

## A matter of ups and downs: the competitive assessment of fuel price dynamics

<sup>1</sup> See, for example, [http://afp.google.com/article/ALeqM5i6mVEiZ6\\_EKX-nmlD62UkJte6khw](http://afp.google.com/article/ALeqM5i6mVEiZ6_EKX-nmlD62UkJte6khw).

<sup>2</sup> The Authority issued its initial report on this matter – *Relatório da Autoridade da Concorrência sobre o Mercado dos Combustíveis em Portugal* – in June 2008. The results of its in-depth investigation – see *Análise Aprofundada sobre os Sectores dos Combustíveis Líquidos e do Gás Engarrafado em Portugal: Relatório Final* – were published in March 2009. For the ACP-commissioned legal opinion, see *Parecer: Concertação e Deficite de Concorrência no Mercado dos Combustíveis* (Automóvel Club de Portugal, October 2008).

<sup>3</sup> In Portugal, retail operators range from international ‘majors’ to small independents to supermarkets.

<sup>4</sup> Of course, OPEC, which brings together the countries controlling around 40% of the world’s crude oil supplies, is often regarded as the classic example of a legal cartel.

<sup>5</sup> RBB advised Galp and its legal advisers PLMJ during this process.

Whenever fuel prices increase markedly, accusations of anti-competitive conduct are almost sure to follow. Indeed, when automotive fuel prices scaled new highs during 2008, this was greeted with waves of protest around the world.<sup>1</sup> Portugal was no exception, with the Automobile Club of Portugal (‘the ACP’) declaring itself ‘convinced’ as to the anti-competitive nature of the price movements. Significantly, the Portuguese Autoridade da Concorrência (‘the Authority’) responded by initiating an in-depth investigation of the sector. In turn, this prompted the ACP to follow up on its claims with a legal opinion that set out its concerns in more formal terms.<sup>2</sup>

In this Brief, we use this episode to illustrate how economic analysis can help to distinguish between spurious and legitimate competition concerns. In particular, we examine the usefulness of formal econometric techniques, as deployed by the Authority, in testing competing claims.

### Identifying the source of concern

The nature of the concern regarding fuel pricing, and the analysis that is required to investigate it, depends on where along the supply chain that concern originates. If it arises at the retail level, attention is likely to focus on whether competition between the various petrol station operators is somehow being suppressed or otherwise distorted.<sup>3</sup> On the other hand, if the focus shifts further up the supply chain, it is likely to centre on whether retail competitors are able to obtain access to (wholesale) fuel supplies on competitive terms. Since Galp operates the only refineries in Portugal, attention would then focus on the terms on which Galp supplies its downstream rivals, and on the scope for imports to provide competitive alternatives. However, if Portuguese fuel price increases are driven by global forces, then Galp should be absolved from responsibility, as it is not in a position to influence these international processes.<sup>4</sup>

The AdC’s investigation centred on establishing the role of Portuguese influences in shaping retail prices. For its part, the ACP’s allegations were directed at wholesale activity in Portugal, and at Galp in particular.<sup>5</sup>

### Interpreting profit data

One source of complaint was the apparently positive relationship observed between fuel prices and oil company profits. In particular, the ACP legal opinion questioned the reasonableness of (retail) fuel price increases coinciding with increased supplier profits *and* higher underlying crude oil prices. In doing so, it highlighted the increased (global) profits earned by Galp and its leading Portuguese rivals – BP and Repsol – during the first part of 2008.

Clearly, increased profits could indicate the anti-competitive exercise of market power. But did the evidence that was presented by the ACP amount to something that the Portuguese authorities should have worried about?

The observed relationship between fuel prices and oil company profits cannot be interpreted without recognising the vertically integrated nature of the oil companies involved. Their activities range across the entire supply chain, from upstream exploration through to retailing activities. For the upstream exploration business, an increase in the global market price of crude oil means better selling terms. These are likely to translate into higher profits too, unless costs have increased by a corresponding amount. In contrast, for the downstream refining and retailing businesses, an increase in crude oil

prices represents an increase in the cost of an essential input. This will typically imply a reduction in downstream profitability. (The scale of this will depend on the extent to which pass-through of increased costs into prices would give rise to reductions in demand.) Both influences may coincide but yield a net overall increase in oil company profits.

A further source of confusion regarding downstream (i.e. refining and retailing) profitability stems from the accounting treatment of fuel stocks. Specifically, if market prices increase then the market value of any stocks of refined fuels will also increase. Stored fuel is therefore worth more when the price at which it can be sold rises. In this context, an increase in fuel prices would imply an upward revaluation of fuel stocks, which may show up in accounting terms as additional profit for the downstream business. However, this is simply a by-product of the interaction between normal price fluctuations and the application of accounting conventions. It does not imply that the underlying price movements are anti-competitive.

In fact, RBB's own analysis of the data reported by the ACP revealed that, after allowing for inventory effects, Galp's profits were actually lower in the first part of 2008 than the equivalent period in 2007. The profit decline was particularly marked in its refining and marketing, i.e. downstream, activities.

Of course, the ACP might have been trying to suggest that the integrated oil companies should have subsidised their retail supplies from any additional profits made upstream. That, however, would represent an abandonment of, rather than adherence to, competitive principles.

## The relevance of cost-based comparisons

The fundamental issue at hand is whether the observed movements in fuel prices were consistent with competitive fundamentals or were the result of anti-competitive conduct, notably at the Portuguese wholesale level. To address this issue, one needs a measure of how prices could have been expected to evolve under competitive conditions. Since the textbook economic models of competition suggest a close relationship between competitive prices and costs, one obvious candidate for such analysis would involve a comparison of prices with a suitable measure of those costs.

It might appear to be a relatively straightforward exercise to identify the costs associated with making supplies of particular fuels available to Portuguese wholesale customers. In essence, these costs are those associated with (1) obtaining the 'raw' crude oil from which finished petroleum products are derived, (2) undertaking the refining processes through which this transformation occurs, and (3) implementing the various logistical steps (storage, transportation, etc.) required to complete the relevant supply chain. However, there are both practical objections and objections of principle to this approach.

In practice, assigning an economically meaningful measure of cost to the supply of an individual refined fuel product is fraught with difficulty. The refining processes by which finished fuel products are obtained typically involve joint production of many different outputs. It follows that a significant proportion of the costs associated with these processes will be common to the production of multiple derivatives. With no economically meaningful way of associating a particular fraction of those common costs with the manufacture of any one fuel product, any economic assessment which depended on such an attribution would be entirely arbitrary.

More generally, even idealised textbook models of competition would only predict a link between prices and marginal costs at the industry level. Producers that are more efficient than the marginal firm in the industry can therefore expect to secure prices which are above their own marginal costs.<sup>6</sup> With liquid and competitive international markets for refined fuels available, international price benchmarks also provide a relevant indication of the economic cost to Galp of supplying a litre of fuel to a Portuguese customer, namely the opportunity cost of not selling that same volume internationally.

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Indeed, it is this uncoupling of the link between a firm's own costs and realised prices which provides that firm with the healthy incentive to cut costs. Efficiencies that are achieved relative to the competition do not translate automatically into corresponding reductions in price.

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The most relevant from a Portuguese perspective are those based on trades in North West Europe. Hence Platts CIF NWE price indices provided a relevant basis for analysis.

For all these reasons, comparison with refined fuel prices on the international markets is likely to provide a better measure of the competitiveness of Portuguese wholesale prices, and changes in those prices, than any measure derived directly from estimates of Galp's own costs. Platts, the leading energy market information provider, publishes regular indicators of relevant international prices for a range of different fuel products.<sup>7</sup> Comparisons of Galp's 'ex refinery' wholesale prices with those benchmarks, as reported by the Authority, indicate that they are aligned over time.

## Evaluating the responsiveness of prices

A further complaint that has often been made, and which was reiterated in the Portuguese context, is that fuel price adjustments are (i) slow and (ii) asymmetric. Most notably, even where it is accepted that movements in retail fuel prices ultimately reflect variations in crude oil prices, fuel suppliers are accused of responding more quickly to upward movements in crude oil prices than to reductions in those prices.

As the Authority itself notes, delays in adjustment to volatile price movements are not obviously a significant competition issue. While such lags will slow the retail price response to decreases in the underlying price of crude, they will also delay increases in retail prices following upward movements in crude prices. Unless there were to be a secular decline in crude prices, it is not obvious that consumers would be made systematically and significantly worse off as a result of these relatively short lags. Indeed, to the extent that such lags contribute to price-smoothing, they will insulate consumers from some of the underlying volatility in crude oil prices.

The ACP claimed evidence of '*asymmetrical developments in the prices of refined products during periods when crude oil prices were rising and falling*'. These claims appear to be based on data for just two relatively short periods in late summer 2008 when average Portuguese retail fuel prices increased despite contemporaneous falls in international crude oil prices, and on the observation that the 40% decline in crude oil prices observed between the July 2008 peak and mid-September 2008 was not reflected in equivalent changes in average retail prices for petrol and diesel over the same period.<sup>8</sup>

Fortunately, statistical methods exist which can provide an escape from such arbitrary comparisons, allowing any claims to be tested robustly. Laudably, the Authority showed itself willing to embrace these methods for its own appraisal of this matter.

## Econometric analysis

Among a number of studies that have deployed formal statistical techniques to examine fuel price adjustment asymmetries, the analysis (of US pricing relationships) undertaken by Borenstein, Cameron and Gilbert is, perhaps, the most widely cited.<sup>9</sup>

Borenstein et al. utilise a so-called error correction modelling framework. This approach postulates a long-term relationship between the variable of interest – the relevant automotive fuel price in our case – and one or more explanatory variables such as crude oil prices. It then considers what happens when that long-run relationship is subject to short-term perturbations. The error correction model describes the process of adjustment that takes place as long-run equilibrium is restored. The magnitude of the difference between the current price and its long-run 'equilibrium' value (the 'error') along with the 'speed of adjustment' – a measure of how quickly that error is eliminated – are taken to play a key role in this process. However, the modelling framework also allows for short-term dynamic effects to influence the adjustment path too.

It is possible to adapt the basic error correction model to capture asymmetries in the adjustment processes. Specifically, the model can allow for different responses to upward and downward shocks, for instance. Moreover, it can be applied to various links in the overall supply chain, to test for the exact origin of any asymmetry.

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Of course, even a systematic and symmetric lag in pricing responses will create such divergence at points where the movement in the crude oil price changes direction. The ACP did not consider the possibility of occasions when retail prices fell despite contemporaneous increases in the price of crude.

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Severin Borenstein, A. Colin Cameron, Richard Gilbert (1997): *Do Gasoline Prices Respond Asymmetrically to Crude Oil Price Changes*, The Quarterly Journal of Economics, Vol.112, No.1, pp.305–339.

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There were a number of small differences in the specifications of the Authority and RBB econometric models.

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The specific statistical processes involved imply that appropriate confidence intervals cannot be derived straightforwardly. However, RBB was able to use so-called 'bootstrap' methods to overcome this technical complication.

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Curiously, in its consideration of the amplitude of the responses, the Authority apparently did recognise these statistical issues and concluded that the differences in estimated effects should not be viewed as statistically meaningful.

The Authority followed Borenstein et al.'s methodology reasonably closely in carrying out its in-depth assessment of fuel price dynamics. In doing so, it analysed separately the links between (i) movements in the price of crude and in the Platts price indices for refined fuel products, (ii) the Platts prices and the corresponding retail prices (observed across a number of EU countries), and (iii) crude oil and retail prices directly. RBB undertook a very similar exercise too, focusing on the various links in the chain between crude oil and Portuguese retail prices.<sup>10</sup>

Both modelling exercises identified some differences in the transmission of positive and negative price shocks, both between crude and Platts prices, and between Platts prices and the corresponding retail prices. However, some variation of this sort is to be expected in any statistical analysis. Moreover, RBB's analysis suggested, if anything, that Portuguese retail prices responded more rapidly to decreases in the corresponding international benchmarks than to upward movements. Both studies also revealed at least as much variation in responses at the (competitive) international stages of the supply chain as within the Portuguese components.

In any event, the appropriate interpretation of these econometric results, as with any such analysis, depends on the statistical significance that can be assigned to those estimates. Specifically, it is essential to ascertain the statistical confidence with which any asymmetries that are observed can be attributed legitimately to fundamental differences in the upward and downward price responses, rather than simply to the effects of random disturbances in the data.<sup>11</sup> The Authority did not apply such statistical standards to all of its own analysis and, as a result, did not adopt an appropriate statistical interpretation of differences in the estimated rates of response to positive and negative price shocks.<sup>12</sup> RBB's analysis showed that the econometric results did not provide statistically meaningful support for the contention that Portuguese retail fuel prices respond more quickly to increases in crude oil prices than to decreases.

Ultimately, the Authority also decided that the evidence did not support an anti-competitive conclusion. It closed eight separate investigations into the automotive fuels sector as a result, ruling that no further action was required.

## Conclusions

Populist allegations of anti-competitive conduct routinely arise in high profile sectors whenever prices rise substantially, especially if these rises are perceived to coincide with increased profits. Often the basis of such allegations lies in some alleged asymmetry or anomaly in pricing behaviour. Fortunately, it is often possible to confirm or refute the substance of such allegations using economic methods, and econometric and statistical techniques can make a decisive contribution in this respect. The investigation of Portuguese petrol price dynamics shows the importance, nevertheless, of ensuring that every step of such analysis is undertaken rigorously, including testing the statistical significance of the results that are obtained.

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