Content:

Annex A: Description of data and spreads analysis

1. This annex has two parts:

   (a) Firstly, we set out the price and cost data we have obtained and describe the methodology used to calculate refining and retail spreads; and

   (b) Secondly, we present analysis of retail prices, and their components, including retail spreads and refining spreads.

Description of data

2. In this section we describe the price and cost data we have obtained, and outline the methodology for calculating refining and retail spreads.

Price data

3. In this section we outline two sets of pricing data we have obtained: average retail petrol and diesel prices across the UK, and retail petrol and diesel prices at each pump in the UK.

Average UK petrol and diesel prices

4. BEIS publishes road fuel price statistics containing weekly UK retail 'pump' prices for petrol and diesel.[1] Petrol and diesel retail prices are collected on a weekly basis (for each Monday). The retail prices are calculated from weekly data submitted by six companies (four oil companies and two supermarkets)[2] which jointly cover around 65% of the market. The BEIS petrol and diesel retail prices are weighted averages of the average prices submitted by the six companies, with weights determined by annual sales. BEIS data is available for the period 9 June 2003 to 31 October 2022 (inclusive).

Petrol and diesel prices at each pump

5. In addition to the retail prices published by BEIS, we also acquired retail price data from Experian. Experian stated there are around 8,350 open sites in the UK currently. On average, 85% of these sites reported price each week, which represents around 97% of the fuel volume in the market. A total number

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[1] Weekly road fuel prices - GOV.UK (www.gov.uk).
[2] BEIS collects the average price across sites from each of the six companies (site-level data is not collected).

of 7,649[3] sites reported petrol and diesel prices in the Experian price dataset The CMA acquired Experian's price data on a twice-weekly basis (for each Wednesday and Saturday) over a five-year period between 3 June 2017 and 11 June 2022 (inclusive).

6. Experian pricing data is collected from transaction data made on Allstar Fuel cards. A price is reported when at least one Allstar Fuel card is used to purchase fuel at a particular site on a particular day. Experian use the most frequently reported price for that site for each day in the dataset.

7. We also obtained data from Experian on site characteristics, covering: site location information, location type,[4] brand, ownership type,[5] company owner, availability of shop, availability of carwash, and estimated average annual volumes. Experian's site characteristics data was provided on a quarterly basis, covering a five-year period between Q2 2017 and Q1 2022 (inclusive).[6] Experian collect and maintain data on all open sites in the UK.

Data on cost components

8. One of the principal factors driving the pump prices for petrol and diesel is the wholesale fuel price, which in turn, is dependent on:

   (a) the global price of crude oil, which is driven by supply and demand for crude oil;

   (b) oil refinery production and capacity;

   (c) the pound to dollar exchange rate, as crude oil and refined fuel is sold in US dollars;

   (d) biofuel prices and costs related to the Renewable Transport Fuel Obligation;

   (e) distribution costs; and

   (f) the margins that refiners and wholesalers make.

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[3] Note, Experian price data contains 7,649 sites. We removed 5 sites as price was not reported on Wednesday or Saturday. We removed an additional 14 sites which were in the Isle of Man.
[4] Experian site data includes the following location types: industry/office, motorway, residential, rural, and urban transient.
[5] Experian site data uses the following ownership types: oil company, dealer, and supermarkets. Experian defined supermarkets to include Asda, Morrisons, Sainsbury's, Tesco, Co-op, and Food Store. The CMA reallocated Co-op and Food Store sites to a separate "not applicable" category to focus on the top four supermarkets in our analysis.
[6] We note the site data excludes the following period: Q2 2021 to Q4 2021.

9. In addition to the wholesale price, the level of, and changes in, pump prices are dependent on:

   (a) The fuel duty charged by the Government, currently 52.95p a litre;

   (b) VAT charged at the end of every forecourt fuel transaction, currently at 20%; and

   (c) the margins that fuel retailers make.

10. We have sought data on the underlying cost components for petrol and diesel in order to analyse and explain changes in prices at the pump. While we have obtained data on several input costs, it has not been possible to collect data for all of the components. We outline below the data which we have obtained, as well as cost components for which we don't have data and how these missing cost components may impact our calculations.

Crude oil

11. Petrol and diesel are made from crude oil. A high percentage of the global extraction of crude oil comes from USA, Saudi Arabia and Russia. It is an internationally traded commodity and thus has a global price.

12. We use the Brent 1-month daily price series from Bloomberg as a proxy for the cost of crude oil.[7] Brent crude is a sweet light crude oil that is extracted from the North Sea. It is used as an international benchmark for pricing crude. The 1-month refers to a crude contract that is bought to be delivered in a month's time, and this crude contract tends to be the most widely quoted price for crude.

13. We do a simple average of the daily prices to obtain the average weekly price of Brent crude, which is then converted from USD per barrel to pence per litre.[8]

Exchange rates

14. As some of the data we have obtained is priced in a different currency (for example, Brent crude oil is priced in USD), we have obtained daily spot

[7] The Bloomberg series code is CO1 Comdty. Data is available for weekdays only, including for Bank holidays where these fall on a weekday.
[8] We first convert from USD per barrel to £ per barrel using exchange rates published by the Bank of England (see paragraphs 14–15 for more details on the exchange rates used), and then from £ per barrel to pence per litre by multiplying the £ per barrel figure by 100/159.

exchange rates for USD into GBP and EUR into GBP from the Bank of England.[9]

15. Exchange rate data is available for weekdays only, excluding Bank holidays. We have calculated simple averages of the daily exchange rates to obtain the average weekly exchange rates which can then be applied to the weekly input prices.

CIF petrol and CIF diesel

16. Several fuel retailers have told us that their wholesale cost of goods for petrol and diesel are based on Platts benchmark prices. We have obtained the following data from Platts, as these benchmarks are most commonly used in contracts between wholesale suppliers and retailers:

    (a) For petrol we have obtained Gasoline 10ppmS CIF NWE Cargo ("CIF petrol"), and

    (b) For diesel we have obtained ULSD 10ppmS CIF NWE Basis UK Cargo ("CIF diesel").

    For both series, we have the daily[10] 'high', 'low' and 'close' amounts in USD per tonne, over the period 2 January 2015 to 31 August 2022.

17. We use the Platts 'close' prices for both petrol and diesel in our analysis, which we convert from USD per tonne to pence per litre using Bank of England exchange rates and conversion factors provided by Platts.[11] We do a simple average of the daily CIF 'close' prices to obtain the average weekly CIF prices of petrol and diesel.

Biofuel and Renewable Transport Fuel Obligation

18. Under the Renewable Transport Fuel Obligation (RTFO)[12] which commenced in April 2008, suppliers of relevant transport fuel in the UK must be able to show that a percentage of the fuel they supply comes from renewable and sustainable sources.[13]

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[9] Exchange rates | Bank of England.
[10] Working days only.
[11] The conversion factors are: 1 tonne = 1,324 litres for petrol and 1 tonne = 1,184 litres for diesel.
[12] Renewable Transport Fuel Obligation
[13] Fuel suppliers that supply at least 450,000 litres of this fuel per year are affected, and we expect this would cover the vast majority of suppliers that supply fuel to pumps, see Renewable Transport Fuel Obligation.

19. In order to meet the RTFO, biofuels are blended into petrol and diesel.[14] In order to price the biofuels component of road fuel, we use data on the price of ethanol for petrol and Fatty Acid Methyl Esters (FAME) for diesel.[15]

20. Under the RTFO the biofuel requirement in 2021 was 9.6% and in 2022 it is 11.1%,[16] however the actual proportion of biodiesel may be lower as some types of biodiesel can be double-counted for the RTFO.

21. We have obtained weekly price indices for ethanol and FAME from Bloomberg.[17] The ethanol index is provided in EUR per cubic metre and the FAME index is provided in USD per tonne. Both indices are available weekly for the period: week of 29 December 2014 until week of 17 October 2022. We have converted the indices I) from their original currencies to GBP using the Bank of England exchange rates described above and ii) from their original units to litres.[18]

22. Additionally, our estimates take into account the possibility that the 'blend wall'[19] for ethanol in UK specification petrol may be below the biofuel proportion required for compliance with the RTFO; and that consequently a supplier of petrol would need additional RTFO certificates (RTFCs) over and above those obtained from blending ethanol into petrol. Such additional RTFCs could be obtained by overachieving the RTFO on diesel or could be purchased from other suppliers.[20] Based on our understanding of the contracts between suppliers and retailers, we have calculated this additional cost as:

    (Required biofuel % under RTFO – Maximum ethanol % in petrol) x (Price of FAME – CIF diesel price)

23. For example, during the period January to August 2021, UK specification petrol (E5) had a maximum biofuel content of 5% while the RTFO required a 9.6% biofuel content. Our estimates for this period therefore assume a 5% ethanol content in petrol and an additional cost equal to 4.6% of the excess of the FAME price over the fossil diesel price. This is to reflect the cost of purchasing sufficient extra FAME to meet the RTFO on petrol as well as

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[14] Suppliers need an RTFO certificate (RTFC) for each litre of fossil fuel supplied. RTFCs are tradable and suppliers can also buy out the obligation at £0.50 per certificate.
[15] Biofuels are made from crops (such as corn) or biowaste (such as used cooking oil). Ethanol has about half the energy per mass of petrol, which means it takes twice as much ethanol to get the same energy.
[16] Prior to 2020, the RTFO biofuel requirement was lower than 9.6%.
[17] The ethanol index is Ethanol T2 Anhydrous 99.3-99.8% in Euros per cubic metre, Free On Board Rotterdam. The FAME index is for FAME zero conforming to EN14214 specifications with a guarantee of 0C Cold Flow Plugging Point (CFPP) in US dollars per Metric Tonne, Free on Board Antwerp/Rotterdam/Amsterdam.
[18] 1 tonne of FAME is assumed equivalent to 1,130 litres.
[19] The maximum proportion of ethanol in UK specification petrol.
[20] Another option would be for a supplier to use some ethanol manufactured from waste, which is double-counted for the RTFO.

diesel. E10 petrol was introduced in September 2021 and increased the biofuel 'blend wall' for standard grade petrol to 10% which is above the RTFO for 2021, so we do not include any additional cost for the period September-December 2021. However, in January 2022, the RTFO was increased to 11.1% so from this point the biofuel 'blend wall' for petrol is once again below the RTFO and from January 2022 we include an additional cost of 1.1% of the excess of the FAME price over the fossil diesel price.

24. The cost of ethanol and FAME have increased significantly since around 2020. This is driven primarily by sharp increases in prices of FAME[21] and Ethanol,[22] and to a lower extent by increased proportions of biofuels in petrol and diesel sold at the pump.

25. In addition to the cost of biofuels, there are some additional costs (including costs related to the requirement to use certain development fuels, and the Motor Fuel Greenhouse Gas Emissions Reporting Regulations prior to 2020) which retailers incur under the RTFO, and these have been incorporated into our analysis.

Calculation of spreads

26. Using data on average retail prices from BEIS and data on the cost components outlined above, we have calculated the spread between the CIF benchmark prices and the price of crude oil[23] (referred to as 'refining spread') as well as the spread between the net price (ie price at pump excluding VAT and fuel duty) and wholesale price (referred to as 'retail spread'). These are described in more detail below.

Refining spread

27. The refining spread is the spread between the CIF benchmark price and the price of crude oil, calculated for the amount of crude oil contained in 1 litre of petrol/diesel sold at the pump:

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[21] FAME is used not only as biofuel, but also as lubricant, fuel additive, coating, in metalworking fields, in cosmetics, and personal care products. The rising costs of vegetable raw materials and energy have been mentioned as the key drivers of increases in the price of FAME. For example, Biodiesel prices seen soaring further in 2022 : Biofuels Digest.

[22] Increases in the price of ethanol are mainly driven by supply factors (particularly the war between Russia and Ukraine) and increased demand. For example, Food vs fuel: Ukraine war sharpens debate on use of crops for energy | Financial Times (ft.com), and Faltering ethanol refiners switch to hand sanitiser | Financial Times (ft.com).

[23] Including the effect of exchange rate fluctuations.

(CIF benchmark price[24] – Price of crude oil[25]) x Proportion of ex-refinery product in 1L of end-product sold at the pump[26].

28. This is not a measure of refining margins for two principal reasons:

    (a) firstly, refining is a co-production system where a single input is used to create multiple outputs. Although it is possible to make small changes in the output mix produced by a refinery, it is not possible to only produce petrol or diesel from crude oil, and as such, a number of other products are always produced. These other products are also internationally traded commodities, some of which are worth substantially less than petrol or diesel; and

    (b) secondly, the refinery spread does not account for any operating costs that refineries face.

Retail spread

29. The retail spread is the difference between average fuel prices at the pump net of fuel duty and VAT, and an estimated wholesale price,[27] which is comprised of the benchmarked cost of diesel and petrol imported into the UK, and the cost of biofuel:

(Price at pump – Fuel duty – VAT) – (CIF benchmark cost[28, 29] + Cost of biofuel)

Estimated wholesale price

30. The retail spread broadly reflects retail and transportation costs as well as retailer profit and some costs that may be borne by wholesale suppliers (such as branding costs, see Section 7), and as such is not a measure of retail margins.

Analysis of retail prices and their components

31. In this section we present our analysis of retail prices, and their components, including refining spreads and retail spreads. We consider both current levels

[24] We use CIF petrol and CIF diesel prices provided by Platts.
[25] We use the Brent 1-month price provided by Bloomberg.
[26] This proportion is less than 1, and has been reducing over time from 0.9525 for both petrol and diesel pre-April 2018 to 0.9 for petrol and 0.889 for diesel from January 2022 due to the addition of biofuels to petrol and diesel sold at the pump.
[27] The actual wholesale price paid will vary by retailer due to differences between purchase contracts, including differences in lags between purchase and delivery.
[28] We use CIF petrol and CIF diesel prices provided by Platts.
[29] The CIF benchmark price is multiplied by the proportion of ex-refinery product in 1L of end-product sold at the pump to get the CIF benchmark cost.

of prices and spreads, as well as trends over time, and include some commentary on the possible explanations for observed levels and changes.

Retail prices

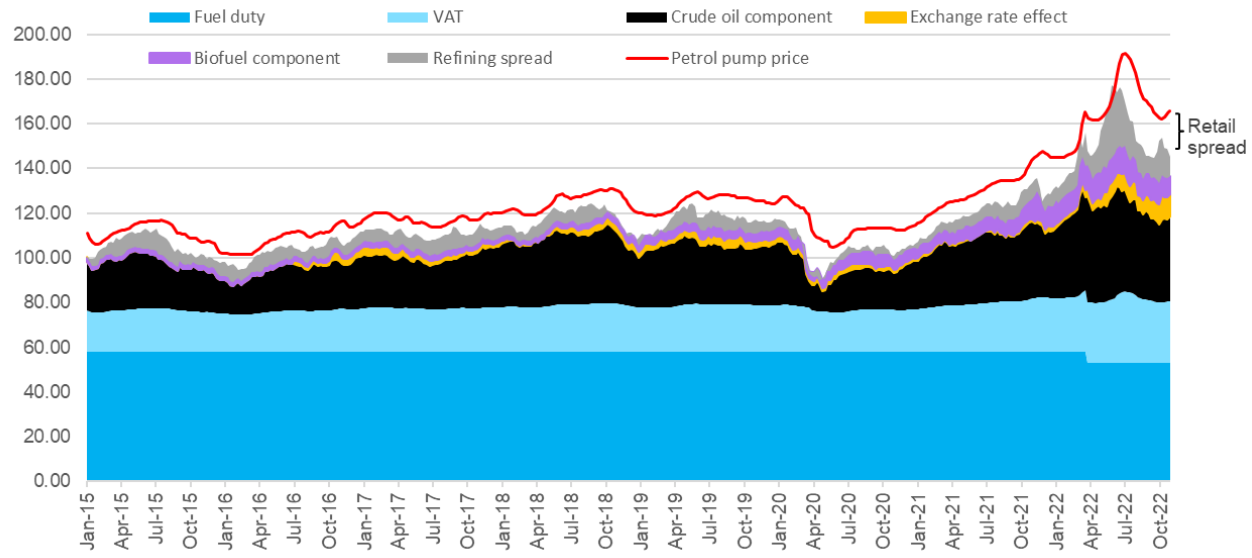
32. We looked at the levels of and trends in retail prices of petrol and diesel, and compared these to their components, as shown in Figures 1 and 2. The most significant components of retail prices are the cost of crude oil (and corresponding exchange rate fluctuation),[30] fuel duty and VAT. Of these, fuel duty has been set at 57.95 pence per litre in the period prior to March 2022, reducing to 52.95 pence per litre from March 2022, and as such, does not explain weekly variation in retail prices. VAT is a fixed percentage which is added onto the price at point of sale, and only varies in amount when there is variation in underlying costs.

33. Both petrol and diesel are derived from crude oil, and so variations in retail prices for both are explained to a great extent by changes in the cost of crude oil as well as exchange rate fluctuations. The price of crude oil is set globally, and UK refineries are thus price takers (see Section 6 for more details on the Refining sector). In addition, recent peaks in the price of crude oil have been exacerbated by the falling value of the British pound against the US dollar, which has further contributed to increasing retail prices.

34. Under the RTFO, the required percentage of fuel which comes from renewable and sustainable sources has been increasing over time. In addition, the prices of biofuels have shown greater fluctuation and have been on an increasing trend particularly since early 2020. This means that over the period since 2020 the cost of biofuels (and associated arbitrage and levies) have become a more significant component of the retail price for both petrol and diesel.

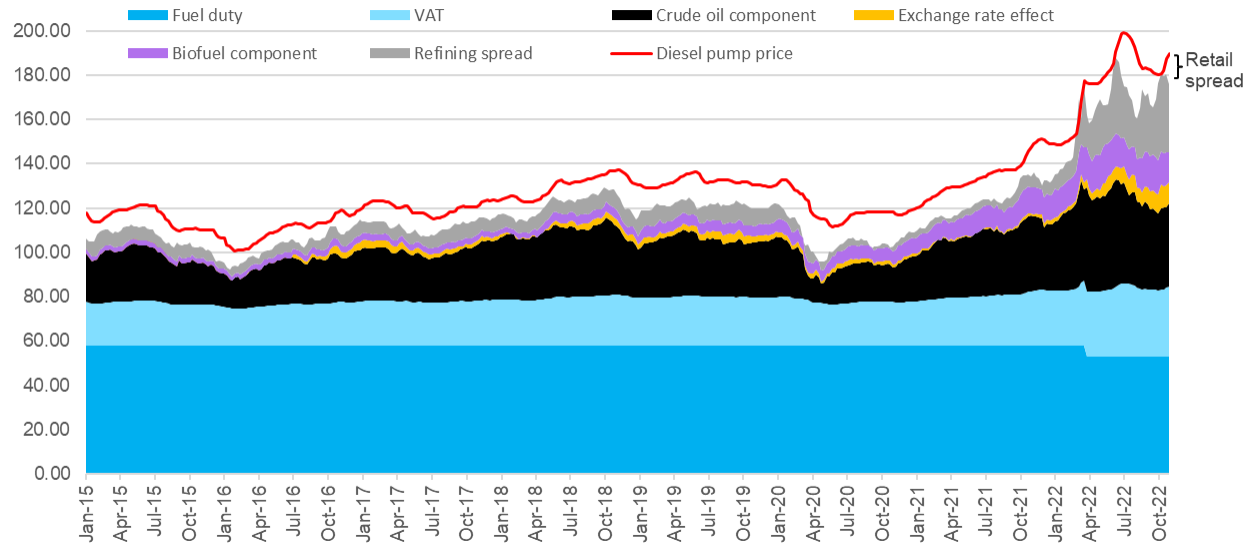
[30] Crude oil is priced in US dollars.

Figure 1: Petrol pump price with components, January 2015–October 2022 pence/litre



Source: BEIS, Platts, Bloomberg and Bank of England data, and CMA analysis.
Note: The exchange rate effect is calculated relative to 7 June 2021, and it is negative in some periods.

Figure 2: Diesel pump price with components, January 2015–October 2022 pence/litre



Source: BEIS, Platts, Bloomberg and Bank of England data, and CMA analysis.
Note: The exchange rate effect is calculated relative to 7 June 2021, and it is negative in some periods.

35. As shown in Figures 1 and 2 above, refining spreads increased to record levels in the first half of 2022 and then reduced at the start of August 2022. The refining spread for diesel has been climbing steeply in September and October 2022, reaching a new peak in mid-October and remaining elevated at the end of the month. On the other hand, the refining spread for petrol remained lower in September, then increased somewhat in mid-October before reducing at the end of the same month.

36. Retail spreads increased in the first half of 2020 which coincides with the covid lockdown and a significant fall in the price of crude oil. Since the end of 2021 there has been increased volatility in retail spreads, including periods of negative values as well as record highs.

37. Since the CMA published its Urgent Review, which included analysis of retail spreads up to, and including, the week of 27th June 2022, retail spreads have increased to record highs of around 30ppl for petrol and 31ppl for diesel at the start of August 2022. The retail spread for diesel fell in mid-October and then increased somewhat at the end of October, while the retail spread for petrol remained higher than that for diesel throughout September and October. Due to the high level of volatility currently it is impossible to say whether retail spreads will remain at these levels, increase or decrease in the weeks and months ahead.

38. We analyse refining and retail spreads in more detail below.

Refining spreads

39. The refining spread has been a relatively small component of the pump price, generally below 10 pence per litre in the majority of weeks over the period 2015–2019, as shown in Figure 3 below. Average refining spreads over the period 2015–2019 were around 5ppl for petrol and 6ppl for diesel.

40. Refining spreads were negative in some weeks: i) for petrol, in the period November 2018–February 2019, and again in the period March–April 2020, when spreads where negative for several weeks consecutively reaching lows of around -5 pence per litre, and ii) for diesel, in a couple of weeks in March and September of 2020. Average refining spreads in 2020 were lower, at around 1.5ppl for petrol and 3ppl for diesel.

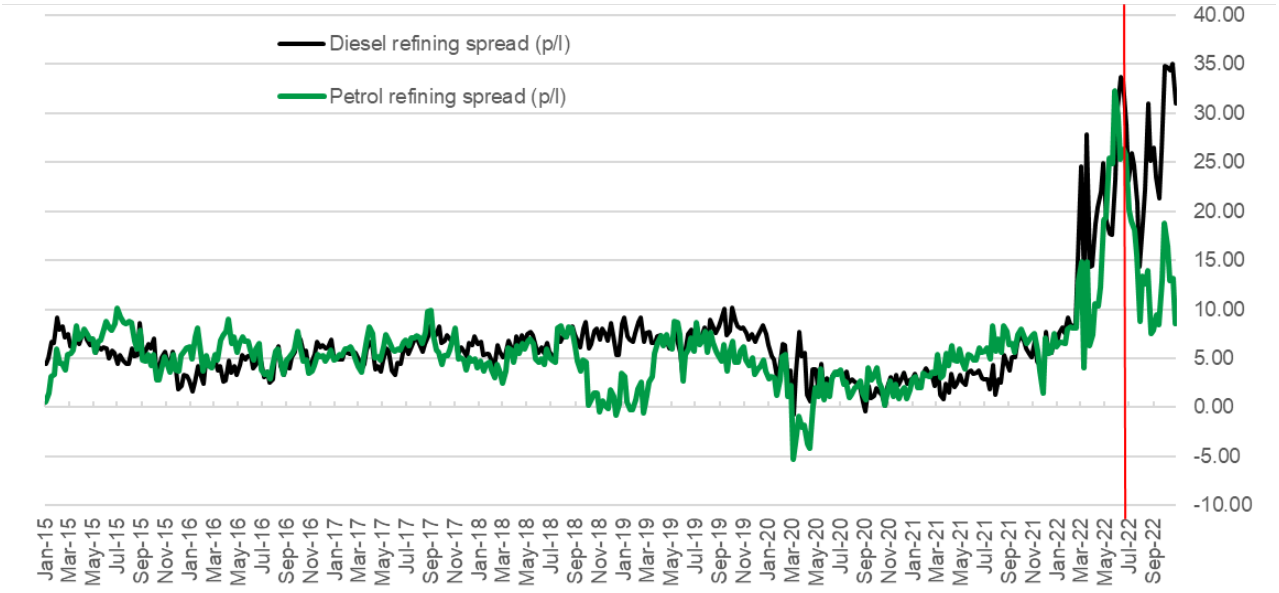
41. Spreads started recovering in the second half of 2021, and then increased to 32-33ppl in the first half of 2022. In the second half of 2022 spreads for petrol and diesel reduced to around 10-15 ppl at the start of August 2022 before diverging:

    (a) The refining spread for diesel has been climbing steeply in September and October 2022, reaching a peak of 35 ppl in mid-October and remaining above 30 ppl at the end of the month.[31]

[31] This may be driven by the ongoing supply crisis in the diesel market due to multiple factors, including higher seasonal demand (eg diesel is used for heating in winter) and reduced supply (eg western self-sanctions on Russian oil, refinery closures resulting from seasonal maintenance, and trade union strikes in French refineries). See for example: Parts of Europe are starting to run out of diesel, Bloomberg article, dated 27 October 2022, and

(b) On the other hand, the refining spread for petrol remained below 15 ppl in September, then increased to 19 ppl in mid-October before reducing below 10 ppl at the end of the same month.

Figure 3: Refining spreads for petrol and diesel, January 2015–October 2022, pence/litre



Source: BEIS, Platts, Bloomberg and Bank of England data, and CMA analysis.

42. As shown in Figure 3, refining spreads increased significantly, and have shown greater volatility since the start of 2022. This was due to several factors:

(a) Decrease in refining capacity in 2020/21 – the COVID-19 pandemic and associated lockdowns significantly decreased demand for refined products, with UK demand declining by around 30% between 2019/20 and 2020/21. The fall in demand caused a knock-on impact on refining capacity, leading to the closure or conversion of a number of refineries. In April 2022, the volume of global refining was around 5% lower than average pre-pandemic levels (78.1 million barrels per day, compared to 82.1 million barrels per day);[32]

(b) Demand recovery – the relaxation of covid restrictions has led to a surge in demand for refined petroleum. Although UK demand for petroleum products remains around one-fifth below 2019 levels, it has been recovering, with Q4 2021 demand for petroleum products up by 12% compared to Q4 2020.[33] Globally, oil demand is forecast to average 99.4

Diesel gas shortage: what stocks are impacted by a diesel gas shortage?, Forbes article, dated 6, November 2022.

[32] See for example: Explainer: why is there a worldwide oil-refining crunch? Reuters article, dated 22 June 2022.

[33] See for example: Energy Trends UK, April to June 2022, Statistical Release 29 September 2022.

million barrels per day in 2022, up 1.8 million barrels per day year-on-year;[34] and

(c) Russian invasion of Ukraine – Russia was the largest net exporter of refined petroleum, with net exports totalling $46.7bn in 2020, accounting for 10.6% of global exports.[35, 36] Following its invasion of Ukraine, sanctions have been imposed on Russia by a number of nations, or oil companies have self-sanctioned on purchasing oil products of Russian origin. This has significantly limited the supply and availability of Russian refined petroleum, including in the UK, US and member states of the EU. The International Energy Agency (IEA) estimates that oil exports from Russia have decreased by 2.5 million barrels per day, of which 40% is refined products.[37] For the UK, Russia was the second most important overseas source of refined petroleum products in 2021, and the most important source of diesel (accounting for 34% of imports and 20% of UK supply).[38]

Retail spreads

43. The retail spread has been a relatively small component of the pump price, ranging from 5 to 10 pence per litre in the majority of weeks over the period 2015–2019, and then increased significantly in the first half of 2020 (to over 25 ppl for petrol and over 20 ppl for diesel) coinciding with a significant drop in road fuel demand during the first the covid lockdown and a significant fall in the price of crude oil, as shown in Figure 4 below.

44. Since the end of 2021 there has been increased volatility in retail spreads, including periods of negative values as well as record highs. Retail spreads were negative in one to two weeks in February/March 2022 for both petrol and diesel which overlaps with Russia's invasion of Ukraine as well as the 5 pence reduction in fuel duty. The retail spread for petrol was negative in several consecutive weeks in May–June 2022 and there was a significant drop in the retail spread for diesel in June 2022.

45. Since the CMA published its Urgent Review, which included analysis of retail spreads up to, and including, the week of 27 June 2022, retail spreads have increased to record highs of around 30p/l for petrol and 31p/l for diesel at the start of August 2022. The retail spread for diesel fell to 0 ppl in mid-October

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[34] See for example: IEA Oil Market Report, May 2022.
[35] See for example: OEC Refined Petroleum, latest trends.
[36] Refined oil imports from Russia constituted 18% of total imports of refined oil into the UK in 2020 (OEC): OEC Refined Petroleum in the United Kingdom.
[37] IEA Oil Market Report, 16 March 2022.
[38] House of Commons Library, Imports of energy from Russia, Research Briefing 9523, 14 June 2022.

and then increased to 14 ppl at the end of October, while the retail spread for petrol fell to 9 ppl in mid-October and subsequently increased to 21 ppl at the end of the same month.

46. As defined in this report, the retail spread includes retail costs, retail margin and also transportation costs (see paragraphs 29-30). Retailers have told us that some of these elements have increased over the last few years, which could explain (some of) the observed increase in spreads. In particular, some retailers have told us that they have faced increases in downstream costs including:

    (a) distribution cost of fuel (mainly driven by driver shortages),[39, 40, 41, 42, 43, 44] and

    (b) labour and other forecourt operating costs, such as electricity.[45, 46, 47, 48]

47. One retailer also told us that it also faced significant one-off costs in 2021 and 2022 due to panic buying, supply disruptions (due to the impact of Russia/Ukraine war) and protestor activity across the UK.

[39] A retailer told us that the distribution cost of fuel has increased between FY 2019 and FY 2021, driven by increased labour costs due to driver supply shortages and increased wage demands from drivers.
[40] One retailer told us that delivery costs have changed over the last 5 years primarily due to fluctuations in the costs associated with delivery of fuel to PFSs, including increased costs associated with driver pay, cost of tankers, insurance, consumables (eg tyres), fuel and vehicle maintenance.
[41] One retailer told us that costs of road transport (ie fuel delivery) have increased by approximately 15% in the last five years, in part driven by driver shortages.
[42] A retailer told us that it has faced increased distribution and transport costs.
[43] A retailer told us that it faced increased costs due to driver shortages in the past 12 months which have increased fuel distribution costs.
[44] A retailer told us that they faced increased costs due to driver absences, this has pushed up the fees paid to subcontractors as well as wages.
[45] A retailer told us that since January 2020 it has seen fuel transport/distribution unit costs increase by over 11%, labour costs increase by over 13% and other forecourt operating costs, such as electricity increase by over 174%.
[46] A retailer told us that labour costs at sites have increased at a CAGR of [✂] from 2017 to 2021, with the risk of further increase in 2022.
[47] A retailer told us that one of the key drivers of the changes in retail fuel price over the past 5 years has been significant increase in the PFS site's operational costs.
[48] A retailer told us that few of the main drivers of price have been increased repair and maintenance costs and increased cost of utilities.

Figure 4: Retail spreads for petrol and diesel, January 2015–October 2022, pence/litre

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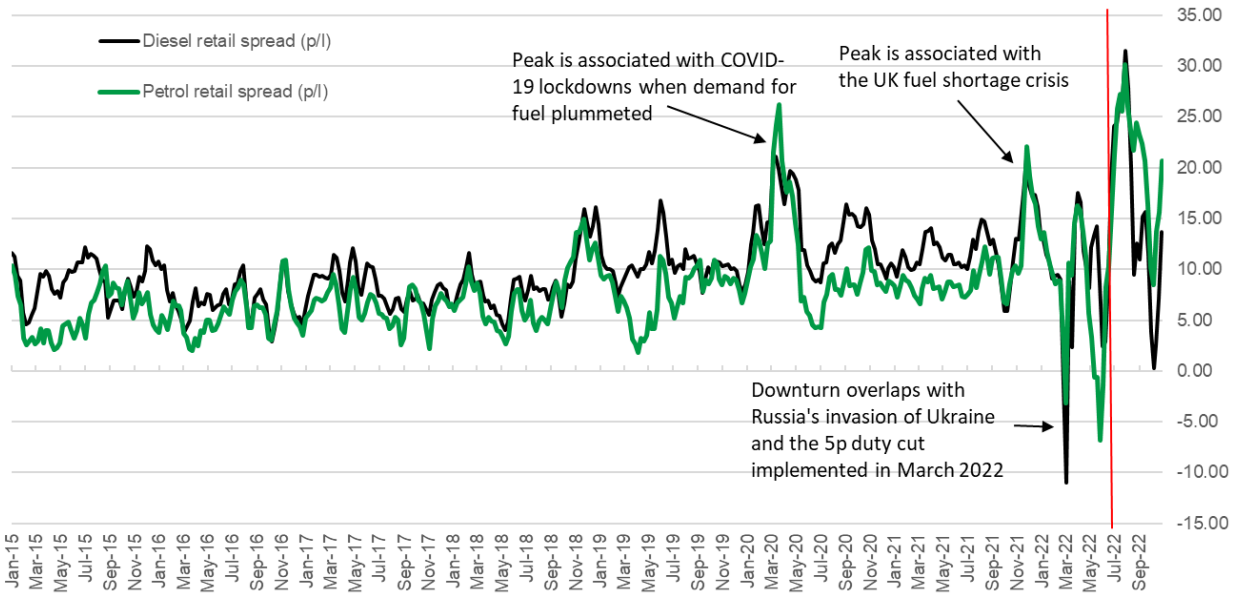
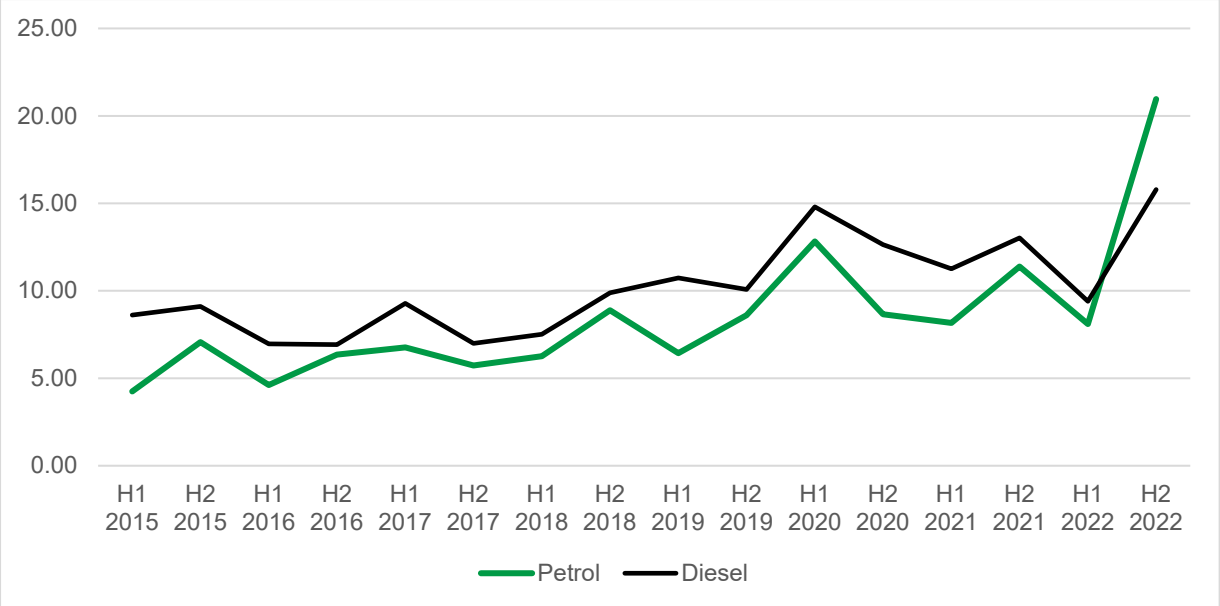


Source: BEIS, Platts, Bloomberg and Bank of England data, and CMA analysis.

48. Next we calculate six-monthly average retail spreads (as shown in Figure 5). By averaging the weekly spreads over a six-month period we can remove some of the volatility that may obscure medium and longer term trends.

Figure 5: Average half-yearly retail spreads for petrol and diesel, 2015–2022, pence/litre



Source: BEIS, Platts, Bloomberg and Bank of England data, and CMA analysis.
Note: Average retail spreads are calculated as a simple average of the weekly retail spreads in each half-year period. H2 2022 covers 18 weeks in July – October.

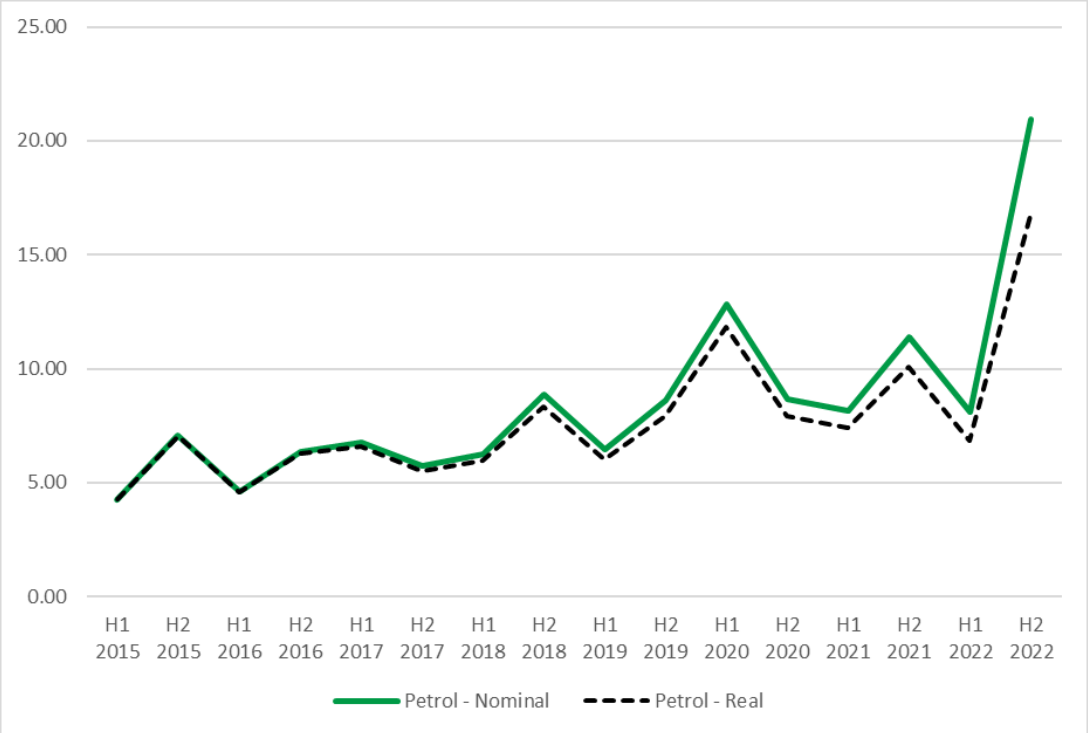
49. We can see from Figure 5 that here has been a general upward trend in average retail spreads over the period 2015 – 2022, though average retail spreads stagnated between H1 2020 and H1 2022. The upward trend over

time could be driven by either one or both of: i) increasing costs, such as costs of transporting fuel to PFSs that retailers face, and ii) increasing margins that retailers make.

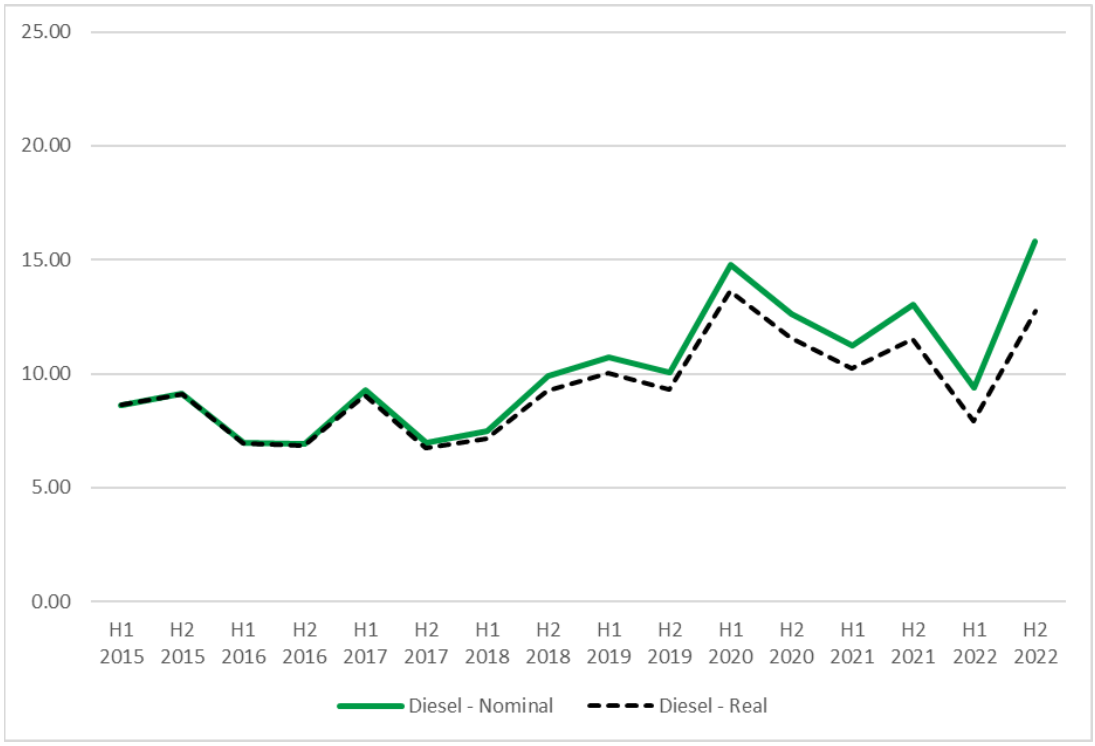
50. We would expect to see some upward trend in retail spreads over time as these are nominal pence per litre values, and will therefore increase over time due to inflation. We calculate estimates of retail spreads for petrol and diesel in real terms, by accounting for CPI.[49] Figure 6 shows a comparison of nominal and real retail spreads for petrol and diesel, and it shows that the impact of inflation was relatively low prior to 2021 when inflation was below 3% in each half-year period. Inflation increased in the second half of 2021 to almost 4%, and then to almost 8% in the first half of 2022, thus increasing the difference between the nominal and real retail spreads.

51. Inflation has remained high in the second half of 2022, thus further widening the gap between nominal and real retail spreads, with inflation accounting for 4ppl for petrol and 3ppl for diesel of the retail spreads in H2 2022, compared with a scenario where inflation was non-existent since H1 2015.

Figure 6: Comparison of nominal and real average half-yearly retail spreads for petrol (top) and diesel (bottom), 2015–2022, pence/litre



[49] Apart from the CPI index, there are other inflation measures, such as CPIH and RPI. In addition, inflation is constantly changing, while inflation indices are updated on a monthly basis. Therefore the retail spreads in real terms should be viewed as indicative.



Source: BEIS, Platts, Bloomberg, Bank of England and ONS data, and CMA analysis.
Note: Average retail spreads are calculated as a simple average of the weekly retail spreads in each half-year period. H2 2022 covers only 18 weeks in July-October. CPI index = 100 in April 2015.

Annex B: Passthrough of wholesale prices to retail prices

Introduction

1. This annex considers the speed at which changes in wholesale prices are passed through to retail consumers in the UK fuel market, and whether this varies for negative and positive changes in prices. The primary purpose of this analysis is to help interpret and feed into our analysis of retail competition.

2. More specifically, the objective of this analysis is to estimate the share of any change in wholesale prices that are passed through to retail prices over different time horizons. For example, if the wholesale price of a given fuel increases by 1p in a particular week, by how much can we expect the retail price to increase in that same week, one week later, two weeks later, and so on. This set of estimates is known as the 'impulse response function' (IRF). It is possible to estimate the impulse response function separately for positive and negative changes in wholesale prices. This enables us to test the hypothesis that positive changes in wholesale prices are passed through to retail customers more quickly than negative changes, a phenomenon often referred to as 'rocket and feather pricing'.

3. The following section of this annex explains how we estimate these IRFs, and the subsequent two sections summarise our results, based on national and site-level data respectively. We estimate IRFs both using national average prices, and for specific suppliers based on site-level data sourced from Experian. This enables us to evaluate the speed of passthrough for the market in general, and how it varies for different types of market participants.

Methodology

4. Impulse response functions are constructed by estimating the coefficients of an error correction model. An error correction model relates the change in retail prices observed for a given period to three groups of explanatory factors: changes in retail prices in previous periods; changes in wholesale prices in that period as well as previous periods; and an 'error correction term' which is the difference between retail prices and their equilibrium level observed in the previous period. This methodology was used by the OFT in its 2013 report, and by a range of academic studies on the topic including for

example Borenstein, Cameron and Gilbert (1997)[1] and Chesnes (2012).[2] This model takes the form:

$$\Delta Retail_t = \sum_{i=1}^{k} \beta_i^+ \Delta Retail_{t-i}^+ + \sum_{i=1}^{k} \beta_i^- \Delta Retail_{t-i}^- + \sum_{i=0}^{k} \gamma_i^+ \Delta Wholesale_{t-i}^+ + \sum_{i=0}^{k} \gamma_i^- \Delta Wholesale_{t-i}^- + \delta^+ z_{t-1}^+ + \delta^- z_{t-1}^- + \varepsilon_t \quad (1)$$

where:

$\Delta Retail_t$ is the change in retail prices observed for period t

$\Delta Wholesale_t$ is the change in wholesale prices observed for period t

z_t is the estimated error correction term for period t (this is defined below)

ε_t is the error term for period t

Lags are indexed by $i \in (1, \dots, k)$ and positive or negative values are distinguished using the suffix $+/-$.

5. The error correction terms (z_t) are the residuals of the following regression:

$$Retail_t = \theta_1 + \theta_2 Wholesale_t + z_t \quad (2)$$

6. If retail and wholesale prices are co-integrated – meaning that the residuals in this regression have a constant mean, constant variance, and covariance that depends only on the time distance between two variables – this regression provides a consistent estimate of the long run relationship between wholesale and retail prices. Intuitively, adding the error correction terms to the model captures the proposition that the market progressively reverts to its long-term equilibrium spread after cost shocks. Since this variable is stationary, it can be directly inserted into the primary model specification (1) above.

7. Each of the variables are reported in the model separately for positive and negative variations. This allows us to build two separate IRFs, for positive and negative changes in wholesale prices.

8. We use estimates of the parameters in the ECM to build the IRFs numerically. The procedure starts by assuming a 1p shock to the wholesale price, and then uses the coefficients from the ECM model to build the price response for

[1] Borenstein, Cameron, and Gilbert, 1997, 'Do Gasoline Prices Respond Asymmetrically to Crude Oil Price Changes?' Quarterly Journal of Economics, Vol. 112, No. 1, pp. 305-339.
[2] Chesnes, 2012, 'Asymmetric Pass-Through in U.S. Gasoline Prices,' U.S. Federal Trade Commission Bureau of Economics Working Paper No 302

that and subsequent periods, iteratively. We build two separate IRFs, one for a negative 1p shock and one for a positive 1p shock.

9. The parameters for the EC model are estimated with a degree of uncertainty, hence the IRFs (which are a function of the parameters) are also estimated with uncertainty. We use a parametric bootstrap procedure to quantify this uncertainty.[3] This allows us to build confidence intervals around IRFs, and also to rigorously test the hypothesis that positive and negative IRFs are different for each time period.

10. It is important to note that the model does not incorporate all possible determinants of retail fuel prices, such as inventory levels, refining capacity utilization, or variations in demand. It is possible that some of these unobserved determinants of retail prices are correlated with changes in wholesale prices (for example, if periods of low economic activity induce both low wholesale price and increased demand elasticity of consumers). If that is the case, then the results of this analysis do not have a causal interpretation. That is, they do not indicate the timing of passthrough that would obtain if wholesale prices were modified while holding all other aspects of the economic environment constant.

11. It should also be emphasised that this model essentially assumes that the market has a stable, 'steady-state' equilibrium over the whole period of analysis, and that market participants constantly revert to that equilibrium when subject to shocks in wholesale costs. This approach works well when the underlying state of the market (eg the nature of competition between retailers, the price-sensitivity of customers, the risk of a supply disruption, etc) remains fairly stable over the period of analysis. When this is not the case, the results can become less reliable and more difficult to interpret. This is relevant in our context because the descriptive analysis suggests that the spread between retail and wholesale prices have become more volatile over the past 6 months, such that it is not clear that the nature of competition was the same over the whole period of observation. One possible interpretation of these movements, discussed in Section 8, is that the increased risk of supply disruption upstream has led to a dampening of competition downstream.

12. We make two changes to our approach to mitigate this issue. Firstly, we estimate the model separately for two time periods: one including all the data in our sample (January 2015 to August 2022); and one excluding the more

[3] The parametric bootstrap relies on the property that the coefficients from the ECM are normally distributed asymptotically (ie when the sample size is large enough). The procedure works by taking 1000 draws from a multivariate normal distribution with a mean equal to the regression coefficients, and a variance-covariance matrix equal to that of these coefficients. The IRFs are then calculated for each draw. The confidence interval for each period is then constructed by taking the 5th and 95th percentile of that distribution.

recent data (related to the period after January 2022). Secondly, when we estimate the model over the whole period, we modify the model of long-term margin presented in (2) to add a variable that takes the value one for observations posterior to January 2022 (and zero otherwise). This allows equilibrium margins to differ for recent observations.

Results using national average prices

13. We start by applying this model to national averages of retail prices published by BEIS, and wholesale prices constructed using data from Platts (this data is described in Annex A). The data is available on a weekly basis from January 2015 to August 2022. We use a statistical procedure to inform the number of lags, which points to 5 lagged weeks as the optimal structure.[4]

14. We verify that retail and wholesale prices are cointegrated using the Engle-Granger co-integration test, we then proceed to construct the error correction terms and the lagged differences of retail and wholesale price.[5]

15. Tables 1 and 2 in the Appendix to this Annex present results from our regressions for petrol and diesel respectively.[6] We use these results to calculate IRFs for positive and negative shocks. The results are presented in Figure 1 below. In each chart, the continuous red line shows the response to a hypothetical 1p *increase* in wholesale prices in week 1, and the continuous blue line shows the response to a hypothetical 1p *decrease* in wholesale price in week 1.[7] For example, considering the chart in the top left quadrant (for diesel over the full period), our model suggests that retailers subject to a 1p shock in wholesale prices have changed retail prices by 0.2p after two weeks when the shock is negative, and by 0.55p when the shock is positive. The dotted lines show 95% confidence intervals, which capture the uncertainty around these central estimates. The confidence intervals tend to increase for longer time horizons.

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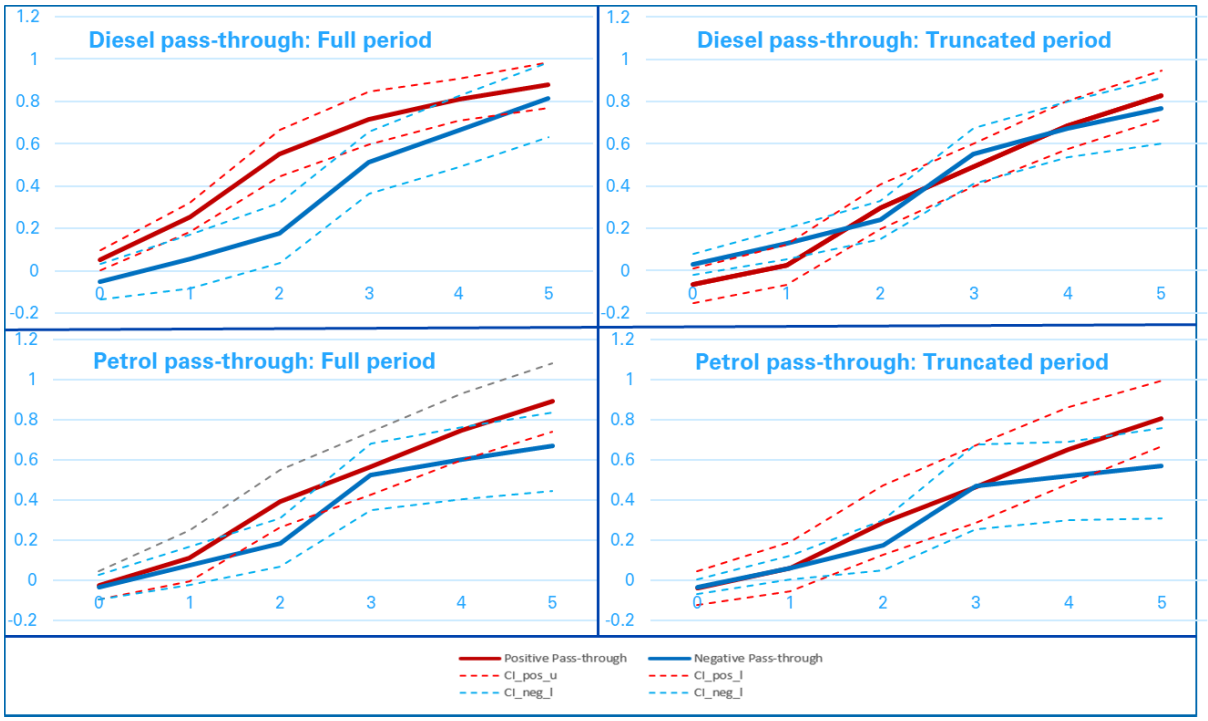
[4] This is because the Bayesian Information Criterion, a statistic that reflects the trade-off between the residual variance of a model and the number of its parameters, is minimised at 4 lags for diesel and 3 lags for petrol. Given that wholesale cost shocks take longer than 4 weeks to be passed on to retail prices, for reasons of simplicity and analysis, we present the analysis for 5 lags.

[5] Given that the two series are co-integrated, the constructed error correction terms and the lagged difference variables can be directly inserted into model specification (1).

[6] Some studies also assess whether the estimated pricing behaviour is consistent with the rockets and feathers hypothesis by comparing the coefficients on positive and negative changes for different lags and testing whether the difference is statistically significant using an F-test. We consider that it is better to test this hypothesis by comparing the values of the impulse response functions for positive and negative changes. This is because the share of a cost shock passed through to consumers in a given period depends not just on the regression coefficients for that period, but also on the coefficients for shorter lags. However, for completeness we present these F-test in the annex of this note.

[7] The negative IRF is negative (ie retailers respond to a reduction in wholesale price by reducing their retail prices), but to facilitate comparison between the negative and positive IRFs we present the absolute value of the negative IRF.

Figure 1: Impulse response functions for different specifications



Source: BEIS, Platts, Bloomberg and Bank of England data, and CMA analysis.
Note: The solid red and blue lines correspond to pass-through rates for a positive and negative cost shock respectively. The dotted red and blue lines are confidence intervals (at 95%) corresponding to the given pass-through line. In general, when the confidence intervals do not interact, we detect the presence of rocket and feathers.

16. Across all 4 graphs, we note that even after 5 weeks, all estimates of IRFs are below one. This means that, it takes more than 5 weeks for retailers to fully pass through the effect of price changes to customers.[8]

17. The IRFs estimated over the truncated period (excluding the period after January 2022) shows no clear evidence of rocket and feather pricing:

    (i) for diesel, the passthrough of positive and negative shocks is virtually identical;

    (ii) for petrol, the passthrough of positive shocks is slightly higher than that of negative shocks for some periods, but the difference is not statistically significant at a 5% confidence level.

18. When we include data from 2022 to estimate the model over the full time period, we find evidence of rocket and feather pricing, especially for diesel:

[8] The model assumes that shocks will be completely passed through after a sufficiently long period of time. However, because the confidence intervals around the IRFs widen for longer time horizons, we have not sought to estimate the shape of IRFs beyond 5 weeks or the exact time it takes for shocks to be fully passed through.

(i) for diesel, the passthrough of positive shocks is higher than that for negative shocks, and the difference is statistically significant for weeks 1 and 2 after the shock;

(ii) for petrol, the passthrough of positive shocks is also higher than that for negative shocks, but the difference is smaller and only significant for one week (and this depends on the threshold used).[9]

19. In summary, we do not see evidence of rocket and feather pricing when data for 2022 is excluded from our analysis. However, when this analysis is extended to recent periods characterised by high costs and price volatility, we do find evidence of rocket and feather pricing (and this evidence is strongest for diesel).

20. To further illustrate how the results vary with the time period considered, Figures 2 and 3 below plot the residuals from the model. These charts are obtained by estimating the error correction model over the truncated sample (ie excluding observations post January 2022), using the results to predict price changes for the whole period (ie including observations post January 2022), and evaluating the difference between predicted and observed price changes. For ease of interpretation, we use different colours to show residuals in periods where the predicted increase is positive or negative. Thus, a red dot above the zero horizontal line means that prices increased by more than predicted in that period, and a blue dot above the zero horizontal line means that prices decreased by less than predicted in that period.[10]

21. The larger residuals observed for the recent period are consistent with the proposition that pricing behaviour changed over that period. There are both larger increases (red dots above the zero line) and larger decreases (blue dots below the zero line). For diesel in particular, the chart shows that price increases vastly exceeded predicted amounts for two weeks in March. If these two weeks are removed from the sample, the differences between the positive and negative IRFs are no longer statistically significant. This shows that these results are very sensitive to the time period considered.

[9] The null hypothesis that the negative and positive IRFs are identical is rejected when we use a one-tailed test (where the alternative hypothesis is that the positive IRF is higher than the negative IRF) but not when we use a two-tailed test (where the alternative hypothesis is that the positive and negative IRFs are different).
[10] Conversely, a red dot below the zero horizontal line means that prices increased by less than predicted in that period, and a blue dot below the zero horizontal line means that prices decreased by more than predicted in that period.

Figure 2: Distribution of retail price residuals for petrol

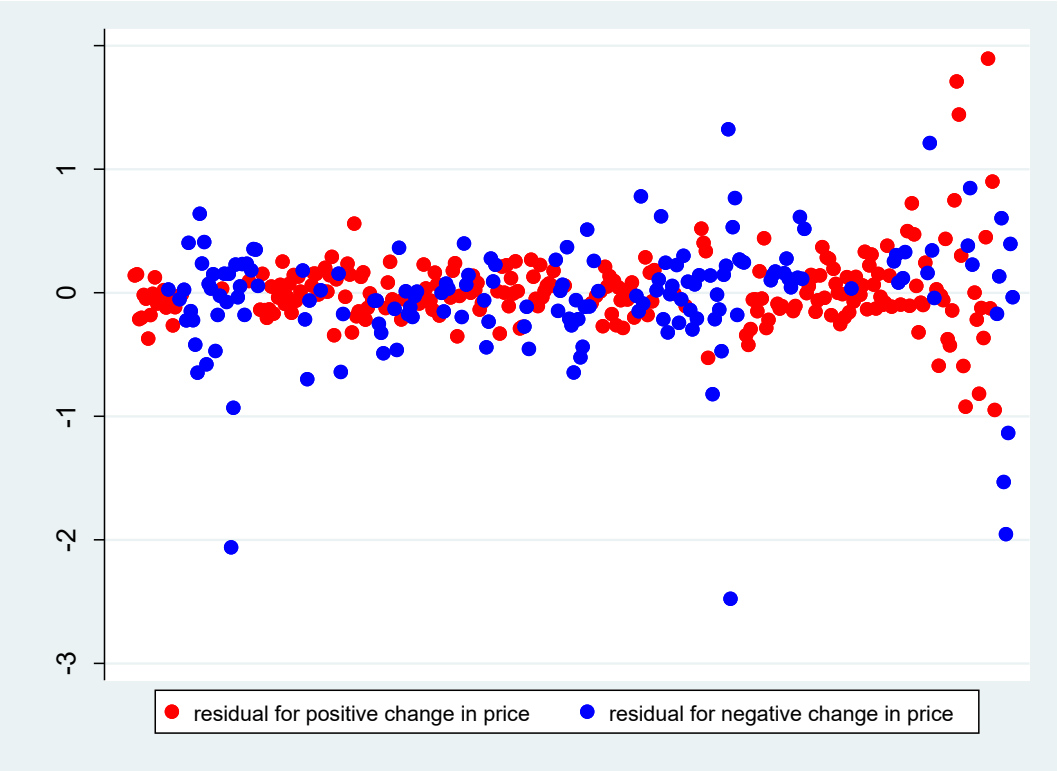
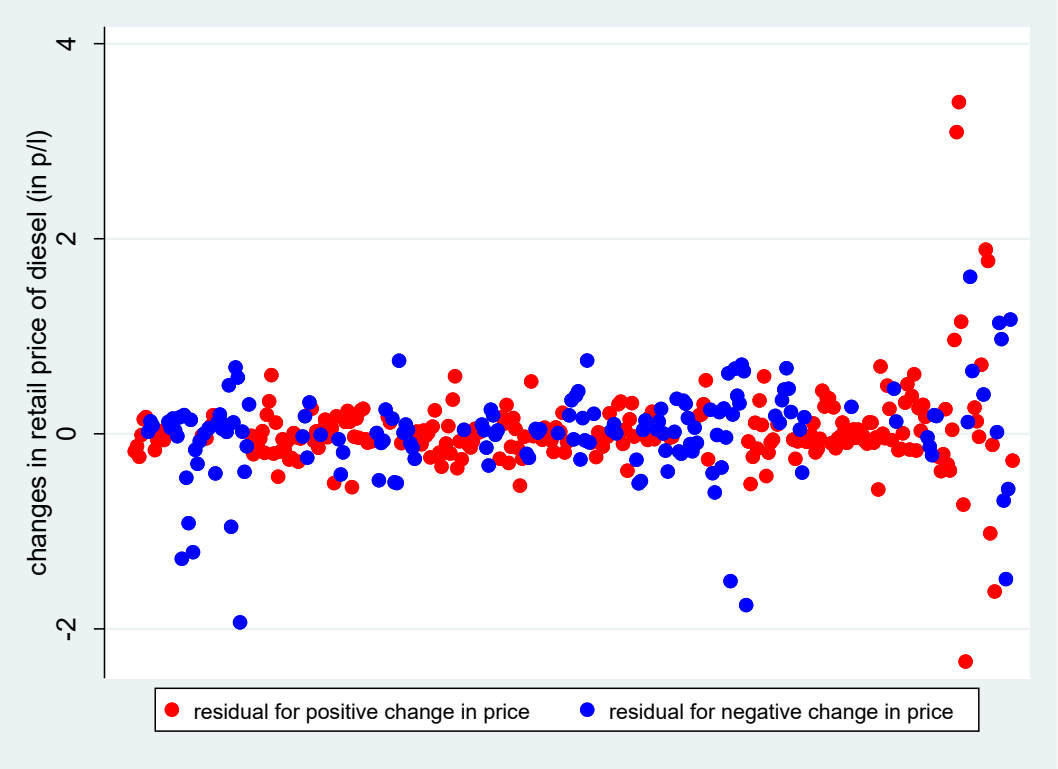


Figure 3: Distribution of retail price residuals for diesel

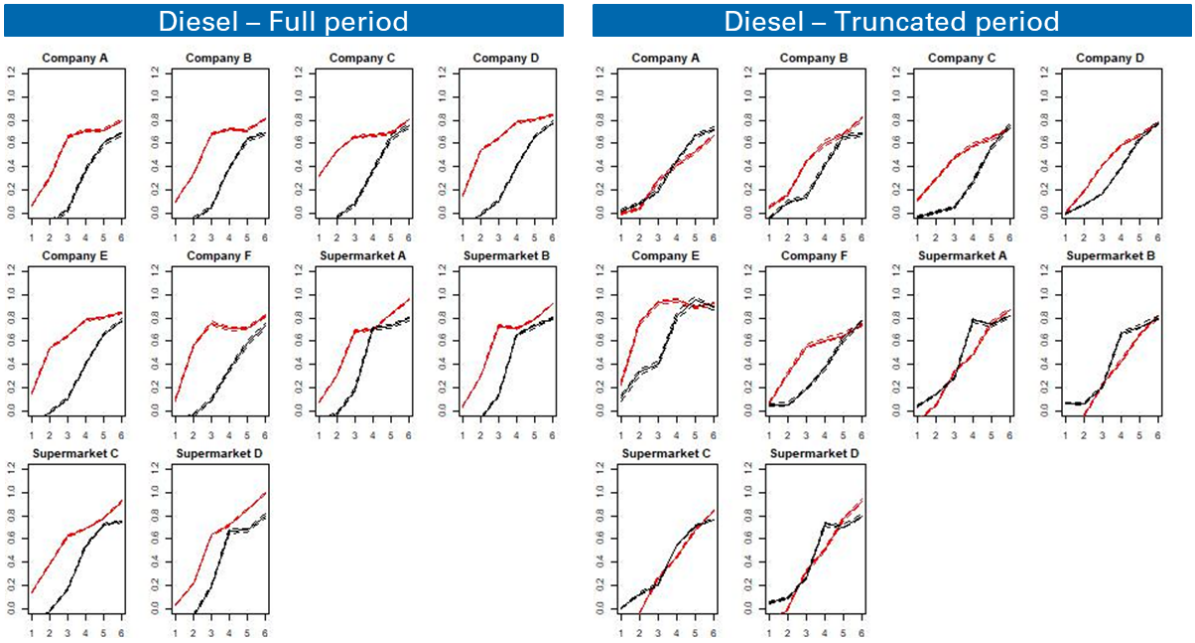


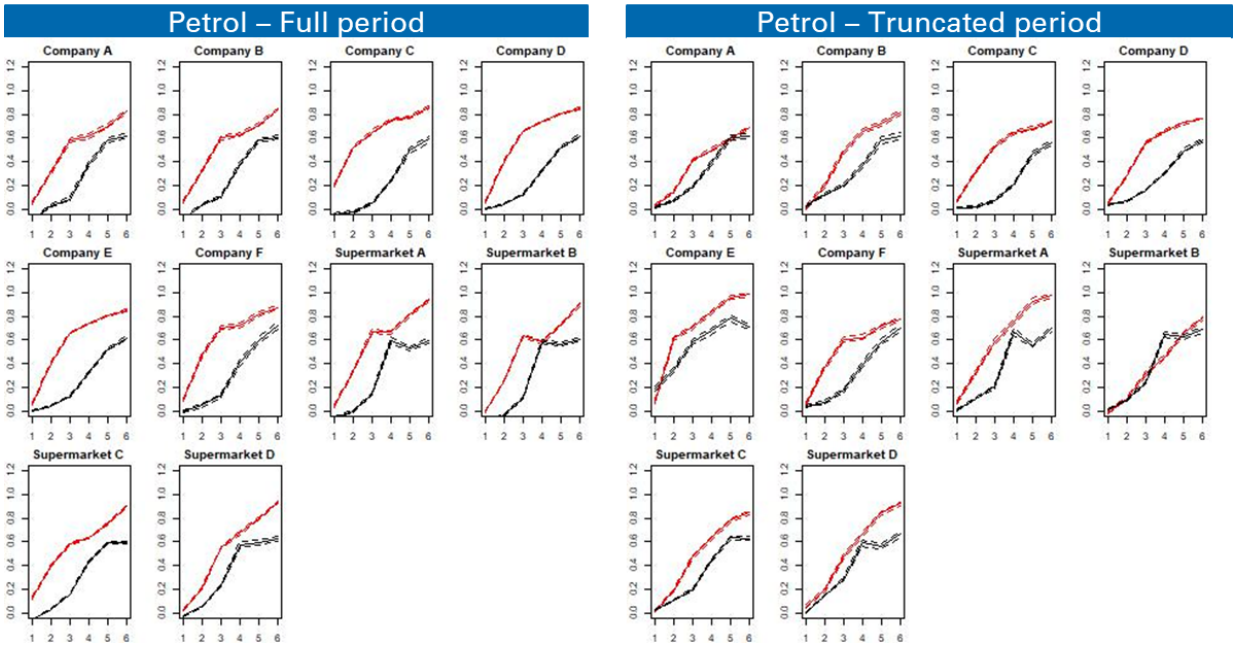
Results using site-level prices

22. To complement the analysis of national average prices, we apply the same methodology to site-specific price data sourced from Experian (this data is described in Annex A). Using the Experian data for this purpose is challenging because we have a shorter time series (June 2017 – June 2022), and not all sites report prices for all days, such that the data has many missing observations. To enable estimation, we 'pool' the data for individual sites for the 10 largest owners. That is, we estimate the first-stage model described in equation (2) on a site-by-site basis, and the second-stage model described in equation (1) on an owner-by-owner basis (pooling the data for sites owned by each owner). This implicitly assumes that owners of multiple sites may have a different target margin for each site but implement a common speed of passthrough across all sites. We recognise that this assumption is debatable, and the results of this analysis need to be interpreted with caution. We also run this analysis for the full time period as well as for the truncated period.

23. The results are presented in Figure 4 below. The top panel shows the results for diesel while the lower panel shows results for petrol. The red line denotes the pass-through from a positive cost shock while the black line denotes pass-through from a negative cost shock. The dotted lines around the IRFs are confidence intervals.

Figure 4: IRFs for 10 largest owners





Source: Experian, Platts, Bloomberg and Bank of England data, and CMA analysis.
Note: The solid red and black lines correspond to pass-through rates for a positive and negative cost shock respectively. The dotted red and black lines are confidence intervals (at 95%) corresponding to the given pass-through line. In general, when the confidence intervals do not interact, we detect the presence of rocket and feathers

24. Some of the results obtained for individual owners are counter-intuitive, especially when the entire time period is used for estimation. In particular, some of the negative IRFs are negative for the first period(s), which, if true, would imply that these owners initially respond to a decrease in wholesale prices by *increasing* retail prices (before falling back on the normal pattern of reducing retail prices). In some cases, we also see IRFs sloping down after 3 to 4 weeks, which, if true, would imply that some owners briefly 'reverse' some adjustments after a period (again, before falling back on the more normal pattern). These anomalies are more pronounced when the model is estimated over the whole sample (ie including the period following January 2022), and in our view this shows the difficulty of estimating such models in circumstances where the market is going through an abnormal level of volatility. For this reason, it is better to consider these results 'in the round' rather than try to draw very specific inferences from individual results or drawing precise comparisons between individual companies.

25. With these qualifications in mind, we can make a few broad observations relevant to both fuels:

(i) Using the full sample, we see clear evidence of rockets and feathers for all retailers, especially during the first 3 weeks after a shock. This is true for both petrol and diesel. Like the aggregate model, the cost shock is not entirely passed on to retail prices at the end of 5 weeks.

(ii) Using the truncated sample, the evidence on rocket and feather is more mixed. For the supermarkets the pass-through for positive and negative shocks is more or less symmetric. However, some retailers continue to show rocket and feathers. These are mostly dealer groups. Despite this, it is evident that the magnitude[11] of rocket and feathers for the truncated period is smaller.

26. Overall, we see that the local analysis is consistent with the aggregate model in that: after 5 weeks, the cost shock is not fully passed on to retail price; the evidence of rockets and feathers pricing is mixed unless the recent period is included in the analysis.

Conclusion

27. This analysis paints a mixed picture regarding the speed of passthrough and its asymmetry in the UK fuel market. When considering the pre-2022 period, we find little evidence of rockets-and-feathers pricing except for a few dealer groups. In contrast when including the 2022 data, we do find evidence of rockets and feather pricing and it seems to be more widespread and stronger for diesel. However, the results are very sensitive to the treatment of outliers.

28. It is also notable that across the different methodologies, the analysis indicates that it takes more than 5 weeks for wholesale cost changes to be passed through to consumers.

29. It is important to note that the rocket and feather analysis conducted above uses wholesale price of fuel as set by the benchmarking company – Platts. We do not know any additional cost components such as fuel transportation cost, role of wholesaler-retailer contracts and forecourt maintenance costs that are likely to affect retail prices. Hence, the analysis above is indicative of changes in pricing trends and not profits. Rocket and feather pricing can be a cause of concern only if we note that retailers are profiteering from the volatility in the recent months, this is more reflective of the underlying competitive conditions among retailers. Thus, a margins analysis is needed to derive any conclusion on the state of competition in the road fuels retail market.

[11] The vertical gap between the positive and the negative IRFs.

Appendix

Table 1: Regression Results from the Error correction model for Petrol across both time periods considered

Model Variables	Petrol: Full Period		Petrol: Truncated Period	
	Co-efficient	Std Error	Co-efficient	Std Error
Positive change in retail price				
Lagged Week 1	0.76849***	0.10156	0.58321***	0.11966
Lagged Week 2	-0.01811	0.13514	0.08343	0.13409
Lagged Week 3	-0.23003*	0.10383	-0.01147	0.12404
Lagged Week 4	0.12299	0.10317	-0.13689	0.11276
Lagged Week 5	0.07553	0.09316	0.09997	0.0885
Negative change in retail price				
Lagged Week 1	0.18371	0.13555	0.1075	0.12054
Lagged Week 2	-0.01781	0.10369	0.02567	0.0765
Lagged Week 3	-0.02615	0.06297	-0.00766	0.05258
Lagged Week 4	0.09071	0.04787	0.09616*	0.03724
Lagged Week 5	-0.01237	0.03737	0.01106	0.03612
Positive change in wholesale price				
Current Week	-0.02601	0.03889	-0.03772	0.05094
Lagged Week 1	0.10811**	0.03942	0.08199*	0.03555
Lagged Week 2	0.14721***	0.04431	0.15571***	0.03994
Lagged Week 3	-0.05898	0.03798	0.01453	0.03331
Lagged Week 4	0.07461	0.03869	0.06019	0.03887
Lagged Week 5	0.04629	0.02956	0.0448	0.041
Negative change in wholesale price				
Current Week	-0.03459	0.03049	-0.03454	0.01991
Lagged Week 1	0.12342**	0.04094	0.11274***	0.02821
Lagged Week 2	0.07931	0.05022	0.10535*	0.05204
Lagged Week 3	0.30255***	0.06612	0.28136**	0.09383
Lagged Week 4	0.02113	0.0395	0.01308	0.04141
Lagged Week 5	0.04878	0.03626	0.02805	0.0386
lagged error correction term (positive)	-0.01176	0.01806	-0.00096	0.01935
lagged error correction term (negative)	-0.03187	0.01722	-0.02056	0.01544
Number of observations	393		363	
R square	0.84482064		0.75220937	

Table 2: Regression Results from the Error correction model for Diesel across both time periods considered

Model Variables	Diesel: Full Period		Diesel: Truncated Period	
	Co-efficient	Std Error	Co-efficient	Std Error
Positive change in retail price				
Lagged Week 1	0.51799***	0.09659	0.37751**	0.09412
Lagged Week 2	-0.10822	0.11181	0.11499	0.09144
Lagged Week 3	-0.11625	0.0952	0.03329	0.11288
Lagged Week 4	0.32898***	0.09314	0.07232	0.09271
Lagged Week 5	0.05504	0.08328	0.06181	0.07728
Negative change in retail price				
Lagged Week 1	0.1695	0.08915	0.07498	0.07703
Lagged Week 2	0.08548	0.09613	0.04322	0.09743
Lagged Week 3	-0.04315	0.08325	-0.08871	0.07007
Lagged Week 4	0.0663	0.09135	0.07871	0.0798
Lagged Week 5	-0.057	0.08107	-0.03789	0.07678
Positive change in wholesale price				
Current Week	0.05262*	0.0256	-0.06413	0.0474
Lagged Week 1	0.12381***	0.02906	0.04876	0.03064
Lagged Week 2	0.16107***	0.03345	0.19766***	0.03177
Lagged Week 3	0.01341	0.03143	0.04299	0.03612
Lagged Week 4	0.0317	0.03095	0.06832*	0.03113
Lagged Week 5	-0.00284	0.02764	0.01505	0.02911
Negative change in wholesale price				
Current Week	-0.05019	0.03974	0.02666	0.03082
Lagged Week 1	0.12899**	0.04213	0.11799**	0.04167
Lagged Week 2	0.09845*	0.04002	0.11765**	0.04068
Lagged Week 3	0.29763***	0.05151	0.31677***	0.06906
Lagged Week 4	0.10573*	0.04511	0.10902*	0.05117
Lagged Week 5	0.09584	0.04901	0.08163	0.0607
lagged error correction term (positive)	-0.00136	0.01602	0.01894	0.01663
lagged error correction term (negative)	-0.05234***	0.01126	-0.04467***	0.012
Number of observations	393		363	
R square	0.85441551		0.7391471	

1. The tables below provide an alternative presentation of these results. In each table, the first column indicates the coefficient and the lag; the second and third columns report the estimated coefficient for a positive variation in the

variable and its standard error; the fourth and fifth columns report the estimated coefficient for a negative variation and its standard error.

2. Tables 3 and 4 below analyse the rate of cost pass through for the retail petrol market using the full set of data and the truncated data.

Table 3: Regression results for Petrol using data from 2015 – August 2022

Coefficient	$Coeff^+$	SE	$Coeff^-$	SE	F-test ($Coeff^+ = Coeff^-$)	p-values
γ_0	-0.02601	0.03889	-0.03459	0.03049	0.02	0.8778
γ_1	0.10811**	0.03942	0.12342**	0.04094	0.05	0.8232
γ_2	0.14721***	0.04431	0.07931	0.05022	0.79	0.3752
γ_3	-0.05898	0.03798	0.30255***	0.06612	17.55	0.000
γ_4	0.07461	0.03869	0.02113	0.0395	0.82	0.3663
γ_5	0.04629	0.02956	0.04878	0.03626	0.00	0.9595
δ	-0.01176	0.01806	-0.03187	0.01722	0.49	0.4865

Note: *, **, *** indicate statistically significant results at 90%, 95% and 99% levels respectively
Overall, 400 observation points are used in the regression

Coefficient	$Coeff^+$	SE	$Coeff^-$	SE	F-test ($Coeff^+ = Coeff^-$)	p-values
γ_0	-0.03772	0.05094	-0.03454	0.01991	0.00	0.9600
γ_1	0.08199*	0.03555	0.11274***	0.02821	0.40	0.5296
γ_2	0.15571***	0.03994	0.10535*	0.05204	0.48	0.4907
γ_3	0.01453	0.03331	0.28136**	0.09383	5.59	0.0186
γ_4	0.06019	0.03887	0.01308	0.04141	0.59	0.4434
γ_5	0.0448	0.041	0.02805	0.0386	0.08	0.7809
δ	-0.00096	0.01935	-0.02056	0.01544	0.44	0.5083

Note: *, **, *** indicate statistically significant results at 90%, 95% and 99% levels respectively
Overall, 370 observation points are used in the regression

3. Tables 5 and 6 below analyse the rate of cost pass through for the retail diesel market using the full set of data and the truncated data.

Table 5: Regression results for Diesel using data from 2015 – August 2022

Coefficient	$Coeff^+$	SE	$Coeff^-$	SE	F-test ($Coeff^+ = Coeff^-$)	p-values
γ_0	0.05262*	0.0256	-0.05019	0.03974	4.01	0.0459
γ_1	0.12381***	0.02906	0.12899**	0.04213	1.01	0.9318
γ_2	0.16107***	0.03345	0.09845*	0.04002	1.09	0.2982
γ_3	0.01341	0.03143	0.29763***	0.05151	16.96	0.0000
γ_4	0.0317	0.03095	0.10573*	0.04511	1.44	0.2312
γ_5	-0.00284	0.02764	0.09584	0.04901	2.39	0.1233
δ	-0.00136	0.01602	-0.05234***	0.01126	6.36	0.0121

Note: *, **, *** indicate statistically significant results at 90%, 95% and 99% levels respectively
Overall, 400 observation points are used in the regression

Table 6: Regression results for Diesel using data from 2015 – January 2022

Coefficient	$Coeff^+$	SE	$Coeff^-$	SE	F-test ($Coeff^+ = Coeff^-$)	p-values
γ_0	-0.06226	0.04872	0.02603	0.03071	1.90	0.1695
γ_1	0.05584	0.03115	0.11595**	0.04138	1.21	0.2718
γ_2	0.20613***	0.03276	0.11577**	0.04063	1.79	0.1815
γ_3	0.04897	0.03724	0.31361***	0.06927	9.32	0.0024
γ_4	0.06476*	0.03154	0.10609*	0.05098	0.50	0.4783
γ_5	0.01485	0.02932	0.08349	0.06107	0.96	0.3278
δ	0.01704	0.01594	-0.04026***	0.01209	6.85	0.0093

Note: *, **, *** indicate statistically significant results at 90%, 95% and 99% levels respectively
Overall, 370 observation points are used in the regression

Annex C – Price concentration analysis

Patterns of price dispersion

1. This section documents patterns of price dispersion in the UK road fuel market. While road fuel is a commodity, some aspects of the market might be expected to induce a degree of price dispersion across different petrol stations.

   (a) On the demand-side, the distribution service provided by petrol stations is differentiated across multiple parameters, including location, brand, volume, associated services and facilities. Some petrol stations, for example those located in more convenient locations or providing better services and facilities, might, in principle, be able to charge higher prices than their competitors.

   (b) On the supply-side, different petrol stations might face different levels of competition, depending in particular on local cost factors, or possibly local barriers to entry. Different operators might also decide on different pricing strategies depending on their business portfolios.

2. The purpose of this analysis is to shed light on factors which may be correlated with higher prices.

Data used in this analysis

3. This analysis relies on retail price data sourced from Experian, which we understand is the source of price data most commonly used by market participants in the UK. Experian receives price data on a daily basis from Allstar Fuel cards transactions. Experian stated there are around 8,350 open sites in the UK currently. On average, 85% of these sites reported price each week, which represents around 97% of the fuel volume in the market. A total number of 7,649[1] sites reported petrol and diesel prices in the Experian price dataset.

4. The CMA's analysis relies on reported prices for two days each week (each Wednesday and Saturday) over a five-year period between Saturday 3rd June 2017 and Saturday 11th June 2022 (inclusive). The CMA's analysis relies on

[1] Note, Experian price data contains 7,649 sites. We removed five sites as price was not reported on Wednesday or Saturday. We removed an additional 14 sites which were in the Isle of Man.

the modal prices reported by Experian for these two days,[2] averaged to provide one observation for each week.

5. In addition, the CMA has obtained quarterly data from Experian on site characteristics,[3] covering:

- site location information. This is provided in terms of postcode, longitude, and latitude.
- location type. Experian allocated sites to the following location categories: industry/office, motorway, residential, rural, and urban transient.[4]
- brand. Experian allocated sites to one of 27 Share Brands, which include subsidiary brands, including Unbranded. Brands also include supermarket brands like Asda, Morrisons, Sainsbury's, or Tesco.
- ownership type. Experian allocated sites to the following ownership types: oil company owned, independent dealer owned, supermarkets or not applicable. Experian defined supermarkets to include Asda, Morrisons, Sainsbury's, Tesco, Co-op, and Food Store. The CMA reallocated Co-op and Food Store sites to a separate "not applicable" category to focus on the top four supermarkets in our analysis.[5]
- company owner. Experian provide the company owner of each site such as Motor Fuel, Euro Garages, Tesco Stores, etc.
- availability of shop.
- availability of carwash.
- estimated average annual volumes.

6. The CMA computed the following derived variables using Experian data:

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[2] The modal price reported for a petrol station for a given day is the price most commonly observed for that petrol station for that day
[3] Experian's site characteristics data was provided on a quarterly basis, covering a five-year period between Q2 2017 and Q1 2022 (inclusive). We note the site data excludes the following period: Q2 2021 to Q4 2021.
[4] Experian said location types are based on the area surrounding the site. Rural sites are described as countryside background or low density residential and/or industrial use or locations on long distance commuter routes that experience inconsistent traffic flows. Industry/Office are described as low residential back-up with relatively high incidence of industry/office units (applicable to business infrastructures such as port areas, manufacturing, distribution centres, etc) Residential sites are described as located away from commercial and industrial areas. Urban transient sites are described as mostly attributed to "A" and "Primary" routes, including major commuter traffic, bypasses and ring roads that are characterised by high traffic volumes spread evenly throughout the day (mix of residential and commercial).
[5] The CMA also reallocated five sites owned by Asda, Morrisons or Tesco from ownership by dealer or company to supermarket as the original allocation was likely to be erroneous.

- Number of competitors. This counts the number of competitors within the catchment area around each site. Consistent with the OFT's definition of catchment areas, the CMA defined this as a five mile linear distance radius from the centroid site for urban areas and a 10 mile radius for rural areas.[6] A site that is owned by the same company as the centroid site does not contribute to the competitor count.

- Competitor dummies for ownership type. For each of the ownership types (supermarket, dealer, company and not applicable), these dummies indicate whether there is at least one competitor for each respective ownership type within the catchment area. For example, a supermarket dummy will indicate if there is at least one site owned by Asda, Morrisons, Sainsbury's or Tesco within the catchment area. A site owned by the same company as the centroid site is not considered to be a separate competitor.

- Competitor dummies for brand-ownership. For each of the brand-ownership combinations, these dummies indicate whether there is at least one competitor. For example, if an Esso oil company site is within the catchment area, the Esso company dummy will indicate this. A site owned by the same company as the centroid site is not considered to be a separate competitor.

7. Calculating these variables for each site and each week involves knowing or estimating the precise week in which sites enter or exit the market. This cannot be done using solely time series of price because not all sites report prices for all days. To mitigate this issue the CMA used the following, two-step rule:

   (a) Experian's quarterly site data is used to identify the quarter of entry and exit. A site is considered to have entered the market in a particular quarter if it is recorded in the site data in that quarter but not recorded in the site data for the previous quarter. Conversely, a site is considered to have exited the market if it is not recorded in the site data for a quarter but was recorded in the data for the previous quarter.

   (b) Once the quarter of entry and exit is identified, Experian's price data is used to identify the precise week of entry and exit. Where a site enters in a quarter, the first week where price is reported is considered to be the week in which that site has entered the market. Where a site exits in a

[6] OFT (2013), Econometric analysis on the determinants of price differences across the UK, Annex D, paragraph D.3.

quarter, the first week where price is not reported is considered the week of exit.

8. The CMA's analysis also relies on Office for National Statistics (ONS) and Northern Ireland Statistics and Research Agency's (NISRA) data covering:

- population density.[7] The CMA relies on the ONS's mid-year population estimates for each UK local authority on an annual basis. The mid-2020 population density was the most recent available and was also used for the years 2021 and 2022.

- median income. For England, Wales and Scotland, the CMA relies on the ONS's Annual Survey of Hours and Earnings (ASHE).[8] For Northern Ireland, the CMA relies on NISRA's ASHE.[9] This is provided for each local authority for each tax year ending 5th April between 2017 and 2020. For tax years ending 2021 and 2022, the CMA relies on provisional estimates for tax year ending 2021.

Descriptive statistics

9. In this section we present descriptive statistics to give an overview of price distribution across sites, and a breakdown of average prices by location type and operator type.

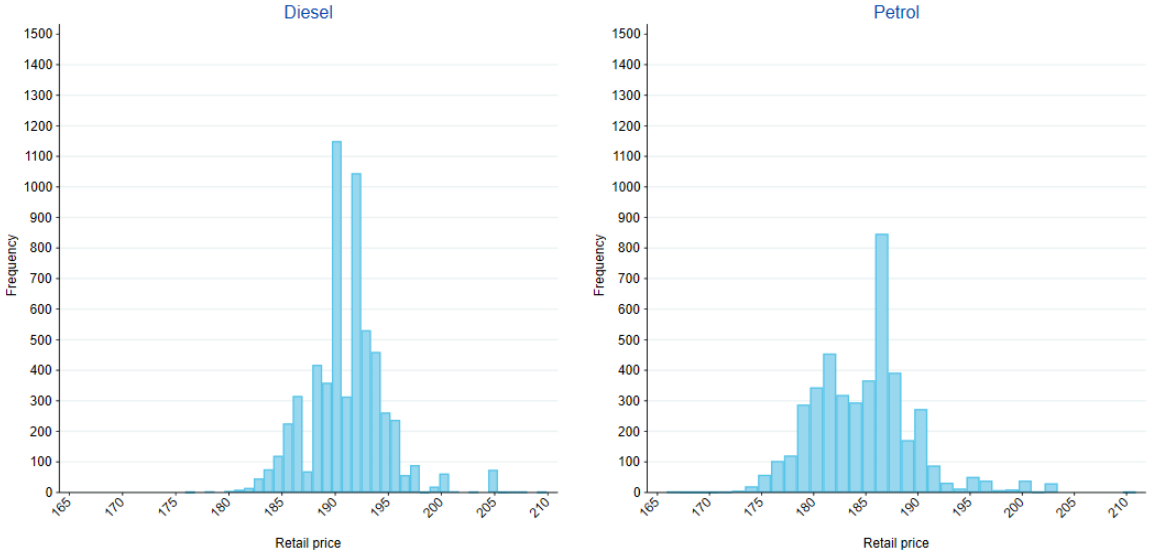
10. Figure 1 shows the distribution of fuel prices separately for diesel and petrol, for the week of 11th June 2022 (the most recent week available in the Experian data). The figure indicates a moderate level of price dispersion (albeit slightly more pronounced for petrol than diesel):

(a) the average price of diesel was 192 pence per litre. 50% of sites were priced within two pence of the mean, and 80% of sites were priced within five pence of the mean.

(b) the average price of petrol was 186 pence per litre. 50% of sites were priced within four pence of the mean, and 80% of sites were priced within six pence of the mean.

[7] ONS, Estimates of the population for the UK, England and Wales, Scotland, and Northern Ireland.
[8] ONS, Annual Survey of Hours and Earnings.
[9] NISRA, Annual Survey of Hours and Earnings.

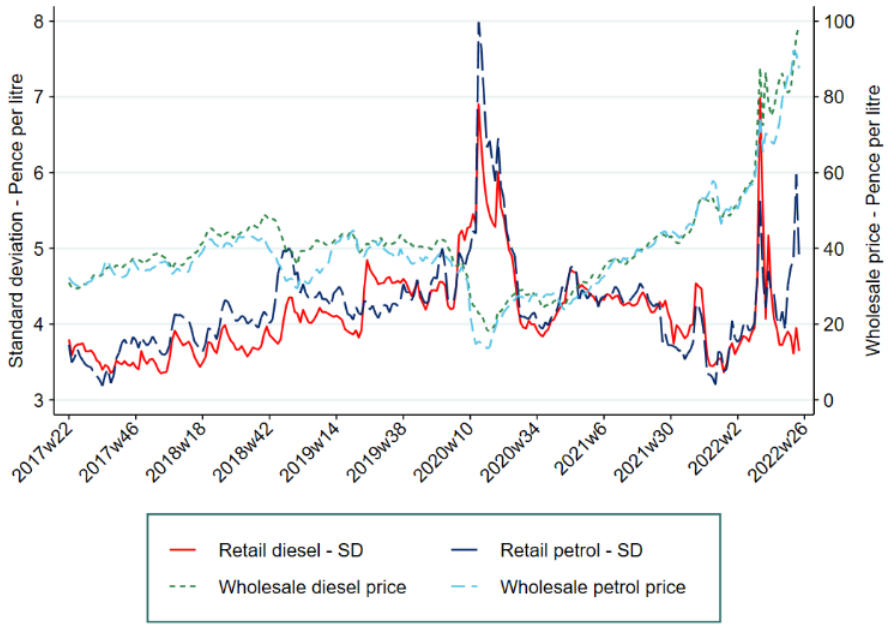
Figure 1 - Distribution of fuel prices (week of 11th June 2022)



Source: CMA analysis of Experian data

11. Figure 2 shows the standard deviation of retail petrol and diesel prices over time, as well as the wholesale prices of the two fuels. The standard deviation is a measure of price dispersion over sites. The chart shows that price dispersion increases substantially when there are significant changes in wholesale price (whether these be increases or decreases), for example following the start of the first lockdown announced on 23 March 2020 and Russia's invasion of Ukraine on 24 February 2022. This might indicate that different retailers adjust to changes in wholesale prices at different speeds, and more generally that the retail market can take time to find a new equilibrium when subject to significant changes in wholesale prices.

Figure 2 - Standard deviation of fuel price over time (primary axis) and wholesale price over time (secondary axis)



Source: CMA analysis of Experian, Argus, Bloomberg, BEIS, and Bank of England

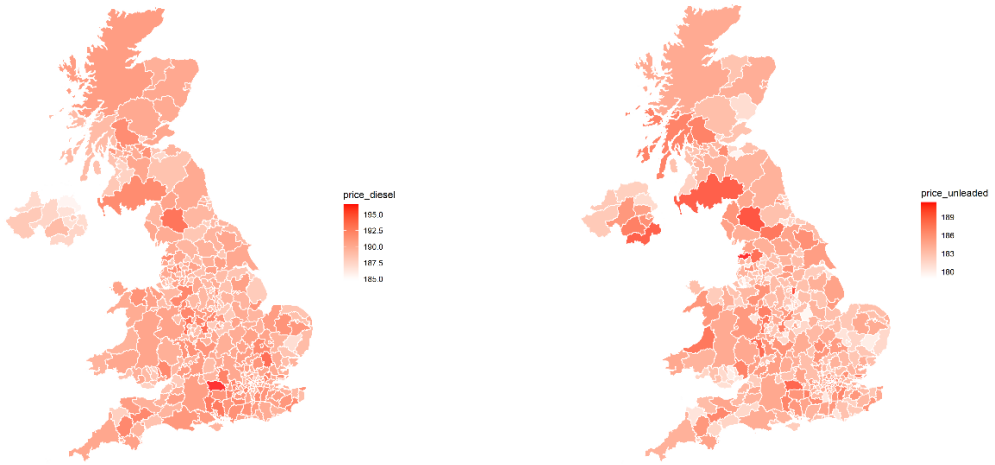
12. Figure 3 shows average price by local authority. This indicates that there is variation in price levels across different regions. In the week of 11th June:

    - For Diesel, Causeway Coast and Glens (Northern Ireland) had the lowest average price (185ppl), and West Berkshire (South East) had the highest average price (197ppl).
    - For Petrol, Ards and North Down (Northern Ireland) had the lowest average price (of 179ppl) and Na h-Eileanan Siar (Scotland) had the highest (199.7ppl).

13. Figure 3 also shows that local authorities which have high average prices of one fuel also have high average prices of the other type of fuel, and similarly for low prices.[10]

[10] For each week at the local authority level, there is generally high correlation between average petrol and average diesel prices (>0.8 in vast majority of weeks). This would indicate that local authorities with relatively high average diesel prices also have relatively high petrol prices.

Figure 3 - Heat map of average price for Diesel (left) and Petrol (right) by local authority, week of 11 June 2022

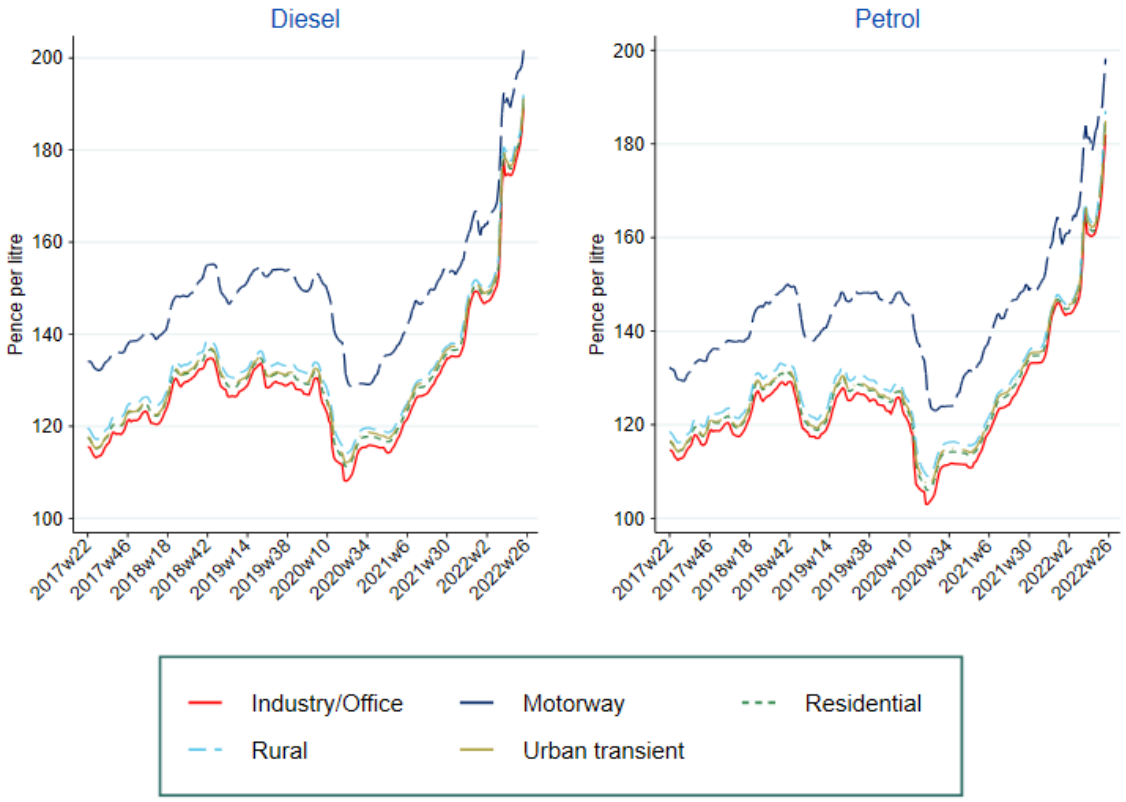


Source: Experian and ONS data and CMA analysis.

Note: the following Scottish Islands are excluded from the map as the high average price means it is more difficult to see price dispersion in the rest of the UK: Na h-Eileanan Siar (194ppl for diesel and 200ppl for petrol), Shetland Islands (193ppl for diesel and 197ppl for petrol), and Orkney Islands (193ppl for diesel and petrol).

14. Figure 4 shows the average price by location type separately for diesel and petrol. Note the rapid price increase in 2022 means the difference between prices across location type appears visually small in the figure – this should be interpreted with caution since, as we discuss below, these differences are not negligible. The average premium at motorway sites relative to industry/office sites is 19.8ppl for diesel and 19.6ppl higher for petrol. This premium varies over time. The average motorway diesel premium decreased from 22.8ppl in 2019 to 19.2ppl in 2021. Similarly, the average motorway petrol premium decreased from 21.7ppl in 2019 to 18.4ppl in 2021. In addition, the average premium at rural sites is 1.5ppl higher than that found in urban transient areas for both diesel and petrol.

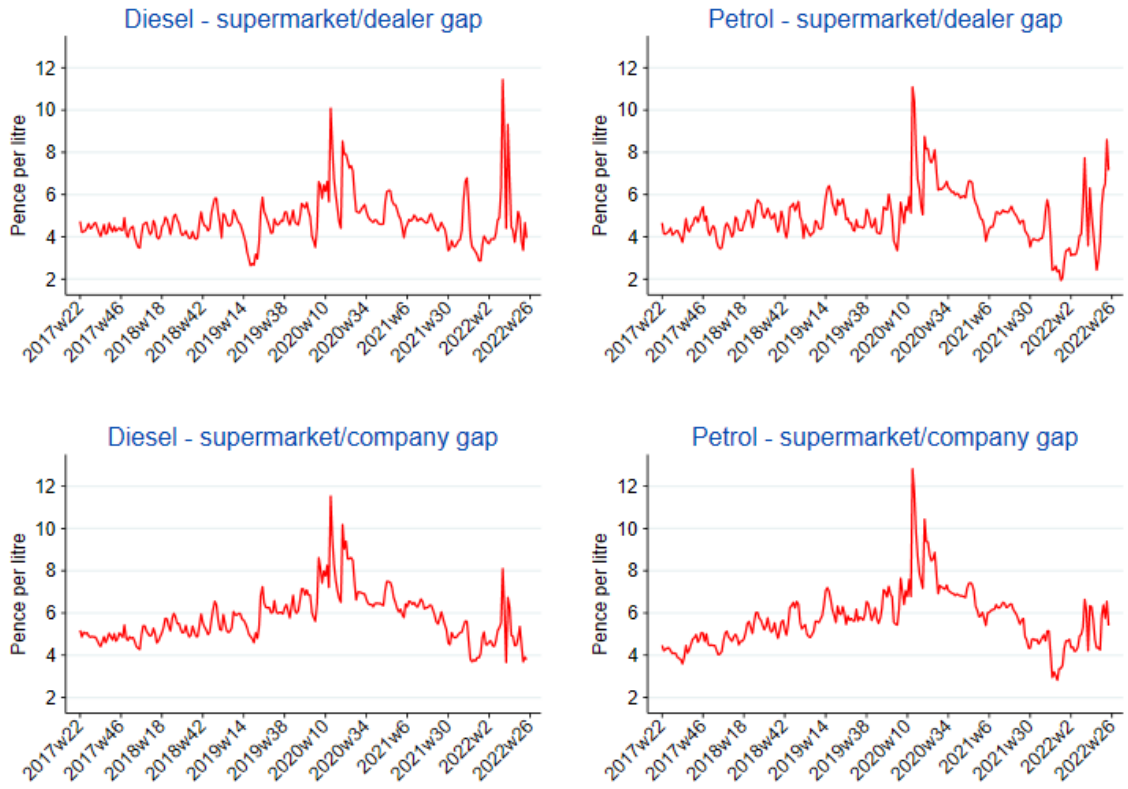
Figure 4 – price by location type



Source: CMA analysis of Experian data

15. Figure 5 shows the average price gap between supermarkets relative to company and dealers. For diesel, the price for supermarket sites is, on average, 5.8ppl below company owned sites and 4.8ppl below dealer owned sites. For petrol, the price for supermarket sites is, on average, 5.7ppl below that of company owned sites and 4.9ppl below dealer owned sites. Figure 5 also shows that the gap between the average price of supermarkets and non-supermarkets increased substantially at the announcement of the first lockdown and has narrowed since 2020.

Figure 5 - average price gap for company and dealers relative to supermarkets, June 2017 - June 2022



Source: CMA analysis of Experian data

Econometric analysis

16. The above charts indicate that retail prices across sites may differ due to several factors including location type and operator type. However, considering the effect of each variable in isolation can be misleading because these variables may be related. For example, the fact that prices tend to be higher at rural sites could reflect some cost and demand factors that are specific to such areas, or it could simply reflect the fact that fewer of these sites tend to be supermarkets (or are located close to other supermarkets). To form a more precise picture of the effect of different factors, we conducted three pieces of econometric analysis:

    (a) We started by running a simple multivariate regression on data for 2021. The coefficients on that regression can approximate the effect of each variable on price, controlling for the other variables. For example, it would tell us whether prices at rural sites are indeed higher once we control for the fact that these sites tend to be owned by dealer groups rather than supermarkets.

(b) We then ran a version of that model over the extended data set covering the past five years, allowing the coefficients to vary over time. This allowed us to form a view on whether these correlations have changed over time. We focused our attention on the evolution over time of the price gap between supermarkets and non-supermarkets.

(c) We then ran a different model seeking to exploit the entry/exit of competitors over time to estimate their effect on local market outcomes. This analysis is used to estimate the causal effect of supermarket presence on price by exploiting the entry/exit of sites in the dataset.

17. The following subsections provide more details on these three strands of analysis in turn.

Patterns of price dispersion

18. To understand patterns of price dispersion over the most recent period, we simply regressed the price charged by each site over the observable characteristics of this site, namely:

    (i) site characteristics (operator, estimated annual volume, availability of carwash, availability of shop, distance to terminal, location type)

    (ii) location characteristics (region, population density, and median income obtained from the ONS)

    (iii) concentration (the number of competing fascia within a catchment area defined as the 5-mile linear distance radius for urban areas and 10–mile radius for rural areas).[11]

    (iv) competitor characteristics within catchment area (brand of competitors, and presence of competitor owned by supermarket,[12] dealer or oil company).

19. We used Experian data for 2021 and added a week 'fixed effect' in the regression to account for the fact that prices varied over the period.

20. This analysis cannot be interpreted to identify causal relationships between the above characteristics and price, as it does not control for all possible factors that might affect prices (and that might be correlated with observed factors). For example, it might appear from the regression results that sites

[11] The catchment area is based on OFT (2013), Annex D of UK petrol and diesel sector - An OFT Call for Information, Econometric analysis on the determinants of price differences across the UK, paragraph D.3.
[12] A supermarket is defined as Asda, Morrisons, Sainsbury's and Tesco during the final 12 months of the data.

with more competitors have relatively lower prices. However, if more competitors enter areas that tend to have lower costs (a factor not directly included in the model), the observed correlation between the number of competitors and prices will overstate the causal impact of local competition on prices. Similarly, it might appear that the presence of a particular supermarket brand leads to lower prices. However, if this brand tends to operate in areas where customers are particularly price-sensitive (for example because they are less affluent), the observed correlation will overstate the causal impact of this supermarket on local prices. For these reasons, these results should be interpreted with caution – we provide them mainly as an overview of factors associated with higher and lower prices and to provide context with the more qualitative submissions we have received. In the remainder of this annex, we refer to the 'effect' of a variable to denote the correlation measured through that regression, in the knowledge that it is not an unbiased estimate of the true causal effect of that variable.

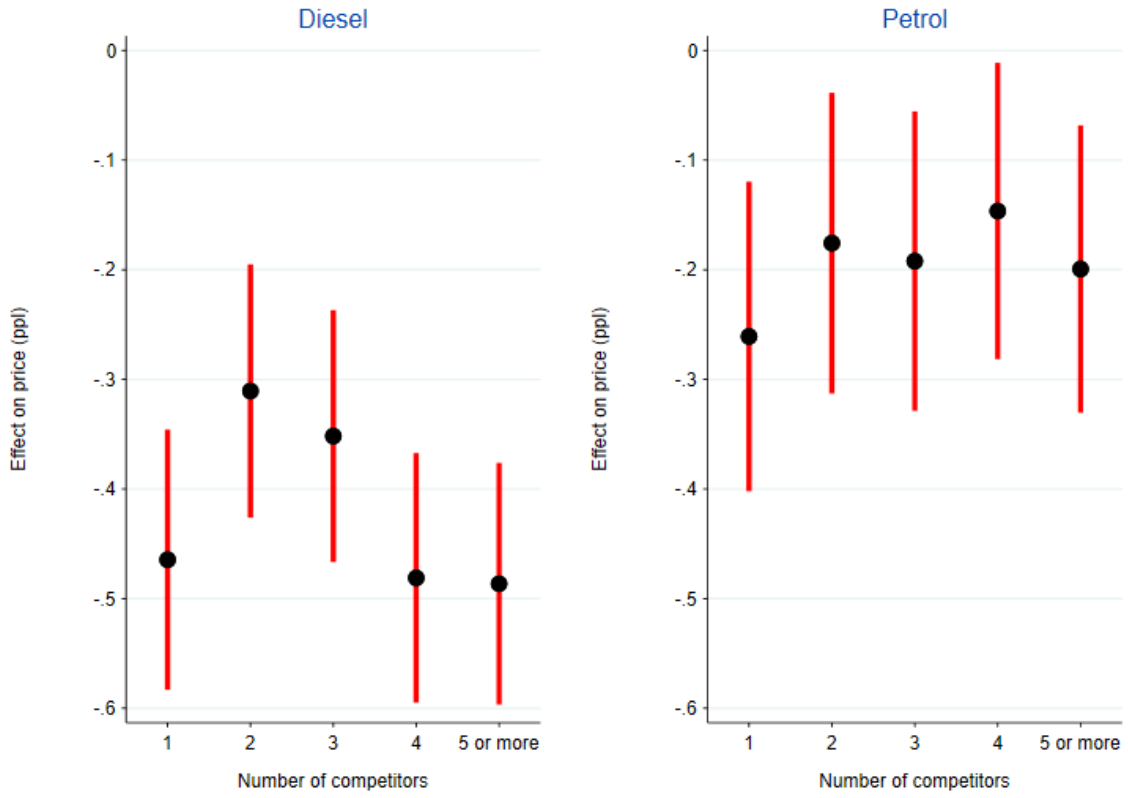
21. The detailed results are provided in Tables 4 and 5 in the Appendix, and some of the key results are presented graphically below. The CMA estimated two models that differ with respect to how the impact of competitor brand of the site is considered. In the first model (whose coefficients are shown in Table 4), the regressor is the ownership type of the competing sites. That is, we consider whether sites with competitors owned by supermarkets, company, or dealer in their catchment area have higher or lower prices. In the second model (whose coefficients are shown in Table 5), the regressor is the brand-ownership type of the competition sites. That is, we consider whether sites that compete with BP company, Esso dealer etc have higher or lower prices.

22. The key results from the analysis are the following:

(a) **Concentration:** Figure 6 shows the relationship between the number of competitors (relative to zero competitors) and price.[13] For diesel and petrol, the first competitor has the most substantial effect on price. For diesel, the addition of a competitor when there are no competitors is associated with a 0.46ppl reduction in price. For petrol, the reduction is smaller at approximately 0.26ppl. As the estimates for number of competitors are estimated imprecisely, we cannot say whether additional competitors have a larger or smaller effect on price.

[13] For one to four competitors, each dummy takes the value of zero if the number of competitors is different to the number of competitors represented by the dummy, and it reports the value of one if that number is equal to it. This allows for the dummies to be interpreted as the effect of competing fascia in a given catchment area, compared to baseline case of zero competitors. For five competitors, the dummy takes the value of zero if the number of competitors is less than five and reports the value of one if the number of competitors is five or more.

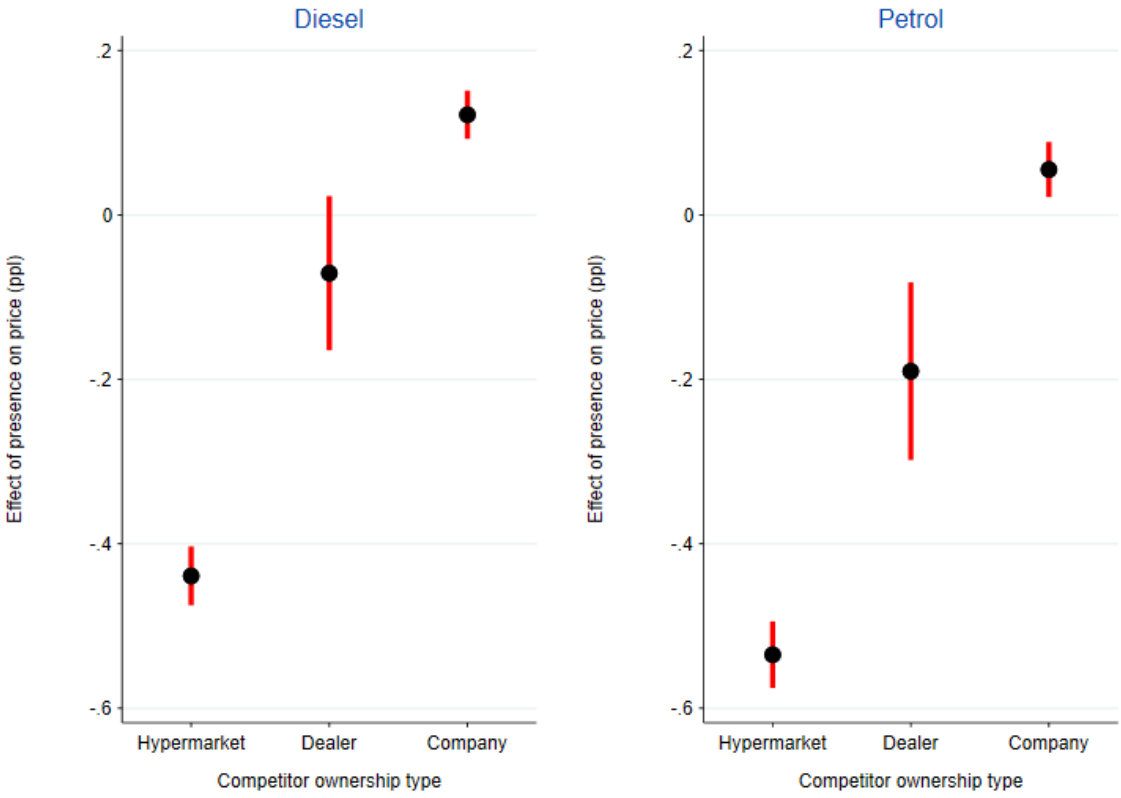
Figure 6 – effect of concentration on price (relative to zero competitors)



Source: CMA analysis of Experian data

(b) **Presence of (any) supermarket:** Figure 7 shows the effect of competitor ownership on price. That is, it shows the effect of the presence in the catchment area of at least one competitor of a particular ownership type on the price charged by the centroid site. The results show that sites that face competition from at least one supermarket will be, on average, 0.44ppl cheaper for diesel and 0.54ppl cheaper for petrol. This effect is statistically significant. The effect of competition from dealer-owned sites is smaller in magnitude and is only statistically significant for petrol. The effect of competition from company-owned sites is positive and statistically significant for both diesel and petrol. As discussed in paragraph 20 these results are particularly difficult to interpret because ownership types may target areas that are structurally different in terms of the unobservable characteristics that drive price.

Figure 7 – Effect of competitor ownership on price



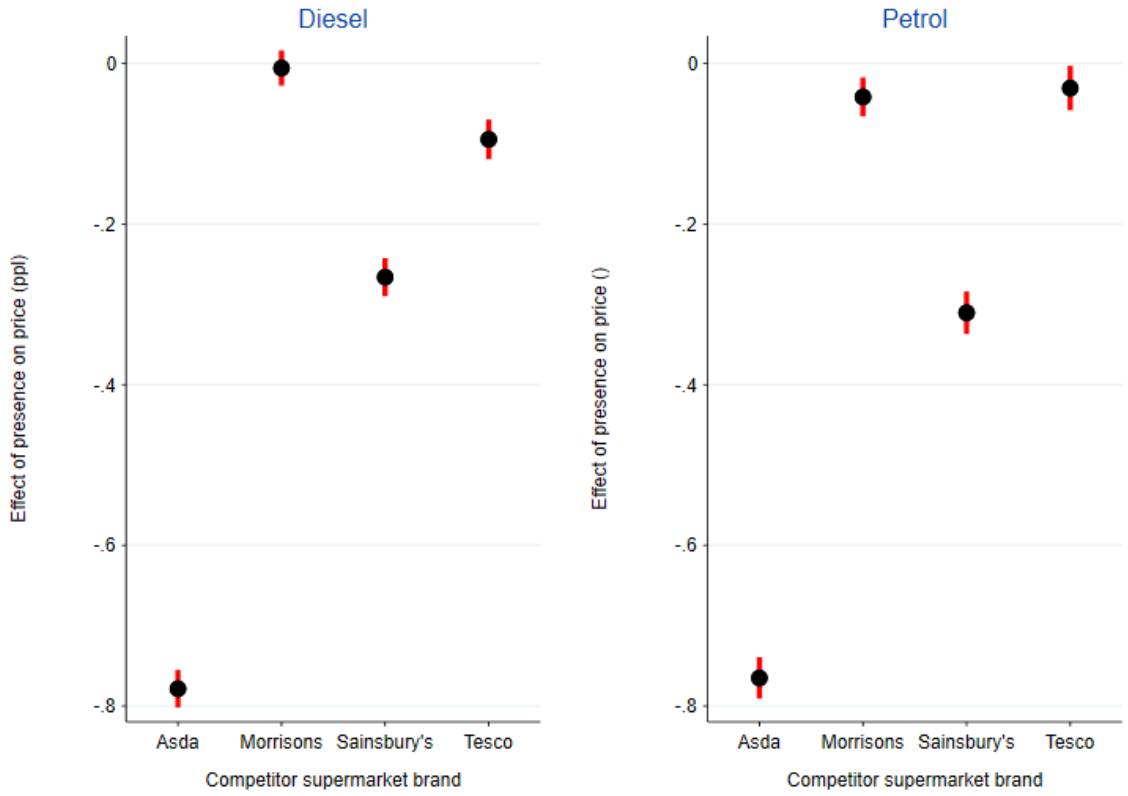
Source: CMA analysis of Experian data

(c) **Presence of different supermarket brands:** Figure 8 shows the effect of competitor supermarket's brand on price. The results show sites that face competition from at least one Asda forecourt in their local area will be, on average, 0.78ppl cheaper for diesel and 0.76ppl cheaper for petrol compared to sites without an Asda in their local area, holding all other factors constant. This effect is statistically significant. Among the supermarkets, the presence of Asda in a catchment area is associated with the lowest prices. As discussed in paragraph 20, strictly speaking these results cannot be interpreted causally because different brands may target areas that are structurally different in terms of the unobservable characteristics that drive price. For example, a brand may target areas where customers are more price sensitive and PFS therefore choose to charge lower prices anyway.

Considering the detailed results presented in Table 5, it is notable that the presence of several brands (eg Shell company, Murco company and Certas Energy company) are associated with statistically significant price premiums. This does not necessarily mean that the presence of these brands cause prices to increase, but more likely that these brands may

target types of areas where retailers find it optimal to charge higher prices (eg because customers are less price sensitive).

Figure 8 – Effect of supermarket brand on price



Source: CMA analysis of Experian data

(d) **Site characteristics:** the Appendix presents our analysis of the effect of site characteristics and price. The results can be interpreted as follows:

(i) Sites with a non-Asda brand (including non-Asda supermarkets, companies and dealers) are relatively more expensive than Asda sites by approximately 1 to 8ppl (on average).

(ii) Sites in rural areas are relatively more expensive than sites in urban areas by approximately 0.4ppl for diesel and 0.3ppl for petrol. This is statistically significant.

(iii) Sites with a motorway are relatively more expensive than urban sites by 15.4ppl for diesel, and 15.0ppl for petrol. This is statistically significant.

(iv) Sites with a carwash have, on average, 0.31ppl lower diesel prices and 0.28ppl lower petrol prices. This is statistically significant.

(e) **Location characteristics:** the Appendix shows our analysis of the relationship between location characteristics and price. The results can be interpreted as follows:

(i) Sites in Northern Ireland, Wales, East Midlands, West Midlands, Yorkshire and Humber and the North of England have lower diesel and petrol prices than sites in London.[14] This is statistically significant.

(ii) A £1,000 increase in median annual income for the local authority is associated with a 0.1ppl increase in diesel and petrol prices. This is statistically significant, but is practically small.

Supermarket price gap relative to non-supermarkets

23. In this section, the CMA analyses supermarket price gap relative to non-supermarkets (ie oil company and dealer owned sites), controlling for other factors. Figures 6 and 7 above show that supermarkets tend to charge lower prices. The purpose of this analysis is to understand how that gap changes when we control for other factors, and how it has varied over time.

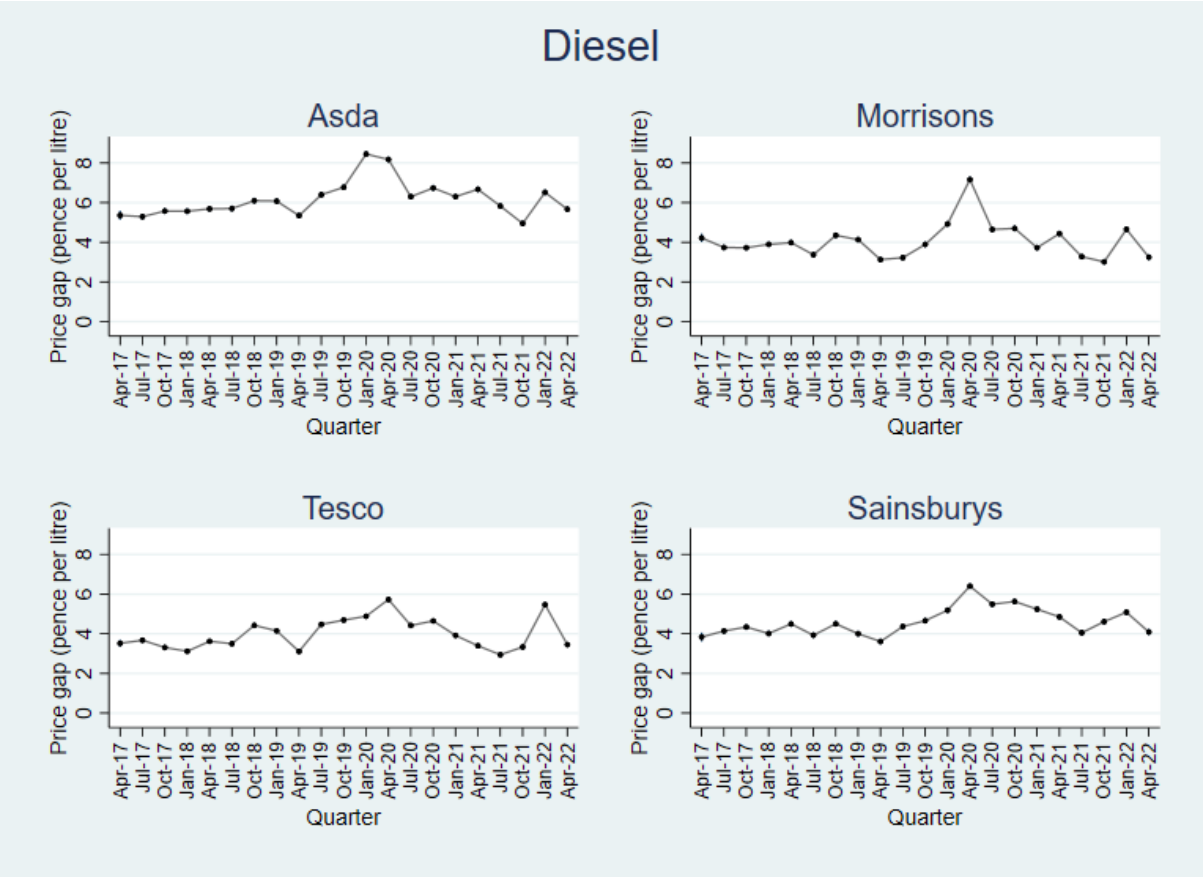
24. This analysis estimates the price gap between each supermarket relative to a baseline non-supermarket group (separately for diesel and petrol). The price gap is estimated on a quarterly basis using Experian and ONS data between June 2017 and June 2022. The model controls for concentration, site characteristics, location, and competitive characteristics.

25. A limitation of this analysis is that it is biased toward finding no change in the level of price gap over time. This is because non-supermarkets will competitively respond to price changes by supermarkets. For example, if a supermarket site were to price less aggressively and increase its price, non-supermarkets in its catchment area will likely respond by also increasing price, hence maintaining the same price gap.[15] For this reason, we cannot interpret a lack of change in the price gap as definitive evidence of no change in the price competitiveness of supermarkets.

26. Figure 9 below shows the supermarket price gap relative to non-supermarkets for diesel.

[14] As part of the analysis, we must choose a baseline region. We have arbitrarily chosen London as the baseline.
[15] RFI responses from all fuel retailers reported having similar price setting strategies as price followers. These strategies are based on pricing their fuel relative to nearby competing PFSs which they monitored whilst also taking into account the margins.

Figure 9 – Supermarket price gap relative to non-supermarket, Diesel (pence per litre)

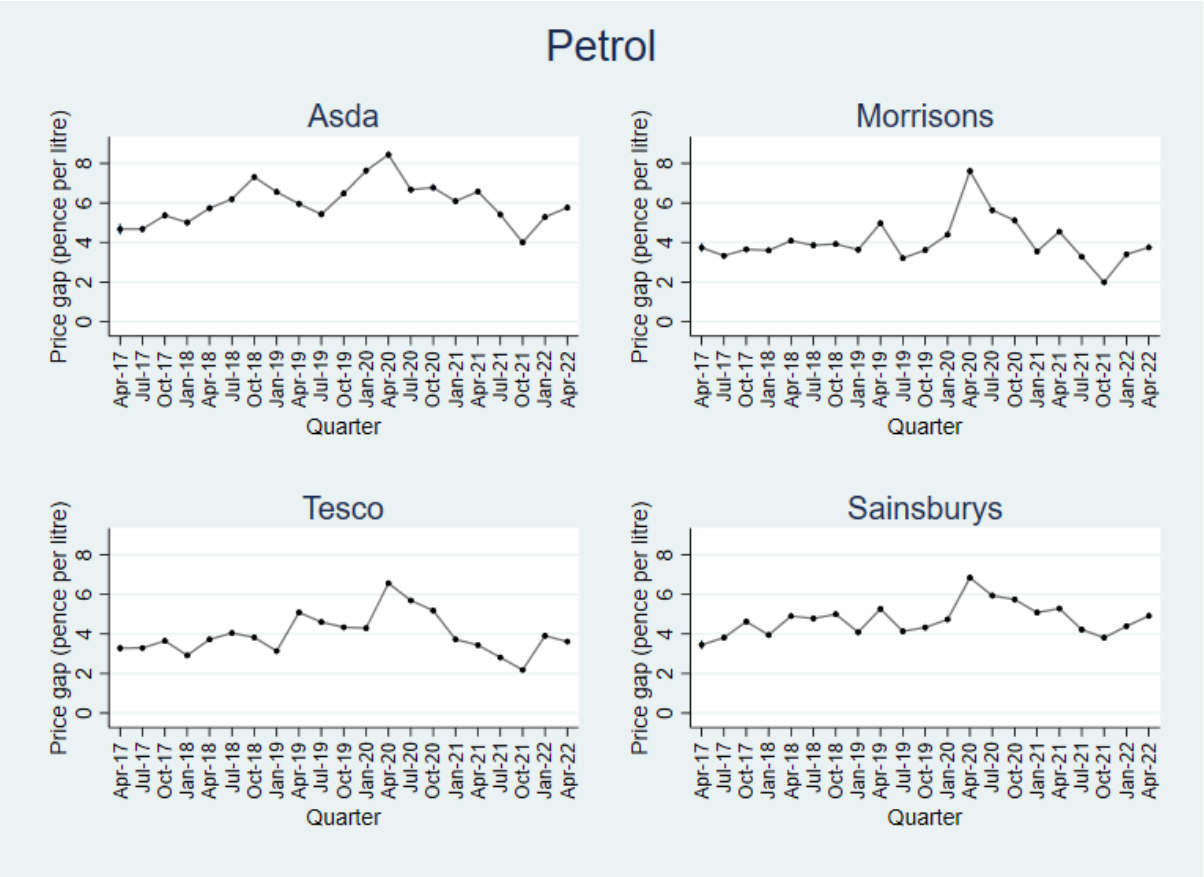


Source: CMA analysis of Experian and ONS data

27. The above figure shows that Asda's diesel price is approximately 6ppl lower than non-supermarkets, and approximately 4ppl lower for Morrisons, Tesco and Sainsbury's. This effect is statistically significant. This price gap remains relatively similar between June 2017 and June 2022, although there was a temporary increase during 2020.

28. Figure 10 shows the supermarket price gap relative to non-supermarkets for petrol.

Figure 10 – Supermarket price gap relative to non-supermarket, Petrol (pence per litre)



Source: CMA analysis of Experian and ONS data

29. Similarly to diesel, the above figure shows that supermarkets petrol prices relative to non-supermarkets is relatively similar over the five year period, although increased temporarily during 2020.

30. The above analysis does not provide evidence to support the view that supermarkets are pricing less aggressively more recently relative to the last five years, however, as stated in paragraph 25, this is not definitive evidence of no change in the price competitiveness of supermarkets.

Supermarket presence effect on price

31. As discussed in paragraph 20 above, our pattern of price dispersion regressions cannot identify the causal effect of various factors on prices because these factors might be correlated with unobserved determinants of prices. To circumvent this issue the CMA has estimated different models that exploit the time dimension of our data. The CMA used this approach to provide alternative estimates of the effect of supermarkets on the prices charged by neighbouring competitors. Instead of testing whether the presence of a particular competitor is associated with lower price at a particular date, we test whether a *change* in the set of competitors is associated with a

change in prices. If the unobserved determinants of prices do not vary materially over time in areas concerned by entry/exit, then this methodology can identify the causal impact of entry/exit by a particular type of competitor on prices. Of course, this leaves the possibility that unobserved determinants *do* vary over time, and that is precisely what triggers the entry/exit of specific competitors.[16] If that is the case, then the results of this strand of analysis are also biased. We cannot exclude this possibility but given that our panel is relatively short we consider this risk to be sufficiently small for the results to be informative.

32. Our analysis focuses on the competitive effect of supermarket on the price charged by petrol stations nearby. This requires sufficient entry and exit of supermarkets. Table 1 shows the number of catchment areas with an entry or exit by a supermarket brand. There were at least 233 catchment areas (or 3% of the catchment areas in the dataset) where a supermarket entered or exited. For Asda, there were 676 entry/exits into catchment areas (9% of all catchment areas in the dataset). This shows only a moderate level of entry/exit, relative to the overall size of the dataset. This implies that the coefficients of these models, while less likely to be biased, are also likely to be imprecisely estimated.

Table 1 – Number of catchment areas for entry/exit by supermarket

Supermarket	Number of catchment areas where there is entry/exit	Percent of total catchment areas
Asda	676	9%
Morrisons	318	4%
Sainsbury's	273	4%
Tesco	233	3%
Total	7630	100%

Source: CMA analysis of Experian data. Note: we exclude catchment areas where there was entry/exit of a site owned by the same company as the centroid site.

33. The CMA uses Experian data between June 2017 and June 2022 to estimate two different models.

34. The first model focuses on the competitive effect of various supermarket brands:

$$Price_{it} = Asda_{it} + Morrisons_{it} + Sainsbury's_{it} + Tesco_{it} + S_i + T_t + \varepsilon_{it}$$

where $price_{it}$ is the modal price charged by site i in week t, $Asda_{it}$ is a dummy variable equal to 1 if there is at least one competitor Asda site present

[16] Conversely, it is possible that the entry of a supermarket might itself cause other changes in the local market structure that might then have indirect effects on price. For example, the entry of supermarket might cause the exit of marginal competitors, in which case the coefficient in our regression will essentially reflect the 'net effect' of the direct effect (the increased competitive pressure from the supermarket) and indirect effects (the lower competitive pressure from other competitors).

in the catchment area of site i in period t, and equal to 0 otherwise, $Morrisons_{it}, Sainsbury's_{it}, Tesco_{it}$ are defined analogously, S_i is the time-invariant effect of unobservable variables on the price charged by site i, and T_t is the site invariant effect of unobservable variables on the price charged by any site in period t.

35. The second model look at the competitive effect of different types of competitors:

$$Price_{it} = Supermarket_{it} + Oil\ company_{it} + Dealer_{it} + S_i + T_t + \varepsilon_{it}$$

where $Supermarket_{it}$ is a dummy variable equal to 1 if there is at least one competitor supermarket site present in the catchment area of site i in period t, and equal to 0 otherwise, and the other variables are defined analogously.

36. This type of model is known as a Two-Way-Fixed-Effects model, in that they include two 'fixed effect' variables designed to capture the effect of (i) unobserved factors that can affect each site differently but do not vary over time; and (ii) unobserved factors that can affect each time period differently but do not vary over sites. This type of model will only identify the causal effect of interest if the effect of the variables of interest is instantaneous and does not vary over time.[17] In our context, this approach is only valid if competitors react instantly to a change in their competitive environment, and do not further adjust their prices in subsequent periods. If competitors respond more progressively to a change, then the estimates will be biased. We cannot exclude this risk, although most of the evidence at our disposal indicates that market participants change their prices very frequently and therefore should be expected to respond promptly to changes in their competitive environment.

37. Table 2 below shows the results of the specification estimating the impact of competitor type on price. The results show that sites with at least one supermarket will be 0.36ppl cheaper for diesel price, and 0.74ppl cheaper for petrol price. This indicates that the entry of a supermarket in an area where there is no supermarket leads to noticeably lower prices. For diesel, this is not substantially different to our cross-sectional results, however, for petrol, the impact of supermarkets is substantially larger in magnitude.

[17] Borusyak, K., Jaravel, X., Spiess, J., 'Revisiting event study design: robust and efficient estimation', Working paper, April 2022.

Table 2 – panel regression of competitor type on price

Dependent variable: Price (modal) in level	Diesel				Petrol			
	Cross-section		Panel		Cross-section		Panel	
	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
Competitor type								
Hypermarket	-0.4412***	0.0182	-0.3648*	0.1780	-0.5357***	0.0207	-0.7445***	0.1952
Dealer	-0.0713	0.0479	-0.0777	0.2686	-0.1908***	0.0551	-0.3439	0.2365
Company	0.1217***	0.0149	-0.1235	0.0673	0.0548**	0.0171	-0.1631*	0.0749
Week dummies (omitted from table)								
For cross-section: site and location characteristics omitted from table								
Constant	113.9357***	0.0946	118.3283***	0.3094	111.4525***	0.1069	117.8171***	0.2944
Number of observations	341033		1765761		276675		1410742	
R-squared	0.9317		0.9850		0.9283		0.9801	

CMA analysis of Experian data. Note: *, **, *** means the results are statistically significant at the 95 per cent, 99 per cent and 99.9 per cent levels respectively.

38. Table 3 shows the results of the regression estimating the impact of competitor supermarket brands on price. The results show sites with at least one Asda competitor have, on average, 0.23ppl cheaper diesel prices. Also, sites with at least one Tesco have, on average, 0.49ppl cheaper petrol prices. This indicates that the entry of an Asda or Tesco into the catchment area noticeably decreases price. The cross-sectional results are generally consistent in direction of effect (with the exception of Sainsbury's for petrol), but are not consistent in terms of magnitude of the effect.

Table 3 – panel regression of competitor supermarket on price

Dependent variable: Price (modal) in level	Diesel				Petrol			
	Cross-section		Panel		Cross-section		Panel	
	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
Competitor supermarket dummies								
Asda	-0.7795***	0.0119	-0.2272*	0.0943	-0.7644***	0.0132	-0.1872	0.1009
Morrisons	-0.0076	0.0112	-0.0548	0.1385	-0.0437***	0.0123	-0.1062	0.1580
Sainsbury's	-0.2671***	0.0121	-0.0344	0.2894	-0.3127***	0.0135	0.0597	0.4063
Tesco	-0.0980***	0.0125	-0.1580	0.1227	-0.0347*	0.0140	-0.4888***	0.1470
Week dummies (omitted from table)								
For cross-section: site and location characteristics omitted from table								
Constant	113.7084***	0.0951	118.1167***	0.2157	111.0409***	0.1075	117.1339***	0.2929
Number of observations	341033		1765761		276675		1410742	
R-squared	0.9336		0.9850		0.9300		0.9801	

CMA analysis of Experian data. Note: *, **, *** means the results are statistically significant at the 95 per cent, 99 per cent and 99.9 per cent levels respectively.

Appendix

Cross-sectional regressions

Table 4 – Cross sectional regression for competitor type (year = 2021)

Dependent variable: Price (modal) in level	Diesel		Petrol	
	Coefficient	Standard Error	Coefficient	Standard Error
Number of competitors (baseline = 0 competitors)				
1	-0.4130***	0.0721	-0.1344	0.0851
2	-0.2141**	0.0739	0.0520	0.0867
3	-0.2630***	0.0764	0.0583	0.0897
4	-0.4207***	0.0765	0.0833	0.0897
5	-0.8036***	0.0770	-0.3489***	0.0904
Competitor type				
Hypermarket	-0.4412***	0.0182	-0.5357***	0.0207
Dealer	-0.0713	0.0479	-0.1908***	0.0551
Oil Company	0.1217***	0.0149	0.0548**	0.0171
Brands-ownership dummies (baseline = Asda)				
morrisons	1.5162***	0.0388	1.5637***	0.0436
sainsburys	0.6739***	0.0391	0.5968***	0.0434
tesco	1.7466***	0.0363	1.8890***	0.0408
applegreen company	2.5227***	0.0519	2.6204***	0.0613
applegreen dealer	6.6664***	0.1175	6.1720***	0.1202
bp company	6.8203***	0.0411	6.3083***	0.0461
bp dealer	6.2710***	0.0388	5.7621***	0.0440
certas_energy company	3.6679***	0.0546	3.2271***	0.0657
certas_energy dealer	5.0694***	0.0430	5.0313***	0.0502
circle_k dealer	4.7742***	0.2903	3.5975***	0.4213
co_op	5.2248***	0.0506	5.0929***	0.0563
essar dealer	4.8952***	0.0695	4.4383***	0.0845
esso company	4.2918***	0.0439	4.1354***	0.0489
esso dealer	6.0867***	0.0386	5.6889***	0.0436
food_store	4.2510***	0.1464	4.2310***	0.1923
gleaner company	5.9833***	0.1357	5.5594***	0.1724
gleaner dealer	4.7915***	0.0872	4.8151***	0.1234
go dealer	2.6834***	0.1483	2.8003***	0.2188
harvest_energy company	4.8234***	0.2239	3.6441***	0.2887
harvest_energy dealer	4.4741***	0.1133	4.3319***	0.1441
jet company	2.4742***	0.1334	2.0705***	0.1489
jet dealer	4.4775***	0.0440	4.1584***	0.0503
maxol company	5.3687***	0.0846	4.7747***	0.1133
maxol dealer	4.6646***	0.0700	4.1690***	0.0955
minor_brand company	3.4296***	0.0955	4.2708***	0.1340
minor_brand dealer	4.9104***	0.0869	5.4026***	0.1174
murco company	5.5382***	0.2396	5.0742***	0.2873
murco dealer	4.7996***	0.0526	4.8289***	0.0645

rix dealer	4.2273***	0.3524	4.7290***	0.5002
shell company	7.1074***	0.0388	6.3421***	0.0435
shell dealer	6.2276***	0.0396	5.6781***	0.0448
solo company	5.3452***	0.5219	5.7721***	1.4666
solo dealer	4.9798***	0.1189	4.5257***	0.1764
star company	3.2873*	1.4701	3.3185**	1.2703
star dealer	4.0826***	0.1017	4.2593***	0.1521
texaco company	2.5976***	0.2760	2.0547***	0.3990
texaco dealer	5.1224***	0.0400	4.8816***	0.0455
thames company	3.4219***	0.3562	3.6601***	0.4828
thames dealer	4.8032***	0.1198	4.8635***	0.1671
total_energies company	3.9800***	0.1380	3.1241***	0.1503
total_energies dealer	4.4968***	0.0671	4.0331***	0.0789
unbranded	5.0960***	0.0575	5.3424***	0.0742
Location type dummies (baseline = urban transient)				
industry/office	-0.1457***	0.0145	-0.1198***	0.0157
motorway	15.3282***	0.0372	14.9713***	0.0388
residential	-0.2181***	0.0117	-0.1545***	0.0131
rural	0.4503***	0.0150	0.4278***	0.0170
Volume	0.0001***	0.0000	0.0001***	0.0000
Minimum distance to terminal	0.0069***	0.0003	0.0042***	0.0004
Availability of car wash dummy	-0.2955***	0.0094	-0.2645***	0.0104
Availability of shop dummy	0.0430	0.0326	-0.1290***	0.0388
Region dummies (baseline = London)				
(pseudo)_northern_ireland	-3.5253***	0.0425	-2.8426***	0.0523
(pseudo)_scotland	-0.0042	0.0296	-0.4531***	0.0319
(pseudo)_wales	-0.3325***	0.0329	-0.8527***	0.0361
east_midlands	-0.3602***	0.0315	-0.8444***	0.0337
east_of_england	0.3518***	0.0283	-0.0586	0.0302
north_east	-0.2277***	0.0354	-0.7508***	0.0384
north_west	-0.3955***	0.0288	-0.7573***	0.0311
south_east	0.2228***	0.0261	-0.2251***	0.0276
south_west	0.2168***	0.0303	-0.2638***	0.0326
west_midlands	-0.2513***	0.0284	-0.7791***	0.0304
yorkshire_and_the_humber	-0.3413***	0.0308	-1.0145***	0.0332
Median income (£)	0.0001***	0.0000	0.0001***	0.0000
Population density (people per sq km)	0.0000	0.0000	0.0000	0.0000
Week dummies (omitted from table)				
Number of observations	341033.0000		276675.0000	
R-squared	0.9317		0.9283	

CMA analysis of Experian and ONS data. Note: *, **, *** means the results are statistically significant at the 95 per cent, 99 per cent and 99.9 per cent levels respectively.

Table 5 – cross sectional regression for brand-ownership type (year = 2021)

Dependent variable: Price (modal) in level	Diesel		Petrol	
	Coefficient	Standard Error	Coefficient	Standard Error
Number of competitors				
1	-0.4554***	0.0604	-0.2615***	0.0719
2	-0.3029***	0.0588	-0.1746*	0.0698
3	-0.3449***	0.0585	-0.1950**	0.0695
4	-0.4814***	0.0579	-0.1473*	0.0688
5	-0.4781***	0.0561	-0.1997**	0.0667
Competitor brand-ownership dummies				
asda	-0.7795***	0.0119	-0.7644***	0.0132
morrisons	-0.0076	0.0112	-0.0437***	0.0123
sainsburys	-0.2671***	0.0121	-0.3127***	0.0135
tesco	-0.0980***	0.0125	-0.0347*	0.0140
applegreen_c	-0.0760***	0.0119	-0.0375**	0.0131
applegreen_d	-0.7972***	0.0356	-0.5241***	0.0390
bp_c	0.1057***	0.0119	0.0084	0.0131
bp dealer	-0.0418**	0.0132	-0.0923***	0.0148
certas_energy company	0.2577***	0.0189	0.2796***	0.0211
certas_energy dealer	-0.0391***	0.0095	0.0214*	0.0105
circle_k company	0.2814	0.2862	-0.3880	0.5031
circle_k dealer	-0.6747***	0.0809	-0.4172***	0.1113
co_op	0.1345***	0.0283	0.1884***	0.0313
essar dealer	0.0952***	0.0194	0.0727***	0.0218
esso company	0.0777***	0.0121	0.1085***	0.0133
esso dealer	-0.0527***	0.0133	-0.0120	0.0148
esso not applicable	-0.1999	0.1443	-0.9667***	0.1586
food_store	0.1174***	0.0166	0.0568**	0.0186
gleaner company	0.0027	0.0612	0.2262**	0.0704
gleaner dealer	0.2683***	0.0498	0.1449*	0.0593
go dealer	-0.0680	0.1521	0.0544	0.2398
harvest_energy company	-0.4009***	0.0347	-0.3198***	0.0370
harvest_energy dealer	-0.0684***	0.0135	-0.0254	0.0147
jet company	0.3575***	0.0661	0.2762***	0.0721
jet dealer	-0.1947***	0.0118	-0.1647***	0.0129
maxol company	0.2184***	0.0526	-0.3948***	0.0728
maxol dealer	-0.1633	0.0899	0.0212	0.1246
minor_brand company	-0.0642*	0.0273	0.0317	0.0312
minor_brand dealer	-0.2288***	0.0206	-0.1314***	0.0241
murco company	0.3441***	0.0463	0.3627***	0.0502
murco dealer	-0.1909***	0.0118	-0.1170***	0.0130
rix dealer	0.0158	0.0653	-0.0282	0.0749
shell company	0.3045***	0.0117	0.1819***	0.0129
shell dealer	0.0063	0.0115	-0.0374**	0.0127
solo company	-0.3048	0.1772	-0.1634	0.2897
solo dealer	0.0913	0.0492	0.4919***	0.0684
star company	-0.1175	0.0857	-0.3908***	0.1142

star dealer	-0.6594***	0.0511	-0.8087***	0.0726
texaco company	-0.7540***	0.0451	-0.9448***	0.0491
texaco dealer	-0.1711***	0.0129	-0.1344***	0.0143
thames company	-2.0599***	0.1790	-2.9284***	0.2376
thames dealer	-0.1591***	0.0378	-0.3775***	0.0427
topaz company	0.0607	0.2847	-0.4629	0.4947
topaz dealer	-0.1527**	0.0581	0.1706*	0.0798
total_energies company	-0.2426***	0.0332	-0.2048***	0.0358
total_energies dealer	0.2578***	0.0242	0.0888***	0.0265
unbranded company	-1.3168***	0.1258	-1.0546***	0.1367
unbranded dealer	0.2169***	0.0114	0.1414***	0.0127
Brands-ownership dummies (baseline = Asda)				
morrisons	2.0973***	0.0405	2.1022***	0.0456
sainsburys	1.0400***	0.0410	0.9330***	0.0456
tesco	2.2476***	0.0384	2.4491***	0.0433
applegreen_c	3.0664***	0.0522	3.1850***	0.0617
applegreen_d	7.2038***	0.1168	6.7494***	0.1198
bp_c	7.3995***	0.0420	6.8412***	0.0472
bp dealer	6.8027***	0.0394	6.2946***	0.0448
certas_energy company	4.2160***	0.0549	3.7753***	0.0660
certas_energy dealer	5.6071***	0.0435	5.5588***	0.0508
circle_k dealer	4.8724***	0.2934	3.7206***	0.4259
co_op	5.7782***	0.0508	5.6272***	0.0566
essar dealer	5.3843***	0.0692	4.9793***	0.0842
esso company	4.8683***	0.0462	4.7956***	0.0515
esso dealer	6.6314***	0.0393	6.2423***	0.0444
foodstore	4.6923***	0.1451	4.5758***	0.1907
gleaner company	6.2665***	0.1348	5.7757***	0.1713
gleaner dealer	5.1034***	0.0910	5.0857***	0.1273
go dealer	2.9087***	0.1497	3.2074***	0.2241
harvest_energy company	5.1008***	0.2211	3.8502***	0.2854
harvest_energy dealer	5.0369***	0.1121	4.8909***	0.1428
jet company	3.0915***	0.1324	2.7234***	0.1480
jet dealer	5.0275***	0.0445	4.7308***	0.0510
maxol company	5.8830***	0.0849	5.0233***	0.1146
maxol dealer	5.1271***	0.0705	4.6439***	0.0969
minor_brand company	3.7993***	0.0955	4.8205***	0.1333
minor_brand dealer	5.3064***	0.0863	5.8013***	0.1165
murco company	5.5985***	0.2367	5.1351***	0.2842
murco dealer	5.3247***	0.0529	5.3122***	0.0647
rix dealer	4.3932***	0.3478	4.9004***	0.4943
shell company	7.7151***	0.0396	6.9293***	0.0445
shell dealer	6.8053***	0.0402	6.2564***	0.0456
solo company	6.5841***	0.5635	7.7727***	1.5082
solo dealer	5.5569***	0.1188	5.1142***	0.1760
star company	3.7088*	1.4509	4.0591**	1.2570
star dealer	4.1992***	0.1033	4.4231***	0.1544
texaco company	3.0119***	0.2730	2.6556***	0.3950

texaco dealer	5.6713***	0.0406	5.4135***	0.0462
thames company	4.2447***	0.3536	4.6197***	0.4789
thames dealer	5.8284***	0.1229	5.9465***	0.1674
total_energies company	4.3662***	0.1365	3.4824***	0.1488
total_energies dealer	5.0859***	0.0669	4.6311***	0.0787
unbranded dealer	5.6164***	0.0577	5.8972***	0.0742
Location type dummies (baseline = urban transient)				
industry/office	-0.2038***	0.0144	-0.1645***	0.0156
motorway	15.3822***	0.0369	15.0290***	0.0385
residential	-0.2525***	0.0116	-0.1847***	0.0130
rural	0.3692***	0.0150	0.3445***	0.0171
Volume	0.0001***	0.0000	0.0001***	0.0000
Minimum distance to terminal	0.0065***	0.0003	0.0037***	0.0004
Availability of car wash dummy	-0.3099***	0.0093	-0.2830***	0.0103
Availability of shop dummy	0.0594	0.0322	-0.1280***	0.0385
Region dummies (baseline = London)				
(pseudo)_northern_ireland	-2.7914***	0.1046	-2.2979***	0.1415
(pseudo)_scotland	-0.0480	0.0341	-0.3946***	0.0372
(pseudo)_wales	-0.2134***	0.0356	-0.7480***	0.0392
east_midlands	-0.2840***	0.0331	-0.7077***	0.0356
east_of_england	0.2352***	0.0292	-0.1136***	0.0313
north_east	-0.2070***	0.0391	-0.6733***	0.0428
north_west	-0.3762***	0.0316	-0.6784***	0.0343
south_east	0.1117***	0.0273	-0.2788***	0.0292
south_west	0.1652***	0.0323	-0.2766***	0.0349
west_midlands	-0.1643***	0.0300	-0.6299***	0.0323
yorkshire_and_the_humber	-0.0702*	0.0332	-0.6757***	0.0361
Median income (£)	0.0001***	0.0000	0.0001***	0.0000
Population density (people per sq km)	0.0001***	0.0000	0.0001***	0.0000
Week dummies (omitted from table)		.		.
Constant	113.7084***	0.0951	111.0409***	0.1075
Number of observations	341033.0000		276675.0000	
R-squared	0.9336		0.9300	

Source: CMA analysis of Experian and ONS data. Note: *, **, *** means the results are statistically significant at the 95 per cent, 99 per cent and 99.9 per cent levels respectively.

Glossary

Applegreen	Petrogas UK Limited.
Asda	Asda Group Limited.
ACS	Association of Convenience Stores.
API	Application Programme Interface, which is software that allows computers or applications to communicate with one another.
BEIS	Department for Business, Energy and Industrial Strategy.
Biofuel	Fuel produced from biomass (plant-based materials).
BP	BP Oil UK Limited.
Business Secretary	The Secretary of State for Business, Energy and Industrial Strategy.
Carbon offsets	A reduction or removal of CO2 or other greenhouse gas emission, eg via investment into an environmental project, to offset emissions made elsewhere.
Catchment area	Catchment areas are used to identify the most significant competitive alternatives available to customers at a local level. They are defined as the areas from which most customers of a given shop are drawn.
Centroid PFS (or 'centroid shop')	The PFS taken as a starting point to define a catchment area.
Certas	Certas Energy UK Limited.
COCO	Company Owned, Company Operated.
CODO	Company Owned, Dealer Operated.
Crude oil	Oil, or petroleum, from underground that has not yet been refined into various petrochemicals including petrol, paraffin and diesel.
Diesel	A type of refined oil used as fuel.
DODO	Dealer Owned, Dealer Operated.

Downstream Oil Industry Protocol	The protocol is part of the National Emergency Plan for Fuel and when activated, the protocol temporarily exempts industry from the Competition Act 1998 for the purpose of optimising supply in the event of a disruption and allows for information sharing, joint planning and co-ordinated supply action. The signatories to the protocol are the Business Secretary and industry parties, which includes relevant industry associations and companies with a significant national role in fuel supply, distribution and retailing.
EG/EG Group	Euro Garages Limited.
Experian/Experian Catalist	Experian Limited.
Emissions Trading Scheme (ETS)	The UK's carbon emissions trading scheme designed to reduce greenhouse gas emissions.
Essar	Essar Oil (UK) Limited.
Esso	Esso Petroleum Company Limited.
Fuel duty	Fuel duties are taxes levied on purchases of petrol, diesel and a variety of other fuels. In the UK, Fuel Duty is levied per unit of fuel purchased and is included in the price paid for petrol, diesel and other fuels used in vehicles or for heating. The rate depends on the type of fuel. Fuel Duty is levied at the time fuel leaves the refinery or import terminal and is paid before the retailer receives the fuel.
Fuel Card	A fuel card (also known as a fleet card) is used by business customers to pay for petrol, diesel, and other fuels at petrol filling stations. Fuel cards enable fleet owners/managers to receive real time reports and set purchase controls with their cards helping them to stay informed of all business-related expenses.
Fuel margin	The difference in the cost of acquiring fuel and the revenue generated from the sale of fuel as reported in the management accounts divided by the reported fuel revenue.
Greenergy	Greenergy Fuels Holdings Limited and Greenergy Fuels Limited.
Importer	A party that purchases petrol, diesel or any other road fuel overseas and imports it into the UK.
Independent wholesaler	A party who buys refined products in the UK and sells them to retailers.

LCC	LCC Group Limited.
Mabanaft	Mabanaft Limited.
Median	The middle number in a set of values when those values are arranged from smallest to largest.
MFG	Motor Fuel Group.
Moto	Moto Hospitality Limited.
Morrisons	WM Morrisons Supermarkets Limited.
MSA	Motorway Service Area – a place where drivers can refuel, rest, or take refreshments on a motorway.
OFT	Office of Fair Trading, a predecessor of the Competition and Markets Authority.
OPEC	Organisation of the Petroleum Exporting Countries.
Open Data Scheme	An initiative whereby data is freely accessible to developers to use in their own software and services, including for commercial purposes.
Operating margins	These are calculated by dividing reported operating profit by total fuel revenues.
Pass-through	The extent to which cost changes are 'passed through' to prices.
Petrol	A type of refined oil used as fuel.
Petroineos	Petroineos Trading Limited and its subsidiaries and Petroineos Refining Limited and its subsidiaries.
Petroleum products	Petroleum products (also referred to as refined products) are materials derived from crude oil (petroleum) processed in oil refineries and include aviation fuel.
Petroleum	See "Crude Oil".
PFS	Petrol Filling Station – the retailing point for road fuel which may form part of a larger site. (This includes filling stations at supermarkets, as well as large and small independent retailers.)
Platts benchmark	A commodity price assessment provided by S&P Global (Platts).
Phillips 66	Phillips 66 Limited.
PRA	Petrol Retailers Association.

Prax	State Oil Limited and its subsidiaries, including Prax Lindsey Oil Refinery Limited.
Refinery	An industrial plant which produces fuels and petrochemicals from crude oil.
Refining activity	The process of separating crude oil into its component fractions to create specific petrochemicals and products including petrol and diesel.
Refining spread	The difference between the price of crude oil (in sterling) entering refineries and the benchmark wholesale price of petrol/diesel leaving them.
Renewable Blending Products	Additives or fuel products produced from renewable or sustainable sources eg ethanol, methanol.
Renewable Transport Fuel Obligation (RTFO)	An obligation placed on suppliers of relevant transport fuel by the UK Government to show that a percentage of the fuel a company supplies comes from renewable or sustainable sources.
Renewable Transport Fuel Certificates (RTFCs)	Certificates issued to suppliers of sustainable renewable fuels. These certificates can be traded or redeemed to help suppliers meet requirements under the RTFO.
Retail activity	Selling petrol and diesel to motorists.
Retailer	A party selling petrol and diesel to motorists. (This includes supermarkets, as well as large and small independent retailers.)
Retail spread	The difference between the benchmark wholesale price of petrol/diesel, and the price at the pump.
Rocket and Feather pricing	A concept where pump prices increase rapidly when wholesale petrol prices are going up, but fall back slowly when wholesale prices decrease.
Rontec	Rontec Roadside Retail Limited.
RFI	Request for Information.
Sainsbury's	J Sainsbury PLC.
Shell	Shell PLC.
Spot price	The spot price is the current price in the marketplace at which a commodity can be bought or sold.
Supermarket	Tesco, Sainsbury's, Morrisons or Asda.
Tesco	Tesco PLC.
UKPIA	United Kingdom Petroleum Industry Association.
Valero	Valero Energy Limited.

Welcome Break	Welcome Break Group Limited.
Wholesale supply	Selling petrol, diesel and any other road fuel to retailers.
Wholesale supplier	A party that sells petrol, diesel and any other road fuel to retailers. Wholesale suppliers may be refiners, importers or independent wholesalers.