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**Opening Remarks**  
**at the “Oil and the Macroeconomy in a Changing World” Symposium**  
**at the Federal Reserve Bank of Boston**

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I'd like to welcome you to the Federal Reserve Bank of Boston's symposium on "Oil and the Macroeconomy in a Changing World." We are very happy to be hosting such a distinguished group of presenters, discussants, and guests from the ranks of academia, business, and policymaking. Many of you have longstanding, hands-on experience with oil and energy markets, and we are delighted you've gathered here today.

I'd like to thank my colleagues at the Bank for organizing this important forum and for giving so much thought to the issues we should explore today. And, in particular, I want to recognize two colleagues, Jane Little and Chris Foote, who worked with me to frame many of the issues that I will briefly share by way of opening the proceedings.

I mentioned this group's long experience with oil and energy markets – markets that often puzzle outside observers. Indeed, plans for this symposium were sparked by the general sense of surprise that prevailed as oil prices rose toward \$140 per barrel in mid-2008, fell to near \$30 later that year, and then returned to between \$75 and \$85 in recent months. The outline of this volatility shows up in **Figure 1** (which uses monthly average data).

Undoubtedly, the behavior of world output, and the financial crisis, had much to do with these movements. But could "fundamentals" be the whole story? As today's conference unfolds, we will learn how energy-market insiders explain recent price movements. We will also hear from energy-market economists about the links between oil markets and the wider economy. I expect we will learn a great deal today, and I am confident that the materials generated by this conference will prove useful to many audiences in the future.

The questions we will explore today are among the most basic and enduring in economic policy: *What explains the often dramatic movements in oil prices, and how should policymakers respond to them?* **Figure 2** gives a longer-term view of oil price movements. Many of us in this room remember the oil shocks of the 1970s. Economists often blame poor policy responses to these shocks for the high inflation of that decade, although the importance of oil shocks for the macroeconomic outcomes of the 1970s is still open to debate.

Since then, oil price shocks have periodically flared up as a policy concern. Over time, the growing importance of services, and gains in energy efficiency, have reduced the energy intensity of U.S. gross domestic product (GDP). Indeed, oil-price developments were generally benign in the late 1980s and 1990s – at least from an importer’s perspective – as prices remained relatively stable over that period. Even so, oil price spikes continue to occur ahead of most U.S. recessions, and policymakers and other analysts continue to worry about the impact of oil prices on inflation – which brings us to **Figure 3**.

The 2007 to 2008 experience provides one recent example of oil’s effect on policymaking. Prices more than doubled in the early 2000s, rising from about \$30 a barrel in 2000 to \$66 a barrel in 2006. They then rose another 50 percent in the following two years, peaking in the summer 2008 at near \$140 per barrel.

There was quite a bit of concern at this time about how these movements would affect inflation. As a theoretical matter, higher oil prices can increase inflation in at least two ways – through the direct effects of oil prices on firms’ costs, and by the indirect effects on both consumer and business inflation *expectations*, which we see plotted in **Figure 4**. In 2008, in particular, a great many people were concerned that soaring and highly visible oil and gasoline prices would boost inflation expectations – an occurrence that, other things equal, would argue for tighter monetary policy.

Of course, other things were *not* equal in 2008. The economy had already begun to weaken in the middle of the previous year, thanks to the mortgage crisis. In addition, it is possible – even likely – that the rapid rise in oil prices of early 2008 represented an additional blow to output, which aggravated the slowdown already under way.

The depressing effect of an oil-price shock reflects the fact that the demand for oil is not very responsive to changes in price in the short to medium run. As a result, a global oil shock tends to undermine confidence in all oil-importing countries and cut their consumption of non-oil goods and services, which are generally domestically produced. By contrast, the swollen spending on oil in the wake of the shock flows mainly overseas, to oil exporters. Thus, it seems plausible that the depressing effect of the 2007 to 2008 oil shock may help to explain the unusual synchronicity and severity of the Great Recession across different countries.

But whatever the relative contribution of the oil shock to the severity of the recent recession, the anticipated effect of oil on inflation meant that policymakers in mid 2008 were confronted with the “classic” monetary-policy dilemma associated with oil price shocks: Should we raise interest rates to keep a lid on inflation and inflationary expectations, or should we reduce interest rates to support the real economy? In retrospect we now know that the near tripling of oil prices induced a 1 to 1.5 percentage increase in core inflation – noticeable relative of our preferred pace, to be sure, but implying an extremely small (.005) coefficient on oil prices – while 5-year inflation expectations remained remarkably stable (as shown, again, in Figure 4).

A second example of oil’s effect on policy deliberations comes from even more recent experience. Currently, several members of the FOMC see the risk to the Board staff’s forecast for inflation as tilted to the upside, because, as mentioned in the minutes for the April meeting, they are concerned about the possibility of additional increases in the price of oil and other commodities. As you know, policy now stands firmly in support of the real economy, a position that I believe is completely appropriate. The dramatic decline in output and employment in late 2008, coupled with the steep drop in oil prices that occurred in the same time, leaves no

doubt in my mind that supporting employment and output, not containing inflation, is of primary importance today. In fact, the most recent data on the Consumer Price Index indicates that core inflation rose less than 1.0 percent in the 12 months ending in April. This is the lowest increase in core inflation since the early 1960s.

But low inflation rates today do not mean that policymakers are free to ignore oil prices, in part because we know relatively little about what causes them to fluctuate and what economic effects they will have. Are recent price fluctuations driven by standard supply-and-demand pressures? Or has something else been at work, such as financial innovation that facilitates speculation in oil markets? To some observers, the available evidence tends to support this second suggestion. For example, despite such “fundamentals” as unusually ample inventories and OPEC spare production capacity, oil prices have risen over the past year (with some softening in recent weeks). The growing importance of passive investors (like pension funds) in energy futures trade, the value of OTC commodity derivatives outstanding, and the value of open positions in oil futures over the past decade also suggest the increased use of oil as a financial asset.<sup>1</sup> Accompanying these changes, oil prices have become more volatile; volatility peaked in mid-2008 but has remained high by earlier standards and rose again in recent weeks. Turning to **Figure 5**, we see that oil prices have also become more highly correlated (positively) with stock prices and (negatively) with the dollar in the past two years. Some analysts interpret these shifts as indicating increased uncertainty about future oil prices and about prospects for total (possibly higher) inflation. But the explanations for and implications of these developments remain a matter of considerable debate and clearly require further exploration.

Modeling longer-term movements in oil prices is also complicated. In the past, forecasters have tended to overestimate the growth in the supply of oil while underestimating the growth in demand. This has prompted concern that oil-market analysts may be missing some important fundamentals, such as the responses of oil exporters to changes in price. Oil producers are generally assumed to maximize profits. But from time to time, some supply-side players appear to give priority to domestic or global political concerns, or to maintaining discipline within the OPEC cartel. And other players, particularly the international oil companies, sometimes delay or abandon once promising investments as their perceptions of the political or technical risks evolve. As economists, we do not have good measures of such political variables. Additionally, we are not well-positioned to assess the prospects for technical advances that could lower production costs, or alter the risks associated with obtaining oil from deep under the ocean floor – risks that are painfully obvious to all of us right now – or from relatively plentiful oil-shale formations.

On the demand side, IMF and IEA forecasts suggest that in the medium run, emerging markets will drive the growth in world output and, thus, in the world demand for oil. We have seen that emerging markets – especially the newly industrializing countries in Asia – have experienced rapid increases in their demands for energy along with their rising incomes. **Figure 6** breaks out world oil consumption by region or country.

Unfortunately, we have relatively sparse information about economic conditions in these countries, let alone how their demand for oil is likely to respond to changes in oil prices, or how their policymakers will address environmental concerns. And again, we face questions about potential technological advances or regulatory changes that will alter the relative cost of oil versus other sources of energy. How do oil companies view these issues? How do scientists assess the feasibility of achieving, and the costs of installing, these technological

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<sup>1</sup> International Energy Agency, *Medium-Term Oil Market Report*, 2009; LCM Research, January 2010.

advances? We hope that the first four sessions of this conference will help us to answer many of these questions. In doing so, we will lay the foundation for the final sessions, where we will explore the best ways to model oil prices and their likely impact on the U. S. economy.

Indeed, the effect of oil-price movements on countries like the United States is an open and exciting area of research. As an econometric matter, standard models of the inflation process indicate that the “pass-through” of oil prices to core inflation is low – and lower today than it was in the 1970s. As already noted, this shift reflects structural and technological changes that have reduced the oil-intensity of the advanced economies.

In addition, some economists attribute the lower impact of oil prices to changes in the conduct of monetary policy -- if consumers and firms believe that the Fed is firmly committed to price stability, then a one-time increase in the level of oil prices is less likely to get hard-wired into the economy’s ongoing inflation rate. On the other hand, high and rapidly rising oil prices are unusually visible to the public – in the media and at the gas pump; preliminary evidence suggests that prices of certain frequently purchased “basics” may affect the public’s inflation expectations disproportionately. Clearly, knowing better how oil prices influence inflation expectations and the pass-through to core inflation is a key issue for policymakers charged with maintaining low, stable inflation.

Going forward, a variety of policymakers – not just those setting interest rates – will need to understand the cost of efforts to slow or stabilize climate change and the impact of these investment costs on output growth. Climatologists have made a compelling case for global warming, and many prominent economists have called for a carbon tax that would reduce carbon emissions and spur the development of greener energy sources. But these benefits will not come for free. Indeed, the IEA has estimated that the additional investment required by climate-stabilization efforts could amount to 0.5 percent of global output in 2020 and 1 percent in 2030. Reducing global warming may be highly beneficial – even essential. But tradeoffs undoubtedly exist, and environmental investments may reduce the economy’s potential growth rate by crowding out other worthwhile projects. A related question concerns the impact of these measures on the size and sustainability of countries’ fiscal and international payments imbalances.

I want to sum up by noting that a better understanding of oil markets should be an important component of the Federal Reserve’s research program. Indeed, speaking at our Phillips’ Curve Conference in 2008, Chairman Bernanke highlighted our need to develop a better understanding of oil and other commodity prices and to explore the possible information about investors’ inflation expectations signaled by their recent behavior. At this conference, we hope to make progress toward this goal by providing an interactive “workshop” atmosphere. The general discussion that follows each pair of presentations and comments will play a key role in determining what we are able to accomplish today, together, so I encourage your spirited participation.

Thank you again for coming.