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Houston's Economy Hitting on All Cylinders in 2014

Robert W. Gilmer

Institute for Regional Forecasting

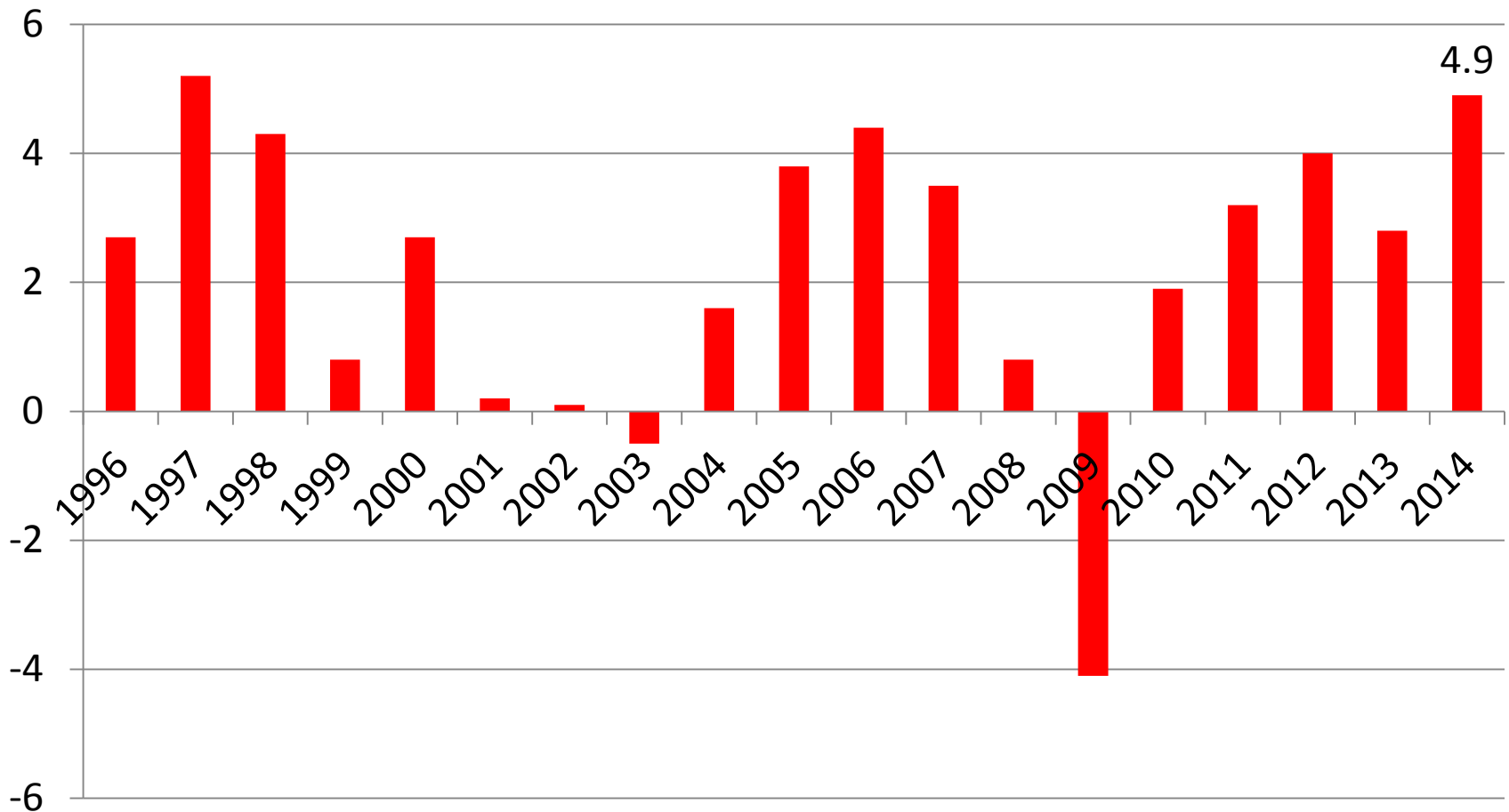
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Houston's economy rests on four major driving forces

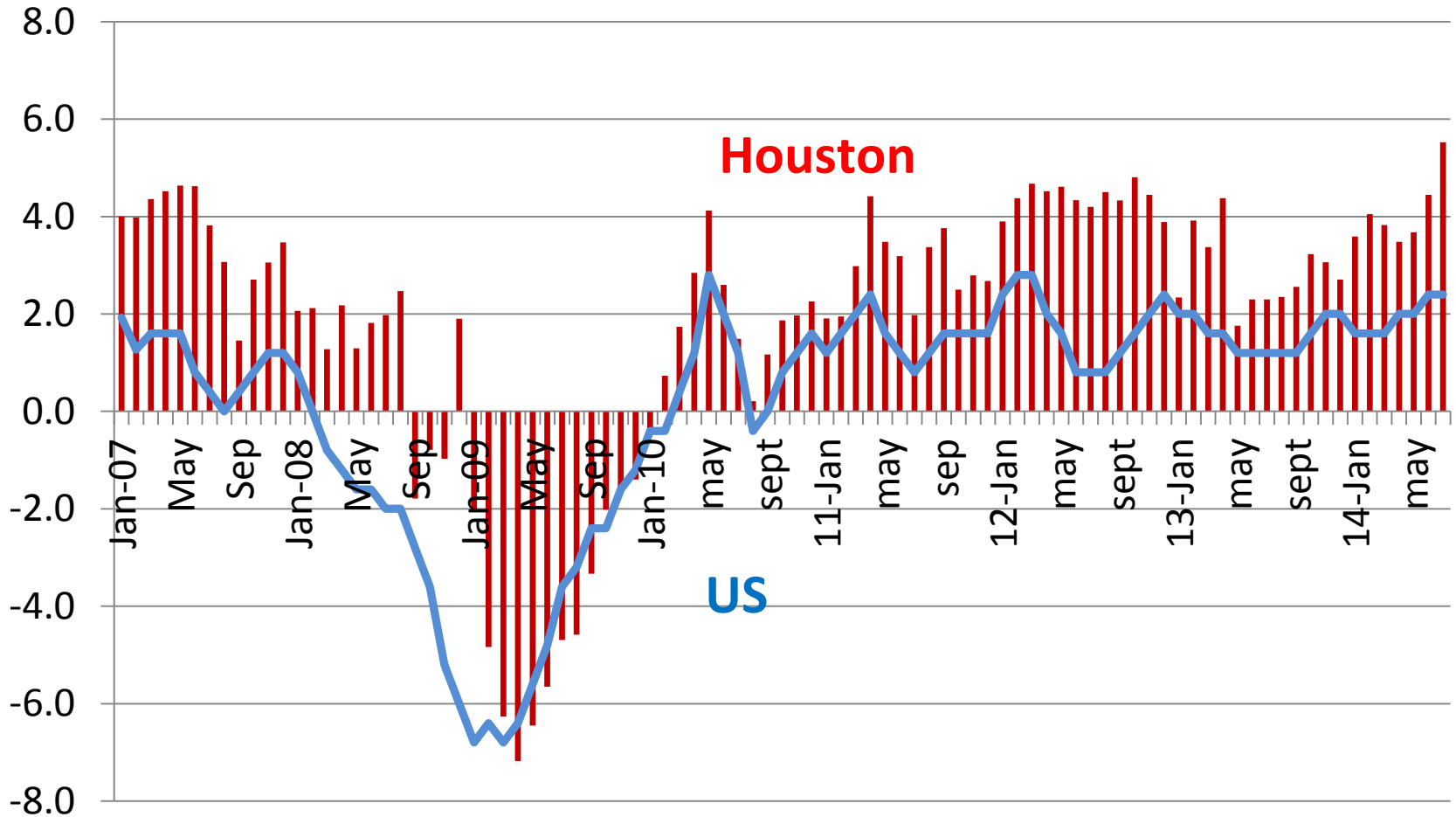
- Energy market
 - Upstream exploration and production still going strong thanks to high oil prices
 - Downstream construction booming based on low natural gas prices
- U.S. economy is putting both the Great Recession and the polar vortex behind it
- The only nagging worry is a slowing global economy
- The economic outlook is good – but how good?

Houston employment: Off to the races again?



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

Houston employment sees job growth accelerate in 2014 (3-month percent change at annual rates)



Bureau of Labor Statistics

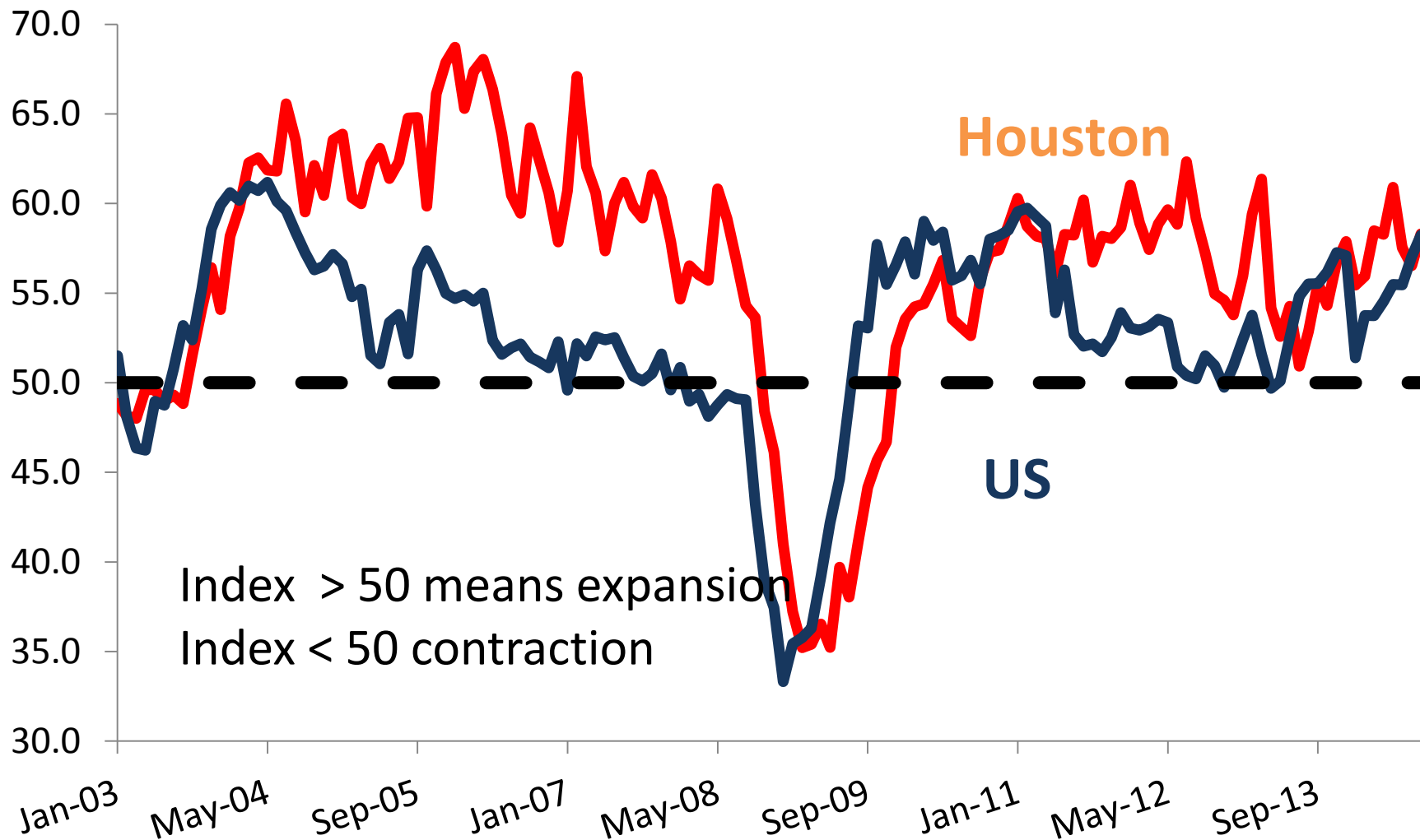
How fast are jobs growing?

- Year-to-date is at a pace of 140,000 new jobs
- Texas Workforce Commission estimates too high?
 - Likely understated 2013 job growth substantially
 - Building 2013 job growth into 2014, so they will be at the right level when they revise data in spring 2015?
- One-time events complicate the count: large construction projects start, relocation of large numbers of company employees, polar vortex
- Simple statistical extrapolation breaks down quickly

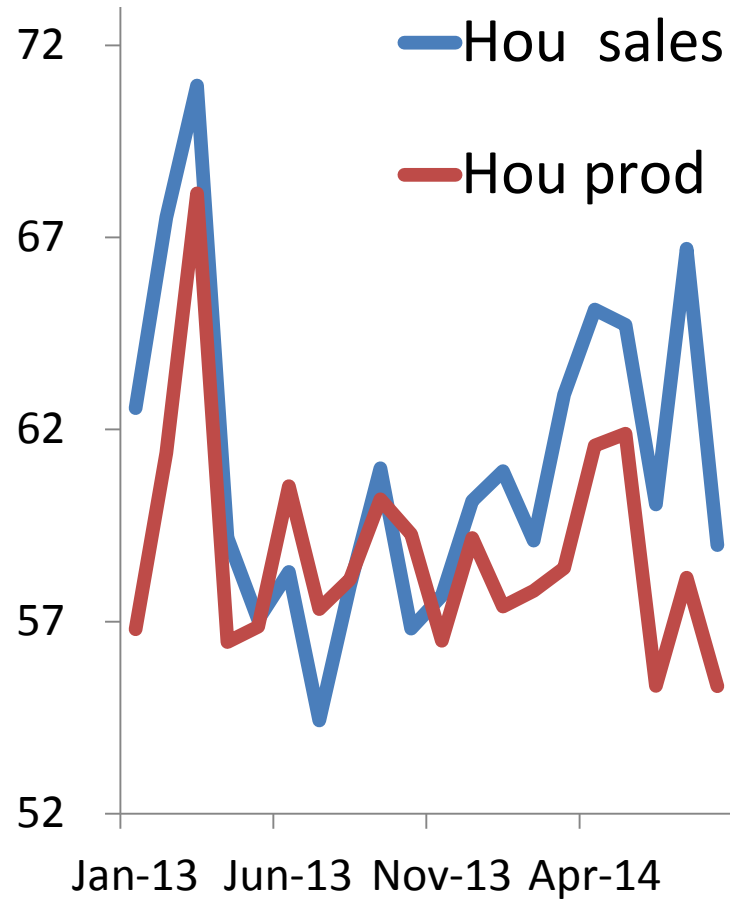
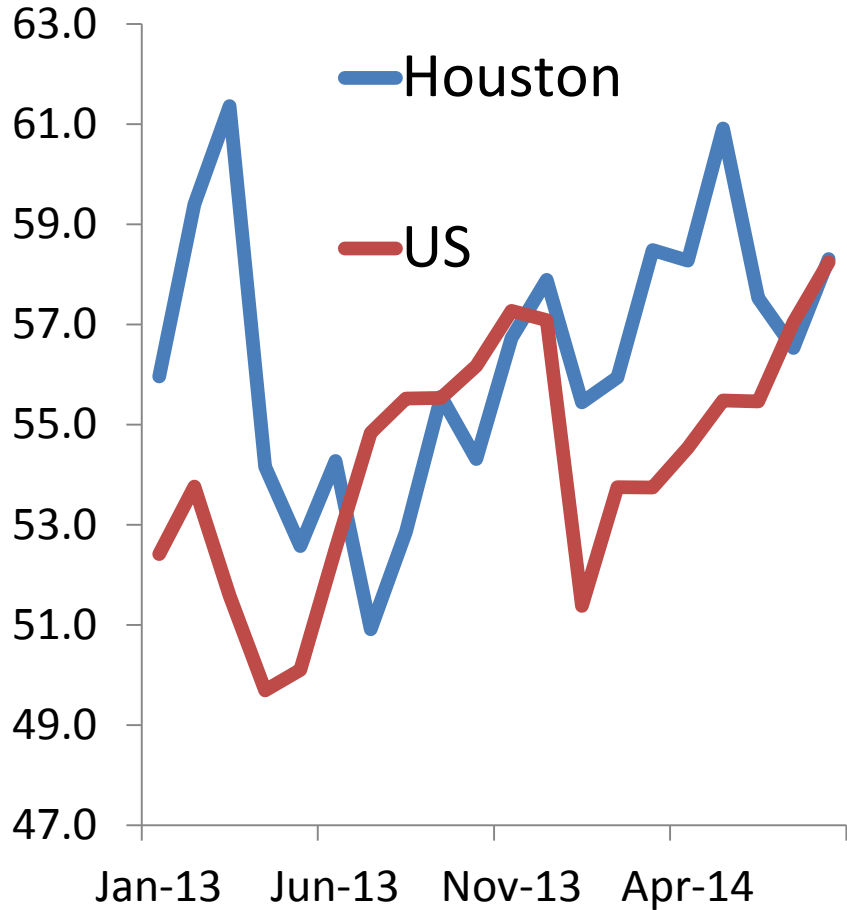
Is 2014 growth really *that* fast?

- Do other data series show this kind of powerful surge?
- Where does TWC say this fast growth is coming from?
- Job growth is probably fast? Question here is how fast? What would be good planning assumptions if we have to guess?

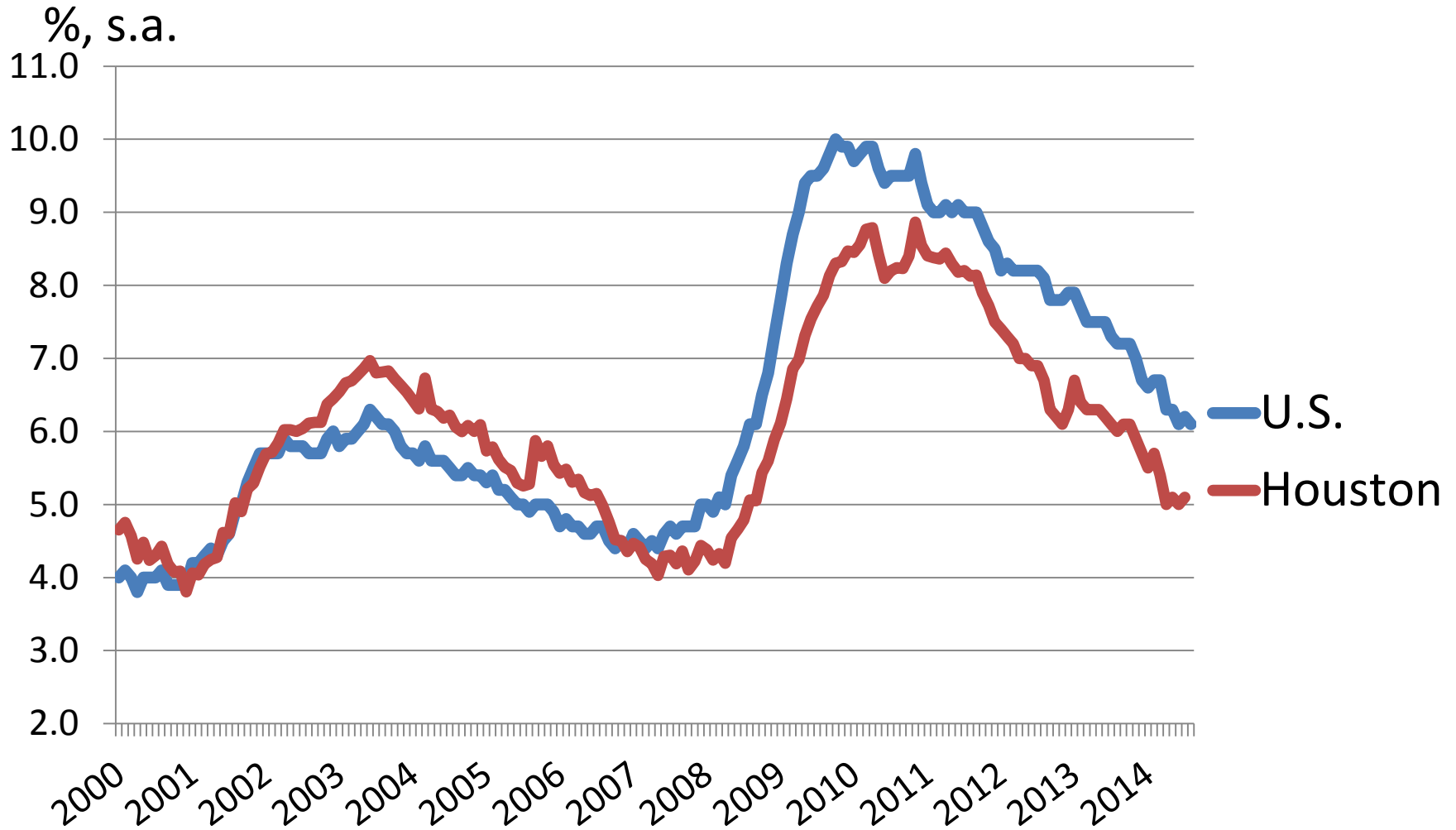
Purchasing managers' index US and Houston compared (s.a.)



Gap between Houston and US PMI closes in 2013, reopens early 2014 ... now?



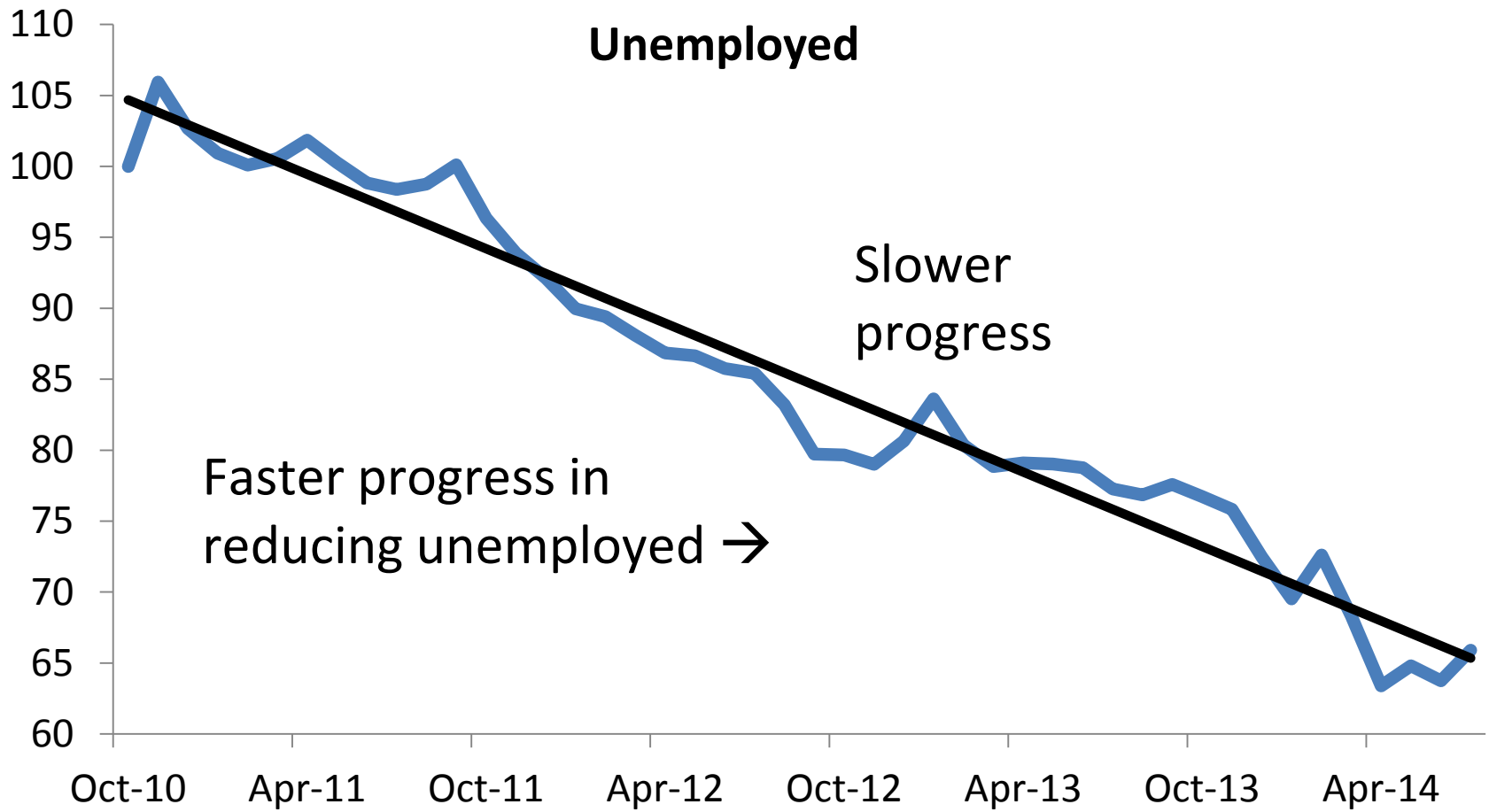
Houston unemployment rate falls on strong job growth



Bureau of Labor Statistics

The number of unemployed in Houston continue to decline in recent months

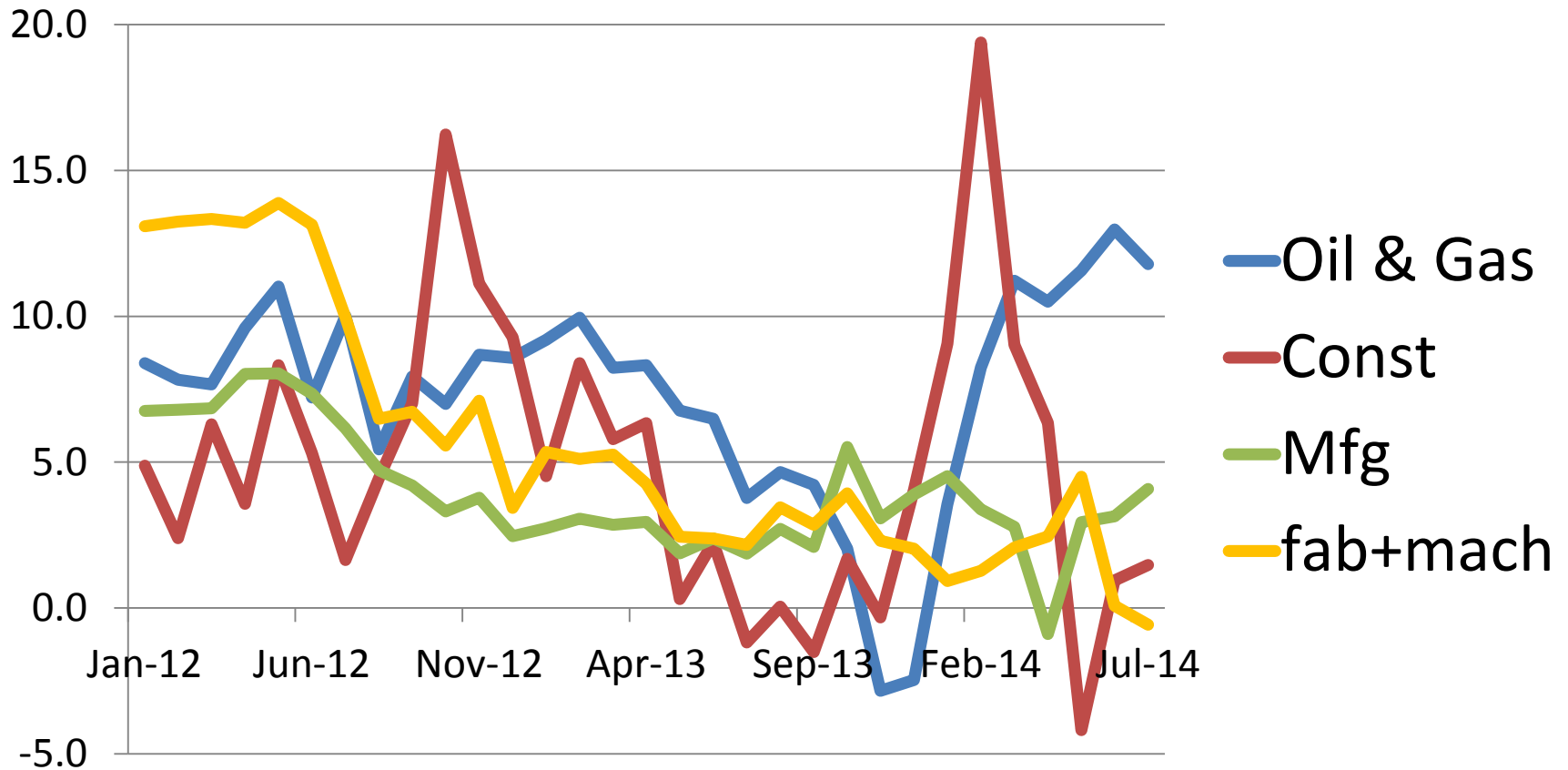
(index = 100 in Oct 2010, s.a.)



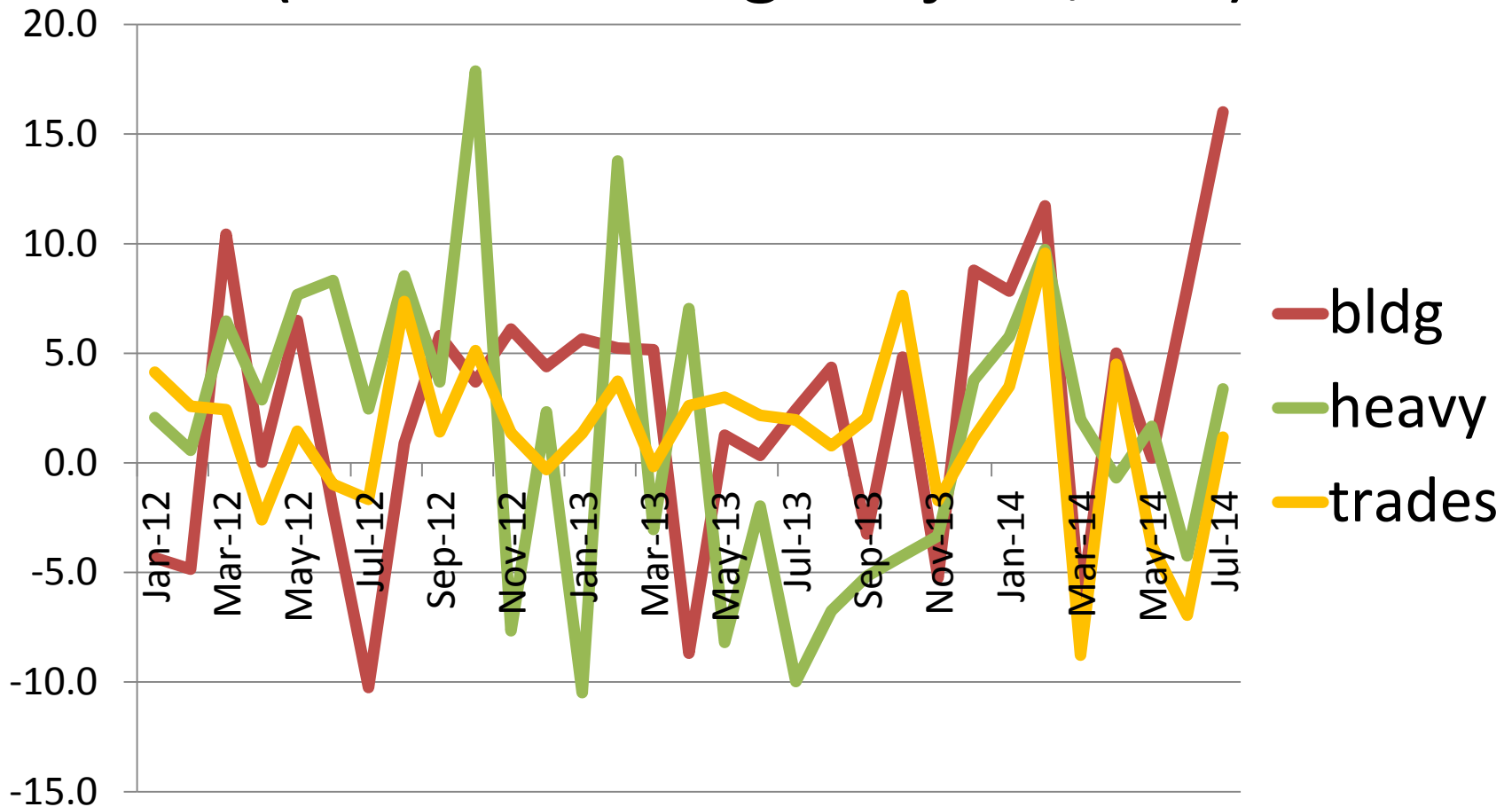
Where does this surge come from?

It is led by oil and construction

(3-mo % change in jobs at annual rates, s.a.)



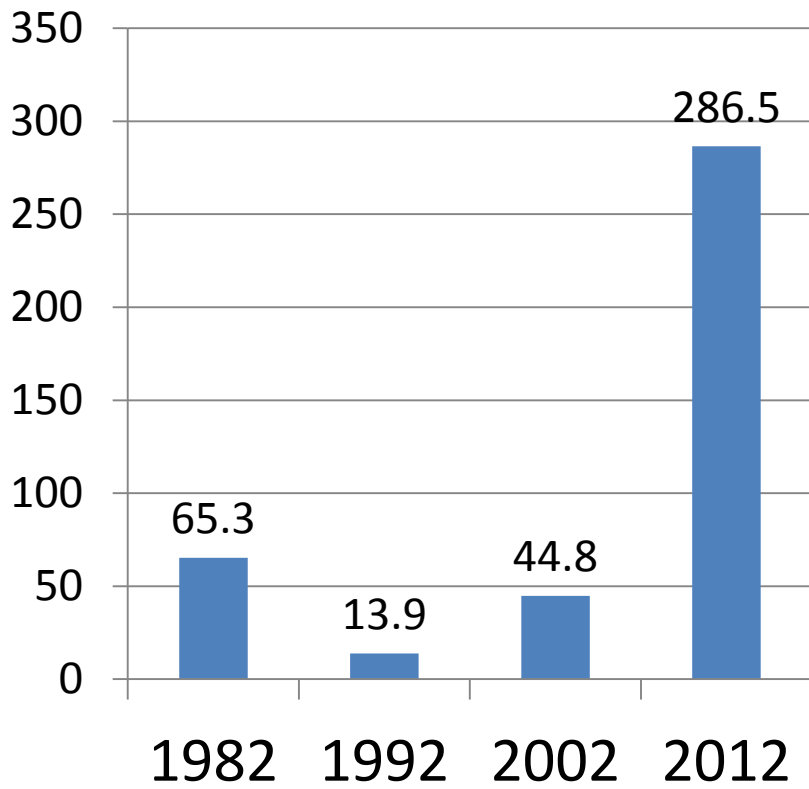
Construction surge comes from all construction sectors (3-mo % change in jobs, s.a.)



The greatest oil boom ever
is still underway

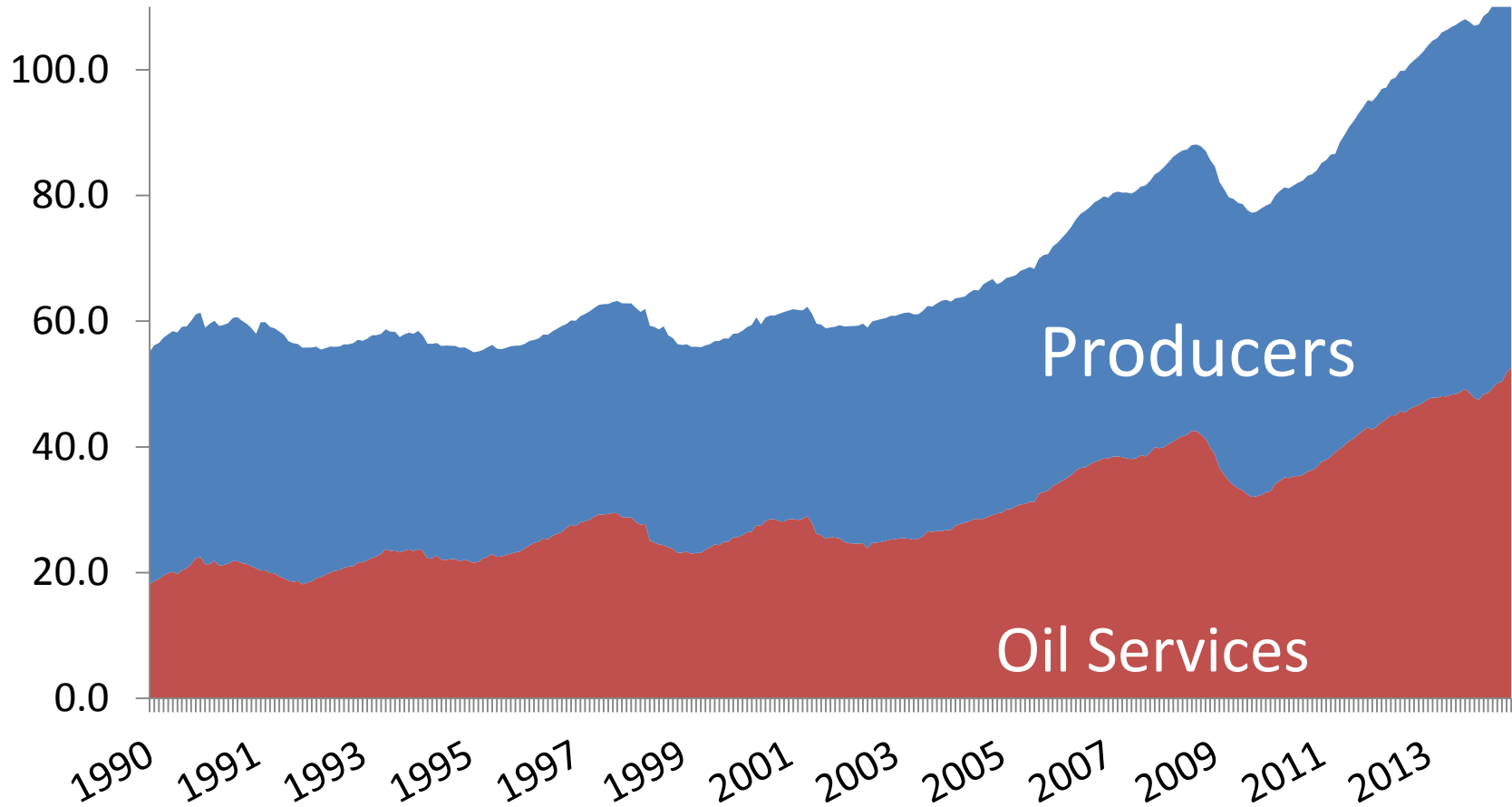
We are experiencing the greatest drilling boom in U.S. history

Constant \$ billion E&P spending



- Horizontal drilling and fracturing lead the increased spending
- Inflation-adjusted expenditures have increased 6x in a decade
- By 2012 they are four times the infamous 1982 peak

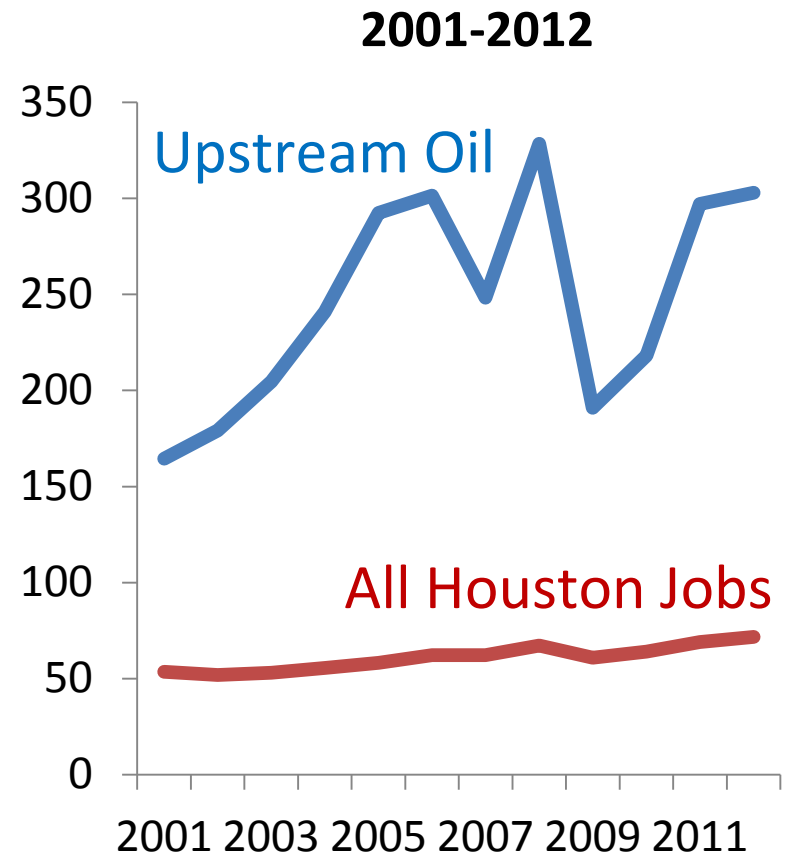
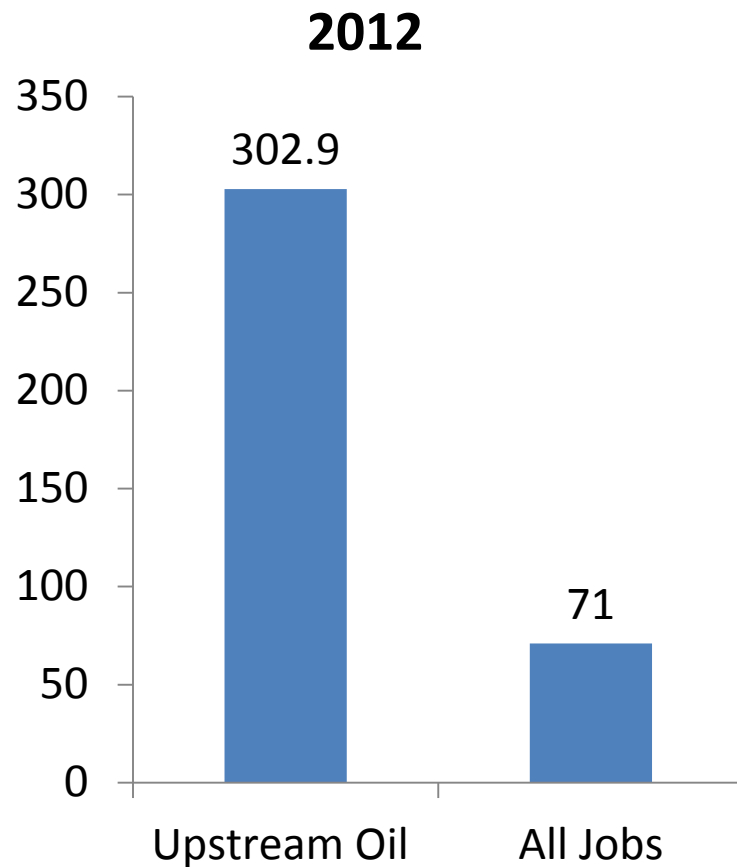
Houston's upstream exploration jobs now total over 100,000



Bureau of Labor Statistics

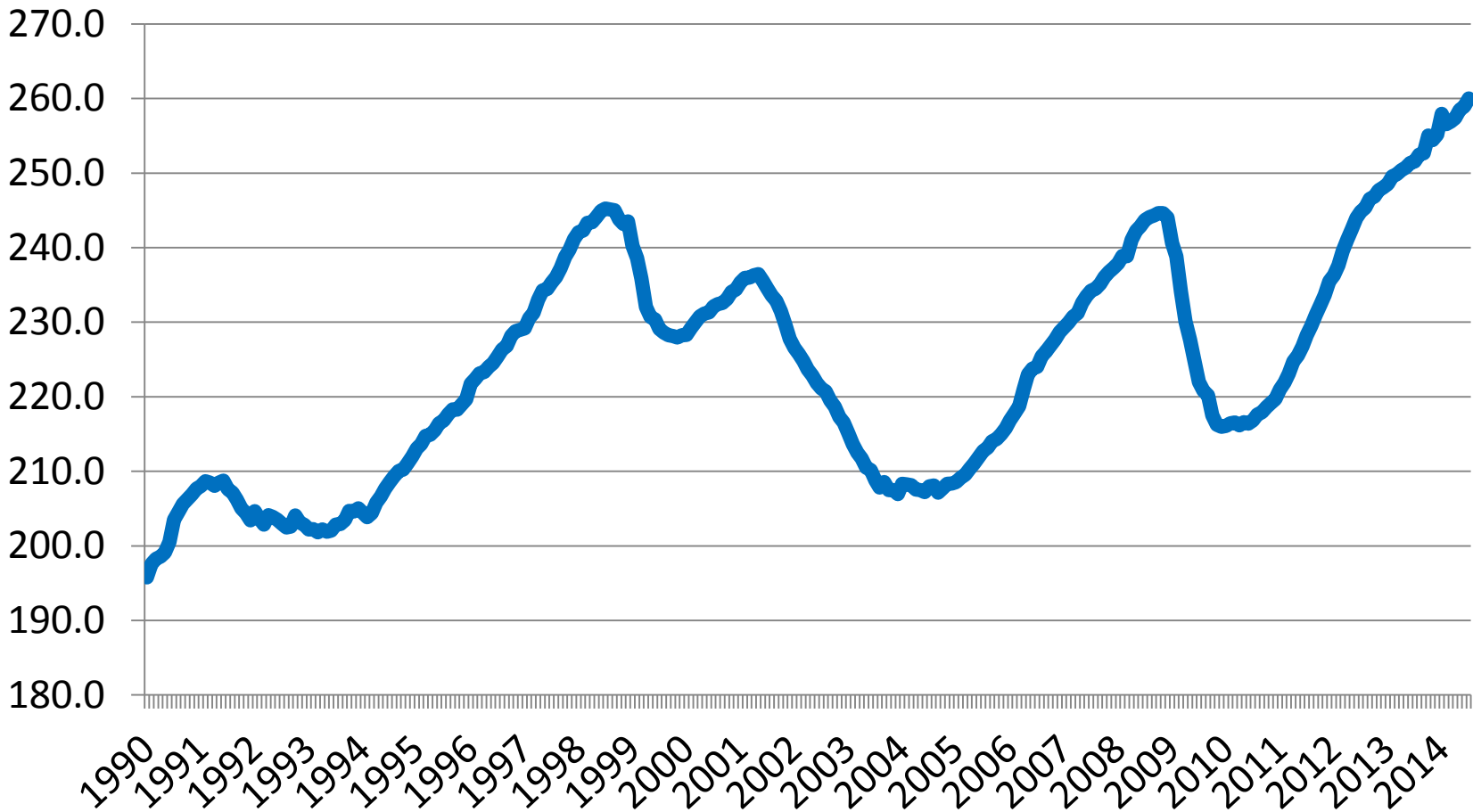
Annual earnings in upstream oil four times the typical Houston job in 2012

(\$000/worker)



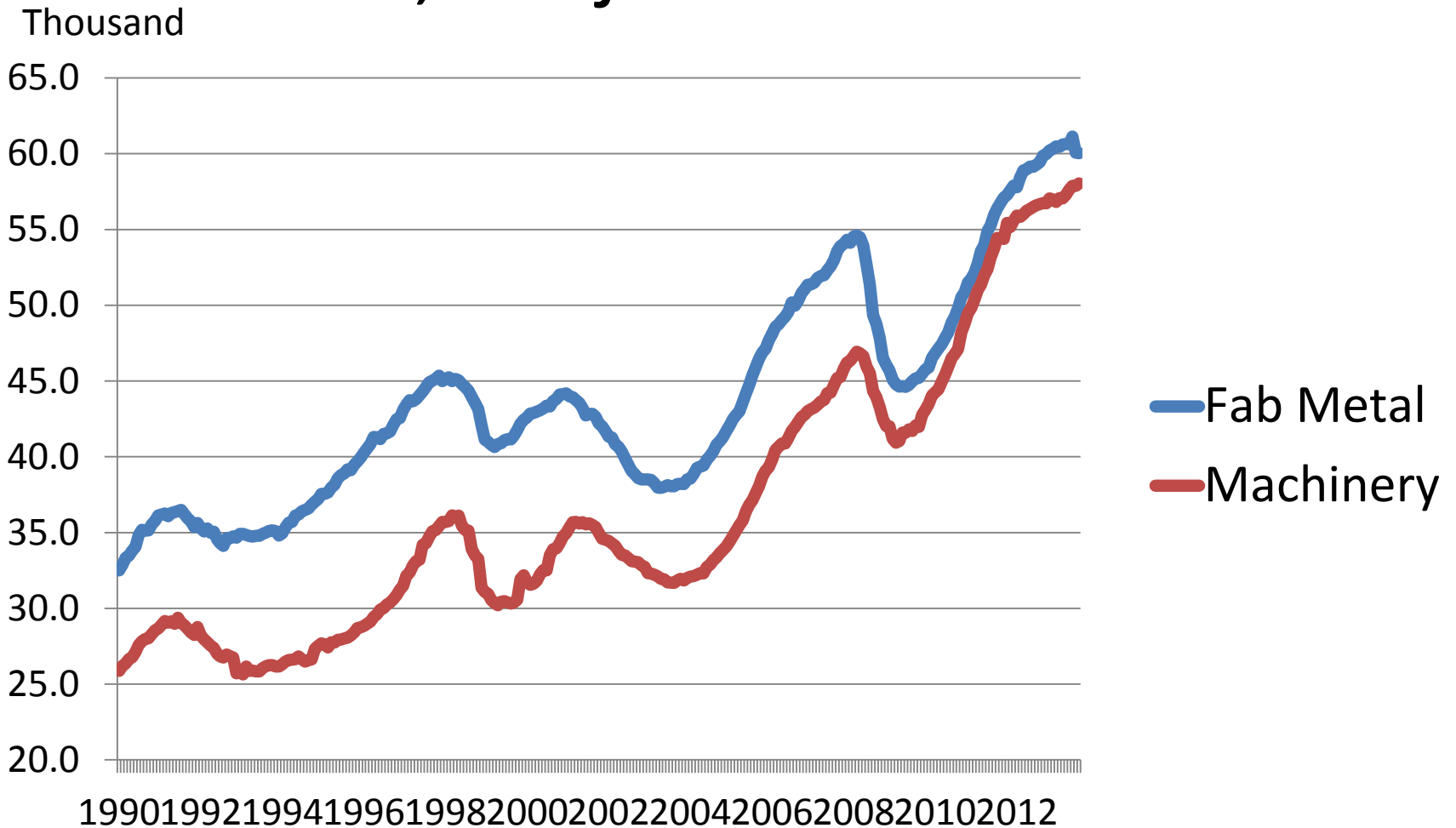
Houston adds manufacturing jobs since 2003

manufacturing employment (000)



Bureau of Labor Statistics

Machinery and fabricated metal bring 115,000 jobs to Houston



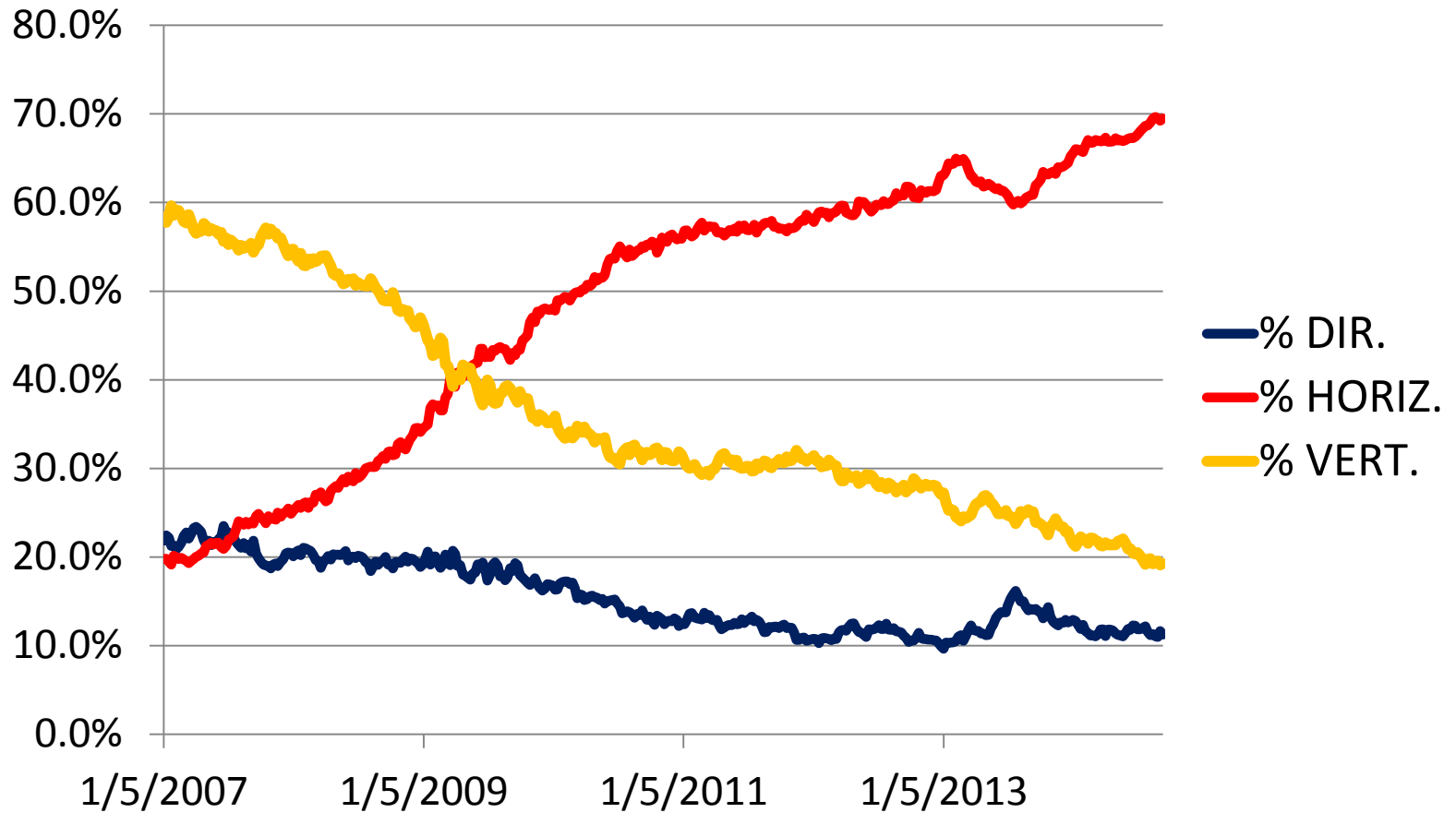
Bureau of Labor Statistics

Drilling activity slowed with collapse of natural gas prices in late 2011

North American shale plays (as of May 2011)



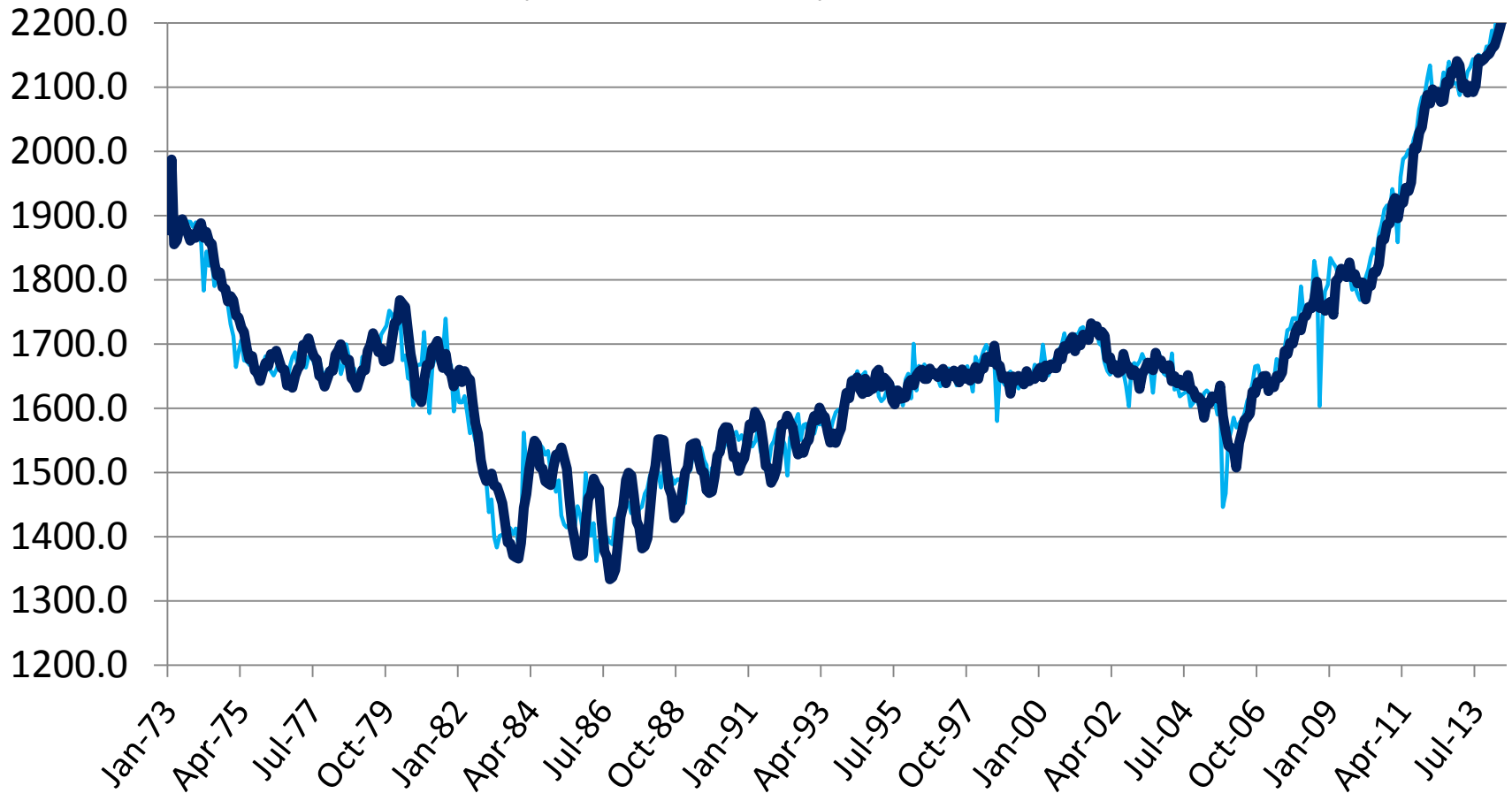
Horizontal Drilling Grows with Shale Gas, Complex Oil Projects



Baker Hughes

Since 2005 U.S. Marketed Natural Gas Production Has Grown Rapidly

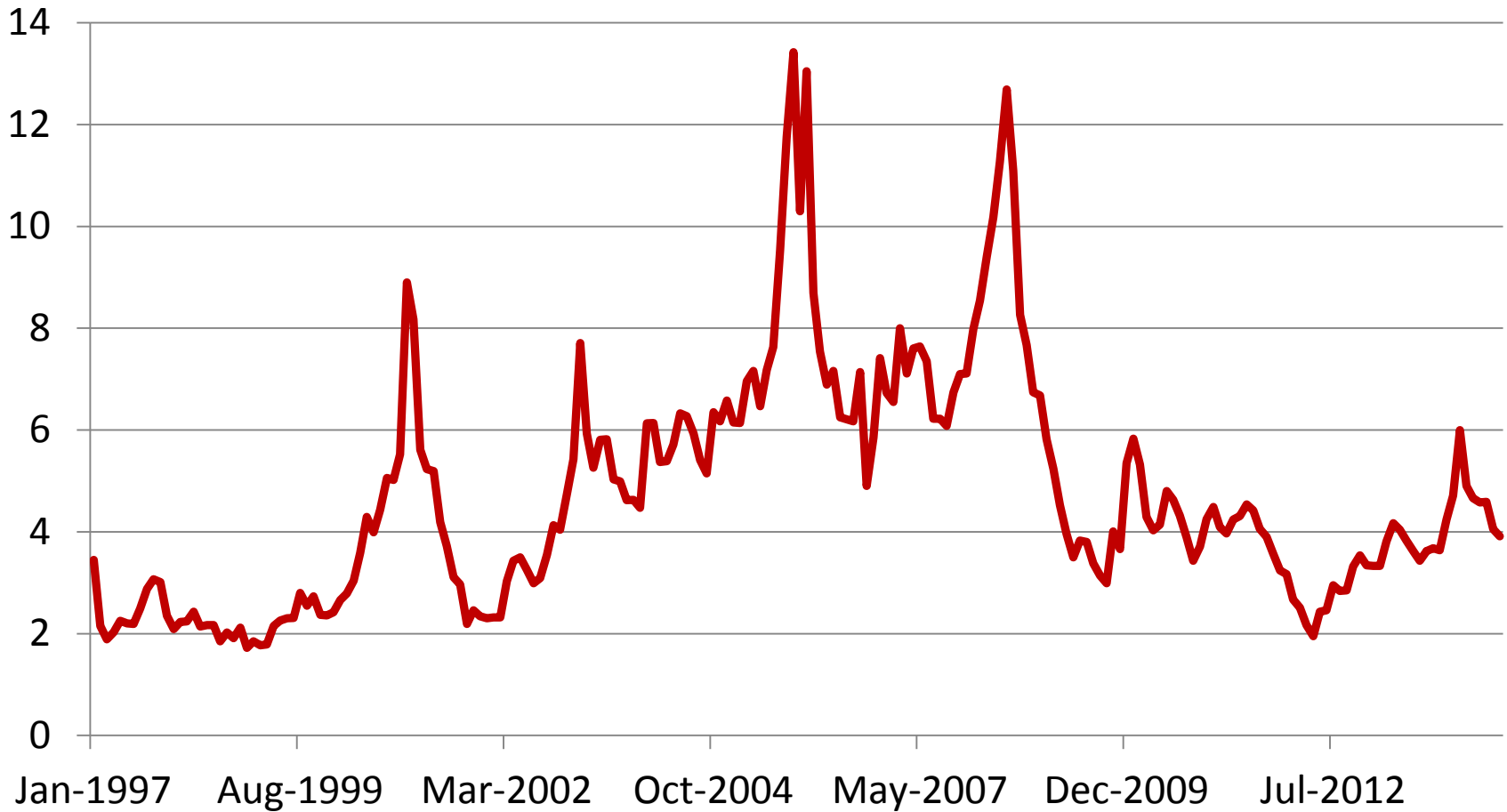
(Billion cubic feet)



DOE/EIA, six month average, seasonally adjusted

Natural gas prices collapsed in late 2011

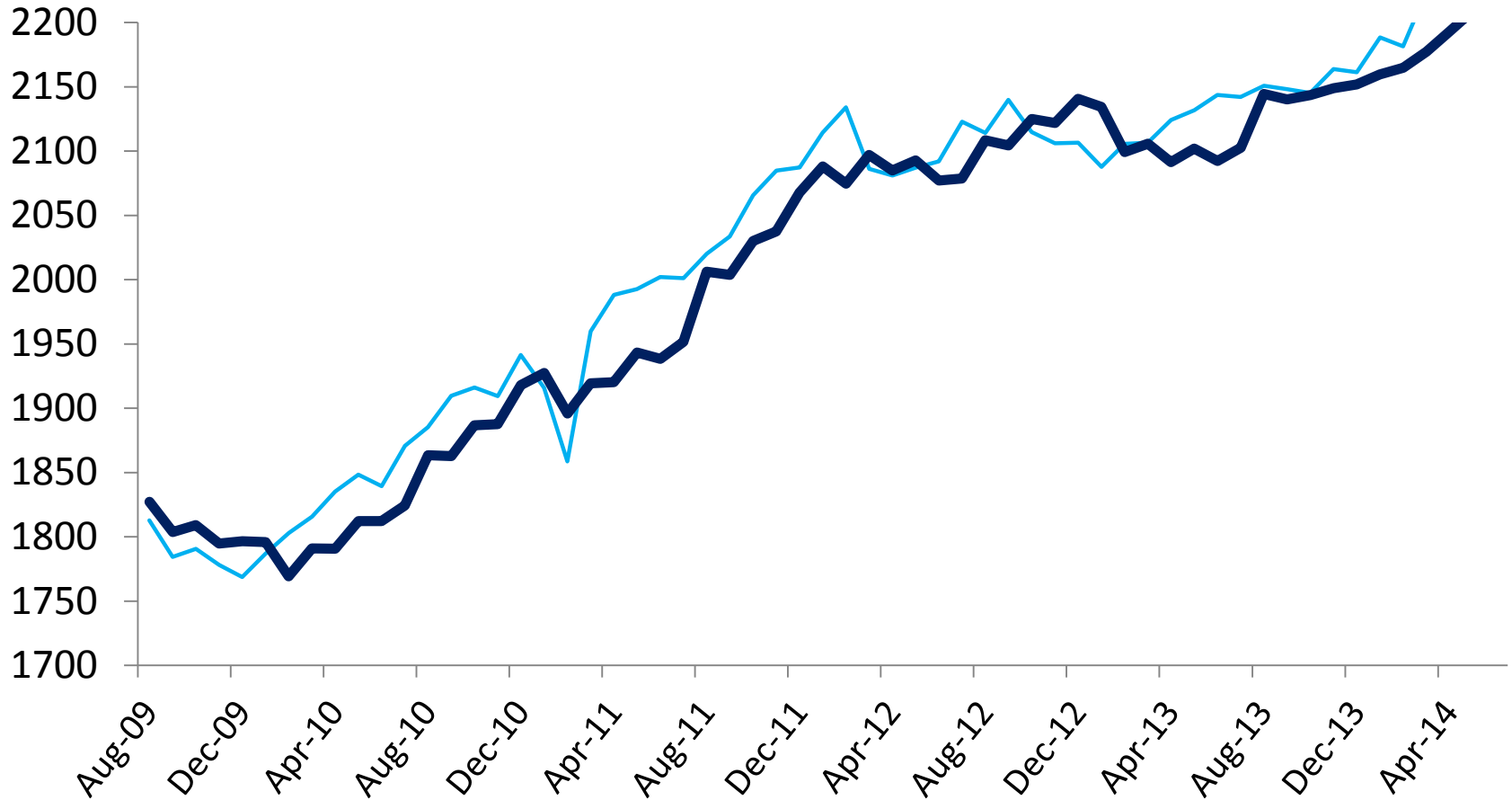
(\$/mcf)



DOE/EIA

Natural gas production has not peaked after removing 600 rigs from gas-directed drilling

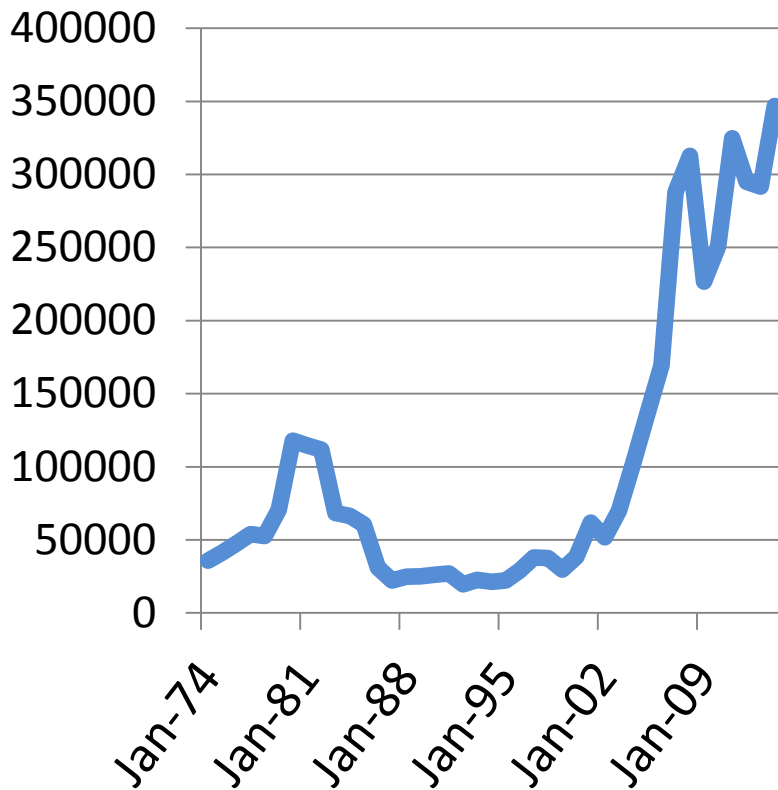
(Billion cubic feet)



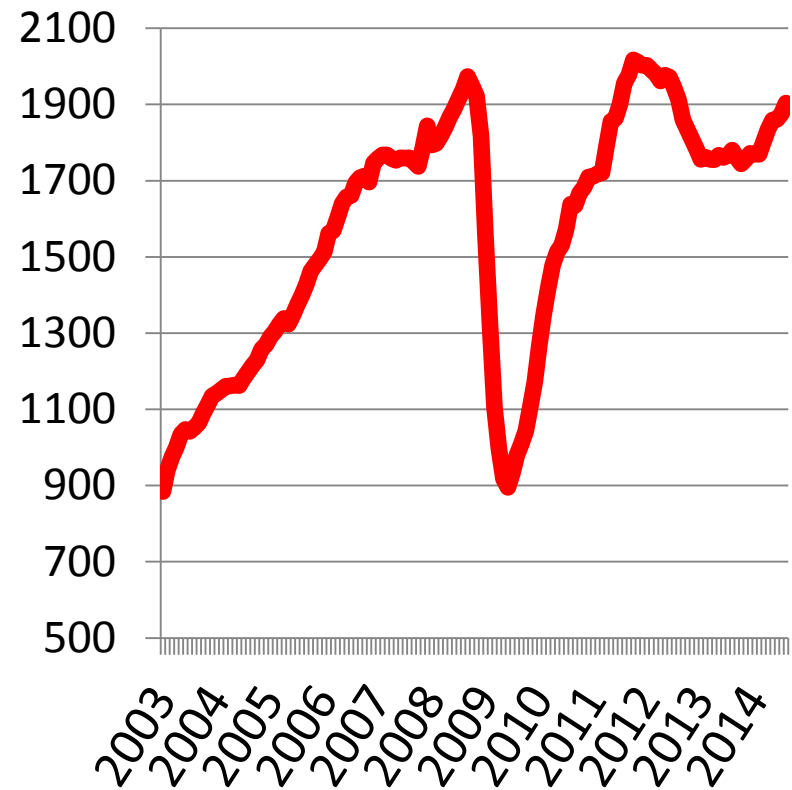
DOE/EIA, six month average, seasonally adjusted

E&P spending has pulled back from the 20 percent growth of the last decade

Real \$ billion capital expenditures

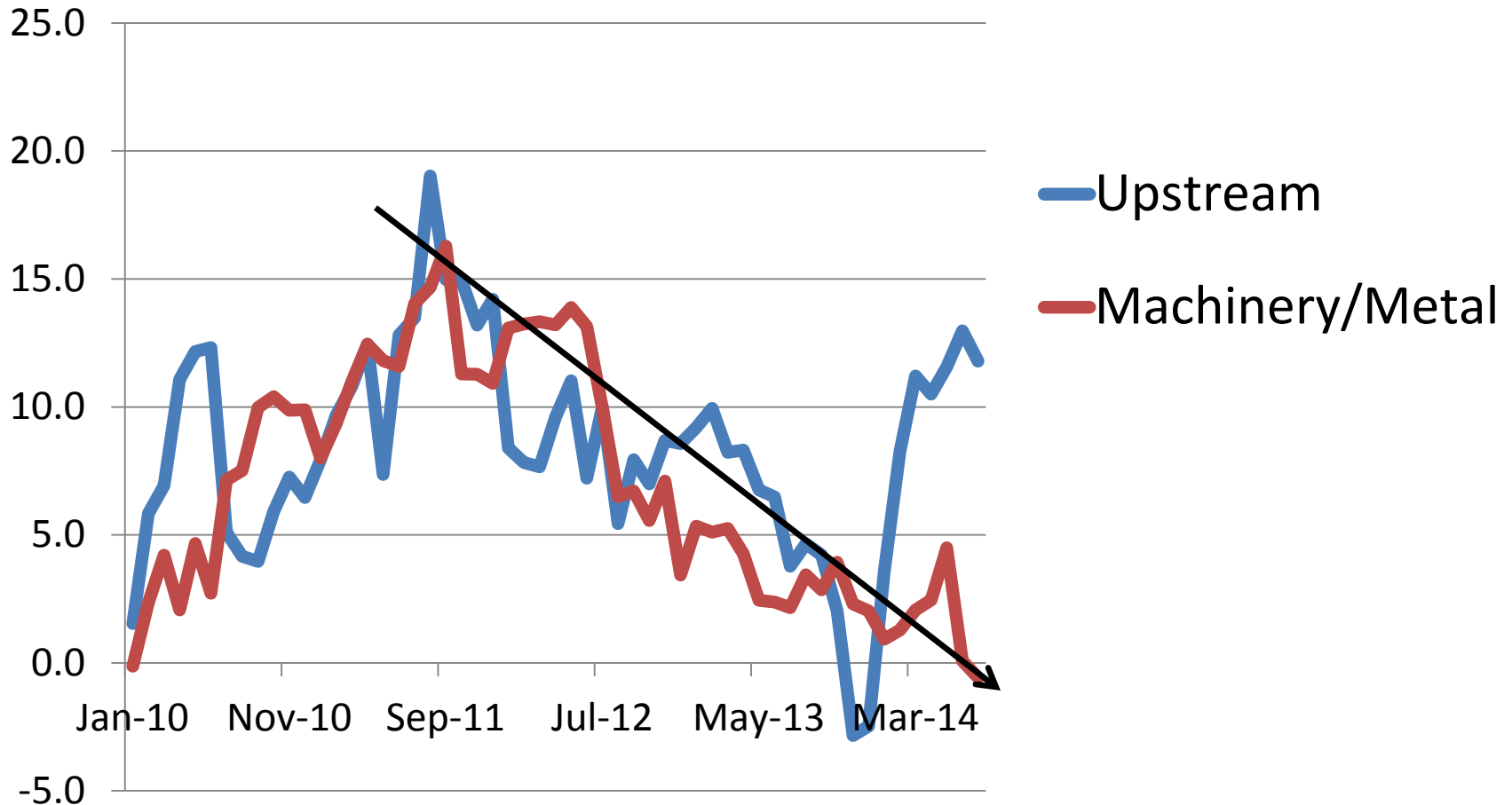


Baker Hughes rig count



Upstream job growth slows through late 2013 – but then ...?

(3-mo change in jobs, annual rate, s.a.)

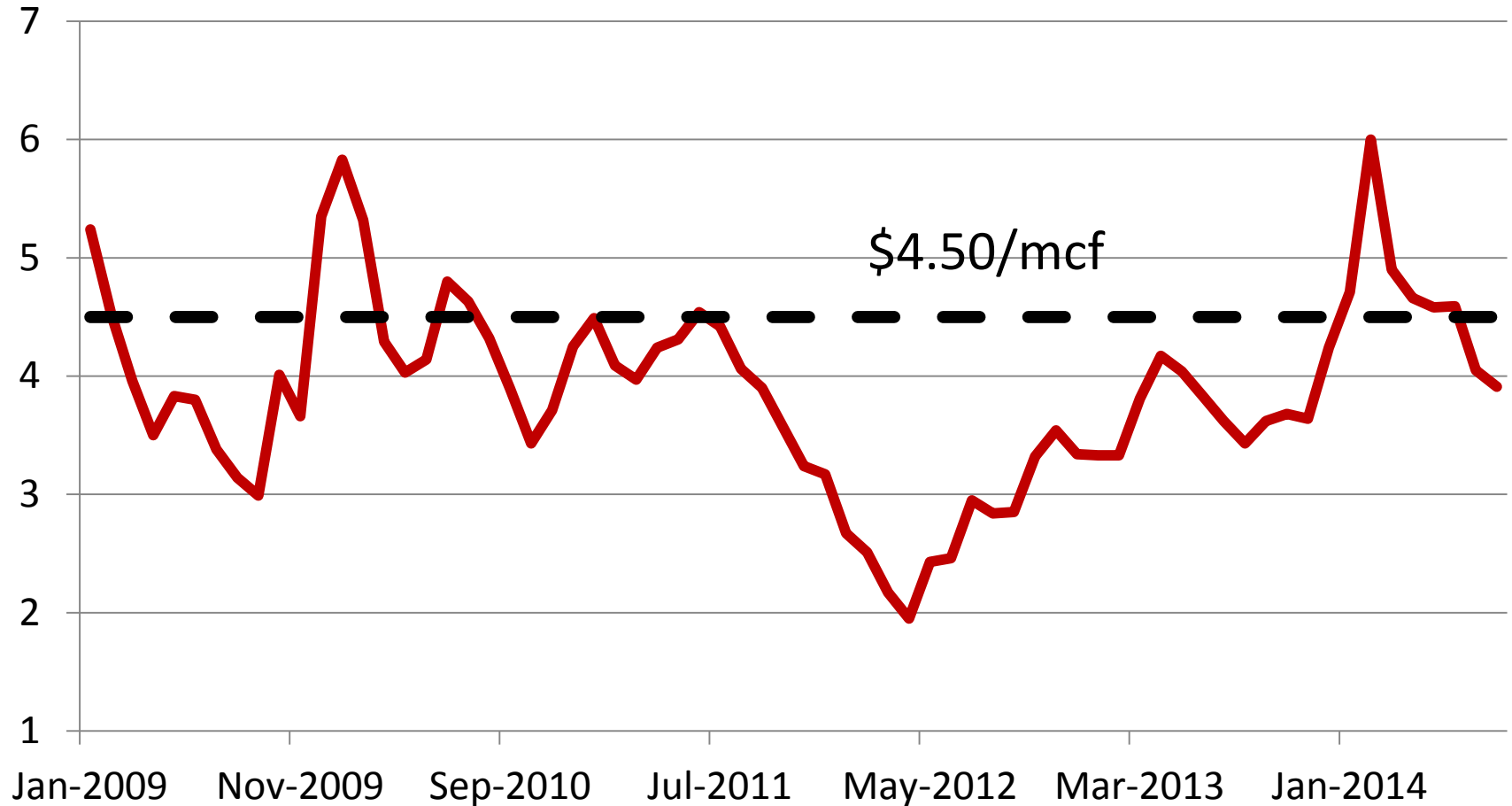


Surge in energy hiring?

- Through June, seasonally adjusted 6,300 new workers, split between producers and services? What caused this spike?
- Is it real?
 - Relocation of large number of producer employees into Houston?
 - Jump in natural gas prices over the winter created a surprise bonus for producers
 - Building 2013 under-estimate into 2014?

Polar Vortex: Higher heating bills mean
revenue for natural gas producers

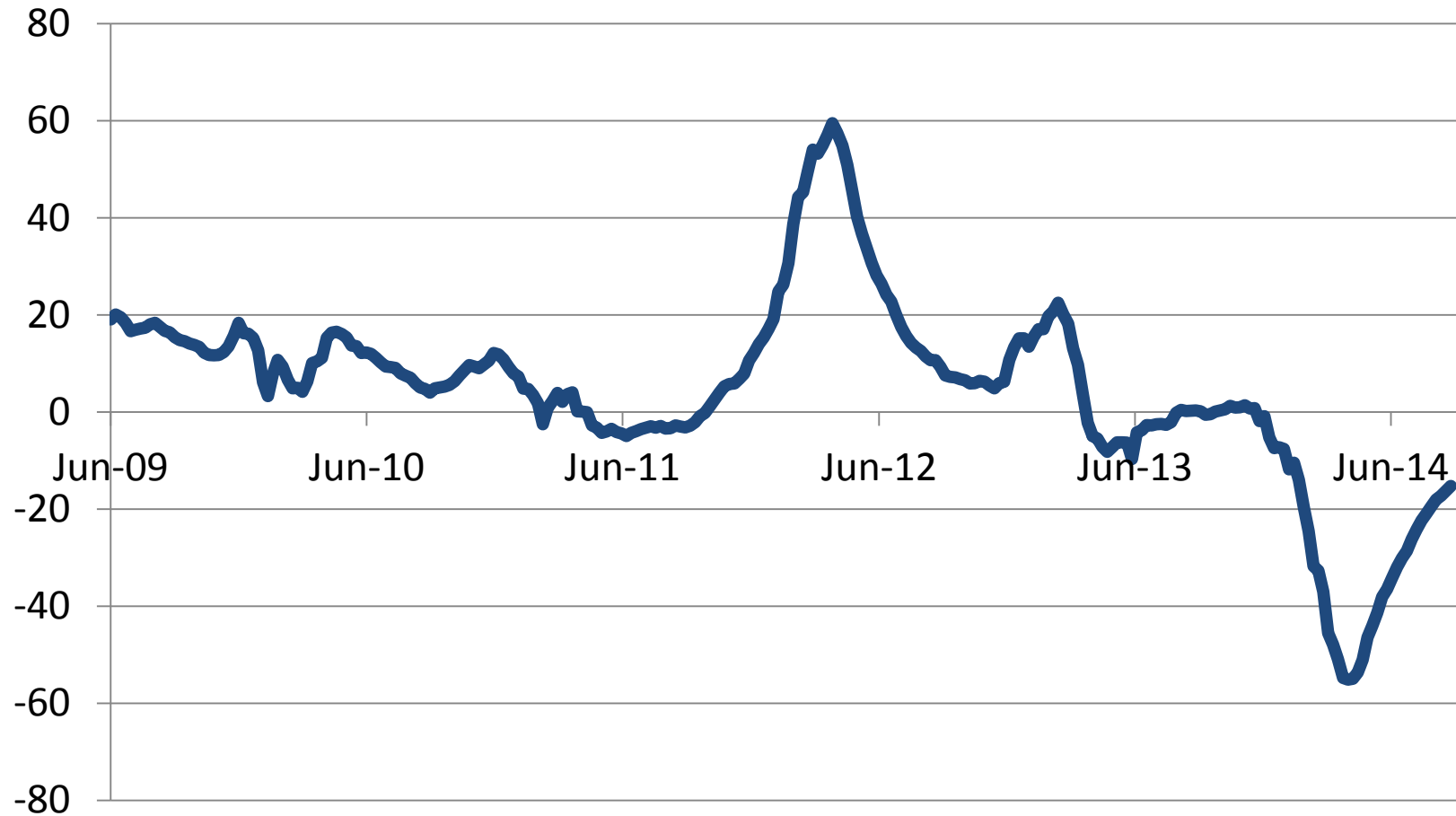
Cold briefly drives up natural gas prices (\$/mcf)



DOE/EIA

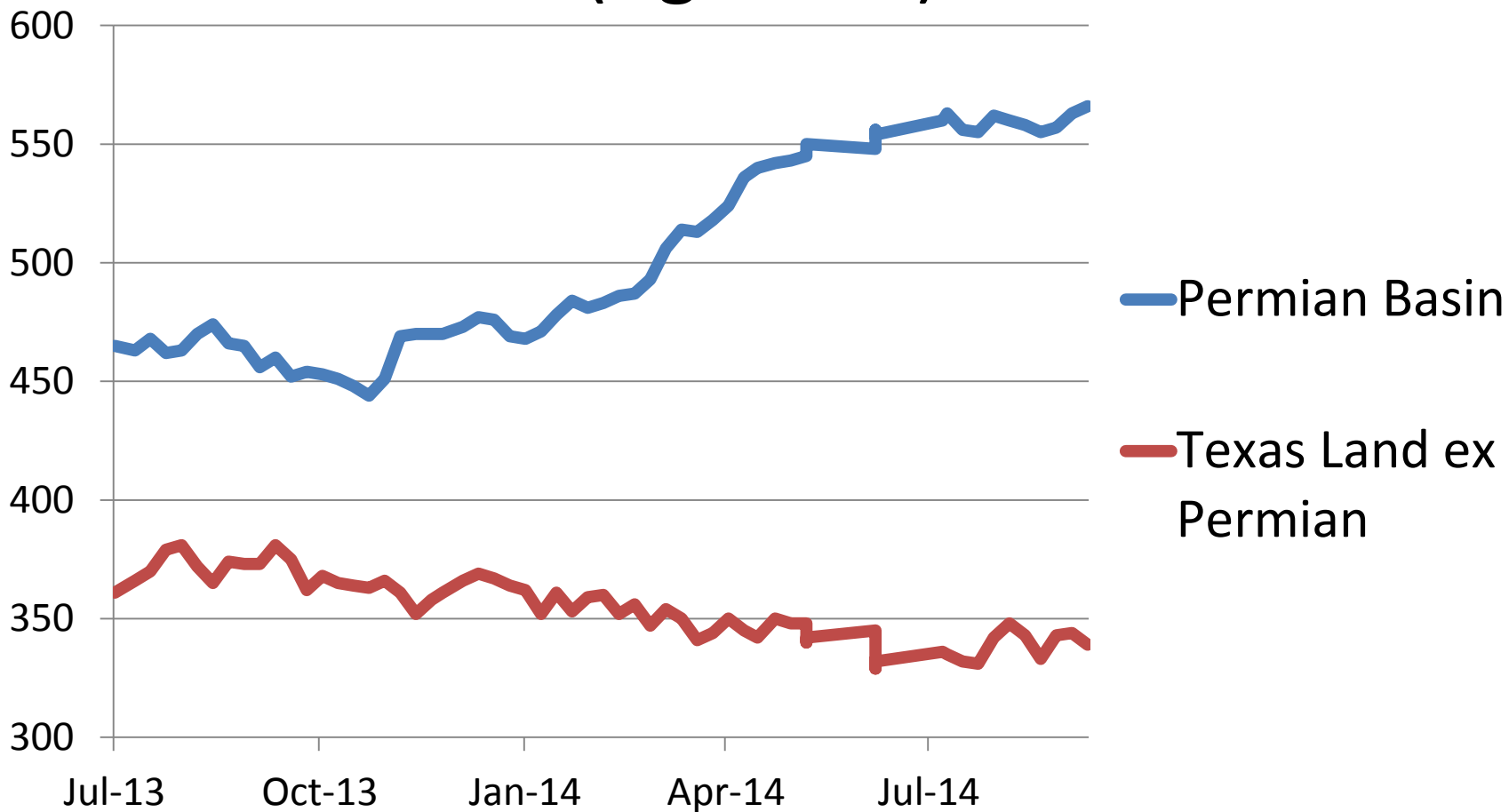
Natural gas inventories at record lows after cold winter in North America

(percent above or below 5-year average)



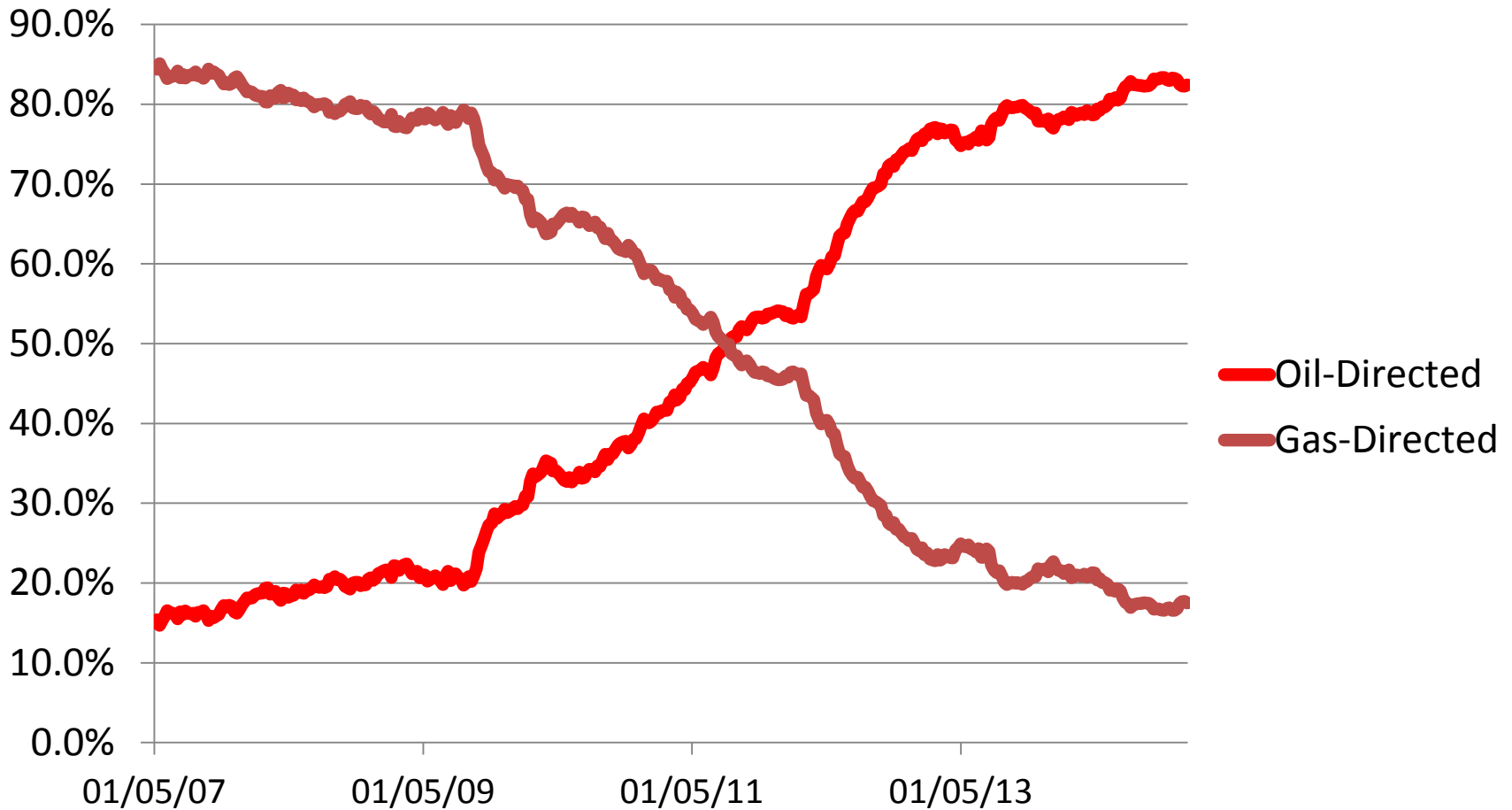
DOE/EIA

Gas producers pump revenues into Permian Basin and oil (rig count)



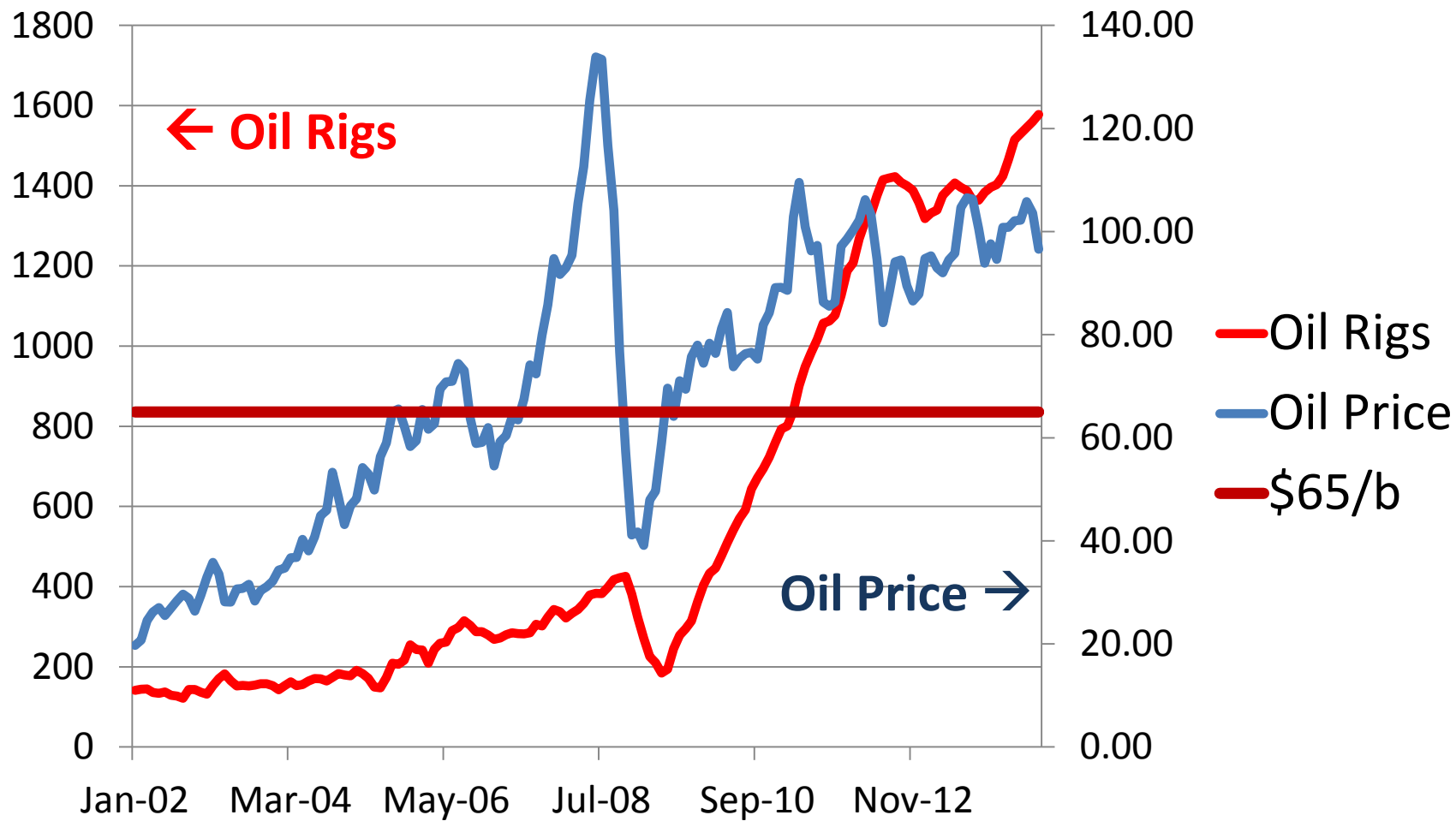
Meanwhile – a lot depends on the
price of oil

High Oil/Low Gas Price Push Drilling Toward Oil-Directed Activity



Baker Hughes

Oil price above \$65/b keeps oil-directed rigs busy



Oil price forecasts (\$/bbl)

	World Bank	IMF	DOE/EIA
2013	104	104	98
2014	103	104	97
2015	99	98	91
2016	98	93	93
2017	98	--	92

DOE/EIA is WTI price; World Bank and IMF a global averages of several marker crudes

Downstream construction
becomes a force in 2014

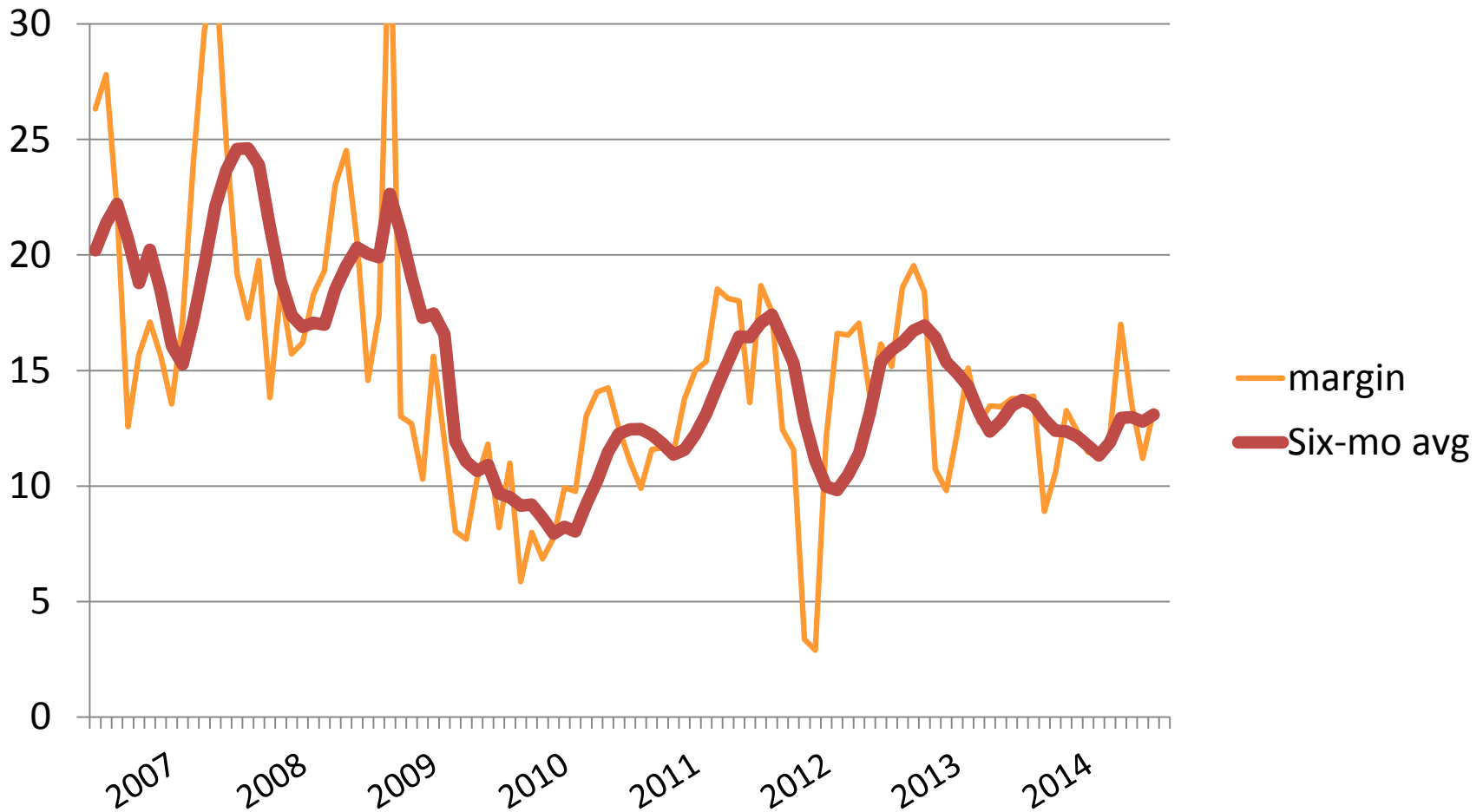


GULF OF MEXICO

Refining Capacity on the Texas and Louisiana Gulf Coast

Region	Number of Refineries	Distillation Capacity (000 b/d)
Houston/Texas City	8	1,900.5
New Orleans	8	2,024.4
Baton Rouge	1	502.5
Beaumont/Lake Charles	6	1,554.9
Corpus Christi	3	647.2
Total	26	6,629.5

Gulf Coast Refining Margin (\$/bbl)



Pace refining margins, *Oil and Gas Journal*

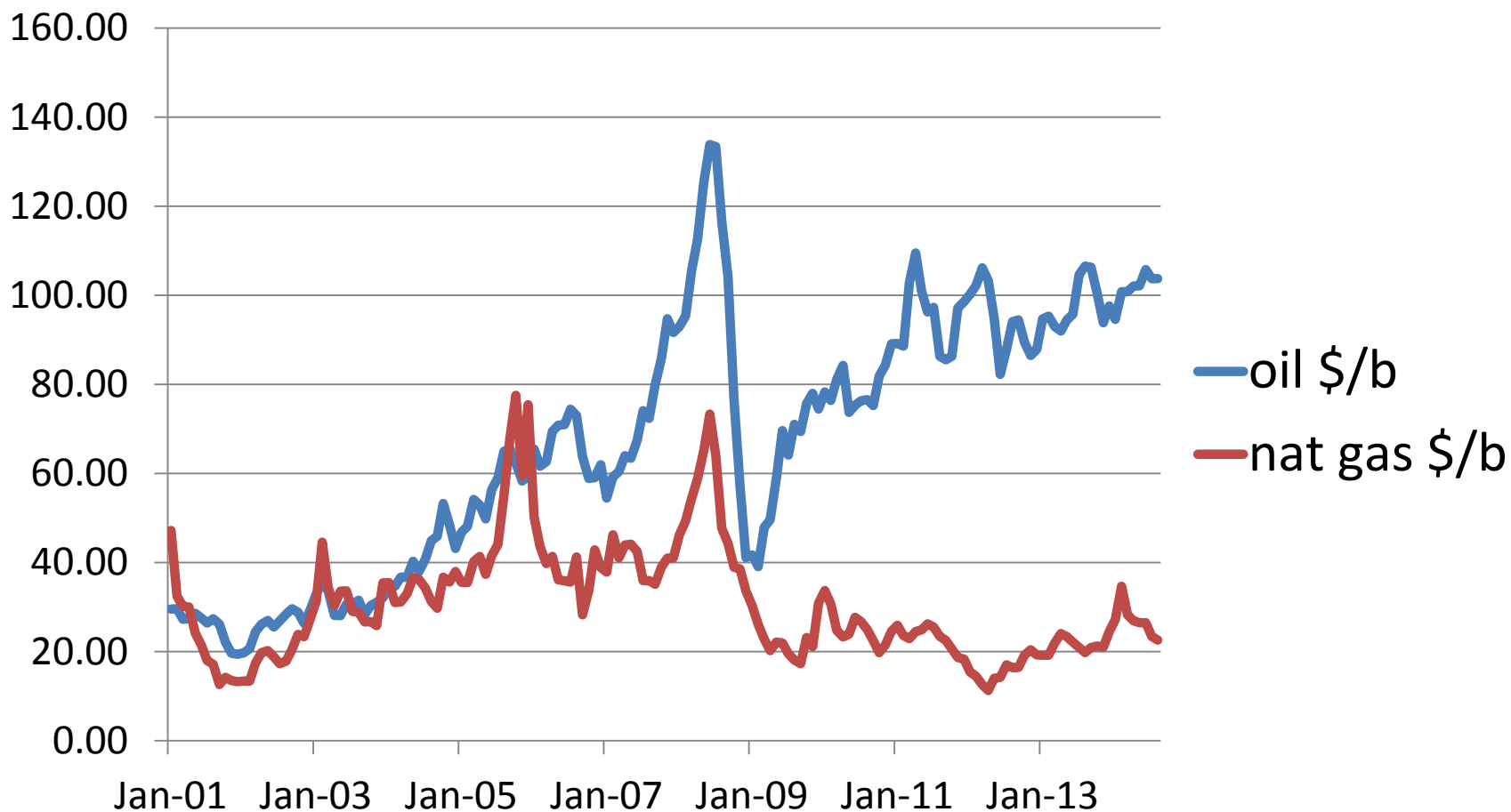
Mont Belvieu is the hub for U.S. gas processing

- Mont Belvieu is the settlement point for 90 percent of U.S. natural gas liquids
- 70 percent of those liquids are subsequently processed on the Gulf Coast
- The Houston Ship Channel will pass Qatar in 2016-2017 to become the number one exporter of propane and butane

Four of eight largest ethylene complexes in the world are in Houston

Company	Plant location	Capacity (million tpy)
Formosa	Taiwan	2,935.0
Nova	Alberta	2,811.7
Arabian Petrochem	Saudi Arabia	2,250.0
ExxonMobil	Baytown	2,197.0
ChevronPhillips	Sweeny	1,865.0
Dow	Netherlands	1,800.0
Ineos	Chocolate Bayou	1,752.0
Equistar	Channelview	1,750.0
Yanbu	Saudi Arabia	1,705.0
Equate	Kuwait	1,650.0

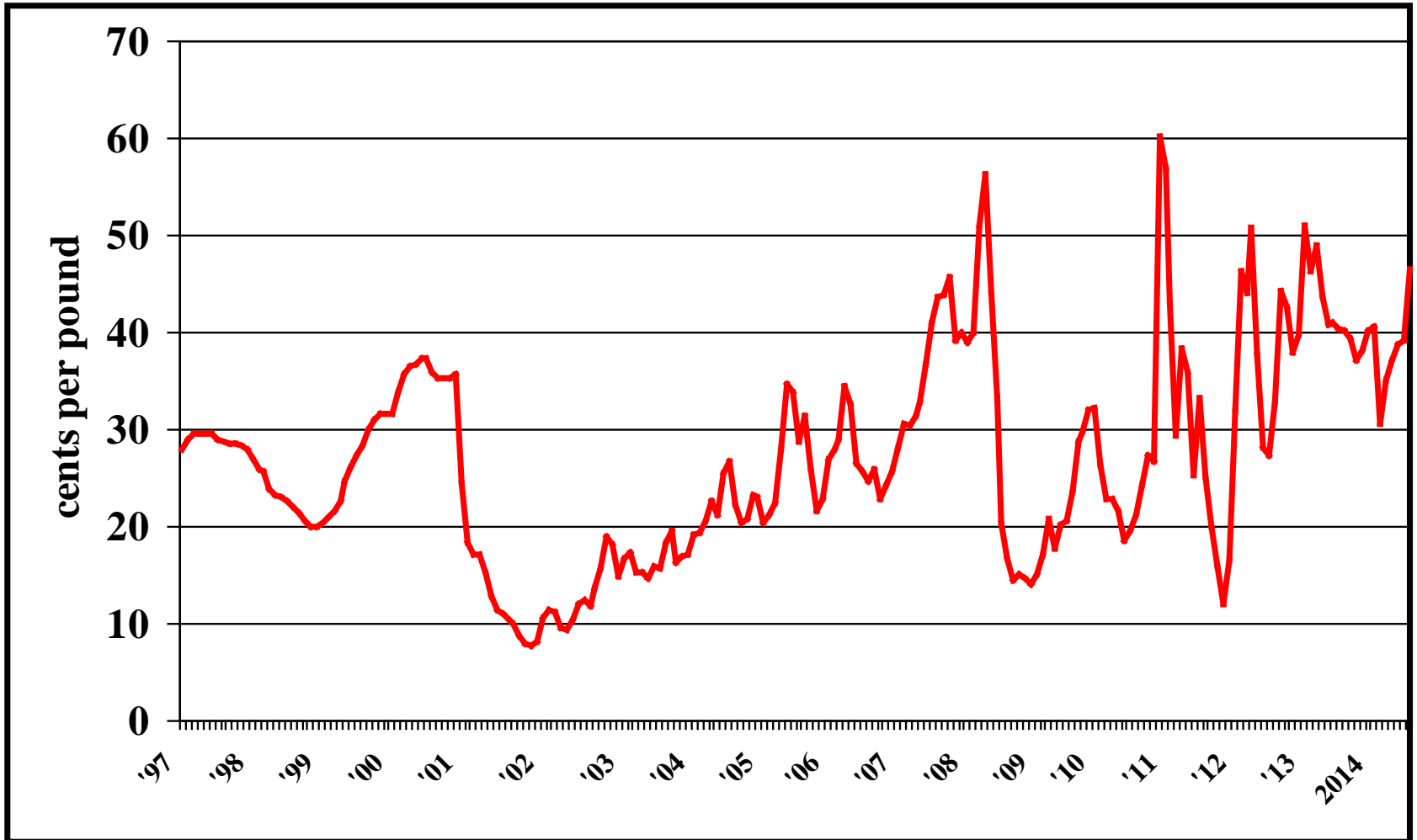
Natural gas energy content equivalent to \$20-\$40 per barrel for oil



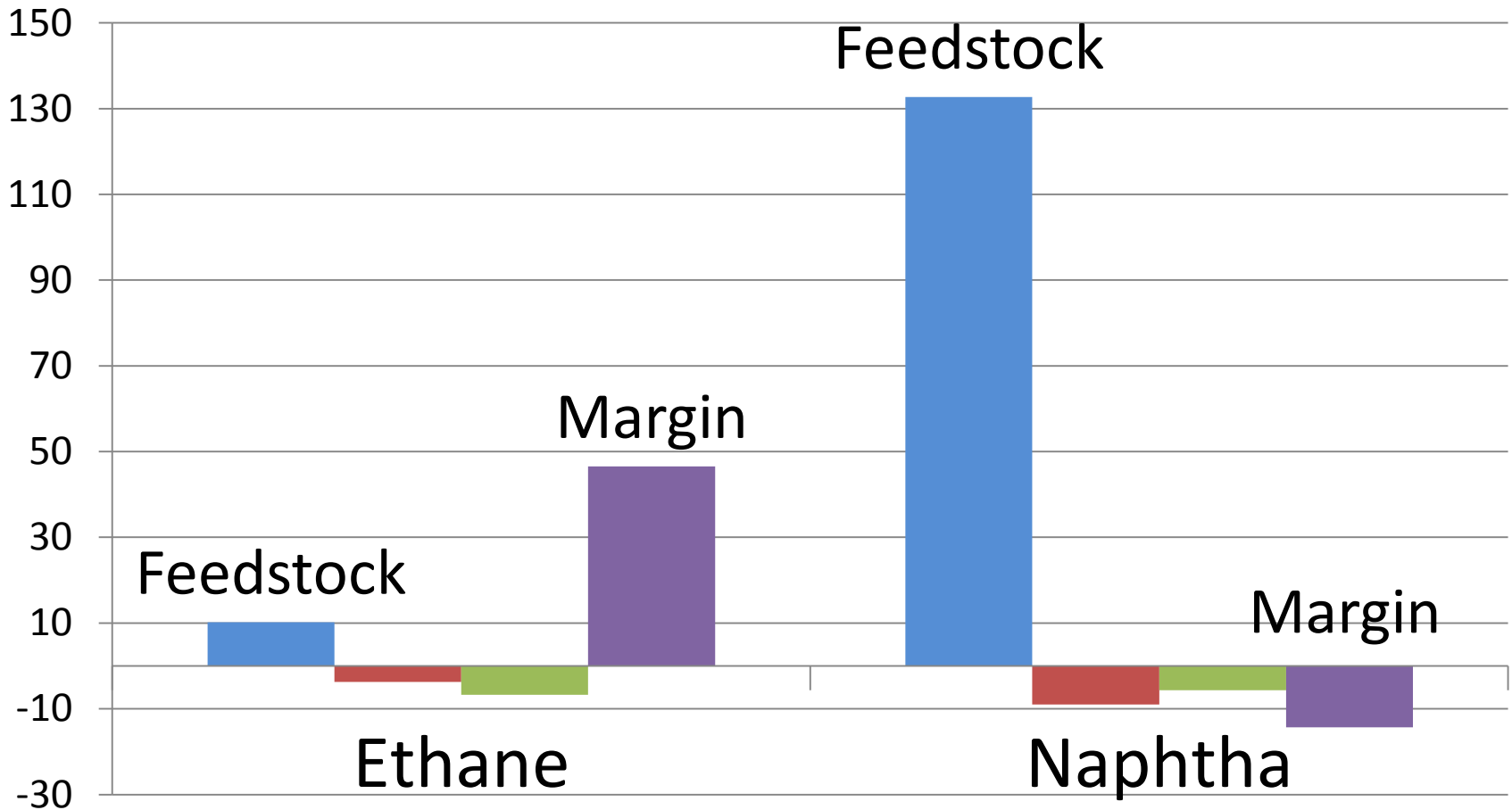
DOE/EIA and calculations of the author

Ethylene Margins

(cents per pound)



June margins for ethylene were 39 cents per pound in North America, -19 cents elsewhere



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

Two of the biggest proposed projects are like peas in a pod

ChevronPhillips

- \$6 billion investment
- 1.5 million ton cracker in Baytown
- Two 2,500 metric ton polyethylene plants near Sweeny
- 10,000 construction jobs, 400 permanent jobs
- Completed 2016-2017

Exxon

- \$5-\$6 billion investment
- 1.5 million metric ton cracker in Baytown
- Two 2,600 metric ton polyethylene plants near Mont Belvieu
- 10,000 construction jobs, 350 permanent jobs
- Completed 2016-2017

There are five more ethylene projects in the US, four on the Gulf Coast

Company	Scale	Location	Completion
Dow	1.5 m tons	Freeport	2017
Sasol	1.5 m tons	Lake Charles	2017
Occidental	.5 m tons	Ingleside	2017
Formosa Plastic	1.2 m tons	Point Comfort	2017
Shell	World scale	Pennsylvania	2019-2020

These giant ethylene projects are rapidly moving forward

- Speed counts, and the first finished are best positioned
- Permitting is a major concern, with multiple groups typically challenging the process
- Craft availability is another big concern with everyone trying to squeeze into a 2014-2016 window. Also, is there machine shop capacity?
- Over-building? These are export facilities, built to for global markets. But billions are at stake

More than just ethylene: Totals for chemicals on the ship channel

Under construction	\$6,229
Permitting	\$4,000
Board approval	\$492
Under study	\$400
Total	\$11,121

Plus three projects with undisclosed costs

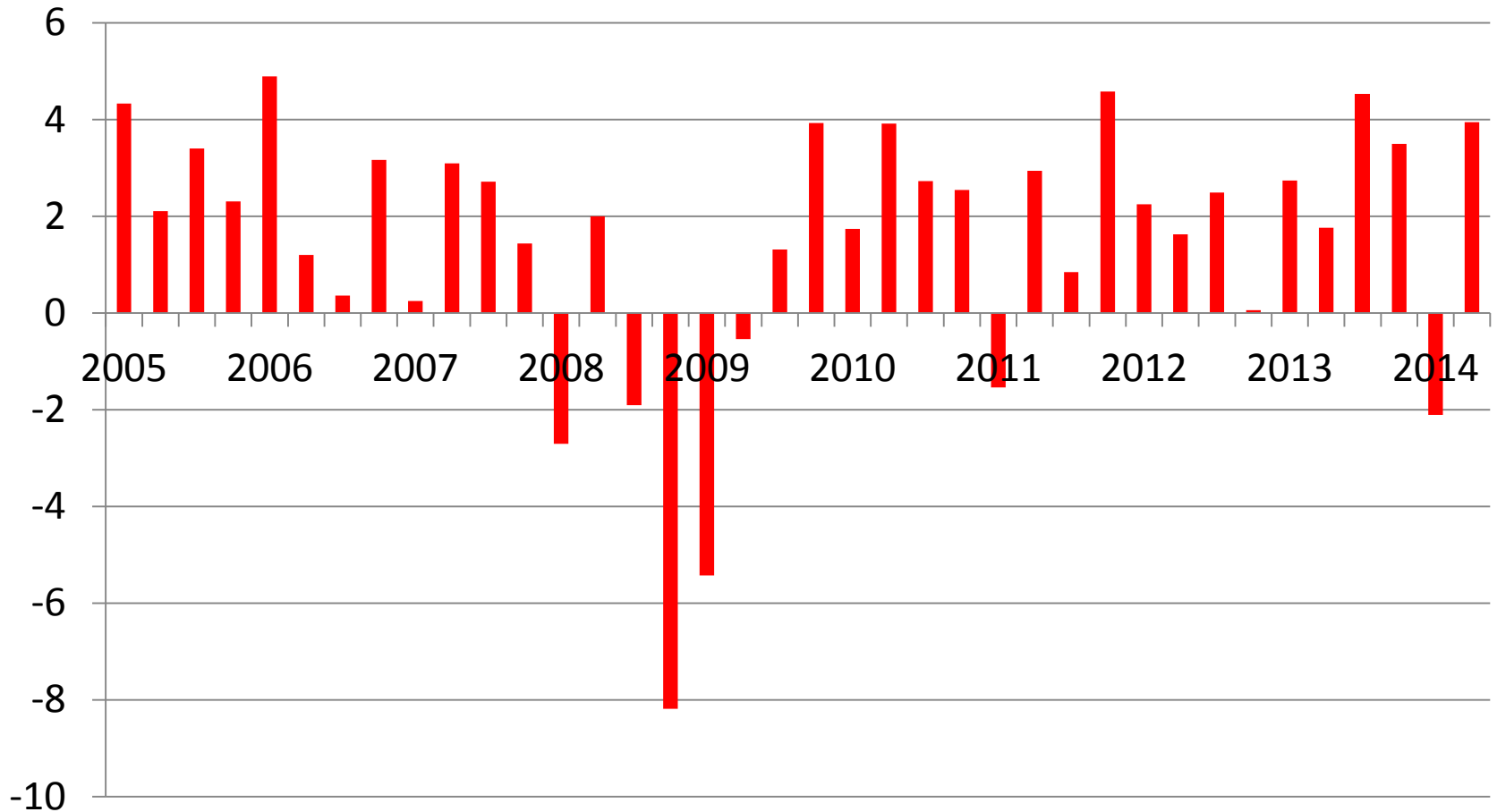
More than just chemicals

- There have been 19 applications for LNG export terminals, 6 have been approved
- Four are located on the Gulf Coast: Two in Cameron Parish, La; one each in Lake Charles and Freeport
- These projects have a typical construction cost of \$10 billion and recent permits hope for initial operation in 2018

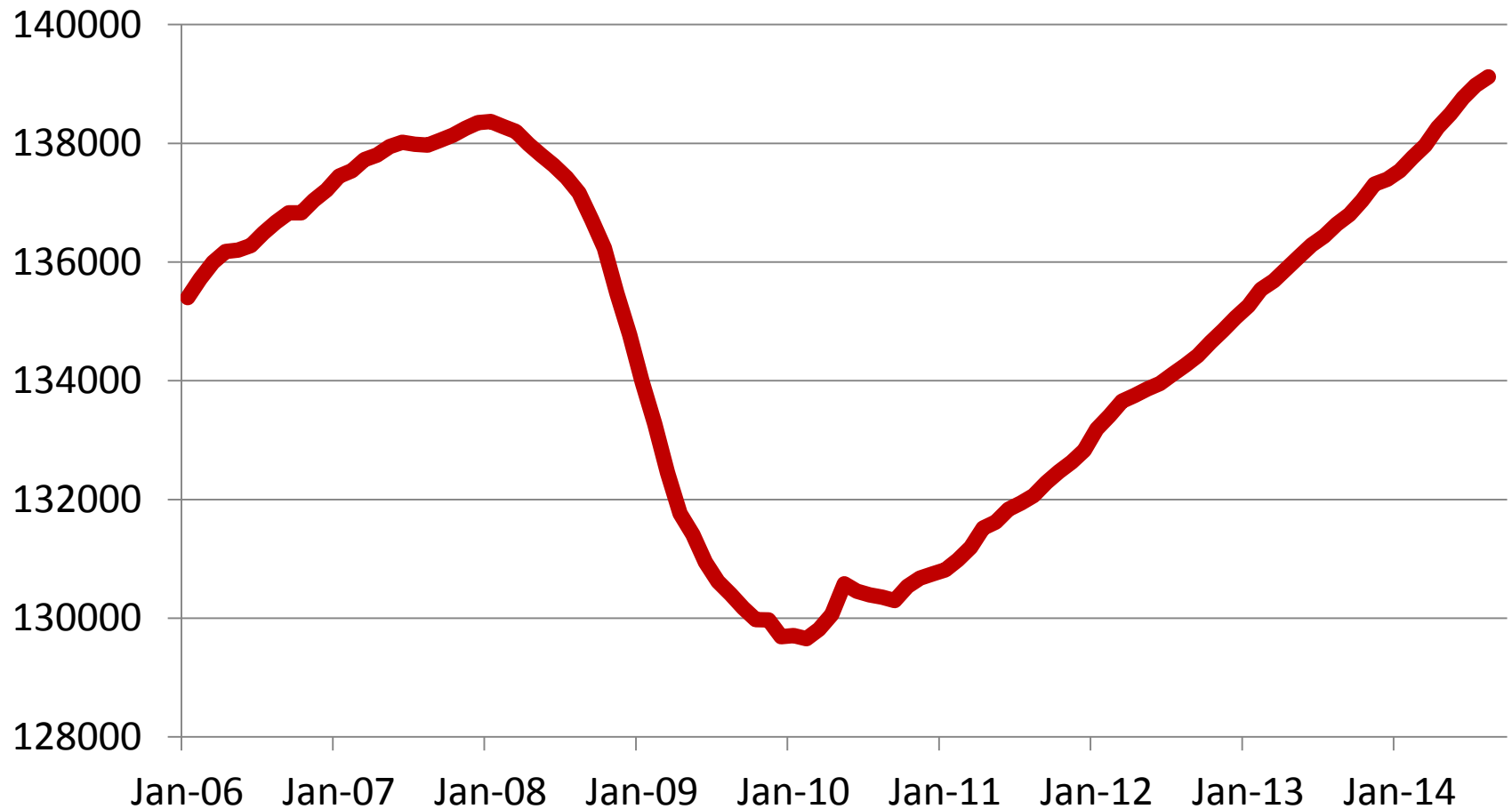
The US economic outlook

Output growth in this recovery has disappointed badly

(Real gross product %-change, annual rates)

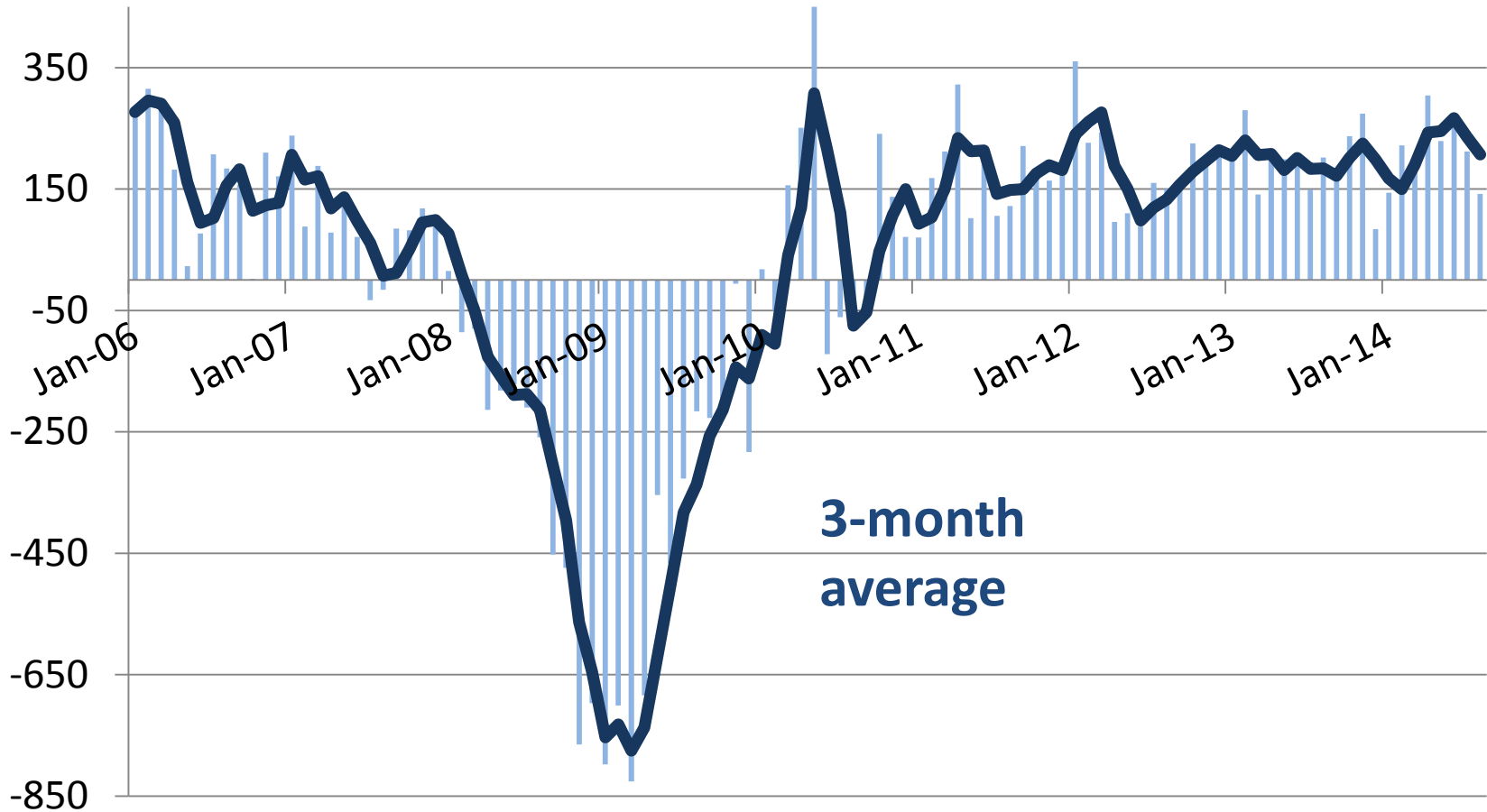


U.S. payroll jobs finally match Jan 2008 peak employment



U.S. Employment Growth

In Thousands of New Jobs per Month, 1990 to 2011

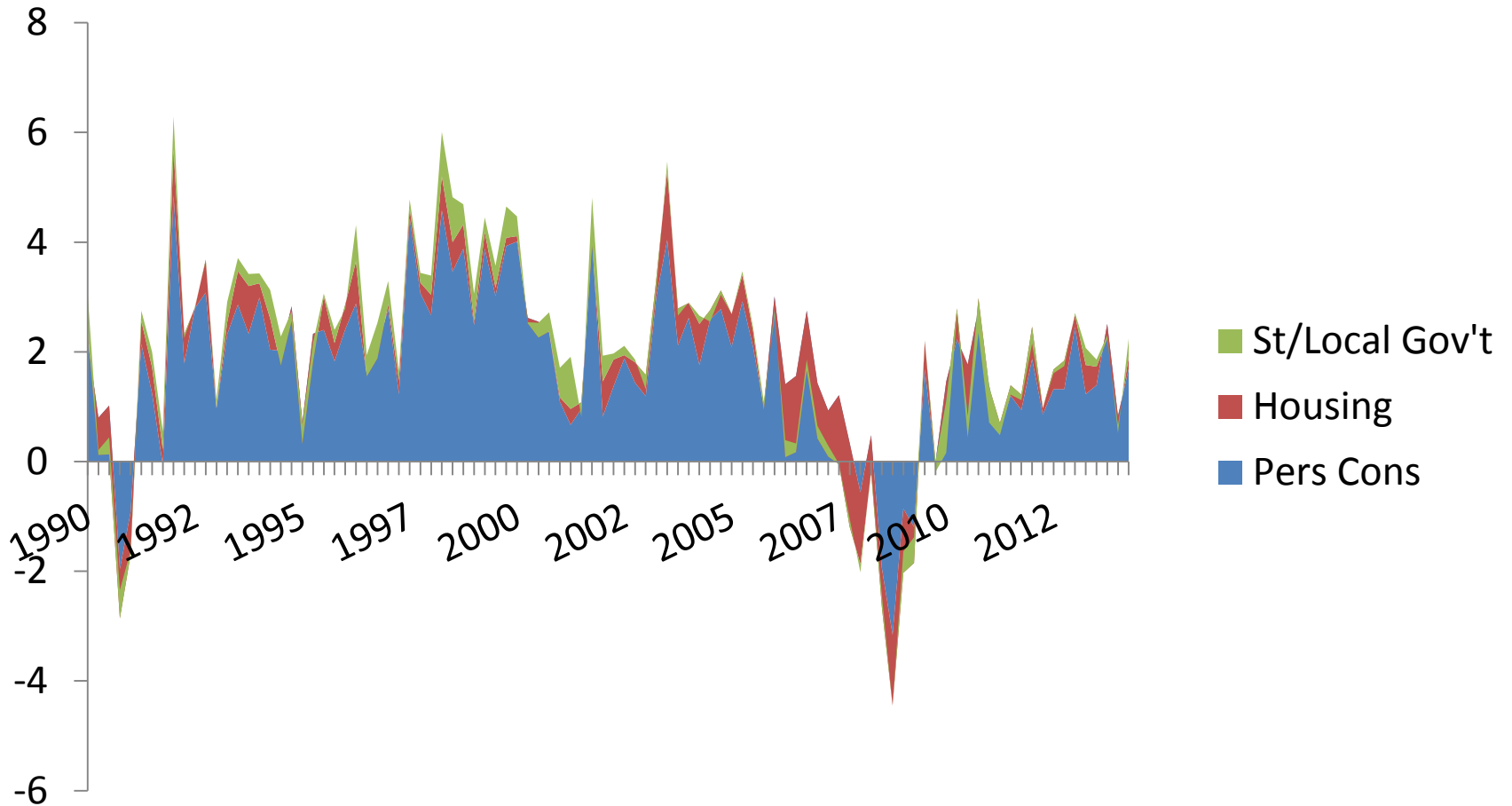


Can we find the missing GDP growth?

Period	GDP	Personal Consumption	Residential Construction	State & Local Gov't
90Q1 - 07Q3	3.0	2.2	0.1	.25
07Q4 - 14Q1	1.1	0.9	-0.2	-0.1
Loss to Great Recession	-2.0	-1.3	-0.3	-0.4

Missing sectors add to GDP again

(percent contribution to GDP growth)



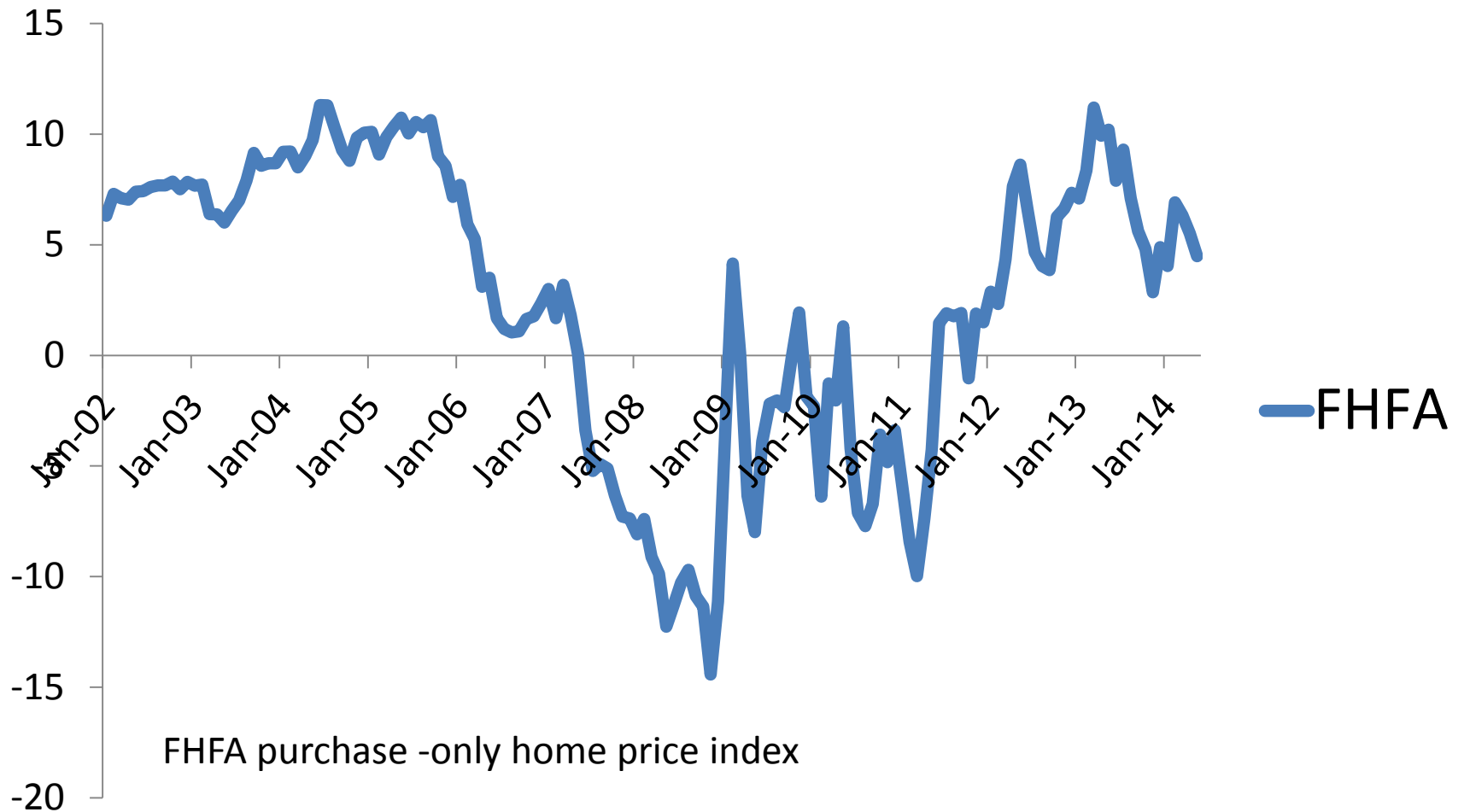
Housing recovery staggers in early 2014

Housing recovery staggers in early 2014

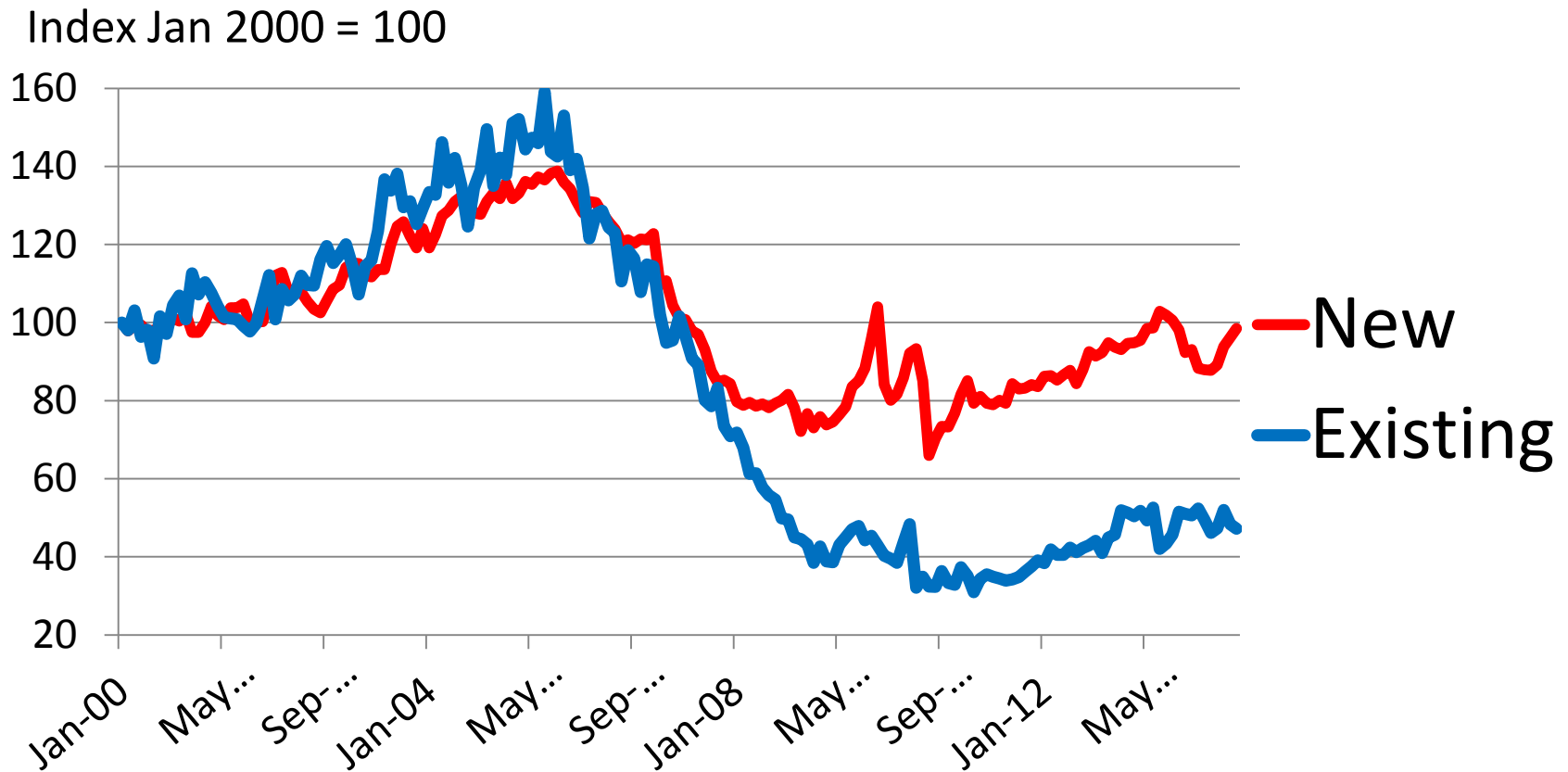
- More than just winter weather has conspired to keep the housing recovery slower than expected
- Interest rate shock from the end of the Fed's QE program raised mortgage rates
- Affordability is stretched for first time home buyers by higher rates and credit standards
- Institutional buyers backed out of the market as prices rose
- Recovery is in place, but will unfold slowly

Home prices rise more slowly in 2014

(index: 3-mo percent change at annual rate)

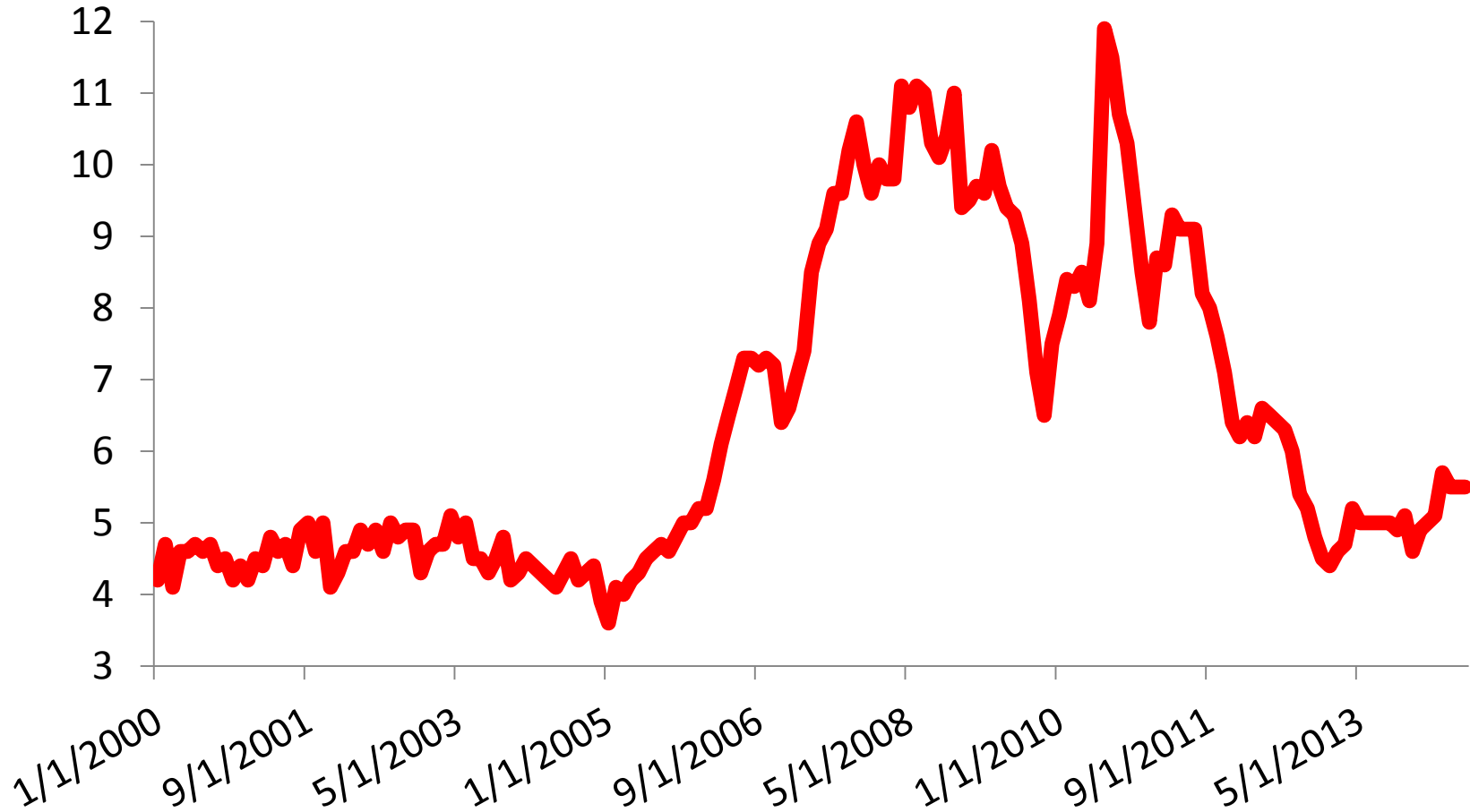


New and existing home sales recover from winter weather



St Louis Federal Reserve Bank

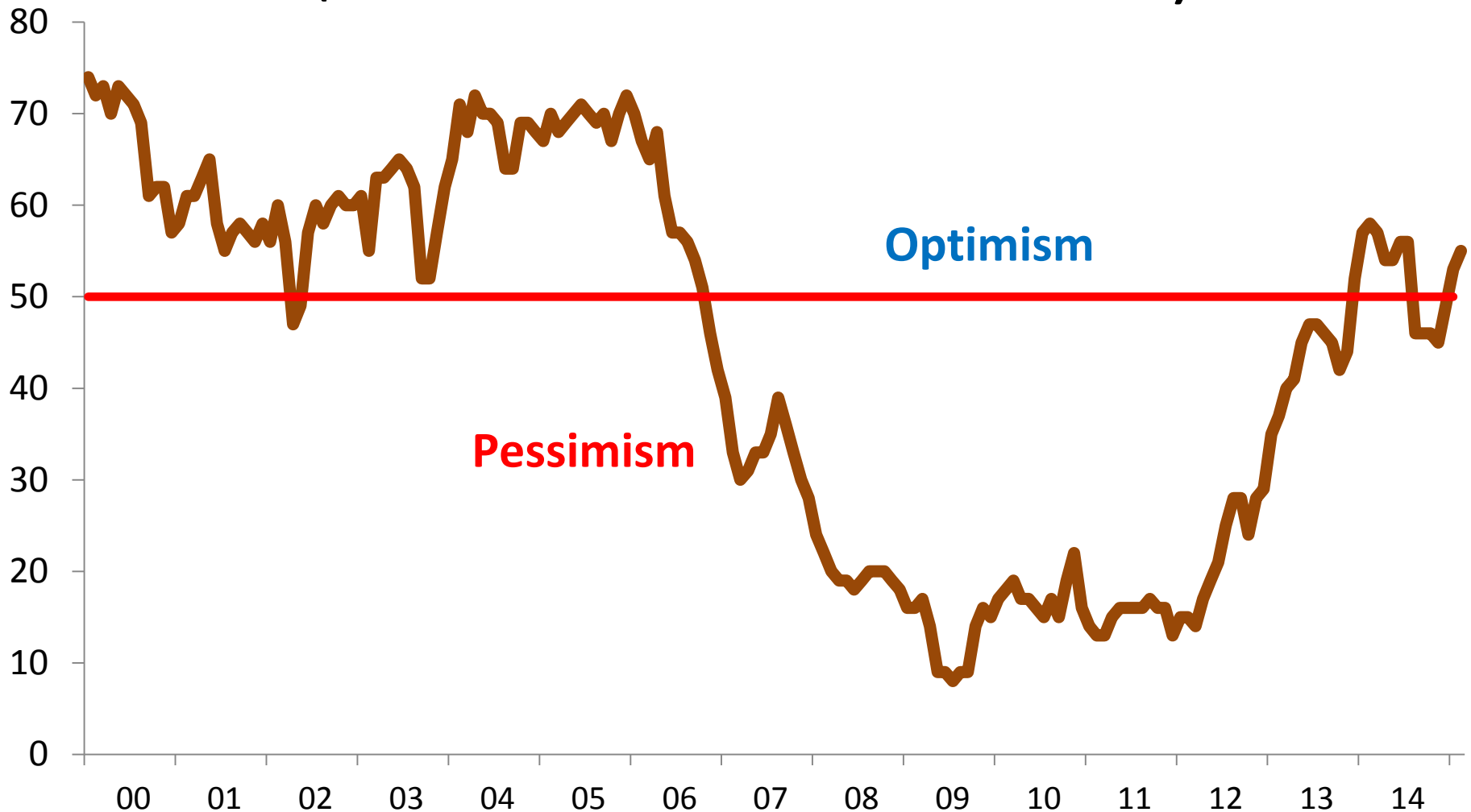
US months of supply of existing homes still below six months



New home starts and permits have stabilized after the winter

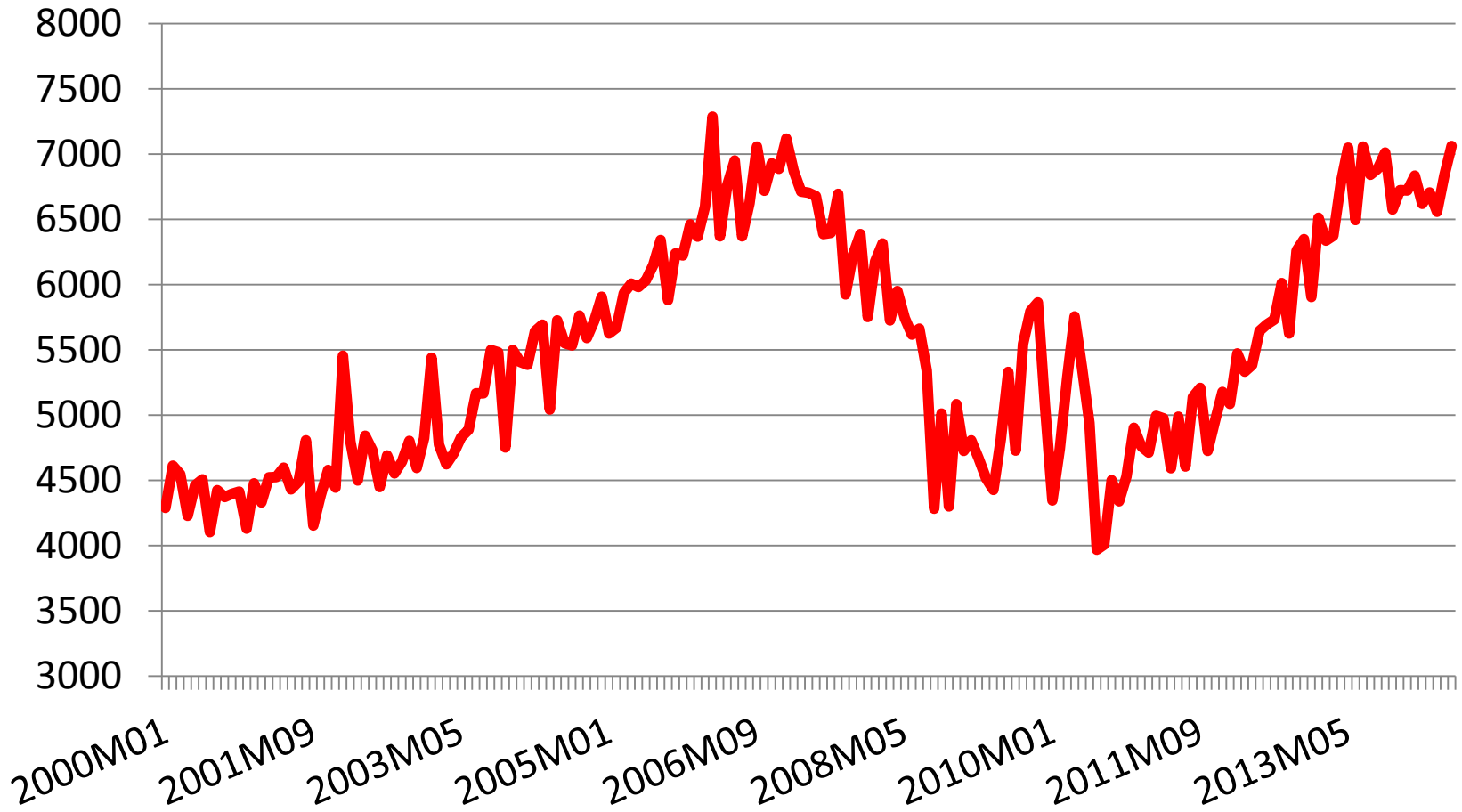


Homebuilder optimism works its way out of winter slump (NAHB homebuilder sentiment)



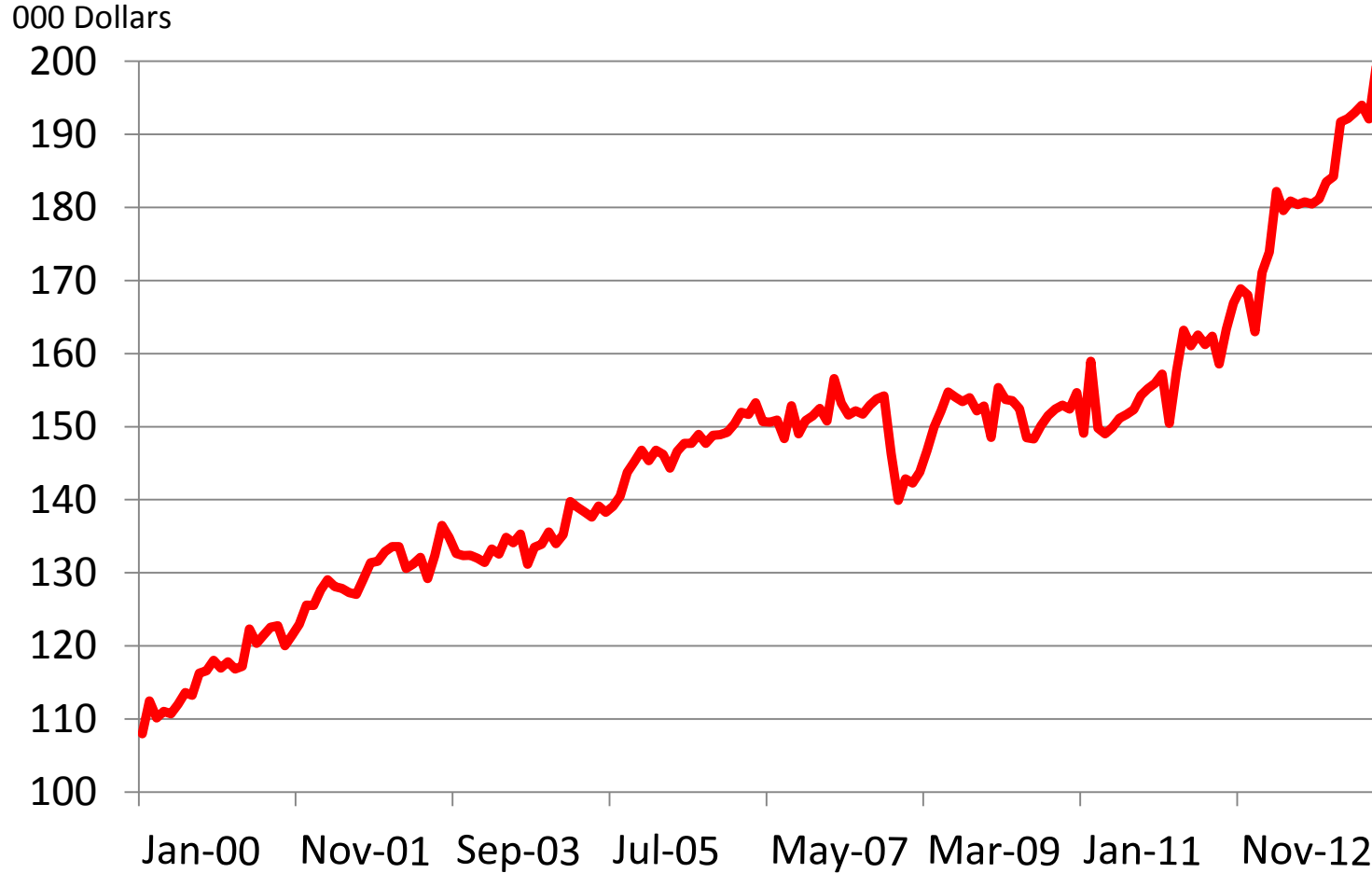
Houston single-family long on demand
and short on supply

Existing home sales in Houston return to 2006 levels (sales/month, s.a.)



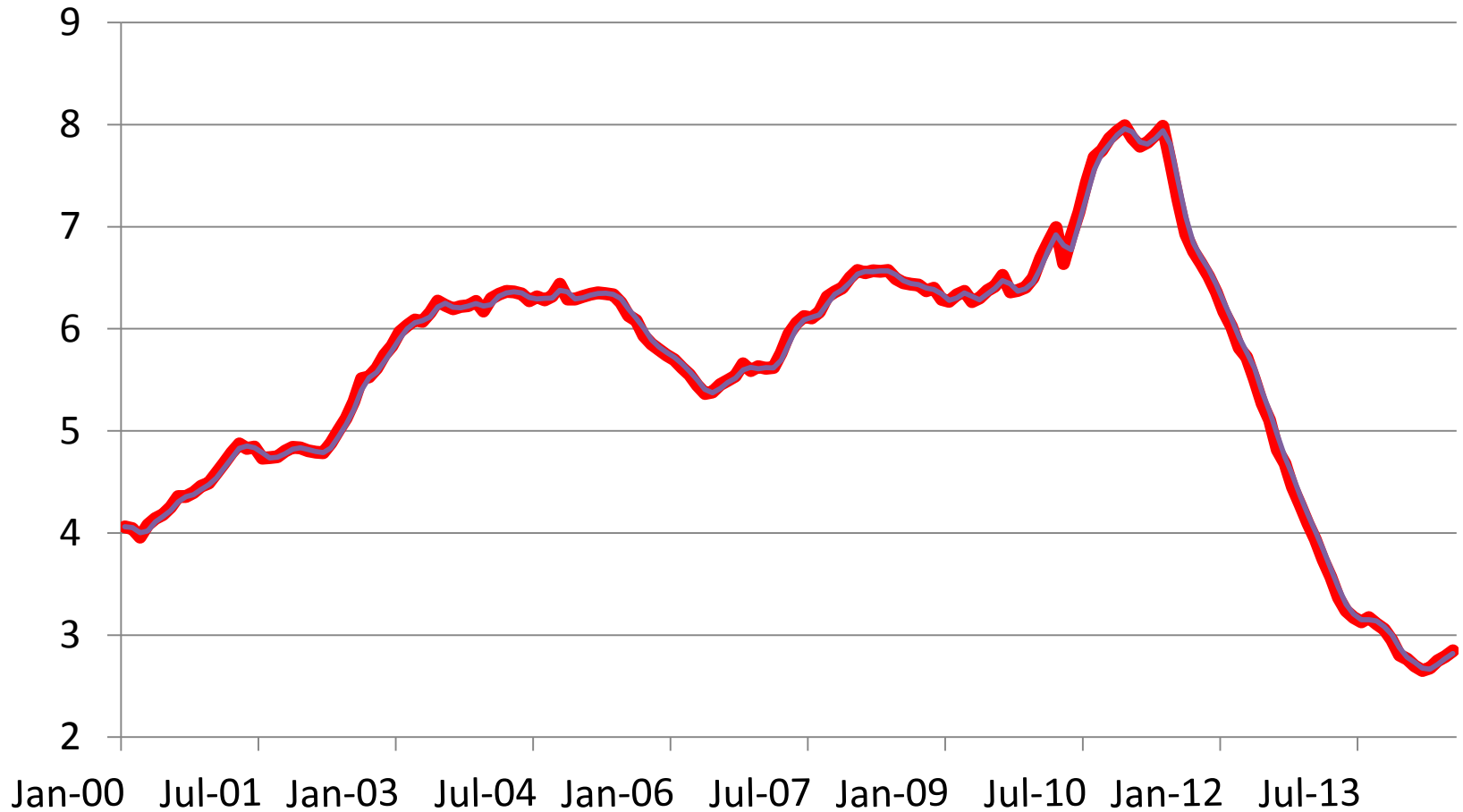
Home prices stable through crisis, but now rising quickly

(median price, s.a.)



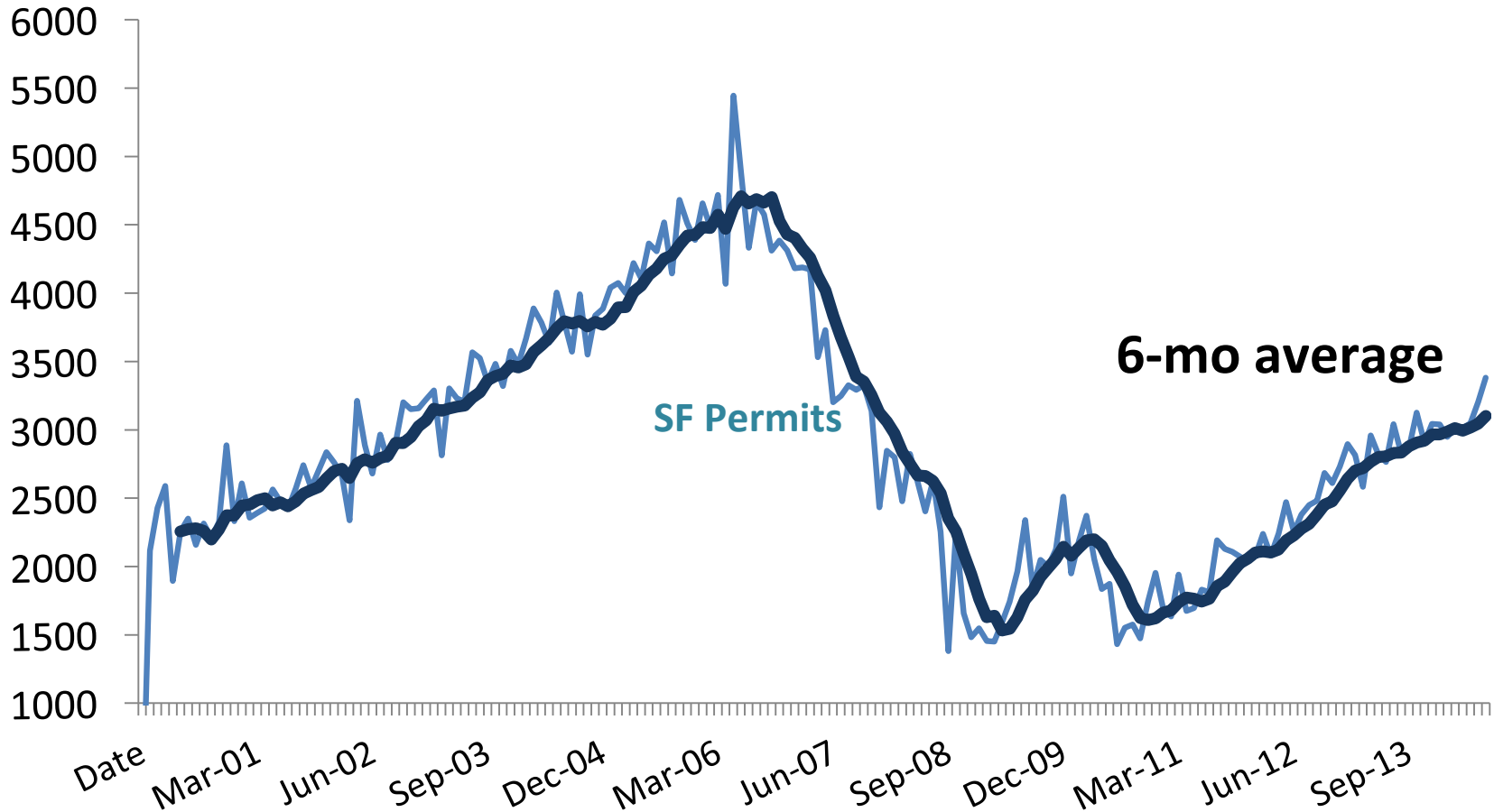
MLS, Texas A&M Real Estate Center

Houston single-family at less than 3 months supply



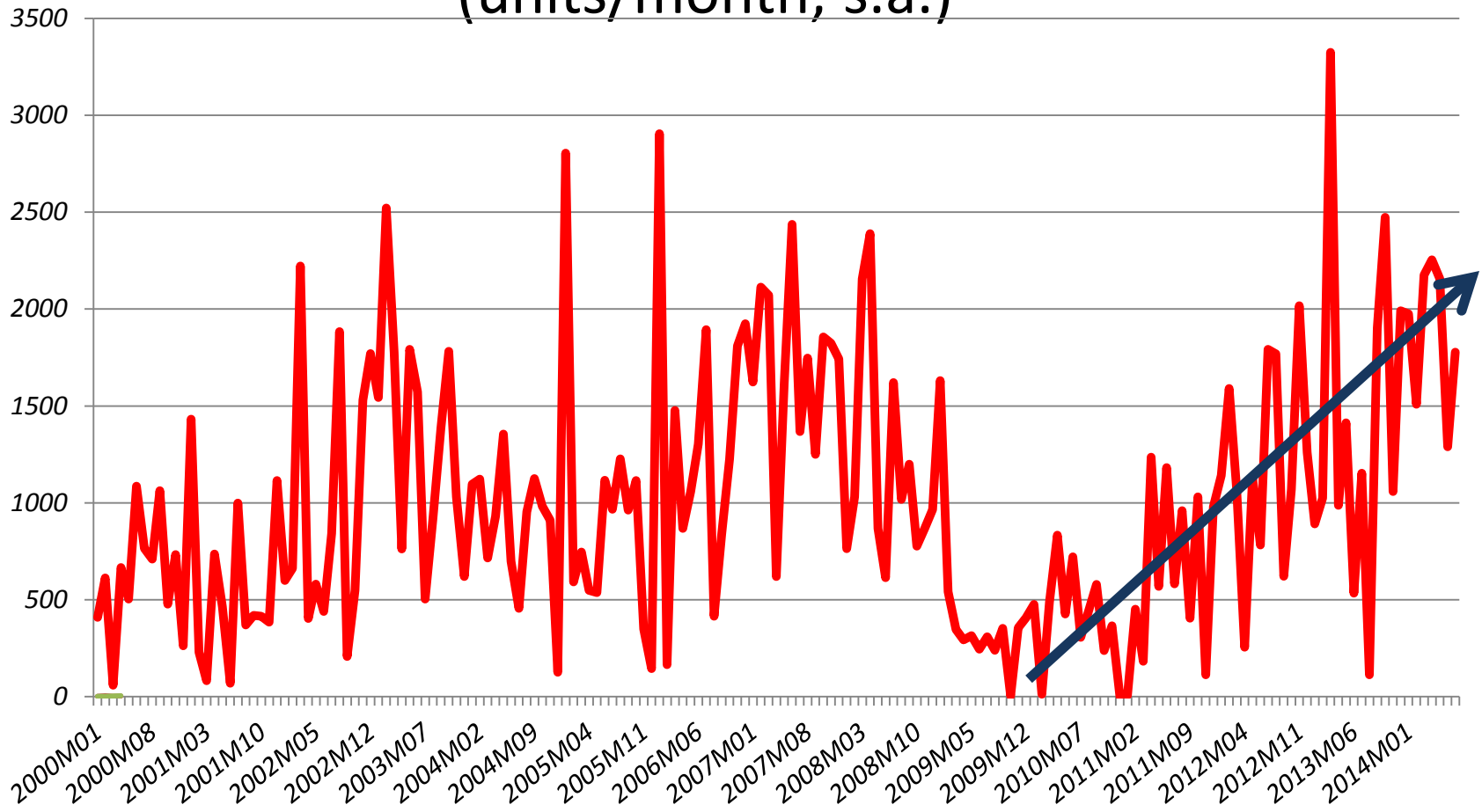
MLS, Texas A&M Real Estate Center

Houston single-family permits constrained by lot shortages (monthly permits, s.a.)



FRED, St Louis Federal Reserve Bank, s.a.

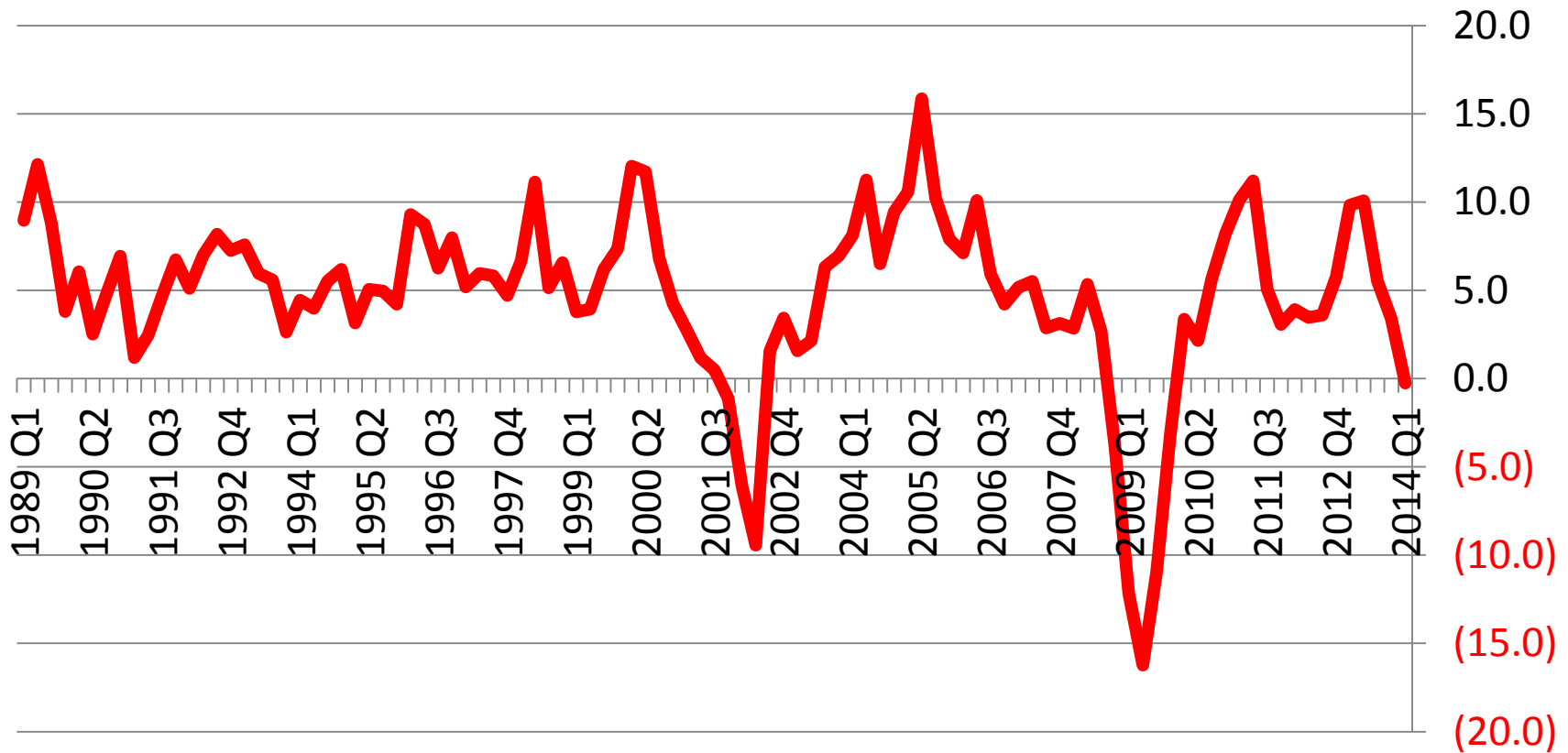
Local multi-family permits still trending up? (units/month, s.a.)



State and local tax revenues
now growing strongly

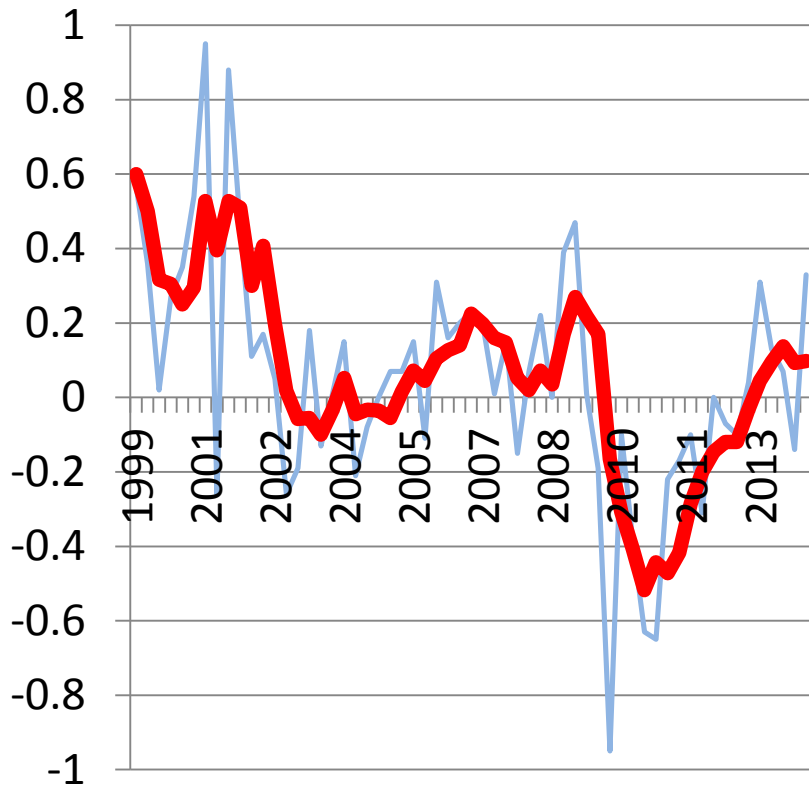
State tax revenue turns also stagger with winter weather

Quarterly percent change, s.a.



Percent contribution of state and local governments to GDP turns positive

Four-quarter average

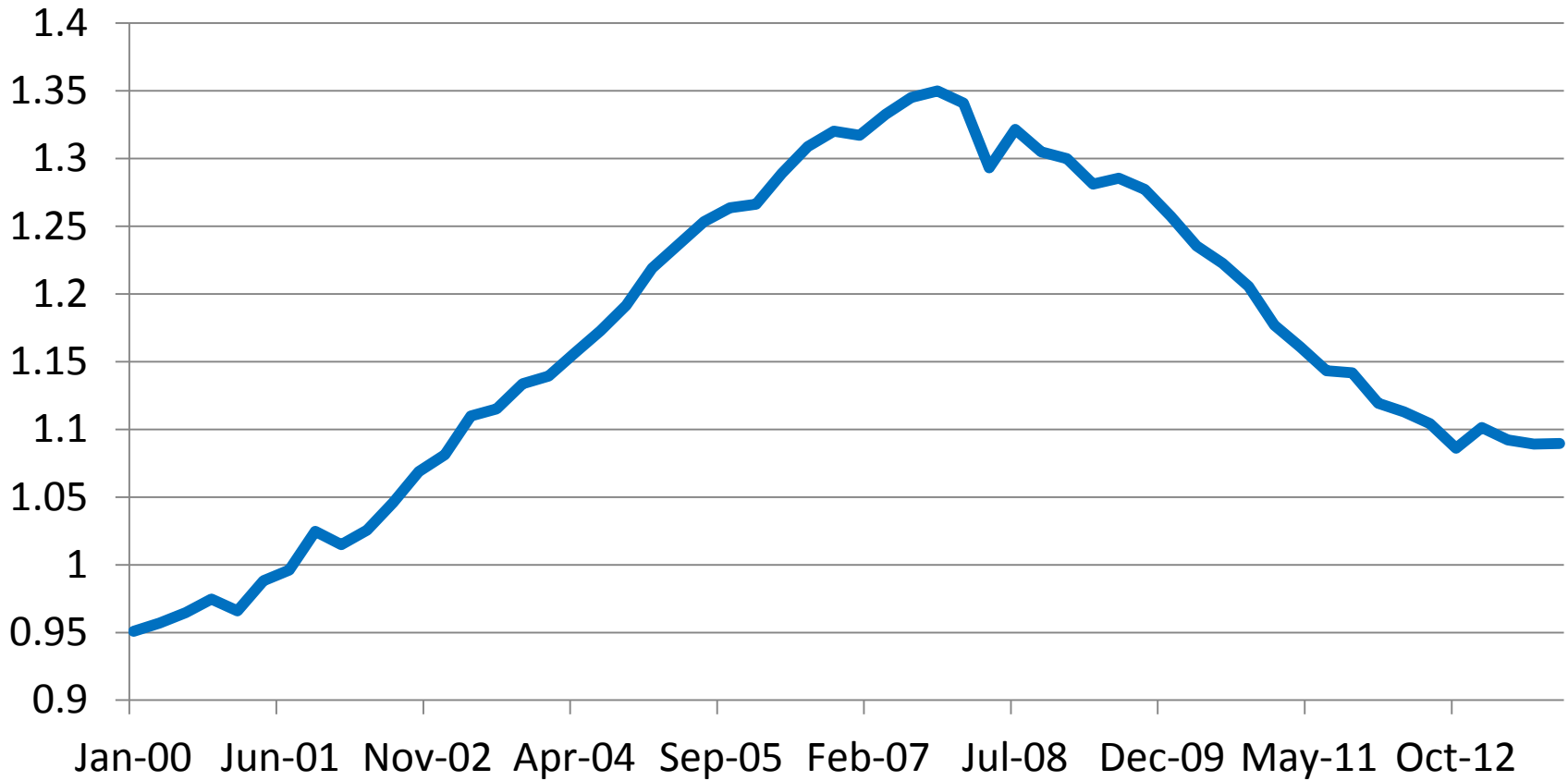


- State revenues up 5.6% in Q4-2012/Q4-2013
- Local property taxes up 5.25 in same period
- Income taxes up 5.1%
- Winter weather a temporary setback

Weak consumer spending a product of
loss income, wealth and confidence

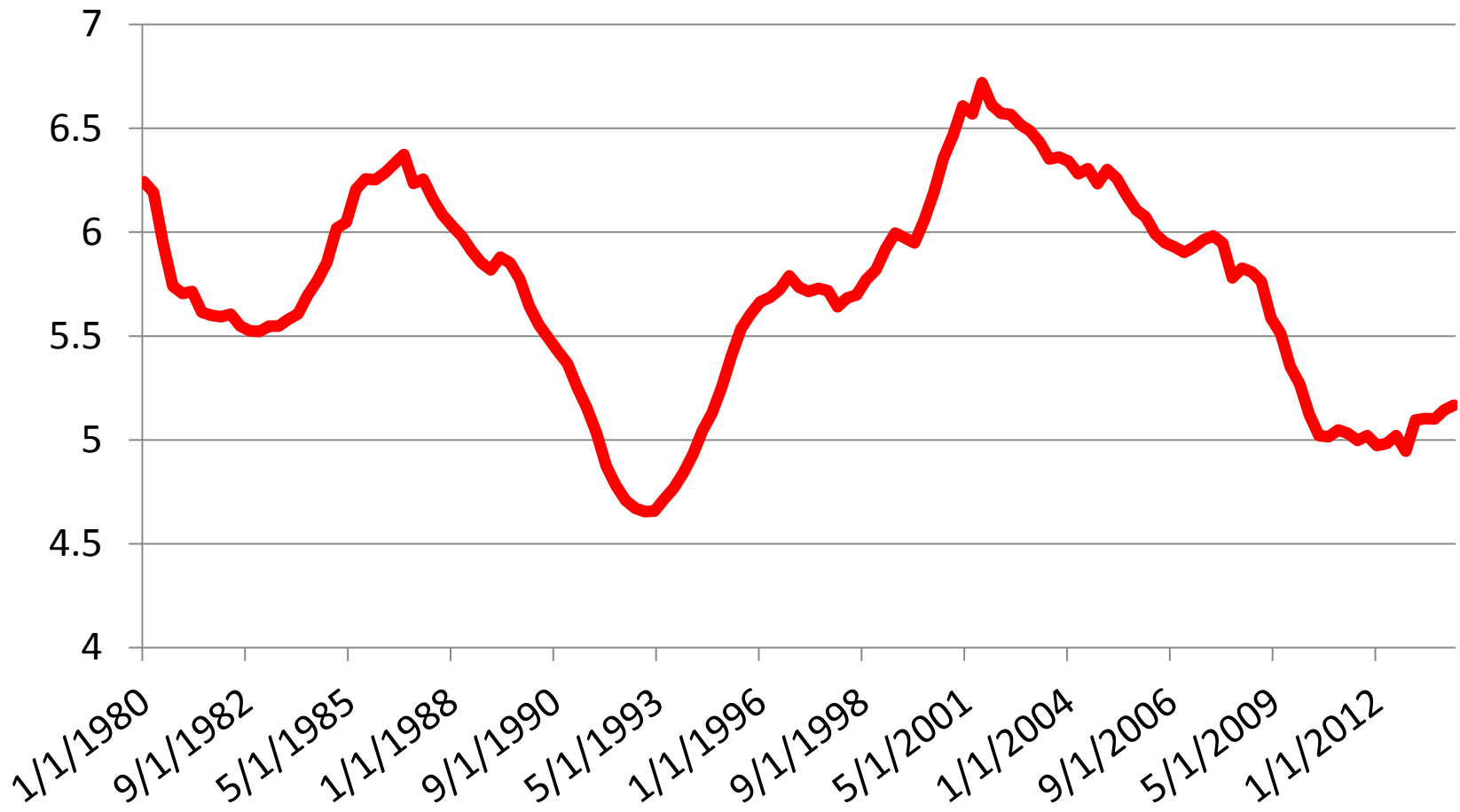
Consumer makes progress reducing debt after the build-up post-2000

(Ratio of debt to disposable personal income)

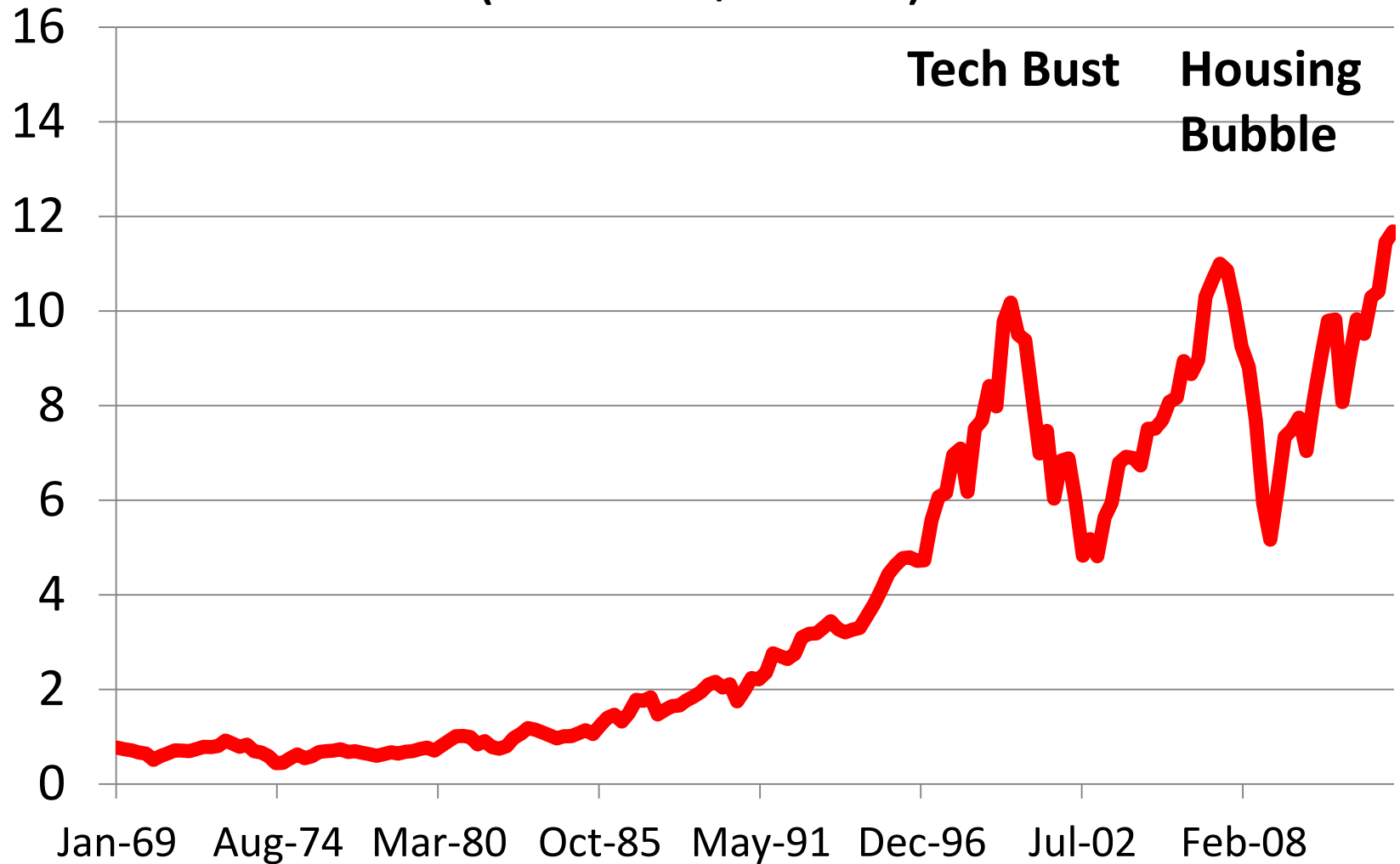


Federal Reserve Board, BEA

Consumer debt payments as percent of disposable income

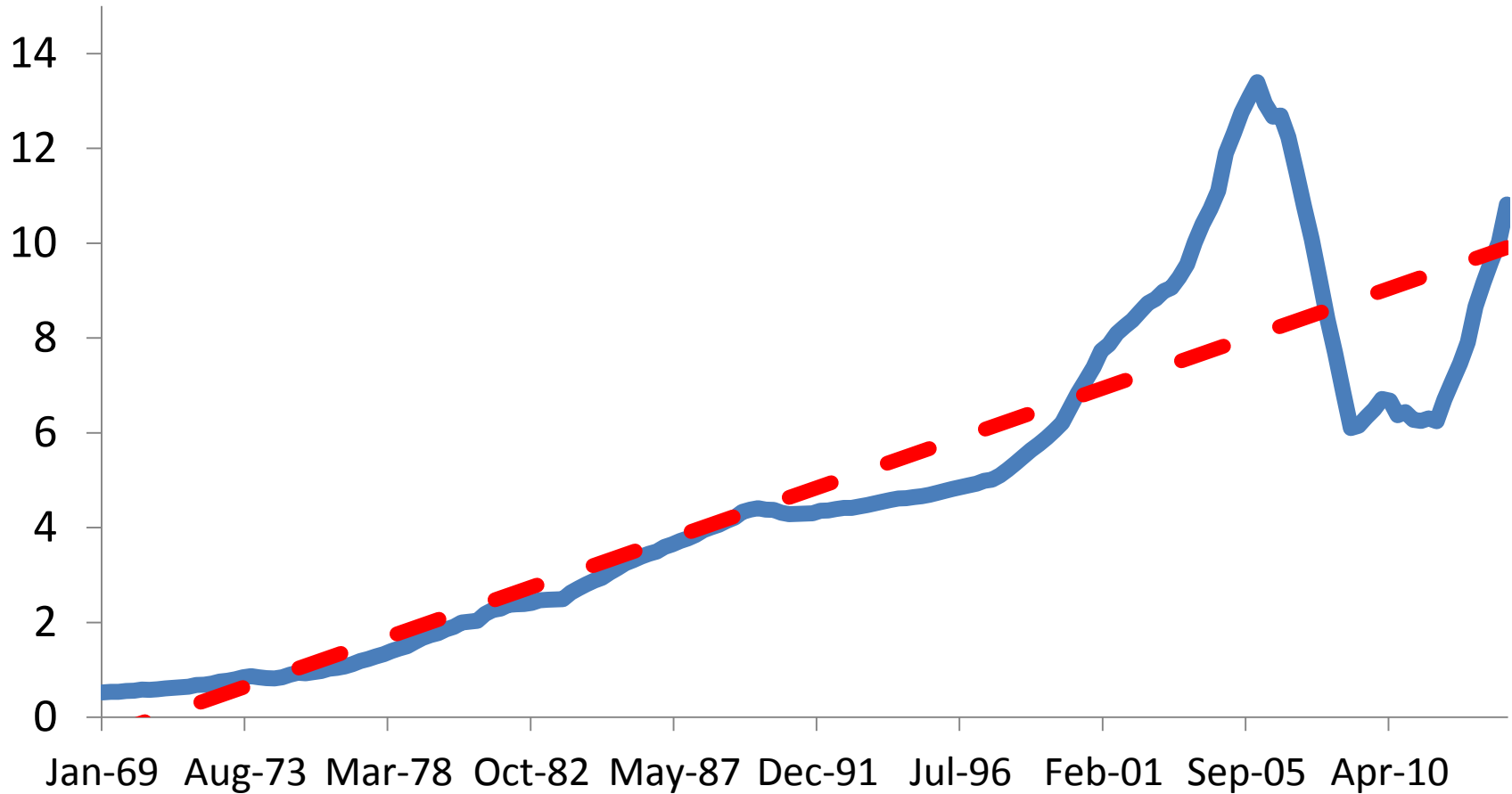


Stock market holdings add to consumer net worth again (trillion \$ 2009)



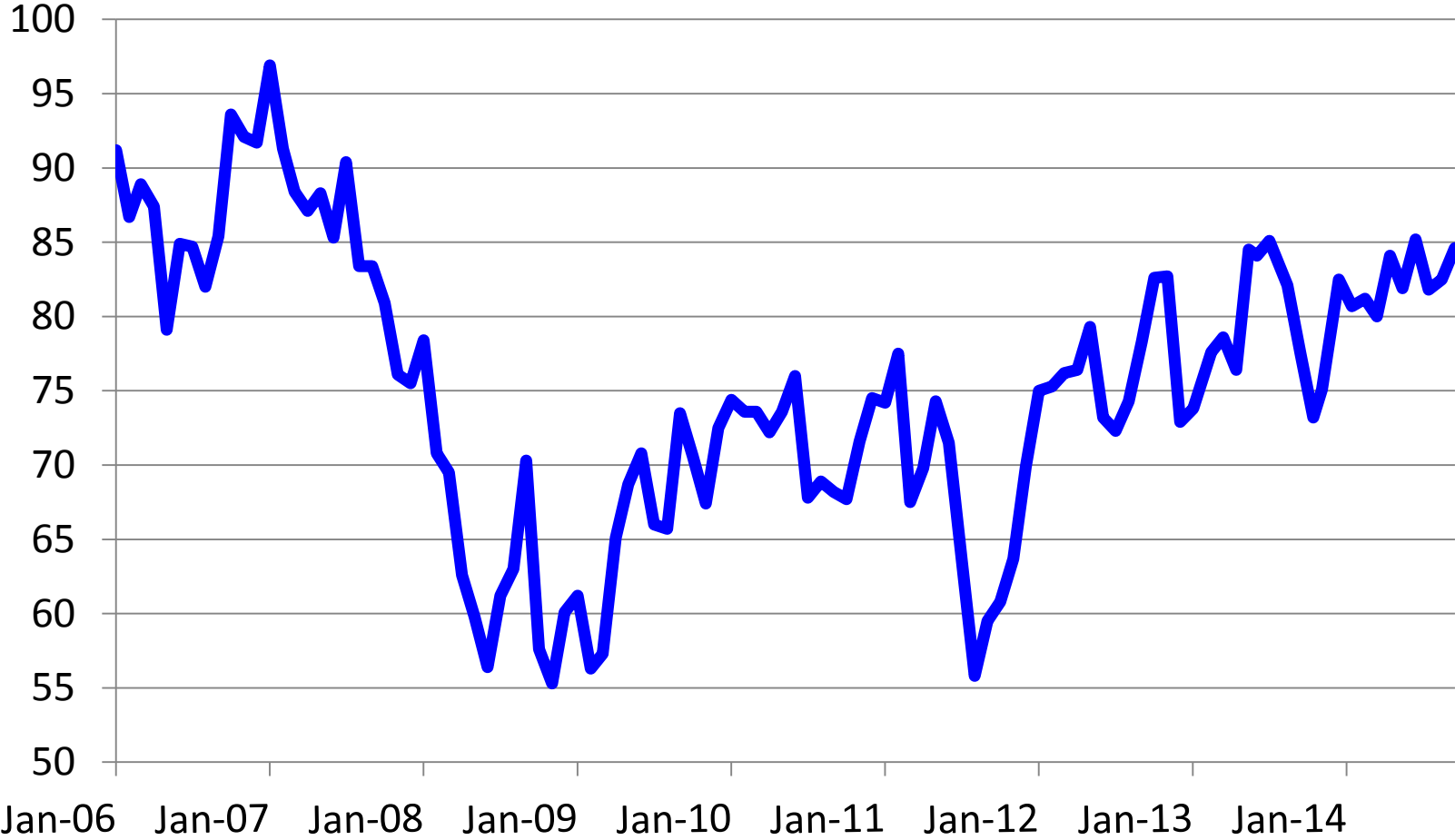
Home equity again over \$10 trillion: Back on a healthy trend?

Trillion \$ 2009

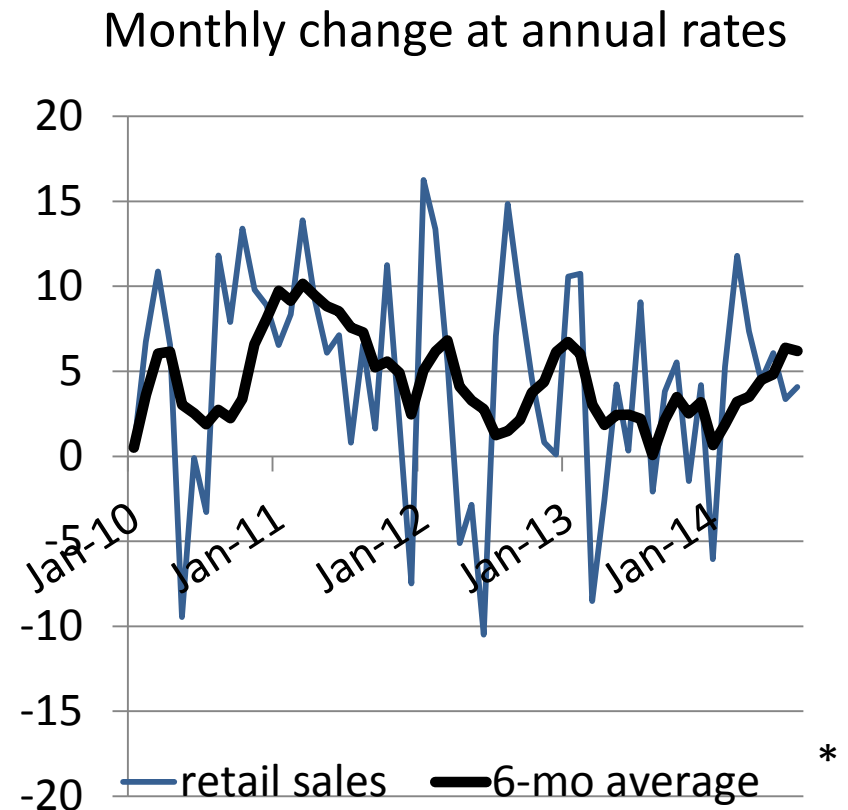
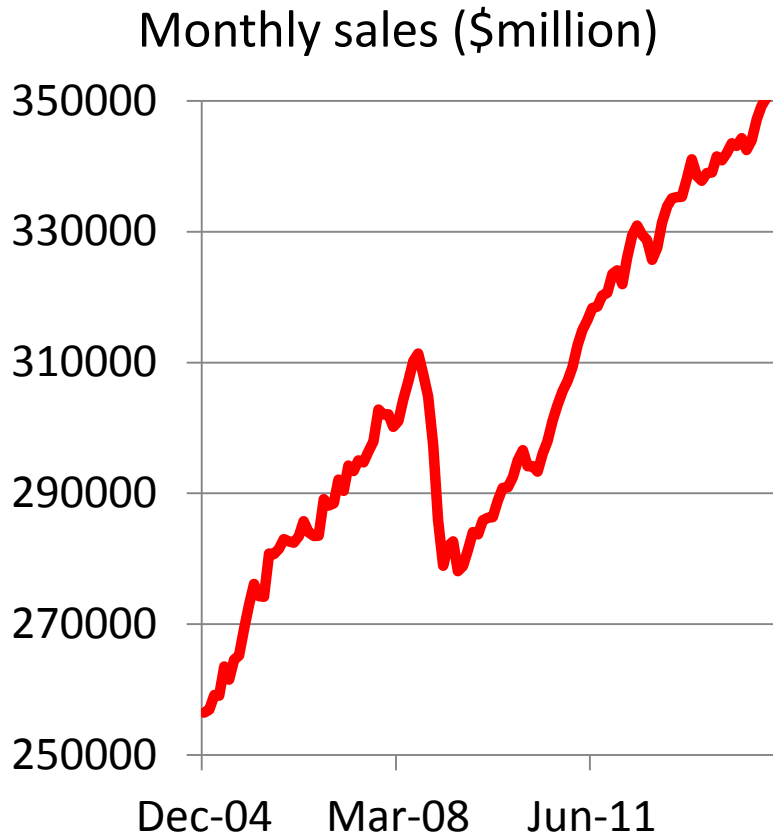


Federal Reserve, U.S. Financial Accounts

University of Michigan: consumer sentiment trends up



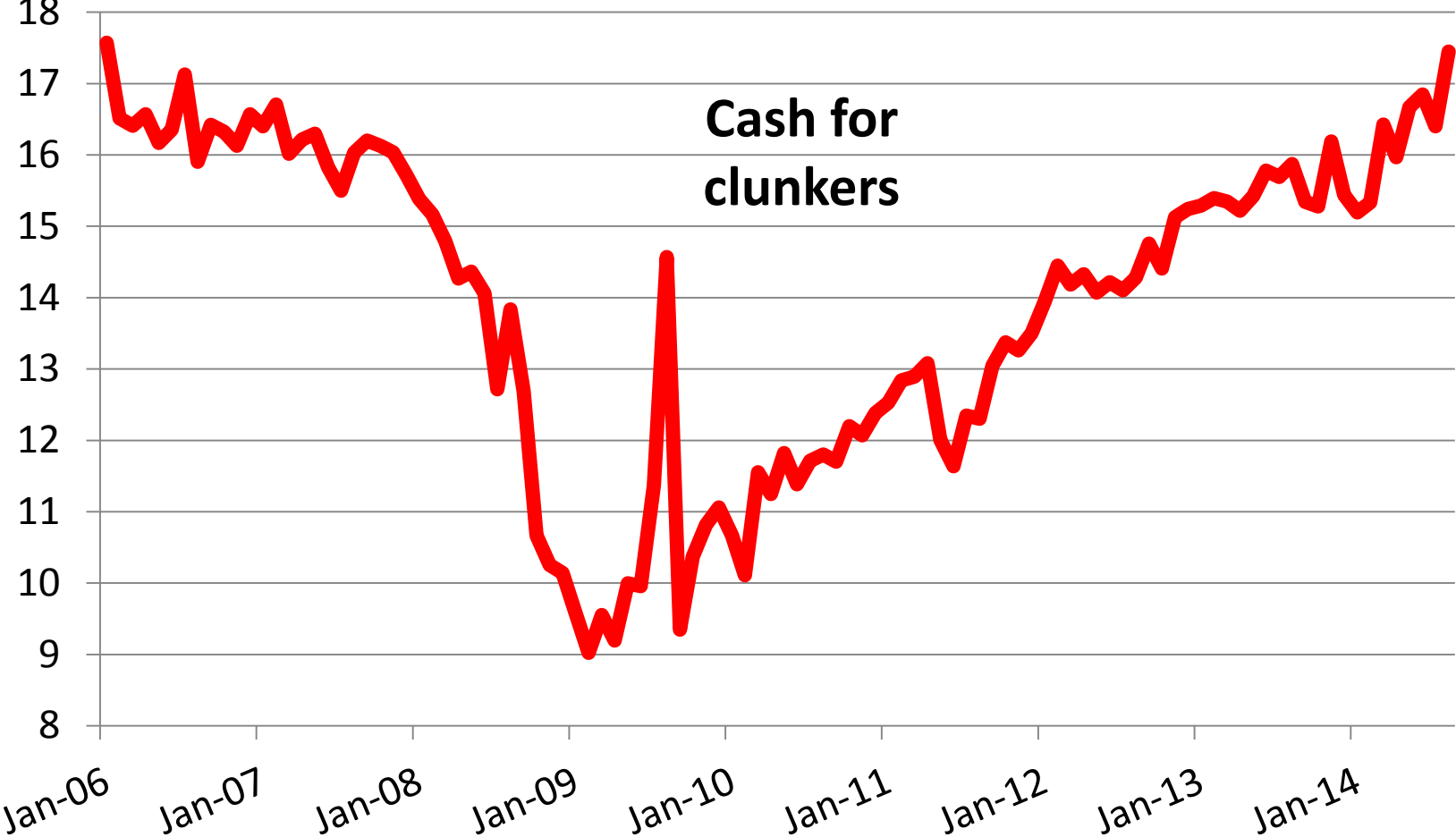
Retail sales have accelerated over the last six months



Seasonally adjusted data

Auto sales back at pre-crisis levels (million units at annual rate)

Million units, s.a annual rate



US economic outlook continues to strengthen

	GDP (%)	Jobs/month (000)	Unemployment Rate (%)	10-year Treas (%)	Consumer Prices (%)
2014Q1	-2.1	189.7	6.7	2.8	1.9
Q2	4.2	266.7	6.2	2.6	3.0
Q3	3.0	228.6	6.1	2.7	2.2
Q4	3.1	211.2	6.0	2.8	2.0
2015 Q1	3.1	208.3	5.8	3.0	2.1
Q2	3.1	209.2	5.8	3.2	2.2
Q3	3.0	200.7	5.6	3.5	2.1
2014	2.1	204.8	6.3	2.7	2.3
2015	3.1	214.0	5.7	3.3	2.2
2016	2.9	--	5.4	3.9	2.3
2017	2.8	--	5.3	4.4	--

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

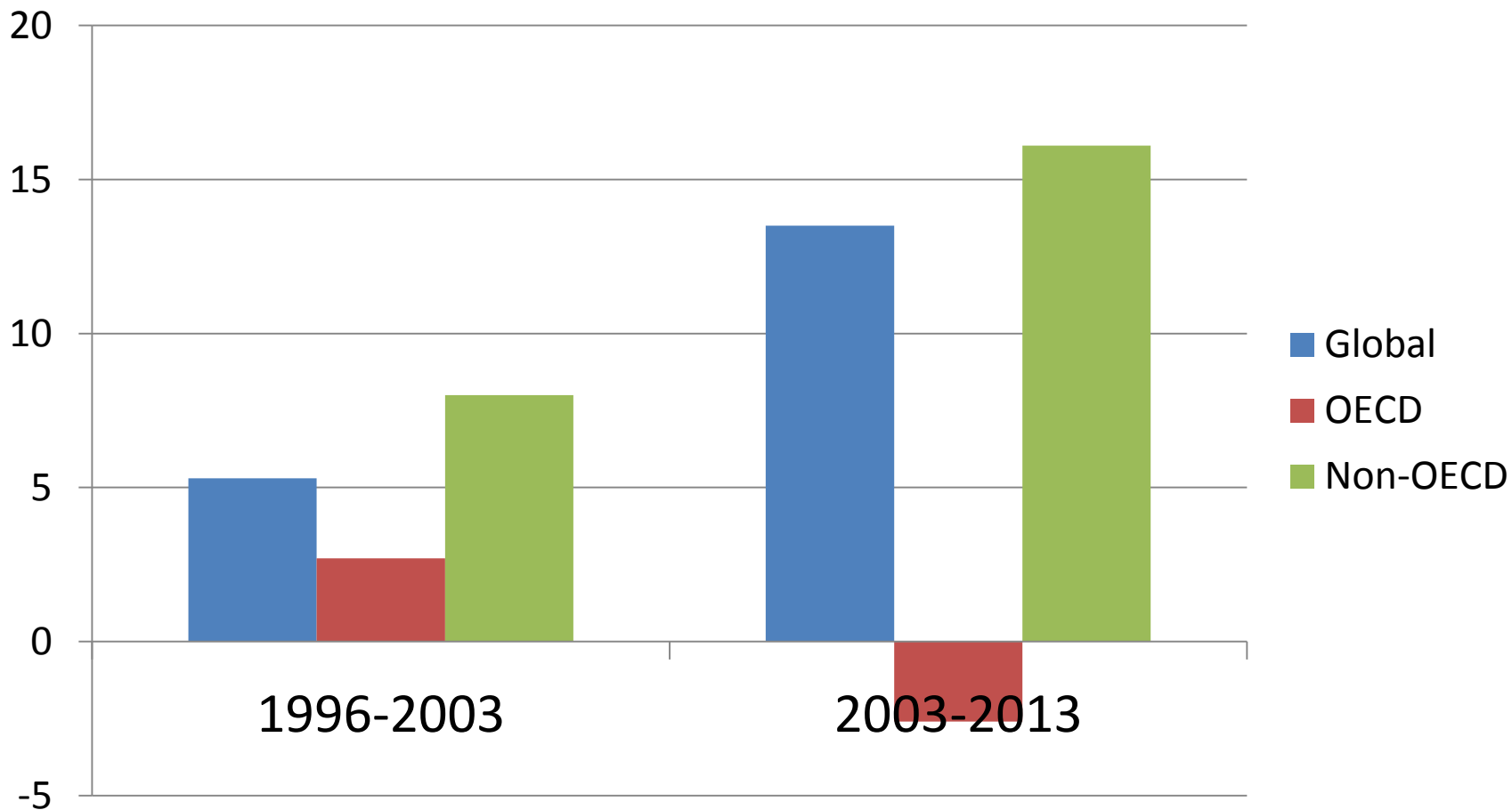
Emerging markets drive local exports
and high oil prices

For the last decade world oil prices have been driven by emerging markets

- Since 2003, all the growth in the global demand for oil has come from emerging markets, especially Brazil, China, and India
- It has not just been oil, but food, agricultural products, and metals that have seen prices soar
- China alone accounts for one-third of increased oil demand since 2003. China and other Asia are nearly 60 percent.

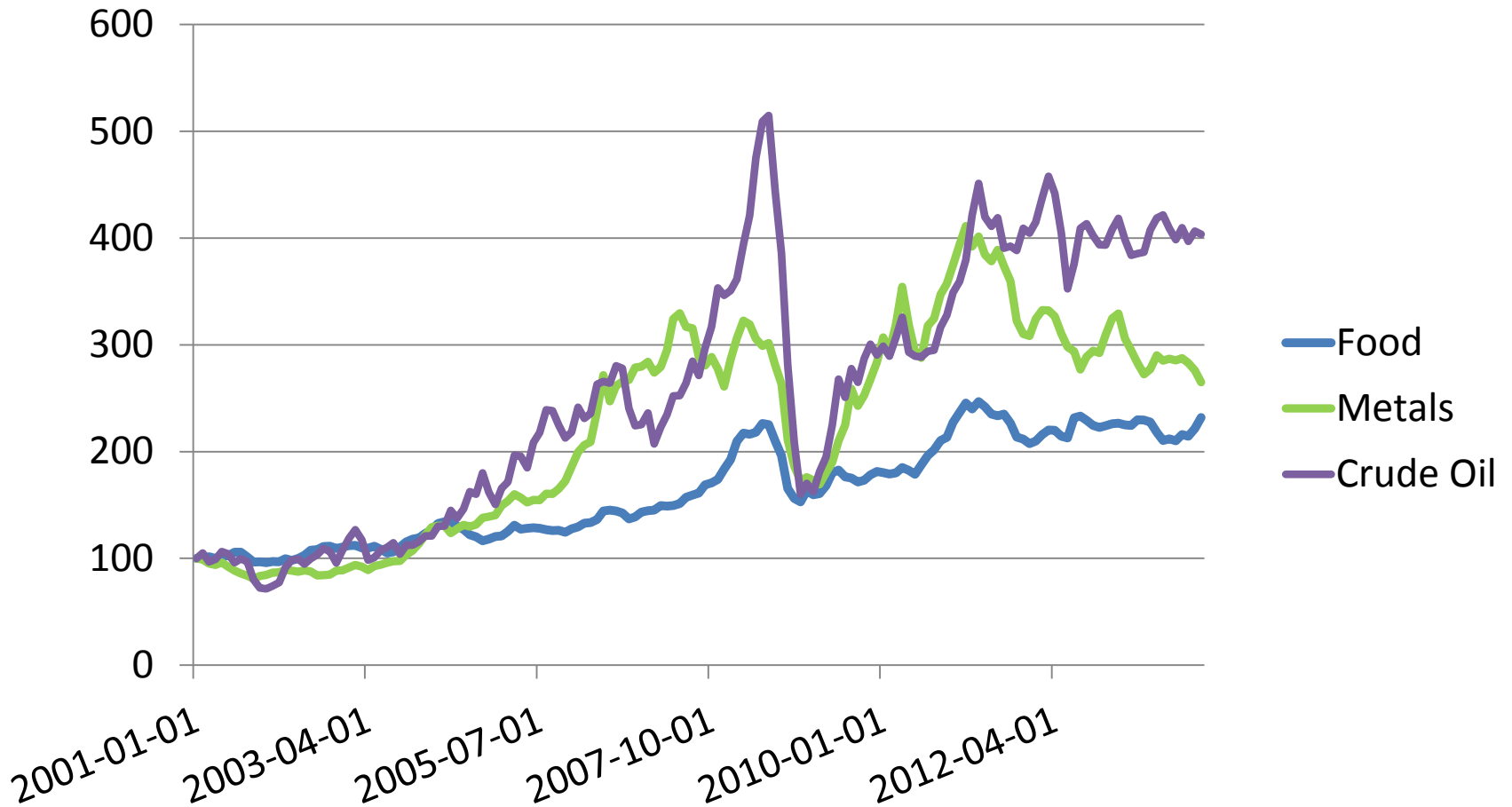
Growth in the demand for oil comes from the emerging markets

(million b/d)



International Energy Agency

Oil part of a wider commodity price boom since 2003



Where has the emerging market growth come from?

- They have developed deep and rapidly growing domestic markets
- They have been good policy actors – balanced fiscal budgets, independent central banks, and enormous foreign exchange reserves
- They are now large markets, last year passing the developed nations in total GDP

Global Growth Sluggish in 2014-15

(% GDP Growth)

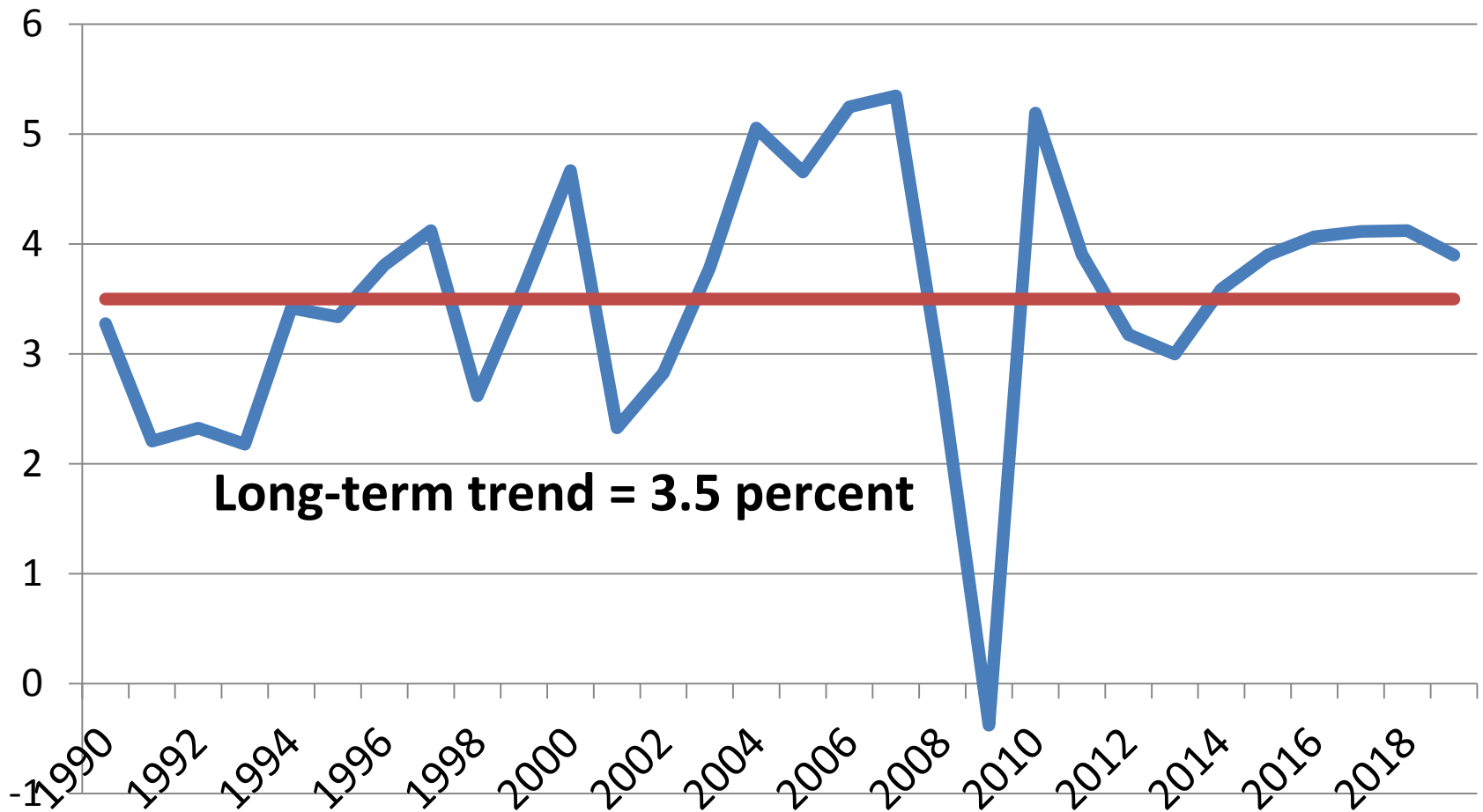
	2011	2012	2013	2014	2015
World	3.9	3.5	3.2	3.4	4.0
US	1.8	2.8	1.9	1.7	3.0
Europe	1.5	-0.7	-0.4	1.1	1.5
Japan	-0.7	1.4	1.5	1.6	1.1
	---	---	---	---	
China	9.3	7.7	7.7	7.7	7.1
India	6.3	4.7	5.0	5.4	6.4
Brazil	2.7	1.0	2.5	1.3	2.0

Source: IMF World Economic Outlook: Update, July 2014

Where did emerging market growth go?

- Their central banks raised interest rates in 2012-13 to slow growth in the face of emerging inflation
- China is trying to engineer a tricky transition from export- to consumer-led growth; India and Brazil face chaotic economic conditions and chronic corruption
- All will need to undertake significant structural reforms to keep growth on a high-growth path
- All will have to cope with rising U.S. interest rates and protect their currency by raising rates themselves

A soft landing for world economic growth: Back above the long-term trend by 2014? (percent change in GDP)



Houston Outlook

How good will it be in 2014?

Better than we thought

- Energy strong
 - Oil prices high, natural gas prices low
 - Unexpected help for drilling from winter weather
 - Downstream construction projects moving quickly to capture scarce construction workers and machine shop capacity
- U.S. healing and moving to historic trend growth rates
- Risks stem from a fragile global market
- Watch out for the unforeseen – events like the Asian financial crisis, tech bust, the American financial crisis

Working assumptions for Houston's job growth to 2018?



Year	New Jobs	% Growth Q4/Q4
2008	28,677	1.10%
2009	-105,376	-4.00%
2010	43,634	1.70%
2011	76,094	3.00%
2012	116,981	4.50%
2013	79,213	2.90%
2014	88,891	3.20%
2015	79,700	2.70%
2016	80,750	2.70%
2017	69,900	2.30%
2018	68,190	2.20%

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Back to deep space

Obama administration cancels the Constellation program in 2011

- Constellation was to develop a heavy lift rocket and new crew capsule
- Would deliver crews to the space station by 2015, return a crew to the moon by 2020, and on to Mars after that
- With cancellation, the International Space Station was extended to 2020, and serious funding was given commercial development of delivery of supplies and astronauts to the space station
- Cancellation would mean 7,000 jobs lost in Clear Lake area

Funding restored with a new and reconfigured program

- NASA is now developing a new heavy lift SLS rocket, crew capsule, service module, and launch abort system
- Goals remain the ISS, the moon and Mars
- Exploration Test Flight-1 in December 2014 will see a Delta VI rocket take an un-crewed Orion capsule/spacecraft on an orbit deeper into space than we have been since 1972
- The first flight of the SLS rocket will take Orion and circumnavigate the moon in December 2017

The bumpy ride for the Clear Lake area over for now

- 2010 employment of 16,500 Space Center and NASA contractors has stabilized at 14,000
- Payrolls have declined further because of the retirement opportunities for many senior staff
- But many of these retirees remain in the area
- Many of those laid off found opportunities in a hot technical and engineering market in Houston

Back to deep space

- The plan is once more for the moon -- and perhaps Mars -- to be in Houston's future
- JSC and Clear Lake dodged a big bullet in 2011, but both are now preparing for exciting and stable economic times ahead
- The current plans envision 2-3 launches per year
- The main question still open is where we are going once the tools are in place – to harness an asteroid, to establish a moon base, or on a mission to Mars?

A new model for medicine

Old model is private health insurance

- Spend the highest share of GDP of any country in the world on healthcare
- That share grows rapidly
- Get very poor health outcomes in longevity, infant mortality, and many other measures
- Perverse financial incentives
 - Based on volume: more treatment = more revenue
 - No incentive for quality care: today's infection = tomorrow's revenue
 - No incentive for prevention

New model of capitation

- Provider is assigned a large group of potential patients – hundreds of thousands
- Given a flat fee of maybe \$300 per potential patient with expectations of particular health outcomes
- Provider can keep part of the cost savings
 - Cares about prevention
 - Cares about quality outcomes if the quality improvements limits treatment
 - Also has strong incentives to limit treatment. Require monitoring to be sure treatment is adequate

Moving from one model to the other?

- No deadline is set at three years into the Affordable Healthcare Act, but there are expectations that there will be one imposed once the market tilts to capitation
- Houston hospitals and healthcare providers moving much more slowly than other parts of the country
 - Houston is relatively rich in corporate and public insurance. Other parts of the country are losing those policies more rapidly
 - Rapid growth in Houston keeps pulling more private policies into the city
- We are still building hospitals in Katy, Pearland, Sugarland, and the Woodlands. Why the suburbs?
 - It is where the patient growth and the private insurance is found
 - It is where healthcare workers live – and would like to work

Implications

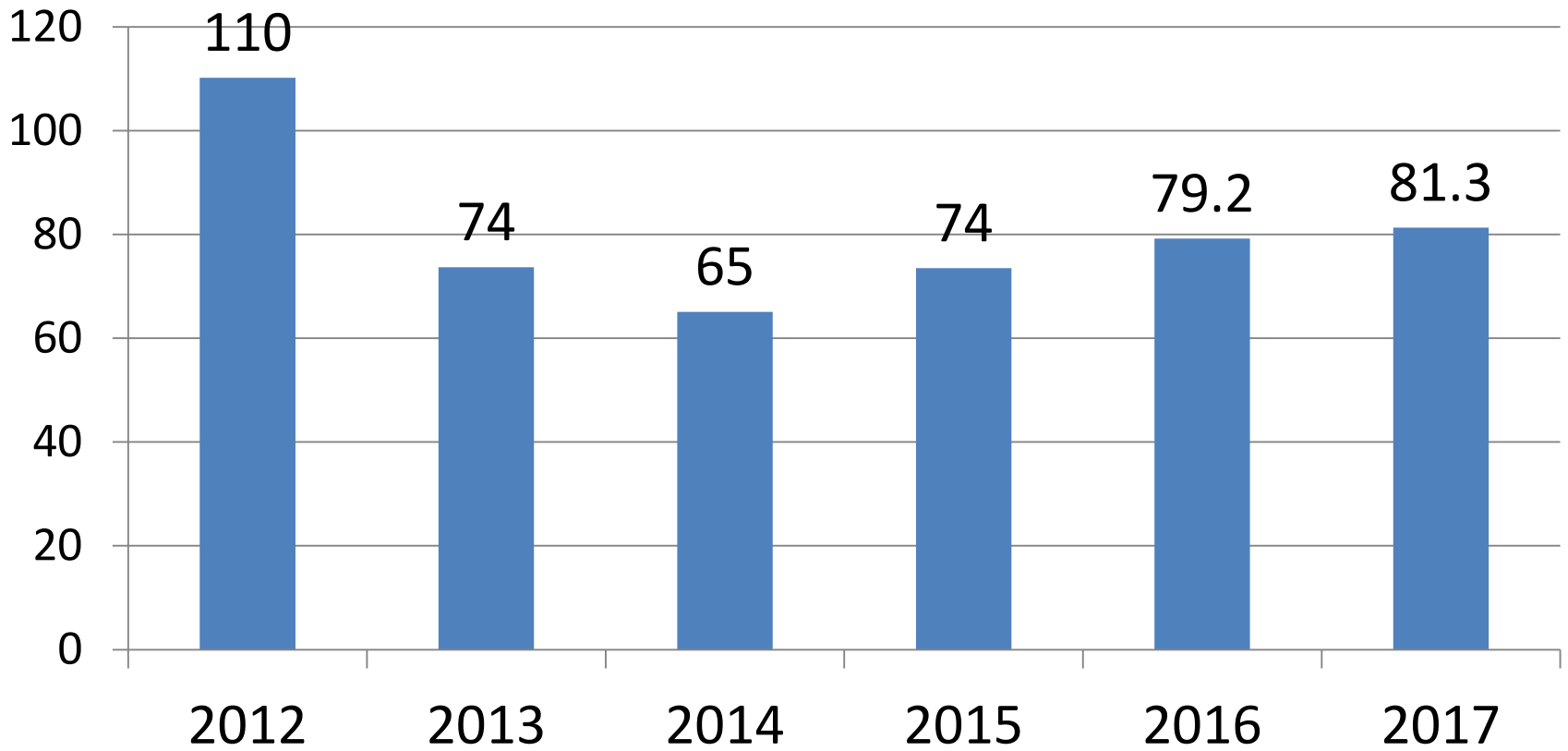
- End of Cadillac Care? Think of it as a giant HMO with a single-provider option
 - Can you get a referral to the Texas Heart Institute or M.D. Anderson?
 - Probably not without a very high deductible or other very high out-of-pocket expense
- End of uncompensated care?
 - There are 1.1 million uninsured in Harris County
 - The exchanges might have provided insurance to 150,000 local uninsured – with half of those previously insured -- and most selected high deductibles
 - For many, including the large number of illegal immigrants, the emergency room model is still working
- *Don't lose sight of the end-game:* Limit admissions and treatment and dramatically shrink the industry . On the current path, Houston simply delays the new model

Houston is again hitting on all cylinders

- Upstream oil has gotten at least a temporary boost from cold winter weather, low natural gas inventories, and higher prices.
- The downstream construction push is starting, and should gain momentum through 2014
- The manned space flight program is back in place
- Houston patient care – so far – is still enjoying great success under the old patient care model

Prior forecast for Houston

Houston Annual Job Growth (000) Q4/Q4



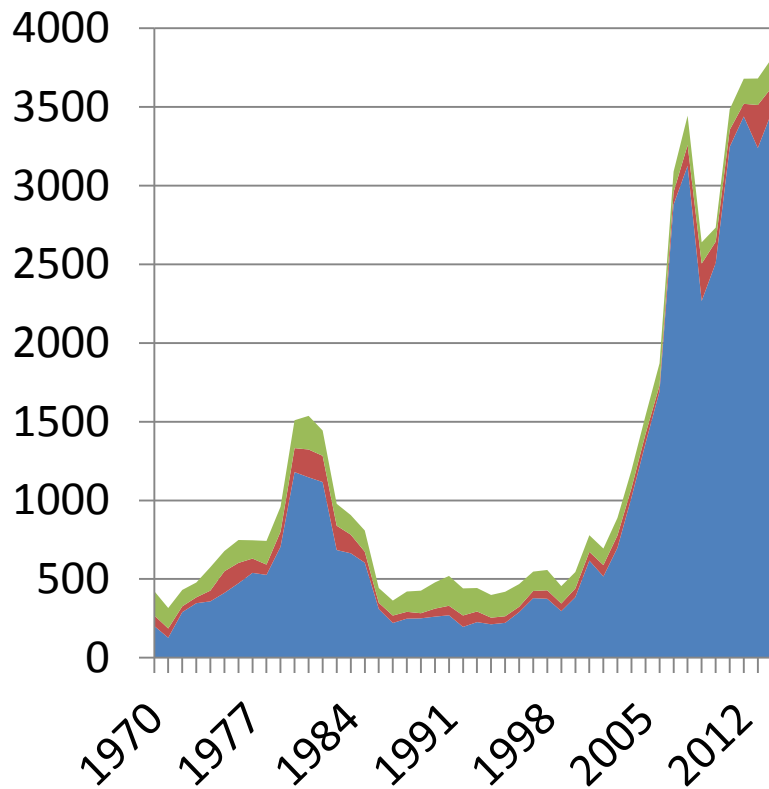
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Better than we thought

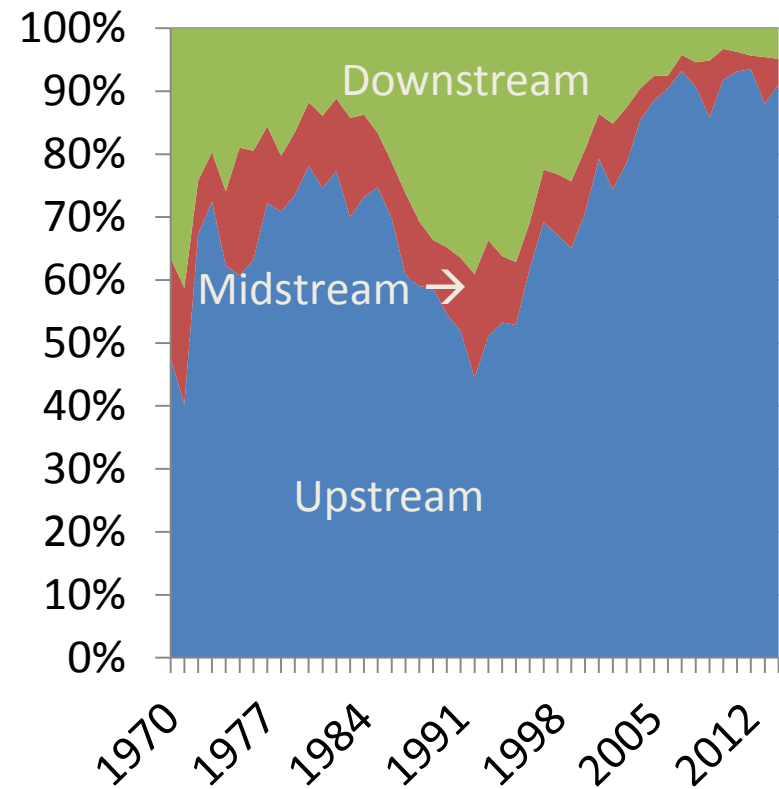
- The surge of 39,000 new jobs in Houston in the first four months of 2014 is based in energy and construction
- On the energy side, perhaps helped by one-time events
 - Producer consolidation of employees?
 - Winter weather produces mini-drilling boom that will fade
- About the 5,800 new construction jobs
 - 2,500 jobs in heavy construction are mostly catch-up for infrastructure and lot development
 - But it looks like the petrochemical push is underway, and will accelerate through 2014 and into 2015
- **Based on these facts, we have revised the forecast for 2014 to 86,000 jobs – 21,000 more than previously forecast**

Why the focus on upstream capital expenditures? Historically it dominates

Inflation-adjusted cap-ex



Share of oil industry cap-ex



After big turn toward recovery, housing pauses over the winter

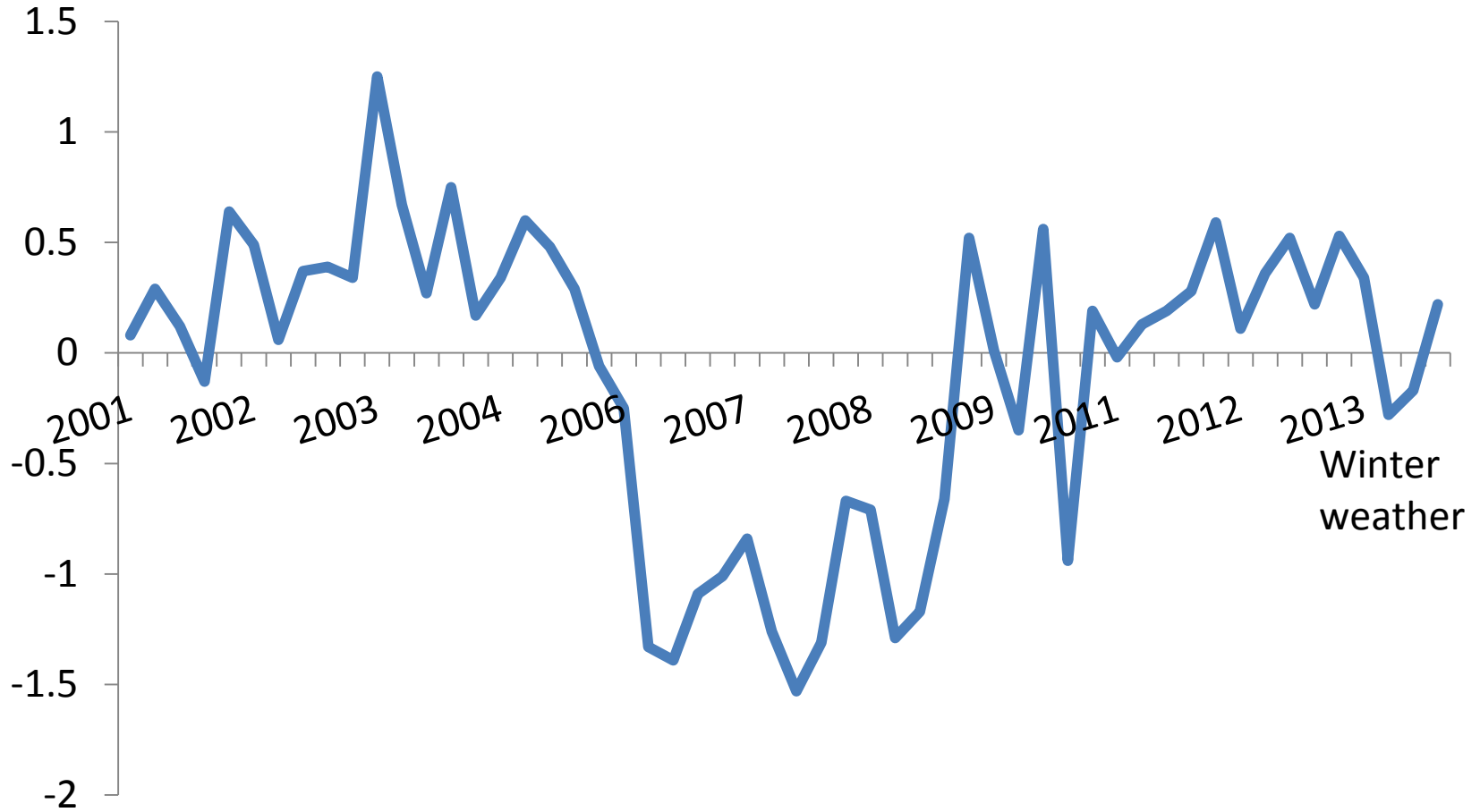
What happened?

- Sales of new and existing home sales fall
- Supplies of new homes are very tight
- Mortgage applications fall
- Prices still rising – just not as fast

Why?

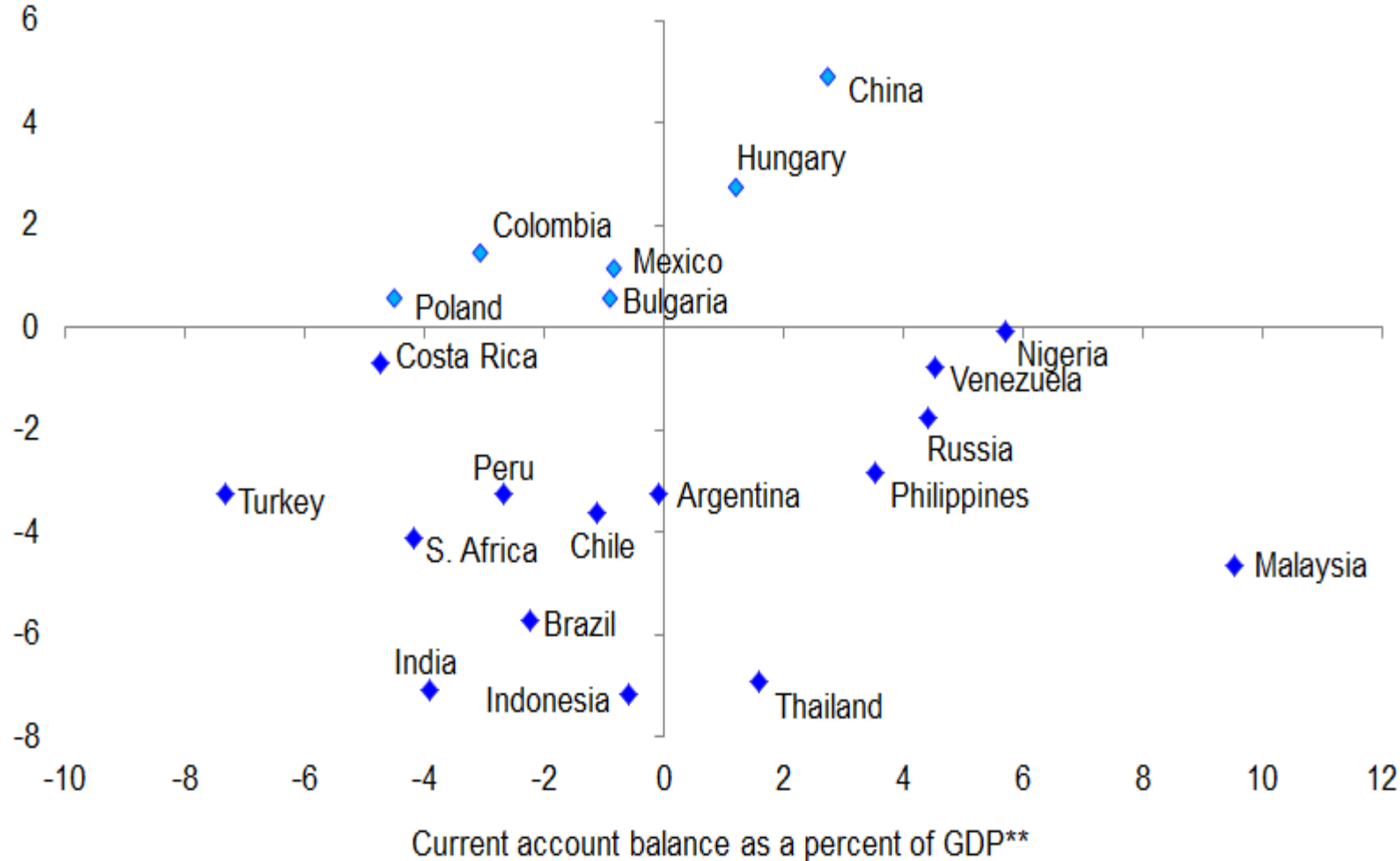
- Brutal winter weather
- Affordability has taken a big hit
 - Rising mortgage rates
 - Home prices up
- Supplies extremely tight
 - Homeowners without equity
 - Developed lot shortages

Housing adds to GDP growth (percent contribution to GDP growth)



Emerging Economies Experiencing Sustained Currency Pressures

0+ = Accumulated appreciation pressures*



Federal Reserve bank of Dallas