HOW COSTLY IS CHINA'S OIL IMPORT? WELFARE LOSS ESTIMATION OF FOREIGN OIL DEPENDENCE 2001–2015

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Overview

As China's relationship with the international oil markets has changed and oil imports have risen, so has the country's preoccupation with energy security. If the supply disrupts suddenly, due to economic, political, military or any other unpredictable reasons, there would be a huge cost because of the oil dependence. In the years 1994 to 1999, energy security featured in just 41 articles; for the period 2006 to 2010, the number was 1435 (Leung, 2011). The Chinese government has also encouraged the state-owned oil companies to make overseas investment to enforce the diversity and enhance the cooperation with foreign oil suppliers. Yet despite this rising level of engagement, it has remained difficult for policymakers to put forward coherent and coordinated policies due to a lack of objective, quantitative data on the effect of China's energy security (or lack thereof) on its economy. This is because the enterprise, as a profit-driven entity, make decisions based on the business basis of whether the investment is economically profitable, while the social welfare aspect is often ignored. Currently one significant obstacle to prevent government to impose an appropriate stimulus is that the welfare gains or losses associated with oil insecurity are unaware of. Only after the potential cost that foreign oil dependence is quantitatively measured, governments can make adequate energy policy decisions to enhance the general interest of the nation.

In this paper, we address a very simple component of this question in an attempt to begin furnishing China's policymakers with the data required for a robust policy response. What is the cost (or more specifically, the welfare loss) to China's economy of its oil imports? Following the definition adopted by Greene and Leiby (2006), the monetary metrics including transfer wealth, potential output loss, and disruption loss are calculated to represent the oil security cost of China, while the non-monetary metrics in terms of politic risk, strategic risk, and military cost have been excluded because they are difficult, if not impossible, to quantify. By focusing on the simplest factors in terms of monetary metrics, we attempt to provide preliminary but currently lacking policy implications for China's energy policy-making. The rest of this paper follows from this question as follows. In section 2 we assess the competing definitions and schemes for measuring energy security to provide context to China's current position. In section 3 we set out our method for defining and calculating welfare loss, and present the data sources. In section 4 we present the main data sources. In sections 5 and 6 we describe the analysis and results with policy implications. And the final section concludes.

Methods

Oil Security Metrics Model (OSMM). For Greene and Ahmad (2005), the economic costs to an economy resulting from the import of oil consist of three components, i.e., wealth transfer, potential output loss and disruption loss. In order to quantitatively evaluate energy security performance and provide concrete cost-benefit comparisons for policy making, this study focuses on the monetary metrics.

Results

This paper estimates the economic cost incurred by China's foreign oil dependence during 2001–2015. By categorizing the cost into three different welfare components, namely wealth transfer, potential output loss, and disruption loss, our results show the annual welfare loss is between $7.58 billion to $168.24 billion (constant 2000 US dollars), or equivalent to between 0.57% and 3.93% of China's GDP. Wealth transfer is the dominant component, contributing 71% of the cost during the whole research period. As a result of international oil price fluctuation, disruption loss contributes 22% of the welfare loss. The other 6% is attributable to the decline of China's potential output. Taking 2015 as the benchmark, sensitivity analyses show that international oil price change brings asymmetric impacts, i.e., a 10% rise of crude oil price rise will increase the cost by $4.08 billion while the same extent of price drop reduces the cost by $4.72 billion. Every barrel of additional domestic oil production reduces the welfare loss by $16.91, while the conservation of a barrel saves $20.50. Based on the results of this study, policy relevant insights are provided with respect to supply side, demand side, and market power positioning.

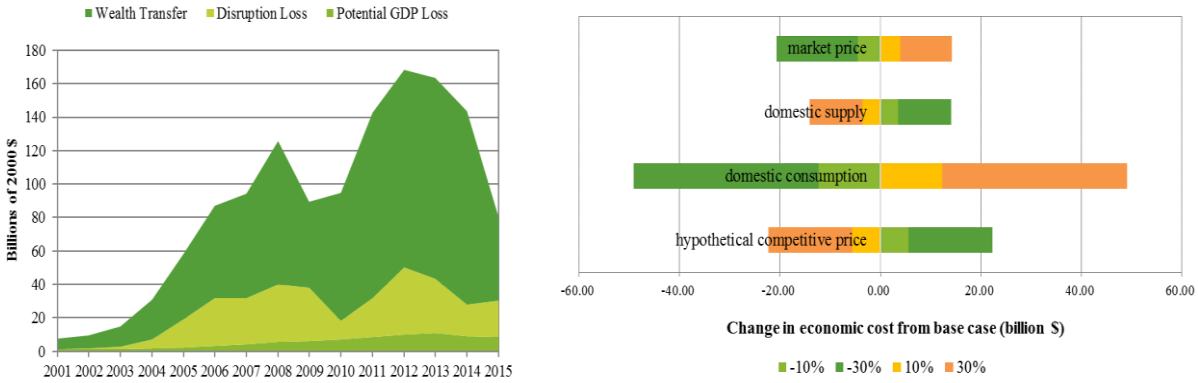

Figure 1. Welfare loss of China from oil import and senseitivity analysis results

Conclusions

These costs of foreign oil imports are not insignificant: during our study period, costs as a proportion of GDP reached almost 4%, and this despite the massive increase in China's GDP throughout the period. If policy makers are concerned by China's perceived energy security status, this study has given a clear quantification of the problem. Challenging China is the ageing nature of the country's conventional oil reserves, the difficulties still facing successful exploitation of the country's unconventional resources, and the continued growth in the economy and in oil demand. Government policies promoting energy efficiency and (in major cities) restricting car use, have helped to dampen the growth in oil demand, but it is likely that continued urbanization and improvements in the standard of living will see oil demand grow throughout the medium term. China's dependence upon foreign oil is not going away. Nonetheless, based on this paper we can present three sets of policy relevant insights based on supply side, demand side, and market power positioning.

Helping to prevent the adoption of costly policies was the main driver for this paper. By breaking down the different components of China's foreign oil dependence and attaching to each a clear dollar amount, we hope that China's policy makers can develop a better understanding of the true costs of importing oil. Reliable and accessible sources of oil are essential for the continued health and growth of China's (and the world's) economy. Where demand can be reduced, or alternative domestic supplies found that cost less than $17 a barrel to produce, this health can be maintained, but the bill can be reduced.

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