“The World Oil Outlook: From new reserves revolution to new oil price uncertainties”

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The views and opinions expressed in this presentation are those of Antonio Merino and do not necessarily reflect the official policy or position of Repsol.
“It sometime almost seems as if the techniques of science were more easily learnt than the thinking that shows us what the problems are and how to approach them”

• What do we know about oil price behavior since the 90’s?

• How will oil prices behave? The unconventional revolution: surplus of resources? At what price?

• Two questions: new regulations and monetary policies

• Conclusions
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What do we know about oil price behavior?
Some stylized fact on past oil price behavior... Oil behaves differently!

<table>
<thead>
<tr>
<th></th>
<th>US Dollar</th>
<th></th>
<th>Deutsche Mark - Euro</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRB</td>
<td>85.6</td>
<td>206.8</td>
<td>2.4</td>
</tr>
<tr>
<td>CRB Metals</td>
<td>106.9</td>
<td>995.5</td>
<td>9.3</td>
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<tr>
<td>WTI</td>
<td>106.3</td>
<td>3402.1</td>
<td><strong>32.0</strong></td>
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<tr>
<td>CRB</td>
<td>76.7</td>
<td>25.0</td>
<td>0.3</td>
</tr>
<tr>
<td>CRB Metals</td>
<td>94.2</td>
<td>120.3</td>
<td>1.3</td>
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<tr>
<td>WTI</td>
<td>94.5</td>
<td>411.3</td>
<td><strong>4.4</strong></td>
</tr>
</tbody>
</table>

Source: Thomson Reuters Datastream and Repsol Economic Research Department
What do we know about oil price behavior since the 90’s?
Looking to the future curve what we see is a future marginal oil price around 90$? Is this shale oil’s future marginal price? Or is it only hedging?

Changes in the Future Market Crude Oil Price Perspectives

Source: Bloomberg and Economic Research Department
What do we know about oil price behavior since the 90’s?
After 2010: New relation explained by supply and demand balance at higher prices

A new price-inventory relationship has been established. Implicitly the new supply curve is indicating that we need higher prices to get more production, but what prices do we expect in the future?

Source: EIA, NYMEX and Repsol Economic Research Department
What do we know about oil price behavior since the 90’s?
Right now, the key question seems to be how marginal price will evolve if more/less oil is needed. Can we draw any lesson from the past? Which type of price behavior?

Non-OPEC Supply Annual Growth

Source: International Energy Agency (IEA) and Repsol Economic Research Department
What do we know about oil price behavior since the 90’s?
What will happen to the future curve if the price forecast by the IEA or EIA is correct. Will we have a market reaction like in 2004-2009? Or will it be different this time

Official Energy Agencies price outlook changes

Source: EIA (AEO 2007 & 2013), IEA (WEO 2007 & 2013) and Repsol Economic Research Department
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How will oil prices behave? The unconventional revolution

Resources are there but marginal cost is moving up. Cost and depletion are key.
How will oil prices behave? The unconventional revolution
All the data point to a very rapid and continuous decline

Typical production curve: Light Tight Oil (LTO) well vs. conventional oil well

LTO well initial production $\sim 500$ b/d

Anual decline rate:
- $1^{st}$ year = 69%
- $2^{nd}$ year = 39%
- $3^{rd}$ year = 26%
- $4^{th}$ year = 27%
- $5^{th}$ year = 33%

Source: IEA (WEO 2013) and Repsol Economic Research Department
How will oil prices behave? The unconventional revolution
And field decline implies an increasing investment to maintain production levels

Total oil production, North Dakota

Source: North Dakota State Government and Repsol Economic Research Department
How will oil prices behave? The unconventional revolution
And field decline implies an increasing investment to maintain production levels

Average active well production, North Dakota

Lateral segments and fracturing stages improvements
Will improvements repeat?
How will oil prices behave? The unconventional revolution

More wells are needed despite efficiency gains in production, so more equipment is needed to maintain plateau.

Producer Price Index (PPI) by components in the oil and gas sector

Source: BLS and Repsol Economic Research Department
How will oil prices behave? The unconventional revolution

According to any macro economic model, energy price increases translate into higher metal prices (steel and cooper). Higher oil price implies higher metal costs.

Source: OEF and Repsol Economic Research Department
How will oil prices behave? The unconventional revolution
Proxy evidence supporting the unconventional production costs hypothesis

Free Cash Flow per Share

Source: Bloomberg and Economic Research Department
How will oil prices behave? The unconventional revolution
Proxy evidence supporting the unconventional production costs hypothesis

Return on Equity

Source: Bloomberg and Economic Research Department
How will oil prices behave? The unconventional revolution

Let's not forget we still need the OPEC, a cartel whose countries need high prices to maintain their high spending... Which is the equilibrium price for OPEC?

EIA’s long terms perspectives of supply and demand balance

<table>
<thead>
<tr>
<th>2010</th>
<th>Supply 2010</th>
<th>Demand 2010</th>
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<tbody>
<tr>
<td>OECD</td>
<td>46</td>
<td>Non-OPEC 51.8</td>
</tr>
<tr>
<td>Rest Non-OECD</td>
<td>31.4</td>
<td>OPEC Gulf 23.8</td>
</tr>
<tr>
<td>China</td>
<td>9.3</td>
<td>Rest OPEC 11.1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2035</th>
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<th>Demand 2035</th>
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<td>45.2</td>
<td>Rest Non-OECD</td>
</tr>
</tbody>
</table>

0.9% yoy growth

2035 = 109.4 Million Bbl/d

2010 = 86.7 Million Bbl/d

So in my view marginal prices will move up and also we will look for additional marginal production beyond conventional. In that case, OPEC production is the actual suspect.

Source: Energy Information Administration (EIA, IEO 2013) and Repsol Economic Research Department de Repsol
How will oil prices behave? The unconventional revolution

The OPEC answer to provide the marginal barrel in 7 year will be key. Will OPEC behavior be like during the period 2000-2004 or like during 2004-2009?

Source: US. Energy Information Administration (EIA) and Repsol Economic Research Department
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Two questions: new regulations and monetary policies

It seems that regulation on both sides of the Atlantic is different, but it has its effects.

Source: Bloomberg and Repsol Economic Research Department
Two questions: new regulations and monetary policies
Less co-movements since the implementation of QE4 in January

Brent

(index 09:08=100)

Operation twist
Expectations about the program announcement
Implementation of the program
Brent

Source: Thomson Reuters Datastream and Repsol Economic Research Department de Repsol
Two questions: new regulations and monetary policies

Less co-movements since the implementation of QE4 in January
Two questions: new regulations and monetary policies
Less co-movements since the implementation of QE4 in January

Brent and S&P

EMIR regulations
Uncertainties regarding Chinese growth

Operation twist
Implementation of the program
Expectations about the program announcement
Brent
S&P

Source: Thomson Reuters Datastream and Repsol Economic Research Department de Repsol
Two questions: new regulations and monetary policies
And what will happen if interest rates come back to normal levels?

Central Bank interventions rates

- United States
- United Kingdom
- Japan
- Eurozone

Source: OEF and Repsol Economic Research Department de Repsol
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Conclusions

- In real terms oil is the only commodity that has multiplied its price since the 60’s. The depreciation of the dollar has to be considered. In € terms the picture is slightly different.

- We have seen the more acute episode of price volatility during a period of financial turbulence (2004-2009). For the time being the issue is marginal price of unconventional.

- When we see the decline rates and the need for more wells, marginal cost increases seem natural even with efficiency gains.

- Moreover, in our view there is a clear relationship between oil price increases and metals price increases. They feed on each other.

- I am of the view that in 5-10 years, OPEC will face important decisions because more OPEC oil will be needed. Price uncertainties can come back, as in the period between 2004-2009. If that not the case, real oil price will fall.

- Last but not least, there are two important issues not directly related with oil influencing price outlook: Regulation of derivative markets and banks and the new monetary policy. One will limit upside movements in normal times and the other support high prices.