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"Asymmetric asymmetries" in Eurozone markets gasoline pricing

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ABSTRACT

Building on the well-established "rockets and feathers" literature and on the recently developed nonlinear autoregressive distributed lag (NARDL) modelling, we investigate the asymmetries in gasoline pricing in a comprehensive sample of monthly data from twelve Eurozone countries from 1999:1 to 2015:12. The empirical results feature two robust patterns. Firstly, while the effects of exchange rate variations display positive asymmetry (i.e., depreciations have a greater effect than appreciations), crude price variations induce negative asymmetry (i.e., reductions in the price of crude oil have a greater effect than price rises). Secondly, the positive asymmetry to exchange rate changes is stronger in core Eurozone countries. The negative asymmetry with respect to crude oil prices confirms the results of recent empirical research and theoretical models. The different behavior between Eurozone core and periphery provides further insights into the nature of pricing asymmetries.

1. Introduction

Gasoline prices have been the subject of numerous empirical studies, usually in one of the following categories (Eckert, 2013): crude oil or wholesale price pass-through; Edgeworth cycles; impacts of mergers or regulation and price dispersion; price differentials across individual stations. Regarding the first of these, on which this paper focuses, the pervasiveness of asymmetry in the gasoline market was recently documented by Perdiguero-García (2013) through an extensive meta-analysis. However, asymmetric price adjustment is not peculiar to the gasoline market: Peltzman (2000) studied 242 products (77 consumer goods and 165 producer goods) and found asymmetric price reaction for the majority of them; Frey and Manera (2007) conducted a meta-analysis on econometric models of asymmetric price transmission in different markets (gasoline, agriculture, food) and showed that only a small fraction of the models was without asymmetry.

There are several reasons why price asymmetries in the market of crude-derived fuels have received special attention: the importance of these products for the general public, the large swings experienced by crude oil prices in the last decade, and the policy implications of asymmetry. The widespread perception among the public at large is that asymmetry in

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gasoline pricing follows a "rockets and feathers" pattern (from Bacon (1991)), i.e., prices rise faster in response to cost increases than they fall in response to cost decreases (positive asymmetry). While the "rockets and feathers" hypothesis (RFH) finds some support in the empirical literature (Kristoufek & Lunackova, 2015), the evidence is actually quite "mixed and sometimes contradictory", as Contín-Pilart, Correljé, and Palacios (2009) put it, and it is fair to conclude that a consensus on the causes, size and sign of asymmetries in gasoline pricing has not been reached.

This also applies to the relatively under-investigated Eurozone gasoline markets, where some studies find that gasoline and diesel prices adjust symmetrically to cost shocks (e.g., Karagiannis, Panagopoulos, & Vlamis, 2014), while others find asymmetries of mixed sign.[1] However, these studies share a crucial feature with the previous literature, namely, they only admit asymmetric responses in the short-run. Neglect of long-run asymmetries amounts to imposing the untested assumption that long-run elasticities are equal for positive and negative shocks (a point already raised by Honarvar (2009)). More recent analyses of the US market resort to the asymmetric cointegration approach by Shin, Yu, and Greenwood-Nimmo (2014), that allows asymmetry both in short- and long-run responses. These studies find negative asymmetry with respect to crude price (e.g., Atil, Lahiani, & Mguyen, 2014). While disproving the RFH, this result is consistent with endogenous mark-up models à la Taylor (2000): the theoretical implication is that asymmetry does not arise from competitive behavior, as in Peltzman (2000), but is rather the consequence of oligopolistic market structure. Bagnai and Mongeau Ospina (2015) applied this method to the Italian gasoline market, disentangling the impact of crude price from that of the exchange rate. In their study "asymmetric asymmetries" emerge: while asymmetry to crude price (in USD) is confirmed to be *negative*, as in Atil et al. (2014), asymmetry to exchange rate variations is *positive*, i.e., gasoline prices in local currency respond more to national currency depreciation (namely, an increase in the domestic cost of foreign currency), than to appreciation.

Irrespective of its causes, the presence of "asymmetric asymmetry" suggests that the inconclusiveness of previous studies regarding Eurozone markets may depend on another source of bias. Indeed, a number of these studies express crude oil price and gasoline price in a common currency, be it local currency or USD, before analysis. In so doing, they force two different asymmetries to conflate in the same parameters, or, to put it in another way, they impose the untested hypothesis that the elasticities of gasoline price to crude price and exchange rate are equal, both in the short- and in the long-run.[2] This hypothesis only appears to be warranted in the long-run, and is disproved by studies on aggregate pass-through behavior, where the proxy of marginal costs is usually found not to have the same long-run coefficients as the exchange rate.

In order to assess the actual impact of these sources of misspecification on the analysis of gasoline pricing, a more extensive empirical study is needed. In this paper, we apply a recently proposed asymmetric cointegration estimator (Shin et al., 2014), separately considering the effects of changes in crude oil price and exchange rate on pre-tax retail gasoline price in twelve Eurozone countries, using monthly data from 1999:1 to 2015:12.[3] This allows us to verify whether negative asymmetry with respect to crude oil price is confirmed and to assess whether "asymmetric asymmetries" only feature in the Italian market or are a more widespread phenomenon. Moreover, since the Eurozone countries in general depend in a relatively similar way on foreign sources of fossil fuels,[4] but come from very different historical experiences, especially as far as inflation and the management of their previous national currencies are concerned, it is of some interest to investigate whether the pass-through from exchange rate to gasoline prices follows the same pattern in "strong" and "weak" Eurozone countries, or whether patterns emerge that could shed light on the role of consumers' perceptions of currency strength.

The remainder of the paper is structured as follows. Section 2 provides an overview of previous findings with a focus on European markets. Section 3 presents the data and methodology used to consider asymmetries. Section 4 gives the results, which are then discussed in Section 5. Finally, Section 6 concludes and draws some policy implications on the grounds of the paper's findings.

2. Evidence on European markets

Research on asymmetric gasoline price adjustment has mainly focused on the U.S. market. Relatively less attention has been dedicated to European countries, as can be inferred from the summaries in Kristoufek and Lunackova (2015) and Perdiguero-García (2013).

Table 1 summarizes previous results on asymmetric price adjustment in major European countries obtained by Galeotti, Lanza, and Manera (2003) and Grasso and Manera (2007). We focus on these studies because unlike most previous empirical literature on European markets (see footnote 2), they include both crude oil price and the USD/EUR exchange rate in their models, thus estimating separate elasticities for crude prices in USD and the USD/EUR exchange rate, and as such they provide results comparable to ours.

Table 1 shows that the estimates obtained in these studies are quite heterogeneous. The estimates by Galeotti et al. (2003) display asymmetries which arise from different responses to crude oil prices (except in Italy, where no price asymmetry is present) and, to some extent (in two out of four countries), to the error correction term. While asymmetry to

[1] A survey of the recent research is provided in Section 2.

[2] See e.g. Meyler (2009), Karagiannis et al. (2014), and Kristoufek and Lunackova (2015).

[3] We refer to the EA12 definition: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal and Spain.

[4] The percentage of imports of crude oil on total petroleum consumption in the EA-12 countries was on average 83% in the period 1994–2013 (calculation based on thousands of barrels per day obtained from the U.S. Energy Information Administration: http://www.eia.gov/countries/data.cfm).