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Oil price effects on personal consumption expenditures

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ABSTRACT

This paper uses a logistic smooth transition model to examine the impact of rising oil prices on personal consumption expenditures in open and industrialized economies. The empirical results suggest a nonlinear and asymmetric relation between oil price changes and personal consumption expenditures. In particular, the effects of rising oil prices on personal consumption expenditures are greater than those of falling oil prices. While oil price changes affect personal consumption expenditures via real balance effects, smooth transition effects also come into play. Below a threshold value, an increase in oil prices reduces personal consumption expenditures. In other words, in the face of uncertainty regarding future oil prices, consumers initially rationally postpone spending. However, once oil prices above the threshold after a prolonged upward trend, the prices of domestic production factors rise. This fuels continued price hikes and further increases personal consumption expenditures until a cost-pushed inflation takes hold. Due to differences in economic developments and structures, the effects of rising oil prices vary from one country to another, with different countries usually to different monetary policies from each other. As a result, personal consumption expenditures also show various patterns across countries.

1. Introduction

Due to its strategic nature, crude oil has become a crucial commodity that has an impact on the global economy. Since oil plays such an important role in the economy, high oil prices influence the economy and the financial markets. Changes in oil prices further influence domestic inflation, economic growth, private consumption expenditure and other related issues; these subjects have received increasing attention from academic researchers (e.g. Hamilton (2008); He et al. (2010)).

We have experienced three major oil crises, and each of them had a major influence on the global economy. All three crises were a result of an imbalance in supply and demand. Rising oil prices cause an economic slowdown; this demonstrates that oil prices and economic growth are correlated. It is an issue of global significance. For highly industrial countries or economies reliant on imported oil, oil is an important factor for economic growth. A prolonged rise in oil prices leads to continued domestic price hikes and, hence, imported inflation. Meanwhile, the more open an economy is, the more easily imported inflation occurs. The G7 consists of the most industrially developed economies in the world. Any drastic changes in oil prices and the resultant temporary imbalance in demand and supply indicate a high probability of imported inflation for the industrial countries in need of large quantities of imported oil. Cost-pushed inflation occurs via cost transmission. This will impact macroeconomic activities, e.g., consumption and investment. It is worth investigating how factors such as oil output and oil price fluctuations affect the macro-economies of the G7. Hanabusa (2009) studies Japan, a country highly dependent on imported oil, and investigates the effects of oil price changes on macroeconomic activities. The result suggests that the high oil prices in 2004 had serious impacts on the Japanese economy. This demonstrates that oil price fluctuations and an energy shortage have significant effects on the macro-economy.

Mehra and Ptersen (2005) notice that there is a correlation between oil price and personal consumption expenditures. Oil price shocks delay expenditure by families and corporations and change potential expenditure and investment. Odusami (2010) suggests that a rise in oil prices reduces the percentage of personal consumption expenditures. In other words, a rise in oil prices means a rise in expenditure on oil products as a percentage of personal consumption. However, there is limited literature addressing the correlation between oil prices and personal consumption expenditures. This paper aims to fill this gap by investigating such a correlation.

As G7 countries are well-developed industrial economies, their demand for oil is large. Oil is a key element to industrial countries. The three major oil crises all resulted in severe consequences to many countries, demonstrating that oil price changes have a significant influence on personal consumption expenditures in the G7 economies. There is extensive literature addressing the impact of oil price changes to G7 economies, but the literature exploring the effects of oil price changes

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to personal consumption expenditures in the G7 is limited. For most developed countries, personal consumption accounts for more than 50% of GDP. Hence, it is worth discussing how wealth transfers and real balance effects affect personal consumption in the G7.

Mehra and Ptersen (2005) indicate that changes in oil prices have asymmetric influence on consumption expenditures via real balance effects, reallocations of capital and labor and wealth transfers, thus demonstrating that the relationship between oil prices and personal consumption is non-linear; there are threshold effects. The negative impact of an increase in oil prices is greater than the stimulus of economic growth as a result of a fall in oil prices.

This paper applies the panel smooth transition regression (PSTR) model developed by Gonzalez et al. (2005) to explore whether or not there are panel smooth transition effects with respect to the influence of oil price changes on personal consumption in the G7. The purpose is to examine whether or not that is the reason for a non-linear relationship between oil prices and personal consumption. This paper intends to examine whether or not the influence on personal consumption is additive or dilutive when the oil price falls below the threshold value. The paper also attempts to investigate whether or not there are structural changes to personal consumption when the oil price rises above the threshold value. Consumers develop expectations when oil prices move. If the government announces any information regarding any rise or fall of oil prices, consumers refer to such information and change their expenditure decisions accordingly. Hence, this paper refers to the oil price of one lag period as the threshold variable to explore the influence of oil price changes on personal consumption expenditures. However, oil price movement does not alter personal consumption expenditures in an instantaneous or dramatic manner. The changes in personal consumption expenditures happen in a slow and gradual manner. The asymmetric relationship between oil prices and personal consumption expenditures becomes even more pronounced via real balance effects and wealth transfers. Below the threshold value, a rise in oil prices delays personal consumption because consumers postpone expenditure rationally. Above the threshold value, a continued rise in oil prices will lead to imported inflation. The cost transmission orientation will trigger a cost-pushed inflation, similar to the case of classic supplies. As a result, adjusted personal consumption expenditures increase.

The remainder of this paper is organized into four sections. Section 2 provides a literature review. Section 3 describes the sample data and the methodology. Section 4 discusses the empirical results, and Section 5 concludes the study and presents a few implications that emerged from our findings.

2. Literature review

Regarding the correlation between economic growth and oil prices in G7 countries, Salman et al. (2008) find that oil price changes in the short run do not severely affect GDP in Italy, Japan and the UK. However, they have significant influence on GDP in other G7 countries, particularly France and Germany. This is in part due to the effectiveness of government policies in Italy, Japan and France regarding the mitigation of impacts of high oil prices. Lardic and Mignon (2008) use the asymmetric cointegration approach and argue that there is an asymmetric relationship between oil prices and economic activities in G7 and Europe.

Japan is the only Asian country in G7 and has limited energy assets. It relies heavily on imported oil. Unlike the US, which has rich resources, the economy of Japan is more prone to the effects of dramatic changes in oil prices. Hanabusa (2009) demonstrates that economic growth and oil prices influence each other. In Japan, oil prices are a good predicative value for economic growth. Changes in oil prices are a good indicator for the evaluation of the domestic economy in Japan.

There is extensive literature addressing the relationship between oil price changes and macroeconomic variables (Hanabusa 2009; Lardic and Mignon 2008; Odusami 2010; Salman et al., 2008). However, there are limited discussions about the impact of oil price changes on personal consumption as an element of GDP. Regarding the influence of oil price changes on personal consumption, Mehra and Ptersen (2005) apply the short-term consumption equation to analyze the relationship between oil prices and personal consumption in the USA. The study indicates that there is a non-linear relationship between oil price changes and real consumer expenditures. Rising oil prices create negative impacts on consumer expenditures, but falling oil prices do not result in any positive effects on consumer expenditures. The asymmetric effects are exacerbated along with an increase in consideration factors. The asymmetric relationship between oil prices and consumer expenditures becomes more pronounced via wealth transfers, real balance effects and reallocation of capital and labor. Through these three channels, rising oil prices reduce demand in the short run; as a result, consumer expenditures fall, and GDP growth declines.

Odusami (2010) analyzes the influence of oil price changes on the consumption–wealth ratio. Odusami believes that oil prices have strong predictability for the consumption–wealth ratio. In the face of oil price shocks, the US household consumption-to-wealth ratio displays a much smaller, more flexible and smooth range of fluctuations, compared to the past 30 years. Also, the short-term deviation of the consumption-wealth ratio can be explained by oil price fluctuations. This proves that oil prices are one of the important factors that influence consumer expenditures.

Bessec and Fouquau (2008) apply the threshold panel approach to investigate the relationship between electricity demand and temperature in European Union. The results show that the non-linear model is more pronounced in Southern Europe where the climate is relatively warm. The sensitivity of electricity demand to temperature becomes strong in summer when temperatures are on the rise. This finding can serve as a reference to policymakers in dealing with energy issues associated with global warming (rising temperatures).

Fouquau et al. (2009) take into account heterogeneity and time instability as the two factors to prove that the regime switching model is more appropriate than the quadratic polynomial model. On the basis of the panel threshold regression models, they infer the country specific and time-specific energy elasticity demand model and find that rising incomes lower elasticity. Bereau et al. (2010) apply the panel smooth transition error correction model to examine equilibrium value as nonlinear adjustments, a dynamic process, of real exchange rates. In the long-term convergence process, real exchange rates are linear in industrialized countries but nonlinear in emerging countries. The nonlinearity is even more pronounced when domestic currencies are overvalued or undervalued. Therefore, real exchange rates are not a key factor that results in global trade imbalances. Lee and Chiu (2011a) apply the nonlinear panel smooth transition regression model to validate the demand elasticity functions of 24 OECD countries in 1978–2004. They indicate that there is a significant and nonlinear relationship among electricity consumption, real incomes, electricity prices and temperatures. Meanwhile, electricity demand changes are one of the factors contributing to structural changes. Therefore, the structural changes resultant from the existence of threshold values of real incomes should be taken into account in the estimates and forecasts of electricity demands. They also suggest the OECD countries to formulate appropriate environmental policies to reduce greenhouse effects and mitigate global warming. Lee and Zeng (2011) adopt the quantile cointegration approach in the examination of the price relationship between the spot and futures oil prices of West Texas Intermediate in 1986–2009. The results indicate that quantile cointegration does exist in the relationship between spot and futures oil prices. Meanwhile, most of market participants focus on the spot market, rather than the futures market. This is why most results point out the effects of spots on futures. Lee and Chiu (2011b) argue that there is a substitute relationship between nuclear energy consumption and oil consumption in