Ten Times Ten: What Future for Oil Prices?
By James Burkhard and Ruchir Kadakia

Ten dollars a barrel. That was the price oil fell to in 1998, just 10 years ago. In 2008, oil has been nine times higher, around $90 a barrel, and briefly flirted with $100 a barrel just a few weeks ago. That was unimaginable 10 years ago has happened. How it has happened, and what does it all tell us about the future of energy?

Financial crisis swept Asia and other parts of the world in 1998, bringing an end to what it had been the world’s most vibrant economic region. The result was a deficit of $20 oil. The expectation of $20 oil in 1998 was $20 was viewed as unrealistic and, even if it had happened, unsustainable. The world was awash in cheap oil — or so it seemed then.

Slowly, perceptions and market conditions changed. After hitting $20 in 2000, oil prices dropped during the recession of 2001. Then in 2003, the global economy took off on a five-year run of extraordinary expansion. China’s boom led to a shuttlecock of energy prices — a deficit offset by burning more oil. In 2004 global oil demand jumped 3 million barrels per day (mbd) — the biggest rise in several decades. As oil prices rose, the economic boom spread to the Middle East, Russia and other major exporters.

Exceptional demand growth sparked an oil price rise of $5 dollars a barrel, but a series of supply disruptions in Iraq, Venezuela, Nigeria and the U.S. Gulf of Mexico — what Cambridge Energy Research Associates calls the “aggregate disruption” — created an even tighter balance between demand and supply. Oil prices also led to increasing demand for the people and equipment needed to find and develop new oil reserves. Suddenly an industry that had been declining couldn’t get rigs and drilling ships, and had trouble finding enough skilled personnel. The cost of developing a new oil field almost doubled between 2004 and 2007. Oil is priced in dollars, and a weakening dollar also pushed up oil prices — particularly evident in oil’s steep ascent with the start of the credit crisis in August, from around $70 a barrel to $90-$100.

In the late 1990s, the idea of $100 a barrel or even $80 a barrel would have seemed preposterous. Prices for long-dated oil futures contracts hovered in the low teens. Today, $20 seems quaint, if not ridiculous. To be sure, many of the political and market forces currently constraining supply growth will not disappear overnight. Also, the desire for higher living standards in China, India, the Middle East, Russia and elsewhere will remain as strong as it was in the United States, Europe and Japan in the years after World War II. Higher living standards mean longer life expectancy, lower infant mortality — and higher energy consumption.

But just when the future seems pre-ordained in the oil market, unexpected things can unfold. It did in the decade following 1998, just as it had several times since 1970. This year will be the stillest test yet for the new oil price era that dawned several years ago. Economic growth is the single most important determinant of oil demand growth — and the course of the global economy in 2008 is fraught with worry.

Financial innovation and the globalization of securitization helped lubricate the wheels of the world’s economy during an extraordinary expansion, but they also created risks that were not — and still are not fully understood. The U.S. subprime mortgage meltdown is the most current example of misunderstood risk, but is it the least?

Oil prices can remain high during an economic downturn. The early 1980s, which was the weakest period of economic growth since the Great Depression, oil prices were at very high levels — topping out in April of 1988 at $59.04 per barrel in today’s dollars. The Iran-Iraq war and the attendant loss of supply was the prime driver for high prices. But eventually, the economy and demand catch up — the 1980s oil price collapse was due to a multi-year decline in oil demand.

This year, just as economic worries began to mount, oil prices touched that new record high of $100 per barrel. Although oil prices are one factor that affects the global economy, they are a significant one. Because the world economy took $70 per barrel in stride does not mean that it would easily absorb $100. If oil prices did hit $100, the impacts would be similar to those seen in the early 1980s:

Economic growth is the single most important determinant of oil demand growth.
Getting More Mileage Out of Gallons
By John Heywood

How many miles per gallon will America’s cars get in a decade? According to Congress, the figure will be 35. Where did this number come from? It is intended to increase in automotive fuel economy standards since 1980s to 2007 by 15 mpg. However, the current fuel economy has increased at a rate of about 1 to 2 percent per year over the past 20 years. But these improvements can be directed toward in-1 percent efficiency gain through such steady, incremen-
tal technology advancements.

By John Heywood

The second option of reducing overall vehicle weight was aimed at reducing the share of parts of new vehicles that were required to propel a vehicle, which in turn, improved fuel efficiency. But something else has improved — fuel economy, the energy output per unit of fuel. Fuel efficiency of auto-
mobiles has consistently increased at the rate of about 1 percent per year over the past 20 years. But these efficiency gains did not get channelled into improving fuel economy, because they were used to drive cars that were heavier and more powerful. Compared to 1987, 2007 vehicles weigh 350 pounds more. The average car and gasoline hybrid-electric systems. All of these changes were combined, a 35 percent reduction in the average of cars and trucks by one EPA size class could achieve a 35 miles per gallon by 2020, but our MIT study suggests that major changes in the way people drive their vehicles to 2035 model year alone. This would translate into an increase of 15 to 20 percent in the American public’s baseline costs. Over 35 years of vehicle operation, this would correspond to a cost of $65 to $75 to reduce one ton of greenhouse gas emissions, which translates to approximately $30 per ton of carbon. Taking fuel savings into account, the unaccounted payback period to recoup these manu-
facturing costs of alternative powertrains and the costs of alternative powertrain technology advancements.

The extra cost to produce the changes required to double fuel economy by 2050 are projected to $55 to $65 per ton of CO2 emissions. If necessary, these costs will be offset by sig-
nificant fuel savings.

Policies to Complement Higher CAFE Standards

Some combination of all three options will be re-
quired to meet fuel economy standards for vehicles by 2035. No two options can reach the target on their own. The highest leverage comes from the first two — directing increased production of alternative powertrains and reducing fuel consumption and reducing vehicle weight — since these changes can affect all new vehicles entering the market.

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nificant fuel savings.
Out of the 811 fields analyzed in the CERA study, 400 are large (more than 500 million barrels of originally proved-plus probable reserves) and the remainder, small (less than 500 million barrels of originally proved-plus probable reserves). They can be broken down into two groups: 375 fields are still in the buildup or plateau phases, with 436 in the decline phase.

When the CERA team analyzed recent production trends in its data base, it found that the aggregate global decline rate for fields currently in production is approximately 4.5 percent per year. This is far lower than the 8 percent figure used by many studies. One reason for this difference, we conclude, is that some analysts focus only on the fields that are in decline, not taking into account the production from the many fields in the world that are still in their buildup or plateau phase. In the data base, 46 percent of the 811 fields are in buildup or plateau. More importantly, these fields account for 59 percent of the current production and 63 percent of the reserves represented by the data set used in the study. Only 41 percent of production is from fields in the data set that are in the decline phase of their production lives. In the fields that are in actual decline, the production weighted decline rate is 6.1 percent. Growing production from fields that are in buildup or plateau is thus able to offset in part shrinking production from fields in decline.

Some analysts have also focused on particular subsets of oil fields that have higher than average decline rates. Small fields, which are increasingly being developed in mature non-OPEC countries, and deepwater projects, which tend to flow at high rates as a requirement of commerciality, both tend to decline more rapidly.

Another important finding is that annual field decline rates are not increasing with time. Large fields in particular have benefited from increased investment, as well as improved planning and technology. Given adequate investment, low decline rates can be maintained in many fields for prolonged periods, and field life is very often longer than originally projected. It is likely, according to CERA’s analysis, that improved understanding of giant fields’ geology and reservoir models over the course of long life cycles has allowed late field expansions that have arrested decline and, in many cases, allowed production to increase significantly.

Focusing on the subset of 436 oil fields that are past the buildup and plateau phase and actually in decline, the CERA research team found notable differences. Production from individual large fields declines at 5.8 percent on average, while in individual small fields it declines at 8.9 percent. Because large fields account for 86 percent of production and 95 percent of reserves — in the data set, the average production weighted decline rate for fields overall is, as noted above, 6.1 percent. The average for onshore fields is six percent, compared with 10 percent for shallow water offshore fields and 16 percent for deepwater fields.

It turns out that other factors — in addition to field size and onshore vs. offshore — also influence post-plateau decline rates, including reservoir characteristics, development location, regional setting and operational tactics. Limestone reservoirs, for example, which are more prevalent in OPEC countries, tend to deplete more slowly than sandstone reservoirs.

A key conclusion of the study: There is no evidence that oilfield decline rates will increase suddenly.

The study of decline rates allows for better and more reliable projections about future oil supply. The new study reinforces CERA’s parallel research, that global liquids capacity — with “liquids” defined here as conventional oil, as well as unconventional liquid fuels such as gas-related liquids, extra-heavy oils or bitumen, tar sands, ultradeepwater oil and biofuels — which stood at approximately 91 million barrels per day (mbd) in 2007 — could climb to as much as 112 mbd by 2017. This outlook is supported by a key conclusion of the study: There is no evidence that oilfield decline rates will increase suddenly.

The CERA study is a signpost that shows we are gaining a better understanding of the below-ground factors, such as decline rate, that will shape the future of world oil supply. We welcome the further research and discussion that will continue to improve that understanding.

At the same time, it needs to be recognized that a range of above-ground factors — geopolitics, investment patterns, rates of oil extraction, government decisions and environmental concerns — will continue to have a major impact. These above-ground factors remain even more difficult to parse — geopolitics, investment patterns, rates of oil extraction, government decisions and environmental concerns — will continue to have a major impact. These above-ground factors remain even more difficult to parse — geopolitical concerns, investment patterns, rates of oil extraction, government decisions and environmental concerns — will continue to have a major impact. These above-ground factors remain even more difficult to parse — geopolitical concerns, investment patterns, rates of oil extraction, government decisions and environmental concerns — will continue to have a major impact.

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