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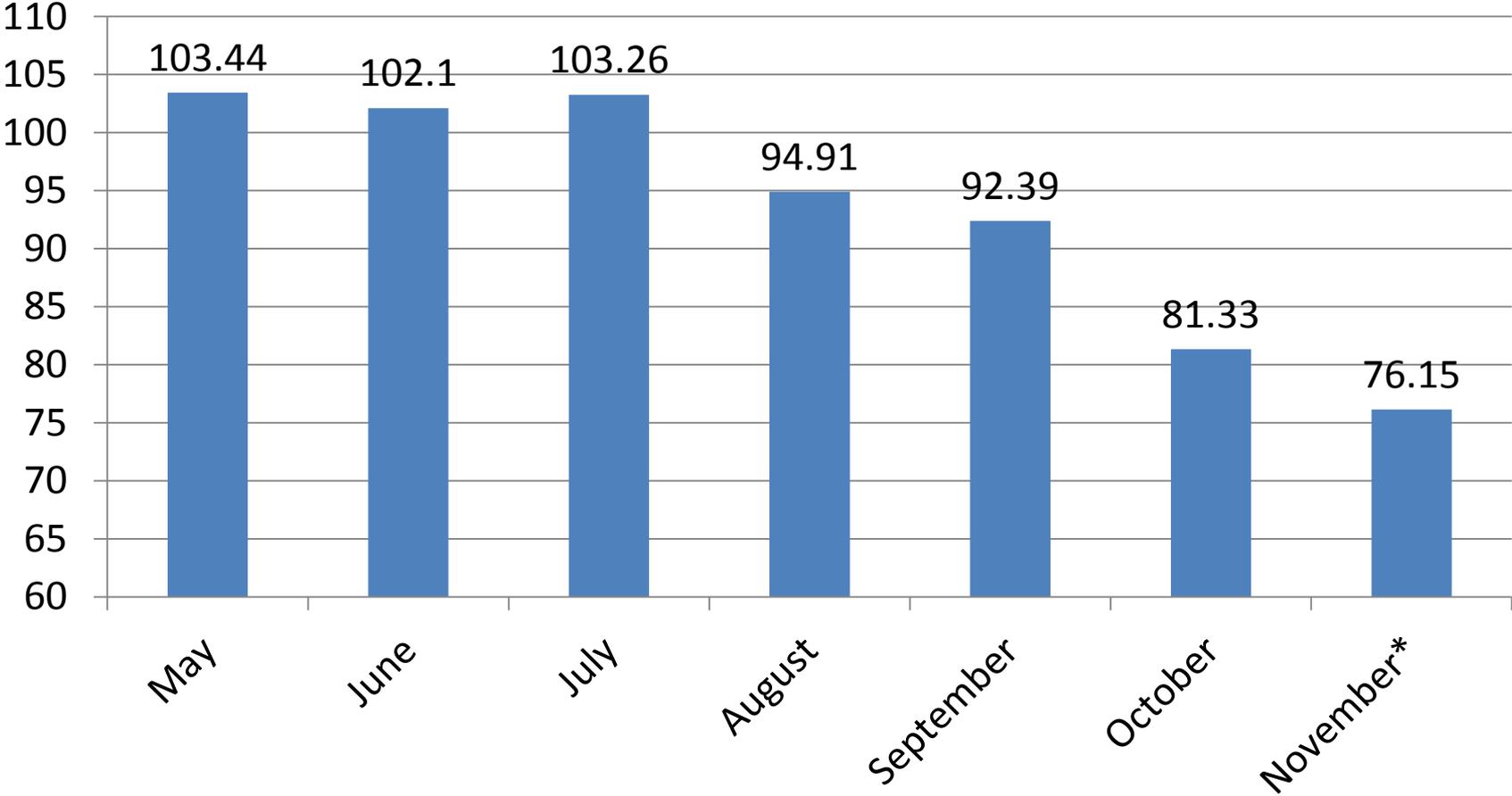
UNIVERSITY of HOUSTON

INSTITUTE FOR
REGIONAL FORECASTING

www.bauer.uh.edu/irf

A Lot Depends on the Price of Oil

(Price of WTI in \$/barrel)

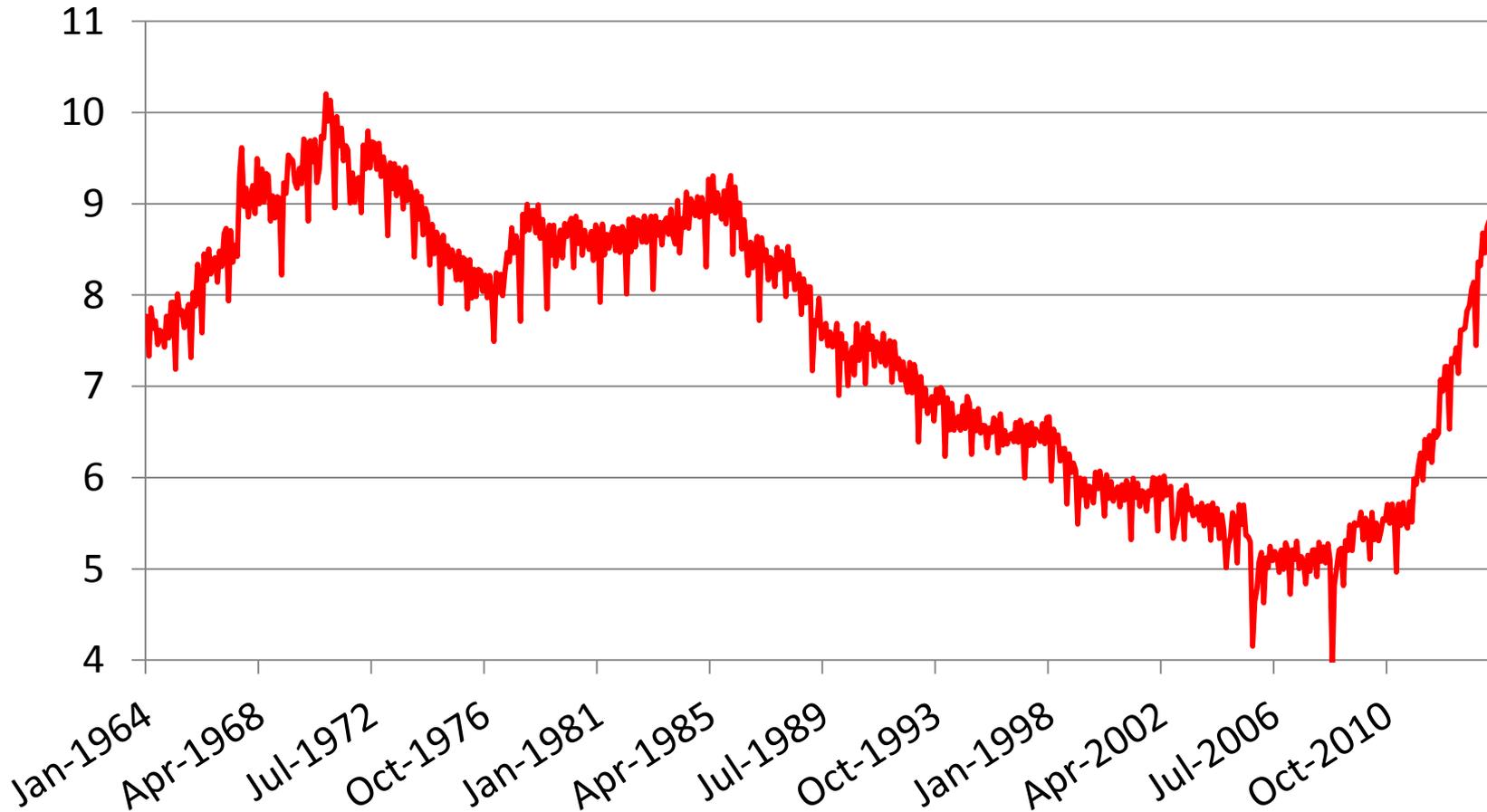


Near-term futures contract, last week of each month
November week ending Nov14

How Did We Get Here?

- Excess supply of crude oil
 - Increased U.S. production from the Gulf of Mexico and from shale
 - Sales by Libya and Iraq for revenue to fight insurgencies
 - Seasonal weakness/refinery turnarounds
- Weaker demand for crude
 - European recession and fear of deflation
 - Emerging market growth disappoints

Shale Reverses Over 40 Years of Declining U.S. Oil Production (million barrels/day)



Global Growth Sluggish in 2014-15

(% GDP Growth)

	2011	2012	2013	2014	2015
World	3.9	3.4	3.3	3.83	3.8
U.S.	1.8	2.3	2.2	2.2	3.1
Europe	1.5	-0.7	-0.4	0.8	1.3
Japan	-0.7	1.4	1.5	1.6	1.1
	---	---	---	---	
China	9.3	7.7	7.7	7.4	7.1
India	6.3	4.7	5.0	5.6	6.4
Brazil	2.7	1.0	2.5	0.3	1.4

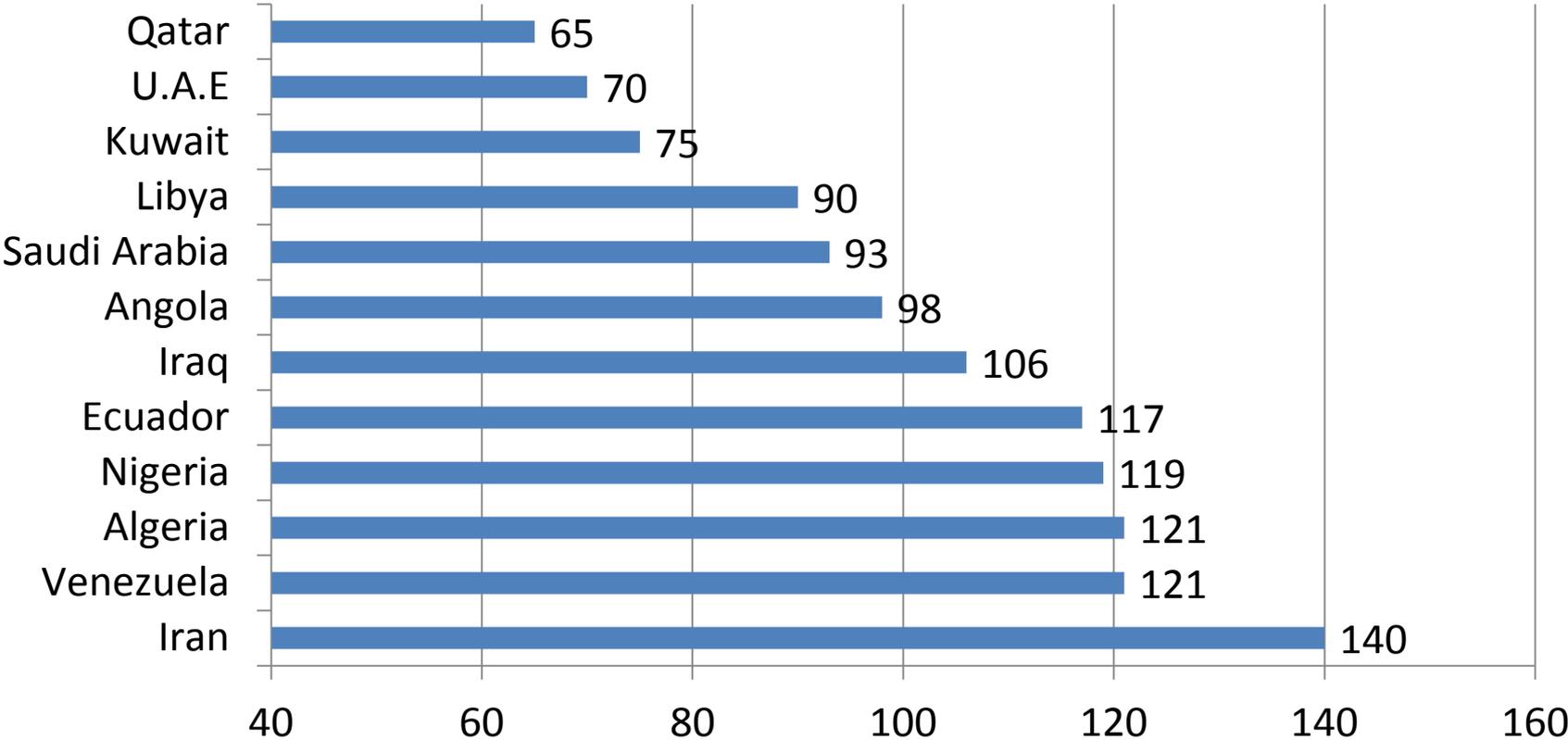
Source: IMF World Economic Outlook: Update, October 2014

The Saudi Revenue Dilemma

- Raise price/Lose market share or Cut price/Keep market share
- Short-term announcement: let price float between \$80 and \$90 per barrel with time limit of two years
 - Help their friends in the U.S. and – especially -- European economies
 - Punish their adversaries: Isis, Iran, Iraq, Venezuela, Russia
 - Force U.S. shale into the role of the swing producer

Breakeven Oil Price for 2014 OPEC Government Budgets

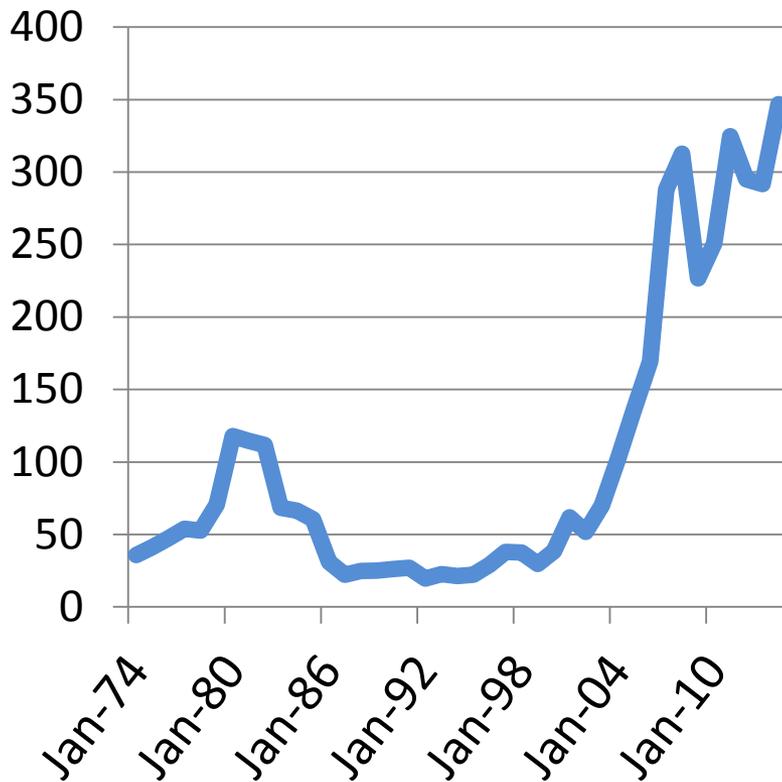
\$/bbl



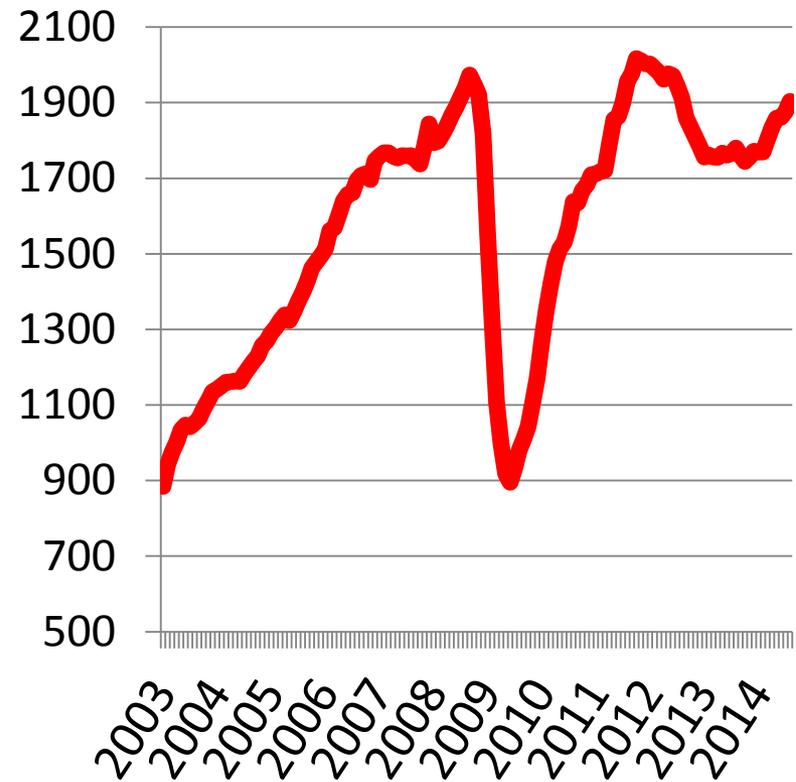
Deutsche Bank and the Wall Street Journal

E&P Spending Has Already Pulled Back From the 20 Percent Growth of the Last Decade

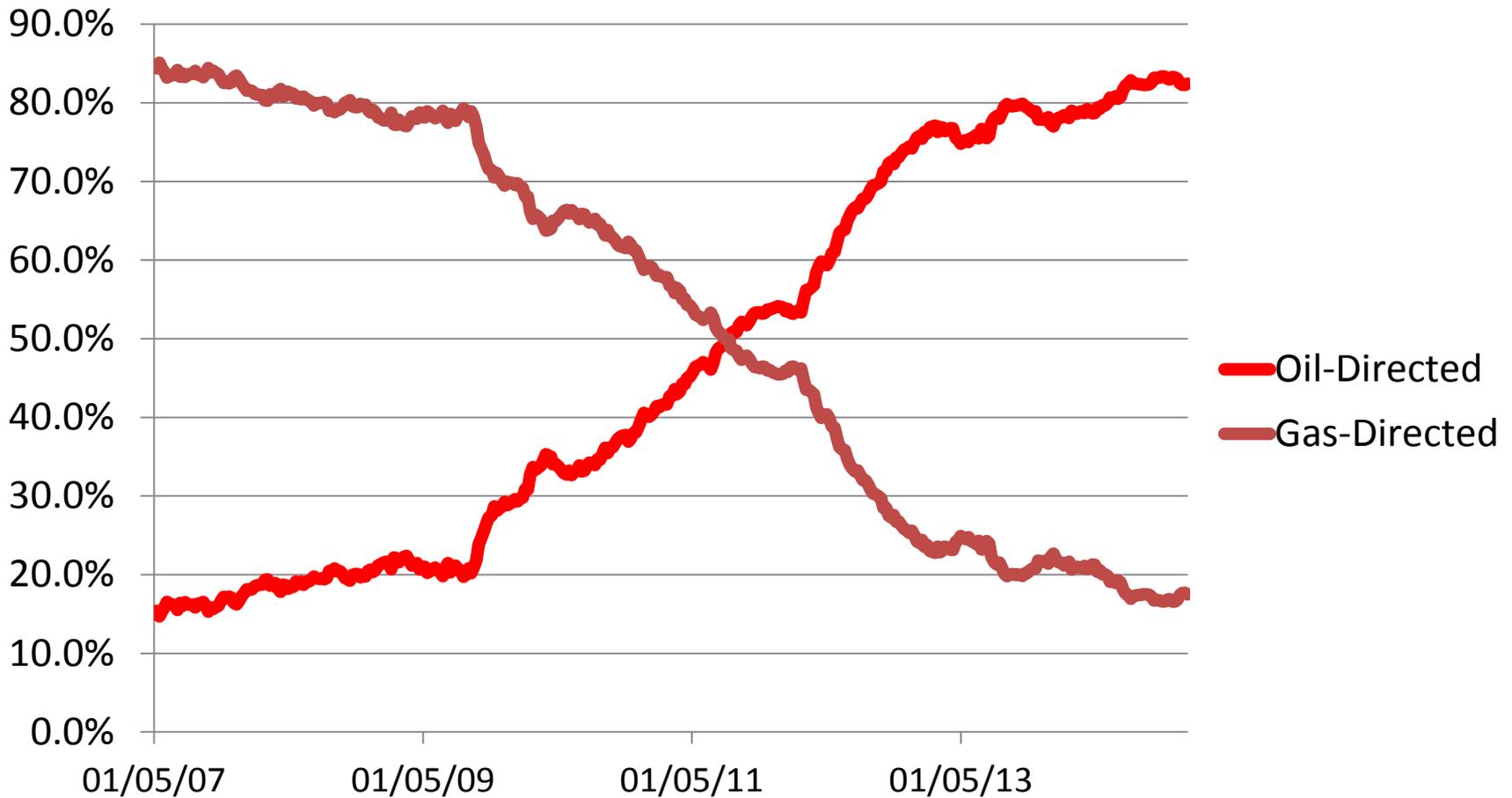
Real \$ billion capital expenditures



Baker Hughes rig count



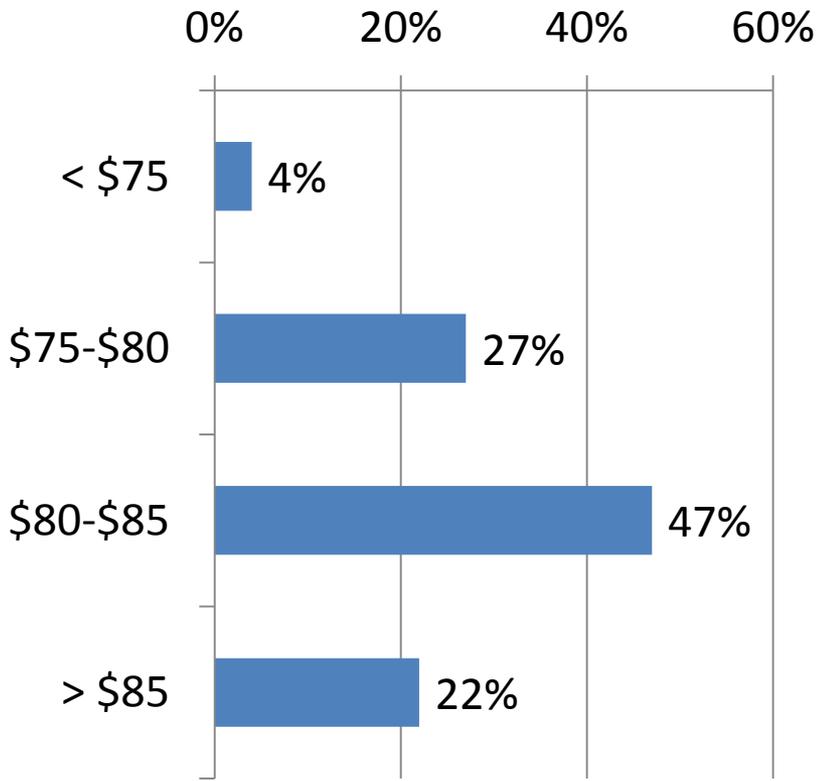
For Shale Drilling ... A Lot Depends on the Price of Oil



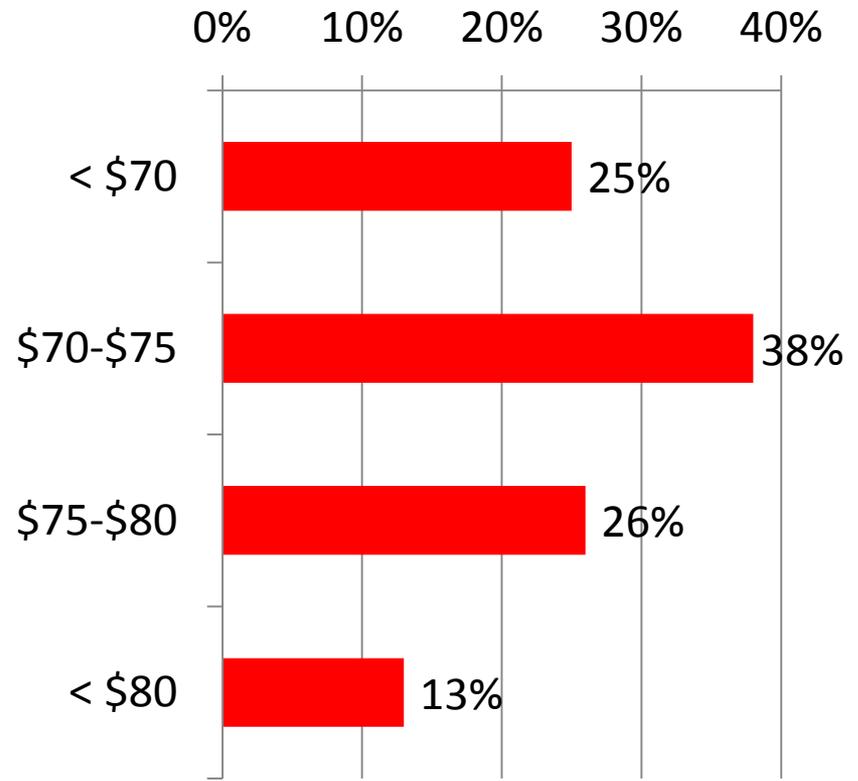
Baker Hughes

Crude Prices and Drilling Plans

What crude price do you use to set forward drilling plans?



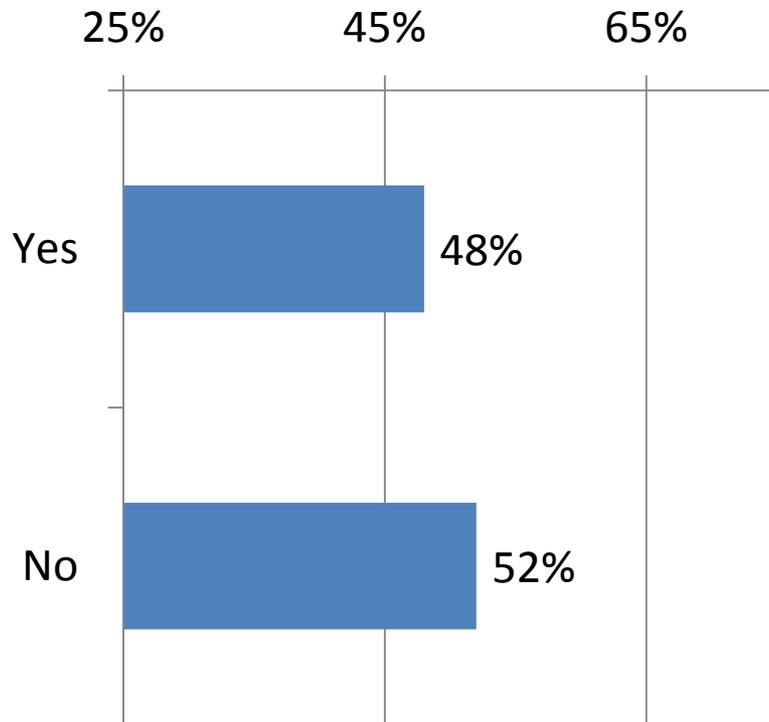
At what price will you cut your drilling plans?



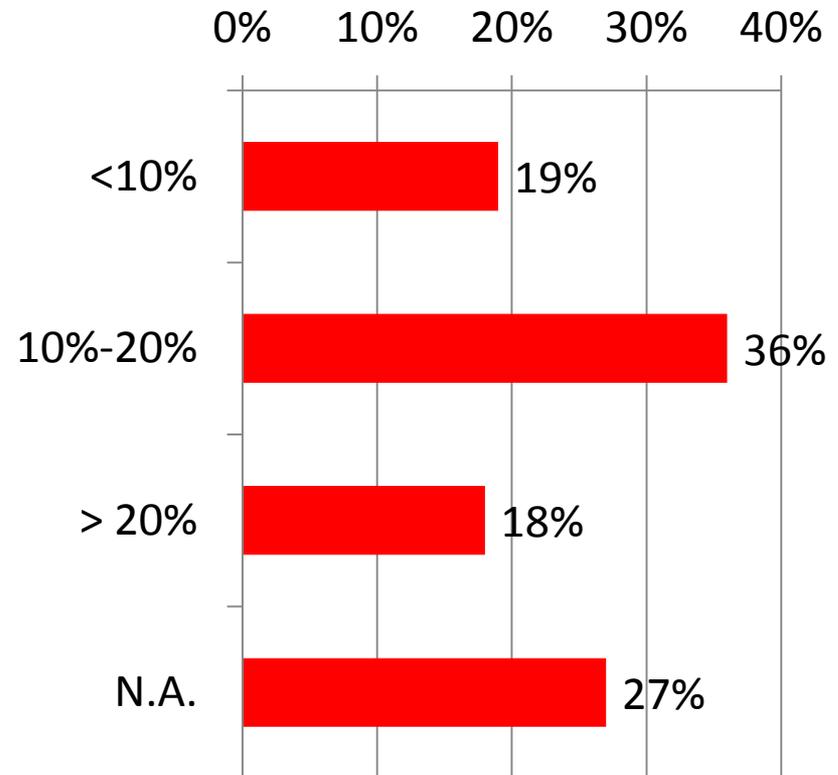
Tudor, Pickering, Holt industry survey

How Much Will Drilling Plans Change at \$79 Per Barrel?

Would you change cap ex if crude averaged \$79/b in 2015?



How much would you cut cap ex compared to \$90/b in 2015?



Tudor, Pickering, Holt survey

Fracking Continues, but the Fracking Frenzy is Probably Over

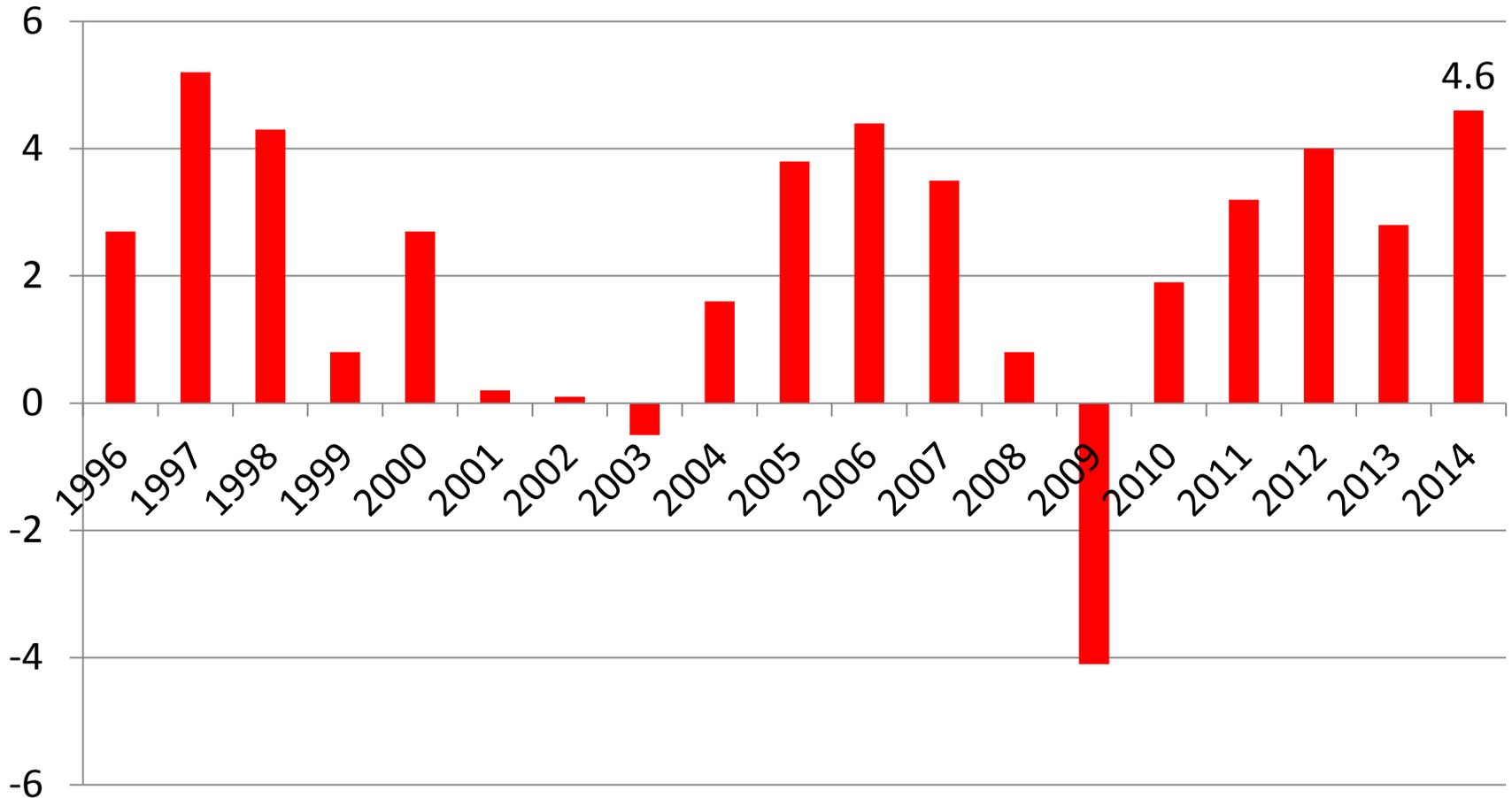
- At best, we have all now seen oil under \$75 per barrel -- and understand better that \$100 per barrel is a not fixture in oil markets
- Over the long term fracking is probably with us to stay. Even the Saudi's probably can't withstand the pain of killing it off
- Over the short-run, fracking activity slows as oil prices approach \$75-\$80 per barrel, begins to decline as oil prices slip under \$75

Houston Economy Looks Great in the Rear View Mirror

For Houston: The Energy Boom has Roared on Through 2014

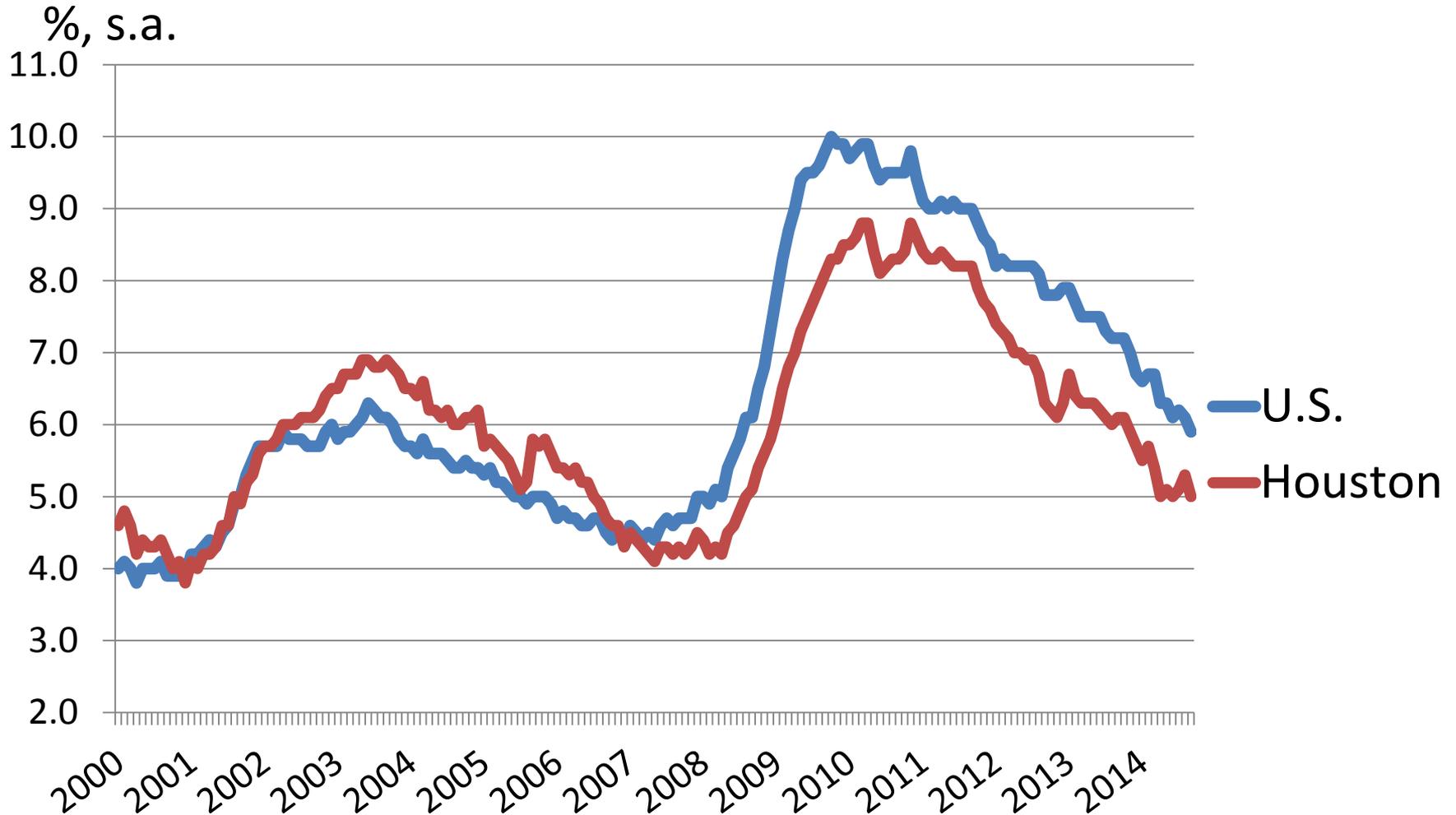
- We may add over 100,000 jobs in 2014, as the energy sector -- and excitement about oil and gas -- drove the economy forward
- Where did this excitement come from?
 - Last winter's polar vortex generated billions in revenues for natural gas producers
 - With \$100 oil, producers put the 2012 collapse in natural gas price behind them. Going into 2015, the fracking fleet was completely sold out
 - There is rush to construct billions in petrochemical and LNG projects in Houston and throughout the Gulf Coast

Houston Employment: Off to the Races Again in 2014



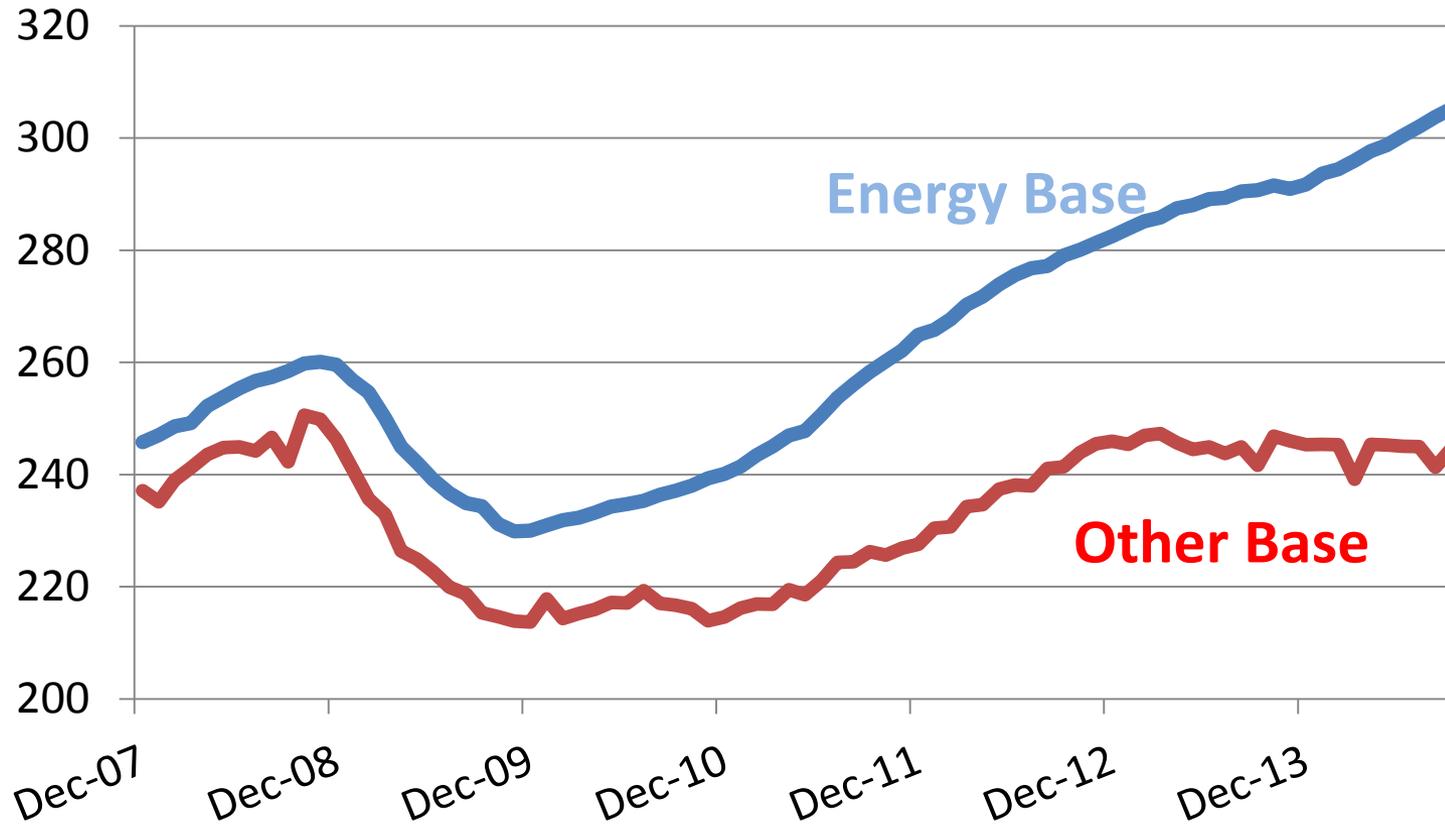
Note: December to December changes, except 2014 which is year-to-date, annualized and s.a.

Houston Unemployment Rate Falls on Strong Job Growth



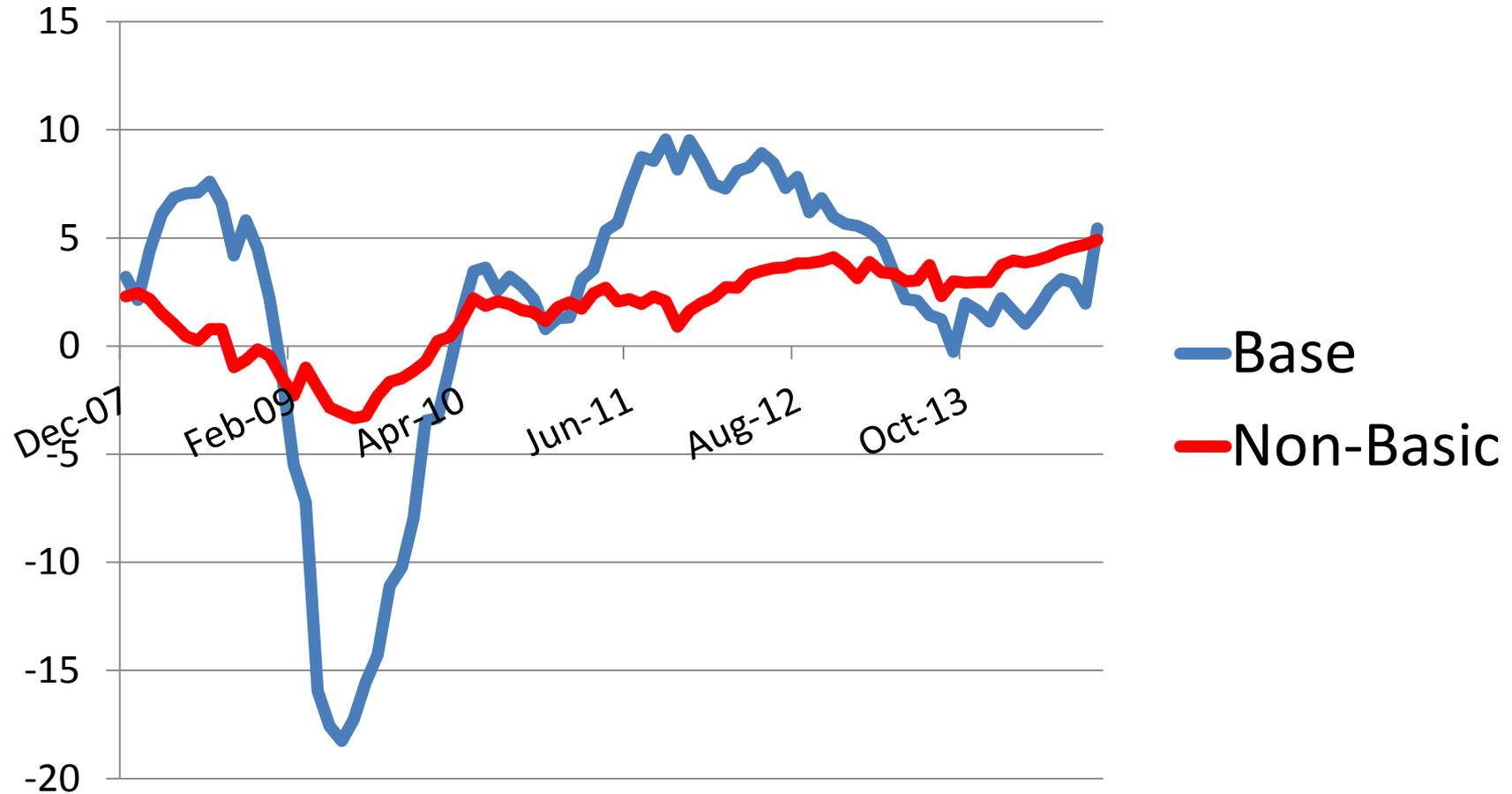
Bureau of Labor Statistics

Energy Has Led the Recent Expansion of Houston's Economic Base (Thousand Jobs)



While Overall Base Growth has Slowed, Non-Basic Growth has Picked Up

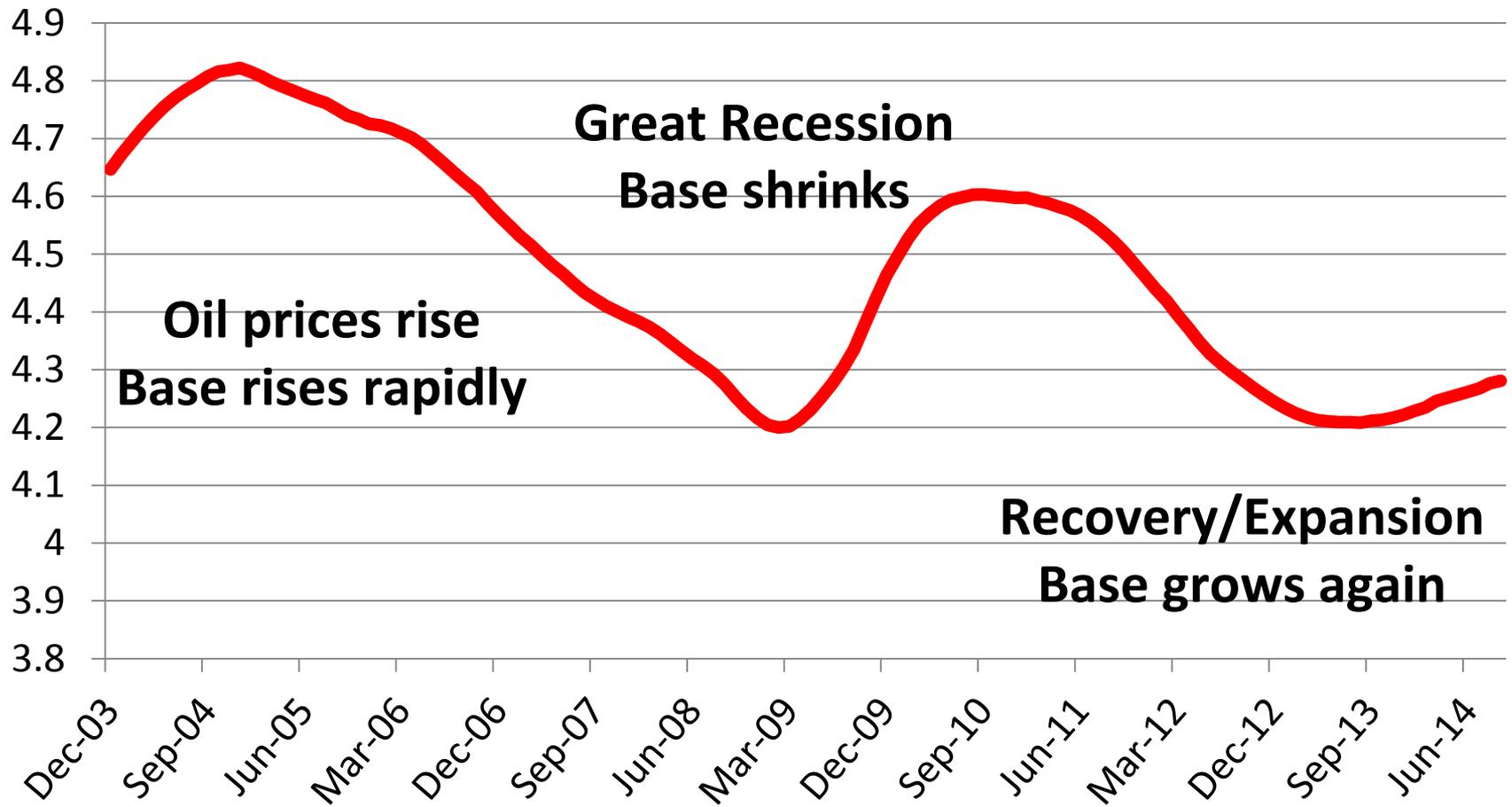
(6-mo percent change at annual rate)



Cheap Oil Puts the Rapid Growth in the Energy Base at Risk

- A one percent change in jobs in Houston's energy cluster means a change of 17,000 total local jobs
- There are several ways to cushion potential losses from lower oil prices
 - U.S. growth also brings jobs to Houston – with a one percent gain national employment bringing 30,000 local jobs
 - There is a large sector of downstream energy activity in Houston that benefits from cheap natural gas
 - Continued non-basic growth catch-up from the rapid growth of the last several years

Ratio: Payroll Employment to Base Employment



Today's Discussion?

- Oil prices and the outlook for fracking
- Recent growth in Houston
- Downstream construction provides a cushion against low oil prices
- Support comes from the U.S. economy as well
 - Stronger U.S. growth
 - The Fed and interest rates
- Two scenarios for Houston
- Residential and commercial real estate caught in the middle

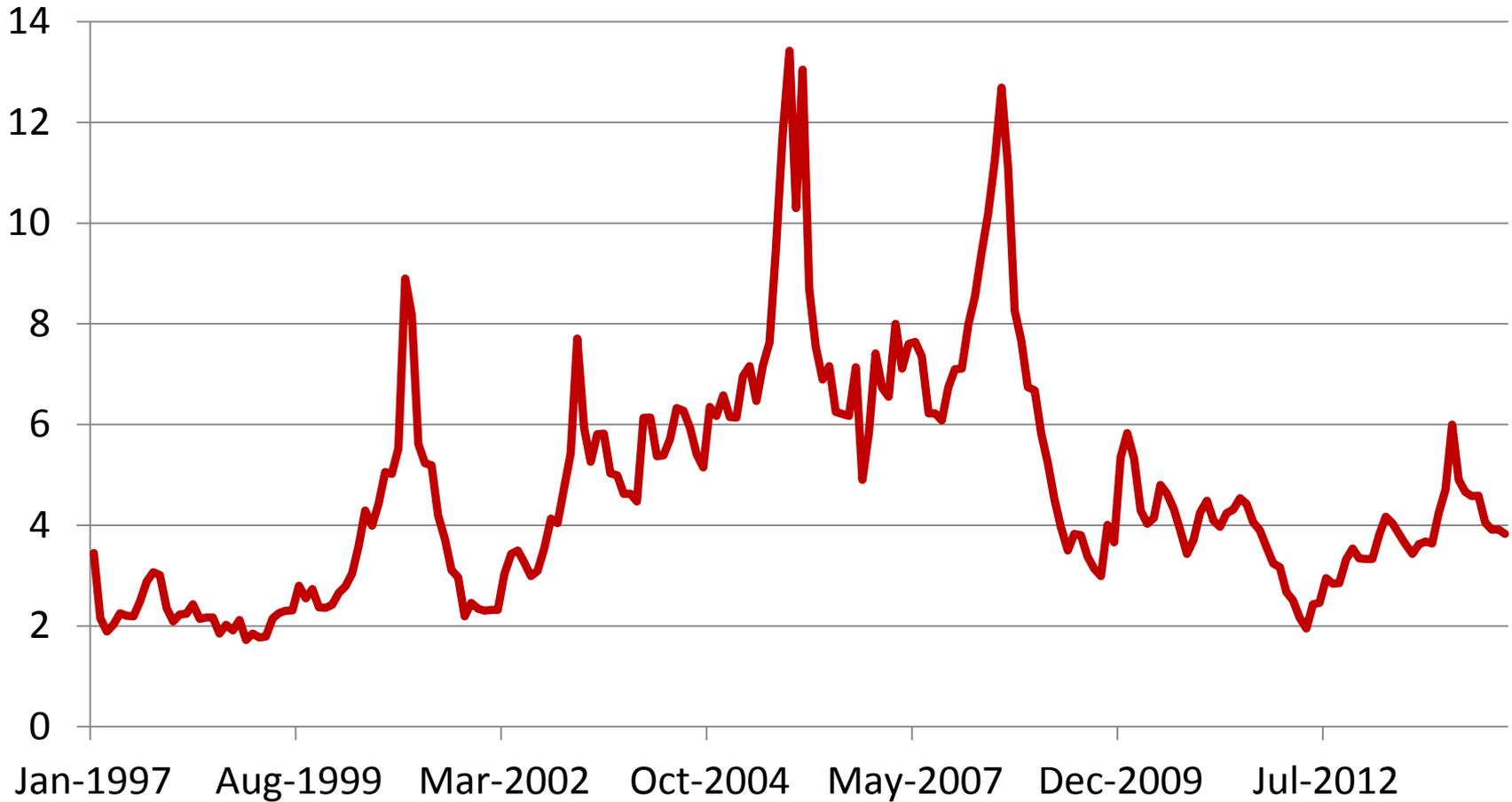
**Downstream Construction
Became a Force in 2014:
A Boom Built on Low Energy Prices**



Corpus Christi

GULF OF MEXICO

Natural Gas Prices Collapsed in Late 2011 (\$/mcf)

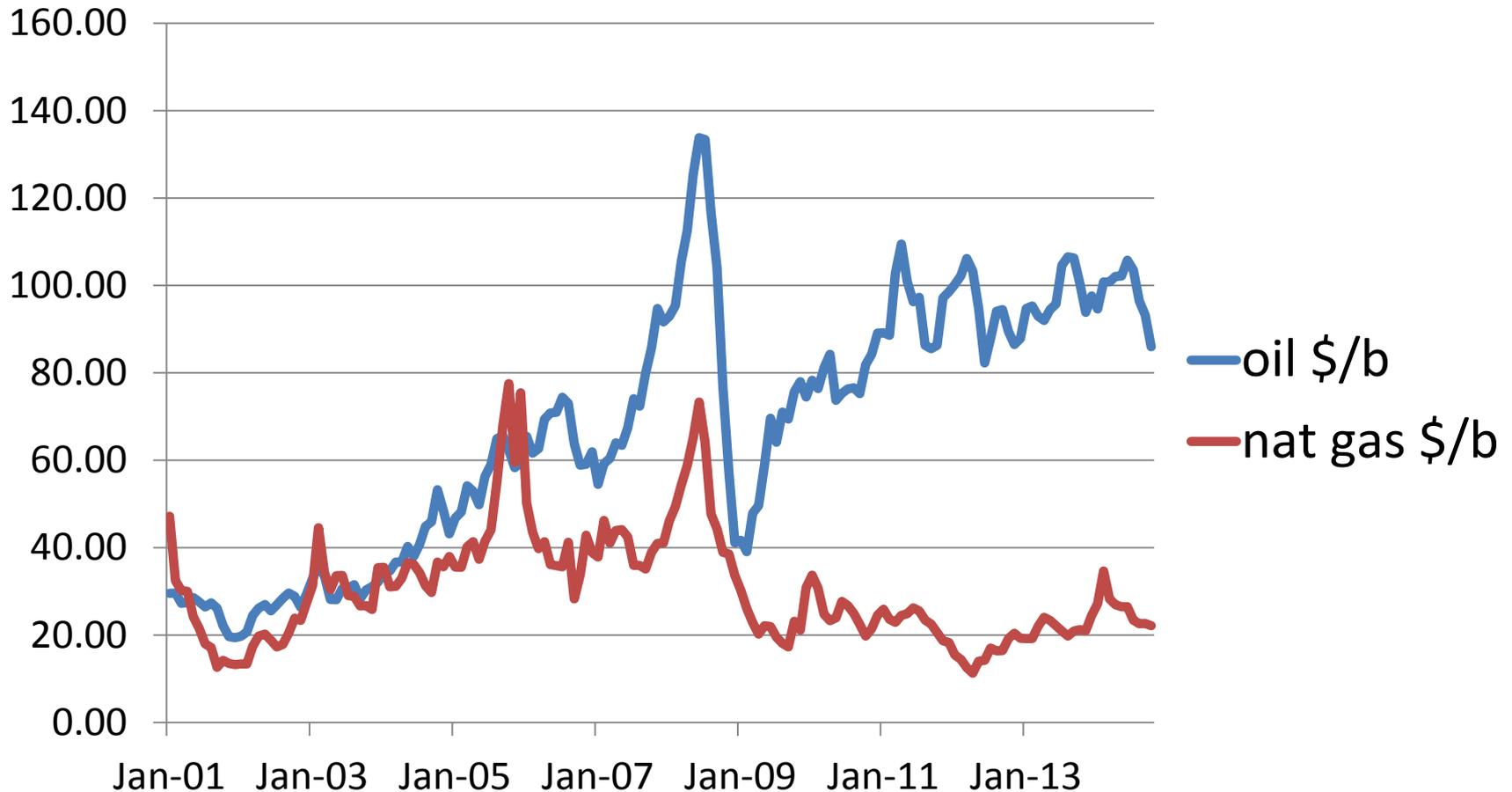


DOE/EIA

\$100 Billion U.S. Construction Boom is Based on Cheap Energy and Exports

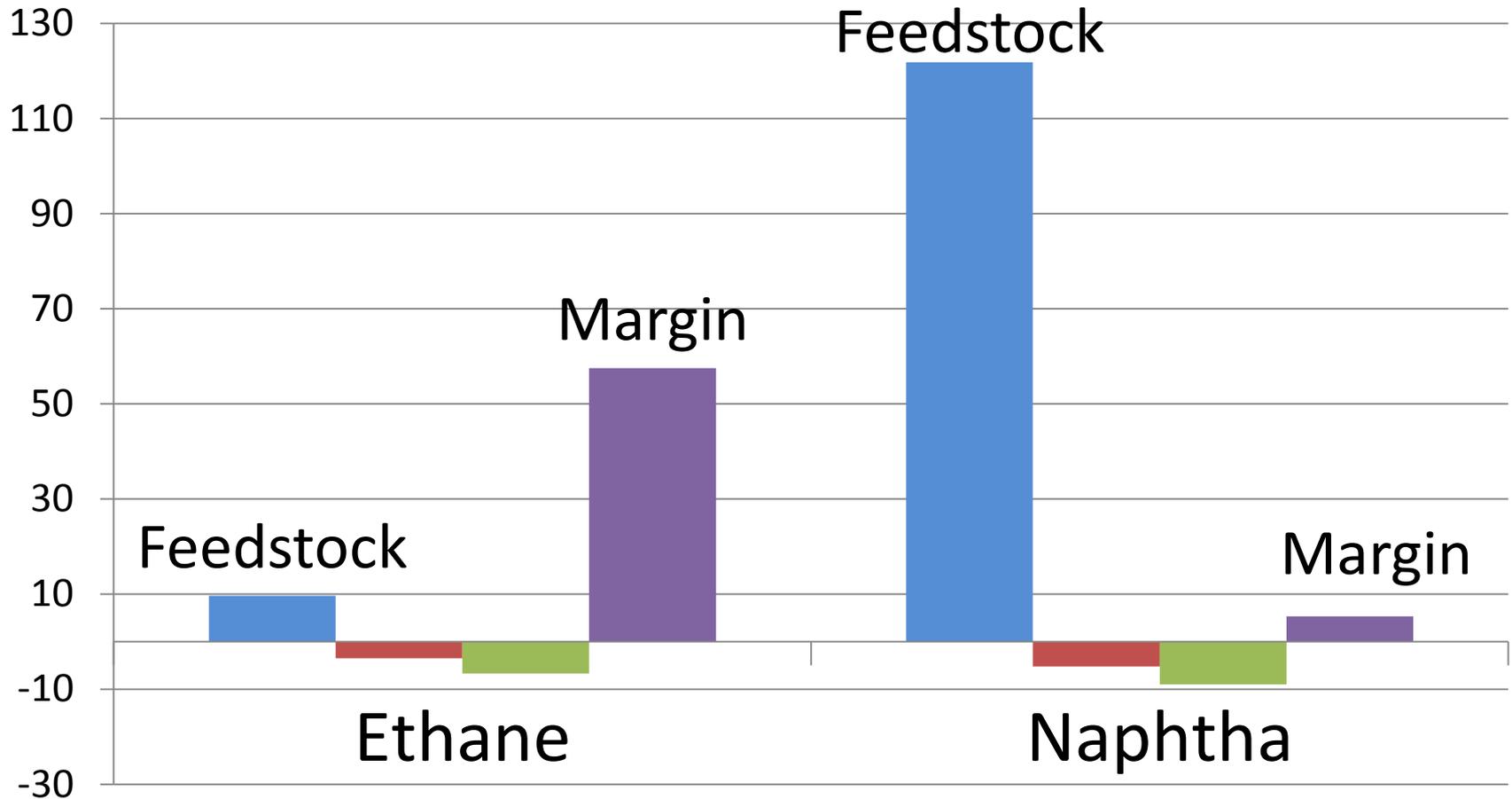
- Ten new ethylene crackers, more ethylene expansion, and downstream PE and other derivative plants
- LNG export terminals to sell surplus natural gas into global markets
- Gas processing facilities, natural gas liquid export terminals, pipelines and other basic infrastructure
- The Gulf Coast is the focus of this expansion

Natural Gas Energy Content Equivalent to \$20-\$40 per Barrel for Oil



DOE/EIA and calculations of the author

September Margins for Ethylene were 39 Cents per Pound in North America, -19 Cents Elsewhere



Muse, Stancil Cash Ethylene Margins, *Oil and Gas Journal*, 2013

Eight Ethylene Projects Proposed or Under Construction in or Near Houston

Company	Scale (thousand m tons/yr)	Location	Completion
ChevronPhillips	1,500	Baytown	2017
ExxonMobil	1,500	Baytown	2017
Dow	1,500	Freeport	2017
Sasol	1,500	Lake Charles	2018
Occidental	500	Ingleside	2017
Formosa Plastic	1,200	Point Comfort	2017
LyondellBasell	450	La Porte and Channelview	2016
Total S.A.	900	Port Arthur	Proposed

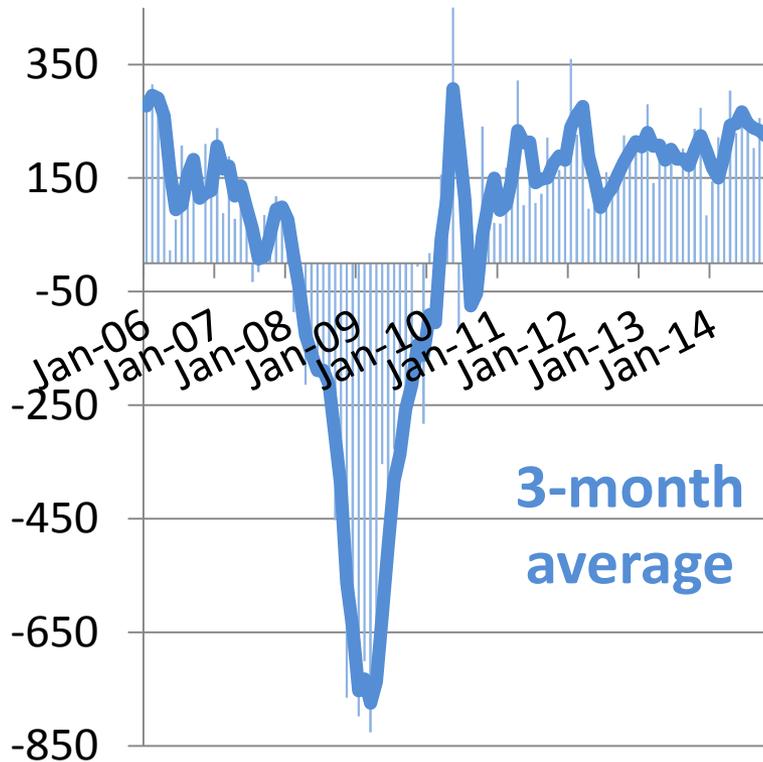
LNG Export Terminals Being Approved

- Over 40 applications for permits to DOE and/or FERC to export up to 42 Bcf/day
- Current global market only 11-12 Bcf/day, projected to 16 BCF/day by 2019. Even allowing for rigid weeding out of projects, and highly optimistic assumptions of global growth, proposed capacity additions are quite large
- But two projects are under construction in Freeport and Sabine Pass. The projects have a typical construction cost of \$10 billion and recent permit applications hope for initial operation in 2018 and 2019

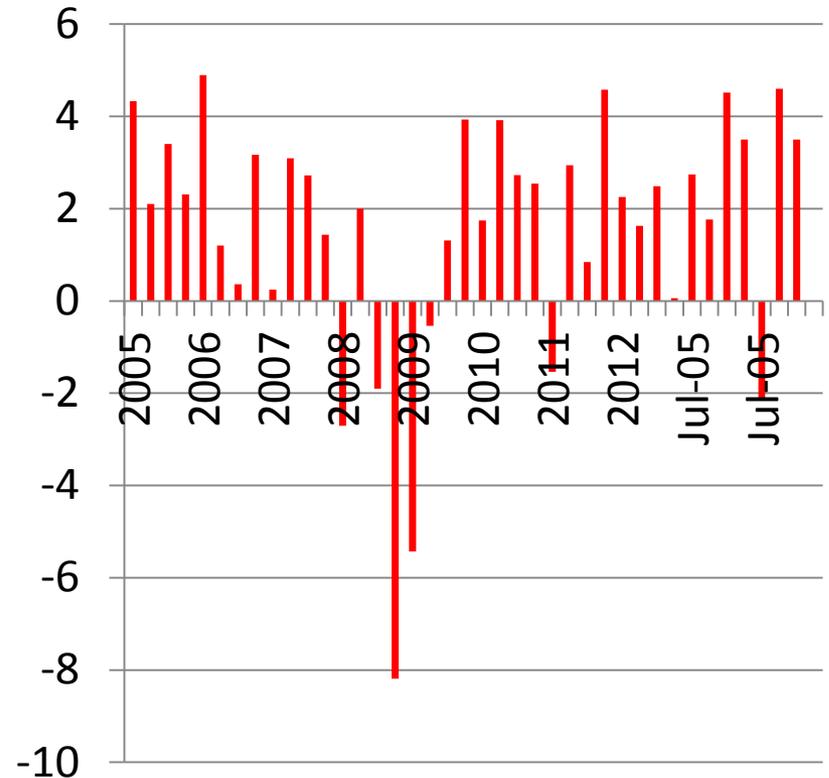
U.S. Economy Finally Returning to Health After the Financial Crisis

U.S. Economy Accelerates in the Past 6 Quarters

Monthly job growth (000/mo)



Growth in GDP (%-annual rate)

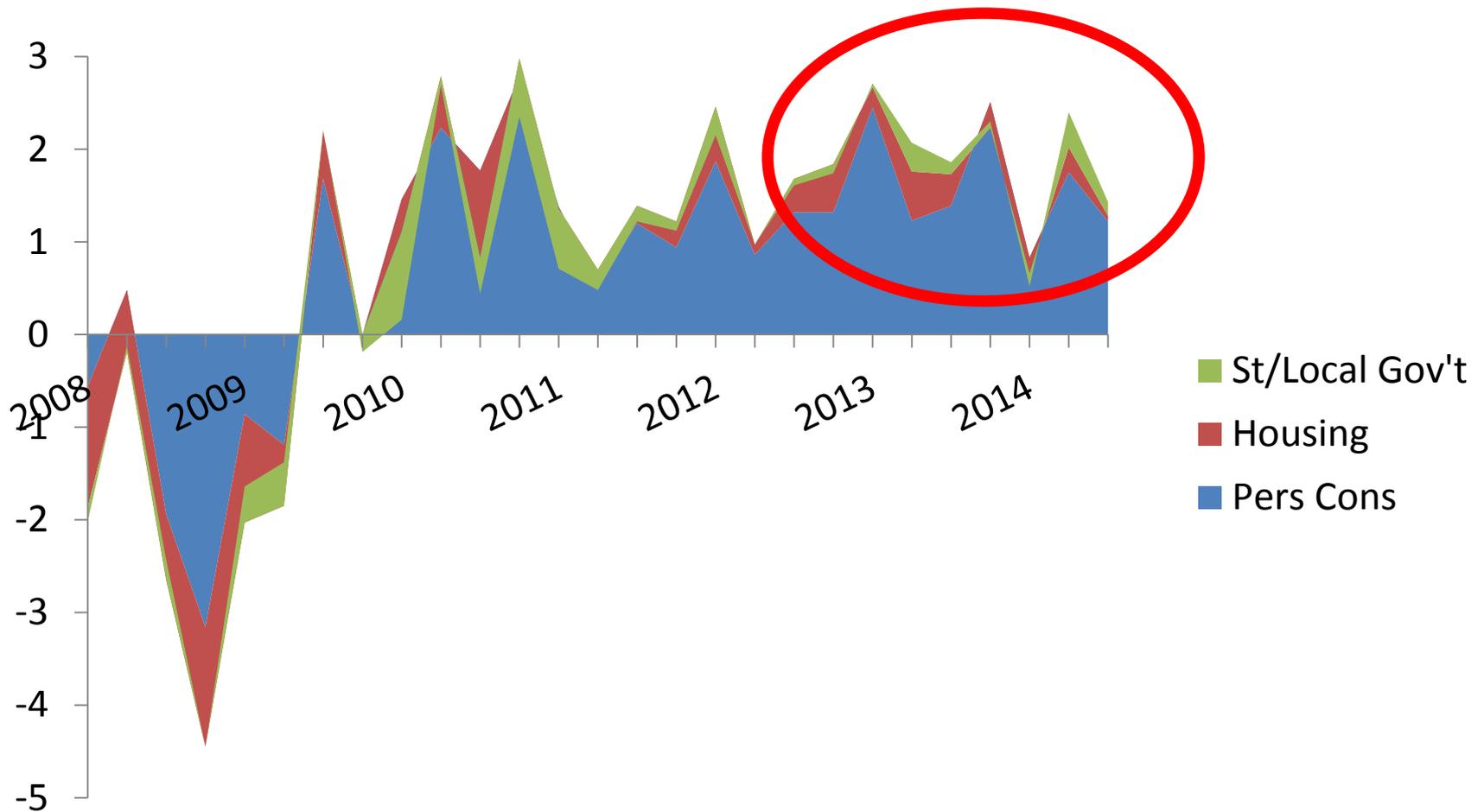


Percent Contribution to GDP Growth, 1990 to the Present

Period	GDP	Personal Consumption	Residential Construction	State & Local Gov't
90Q1 - 07Q3	3.0	2.2	0.1	.3
07Q4 - 14Q3	1.1	0.9	-0.3	-0.1
Last 7 Quarters	2.6	1.7	0.1	0.1

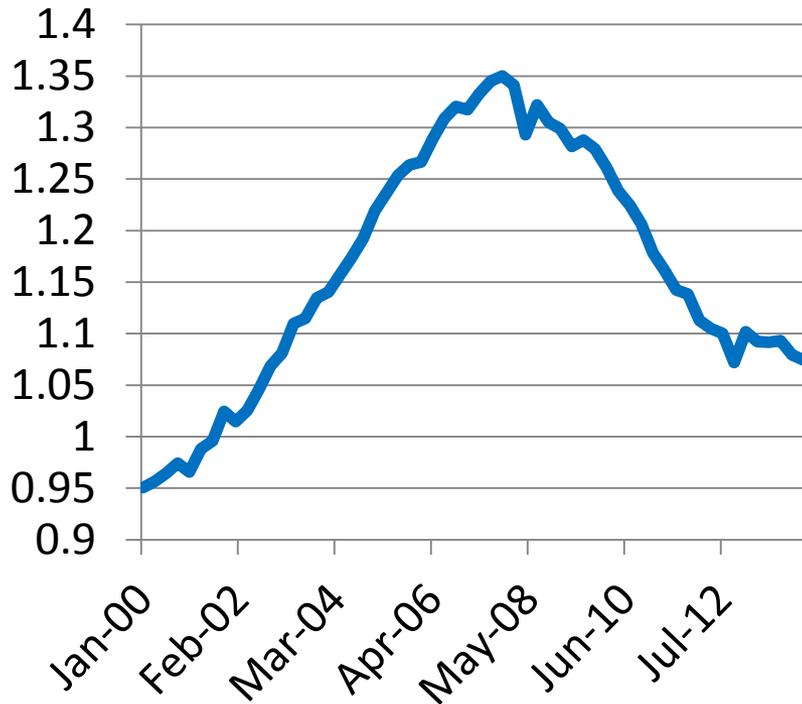
Missing Sectors Add to GDP Again

(percent contribution to GDP growth)



Consumer Makes Progress Reducing Debt after the Build-Up Post-2000

Ratio of debt to disposable income



Debt payments as a share of disposable income

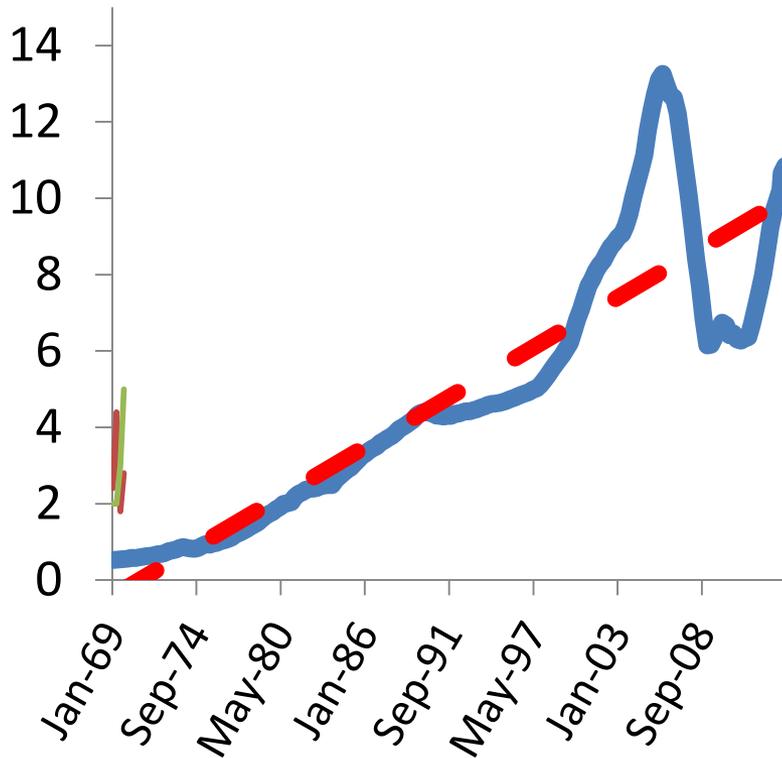


Federal Reserve Board, BEA

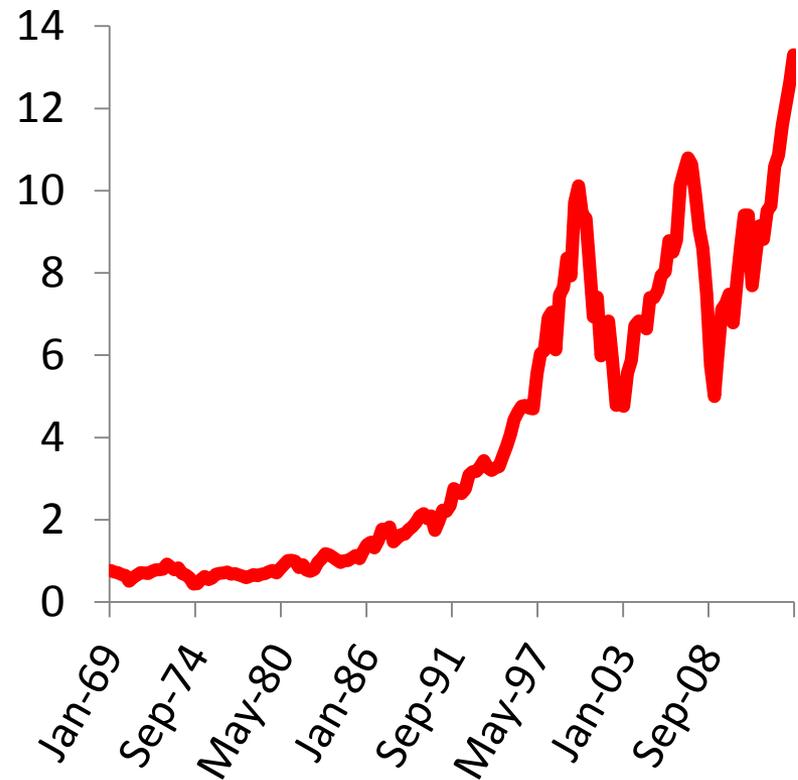
Wealth Builds Again in Home Equity and the Stock Market

(Trillion \$ 2009)

Home equity on a healthy trend

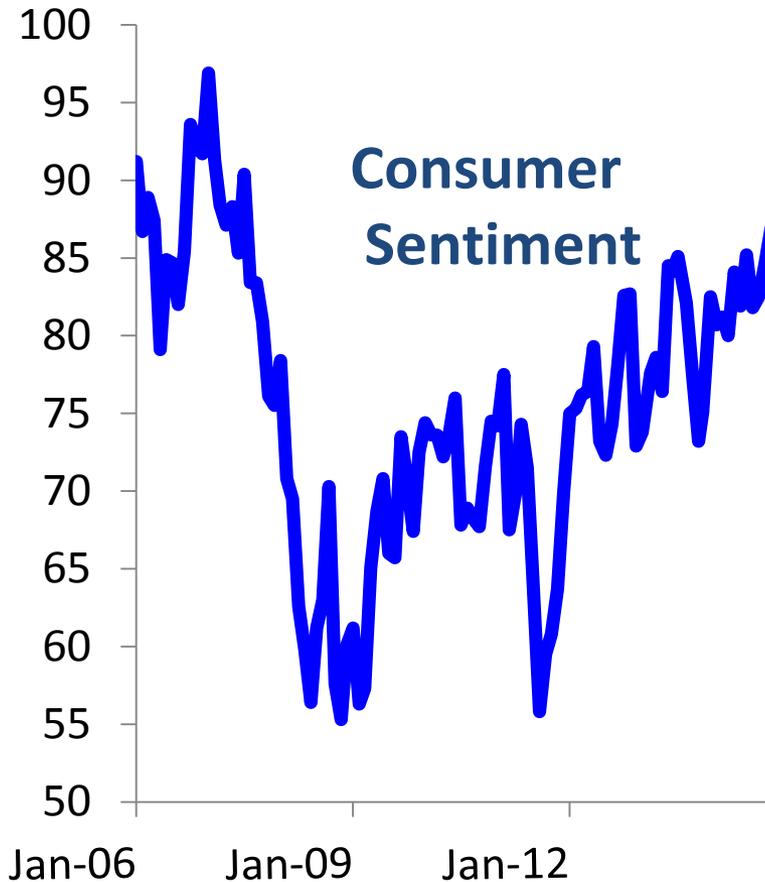


Stock market holdings grow



Federal Reserve, U.S. Financial Accounts

Improved Consumer Confidence Leads Better Household Spending



- U.S. consumer confidence (at left) trends up steadily
- U.S. retail sales up at 2.8 annual rate over last 7 quarters, and now accelerating
- U.S. auto sales finally push back over 17 million units at annual rates

Housing Recovery Staggered in 2014

Bad News

- Higher mortgage rates peaked in late 2013, credit remains tight for many
- Polar Vortex hits housing hard, little snapback in the spring
- Over 9 million mortgages still upside down, limiting turnover of homes.
- SLOOS survey shows limited loan demand
- Household formation still less than half the historic rate

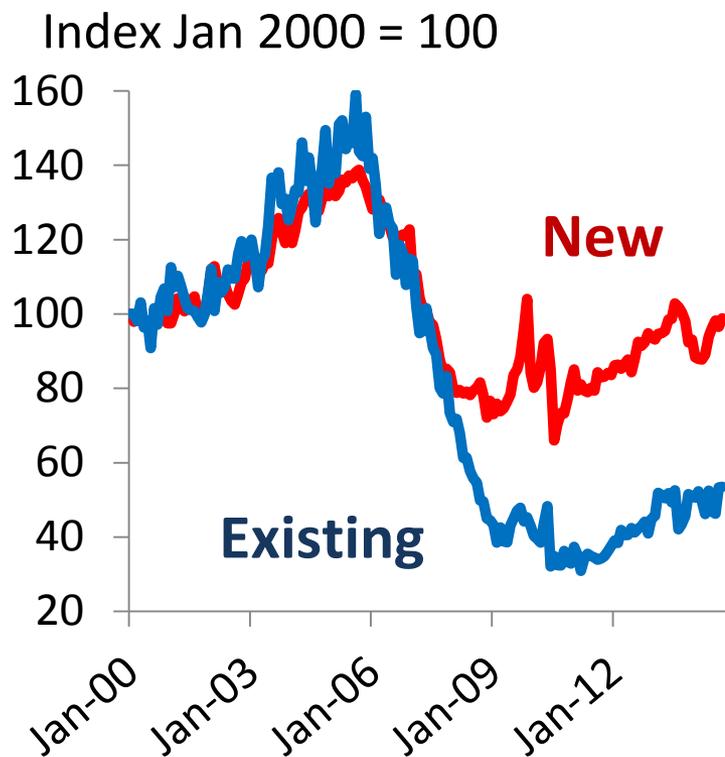
Good news

- Job growth, falling unemployment, and rising consumer confidence
- Mortgage rates fall back through 2014
- Homebuilder confidence has shifted to positive after Polar Vortex
- Regulators reduce down payment requirements for mortgages

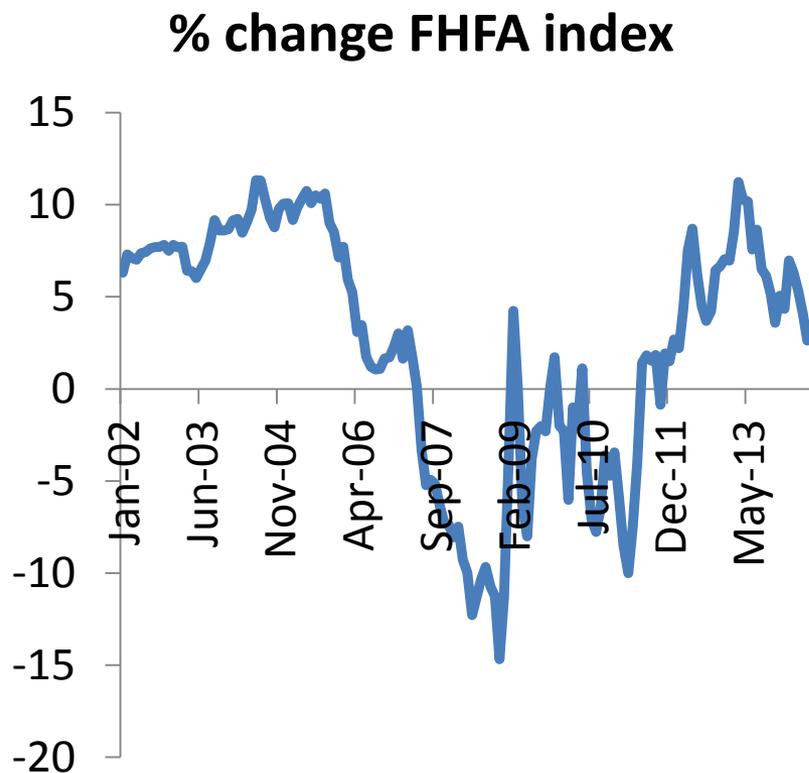
New and Existing Home Sales

Recovered Slowly from Winter Weather

New and existing home sales

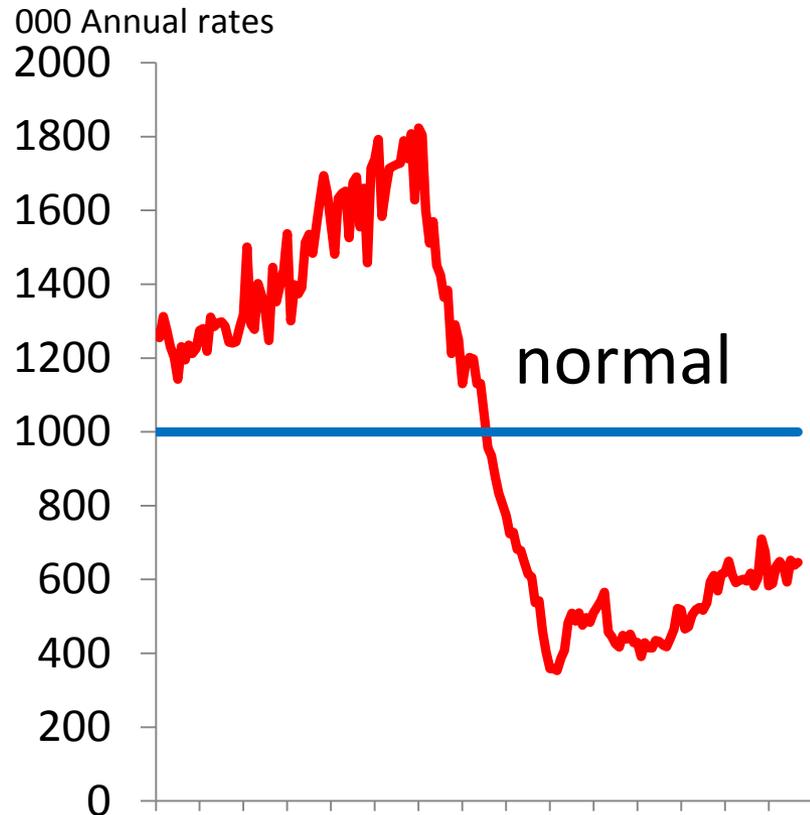


Home price increases moderate

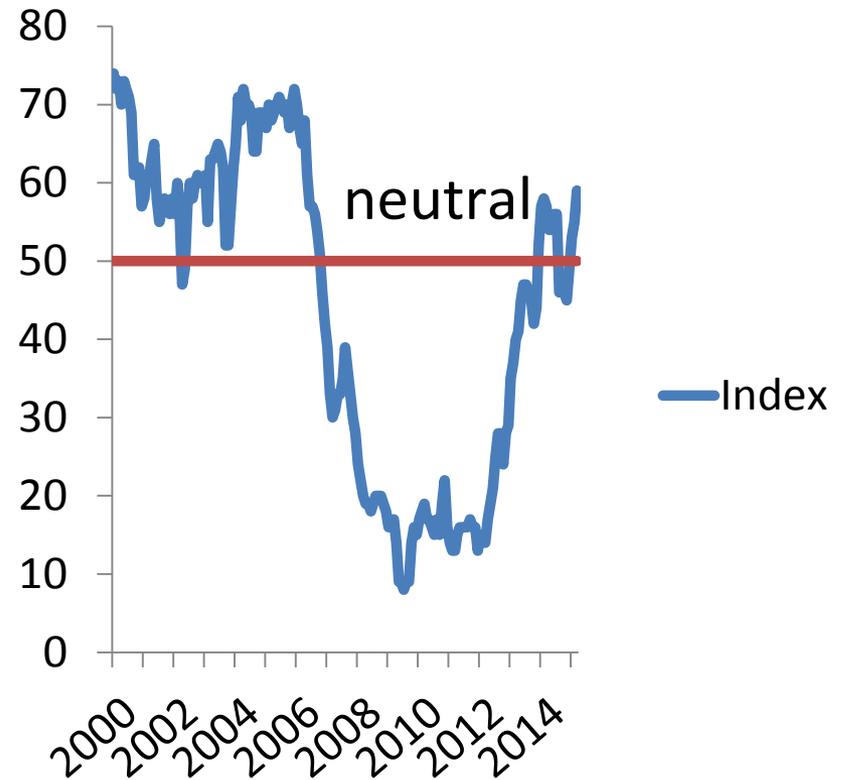


New Single-family Starts Stabilized After the Winter, Confidence Returned

New single-family starts



Homebuilder confidence returns



U.S. Economic Outlook Continues to Strengthen

	GDP (%)	Jobs/month (000)	Unemployment Rate (%)	10-year Treas (%)	Consumer Prices (%)
2014Q2	4.2	266.7	6.2	2.6	3.0
Q3	3.0	228.6	6.1	2.7	2.2
Q4	2.7	221.6	5.9	2.4	1.0
2015 Q1	2.8	211.2	5.8	2.6	1.8
Q2	3.1	195.4	5.7	2.8	1.9
Q3	2.8	208.0	5.6	3.0	2.0
Q4	3.0	201.3	5.5	3.2	2.0
2014	2.1	206.4	6.2	2.6	1.8
2015	3.1	212.3	5.6	2.9	1.9
2016	2.9	--	5.4	3.4	2.1
2017	2.8	--	5.2	3.9	--

Federal Reserve Bank of Philadelphia, *Survey of Professional Forecasters*

Is the Era of Easy Money Finally Over?

Monetary Policy Followed the Financial Crisis

- Housing bubble bursts in 2006-07, home prices begin to fall. Summer brings a crisis in subprime mortgage markets, credit tightens
- US enters mild recession in Dec 2007.
- The worst financial crisis since the 1930s spreads to banks, commercial paper, and money markets. Flight to quality. Crisis peaks with Lehman bankruptcy, AIG rescue.
- TARP put together to provide capital to systemically risky institutions
- US economy falls into deep recession, followed by the global economy.

As the Crisis Unfolded the Federal Reserve Intervened Repeatedly in Credit Markets to Keep Them Working

- Money Market Investor Funding Facility*
- ABCP MMMF Liquidity Facility **
- Commercial Paper Funding Facility**
- Primary Dealer Credit Facility**
- Term Securities Lending Facility**
- Term Auction Facility***
- Term Asset-Backed Securities Loan Facility (TALF)****

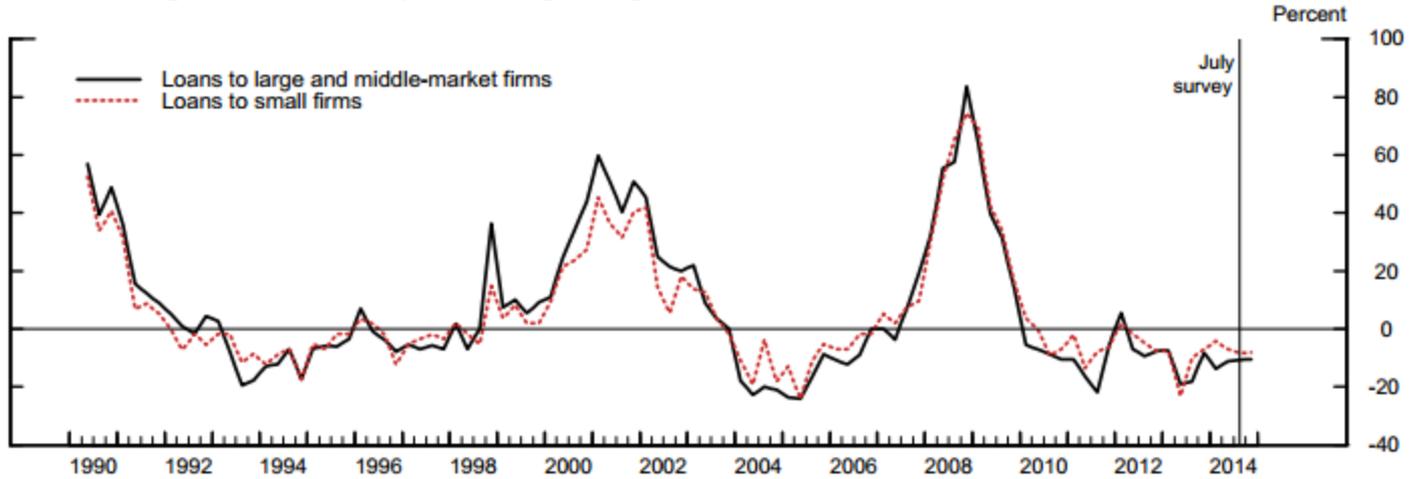
* Expired on October 30, 2009

** Expired on February 1, 2010

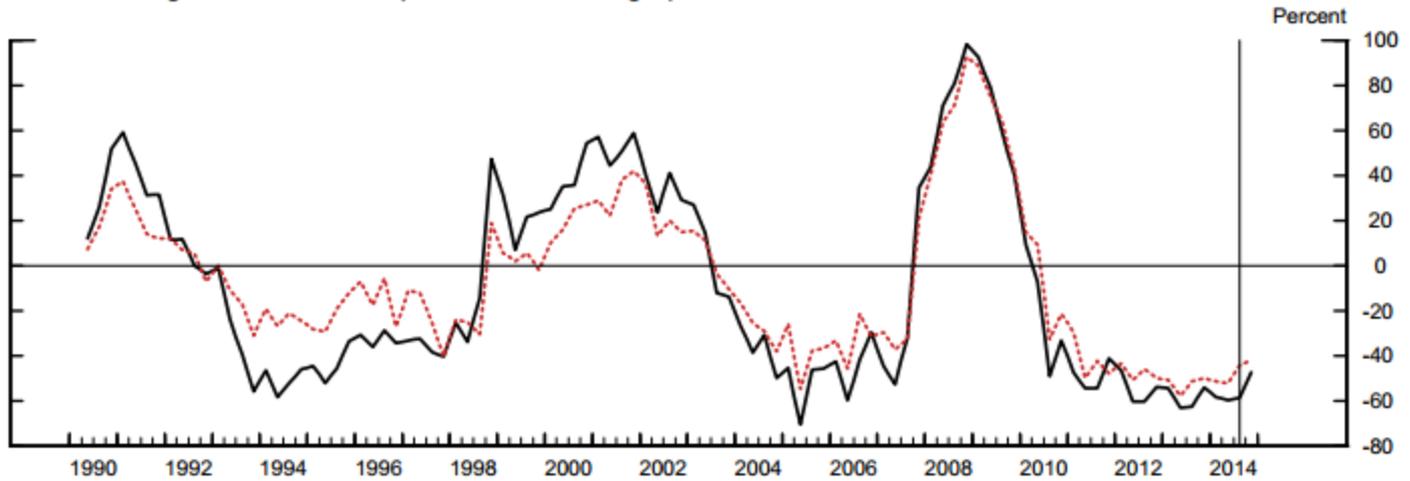
*** Expired on March 8, 2010

**** Expired on June 30, 2010

Net Percentage of Domestic Respondents Tightening Standards for Commercial and Industrial Loans



Net Percentage of Domestic Respondents Increasing Spreads of Loan Rates over Bank's Cost of Funds

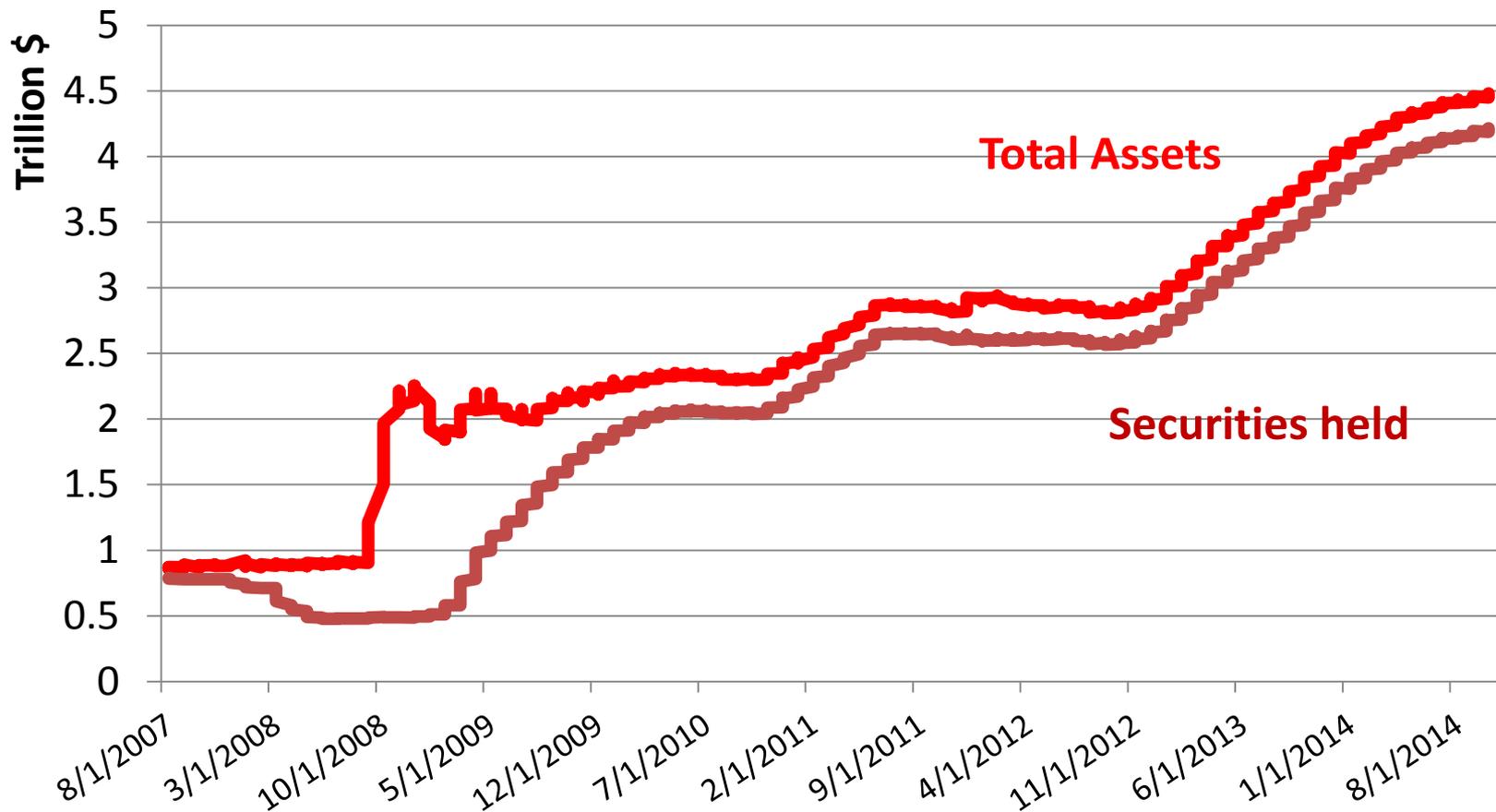


Source: Federal Reserve Board, Senior Loan Officers Opinion Survey

Quantitative Easing Programs Support Economy and Lower Interest Rates

Program	Date	Securities	Amount
QE1	Mid-2010	MBS/agency debt	\$1.25 trillion
QE2	November 2010	Long-term treasuries	\$600 billion
QE3	September 2012	MBS/treasuries	\$1.66 trillion

Federal Reserve Balance Sheet Approaches \$4.5 Trillion



New Tools to Conduct Monetary Policy Without Buying and Selling Assets

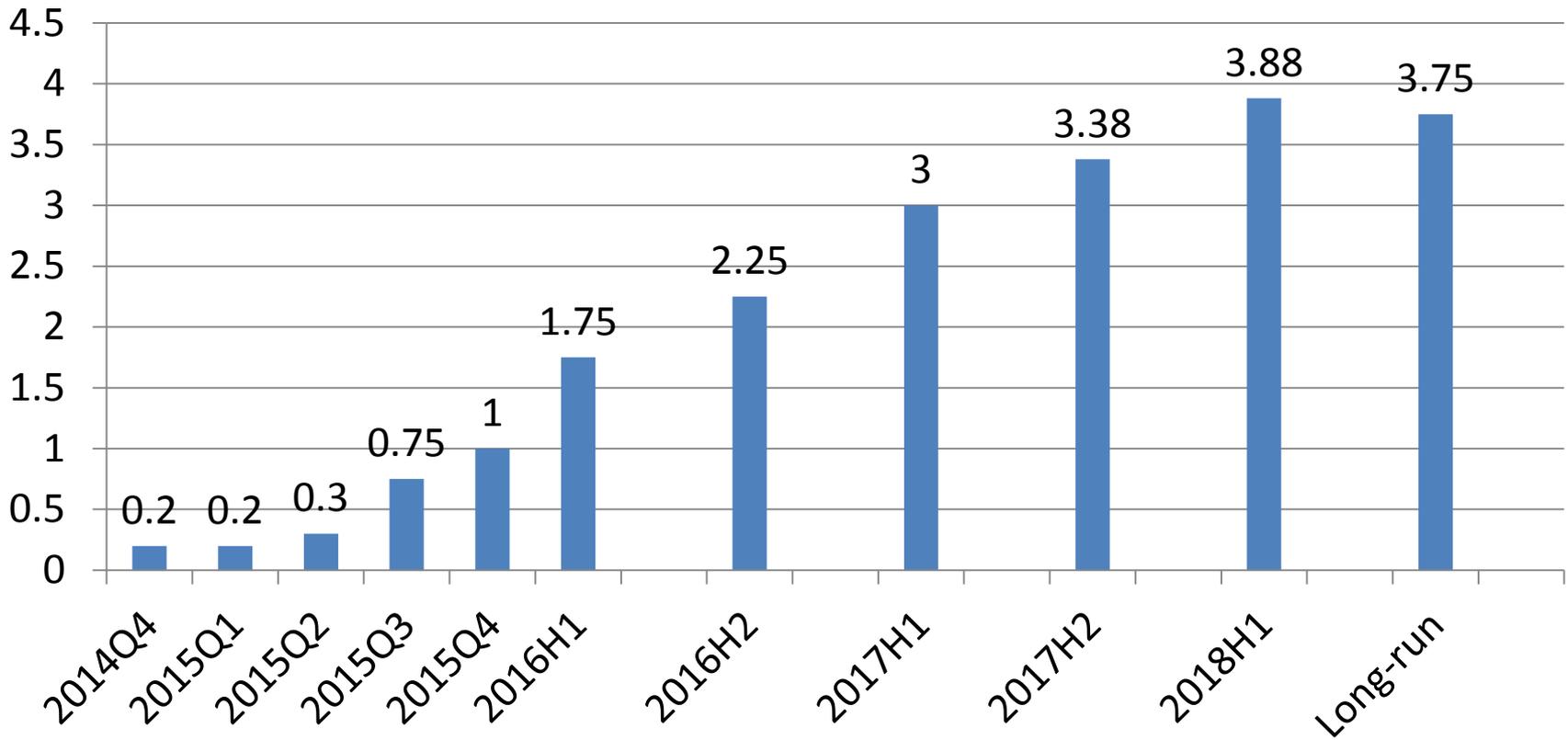
- Set interest rates (primarily) by rate paid on reserves of depository institutions
- Reduce liquidity in hands of public?
 - Borrow from the public
 - Borrow from depository institutions
 - Raise rate paid on reserves
 - Borrow reserves through Term Deposit Facility

With the End of the Crisis the Federal Reserve Embarked on a Series of Quantitative Easing Programs

- Traditional monetary policy eases credit conditions by reducing specific interest rates (federal funds) or specific credit markets (short-term treasuries)
- Federal Reserve had already pushed interest rates to zero
- Quantitative easing is simply an expansion of the central bank balance sheet by buying assets – in principle, any assets from anyone

Consensus of Primary Dealers that Short-run Rates Rise 2015Q2/Q3

Target fed funds (%)

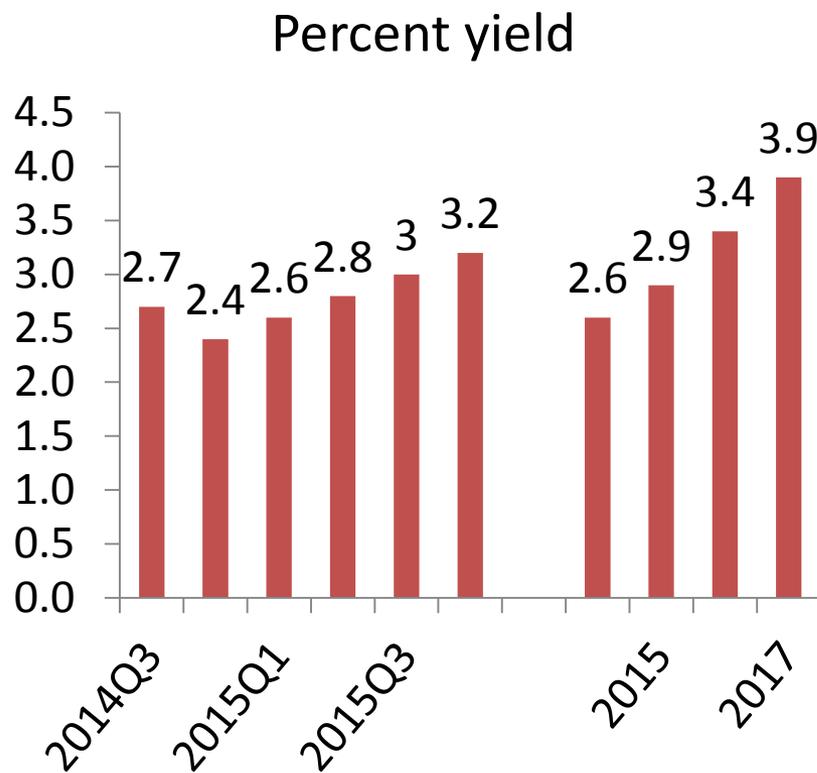


Where Will the 10-year Treasury be...? (percent)

Survey of Primary Dealers
(% respondents)

Yield (%)	End 2014	End 2015
2.0-2.5%	28%	--
2.5-3.0	46%	22%
3.0-3.5	18%	29%
3.5-4.0	4%	24%
Other	5%	25%

Survey of Professional Forecasters



Two Planning Scenarios for Houston ... and Their Consequences

- Some likely damage upstream – but how much?
- While for both scenarios assume:
 - Downstream construction a force through 2018, as low natural gas prices drive construction
 - Continued good news from the U.S. economy, and a moderate acceleration in growth in emerging markets
 - The Fed raises the price of money, but headwinds here develop slowly

Two Scenarios

Base scenario

- Saudis maintain and \$80-\$90 price range for WTI
- Fracking continues at a high level, but there is less growth as cash flow is squeezed
- E&P spending and hiring slows for both producers and service companies, but remains a force locally

Things don't work out so well

- Fracking is compromised either by low oil prices or by significant cost increases from environmental issues
- E&P spending sees little growth or decline; industry subject to swings in activity that follow oil prices
- Oil-related hiring slows sharply with excess capacity

Consequences

Base job growth

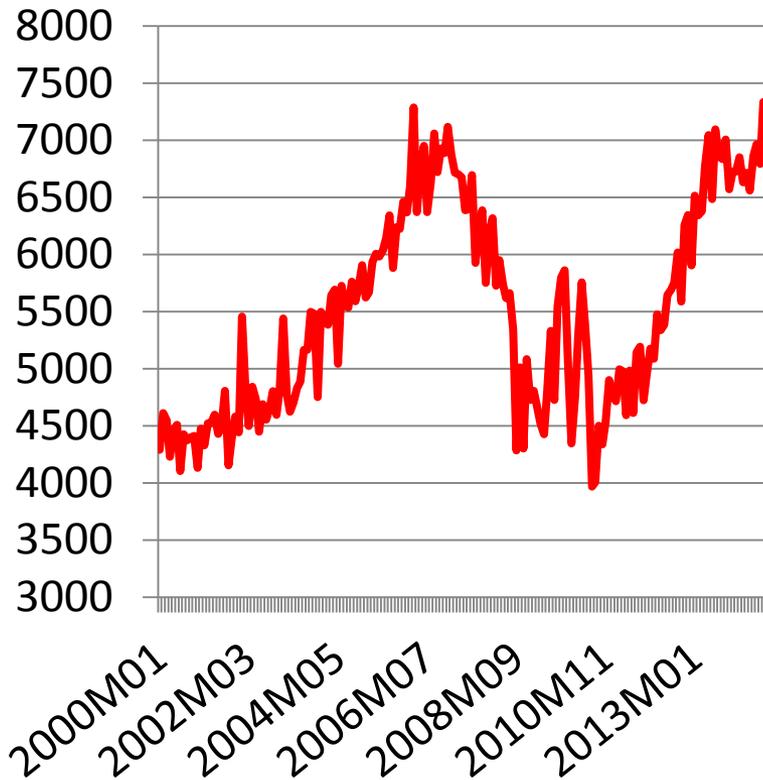
Big setback for fracking?

	Percent Increase	Number of jobs		Percent Increase	Number of jobs
2014	3.2	89,000	2014	3.2	89,000
2015	2.7	76,500	2015	2.0	58,300
2016	2.7	78,700	2016	1.7	58,700
2017	2.5	76,100	2017	1.5	50,900
2018	2.1	66,300	2018	1.1	45,700
1990-2014 average	2.3	51,800	1990-2014 average	2.3	51,800

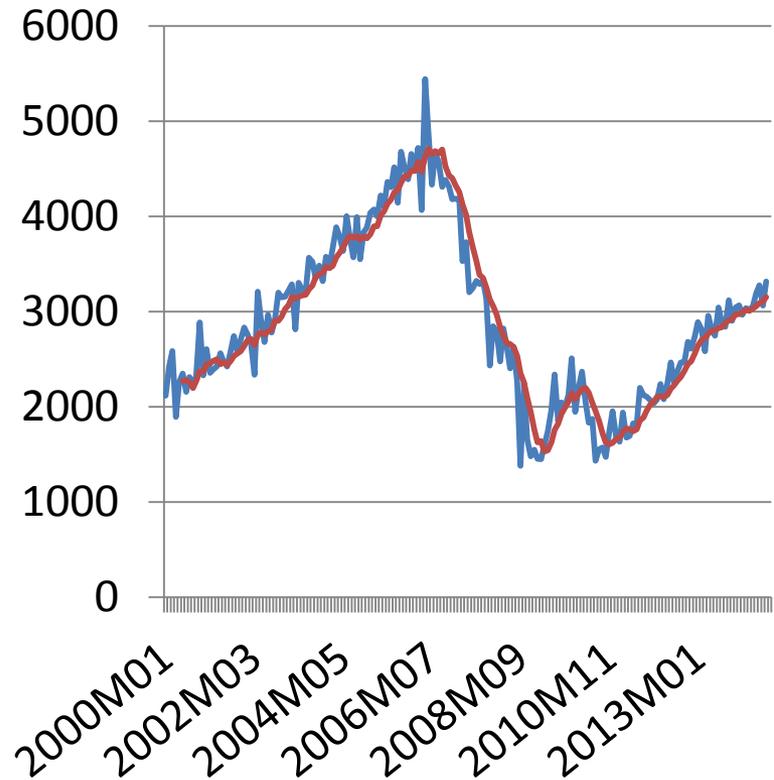
Residential and Commercial Real Estate is Hot in Houston

Houston Existing Home Sales Soar, New Single-family Housing Starts Sag

Existing home sales: 2006 levels

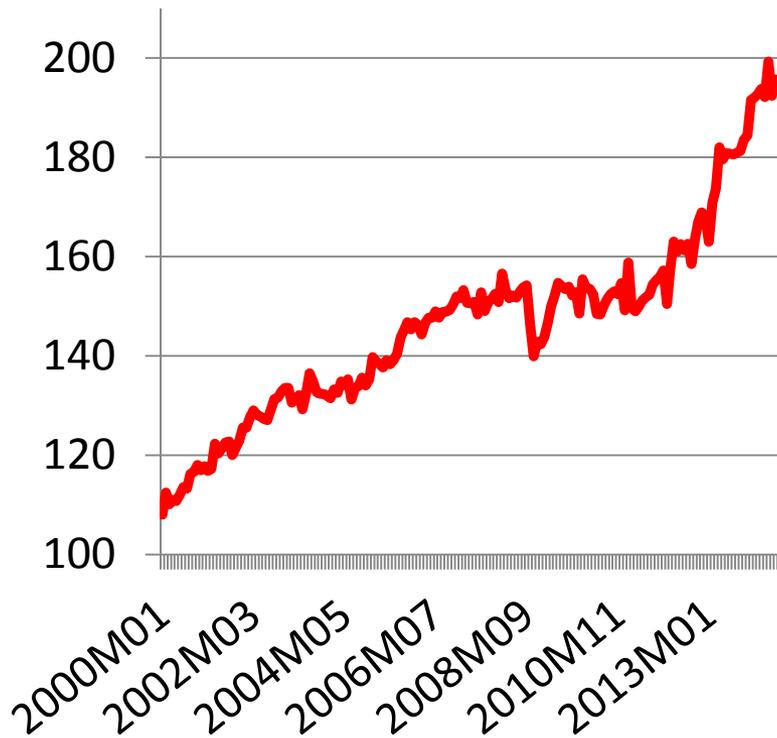


Single-family permits monthly

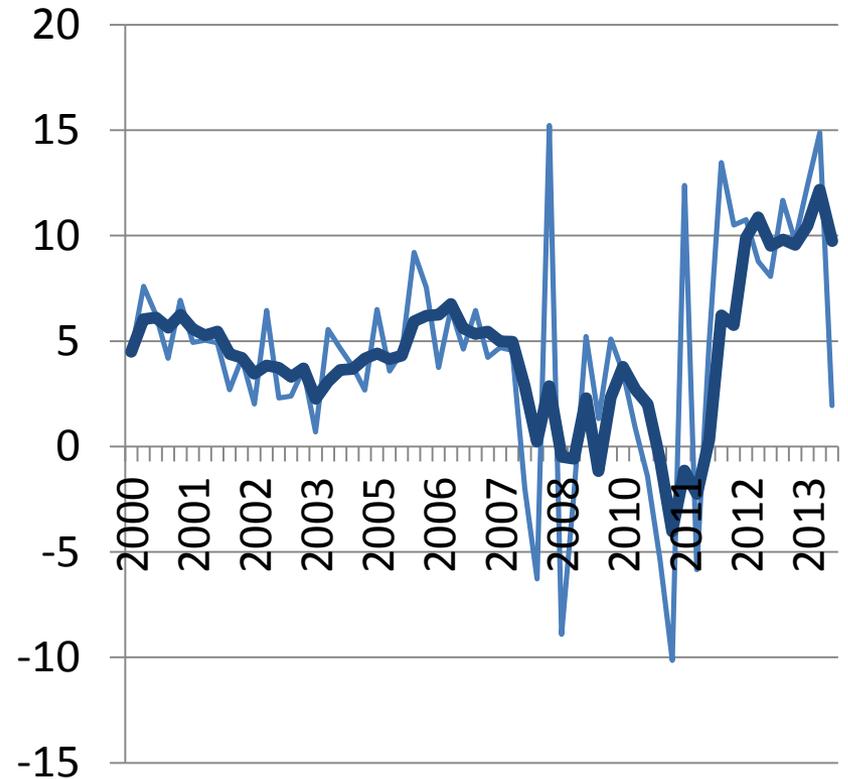


Houston Home Prices Stable Through Crisis, but Now Rising Quickly

Median price for existing home:
(\$000)



FHFA home price index :
4Q % change at annual rates

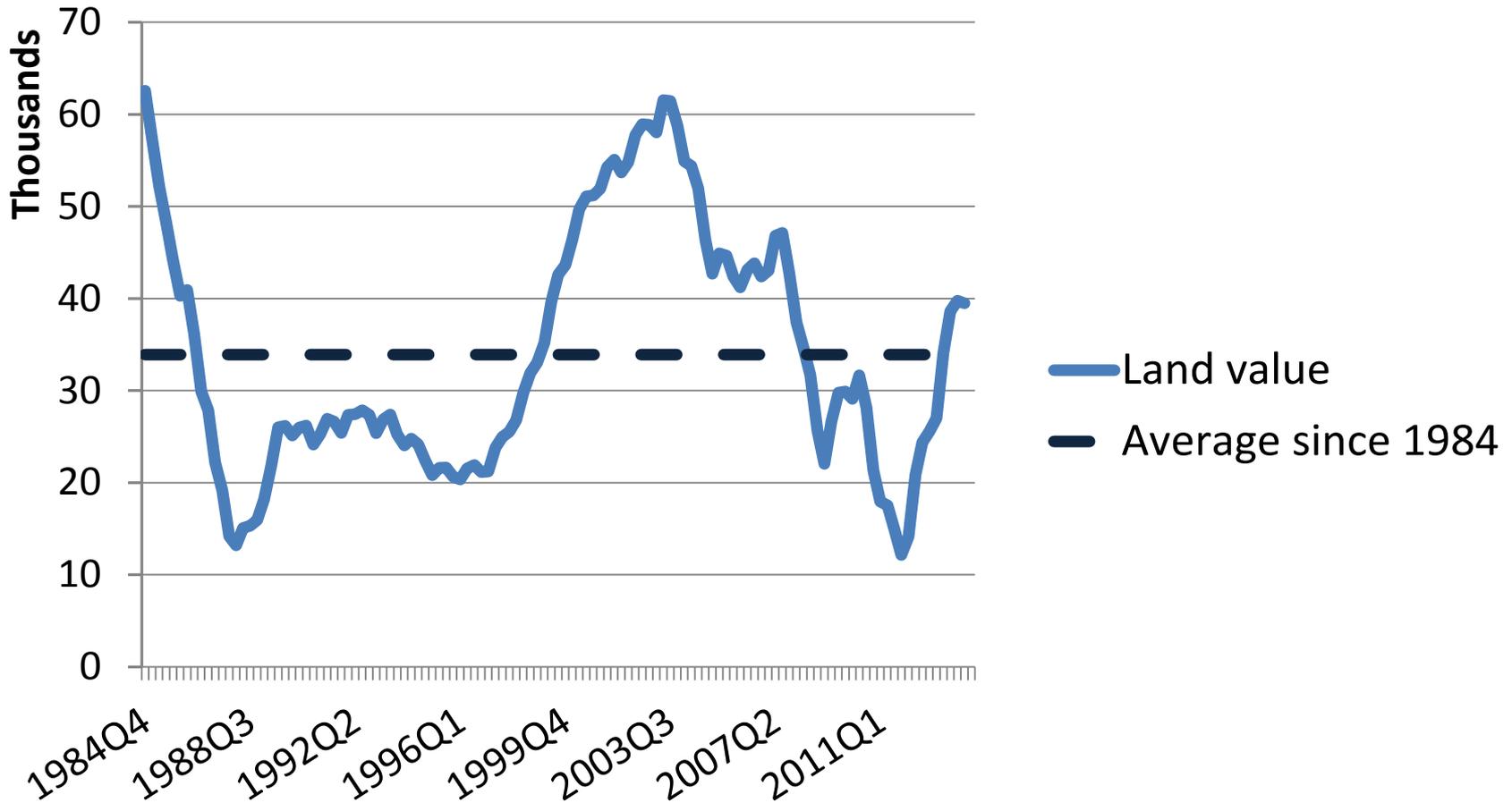


Change in Home Value, Construction Cost, and Land Prices: 2011Q1 to 2014Q1

	Home value (%)	Construction cost (%)	Land value (%)
Houston	17.1	9.0	271.8
Fort Worth	16.8	7.4	176.9
Dallas	23.0	7.7	342.4
San Antonio	11.6	8.0	179.4
Kansas City	8.7	5.7	65.8
Los Angeles	31.7	9.6	44.5
Miami	30.5	7.3	65.9
New York	3.9	7.5	0.3
Phoenix	42.7	7.5	710.8
Tampa	23.4	8.8	390.5

Contribution of Land Value to Price of Single-family Home in Houston

(Constant \$2014)



Texas Homes Still Affordable, but Less Competitive with Nation

Metro area	2011Q4*	2014Q2*
Austin	71.5	59.8
Dallas	74.1	55.7
Fort Worth	82.6	68.9
Houston	73.2	56.4
San Antonio	71.0	61.1
United States	75.9	62.6

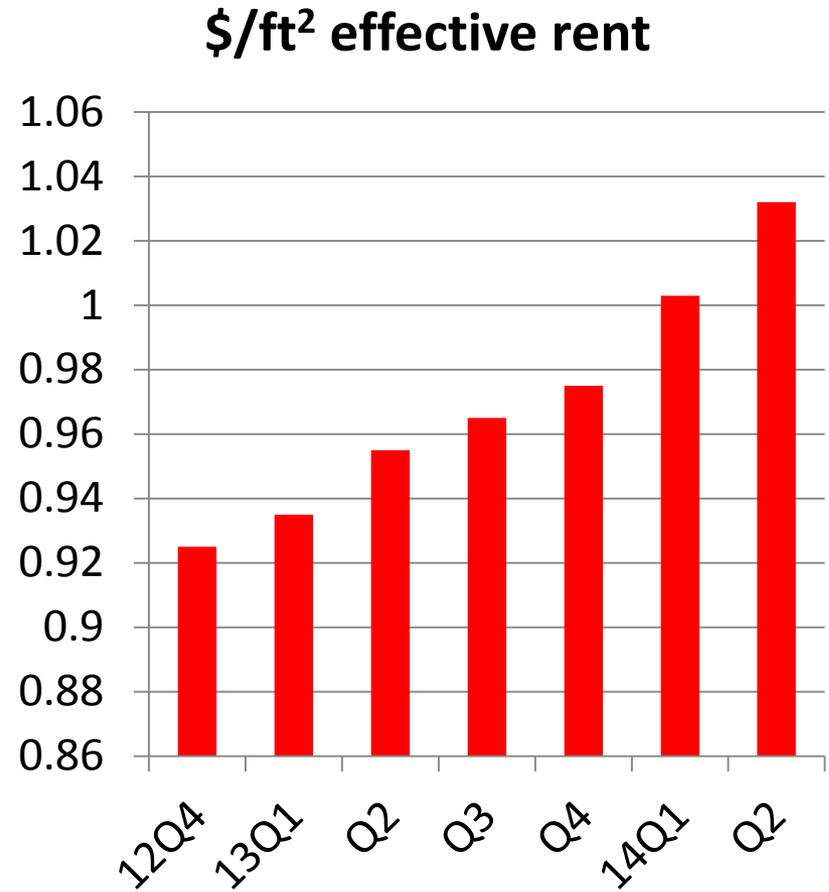
*Percentage of homes sold in the area that are affordable to families that earn the median income in the metro area and based on a standard 30-year mortgage

Looking Forward

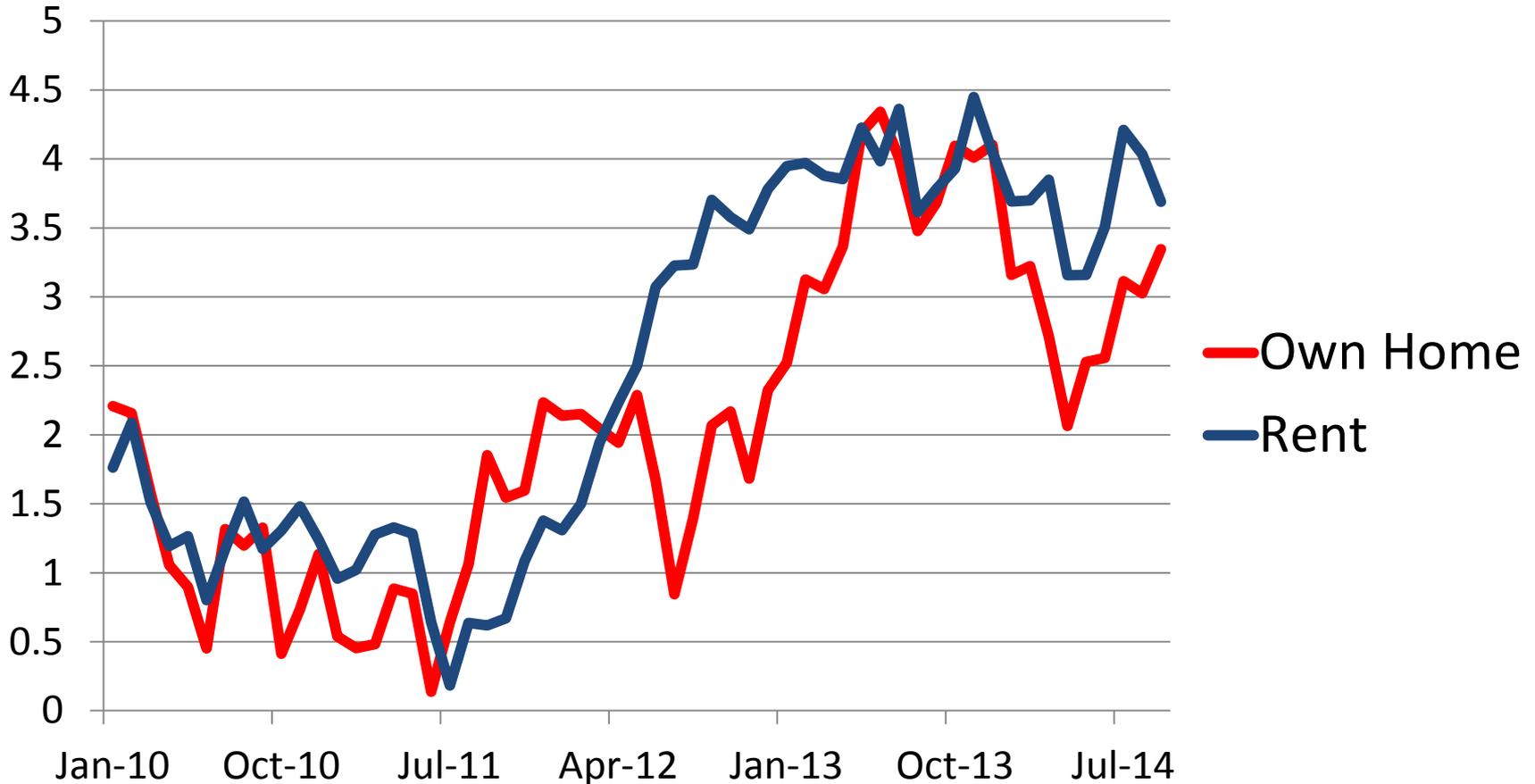
- We fell behind in putting homes on the ground with credit crunch and recession, maybe by 20,000. Catch up since then has only 6,000
- The lot development machine is catching up with demand, and 2015 will see more lots come on-line than are absorbed
- Even with some moderation upstream, sustained population growth should see us permit and sell 35,000 homes in 2015 and 2016
- Construction falls back to 28,000 by 2017-2018 with the modest employment slowing of Scenario One, and to 26,000 with Scenario Two.

Multi-family on a Roll

- Occupancy greater than 90 percent since 2012Q2
- Metro-wide rents push over \$1/ft², \$900/unit
- Strong absorption: 11,200 units in 2012, 16,000 in 2013, 21,000 annual pace in 2014
- 24,000 units under construction in 2014Q2



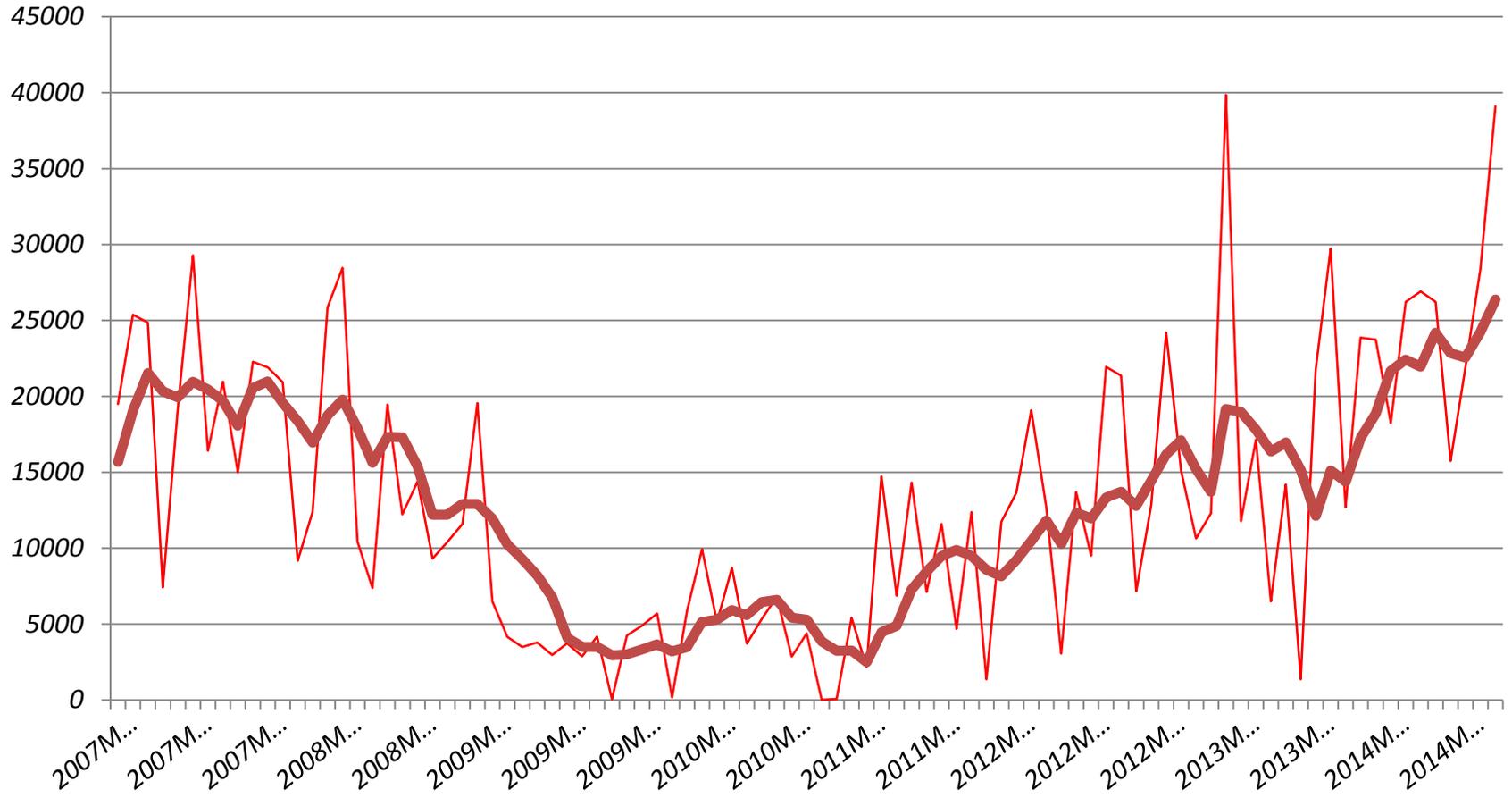
Rents for Primary Residence Have Outstripped Cost of Home Ownership (12-month percent change)



Consumer price index: rent of primary residence versus owner's equivalent rent

Local Multi-family Permits Still Trending Up

(units/mo at annual rate, s.a., 6-mo avg)



How Many Units Should We Permit?

	Scenario 1	Scenario 2
2013	16,649	16,649
2014	21,900	21,900
2015	19,000	19,000
2016	15,000	13,600
2017	12,500	9,400
2018	11,500	7,600

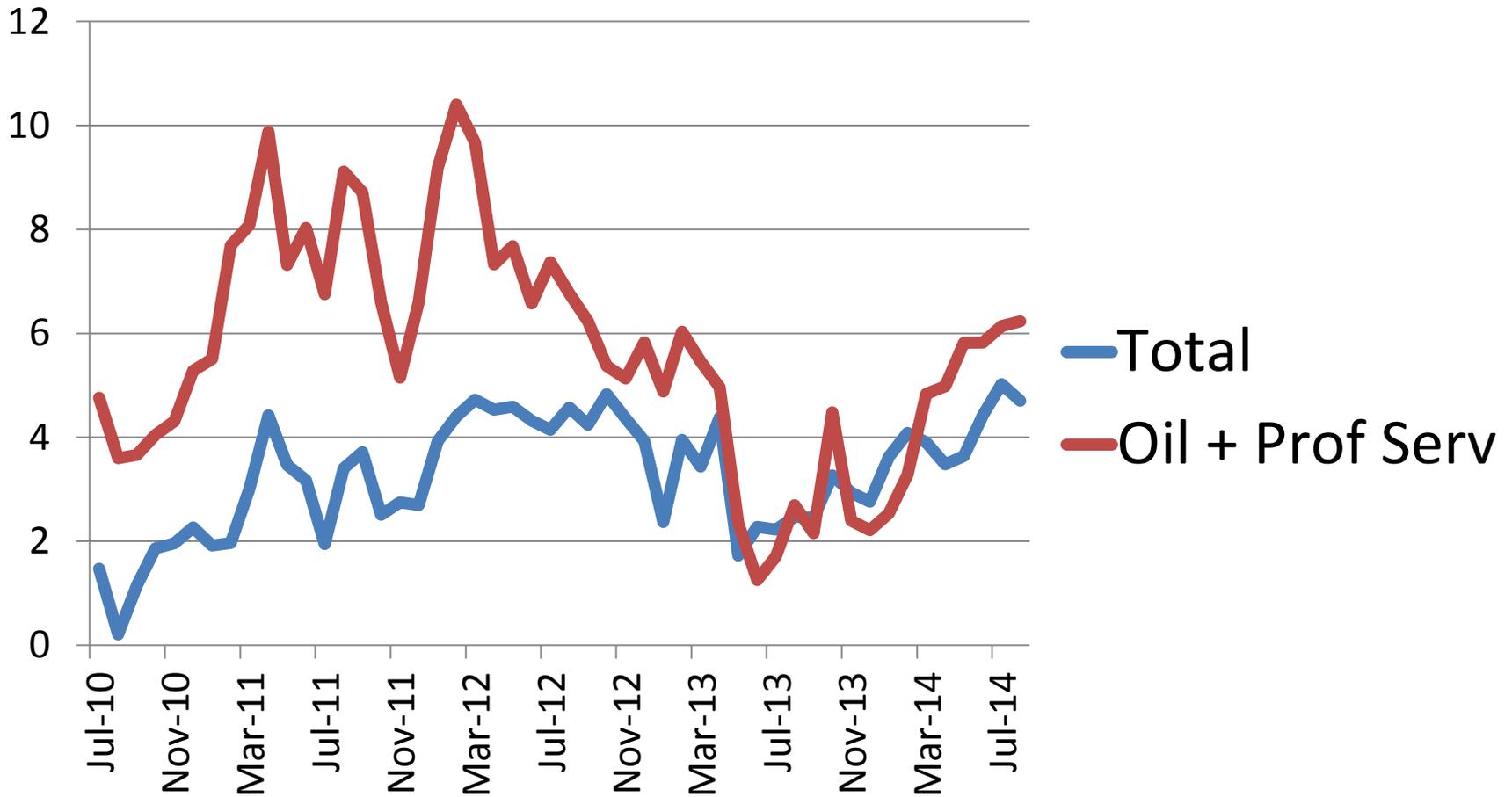
How is Residential Positioned for Any Slowdown?

- Single-family
 - There is backlog of potential homeowners locked out of current market by supply and price
 - Next year the lot supply probably catches up with demand, and if even with moderation upstream, homebuilding can stay strong
 - Prices and builders margins should begin to squeezed as we move through the year
- Multi-family
 - This markets shows clear signs of moving ahead of fundamentals based on the 2014 deliveries, pipeline, and pace of permitting
 - The narrow difference in rents between new and stabilized class A is a warning flag – magnified in importance if there is any economic slowdown

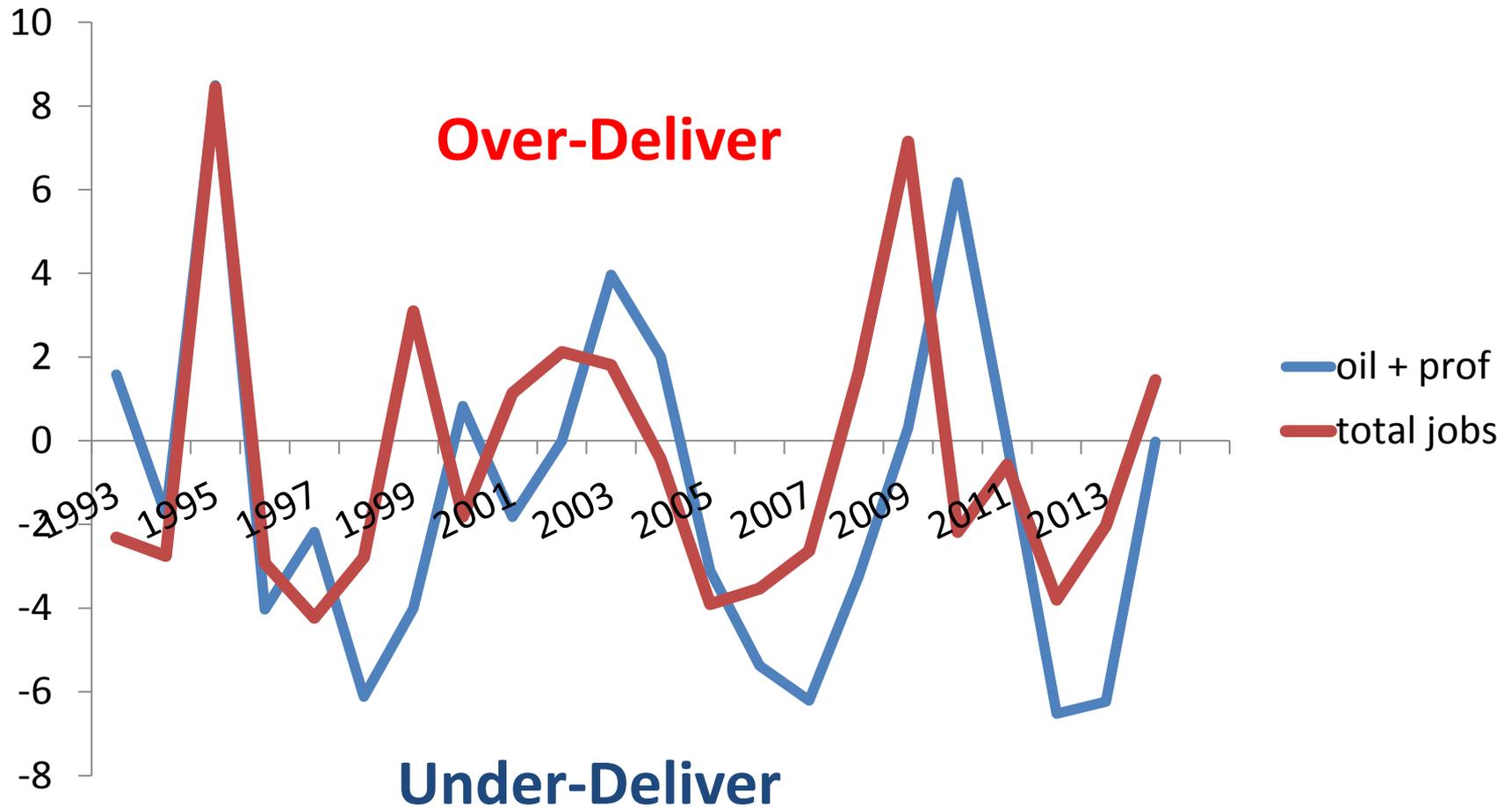
Office Market Performance has Mirrored Houston's Economic Strength

- Rents have been on a steady march up since late 2011, with class A space in the CBD rising \$5 per ft² to over \$40, and the suburbs up nearly \$4 to \$32. But rents increases have paused in 2014
- Citywide vacancy rates near 10 percent since 2012 for class A space. Colliers reported that out of 1644 buildings surveyed, only 45 had 100,000 square feet or more of space available
- Around 9.0 million square feet will be delivered in 2014, including ExxonMobil's 3.0 million delivered in Q4
- Energy dominates the pipeline of 17 million square feet, including ExxonMobil, Phillips 66, Shell, BHP, and Noble. About 2/3 of the pipeline is pre-leased or owner-occupied

Growth of Oil and Professional Services Now Looking More Like Total Jobs



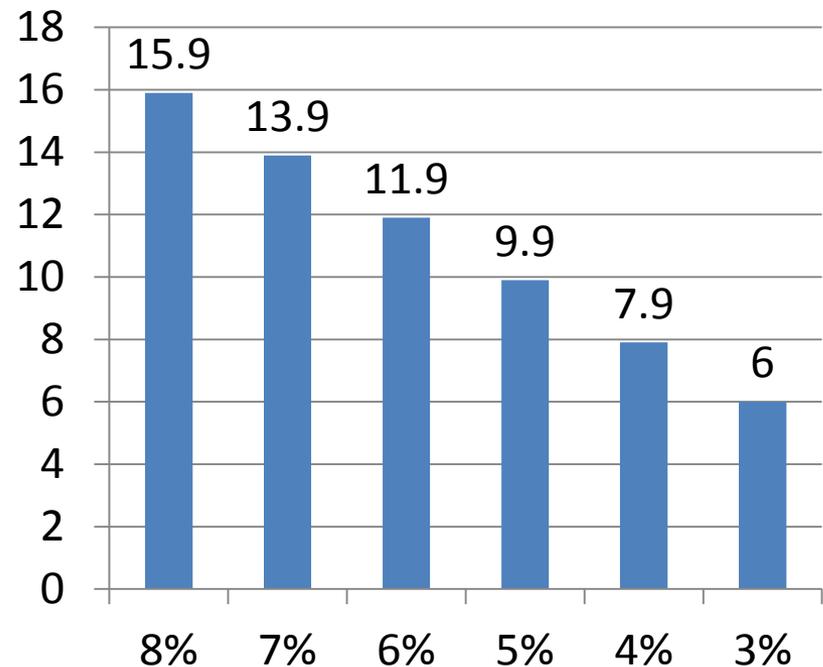
Growth of Houston Metro Office Space Compared to Employment (percent difference in growth)



Office Going Forward

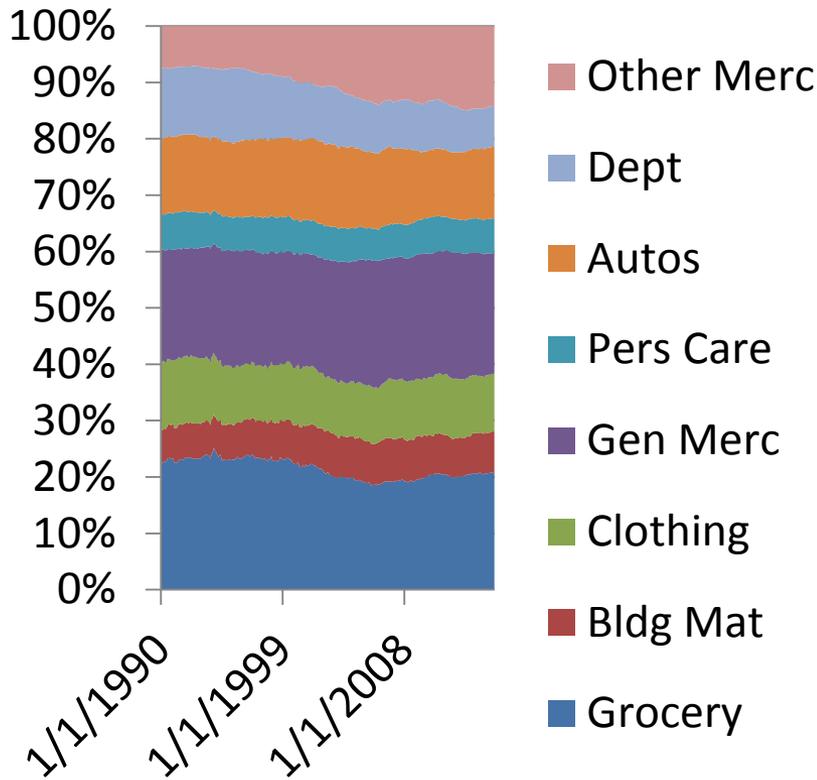
- Houston's office market is showing signs of catching up with history, and leveling off -- at a very high level
- The 2014 deliveries seem right in line with recent job growth, after several years of failing to deliver enough product
- Double-digit growth of energy and professional services has been cut in half, and could be at further risk if oil prices fall

Million ft² of office space needed if Oil and Prof Services grow X%

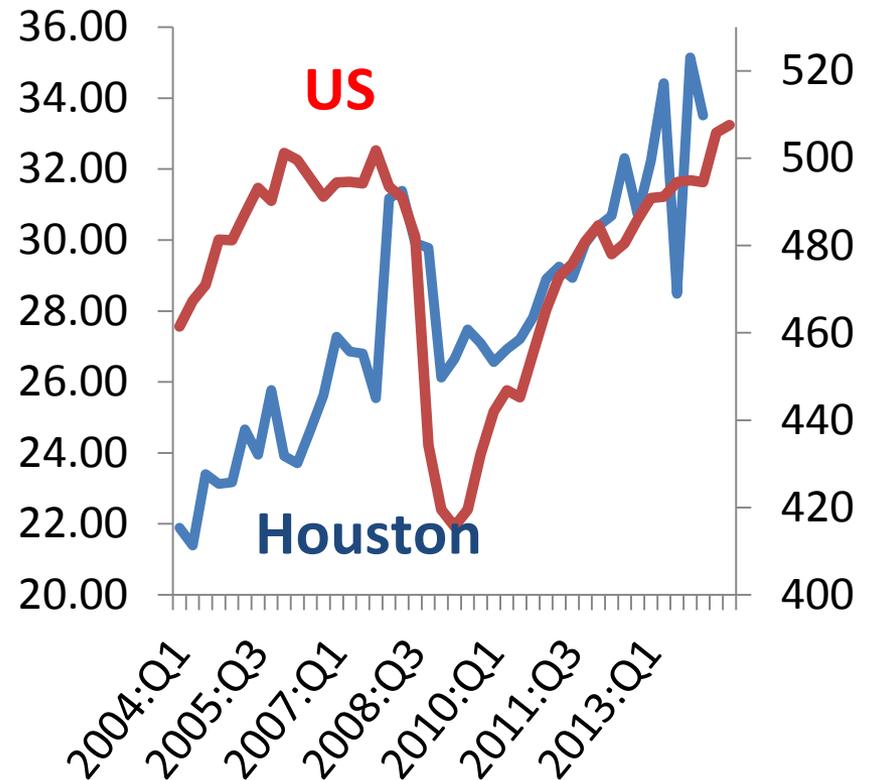


Houston Retail Mix Changes Little, Despite Fast Growth

Mix of retail jobs changes slowly in Houston



Inflation adjusted retail grows much faster in Houston than US

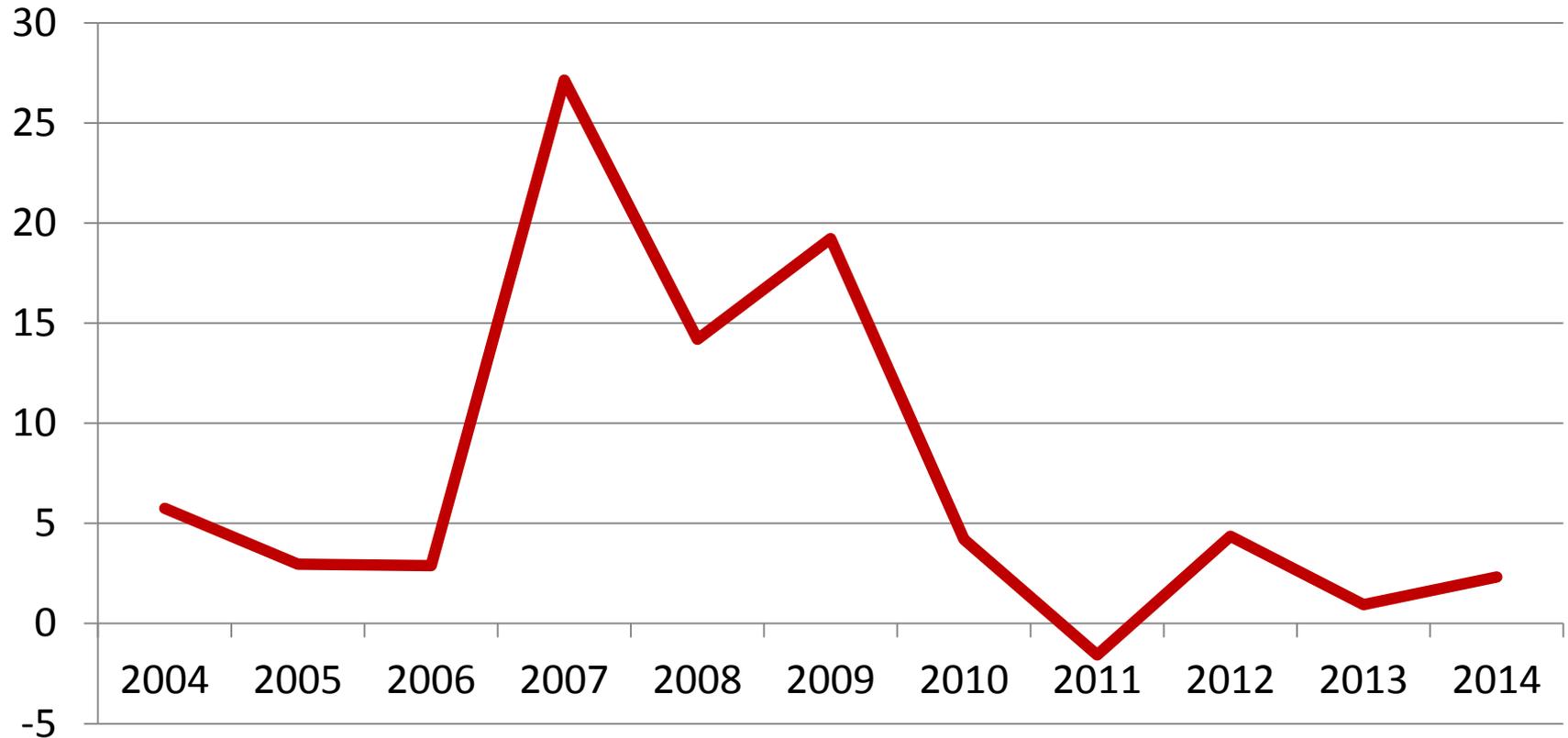


Vacancy Rate Falls and Rents Rise as Capacity Tightens in Houston Retail

- Metro vacancy rate falls to near 6 percent, nearly a full percentage point in the last year. Rents are up about 3 percent in 12 months
- About a million square feet were delivered and absorbed in Q3
- Over 70 percent of the delivered retail in Q3 was grocery-anchored shopping centers, most in the far suburbs
- There is about 2 million square feet of retail in the pipeline

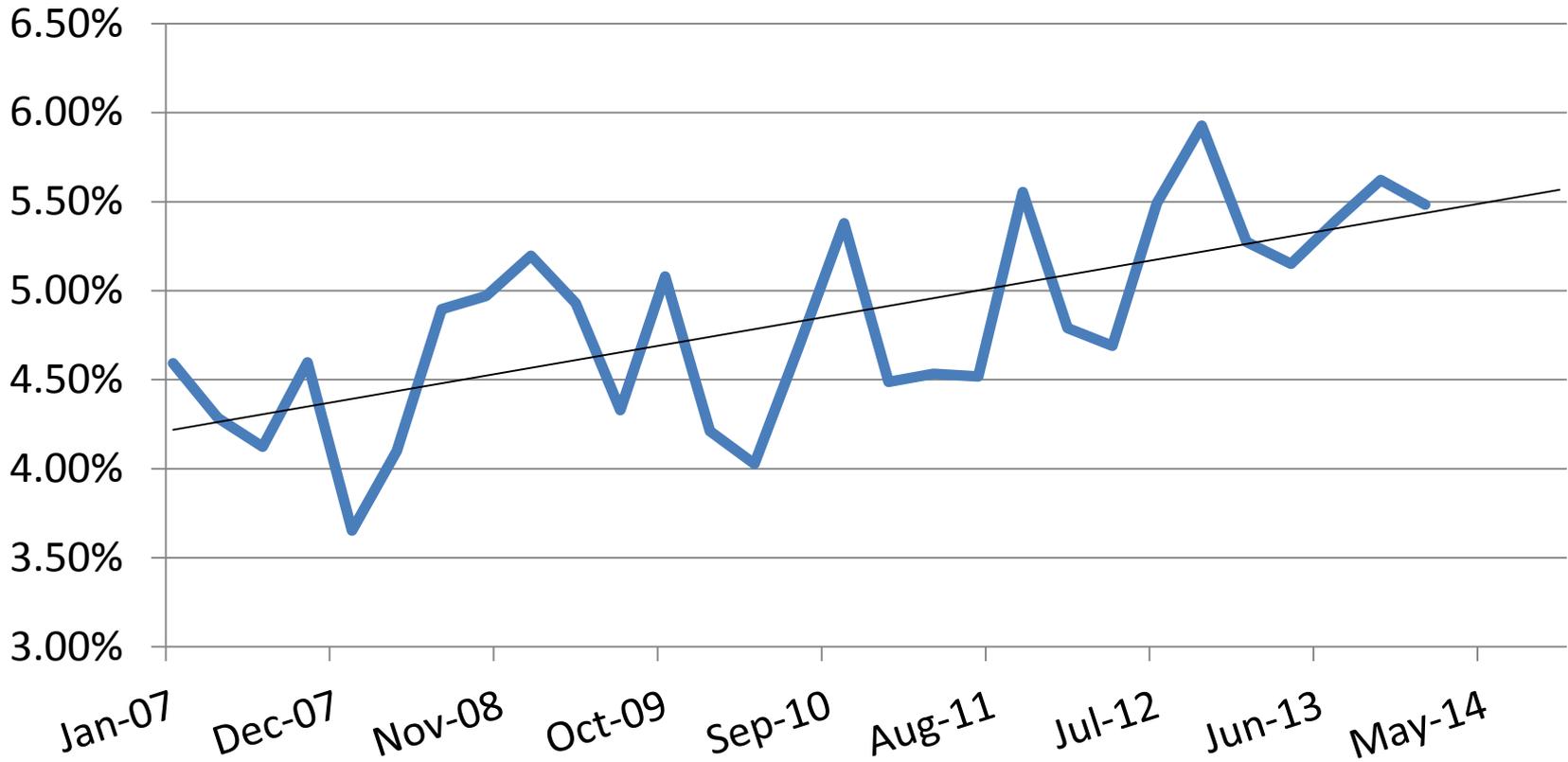
Houston Retail Construction Slowed by Large Additions in 2008-2010

Million square feet brought to market



Texas Out-of-State Retail Tax Collections Trend Up to 5.5 percent

Percent share of gross retail collections

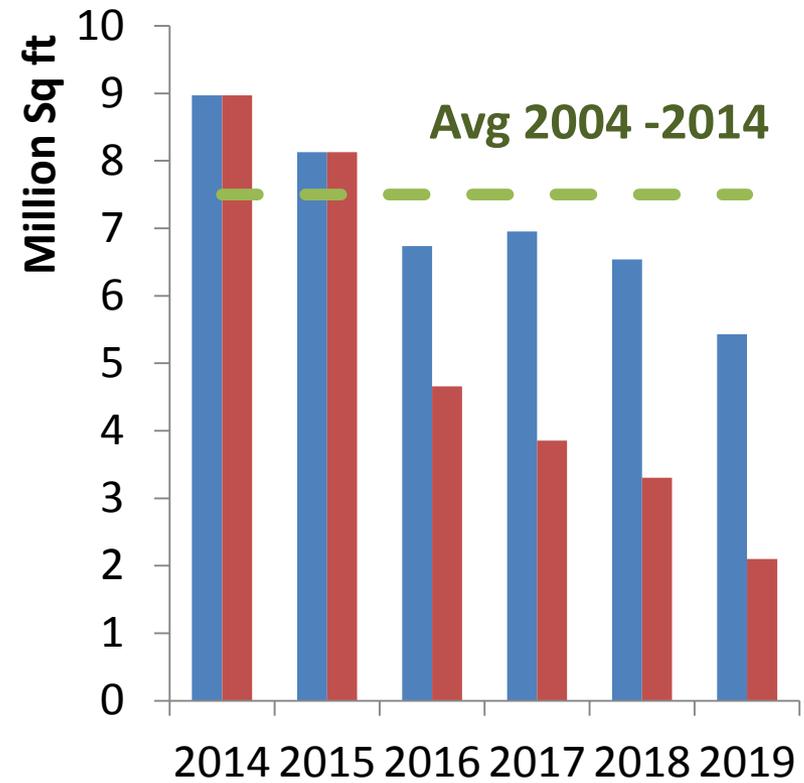


How Much Retail Space?

Assumptions

- Over long run, retail sales grow 1.4 percent for one percent job increase
- Assume e-commerce takes 0.6 percent per year in market share – like U.S.
- Retail sales per \$ of sales remain fixed through 2019

Scenario 1 and 2

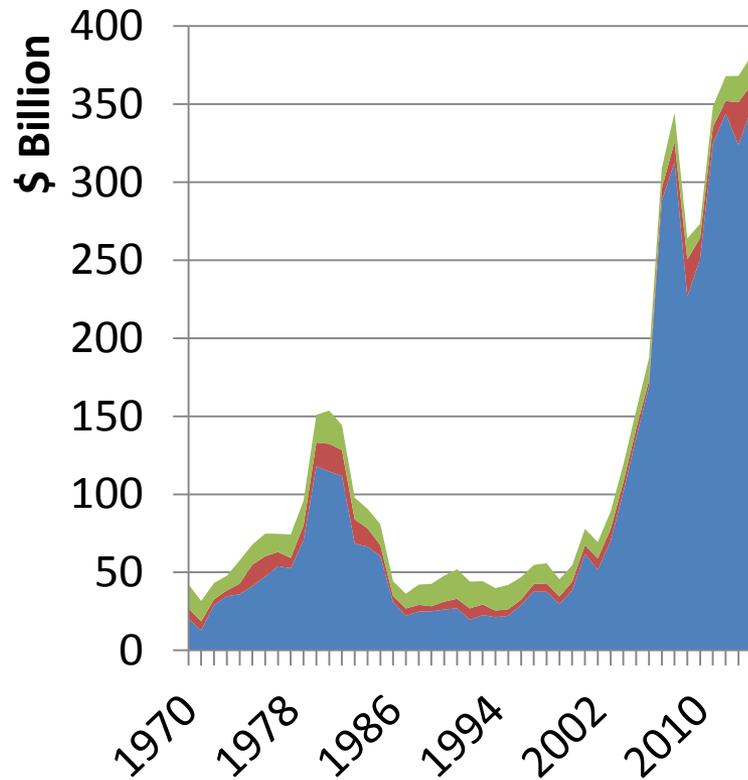


Houston Industrial Market Draws Strength from Oil and Gas

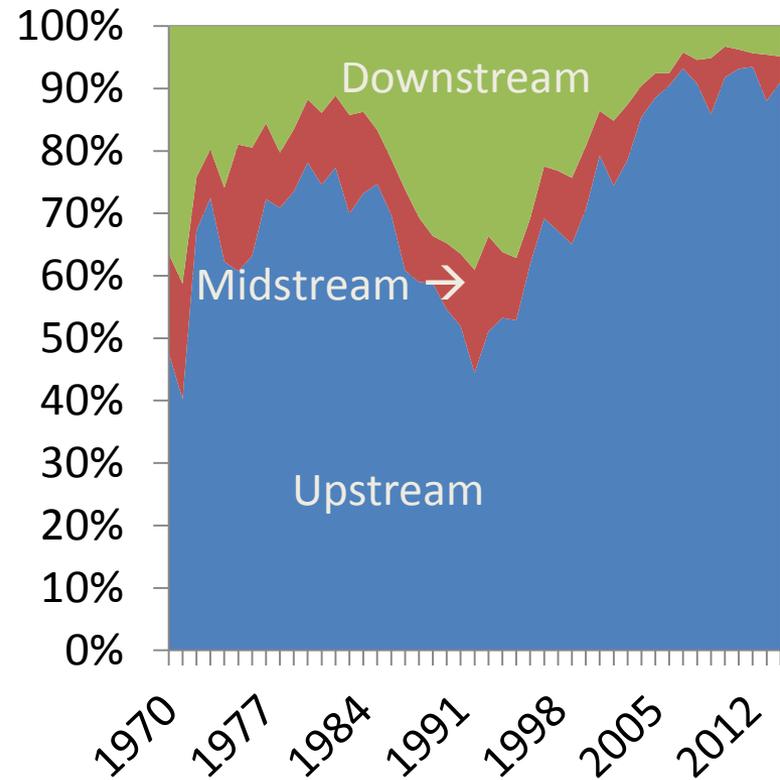
- One of the strongest industrial markets in the U.S. and largely driven by energy
- Marked by continued strong absorption. Vacancy rates rose slightly in early in 2014, but declined in Q3
- Around 10 million square feet of new capacity will be delivered in 2014, leaving another 7 million in the pipeline
- The slowdown upstream would mostly affect machine shop and manufacturing capacity in North and Northwest Houston, the ship channel much less

Why the Focus on Upstream Capital Expenditures? Historically it Dominates

Inflation-adjusted cap-ex

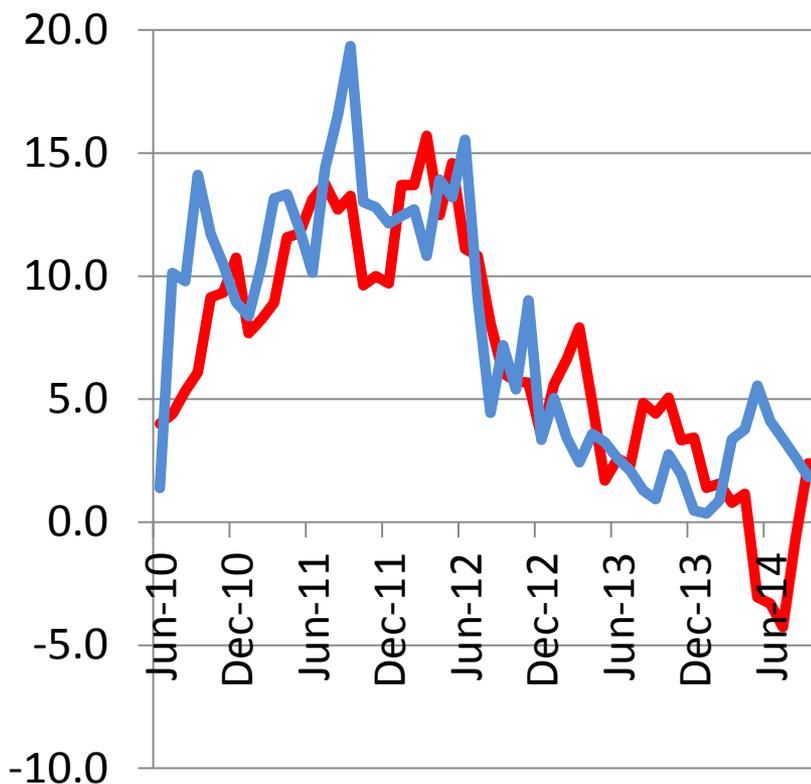


Share of oil industry cap-ex

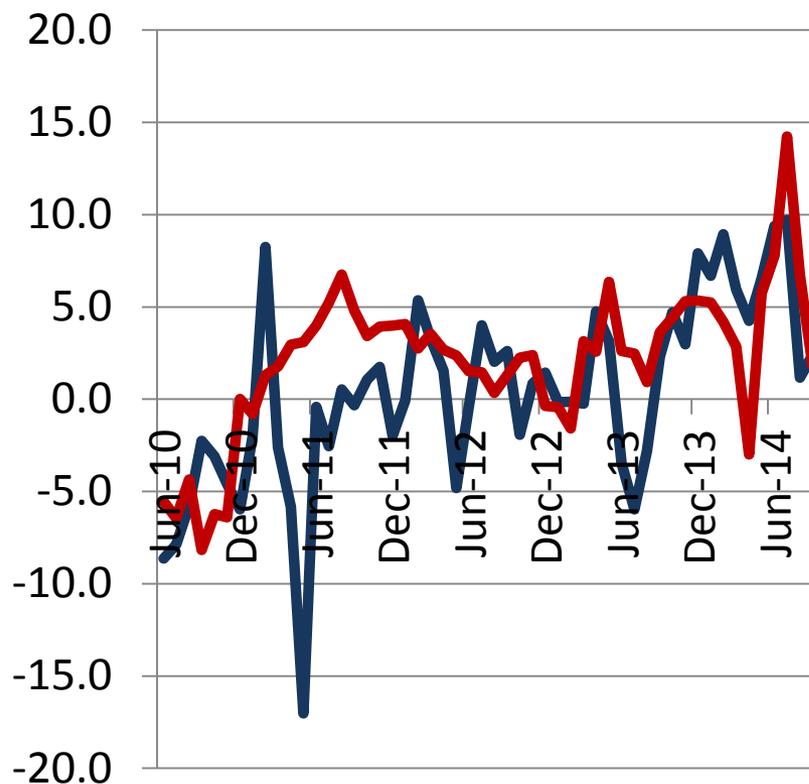


Job Growth Declines Upstream and Increases Downstream (% change at annual rates, s.a.)

Machinery and fab metals

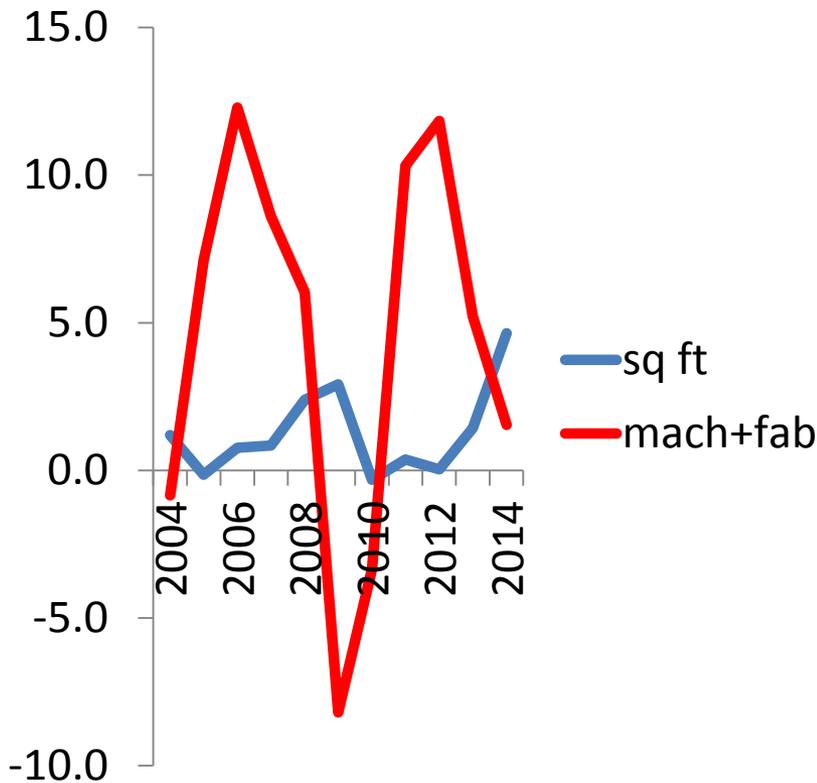


Refining and chemicals

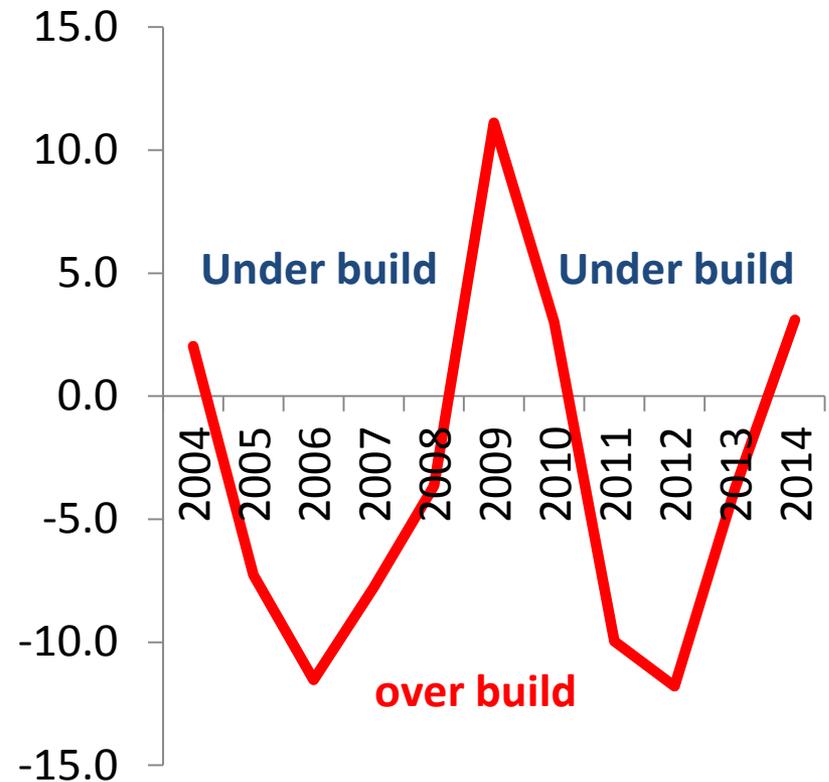


Industrial in 2014 Moves Back to a Catch-up or Over-build Phase

% growth in ft² and machinery and fab metal employment



difference in % growth: ft² minus machinery/metal



Commercial Real Estate and Economic Slowdown?

- An economic slowdown would not catch office, retail, or industrial in a over-built position, as long as nothing goes *seriously* into reverse
- Deliveries have been large, especially in office and industrial, but they reflect powerful local growth and the need to catch up after 2008-2010 recession and tight credit. The 2015 pipeline does not look out of line
- Retail was the last to join the recent construction push after seriously over-building in 2008-2010, but future plans still look modest

Big Conclusions

- Crude in the \$80-\$90 per barrel range implies modest industry retrenchment, but upstream growth evaporates and could reverse below \$75
- Houston has depended strongly on the drilling boom to set itself apart from the U.S.
- There is a big cushion for the Houston economy from downstream construction and a much healthier US economy
- We set out two scenarios for a future with healthy and not-so-healthy fracking. Neither are a serious reversal to the economy, although the outlook without fracking is pretty dreary
- A serious reversal? The risks here mainly stem from the weak global economy. Perhaps a real estate collapse in China, a bond market default in Italy ... or a dozen other low-probability nightmares

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