Institute for Regional Forecasting

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Houston Job Growth Takes a Mid-Year Breather

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Since the financial crisis the Texas economy has pulled away from the U.S.
... and Houston has pulled away from Texas

Federal Reserve Bank of Dallas
Houston is by far the fastest growing major metro in Texas since 2004.
Year-to-date Houston job growth is running at 2.8 percent

Note: December to December changes, except 2013 which is annualized year-to-date
Houston employment shows strength in recovery (3-month percent change at annual rates)

Bureau of Labor Statistics
Job growth slowed beginning mid-year
(3-mo percent change, annual rates, s.a.)
Purchasing managers’ index
U.S. and Houston compared (s.a.)
Houston unemployment rate falls on strong job growth

%, s.a.
Is too much good news now driving Houston’s economy? Basic v non-basic industries
Since 2010, Houston, growth led by mining, manufacturing, prof services

(% change Dec 2009 – Dec 2011)
Since Dec 2011 growth is much more broadly based.
Too much good news? Economic base slows, non-basic growth accelerates

(3-month change at annual rates, s.a)
Slowdown? Yes ... but healthy growth still likely for Houston

Houston Annual Job Growth Q4/Q4

<table>
<thead>
<tr>
<th>Year</th>
<th>Job Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>110,200</td>
</tr>
<tr>
<td>2013</td>
<td>81,500</td>
</tr>
<tr>
<td>2014</td>
<td>61,600</td>
</tr>
<tr>
<td>2015</td>
<td>81,200</td>
</tr>
</tbody>
</table>
What makes Houston grow?

- U.S. economic growth
- Global growth drives local exports, keeps oil prices high
- Energy upstream and downstream
The U.S. economy has provided little support for Houston
Gross domestic product
(%-change, annual rates)

2005 2006 2007 2008 2009 2010 2011 2012 2013
Job Market Improves Too Slowly, Employment Growth Lags Recovery
U.S. payroll jobs still 2.0 million short of prior peak in 2007
U.S. Employment Growth
In Thousands of New Jobs per Month, 1990 to 2011

Bureau of Labor Statistics
What is missing from growth at 15 quarters after the trough?

### Contribution to GDP (%)

<table>
<thead>
<tr>
<th></th>
<th>3 Recent Recoveries</th>
<th>This Recovery</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP</td>
<td>3.9</td>
<td>2.2</td>
</tr>
<tr>
<td>Cons</td>
<td>2.6</td>
<td>1.5</td>
</tr>
<tr>
<td>Res Inv</td>
<td>0.5</td>
<td>-0.4</td>
</tr>
<tr>
<td>Fixed Inv</td>
<td>0.9</td>
<td>1.2</td>
</tr>
<tr>
<td>Net Exports</td>
<td>-0.6</td>
<td>-0.20</td>
</tr>
<tr>
<td>Gov’t</td>
<td>0.50</td>
<td>-0.3</td>
</tr>
</tbody>
</table>

### Consumption, housing, and state/local gov’t all a drag (%)

- GDP
- Cons
- Res I
- Non Res I
- Govt
- Net X
Expect improvements in 2013?

• Housing market will start to add to GDP
• State and local government revenues allow them to grow
• The consumer would have made substantial progress on deleveraging – except for $200 billion in new taxes
Is the housing upturn finally here?
Housing prices stabilized and turned up over last summer of 2012
(index: 12-mo percent change)
Pessimism quickly recedes in new home market

(NAHB homebuilder sentiment)
Consumer still working to deleverage after housing debt build-up
(Ratio of debt to disposable personal income)

Federal Reserve Board, BEA
Auto Sales Still In Recovery

Million units, annual rate

2006 2007 2008 2009 2010 2011 2012 2013
New taxes in 2013 finally catching up with the consumer

- Payroll taxes rise $126 billion, Bush-era tax cut loss to high-income earners will be $50 billion, and Affordable Care Act adds $24 billion.
- Total tax increase is $200 billion or 1.6 percent of disposable personal income.
- Expected real consumer spending to drop by one percent or more in the first half of 2013, but delayed a quarter
U.S. GDP growth muddles through at 2.0-2.5 percent in 2013
(Percent change 2007 to 2014)
Houston real estate is in trying to catch up with past economic growth
Existing homes sales in Houston are back on a strong track
(monthly MLS, s.a.)
Home prices did not fall in Houston like elsewhere in U.S.

(median price, s.a.)

MLS, Texas A&M Real Estate Center
Houston single-family inventory falling sharply

Months supply at 3.1 in July

MLS, Texas A&M Real Estate Center
Houston single-family permits began to pick up in 2012.

Texas A&M Real Estate Center
Local Real Estate Development Moving Very Quickly to Catch Up With Past Growth

• All markets see rent and construction rising, vacancy rates and cap rates falling
• Apartment construction is focused inside the Loop, but Woodlands/Montgomery County is leading an acceleration in the suburbs
• Large blocks of office space have disappeared in hottest markets like the Energy Corridor, West Sam Houston, and Woodlands.
• Retail led by suburbs, especially grocery-anchored strip malls
• Industrial has lowest vacancy rate in decades
Domestic drilling pulls back in 2012-2013
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 price, 1997-present
($/mcf)
Is marketed production of natural gas finally peaking?
Natural gas inventories return to normal – with help from cold spring?

(percent above or below 5-year average)
Natural gas price below $4.50 keeps takes out gas-directed rigs
Oil price above $65/b keeps oil-directed rigs busy
High Oil/Low Gas Price Push Drilling Toward Oil-Directed Activity

Baker Hughes
U.S. Rig Count Weakens on Low Natural Gas Prices

Baker Hughes
The frantic edge is off domestic oil exploration and production

- Capital spending will be flat in 2013, margins squeezed, local hiring has already slowed
- There is good news offshore, where deep-water drilling continues to improve
- There is a lot of catch-up on infrastructure – on land and offshore – that won’t show up in the rig count
- Oil-directed activity now dominates U.S. drilling activity
Global drilling is healthy

- Oil is a global product, easily transported and sold around the world
- Drilling outside North America bounced back strongly after the financial crisis, should be strong in 2013
- These markets are important for Houston-based producers and oil-service firms. It is high revenue, high margin work for service companies.
- Like the U.S., these markets are 80 percent dependent on oil-directed activity
International Rig Count Rises Steadily

Baker Hughes Excludes Iran and the Sudan
Share of foreign oil-directed activity today – by region

Percent Drilling Activity 2013 Q2

Baker Hughes
<table>
<thead>
<tr>
<th>Method</th>
<th>Dollars/Barrel</th>
<th>Where</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deep-water Drilling</td>
<td>$50-$85</td>
<td>Gulf of Mexico, West Africa, Brazil</td>
</tr>
<tr>
<td>Tar Sands</td>
<td>$65-$75</td>
<td>Alberta, Venezuela, Russia, Congo</td>
</tr>
<tr>
<td>Shale Oil</td>
<td>$65-$75</td>
<td>North Dakota, Permian Basin, Eagle Ford</td>
</tr>
</tbody>
</table>
Who sets the price of oil: Exxon?, the Federal Reserve? the Illuminati?
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.
Oil part of a wider commodity price boom since 2003
The developing world has been the global engine of growth since 2008

(Percent GDP growth)

IMF World Economic Outlook update, January 2013
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, this year passing the developed nations in total GDP
Growth in the Demand for Oil Comes from the Emerging Markets

(million b/d)

International Energy Agency
Percent contributions to oil demand growth since 2003

- China: 32.3%
- Other Asia: 25.0%
- Middle East: 16.9%
- Latin America: 13.7%
- FSU: 5.6%
- Africa: 5.5%

International Energy Agency
Global Growth Sluggish in 2013
(% GDP Growth)

<table>
<thead>
<tr>
<th>Country</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>World</td>
<td>4.0</td>
<td>3.2</td>
<td>3.3</td>
<td>4.0</td>
</tr>
<tr>
<td>U.S.</td>
<td>1.8</td>
<td>2.2</td>
<td>1.9</td>
<td>3.0</td>
</tr>
<tr>
<td>Europe</td>
<td>1.4</td>
<td>-0.6</td>
<td>-0.3</td>
<td>1.1</td>
</tr>
<tr>
<td>Japan</td>
<td>-0.6</td>
<td>2.0</td>
<td>1.6</td>
<td>1.4</td>
</tr>
<tr>
<td>China</td>
<td>9.3</td>
<td>7.8</td>
<td>8.0</td>
<td>8.2</td>
</tr>
<tr>
<td>India</td>
<td>7.7</td>
<td>4.0</td>
<td>5.7</td>
<td>6.2</td>
</tr>
<tr>
<td>Brazil</td>
<td>2.7</td>
<td>0.9</td>
<td>2.0</td>
<td>4.0</td>
</tr>
</tbody>
</table>

Source: IMF World Economic Outlook, April 2013
Houston’s ties to oil and natural gas
Houston’s upstream exploration jobs now total over 100,000

Bureau of Labor Statistics
Annual earnings in upstream oil double the typical Houston job in 2011 ($000/worker)

Bureau of Economic Analysis
Houston adds manufacturing jobs since 2003

Manufacturing employment (000)

Bureau of Labor Statistics
Machinery and Fabricated Metal Bring 115,000 Jobs in Houston

Bureau of Labor Statistics
But production hours worked fall in mid-2013.
Houston is the capital of a refining and petrochemical complex on the Texas and Louisiana Gulf Coast
Gulf Coast Refining Margin ($/bbl)

Pace refining margins, *Oil and Gas Journal*
Four of eight largest ethylene complexes in the world are in Houston

<table>
<thead>
<tr>
<th>Company</th>
<th>Plant location</th>
<th>Capacity (million tpy)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formosa</td>
<td>Taiwan</td>
<td>2,935.0</td>
</tr>
<tr>
<td>Nova</td>
<td>Alberta</td>
<td>2,811.7</td>
</tr>
<tr>
<td>Arabian Petrochem</td>
<td>Saudi Arabia</td>
<td>2,250.0</td>
</tr>
<tr>
<td>ExxonMobil</td>
<td>Baytown</td>
<td>2,197.0</td>
</tr>
<tr>
<td>ChevronPhillips</td>
<td>Sweeny</td>
<td>1,865.0</td>
</tr>
<tr>
<td>Dow</td>
<td>Netherlands</td>
<td>1,800.0</td>
</tr>
<tr>
<td>Ineos</td>
<td>Chocolate Bayou</td>
<td>1,752.0</td>
</tr>
<tr>
<td>Equistar</td>
<td>Channelview</td>
<td>1,750.0</td>
</tr>
<tr>
<td>Anlou</td>
<td>Saudi Arabia</td>
<td>1,705.0</td>
</tr>
<tr>
<td>Equate</td>
<td>Kuwait</td>
<td>1,650.0</td>
</tr>
</tbody>
</table>

Oil and Gas Journal, 7/2/2012
Natural gas energy content equivalent to $20 per barrel for oil

DOE/EIA and calculations of the author
Ethylene Margins
(cents per pound)
August margins for ethylene were 41 cents per pound in North America, -17 cents elsewhere.

<table>
<thead>
<tr>
<th>Feedstock Margin</th>
<th>Etane Margin</th>
<th>Naphtha Margin</th>
</tr>
</thead>
<tbody>
<tr>
<td>-30</td>
<td>-10</td>
<td>10</td>
</tr>
<tr>
<td>-10</td>
<td>30</td>
<td>50</td>
</tr>
<tr>
<td>10</td>
<td>70</td>
<td>90</td>
</tr>
<tr>
<td>30</td>
<td>110</td>
<td>130</td>
</tr>
<tr>
<td>50</td>
<td>150</td>
<td></td>
</tr>
</tbody>
</table>

Muse, Stancil Cash Ethylene Margins, *Oil and Gas Journal*, 2013
New ethylene capacity concentrated on the U.S. Gulf Coast

<table>
<thead>
<tr>
<th>Company</th>
<th>Location</th>
<th>Capacity (mm lb/yr)</th>
<th>Start-Up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exxon</td>
<td>Baytown</td>
<td>3,300</td>
<td>2016</td>
</tr>
<tr>
<td>Chevron Phillips</td>
<td>Baytown</td>
<td>3,000</td>
<td>2017</td>
</tr>
<tr>
<td>Dow Chemical</td>
<td>U.S. Gulf Coast</td>
<td>4,200</td>
<td>2017</td>
</tr>
<tr>
<td>Ineos</td>
<td>Lake Charles, LA</td>
<td>3,000</td>
<td>2018</td>
</tr>
<tr>
<td>CP Chem</td>
<td>Baytown, TX</td>
<td>2,500</td>
<td>2016/2017</td>
</tr>
<tr>
<td>Braskem/Idesa</td>
<td>Mexico</td>
<td>2,200</td>
<td>2015</td>
</tr>
<tr>
<td>Shell Chemical</td>
<td>Pennsylvania</td>
<td>2,000</td>
<td>2016+</td>
</tr>
<tr>
<td>Formosa</td>
<td>Point Comfort, TX</td>
<td>1,760</td>
<td>2015</td>
</tr>
<tr>
<td>LyondellBasell</td>
<td>LaPorte, Texas</td>
<td>1,450</td>
<td>2012-2014</td>
</tr>
<tr>
<td>Dow Chemical</td>
<td>Hahnville, LA</td>
<td>800</td>
<td>2012Q4</td>
</tr>
<tr>
<td>Williams</td>
<td>Lake Charles, LA</td>
<td>600</td>
<td>2013Q3</td>
</tr>
<tr>
<td>Westlake Chemical</td>
<td>Lake Charles, LA</td>
<td>230</td>
<td>2012</td>
</tr>
<tr>
<td>Ineos</td>
<td>Chocolate Bayou, TX</td>
<td>230</td>
<td>2013</td>
</tr>
</tbody>
</table>
Heavy construction to boom in U.S. and on Gulf Coast

- The American Chemistry Council recently counted 97 chemical project announcements with $77.1 billion in construction cost
- 7 proposed LNG export terminals
- Numerous pipelines and processing facilities connect new oil and gas plays to Houston
- Many general manufacturing announcements for energy, plastics, tires, iron and steel
It is an exciting time to be in Houston

• We have been growing rapidly for nearly a decade, and saw the local economy accelerate after the financial crisis

• This could last another decade
  – Shale, tar sands, and deep-water drilling mean we can have a serious conversation about energy independence in the U.S.
  – We will need to rework and expand energy infrastructure in pipelines and processing
  – We have a new petrochemical industry to build
It all depends on the price of oil?

• Upstream, yes. The collapse of natural gas prices and weaker natural gas liquids prices put the burden on oil

• But weak natural gas prices are driving downstream expansion and construction. It could cushion any blow

• But any threat to oil prices is a prices threat to Houston’s current expansion
IMF says that medium-term risks to the global economy remain high

• Europe continues to stagnate or has a financial crisis
• Fiscal trouble in the U.S. or Japan
• There is less slack in the advanced economies than thought, and inflation breaks out
• Unconventional monetary policy backfires
• There is a sustained slowdown in key emerging markets
Where is the price of oil going?

- The current expansion is again dependent on oil prices, and oil price depends on the health of the global economy.
- No one knows where oil price will be next month – or how this ends. Don’t bet your business on the price of oil.
Houston Job Growth Takes a Mid-Year Breather

Robert W. Gilmer
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University of Houston
Domestic Consumption of Oil is Stable, Production Rising through 2014 (million b/d)

DOE/EIA
U.S. Net Imports Fall through 2014
(million b/d)

DOE/EIA
Good time to look to foreign markets for growth

- Barclay’s forecast year-over-year growth of nine percent outside North America
- The market is $460 billion, 2.5 times the size of the U.S. market
- The return of Iraq and 300 rigs has been the story of the last decade
- Now it is about complex geologies, and deep-water drilling
Houston has largest gains in upstream oil employment in Texas, 2006-2012

BLS payroll employment and FRB-Dallas calculations
Weekly hours surged for production workers in Houston manufacturing.
Chemical Plants Affected By Hurricane Rita

(Percent N.A. Capacity Shut Down at Peak)

- Ethylene Steam Cracker: 58.5%
- RG Propylene: 30.7%
- Benzene: 68.5%
- Polyethylene: 63.0%
- Styrene: 85.3%
- Butadiene: 95.8%

Data from CMAI, Inc. and expressed as percent of North American Capacity