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Pass-through of crude oil prices at different stages in Turkey☆,☆☆

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ABSTRACT

This paper examines the degree of oil price pass-through to domestic prices at different stages of supply chain in Turkey. Our results, based on vector autoregressive models, point out that the pass-through to domestic motor fuel prices is considerably fast as expected and just one third of a change in crude oil prices is reflected to the motor fuel prices due to the high share of taxes on retail prices. On the other hand, it is shown that impact of oil prices on transport services takes a longer time compared to other domestic prices. Over the 2004–2014 period, estimates suggest that a 10% permanent change in the international crude oil prices is associated with a 0.42 percentage points change in consumer inflation at the end of one year. The final accumulated pass-through to consumer inflation reaches 0.50 percentage points. Moreover, the pass-through to producer prices is nearly twice as much as that to consumer prices. Findings also provide some evidence for a strengthening in oil price pass-through to consumer inflation over time, which might reflect the growing natural gas intensity of the economy.

1. Introduction

Oil prices have declined prominently since June 2014 after hovering around $110 per barrel from early 2011 to first half of 2014 (Fig. 1). Baffes et al. (2015) called this sharp decline as “the great plunge” as oil prices have nearly halved since mid-2014.[1] Given that the past oil price declines are associated with the slowdown in inflation rates, this severe drop in oil prices has once again raised the interest in the impact of oil prices on consumer inflation. Understanding this connection is crucial for the implementation of monetary policy as the authorities form their policies according to the future course of inflation. For this purpose, this study estimates the pass-through of crude oil prices at different stages of supply chain including import, producer, and consumer prices.

Many studies in the literature point out to a limited or negligible impact of oil prices on inflation. Besides, they document a decline in the pass-through over time, which appears to be a common phenomenon especially for industrialized economies. Hooker (2002) finds that oil price changes have a significant impact on U.S. core inflation before 1981 but little or no pass-through since that time. Blanchard and Gali (2007) document that oil price shocks have smaller effects on prices for six major economies. Possible causes could be a decrease in real wage rigidities, the increased credibility of monetary policy, and simply the reduced oil dependence of production and consumption. Chen (2009) investigates the pass-through for 19 industrialized countries and presents a diminishing effect of oil shocks on inflation over time. Some potential explanations to this weakening in the inflationary effect of oil prices include appreciation of the domestic currency, a more active monetary policy in response to inflation and a higher degree of trade openness. Limited impact of oil prices on inflation is also documented in Alvarez et al. (2011) for Spain and Euro area. De Gregorio et al. (2007) present similar results not only for industrialized but also for emerging market economies though the fall in the average estimated pass-through is to a lesser extent in the latter.

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[1] Baffes et al. (2015) presents a comprehensive assessment of this sharp drop in oil prices involving causes and possible consequences. They put forward the following factors for this severe fall: several years of upward surprises in the production of unconventional oil; weakening global demand; a significant shift in OPEC policy; unwinding of some geopolitical risks; and an appreciation of the U.S. dollar. Among these, they express that “OPEC’s renouncement of price support and rapid expansion of oil supply from unconventional sources appear to have played a crucial role since mid-2014”.

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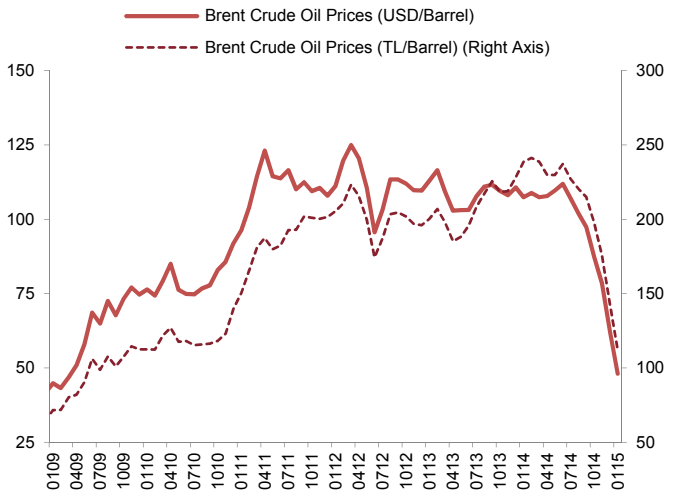

Fig. 1. Oil price developments.
Source: Bloomberg, CBRT.

They assert that the decline in oil pass-through is a generalized fact for a large set of countries.

For Turkey, Kibritçioğlu and Kibritçioğlu (1999), by utilizing a vector autoregression (VAR) methodology and the data between 1986:01 and 1998:03, obtain a subdued role for oil price pass-through to inflation. Berument and Taşçı (2002), using the 1990 input–output table, state that unless the second round effects appear, oil prices play a limited role on inflation under fixed nominal wages, profits, interest and rent earnings. On the other hand, a recent study by Dedeoğlu and Kaya (2014) claim the opposite and put forward that the oil pass-through to inflation has increased over time in Turkey. They argue that oil might be becoming more binding in the overall cost structure of the firms due to changes in the relative prices.

The aim of our paper is to analyze in detail the pass-through of oil prices to domestic prices at different stages of supply chain in Turkey and thus to present a clear understanding of oil price pass-through dynamics. Literature mostly focuses on the later stages of the distribution chain, namely pass-through to producer and consumer prices, whereas this paper, by examining the link between oil and import prices as well as motor fuel and transport service prices, also pays attention to the intermediate stages. Oil prices affect not only the consumer energy prices like motor fuels, but also other consumer goods and services prices such as transport services indirectly through production costs. Besides, indirect effects can also work through import prices (ECB, 2014). Specifically, to the extent that changes in international oil prices trigger a change in the output price of our trading partners, they also influence our domestic consumer inflation through the import price developments. Given that the import price pass-through is as critical as the exchange rate pass-through in Turkey (Kara and Öğünç, 2012), it is worthwhile to investigate the oil price pass-through to import prices as well.[2]

Turkey imports almost all of its oil supplies owing to limited oil reserves.[3] In 2014, oil imports are $ 16.1 billion, constituting approximately 6.6% of total imports. When it comes to total energy imports, these figures are $ 54.9 billion and 22.7%, respectively. Hence, the exchange rate developments are as important as crude oil prices in assessing the pressures on domestic energy prices. Another key factor effective in the repercussions of crude oil prices to domestic prices in Turkey is the tax burden on motor fuel products. As of November 2014, value added tax (VAT) and special consumption tax (SCT) on motor fuel products in all account for a substantial share (63%) of final consumer prices. This feature introduces a price smoothing mechanism for domestic motor fuel prices and restrains the impact of oil prices on domestic prices.

We use a vector autoregression setup to investigate the impact of changes in oil prices on various prices. We focus on the period after 2003 because of the structural change experienced in the Turkish economy following the 2001 crisis. Our main results can be summarized as follows: (i) VAR evidence suggests that crude oil price pass-through to import prices is around 32%, (ii) one third of the changes in oil prices pass into domestic motor fuel prices and most of the response occurs over the first two months, (iii) the emergence of the impact of oil prices on transport services take a long time compared to other domestic prices, (iv) a 10% increase in the international crude oil prices causes consumer inflation to go up by 0.42 percentage points at the end of one year, (v) the pass-through from oil prices to producer prices is about two times higher than that to consumer prices, (vi) the pass-through from oil prices to consumer inflation seems to have been strengthening over time. We argue that this finding might be mainly owing to the following features: the share of oil in consumer basket has risen over time, and much more importantly, the natural gas intensity of the economy specifically in electricity generation and industry sectors has been increasing.

The remainder of this paper has the following structure. Section 2 discusses the methodology together with data used in the paper. Section 3 presents the pass-through findings concerning the motor fuels, transport services, import, producer, and consumer prices. Final part of this section investigates whether there is any change in oil pass-through over time. Finally, some concluding remarks are put forward in the last section.

2. Methodology and the data

2.1. Methodology and the baseline Model

In order to investigate the pass-through effect, we use a monthly VAR model based on McCarthy (2006). He examines the impact of exchange rates and import prices on producer and consumer prices for 9 selected industrialized countries by estimating an eight-variable VAR model with the following ordering of the variables: oil price inflation denominated in local currency, output gap, nominal exchange rate, import price inflation, producer price (PPI) inflation, CPI inflation, short-term interest rate and money growth. Here, we use a similar set up to examine the pass-through of oil price fluctuations to domestic prices, which are motor fuel prices, transport services prices, import prices, producer and consumer prices, at different stages of the supply chain both via direct and indirect channels. For the structure of identification to be understood, the baseline model can be written as:

$$\Delta rp_t = E_{t-1}(\Delta rp_t) + \varepsilon_t^{rp} \quad (1)$$

$$\Delta e_t^b = E_{t-1}\left(\Delta e_t^b\right) + a_1\varepsilon_t^{rp} + \varepsilon_t^e \quad (2)$$

[2] Besides, Central Bank of the Republic of Turkey makes assumptions on import prices in its inflation reports. Thus, improving the understanding of oil price pass-through to import prices may also help when building up assumptions or scenarios.

[3] According to TPAC (2014), Turkey's total crude oil production averaged 48,000 barrels per day, whereas crude oil consumption was nearly 500,000 barrels per day in 2013. Therefore, more than 90% of crude oil consumption came from imports. As of 2013, Turkey's estimated proved oil reserves stand at 296 million barrels.