CHAPTER 2

Technology and Unconventional Sources in the Global Oil Market

Technological factors played an important role in the collapse of oil prices that started in June 2014. Macroeconomists often assume that technological innovation results from independent, external forces (is exogenous), but in oil markets innovation is driven by prices. Indeed, high oil prices prompted breakthroughs in technology in extractive industries and led to the emergence of new sources known as "unconventional oil." Shale oil in particular has important consequences for the oil market outlook in that it not only significantly increases supply but also contributes to more limited and shorter production and price cycles.

Technology has transformed the oil market in powerful ways. Technological innovation and the subsequent adoption of new recovery techniques—including for drilling and processing—have given rise to new sources known as "unconventional oil." One recent example is shale oil (also known as tight oil), which has become a major contributor to global oil supply. Provided they are effective and widely adopted, improvements in recovery techniques mechanically increase the size of technically recoverable oil reserves. This increase, in turn, changes the outlook for oil supply—with potentially large and immediate implications for oil prices—by changing expectations about the future path of oil production. Increased supply lowers oil prices, but even if this has the effect of reducing investment and hence production, the industry is nonetheless forced to become more efficient, unleashing automatic stabilization forces.

Innovation in recovery techniques typically follows periods of prolonged high prices or changes in regulations that render new techniques more economical. New oil sources often come onstream in times of need—because of, say, the depletion of existing conventional sources—and in places that have economic and institutional systems more favorable to both innovation and the adoption of new recovery techniques. Innovation has led to significant improvements in drilling techniques in particular. The advent of hydraulic fracturing and directional (non-vertical) drilling gave rise to the production of shale oil in the 2000s by allowing for the capture of oil trapped within layers of rock. In the wake of the two oil crises of the 1970s, which dramatically increased oil prices, successive

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