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Retail fuel price adjustment in Germany: A threshold cointegration approach

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HIGHLIGHTS

- The paper examines the adjustment of German retail fuel (gasoline and diesel) prices to international crude oil price changes.
- An error correction model with threshold cointegration is used to investigate the price dynamics.
- The findings generally point to a competitive retail fuel pricing, notwithstanding the oligopolistic market structure.

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ABSTRACT

Consumers in Germany often complain that retail fuel prices usually adjust quickly to crude oil price increases than decreases and characterize this pricing pattern as market power exploitation. In this paper, we use both weekly national and daily city-specific (Berlin, Hamburg, Munich and Cologne) data to investigate the extent to which retail fuel prices in Germany adjust to changes in the international crude oil price. At the national level with weekly prices, we find positive asymmetries for both gasoline and diesel within the period 2003–2007, reflecting that retail prices react more swiftly to crude oil price increases than decreases. In contrast, for 2009–2013, we observe symmetric adjustment and negative asymmetry for retail diesel and gasoline prices, respectively. The city level analysis supports our findings in the latter time period. Thus, regulatory measures aimed at the retail fuel market over recent years seem to have been effective, and, contrary to consumers' perception, we find no evidence for excessive market power or collusion.

1. Introduction

Like in many other countries, retail fuel price fluctuations are a recurrent issue of broad public discourse and invoke sentimental concerns among motorists and politicians in Germany (OECD, 2013). These concerns are primarily borne out of the perception that oil companies collude in setting fuel prices at the pump and that fuel prices usually react swiftly to input cost (i.e. crude oil price) increases compared to cost reductions. As such, the typical complaints often reported in the press and also received by the German Cartel Office among others include the assertion that prices rise most often despite no change in crude oil price; that oil companies agree on retail prices and fuel prices are generally higher just before and during holiday periods (Bundeskartellamt, 2011).[1] Consequently, the retail fuel market in Germany is under suspicion of being cartelized, leading to calls for policy intervention.

Although the entire oil market is largely deregulated, the nature of the retail fuel market in Germany makes the claim of tacit collusion among the dominant players to some degree plausible, although outright market power seems very unlikely. The retail fuel market is composed of a few large oil firms and numerous small and medium sized traders. The five dominant players – BP, ConocoPhilipps, ExxonMobil, Shell, and Total – are active in all regional markets and together command a combined share of about 65% of annual national sales while the residual 35% is shared among the remaining firms some of which have regional and local prominence (Bundeskartellamt, 2011). This market structure in principle could induce price competition, given the homogeneity of retail fuel products. But again, the high market concentration and the vertically integrated nature of the dominant oligopolies with their nationwide network of fuel stations signal a shared common interest which could provide an impetus for coordinated pricing, price cycling patterns and an asymmetric pricing behavior.

Since gasoline and diesel constitute the main oil products in Germany, this paper re-visits the adjustment dynamics between

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[1] The topic of how upstream prices are passed through to consumers is regularly discussed in German media: see exemplarily the articles by Trauthig (2014), Basler (2012) and Rohwetter (2012) in online versions of German mainstream newspapers.

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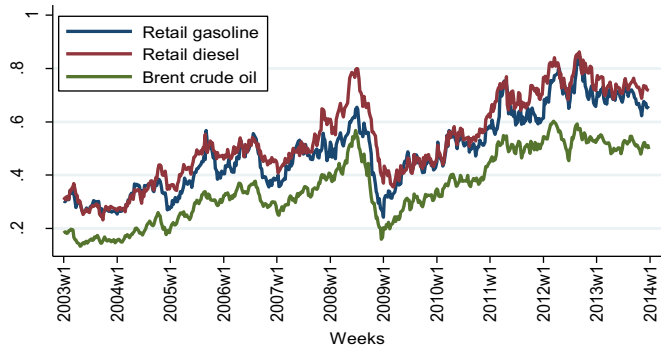

Fig. 1. Weekly retail fuel and crude oil prices (Euro/liter).

crude oil and retail gasoline/diesel prices (net of taxes) over different time periods. First, we use weekly data from January 2003 to December 2013 and distinguish between two sub-periods: 5 years before and after 2008. The choice of before and after 2008 hinges on the extreme fluctuations in crude oil and retail fuel prices that were observed during the 2008 economic crisis as shown in Fig. 1. Using the Zivot–Andrews unit root test (Zivot and Andrews, 2002), we examine whether these fluctuations could lead to structural breaks in the price series. The test results show the existence of structural breaks in the price series within the year 2008 (see Fig. A1). We therefore take out these extreme data points to avoid their potential influence on the entire dataset. The two periods therefore offer us the opportunity to compare whether the transmission mechanism for the two most important oil products in Germany has changed over the periods and most importantly after the 2008 crude oil price hikes.

Secondly, the German Federal Cartel Office (Bundeskartellamt) introduced a Market Transparency Unit in 2013 which makes it possible for consumers to gain information on fuel prices at the respective retail fuel outlets in real time.[2] As a result, we are able to compute average daily prices (net of taxes) per city from the prices reported by the oil companies and fuel station operators in the four largest cities (i.e., Berlin, Hamburg, Munich and Cologne). Again, we test the price transmission from daily spot crude oil price to retail fuel prices in these cities and compare the outcome with the national weekly data estimation results. The use of prices net of taxes is based on the broad acknowledgment that taxes make up a significant proportion of retail fuel prices and thus tend to affect the adjustment mechanism of fuel prices to fluctuations in crude oil price. We exploit a well-established two regime asymmetric error correction model (ECM) which incorporates threshold cointegration to investigate the underlying adjustment mechanisms.

Our main contributions to the current discussion on asymmetric price transmission with respect to Germany are in two folds: First, we provide more recent empirical evidence, given that the existing literature predates 2008. Second, all previous studies – except L'oeillet and Lantz (2009) – with reference to Germany use monthly data at the national level. Our analysis builds on previous studies by using not only weekly data at the national level but also city-specific daily data. Given that fuel prices at the pump changes several times within a given day, national monthly or even weekly data might fail to adequately capture potential adjustment mechanisms that may exist. The use of city-specific daily data thus adds to existing studies by reflecting city-specific effects, other spatial differences among various fuel markets as well as daily price volatilities.

Our findings differ for different periods, price pairs and cities. For the period 2003–2007, the national retail gasoline and diesel prices react more swiftly to crude oil price increases compared to equivalent crude oil price decreases. In contrast, the estimates show a negative asymmetric adjustment mechanism between 2009 and 2013 weekly retail gasoline and crude oil prices and a symmetric price transmission with respect to the relationship between retail diesel and crude oil prices.[3] At the city level, the findings to a larger extent suggest competitive pricing, albeit being characterized by different adjustment mechanisms. More specifically, we find symmetric adjustments in the case of gasoline prices in Hamburg and Cologne while estimates for diesel prices in Berlin and Munich reveal the existence of negative asymmetric price transmission.

The remaining part of the paper is organized as follows. We present a brief literature review of relevant studies in Section 2 and describe the data and econometric approach, i.e. threshold cointegration and its corresponding asymmetric error correction model in Section 3. In Section 4, we present our empirical results and draw our conclusions in Section 5.

2. Related literature on asymmetric price adjustment

Asymmetries in the adjustment of downstream prices to upstream price changes have extensively been investigated using different empirical models in a wide range of commodity markets (Frey and Manera, 2007; Meyer and Cramon-Taubadel, 2004). Asymmetric price transmission implies that some market participants are denied the potential benefits of price increases or decreases which they would have otherwise accrued sooner and/or at a greater magnitude under symmetry conditions. The alteration in the timing and magnitude of price changes has varied implications for the distribution of the associated welfare changes. Peltzman (2000) argues that asymmetric price transmission is prevalent in most commodity markets and also indicates that economic theory on the other hand "suggests no pervasive tendency for prices to respond faster to one kind of cost change than to another".

Although the empirical literature on asymmetric price transmission is extensive, the findings in most markets in different countries are inconclusive. In particular, not only is there no consensus on the existence of asymmetric price relationship between crude oil and retail fuel prices, but also the nature of asymmetry if it does exist. Empirical evidences in support of a quick transmission of increases in upstream fuel prices to retail prices as well as asymmetric response of pump prices to changes in crude oil prices have been established in different countries (e.g. Al-Gudhea et al., 2007; Balke et al., 1998; Galeotti et al., 2003; Valadkhani, 2013). Other studies, however, provide contrasting evidences and argue against the existence of asymmetric adjustment (e.g. Bachmeier and Griffin, 2003; Balaguer and Ripollés, 2012; Douglas, 2010; Honarvar, 2009; Liu et al., 2010).

A number of explanations have been offered in the literature to explain the underlining causes of asymmetric pricing behavior. Since asymmetric pricing most likely connotes a market structure which is hardly conducive for competition, market power

[2] Prior to any fuel price change, all the approximately 14,500 retail fuel stations across Germany are required to submit new prices to the Market Transparency Unit of the Federal Cartel Office. This information is passed onto all the consumer information service providers who then pass the price information to consumers via internet browsers or smart phone applications.

[3] Negative asymmetry indicates a rapid adjustment of price changes that increases the retail margin compared to a similar movement that squeezes it while positive asymmetry implies price changes that reduce the margin are transmitted swiftly or to a greater degree than the equivalent price change that increases it (Meyer and Cramon-Taubadel, 2004).