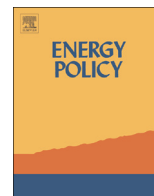




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## Energy Policy

journal homepage: [www.elsevier.com/locate/enpol](http://www.elsevier.com/locate/enpol)Macroeconomic impacts of oil price shocks in Asian economies<sup>☆</sup>Juncal Cunado<sup>a</sup>, Soojin Jo<sup>b,\*</sup>, Fernando Perez de Gracia<sup>a</sup><sup>a</sup> Universidad de Navarra, Department of Economics, Campus Universitario, 31080 Pamplona, Spain<sup>b</sup> Canadian Economic Analysis, Bank of Canada, 234 Laurier Avenue W., Ottawa, ON, Canada K1A 0G9

## HIGHLIGHTS

- We analyze the effects of three structural oil price shocks on Asian economies.
- Supply shocks have limited impact on the economic activity of Asian economies examined.
- Demand shocks due to economic activity boosts GDP of all economies.
- CPIs in India and Indonesia were only marginally affected by oil price shocks.
- Monetary and exchange rate tools help mitigating supply shocks in Korea and Japan.

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## ABSTRACT

This paper analyzes the macroeconomic impact of structural oil shocks in four of the top oil-consuming Asian economies, using a VAR model. We identify three different structural oil shocks via sign restrictions: an oil supply shock, an oil demand shock driven by global economic activity and an oil-specific demand shock. The main results suggest that economic activity and prices respond very differently to oil price shocks depending on their types. In particular, an oil supply shock has a limited impact, while a demand shock driven by global economic activity has a significant positive effect in all four Asian countries examined. Our finding also includes that policy tools such as interest rates and exchange rates help mitigating the effects of supply shocks in Japan and Korea; however, they can be more actively used in response to demands shocks.

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## 1. Introduction

A great number of studies have analyzed the relationship between oil prices and real economic activity since the seminal paper by Hamilton (1983), focusing on the recessionary effect of unexpected oil price increases (see Brown and Yücel (2002), Kilian (2008) and Hamilton (2008) for detailed surveys). Higher oil price

will have a negative effect on aggregate demand, as it redistributes income between net oil importing and exporting countries (Ftiti et al., 2014). A price increase will also be transmitted to a higher input cost for firms, reducing aggregate supply; consequently, the productivity of any given amount of capital and labor declines and potential output falls, a channel explored in depth in Ayres and Voudouris (2014). Recent studies also explore non-linearity in the oil price–economic activity relationship, such as Elder and Serletis (2010) and Jo (2014). One common feature in most previous studies is a focus on developed countries such as the United States and/or European countries, and relatively less attention has been paid to Asian economies despite their increasing importance in the oil market.

Nonetheless, the rise of Asia has been one of the most important global challenges for the world economy since the 1950s (Eichengreen et al., 2008). Asia's share of global GDP was around

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20% in the 1950s and will exceed 40% in the decade following 2030. According to the estimates of the [International Monetary Fund \(2010, 2012\)](#), Asia's share of the world economy is expected to be larger by 2030 than that of the US, European Union or the G-7. This increase has been followed by substantial growth in the demand for oil and other energy sources in these countries. Related to this point, the [BP Statistical Review of World Energy \(2012\)](#) reported that oil demand in the Organization for Economic Co-operation and Development (OECD) countries has decreased by 5.3% over the past five years, while demand in non-OECD countries has increased by 20.3%, driven primarily by China and other Asian economies. The growing relative importance of Asian economies in world oil demand supports the interest in investigating the impact of oil price changes on economic activity and consumer prices in Asian countries.

Hence, this paper analyzes the economic impact of oil price shocks on economic activity and prices in four Asian economies: Japan, Korea, India and Indonesia.<sup>1</sup> The main contribution of this paper is to exclusively examine Asian countries while distinguishing the effects of oil shocks according to their type, compared to the previous studies on Asian countries (e.g., [Abeyasinghe, 2001](#); [Cunado and Perez de Gracia, 2005](#); [Ran and Voon, 2012](#); [Le and Chang, 2013](#)). More precisely, we estimate a structural vector autoregressive (SVAR) model and distinguish between oil price innovations caused by (1) exogenous disruptions in the oil supply, (2) an increase in oil demand due to strong global economic activity, and (3) higher demand specifically for oil due to speculative or precautionary motives. In particular, we introduce sign restrictions on variables representing the global oil market to identify the structural shocks, and examine their effects on economic activity and the price level of each country.

Regarding the transmission of oil price shocks to each of the countries, the effect of oil price shocks on the economy is determined not only by the oil prices per se, but by the response of the monetary policy measures to the oil price shock ([Bernanke et al., 1997](#)). The same could happen if a government intervenes to counter-act the oil price change by manipulating the exchange rate and as a consequence, the shock the country experiences may have different final effects, compared to other countries in the world. Hence, we include the interest rates and exchange rates in our benchmark VAR model, which allows us to gauge the role of monetary and the exchange rate policies in stabilizing oil price impacts. Therefore, the results presented in this paper will further shed some lights on how successful the monetary and the exchange rate policies have been and in which case their usage can be improved to mitigate the macroeconomic impact of oil price shocks better.

Using data between 1997Q2 and 2014Q3, we find that unanticipated oil price increases of the same magnitude conditional on the source of a shock can result in distinct responses of economic activity and CPIs, extending the findings in [Kilian \(2009\)](#) to Asian economies. More specifically, we find limited impacts of an oil supply shock on the four Asian countries during the recent period, reflecting structural changes and strong rapid growth in economic fundamentals. On the contrary, all countries show notable positive responses of GDP to an oil demand shock driven by economic activity. Finally, the effects of an oil-specific demand shock depend on a country's position in the global oil market, with Indonesia, a previous net-oil exporter, being the only country with

mild but positive responses of GDP.

We also find differences in the monetary policy and exchange rate responses to oil price shocks among the analyzed Asian countries. For example, Japan and Korea's monetary and exchange rate policies are effective for further stabilizing the responses of GDP and CPI to an oil supply shock. However, interest rates and exchange rates do not have a material impact on stabilizing the responses of CPI in India and Indonesia, possibly dominated by the effects of the energy price regulation and government subsidization. Our findings also emphasize that the source of an oil price change must be considered for a more relevant and effective implementation of monetary and exchange rate policies.

The remainder of the paper is organized as follows. In [Section 2](#) we review the economic literature on the macroeconomy and oil price relationship for Asian economies. [Section 2](#) also outlines the econometric methodology as well as the identification strategy and covers the data set used in the empirical analysis. [Section 3](#) provides the main results of the empirical analysis. [Section 4](#) introduces policy implications derived from our results. Finally, [Section 5](#) presents some concluding remarks.

## 2. Related literature and methodology

### 2.1. Review of literature on oil shocks in Asian countries

Among Asian economies, Japan is the country that has been most extensively studied. [Burbidge and Harrison \(1984\)](#) estimate a VAR model for five OECD economies including Japan. They find that the price of oil exerts a smaller influence both on the price level and the industrial production index than it does in the US economy. [Zhang \(2008\)](#) provides evidence that oil price changes and economic growth in Japan appear to have a nonlinear relationship. More recently, [Jimenez-Rodriguez and Sanchez \(2012\)](#) find that oil price shocks generate a decrease in industrial production in Japan, while resulting in higher inflation rates. Most other papers conduct a case study of Japan as included in the panel of the G-7 countries or in comparison with the US, rather than focusing on the Asian countries at large (see, for example, [Hutchison, 1993](#); [Engemann et al., 2011](#); [Baumeister et al., 2010](#); [Peersman and Van Robays, 2012](#)).

Few studies focus exclusively on Asian economies. For example, [Abeyasinghe \(2001\)](#) studies ten Asian economies (Indonesia, Malaysia, Philippines, Thailand, Hong Kong, South Korea, Singapore, Taiwan, China, Japan) and the US, and finds that even the net oil exporters such as Indonesia and Malaysia cannot escape from the negative influence of high oil prices. Although oil price increases have a direct positive impact on economic activity for these two oil exporting countries, he finds that the long-run effect (including the indirect effects of oil prices through their trading partners) is negative. [Cunado and Perez de Gracia \(2005\)](#) analyze the oil price-macroeconomy relationship of six Asian economies (Japan, Malaysia, Philippines, Singapore, South Korea and Thailand), and find that oil prices have a significant effect on both economic activity and prices, although the impact is limited to the short run and dependent upon the oil importing or exporting status of the countries. Interestingly, the relationship becomes more significant when oil price is defined in local currencies. [Ran and Voon \(2012\)](#) find that oil prices do not have a significant impact on real economic activity in Hong Kong, Singapore, South Korea and Taiwan. Rather, they detect positive significant effects on unemployment rates and significant contemporaneous effects on CPIs.

[Lee and Song \(2009\)](#) investigate the nature of oil price shocks to the Korean economy and find that the recent hikes in oil price are induced by the increase in oil demand, in contrast to previous years when oil price run-ups were mostly from supply disruptions.

<sup>1</sup> It is well known that China's rapidly increasing oil demand is greatly affecting the world oil price (see, for example, [Hamilton, 2008](#)). However, we do not include China in our benchmark sample of Asian economies due to the identification scheme employed for our benchmark VAR, which is detailed below. Nonetheless, due to its importance in the global crude oil market, we conduct an analysis for China in [Section 3.5](#).

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