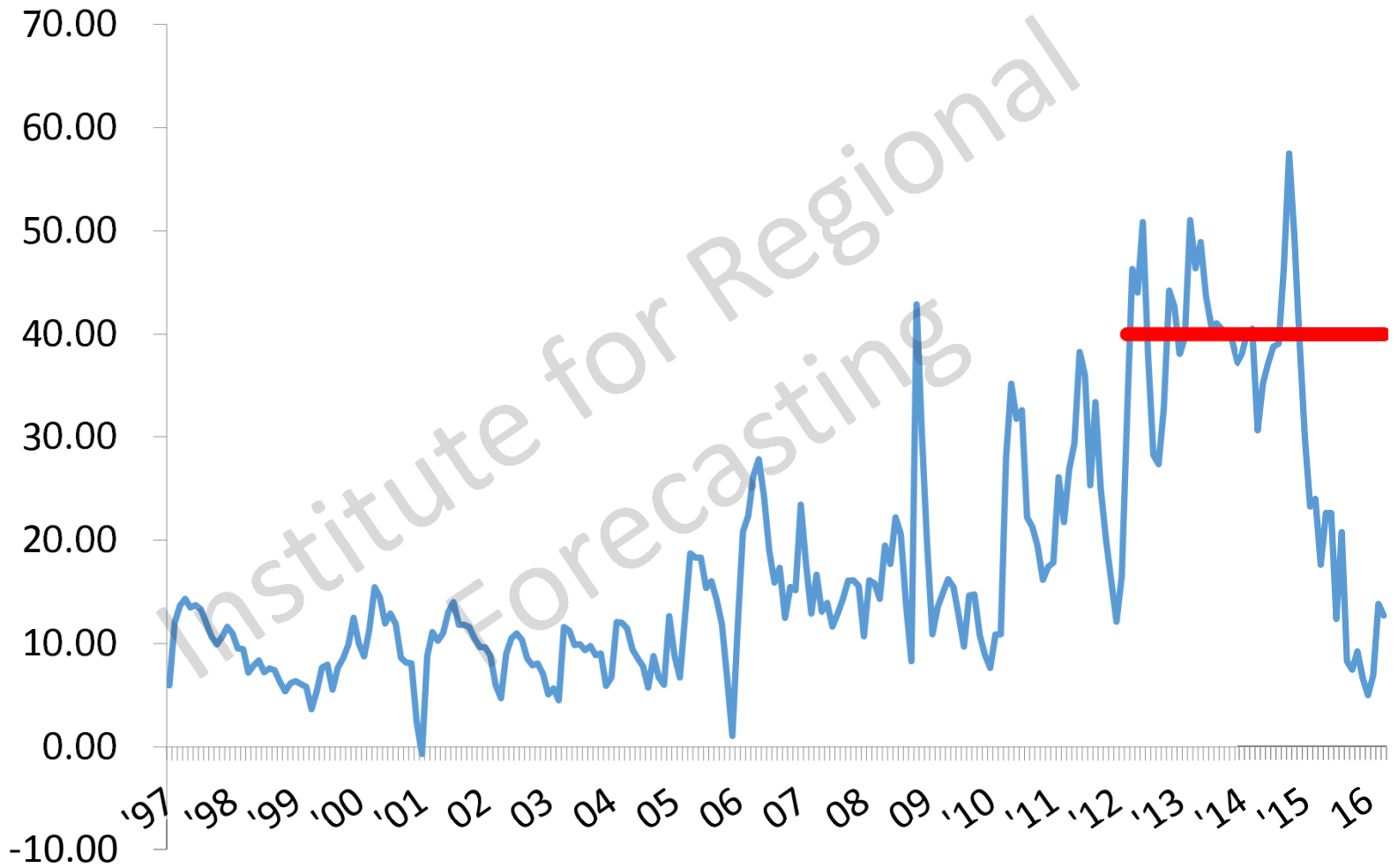
Note: The \$153 billion figure is based on all U.S. shale-related expansion, estimated by the American Chemistry Council in April, 2016

Natural Gas Energy Content Equivalent to \$15 - \$30 per Barrel for Oil



DOE/EIA and calculations of the author

Ethylene Margins (cents per pound)

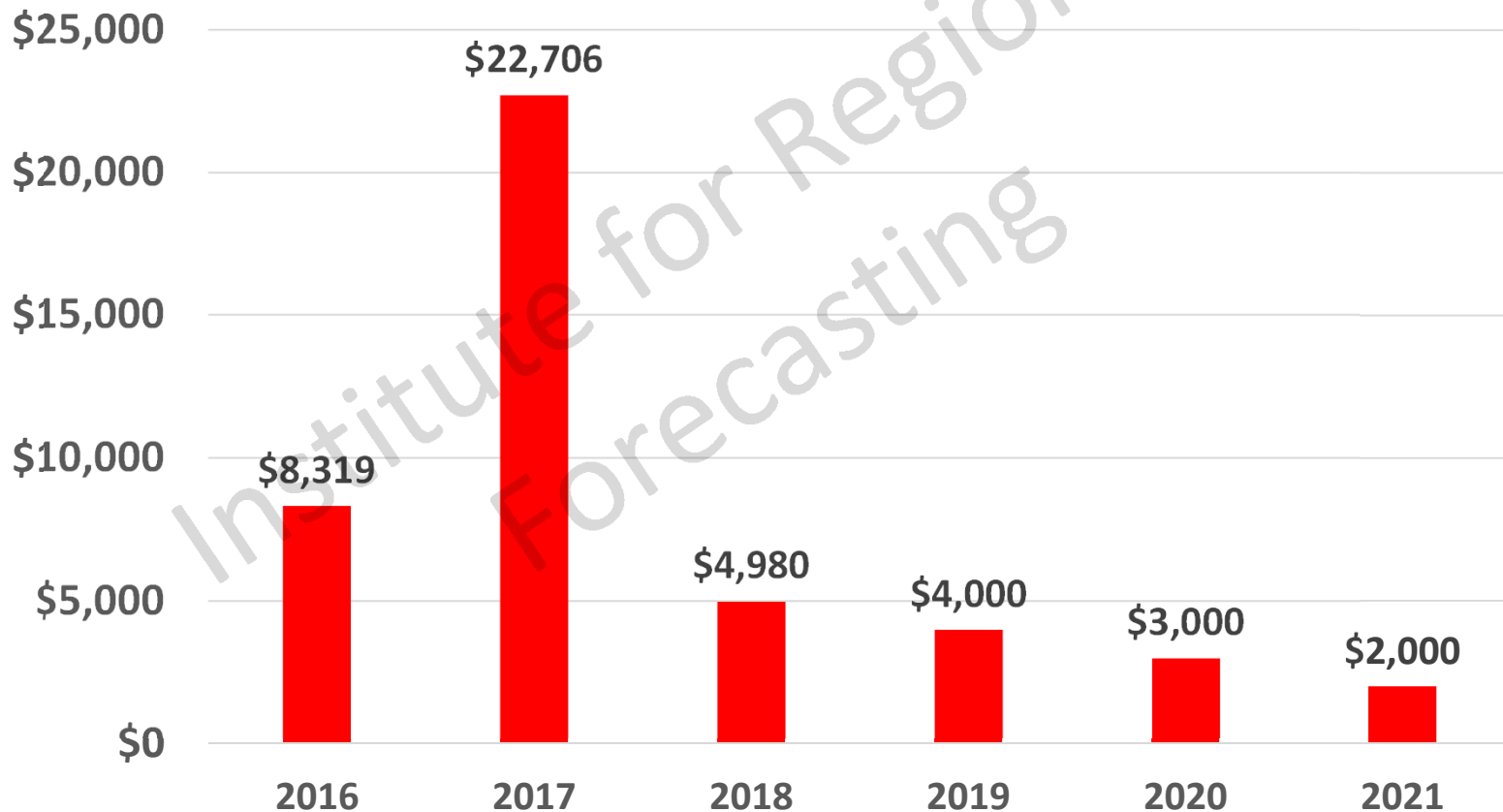


Large Projects Headline Over \$50 Billion in East Houston Construction

Company	Location	Project	Completion	Value (\$ mil)
Exxon	Baytown	Ethylene	2017	\$5,000
Chevron	Freeport	Ethylene	2017	\$4,000
Dow	Baytown	Ethylene	2017	\$3,500
BASF	Freeport	Ethylene	2017	\$3,000
Freeport LNG	Freeport	LNG Export	2019	\$3,000
Freeport LNG	Freeport	LNG Export	2020	\$3,000
Bayer	Baytown	PUR Facility	2021	\$2,000
CPV	Freeport	Gas to Polypropylene	2017	\$1,500
Freeport LNG	Freeport	Methane to Propylene	2018	\$1,400

Projects Begin to Wind Down Rapidly After 2017

(Value of Projects Completed, \$ million)



Projects Are Still Being Proposed and Announced ... But Tough to Replace \$50 Billion

Company	Location	Project	Completion	Value (\$ mil)
Ineos	Brazoria	Proposed Ethylene	2020+	\$ 2-4,000 ?
Dow MEGlobal	Freeport	Monoethylene Glycol	2019	\$1,000
BASF	Freeport	Proposed Propylene	?	\$1,000+
Fund Connell	Texas City	Proposed Methanol	Status?	\$4,500
Air Products	Baytown	Hydrogen	2018	\$400
BASF	Pasadena	Plasticizers	2017	?
Chevron Phillips	Baytown	PAO	2017	\$?

Various sources

A Counterweight to Upstream Damage Lost in 2017

- Jobs added up quickly given the number and scale of proposed construction projects in 2015-2017
- These are temporary jobs, disappearing as projects end and capital expenditures wind down
- Normally, downstream capital expenditures are small compared to the upstream, move in a narrow range, and create relatively few jobs. We have been lucky, so far.
- What if the construction boom ends with oil producers, oil services, machinery and fabricated metals still struggling?

We Are Running Out of Time

- Petrochemical construction begins to wind down in mid-2017. The petrochemical construction advantage enjoyed so far turns negative in the next 12 months.
- Count quarters and we needed oil prices to stabilize in 2016 Q1 for rig count and upstream energy employment to turn up in time to offset construction losses.
- Even our high scenario means another slow year in 2017, and either the medium or low scenario could bring significant job losses next year

Job Growth in Houston 2013-2019

(000 Jobs, Q4/Q4)

Scenario

Year	High	Medium	Low	30/50/20
2013	90.3	90.3	90.3	90.3
2014	112.1	112.1	112.1	112.1
2015	23.4	23.4	23.4	23.4
2016	-7.4	-11.1	-13.5	-10.8
2017	10.3	-34.2	-57.6	-30
2018	97.2	65.8	20.1	62.9
2019	94	107.3	69.4	97.1

Calculations of IRF, based on drilling scenarios above

This Forecast vs. November: Recovery Delayed

(Thousands of Jobs)

	Current 30/50/20	Last November 40/40/20
2014	112.1	103.6
2015	23.4	14.0
2016	-10.8	20.1
2017	-30.0	74.4
2018	62.9	86.8
2019	97.1	73.6

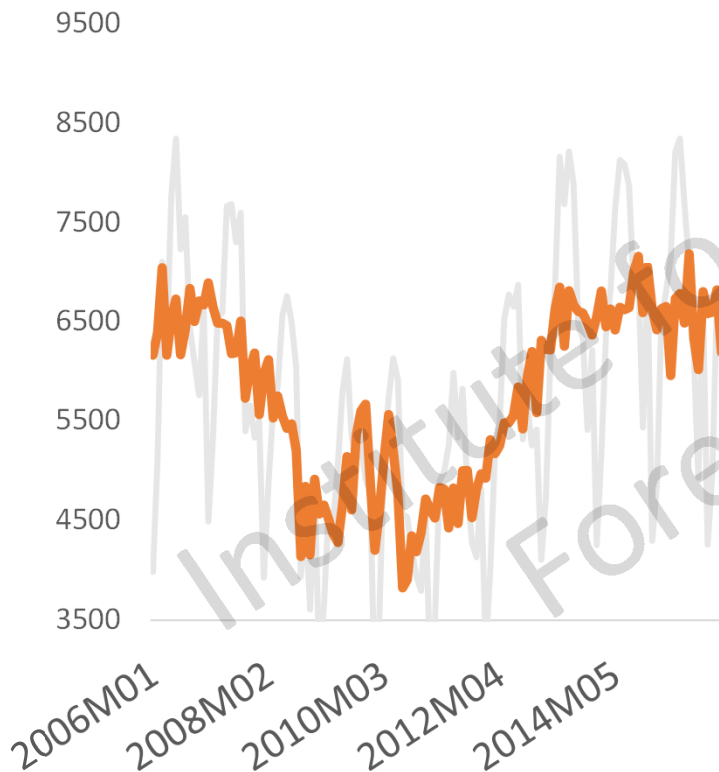
Calculations of Institute for Regional Forecasting

Residential and Commercial Real Estate: The View from the Back of the Bus

- Residential and commercial real estate is the ultimate NONBASIC industry. A follower that responds to growth led by others
- When oil prices fell, the office market found itself in trouble almost immediately. And apartments just kept building, building, building ... and now have made their own problems
- Single-family statistics still look good for the metro area. but beneath the surface, strains are showing up in a number of markets
- Industrial and retail are in good shape, but caution is warranted until oil markets finally turn

Existing Home Sales Flat in Houston Since 2012

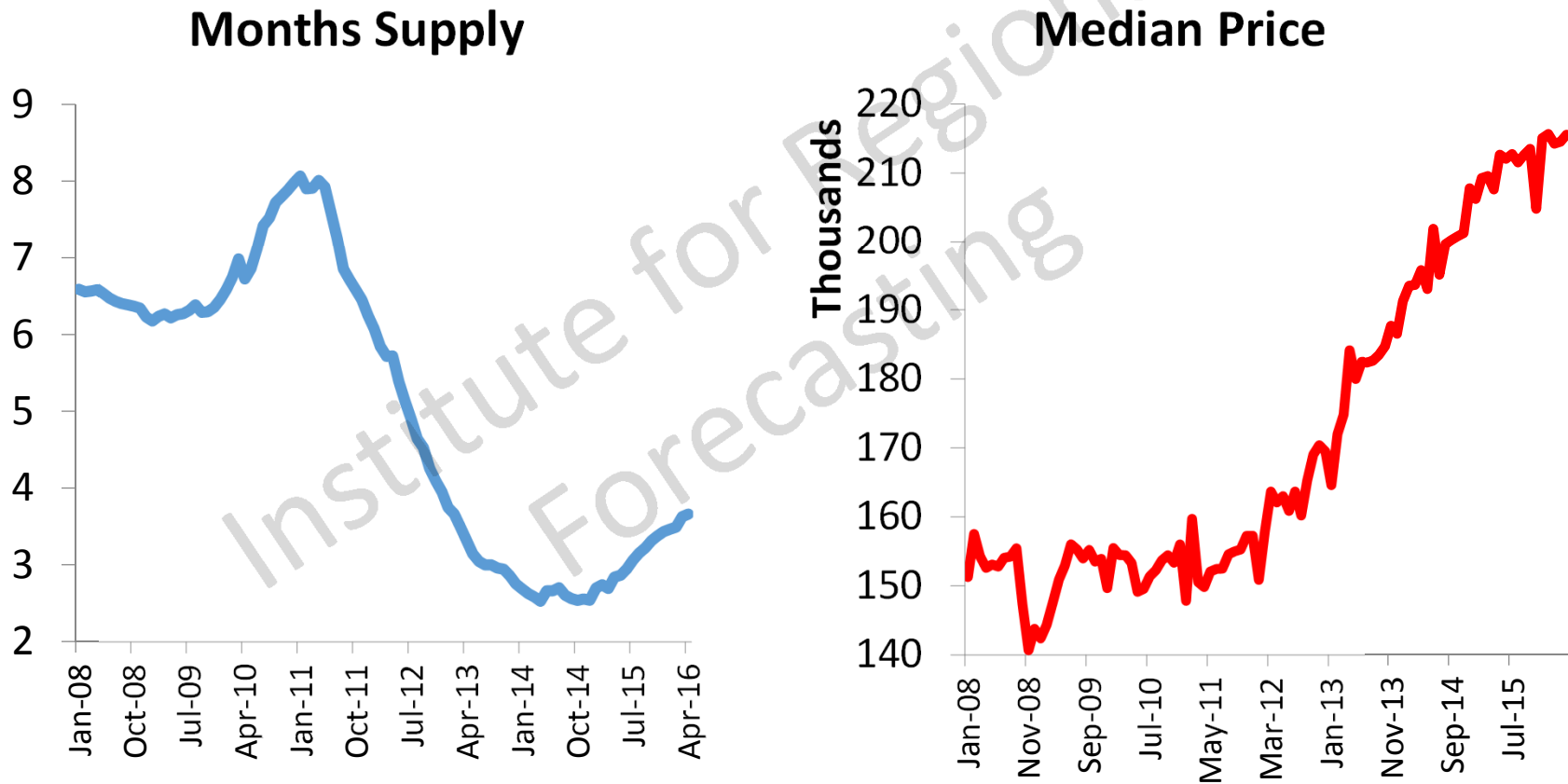
(sales, s.a.)



- Flat since 2012? Due to lack of existing and new home supply
- Median home prices rose rapidly after 2011, at 9.4 percent annually from 2012-2014
- 2015 saw continued high level of sales, limited relief on inventories, prices level off since the spring

Source: Texas A&M Real Estate Center

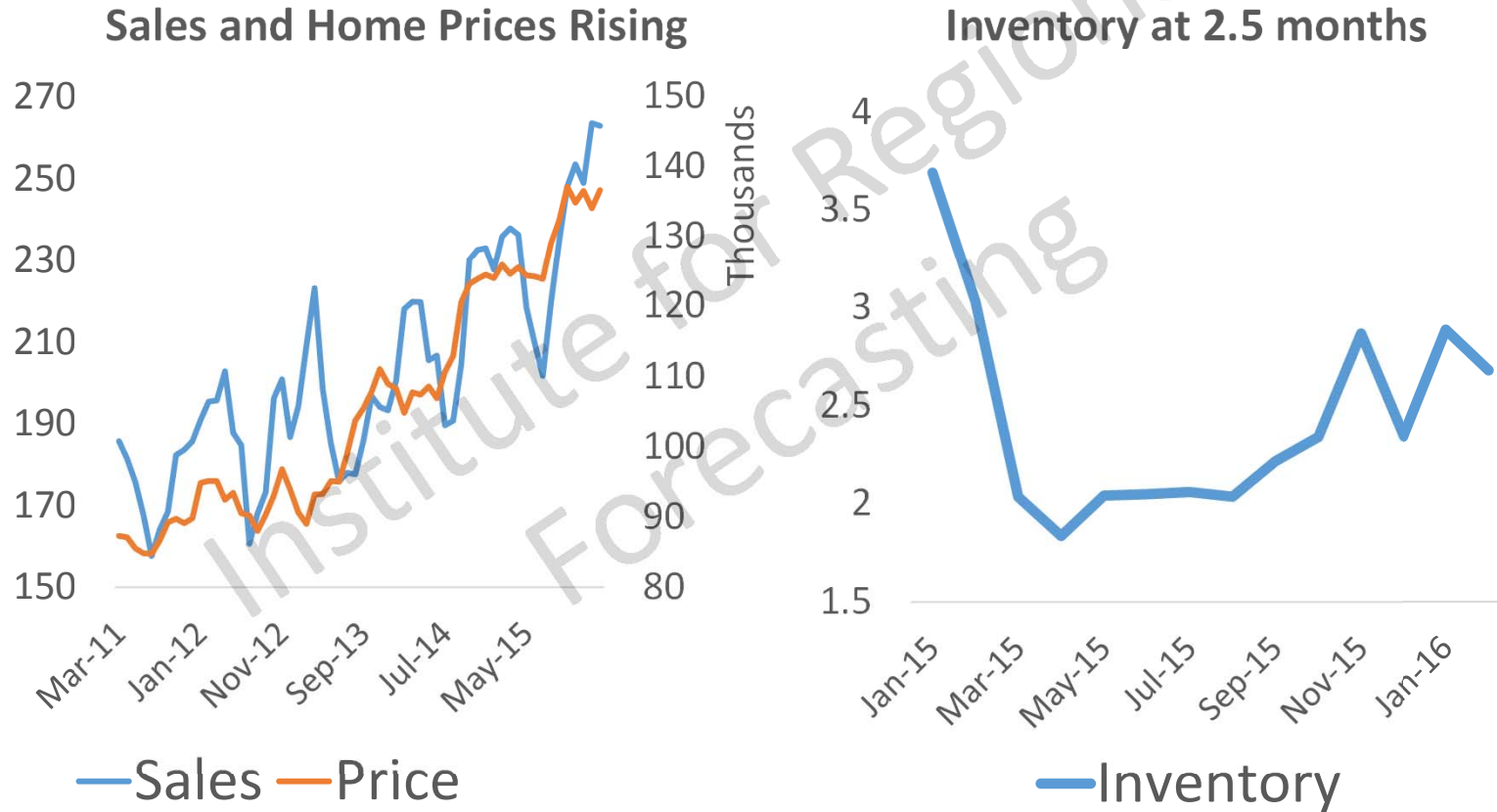
Strong Growth and Lot Shortages Distorted Single-Family Housing Market



Source: Texas A&M Real Estate Center

Ship Channel Cities

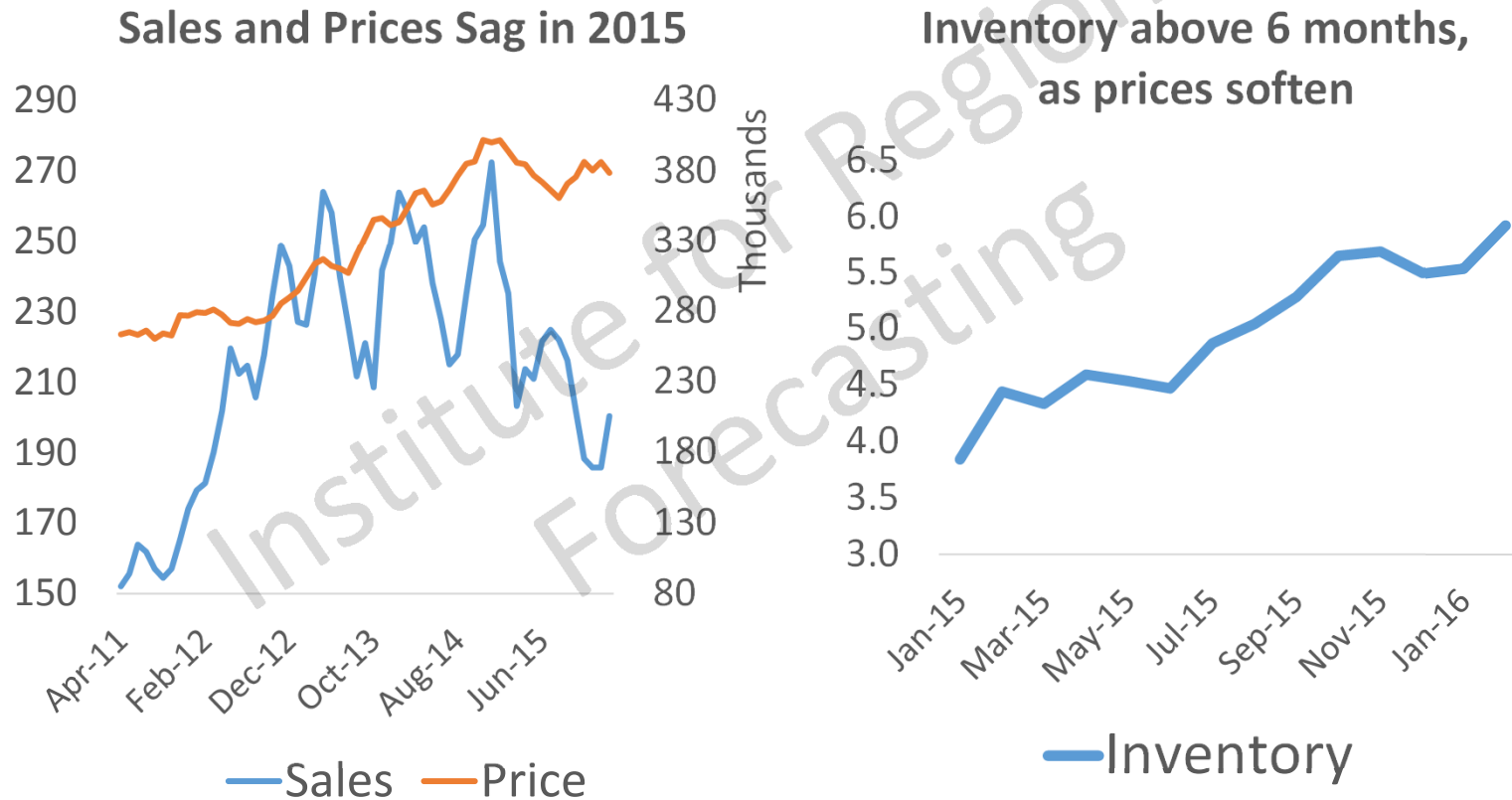
Baytown, Channelview, Pasadena



Source: Texas A&M Real Estate Center, calculations of IRF

Close-In

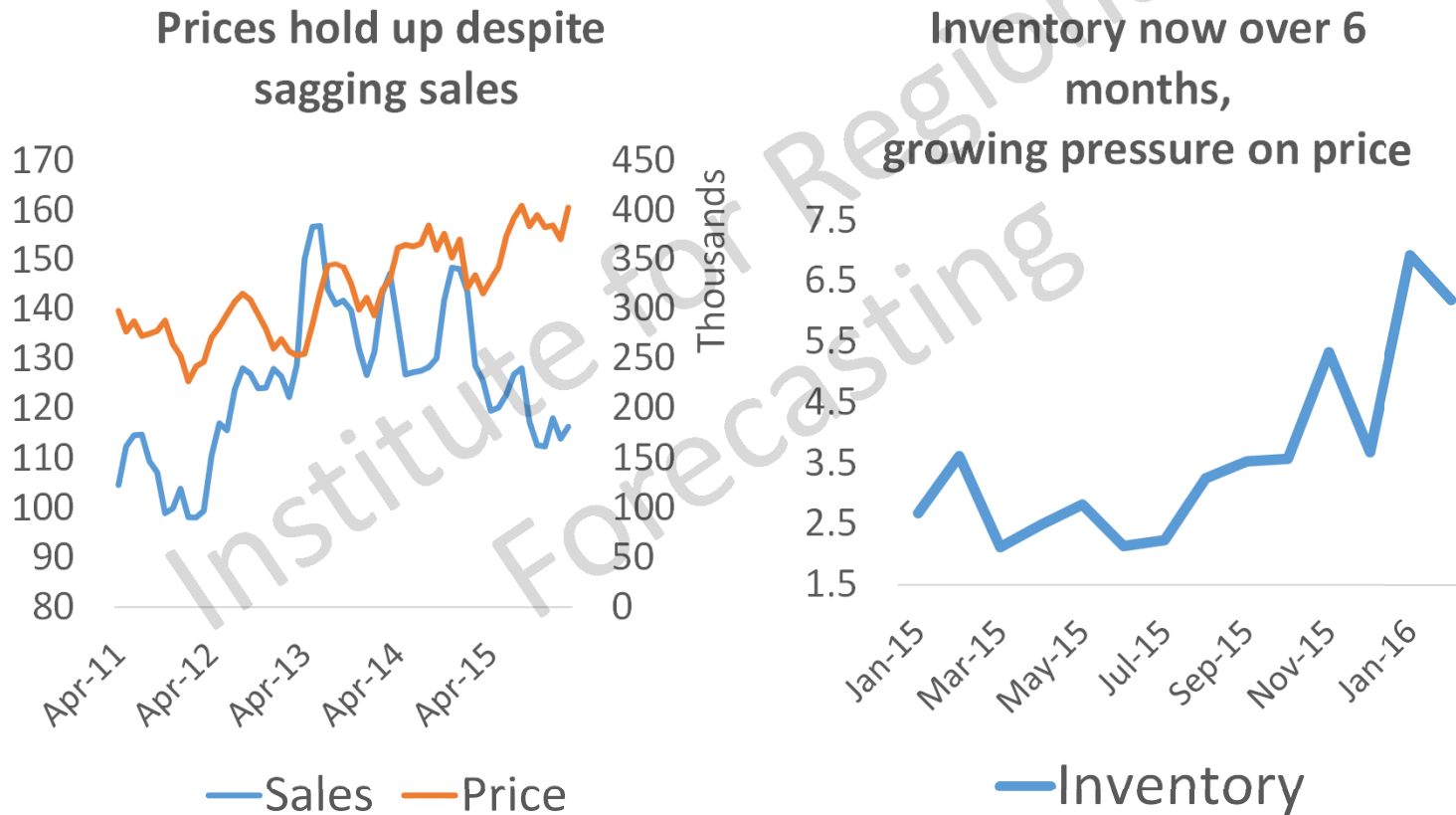
Rice Military, Heights, Galleria



Source: Texas A&M Real Estate Center, calculations of IRF

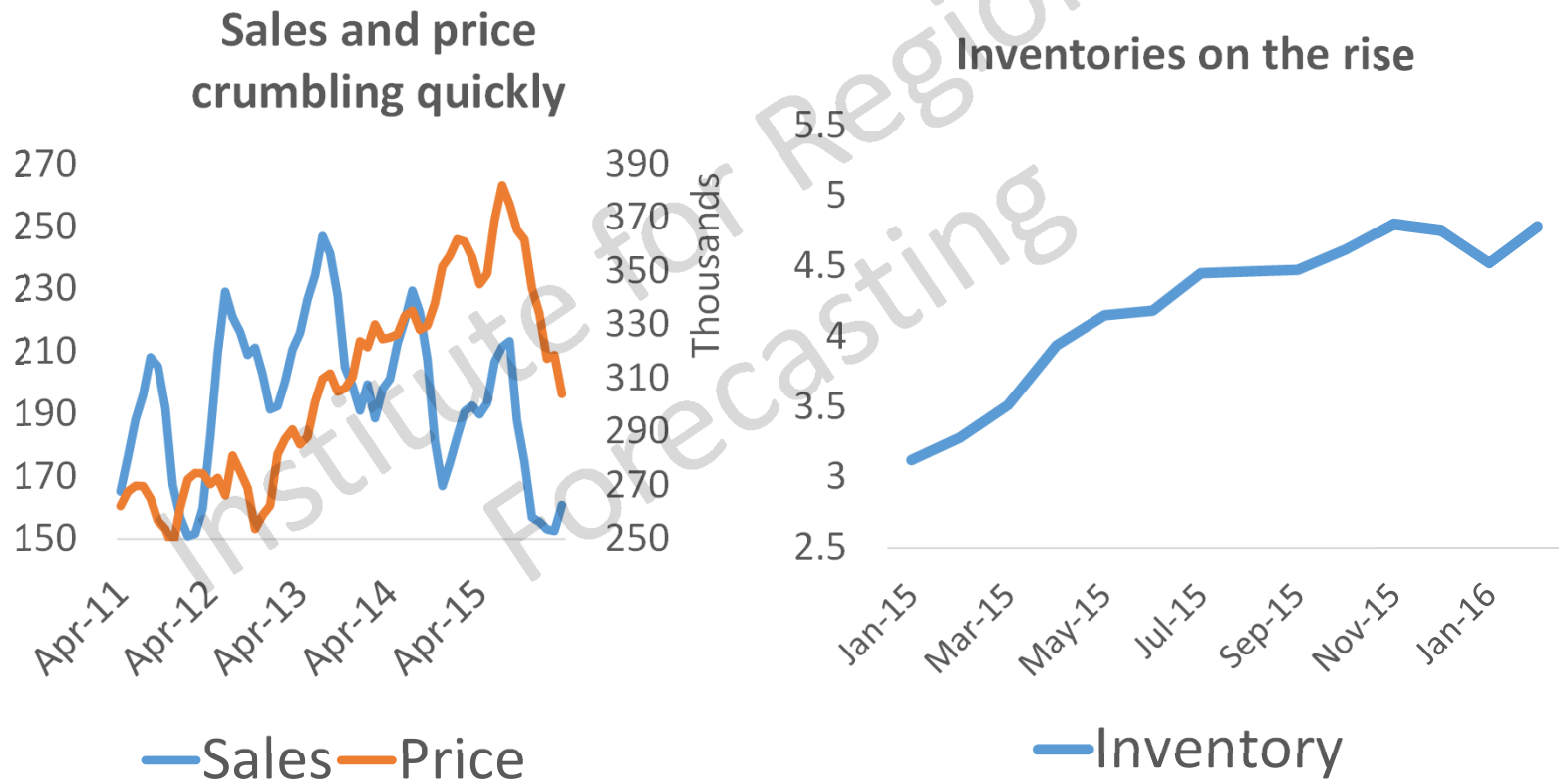
South of I-10

Memorial and Energy Corridor



Source: Texas A&M Real Estate Center, calculations of IRF

Woodlands in Retreat

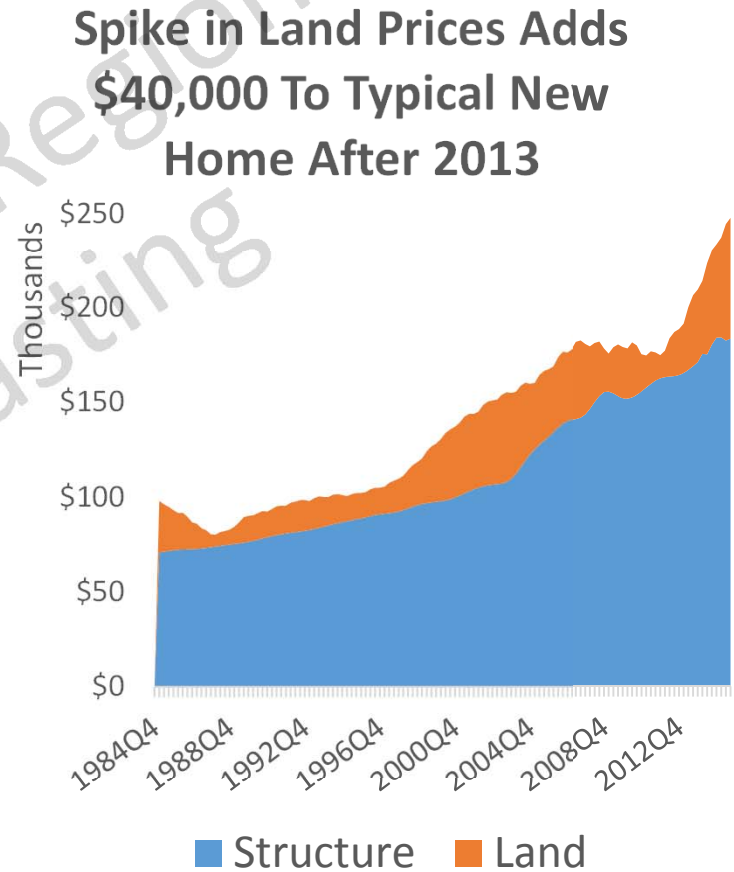
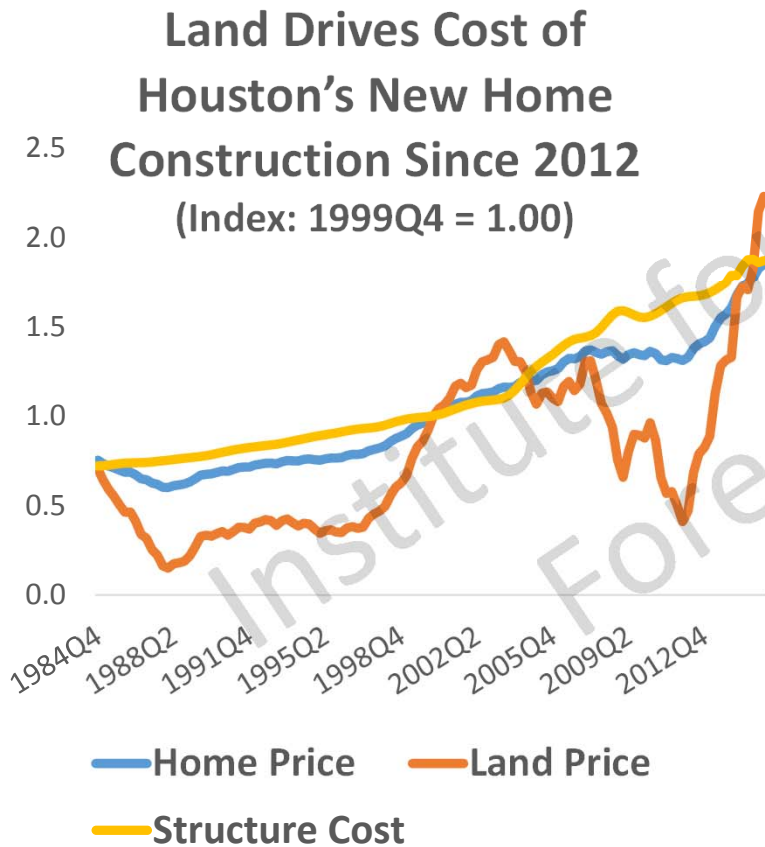


Source: Texas A&M Real Estate Center, calculations of IRF

Other Markets

	Sales	Price	Inventory
South Houston	Flat	Up+	Low
North of I-10	Flat	Flat	Up+
Katy	Up	Flat	Low
Distant Suburbs*	Down	Up	Low
*Distant suburbs are Kingwood, Pearland, and Sugarland			

Rising Land Prices Drove Cost of New Homes



Source: Lincoln Institute of Land Policy

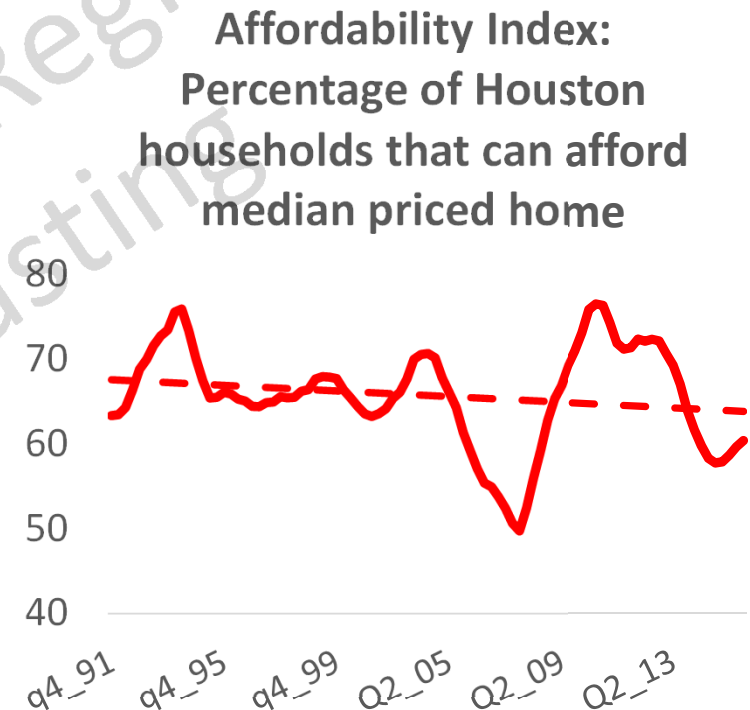
Losing Our Affordability Edge?

Metro Area	Population (million)	Share of Land Cost in Home Price (%)	Affordability % Potential Buyers
New York	20.1	47.4	22.0
Los Angeles	13.3	70.5	14.9
Chicago	9.6	15.8	67.3
Dallas – Fort Worth	7.0	---	---
Dallas	4.6	28.0	54.0
Fort Worth	2.4	21.0	64.9
Houston	6.5	25.0	60.9
Philadelphia	6.1	22.2	68.9
Washington, D.C.	6.0	47.5	68.4
Miami	5.9	53.0	53.4
Atlanta	5.6	29.7	71.8
Boston	4.7	60.7	50.5
San Francisco	4.6	80.5	10.4
Phoenix	4.5	30.0	68.6

Red means the market is more affordable than Houston

Top-end buyers lost to oil bust, bottom of the market wants back in

- High-end market for executives and professionals is gone for the next couple of years
- There are 2.3 million households in Houston. Every time affordability ticks up one percent, it locks 23,000 families out of the market.
- Affordability down 4-5 percent means over 100,000 families were pushed out since 2013
- They have household incomes of \$55-\$65,000 and can qualify for \$200,000 product. Can we deliver this price point?



Wells Fargo Housing Opportunity Index

Single-Family Permits Stagger

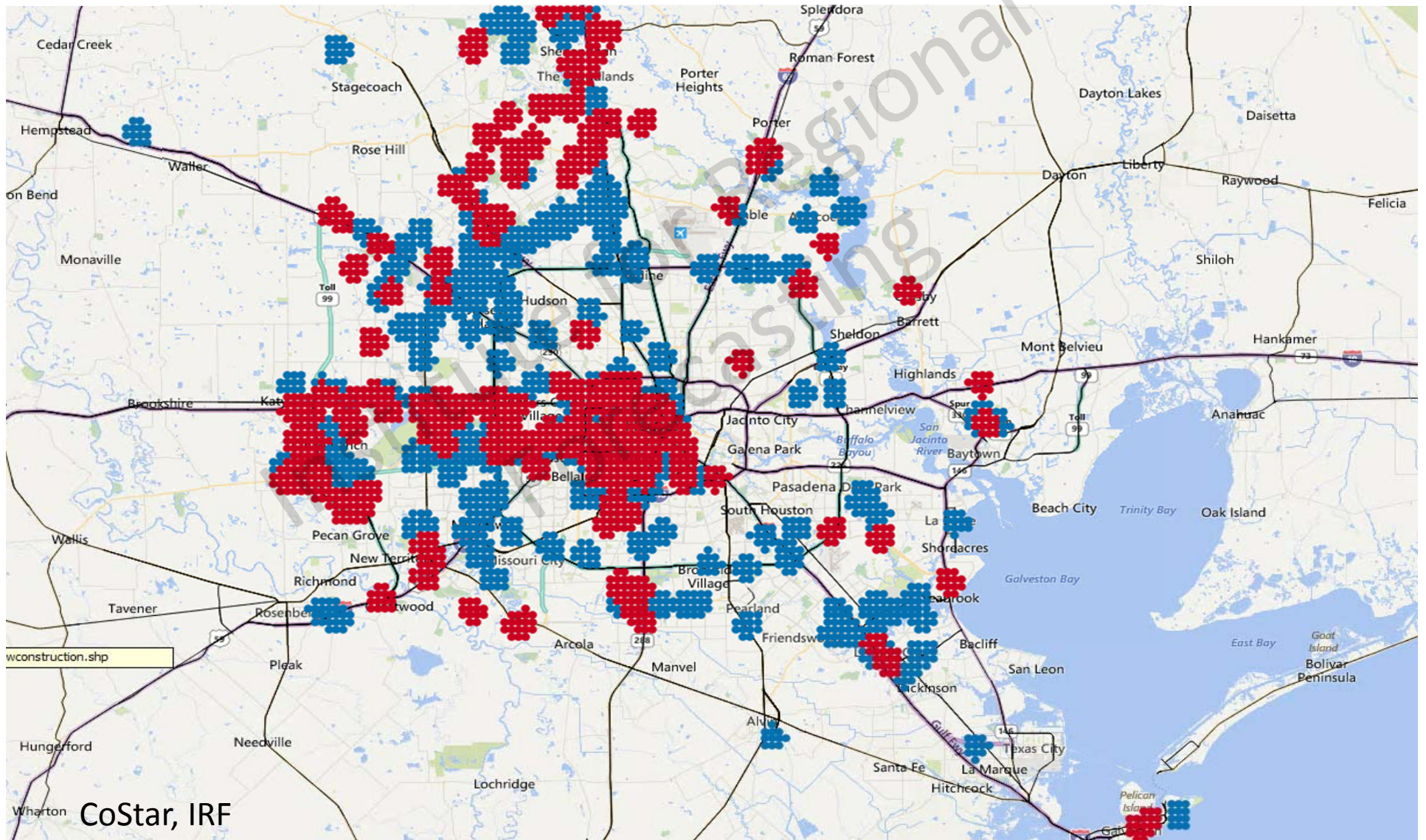
(monthly permits at annual rates, s.a.)



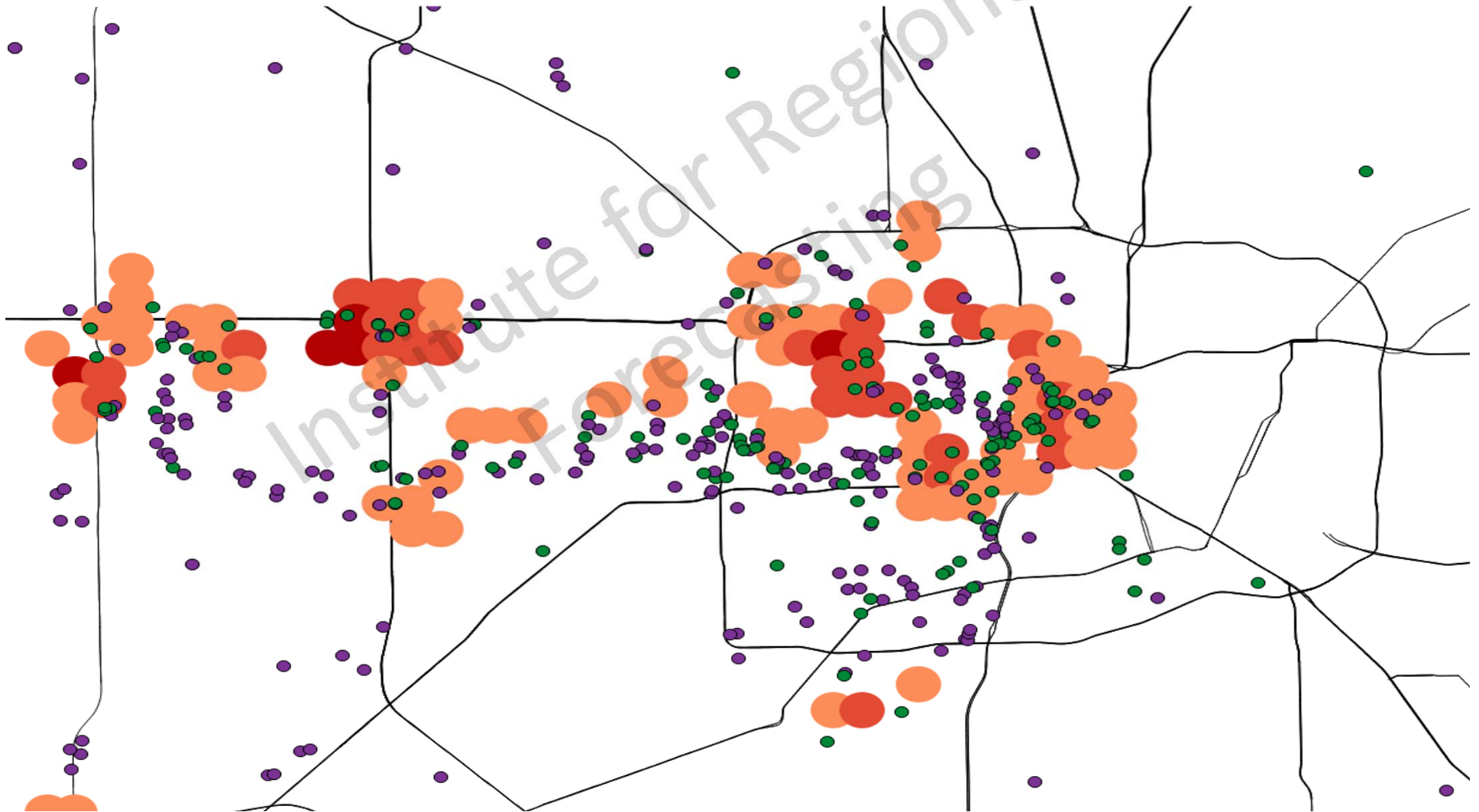
Multifamily Finally Overdoes It

Institute for Regional
Forecasting

Red? Where Apartment Units Are Built or Under Construction After 2013



Light Orange Doubles Apartments In A Local Market Since Early 2014, Medium Triples, Darkest Quadruple or More



Class A Apartment Market Suffering from Self-Inflicted Wounds

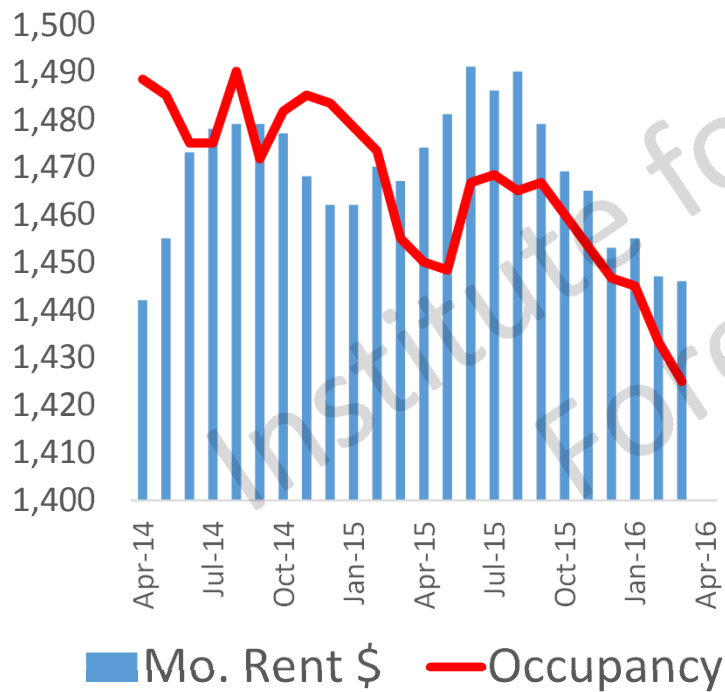
Class A Rents and Occupancy Under Growing Pressure			
	Stable	In Lease Up	All Class A
No. of Units	118,922	23,498	142,420
Monthly Rent	\$1,434	\$1,505	\$1,464
Occupancy	91.3%	26.2%	80.5%

Apartment Data Services

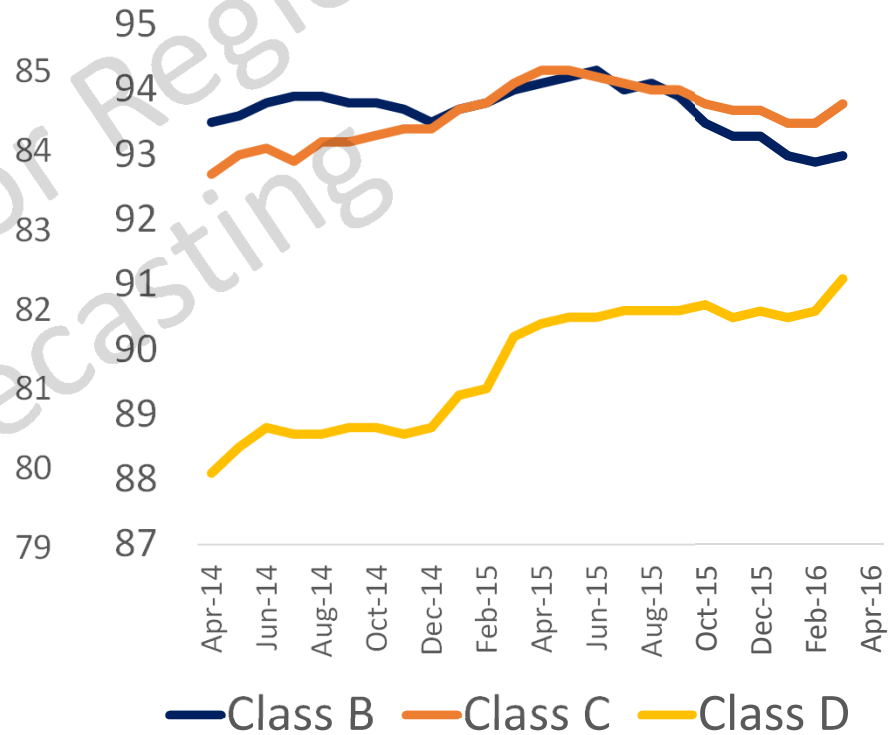
- Occupancy still very high at 90+% for Class B,C, and D
- Class A is struggling with rent under pressure from widespread concessions and falling occupancy rates
- There are 23,500 units in lease-up with only 26.2% occupancy, another 25,000 units still in the construction pipeline
- Some parts of Houston will get a couple of months of relief from concessions as flood victims seek new housing

New Product Puts Class A Under Pressure, Others Okay ... So Far

Class A Rents and Occupancy Under Pressure



Occupancy Still high in Class B, C, and D

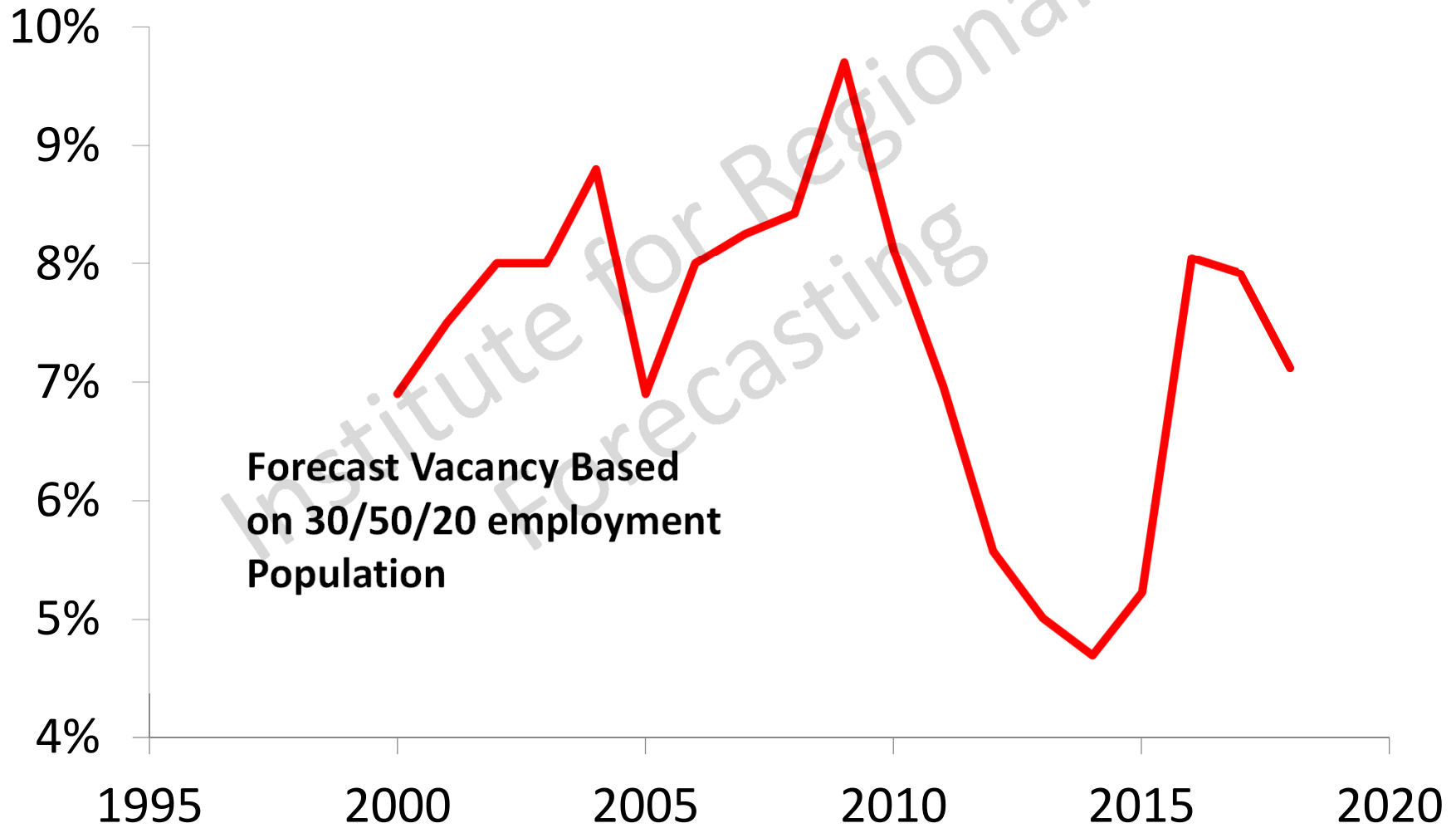


Multifamily Permits Finally Turn Down In Houston

6-month average



These Multifamily Vacancy Rates Have Been Seen Before (percent)



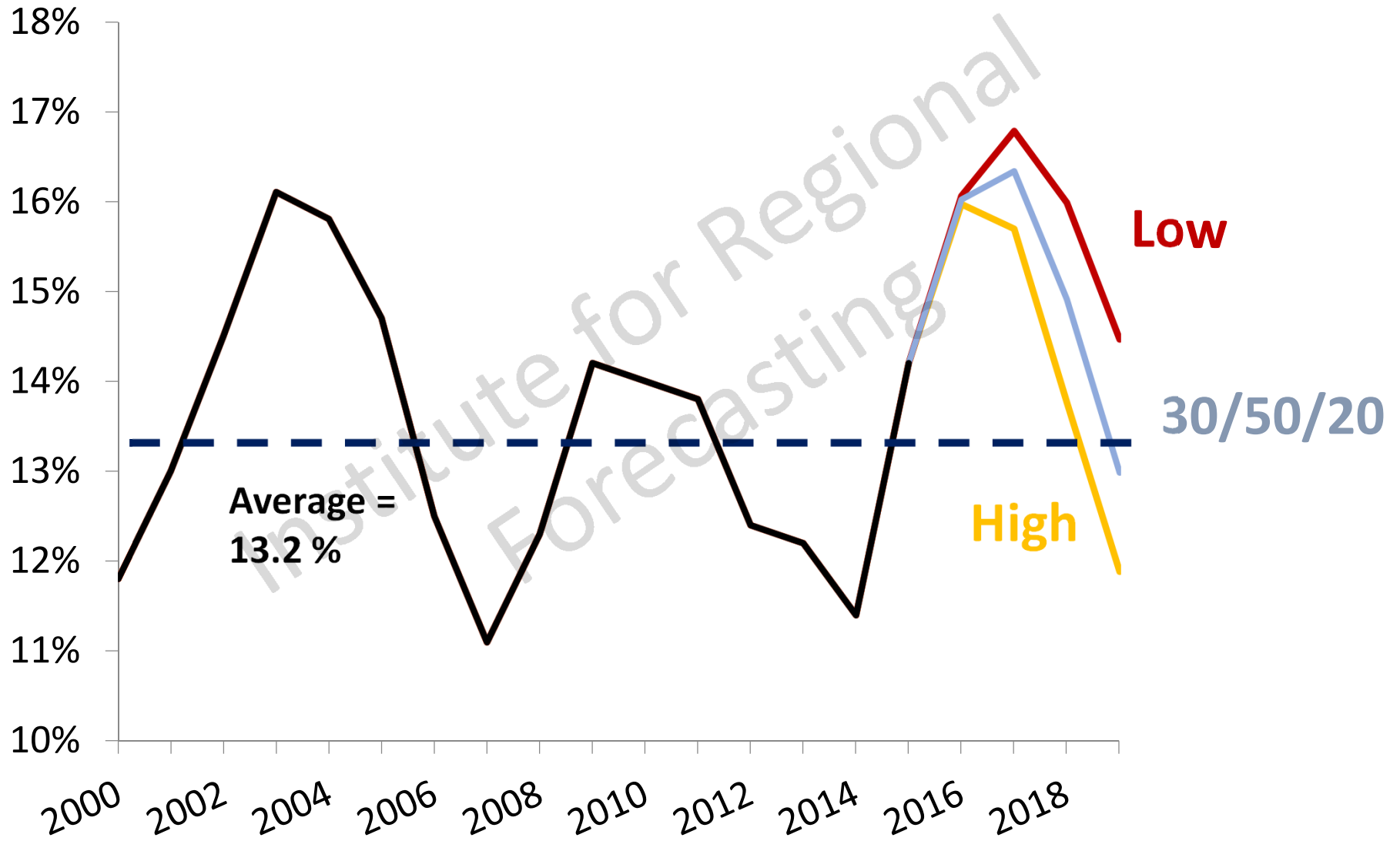
Office Market Deliveries Out of Synch With Local Economy

Institute for Regional
Forecasting

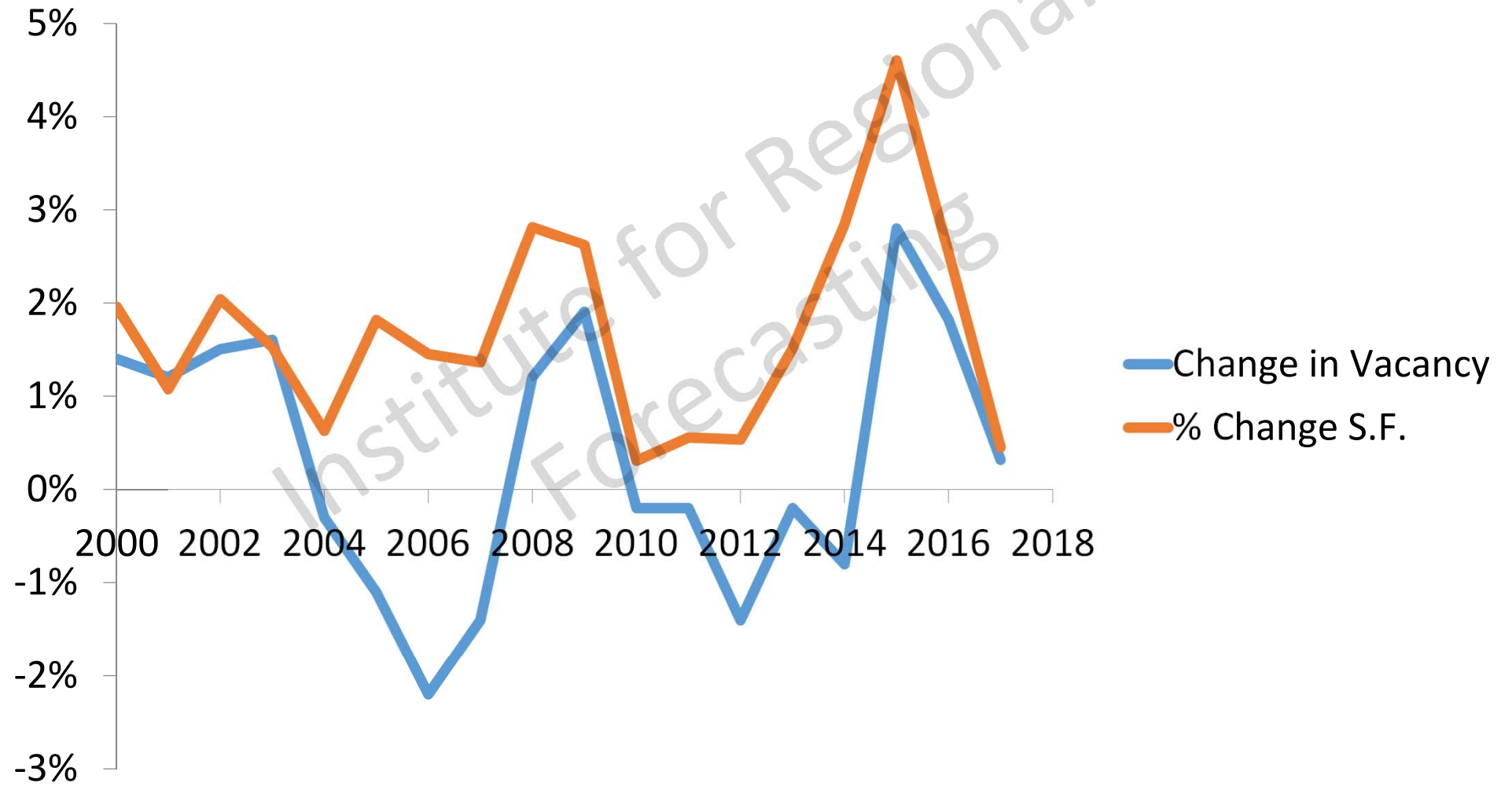
Office Market Swoons

- The worst damage was done with 14.5 million square feet entering construction just before the bust begins, from 2013Q2 to 2014Q1
- Much of the space was for corporate headquarters, campuses, and otherwise preleased ... but it opened the door to at least 10 million square feet of sublet space to return
- Oil bust arrives, and it leads to an all-too-familiar cycle with office deliveries completely out of synch with the local economy, with vacancies on the rise and rents under pressure

Office Vacancy Forecast



Vacancies Rise Through 2017 Mainly Due to Continued Deliveries

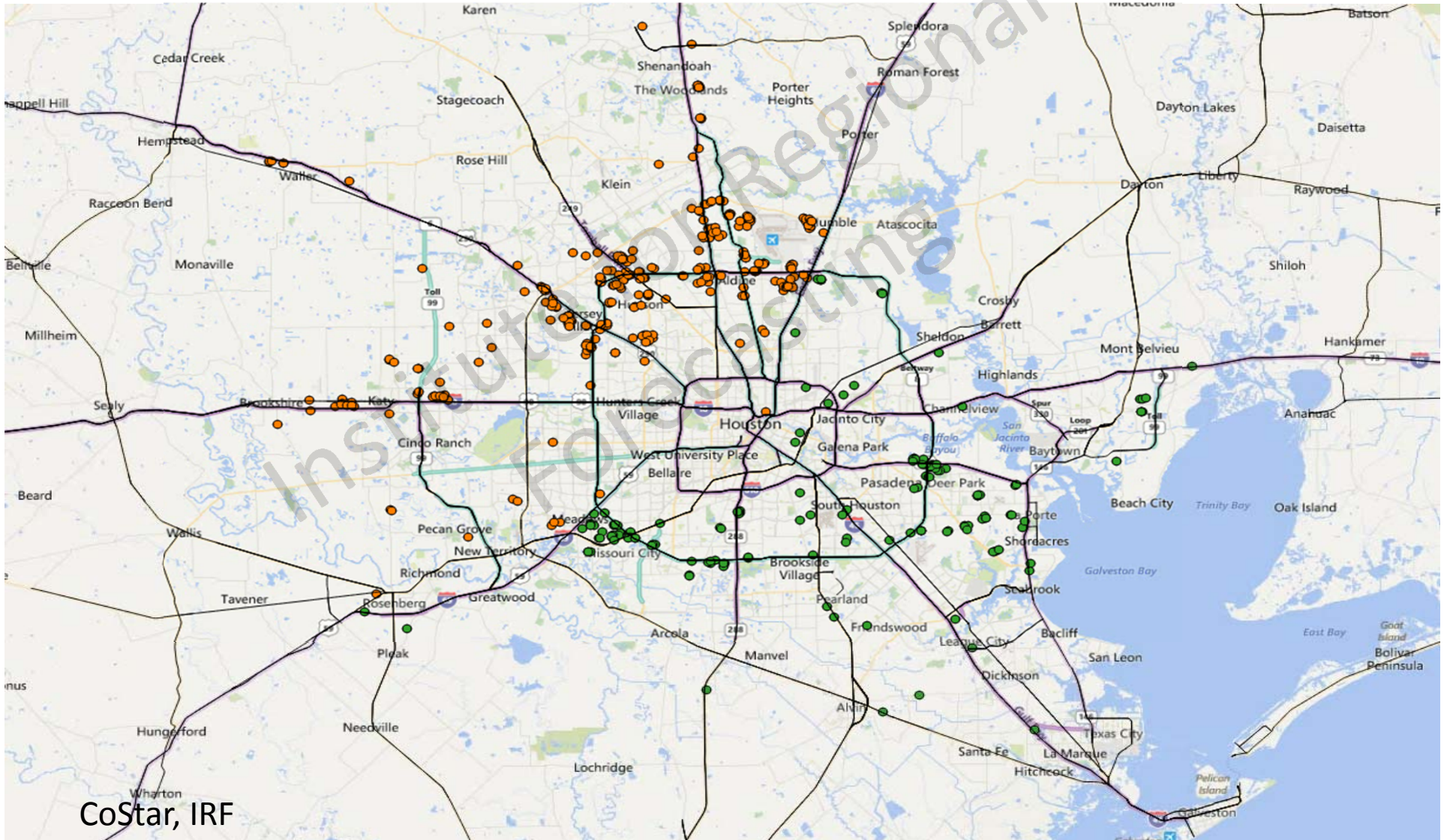


CoStar, IRF

Industrial Thriving in East, Pauses in the West

Institute for Regional
Forecasting

Industrial Buildings Delivered After 2010: East vs. West

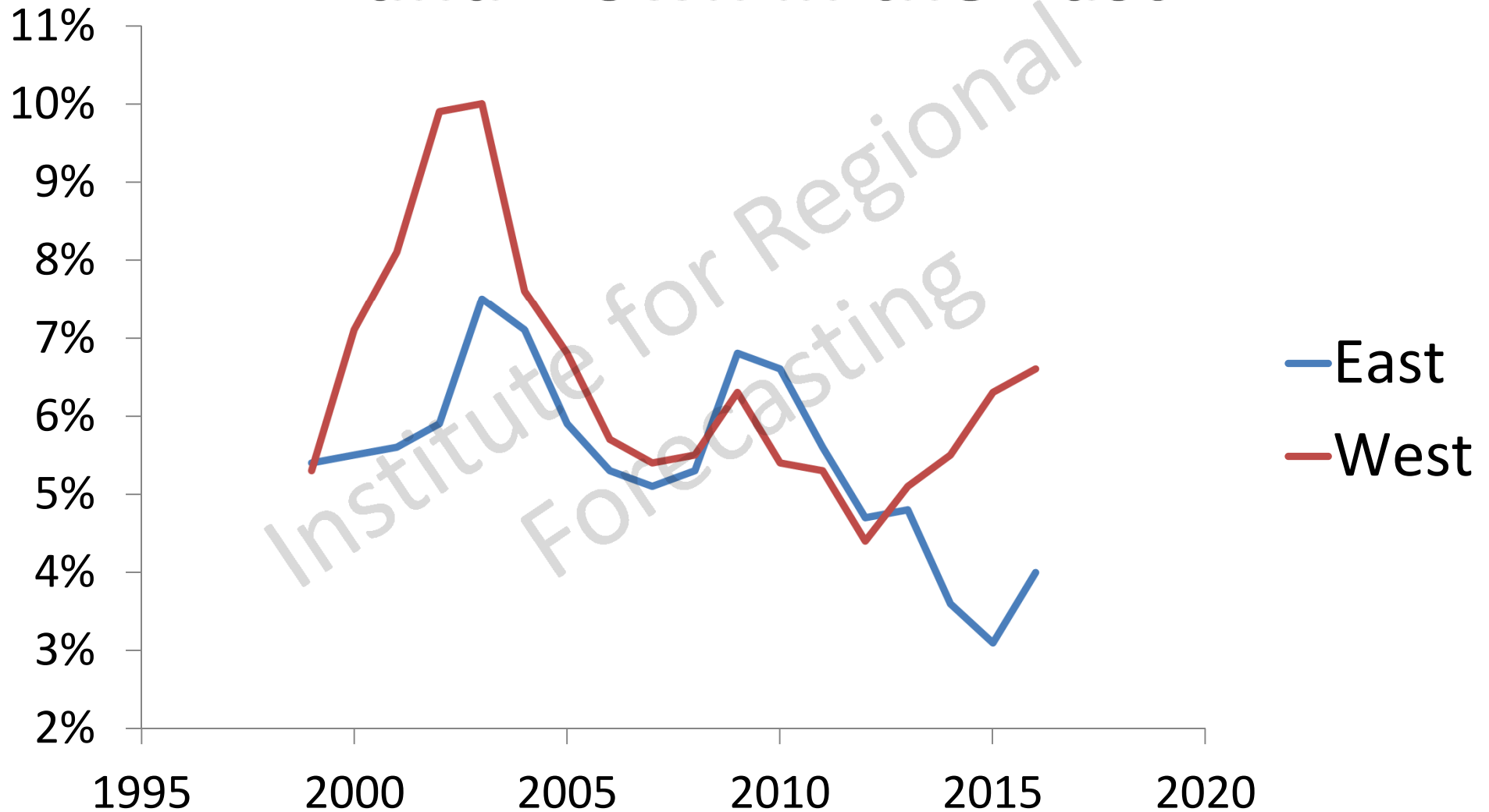


Deliveries: West Now Holds Steady While East Ramps Up

Year	RBA Delivered East	RBA Delivered West	Percent West
2010	559,217	2,003,106	78%
2011	380,214	1,864,422	83%
2012	1,738,112	2,848,026	62%
2013	1,566,298	6,320,350	80%
2014	1,940,699	6,754,671	78%
2015	3,349,933	7,736,091	70%
2016 (Includes Under Construction)	7,297,404	7,169,949	50%
Grand Total	17,041,877	35,526,615	68%

CoStar, IRF Geography

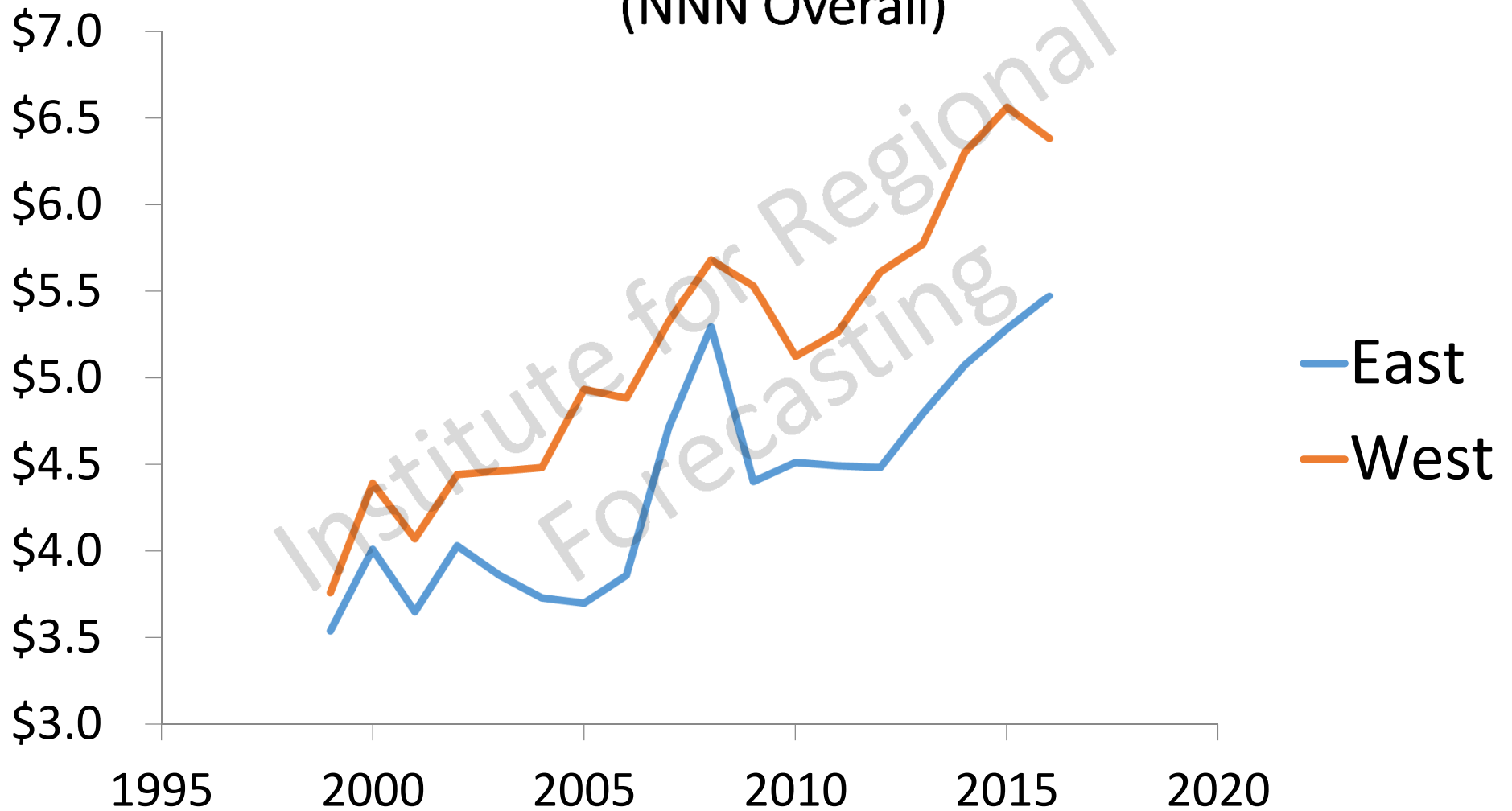
Vacancy Rates Trend Up in West and Down in the East



CoStar, 2016 YTD

Industrial Rents Pause in West and Rise in the East

(NNN Overall)

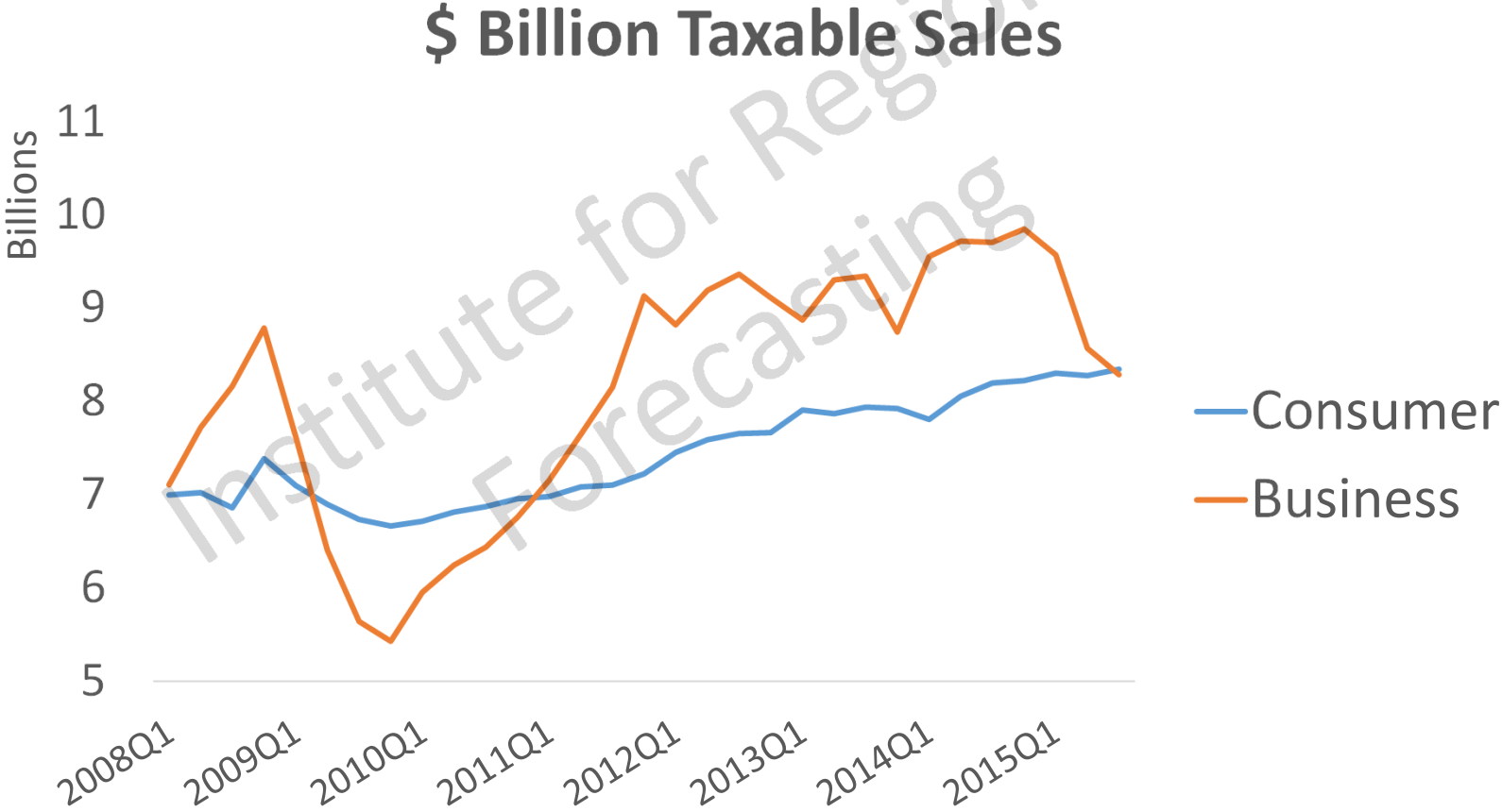


CoStar, 2016 YTD

Retail: Ready for the Recovery

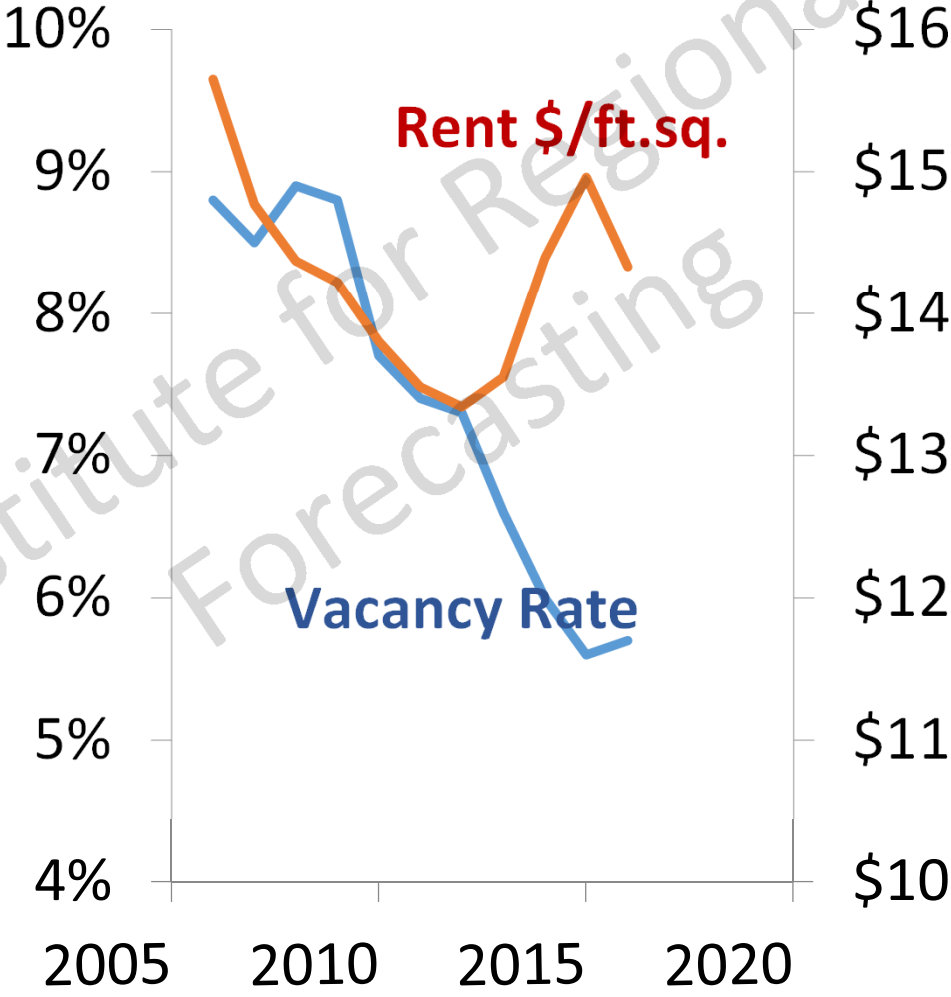
- Retail missed the boom of recent years after delivering 16 million square feet in 2006-07, just in time for the Great Recession
- It has been relegated in recent years to following the grocery store anchored shopping centers, chasing new home construction around the Grand Parkway
- Vacancy rates turned healthy and rents began to rise – but just in time for the current oil bust
- Retail sales continue to grow slowly, but is the market for new product is diversifying from grocery stores.
- The current construction pipeline is no threat to the market, growing more slowly than population. But definite signs of weakness are now showing up in some housing markets, and retail sales growth cut by half through 2015.

Consumer Taxable Sales Still Grow Slowly, Business Sales in Full Retreat



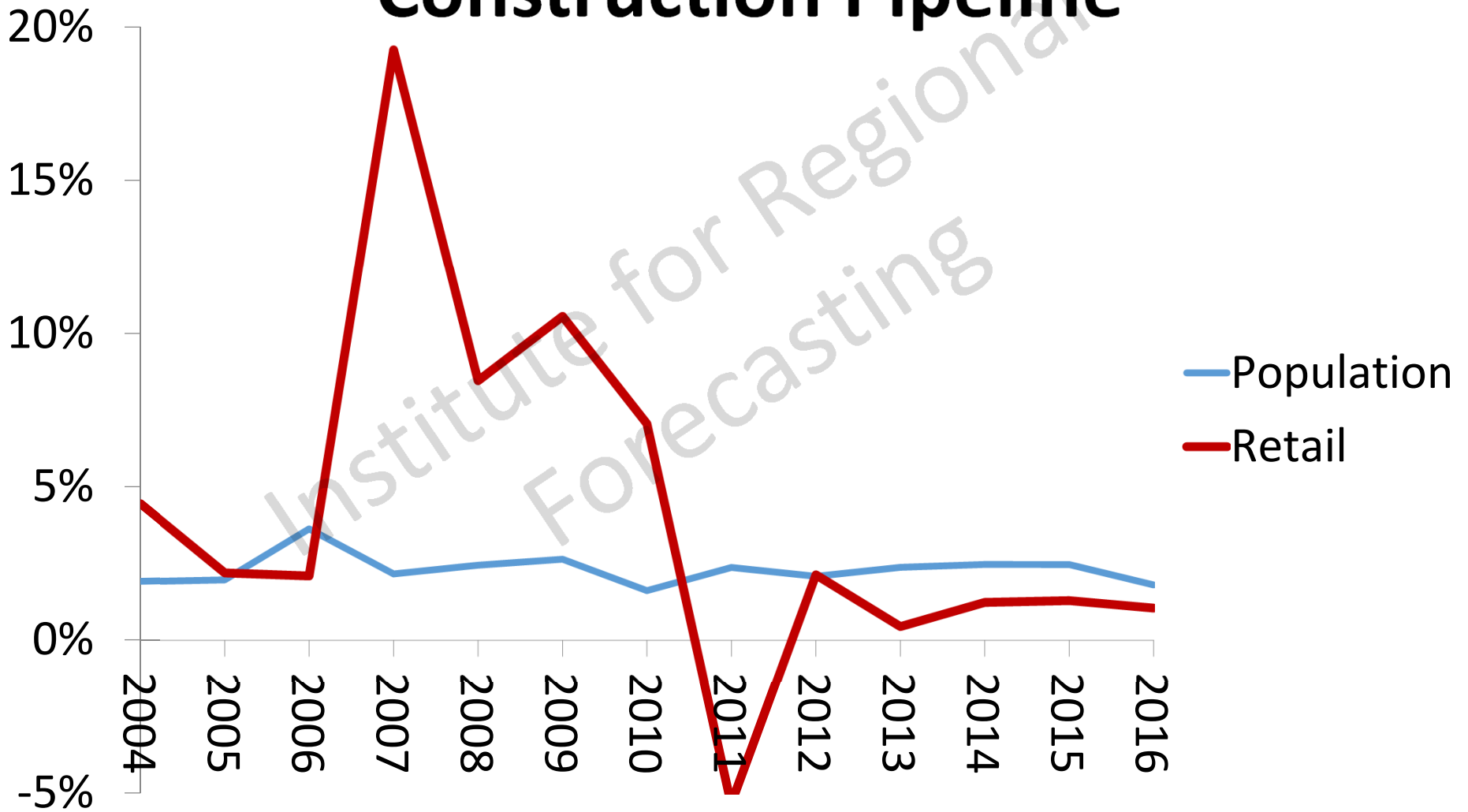
Texas Comptroller, data for City of Houston

But Rents and Vacancy Turned Just in Time for the Bust



CoStar, 2016 YTD

Retail Growth Will Continue to Lag Population Based on Current Construction Pipeline



CBRE, Texas A&M Real Estate Center, IRF Forecast



BAUER
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UNIVERSITY of HOUSTON

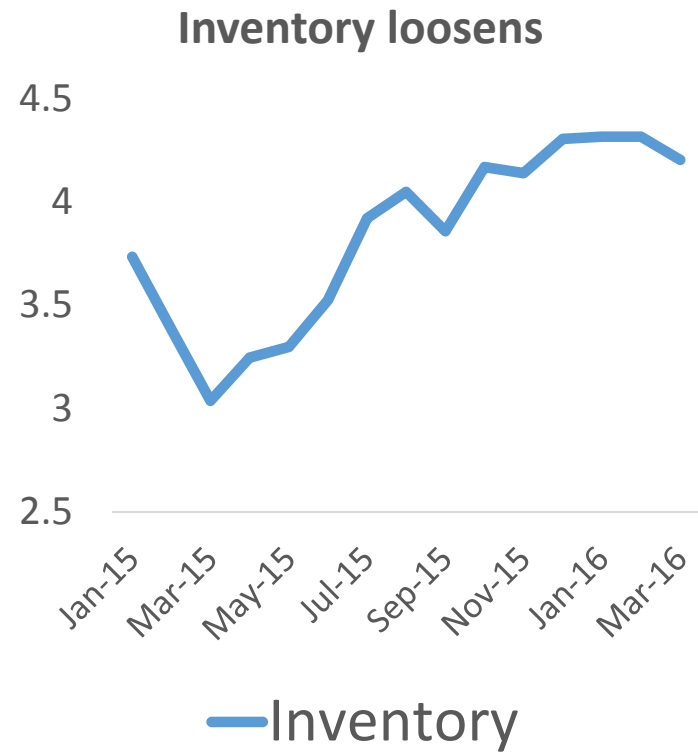
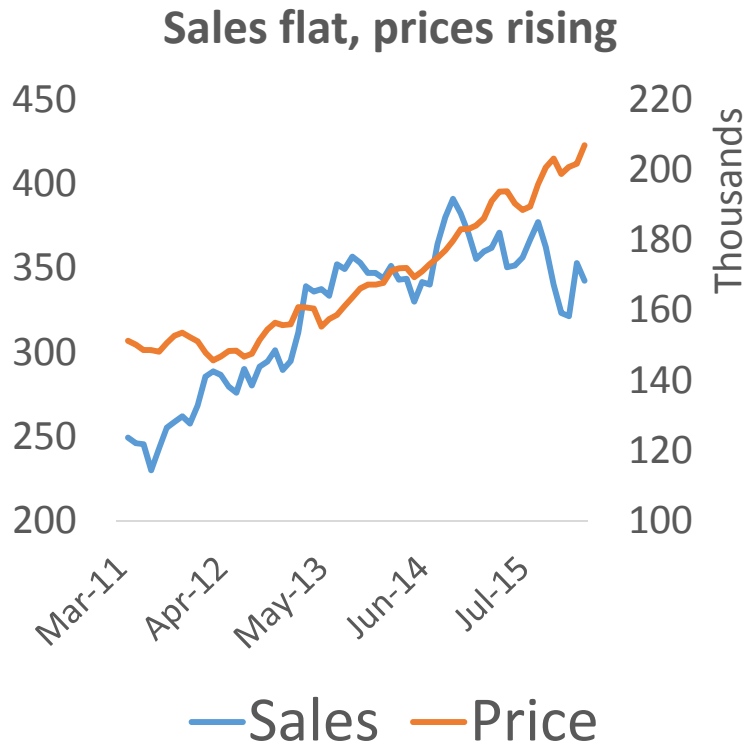
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Thank You for Attending

Please Join Us for Our Next Symposium on
Thursday, November 10, 2016
Registration Information in September

South Houston

South Belt, Clear Lake, League City

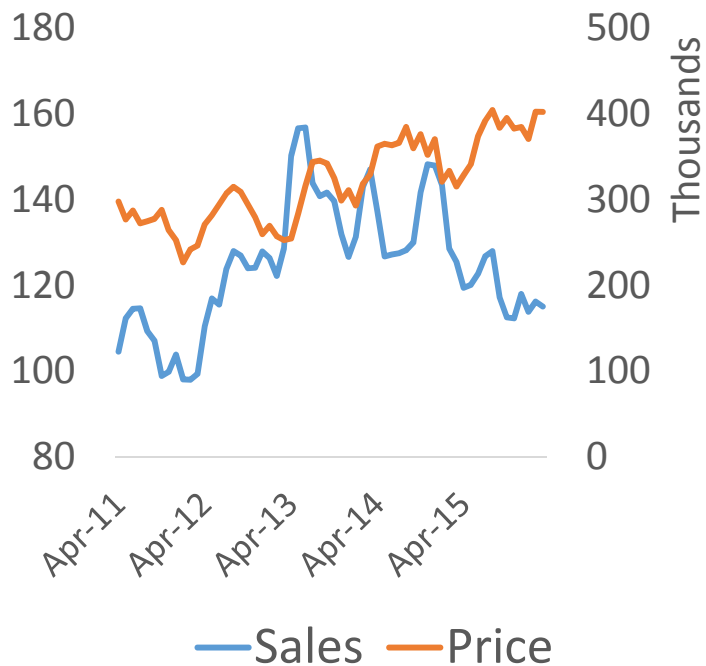


Source: Texas A&M Real Estate Center, calculations of IRF

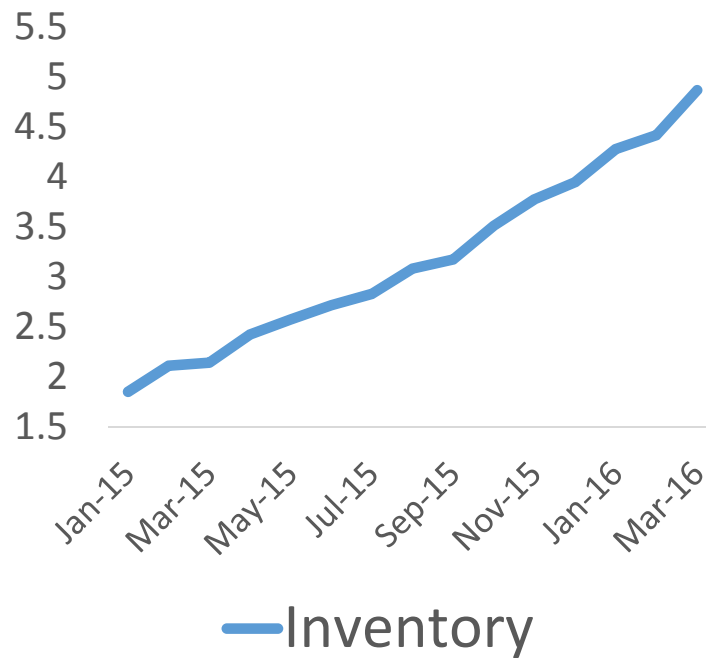
South of I-10

Memorial and Energy Corridor

Prices hold up despite sagging sales



Inventory rising steadily, growing pressure on price

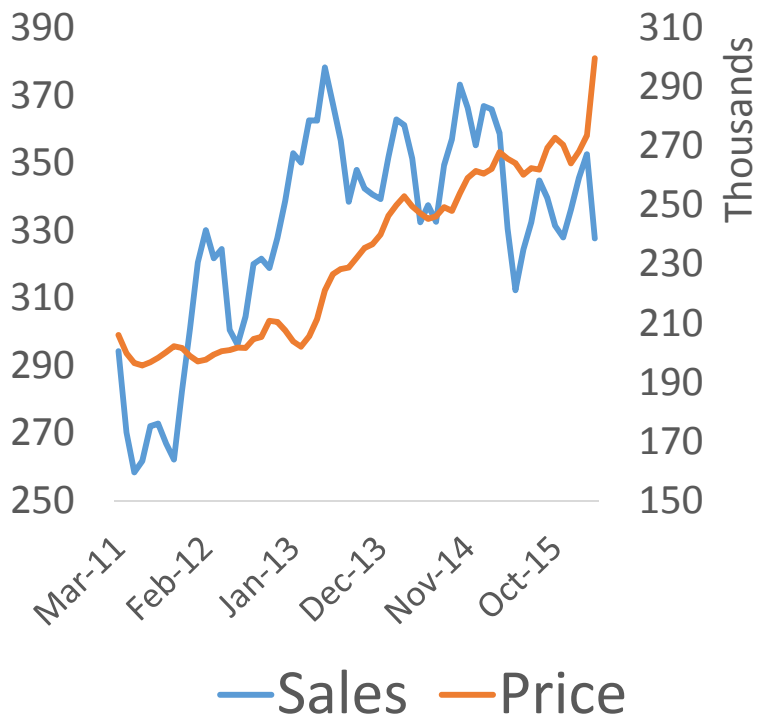


Source: Texas A&M Real Estate Center, calculations of IRF

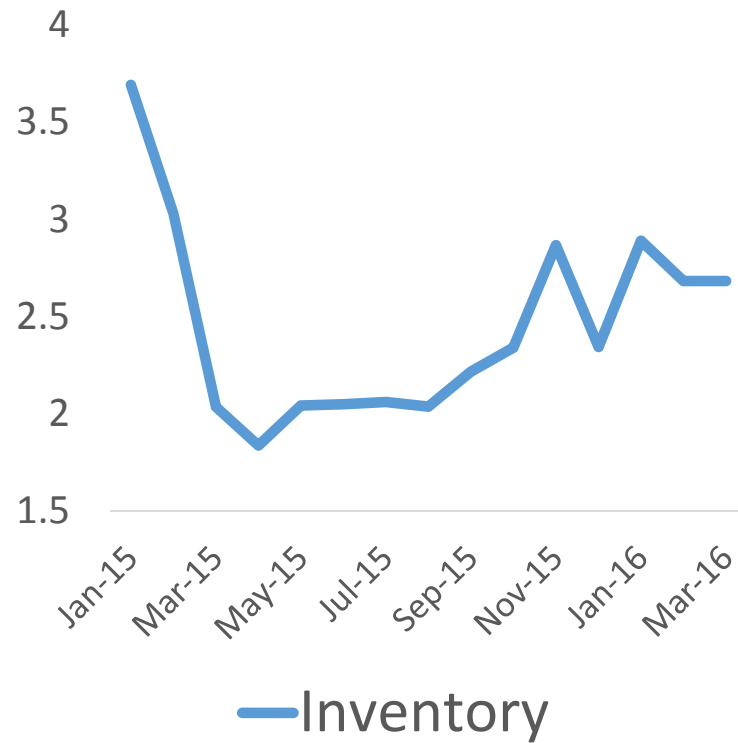
Katy

Katy North and South

Sales and price holding on

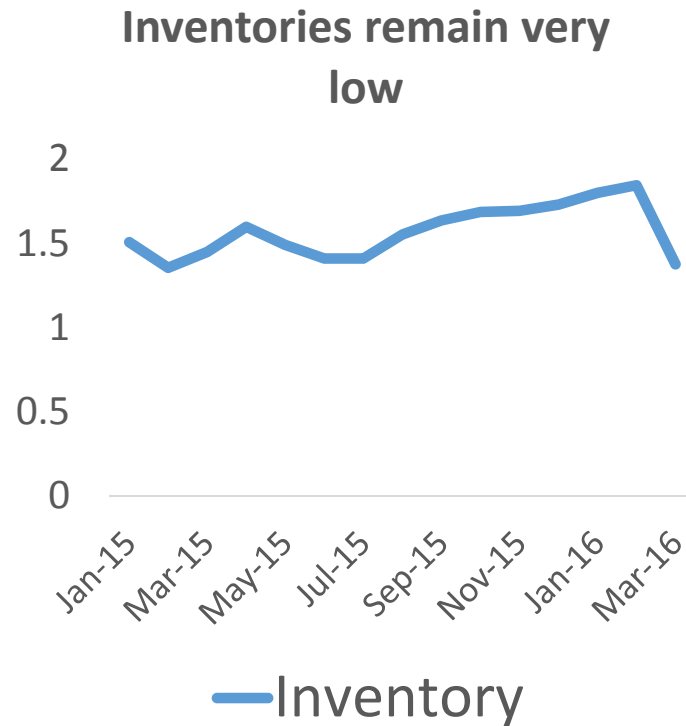
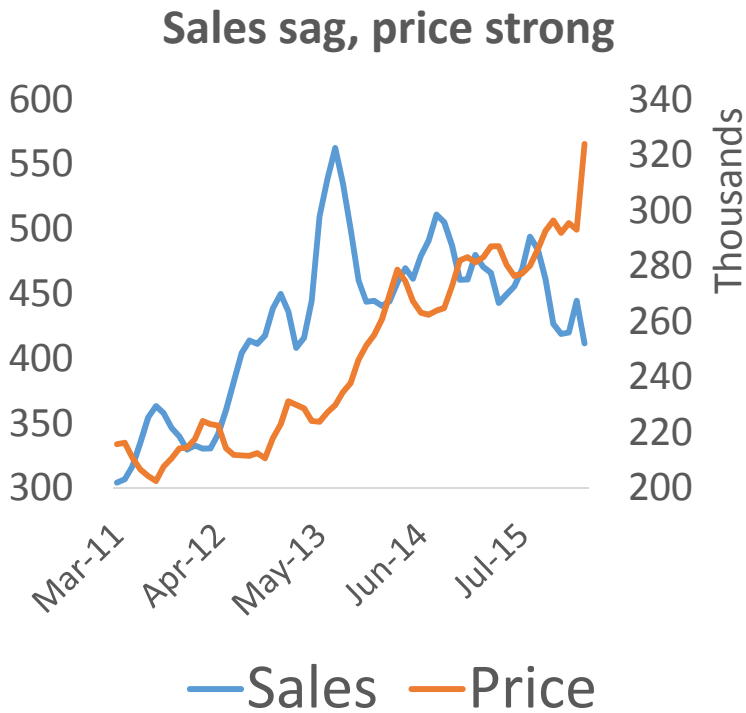


Inventories still low



Source: Texas A&M Real Estate Center, calculations of IRF

Other Distant Suburbs Pearland, Sugarland, Kingwood



Source: Texas A&M Real Estate Center, calculations of IRF