Appendix 7.2: Cost pass-through

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Introduction

1. This appendix sets out our analysis of the relationship between domestic energy prices and costs. The analysis consists of two parts:

   (a) Part A: analysis of the relationship between cost movements and price setting.

   (b) Part B: analysis of the relationship between incurred costs and realised prices.

2. The purpose of this analysis is to describe the way in which costs to the domestic retail supply of energy are passed through to prices. In particular, Part A informs us of the way industrywide cost changes are factored into pricing decisions in the shorter term; Part B informs us of the trend in realised gross margins over the longer term.

3. This appendix is structured as follows:

   (a) We first set out the background to this analysis: definitions, economic theory and analytical framework (paragraphs 4 to 14).

   (b) Second, we present Part A of the analysis: description of the data and the results (paragraphs 15 to 65).

   (c) Third, we present Part B of the analysis (paragraphs 66 to 74).

(d) Fourth, we summarise the parties' responses to the cost pass-through working paper, published on 23 February 2015 (the Working Paper).

(e) Finally, we summarise the key findings (paragraph 83).

(f) Annex A sets out further details of our cost benchmark methodology.

(g) Annex B presents additional results.

(h) Annex C sets out the detailed methodology and results of our econometric analysis.

Background

Definitions

4. Cost pass-through is a concept that describes the response of the price of a good or service to a change in relevant input costs. We are interested in the relationship between retail domestic energy prices and marginal costs of energy supply, which largely consist of costs of purchasing and delivering energy and meeting environmental and social obligations.

5. Marginal costs are costs that increase with output. In the domestic energy markets these may be costs that are fixed per customer and therefore increase with the size of the customer base (for example, costs of meeting certain social obligations), or costs that increase with volumes delivered (such as wholesale costs or variable costs of transmission and distribution). In any case these are costs that unavoidably vary with some measure of output within the time period considered. Costs over which the firm has discretion or which are fixed within the time period considered (such as customer service or overhead costs) are not considered to be marginal, although it is likely that some of them become marginal in the long run.

6. There are two key dimensions of cost pass-through:

   (a) Degree of pass-through – the size of a price change relative to the size of a cost change. A 100% pass-through would refer to a situation where a change in input costs is followed by a change in price of an equal amount. This would imply that gross margins do not change over time.

   (b) Speed of pass-through – the time it takes for a change in input costs to have an impact on retail prices.

7. Asymmetric pass-through occurs, for example, when prices rise relatively fast or more in response to increasing costs, but fall slowly or less when costs decrease.

Economic theory

8. Economic theory predicts that the degree of pass-through of marginal costs to prices in a market will depend on the model of competition as well as the shapes of the demand and supply curves. An estimate of the degree of pass-through must therefore be interpreted along with some information about the other relevant parameters characterising demand and supply in the market.

9. In general, however, cost pass-through of relevant industry-level cost movements is thought to be higher in more competitive markets. Intuitively, this is because in a competitive market margins are low and firms must adjust prices immediately when costs change in order to remain competitive.

10. The word 'relevant' above is important. First, only costs that are considered to be marginal are relevant in this context. Second, relevant cost movements would be those that firms can be expected to take into account in their pricing decisions. For example, week-to-week cost fluctuations may not be relevant if firms cannot realistically adjust their prices weekly, as is the case, for example, with standard variable tariffs (SVTs).[1]

11. We note that the pass-through of short-run industry-level cost movements to SVT prices may be very low because, for example:

    (a) firms may be (efficiently) absorbing short-run cost movements that risk-averse customers do not like; and

    (b) there may be significant menu costs (costs of changing prices, such as the costs of updating the billing systems, informing customers, or reputational costs).

Analytical framework

12. Our analytical framework for assessing cost pass-through in the domestic energy markets consists of two parts. The first part (Part A) assesses the Six Large Energy Firms' price setting behaviour and the extent to which changes

[1] We consider that the lowest frequency with which firms could in principle adjust their SVT prices is monthly. While typically SVT prices are adjusted less frequently than that, there have been instances of price adjustments in consecutive months, for example, in early 2014. However, we acknowledge that this may only be feasible for price reductions and not price increases, since the latter draw considerably more public attention and require an early announcement.

in marginal costs impact price changes. The second part (Part B) assesses the relationship between actual (incurred) costs and actual (realised) prices.

13. The two types of analysis are different in nature and as such can be used to draw different types of conclusions. Part A uses stylised monthly prices and costs measured in a forward-looking way that resembles the cost outlook firms factor into their pricing decisions, and can be used to assess the role of changing costs in price setting in the shorter term. We consider the measures used in Part A to be sufficiently robust for assessing the relative movements of costs and prices, but they are not a comprehensive source for the assessment of the levels of costs, and so gross margins. Conversely, Part B uses annual data and more comprehensive measures of all direct cost items, and so can be used to assess the levels of gross margins and the relationship between costs and prices over the longer term. While Part A assesses firm pricing behaviour, Part B assesses market outcomes.

14. The table below contrasts the key characteristics of each type of analysis.

Table 1: Overview of the differences between the two analytical approaches

	Part A	**Part B**
Cost measures	Expected direct costs (industry- or firm-level forecasts) for a representative customer	Direct costs: actual (incurred), on average for a portfolio of different customers
Price measures	Representative customer price	Actual (realised) revenue, on average for a portfolio of different customers
Data frequency	Monthly	Annual
Advantages	Can be used to understand price setting in the shorter term	Can be used to assess the levels of realised gross margins and the relationship between direct costs and prices in the longer term
Disadvantages	• Monthly forecast cost measures may lack precision and are in some cases produced on a different basis by each firm • Not all cost items have forecasts available, or they are not available on a monthly basis	• Differences in costs and prices over time or across firms may be due to differences and changes in the composition of the customer base, and are therefore less informative about the suppliers' pricing behaviour • Accounting costs may not be a good measure of true economic (opportunity) costs and may differ from the costs that were known to or expected by firms when they set their prices

Source: CMA analysis.

Part A: short term analysis of forward-looking costs and prices

15. This part of our analysis assesses the extent to which short-term (monthly) changes in expected marginal costs are passed through to prices. We observe how suppliers have changed their prices at particular points in time,

and assess the extent to which these price changes were driven by the information the industry or the suppliers had at that point in time about the costs of energy supply. That is, this analysis compares price movements with movements in expected costs.

16. We recognise that expected costs are only one of several factors suppliers take into account when setting prices. We also acknowledge that there have been a number of regulatory changes throughout the period of analysis, which may have affected the way suppliers price their products. This analysis does not seek to form a view of how each of these factors interact, and should be interpreted alongside other evidence we have gathered (see, for example, Appendix 7.3: The pricing strategies of the Six Large Energy Firms, Appendix 8.2: Impact of the Retail Market Review and Appendix 8.4: Price discrimination).

Approach

17. The methodology is motivated by our understanding that decisions to change SVT prices or launch new non-standard tariffs (NSTs) at certain prices are informed by suppliers' expectations of future costs (both energy and other direct costs, such as transmission or policy). Intuitively, this is because a price quoted in a contract today will apply to energy delivered to a customer over a period of time (until the customer switches, until the price is changed, or until a contract expires).[2]

18. An energy supplier's expectations of its costs of delivering a certain amount of energy at a point in time in the future consist of:

   (a) the cost that the supplier has already incurred for future delivery by purchasing some of the expected volume in advance (the 'closed' position); and

   (b) the cost that the supplier expects to incur in purchasing the remaining expected volume (the 'open' position). These expectations are informed by forward prices of future products.

19. In principle, only the energy cost in 18(b) should matter to a profit maximising supplier when setting its prices, regardless of the cost of the energy that has already been purchased (although the cost in 18(a) will affect its profits).[3] In

[2] We also note that a price change for the SVT can only be implemented a month after it was announced. This means that the current (spot) price of energy should have no relevance to the pricing decision at a point in time. This is to some extent also true for NSTs, as switching to a NST does not take effect instantaneously.
[3] See, for example, Nakamura, E and Zerom, D (2010), *Accounting for Incomplete Pass-Through*, who discuss the irrelevance of hedging contracts to marginal costs in the context of the coffee market.

particular, we consider that forward prices of future energy products are a good benchmark of the expected marginal wholesale cost as:

(a) forward gas and electricity prices measure the expected cost of supplying energy to a newly acquired domestic customer in the future; and

(b) forward prices also measure the expected value, or opportunity cost, at a point in time, of the energy the supplier already procured in the past for future delivery. That is, if a supplier lost a domestic customer and had to sell the energy it previously purchased for that customer back to the market, the price at which this energy could be sold is the forward price in the market at that point in time.

20. In practice, however, we understand that energy suppliers also take account of their hedging contracts when setting domestic retail prices. We therefore consider a range of measures of expected costs.

Measures of expectations of energy costs

Forward-looking opportunity cost benchmarks

21. We constructed forward-looking industry cost benchmarks for the period between 2004 and March 2015. These benchmarks approximate the economic opportunity cost and do not make any assumptions about hedging. The benchmarks use daily electricity and gas forward price assessments from ICIS[4] for future energy products traded for delivery in the month(s), quarter(s) and season(s). We constructed three versions of this benchmark:[5]

(a) A one-year wholesale cost benchmark. This is an index that, on each day, evaluates the expected cost of delivering gas and electricity for a dual fuel domestic customer with typical consumption[6] over the next year. The index is a weighted average of the prices of the relevant future products (month(s), quarter(s) and season(s))[7] that cover the next one year of delivery. Each product's prices are weighted by the length of the period that product covers within the year (for example, the price of the

[4] ICIS is a market information provider.
[5] Each of the wholesale cost benchmarks also includes a set of assumptions for the costs of transmission losses and shaping (see Annex A).
[6] As per Ofgem's current definition of a typical (medium) customer. See Ofgem's decision letter.
[7] We use the ICIS price assessments for each of the products.

season-ahead product determines one half of next year's cost).[8] Additionally, we apply seasonal consumption weights for electricity (winter and summer)[9] and quarterly consumption weights for gas. We aggregate the daily index to monthly values, taking a simple average of all daily index values within a month.[10]

(b) An 18-month wholesale cost benchmark. This index is constructed similarly to 21(a) but covers the next 18 months of delivery.

(c) A two-year wholesale cost benchmark. This index is constructed similarly to 21(a) but covers the next two years of delivery.

Day-ahead cost benchmark

22. We also constructed a day-ahead wholesale cost benchmark. This benchmark is constructed by applying the day-ahead electricity and gas prices (sourced from the ICIS Heren Day-ahead index)[11] to the typical domestic consumption values, and is aggregated to a monthly frequency.[12] In other words, in each month this is the average cost of buying all of a typical customer's demanded energy one day ahead of consumption (expressed in annual consumption values for the purpose of comparison with the other benchmarks). This benchmark is not a forward-looking measure like the benchmarks above, but instead assumes that all energy is bought shortly before delivery.

Ofgem's forward-looking Supply Market Indicator

23. Ofgem constructs a forward-looking expected cost measure (the Supply Market Indicator (SMI)), which is a forecast of the cost of delivering energy over the next 12 months, and assumes a certain purchasing (hedging) strategy.[13] The central stylised hedging strategy embedded in the SMI assumes that energy for delivery in a particular month in the future is bought at equal amounts throughout the 18 months leading up to that month. Therefore, the calculation of the SMI energy component for the next season is an average of that season product's traded price over the previous 18

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[8] For electricity, we construct this index for baseload and peak product prices separately, and then compute a weighted average electricity index (assuming that 70% of the electricity consumed is baseload, and 30% are peak products).
[9] Winter and summer products are both six-month seasonal products. We use fixed seasonal consumption weights throughout the period. The weights are based on energy consumption figures between 2004 and 2014, as published by DECC. See DECC's publication page.
[10] See Annex A for illustrative diagrams showing how the one-year cost benchmark was calculated.
[11] The Heren Day-ahead index is an average of day-ahead trade prices, weighted by the trading volume.
[12] Historical data was only available from 2011 for the peak price index. The day-ahead benchmark is therefore only shown from 2011 onwards in Figure 1.
[13] See Ofgem's SMI methodology.

months. For the season after that, the calculation takes account of the last 12 months' traded prices.

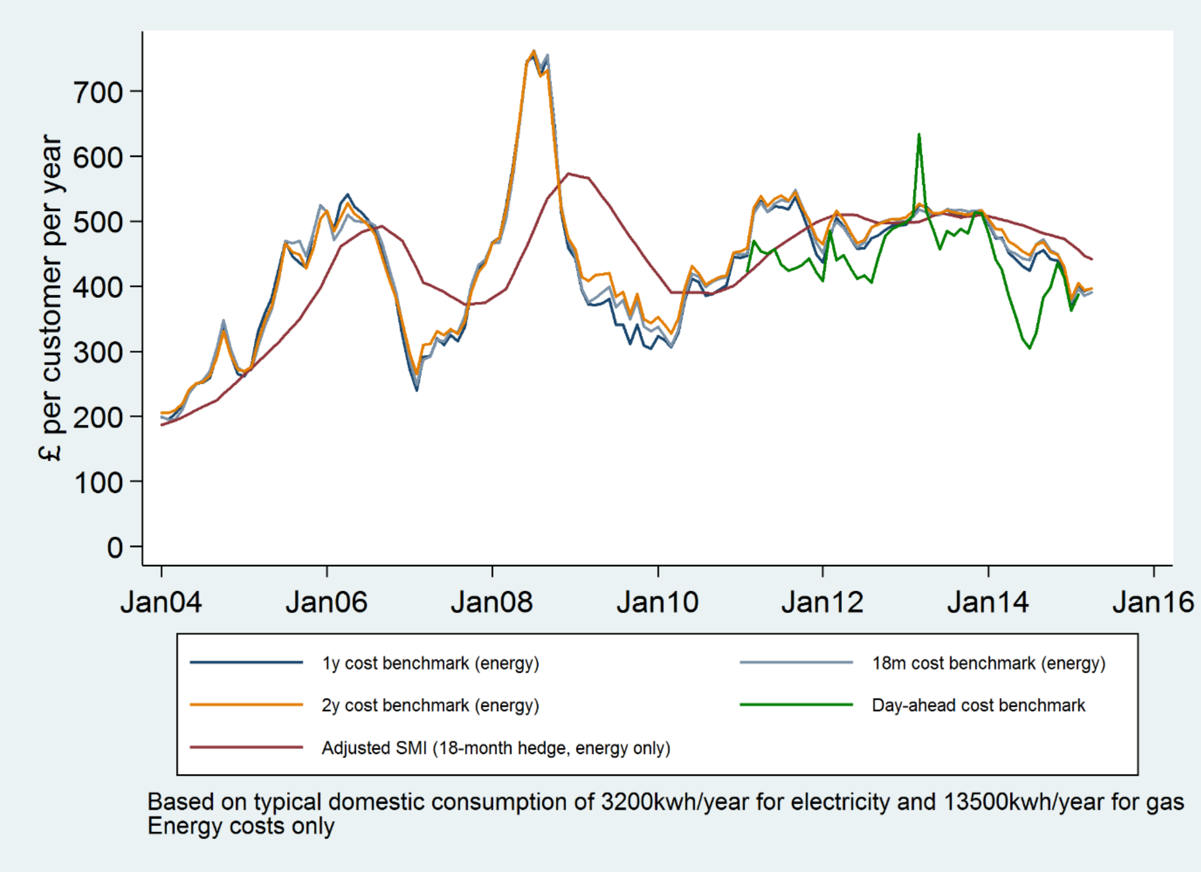
24. In other words, while our forward-looking cost benchmarks above track the expected cost of supplying energy to a typical domestic customer for the next year at each month if the supplier were to purchase all of the following year's expected volume for that customer in that month, the SMI tracks the expected cost by assuming that the supplier already purchased some of that expected volume in the past (see Annex A for an illustrative example).

Comparison of industry-level energy cost benchmarks

25. We emphasise that both the SMI and the forward-looking benchmarks above are cost forecasts (expectations), and both the SMI and the one-year cost benchmark are measuring costs for the same period of delivery (the following 12 months). The difference between the two types of measures is in the information that is used to construct the forecast: the cost benchmarks use only the market information available in the month when the forecast is made, whereas the SMI also uses price information from earlier months.

26. Figure 1 illustrates the movements of the cost benchmarks and the Ofgem SMI in the period between January 2004 and March 2015.

Figure 1: Expected energy cost for supplying a typical dual fuel domestic customer over the next year



Source: CMA analysis of data collected from ICIS and Ofgem.

27. We observe from Figure 1 that the forward-looking benchmarks co-move closely over time and in most periods there is no material difference. The day-ahead index co-moves with the forward-looking indices but is more volatile. The SMI energy cost is much smoother than the other benchmarks, and expected wholesale cost changes appear with a lag because of the hedging assumption.

28. We focus in our analysis primarily on the one-year expected cost benchmark in our analysis. We consider that this benchmark is directly relevant for an analysis of pass-through to tariffs with a one-year fixed-term contract. We also consider it to be a relevant benchmark for the analysis of SVT prices and prices of NSTs with contracts of different lengths because:

(a) we consider that domestic customers are not typically expected to switch more frequently than this period. Infrequent switching may be caused, for example, by switching costs or weak customer engagement;

(b) we understand that the Six Large Energy Firms take account of energy cost forecasts of at least such length when setting their SVT prices; and

(c) the benchmarks with different lengths of forecast periods are not materially different from the one-year benchmark. For example, we observe that the movements of the 18-month and two-year indices are not materially different from the movements of the one-year index.

29. With regards to the day-ahead benchmark, we consider this benchmark to reflect the spot price of energy. We observe, from Figure 1, that the cost trends measured by the day-ahead and longer period forward price indices are similar, however, the day-ahead index is more volatile and may be affected by short-term shocks (for example, unexpected weather conditions).[14] Because of this and for the reasons set out in point 28(c) we do not use the day-ahead benchmark in the remainder of this analysis.

Firm-level expected wholesale cost measures

30. We collected data on the Six Large Energy Firms' own energy cost forecasts. The data that was available differed between the suppliers with respect to the time period, frequency and granularity (for example, availability of cost forecasts by product). For the majority of the Six Large Energy Firms the data we collected takes the form of matrices, where for each month of forecasting we have the expected cost per unit of electricity or gas for each of the following 24 months.[15] The expected cost per unit is defined as a weighted average of the open and closed (hedged) positions. We have also collected data on volume forecasts in the same format.

31. We use the suppliers' cost forecasts for the next 12 months, each month weighted by the expected volumes in that month relative to the expected volumes for the year, to construct, in each month, an expected cost per unit of electricity and gas over the next year. We then use these figures to calculate an index of an expected cost of supplying energy to a typical dual fuel domestic customer over the next year.[16]

32. The data available to us from the Six Large Energy Firms differed in how certain cost items relating to the purchasing of energy were accounted for. For example, EDF Energy did not hold separate data on BSUoS costs and this was included in the wholesale cost; E.ON's wholesale costs include balancing and some transmission and distribution costs; Centrica's wholesale costs also include a contribution to brokerage and hedging-related operating costs. For

[14] We also note that the day-ahead energy price tends to be lower than the forward prices. See Appendix 10.5: Assessment of the competitive benchmark in retail energy supply for a discussion about this.
[15] The data we received from SSE was only available in certain times of the year and not for the full 24 month forecast period.
[16] As the cost forecast data was not always fully available for delivery months further than the next 12, we did not calculate expected cost indices of different lengths. However, for the reasons set out in paragraph 28 we expect the 1-year forecast to adequately approximate the cost that suppliers were factoring into their pricing decisions.

this reason we do not consider the levels of the reported wholesale costs to be comparable across the suppliers, although the differences in these definitions are likely to be small in monetary terms.

Measures of expectations of other direct costs

33. We consider the following cost categories to also be relevant to domestic retail pricing (we refer to these as 'other costs' throughout the analysis):[17]

(a) Transmission and distribution costs.

(b) BSUoS (electricity only).

(c) Environmental and social obligations (or policy costs).

34. Ofgem estimates these costs for the SMI using publicly available information.[18] We adapted the Ofgem measures to reflect the latest typical domestic consumption values.[19] The environmental and social obligation costs included in these measures are ROCs, FITs, ECO and the Warm Home Discount Scheme.[20]

35. We do not include operational costs in our analysis, as these are indirect costs that should not be relevant to pricing in the short term.

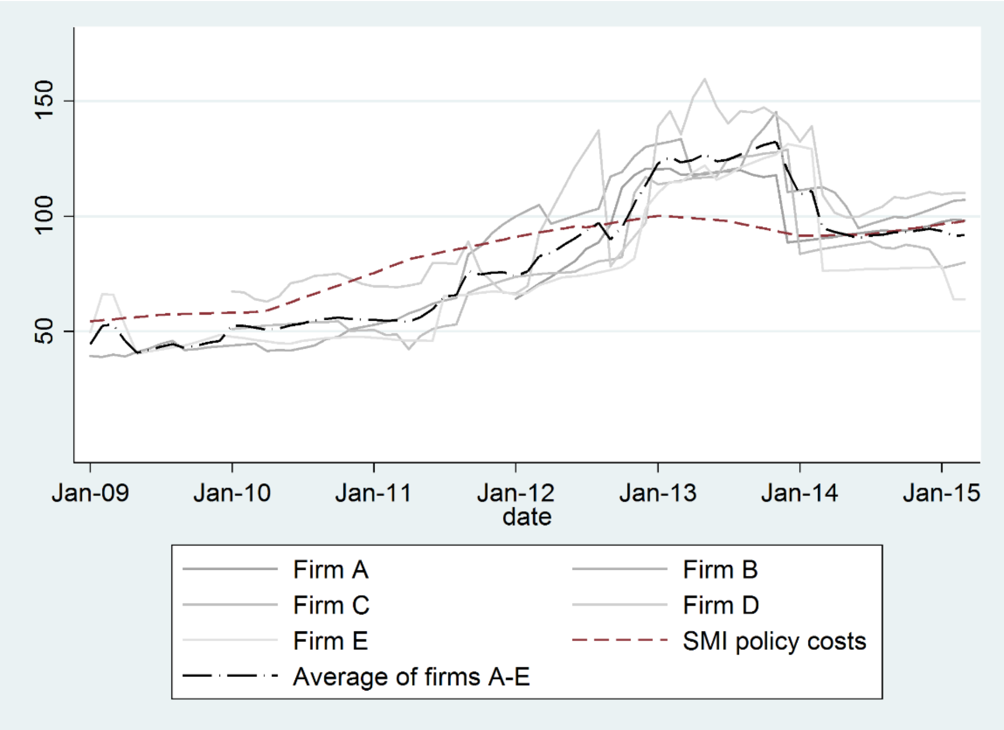
36. EDF Energy and RWE argued that some of these measures did not reflect the high degree of uncertainty that firms faced with respect to some of these cost items, and in particular ECO. SSE also argued that the SMI policy cost measures as used in our analysis were not purely forward-looking as they appeared to be constructed on ex-post cost data. To address these points we also constructed policy cost forecasts using the forecast data submitted by five of the Six Large Energy Firms.[21] We note that the method of construction of these forecasts differed between the suppliers; in particular, these forecasts are produced at different frequencies by suppliers; E.ON included ROC costs in the wholesale costs and not the policy costs.

37. Figure 2 presents the evolution of the forecasts of policy costs over time. We observe that the SMI measure does not capture the sharp rise in expected

[17] While there may be other costs (such as metering) that may be marginal to the number of customer accounts, we understand that these are not material in magnitude for the purposes of Part A of our analysis, and do not vary materially over shorter periods of time. See also paragraph 82.
[18] See Ofgem's SMI methodology, which lists the data sources and assumptions used to construct the measures of these costs.
[19] We note that Ofgem flagged that this data may be less reliable, in particular with respect to network costs, prior to 2007.
[20] Appendix 7.1: Social and environmental obligation thresholds discusses these obligations in more detail.
[21] It was not available for SSE in the format requested.

policy costs in 2013, but it overstates expected policy costs before 2013. It appears to be a fairly good reflection of the suppliers' average forecasts from early 2014.

Figure 2: Environmental and social obligation cost forecasts



Source: CMA analysis of data collected from Ofgem and five of the Six Large Energy Firms.
Note: [✂].

38. Whilst we recognise that the SMI policy cost measures depart at times from the actual cost expectations the industry had, this error in measurement is not material as a proportion of total direct costs (see Figure 1 in Annex B, which shows the forward-looking index with either the SMI or firm-level average policy cost forecasts assumed). We therefore use the Ofgem measures of policy costs for the remainder of this analysis, as this allows us to look at the full period from 2004.

Measures of prices

39. We collected data on two sets of prices: the SVT prices and NST prices. Both sets of price measures are based on the annual dual fuel bill for a typical (medium) customer[22] paying by direct debit, on average (simple average)

[22] As per Ofgem's current definition of a medium customer. See Ofgem's decision letter.

across the regions. We also collected SVT prices for earlier definitions of typical domestic consumption.[23]

Standard variable tariff prices

40. We initially considered the following measures of SVT prices:

   (a) A simple average of the Six Large Energy Firms' SVT bills (for a dual fuel domestic customer with typical consumption values).

   (b) A weighted average of the Six Large Energy Firms' SVT bills, weighted by market shares.

41. We consider the simple average in 40(a) to be informative and relevant for this part of the analysis because the movements of this measure over time reflect genuine price changes implemented by the suppliers in response to changes in costs or other factors in the market. In contrast, a weighted average such as the one in 40(b) can change over time because of changes in the mix of customer types or market shares, even if suppliers do not change the prices they charge to each of their domestic customers subscribed to the SVT. Similarly, a unit revenue measure would be partly driven by changes in consumption and payment type mix over time and this would mask the response of prices to cost movements. We use the unit revenue measure in Part B.

42. We emphasise that this price measure is not a measure of average per customer revenues, and its purpose is to track the Six Large Energy Firms' SVT pricing decisions over time.

NST prices

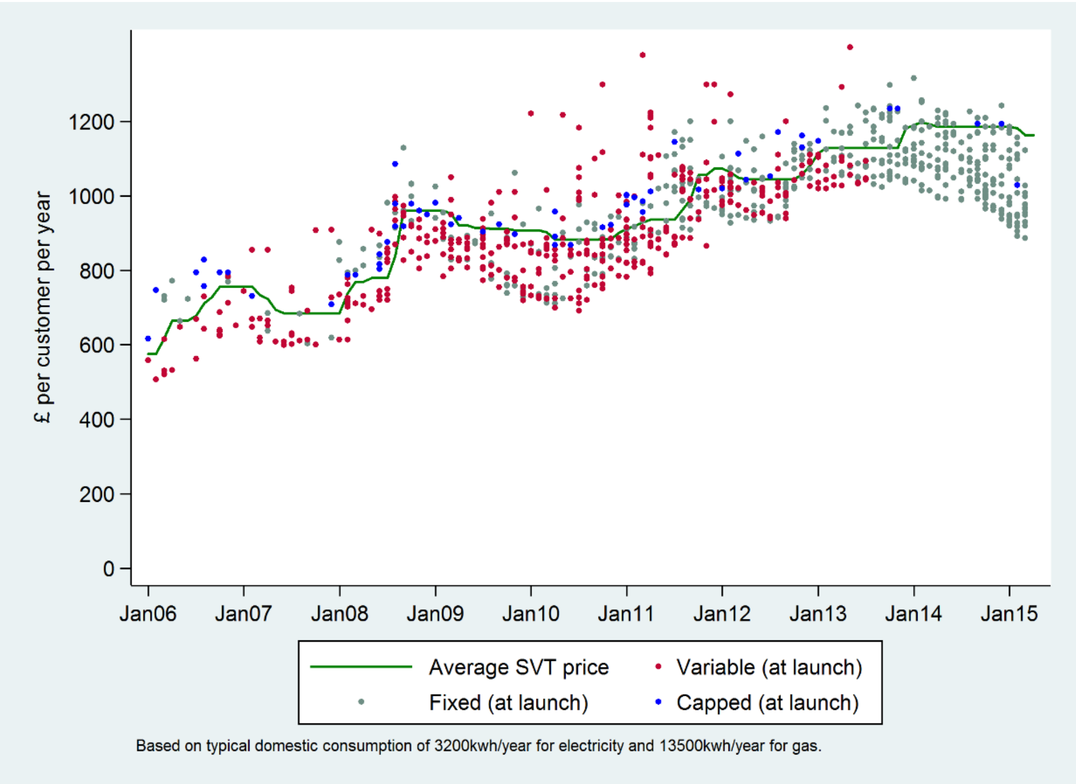
43. The data we collected on NST prices is a list of NSTs launched by the Six Large Energy Firms and four mid-tier firms[24] between 2006 and March 2015 and, for each tariff, the date the tariff was introduced into the market, the date it was withdrawn, and the dual fuel bill for a domestic customer with typical consumption, paying by direct debit.

44. Figure 3 plots the NSTs in the data. This includes NSTs offered by the Six Large Energy Firms (including white label tariffs launched under Marks & Spencer and Sainsbury's Energy) and the four mid-tier suppliers (Ovo Energy, Utility Warehouse, First Utility and Co-operative Energy). The dots represent

[23] These are the definitions used by Ofgem in 2011–2013 (16,500 KWh for gas and 3,300 kWh for electricity) and before 2010 (20,500 KWh for gas and 3,300 KWh for electricity).
[24] Co-op Energy, First Utility, Ovo Energy and Utility Warehouse.

the annual dual fuel bill of a typical domestic customer subscribing to the particular NST at launch. We note that some data points between 2010 and mid-2013 appear exceptionally high; these were tariffs offered by First Utility, who told us they did not hold parts of the data.

Figure 3: NSTs at launch, and average SVT price of the Six Large Energy Firms (including white labels) and mid-tier suppliers



Source: CMA analysis of data collected from the Six Large Energy Firms, the four mid-tier suppliers, Ofgem and ICIS.

45. We observe from Figure 3 that the majority of NSTs were launched at a discount to the SVT. This discount appears to have varied over the period. We also observed that following the introduction of the RMR rules fixed tariffs appear to have replaced NSTs.

Analysis of price setting and cost expectations

46. We use the price and cost measures described above to characterise cost pass-through. Our analysis relies primarily on the visual presentation of the data. We also comment on the results of our econometric analysis.

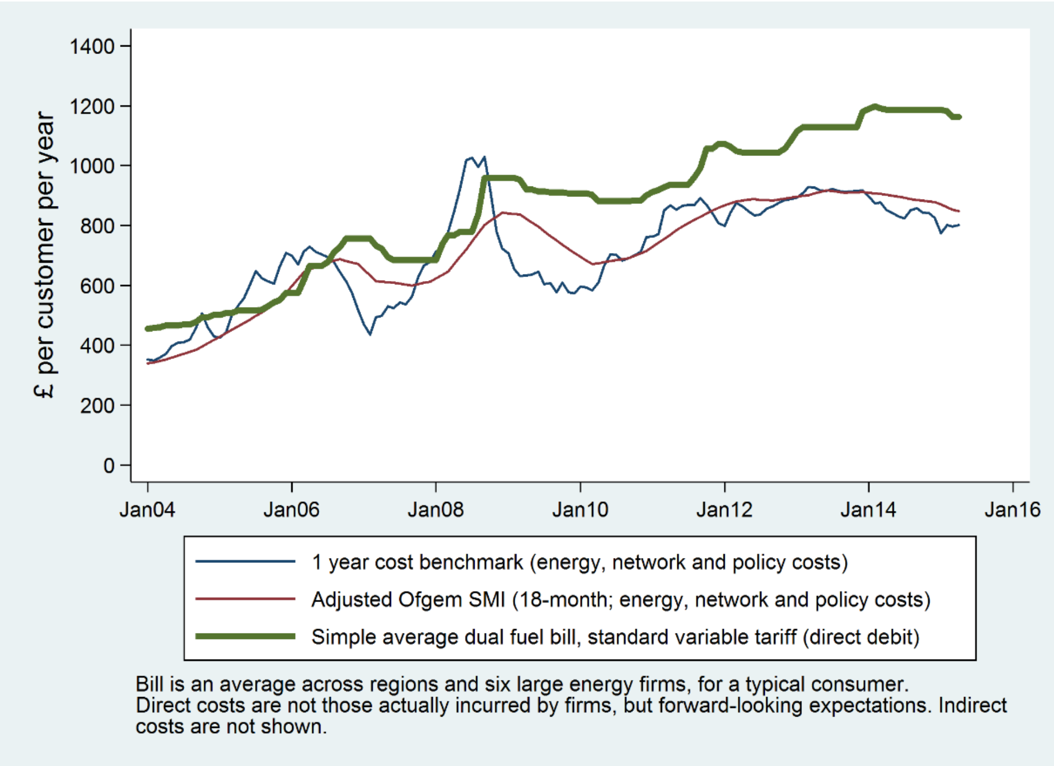
47. Figure 4 presents movements in the one-year expected cost benchmark and SVT prices between 2004 and March 2015. We observe the following:

(a) SVT price changes have generally been less frequent and smaller in magnitude than the movements in the expected costs.

(b) SVT price changes appear to lag expected cost changes. For example, expected cost rises in 2008 and 2011 were followed by price rises a few months later; likewise, price reductions were slow to follow expected cost reductions in 2007, 2008 and 2014.

(c) It appears that SVT prices have been mostly rising since 2011 despite expected costs remaining fairly flat over the period (with reductions in 2014). However, we turn to this issue in Part B of our analysis which is more appropriate to assess the evolution of gross margins over the longer term.

Figure 4: Average SVT price and a forward-looking industry-level benchmark of direct costs



Source: CMA analysis of data collected from the Six Large Energy Firms, Ofgem and ICIS.

48. Figure 5 illustrates the evolution of the range of one-year fixed tariffs[25] that were on sale at particular points in time, the average or minimum SVT price and the forward-looking cost benchmarks. We observe the following with respect to one-year fixed tariffs:

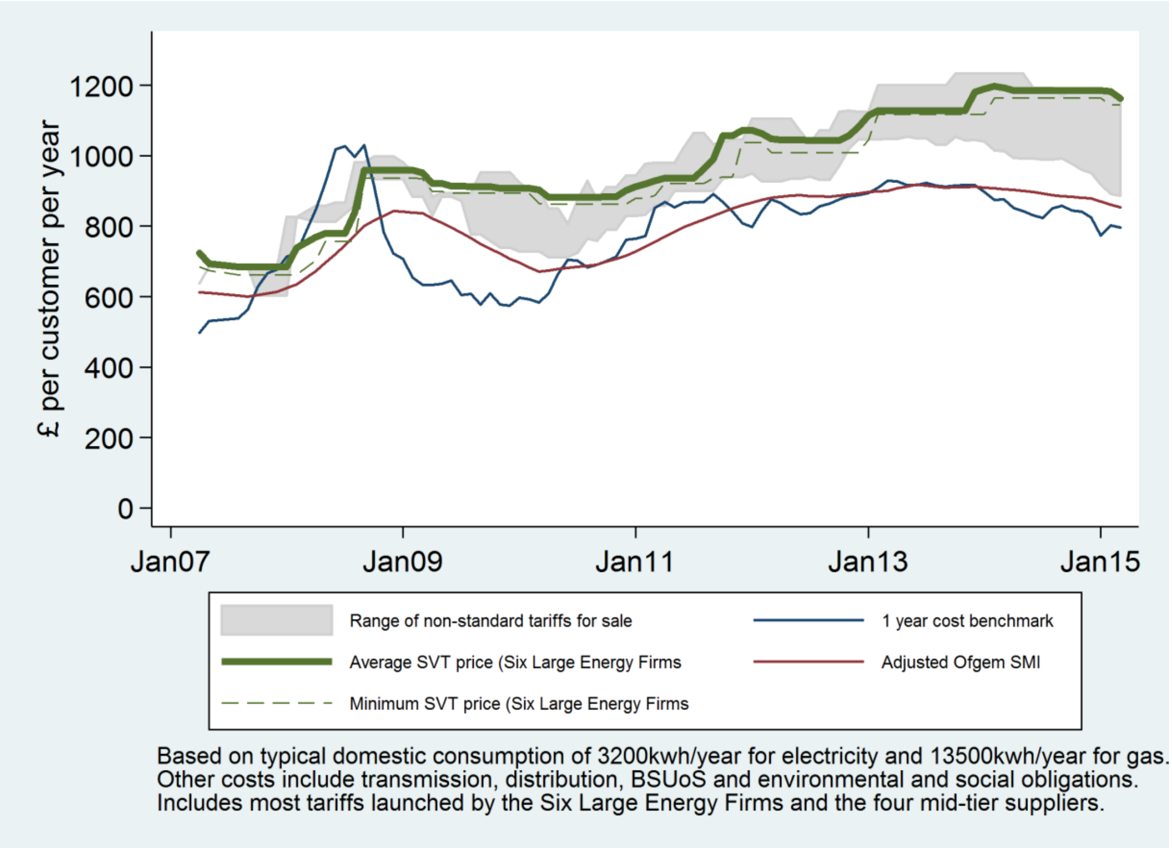
(a) They tend to be cheaper than the average SVT throughout the period, although there have been some tariffs offered at a premium.

[25] Defined here as fixed-term, fixed-price tariffs with a contract (at the date of first launch) of up to 18 months. The data presented here includes tariffs launched by the Six Large Energy Firms, Ovo Energy, Utility Warehouse and Co-op Energy.

(b) The price of one-year fixed tariffs that are available at a point in time tends to change more frequently than the SVT price. This happens through the frequent introduction and withdrawal of tariffs.

(c) The cheaper tariffs appear to have followed expected costs more closely than the SVT price has. For example, the one-year fixed price decreased more than the SVT price during the period following the cost reduction in 2009, and followed more closely the recent cost reduction in 2014 while the SVT price remained flat.

Figure 5: The range of one-year fixed tariffs on sale, average and lowest SVT price and a forward-looking industry-level benchmark of direct costs[26]



Source: CMA analysis of data collected from the Six Large Energy Firms, Co-op Energy, Ovo Energy, Utility Warehouse, Ofgem and ICIS.

49. We tested the proposition in point 48(c) empirically (see Annex C for details on the methodology and the results). In particular, we wanted to test whether the rate of cost pass-through differs between the SVT and NST prices. The regression analysis we conducted appears to confirm that costs are passed through to NST prices at a higher rate than to SVT prices, as is visible from

[26] The range of one-year fixed tariffs includes most NSTs with a contract of up to 18 months, launched by the Six Large Energy Firms (including white labels) and the four mid-tier suppliers. The SVT price includes the Six Large Energy Firms.

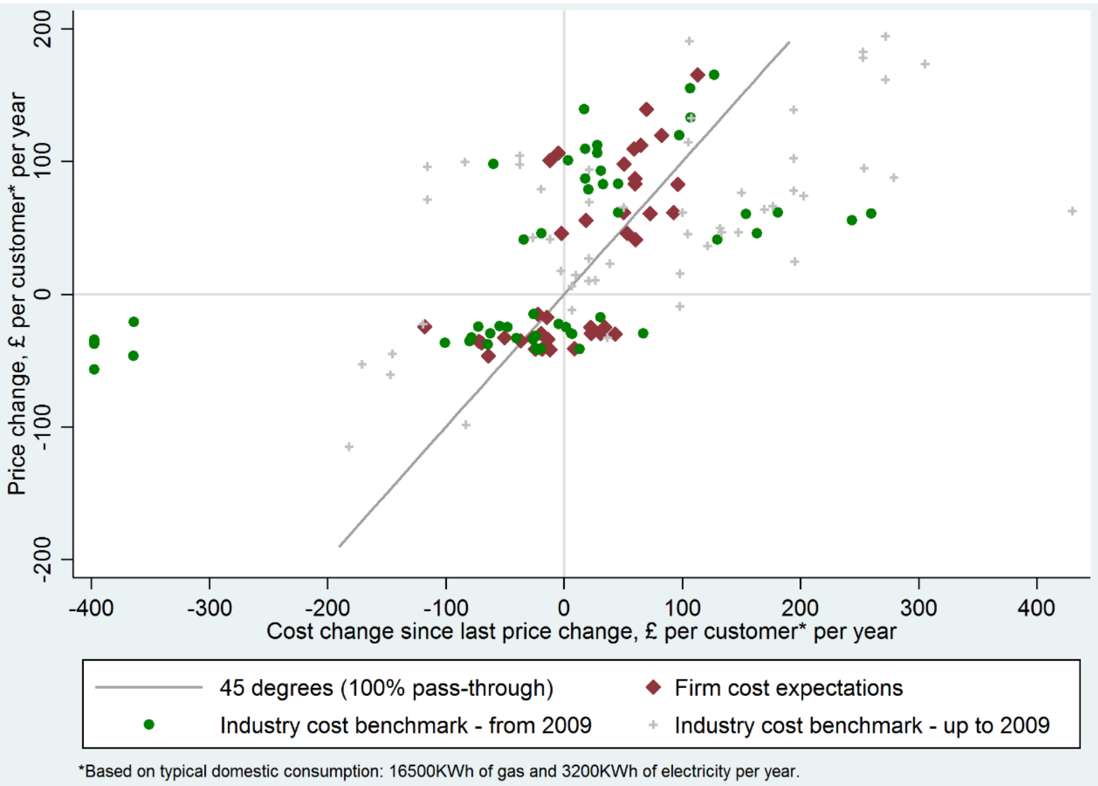
Figure 5 above. However, we do not put weight on this part of the analysis for the following reasons:

(a) The time period is too short to provide enough observations for a robust and precise estimate.

(b) We found the results to be imprecise and sensitive to modifications in the specification of the equation and the data used. This may be because the time period is too short, or because we do not control for other factors that affect pricing.

50. Since SVT prices change infrequently, we also conduct a comparison of price and cost changes that disregards the periods where prices were not changing. Figure 6 shows how the size of the SVT price change correlates with the size of the net cost change that accumulated since the last time the firm changed it price. The figure includes the Six Large Energy Firms' SVTs. The green and grey markers in the figure map each firm's price change against the net cumulative cost change as measured by the one-year forward cost benchmark; the red diamonds map each firm's price change against the net cumulative change in its own cost forecast, which includes a hedged energy cost position. Firm-level cost forecasts were only available from 2009 or later.

Figure 6: Size of SVT price changes (firm-level) against the change in expected costs (one-year cost benchmark) since the last price change the firm made



Source: CMA analysis of data collected from the Six Large Energy Firms, Ofgem and ICIS.

51. We make the following observations based on Figure 6:

(a) All price rises since 2009 have been larger than approximately £40; in contrast, there have been price reductions of a relatively small magnitude. This may indicate a difference in the menu costs associated with increasing and decreasing the SVT price.

(b) There have been price rises that were larger than the increase in the firms' expected costs; however, there have also been price reductions of a magnitude larger than the associated expected cost reduction. This is consistent with suppliers hedging their costs and smoothing the SVT price.

52. Centrica, EDF Energy and RWE argued that historically the one-year expected cost benchmark departs materially from the actual cost outlook that is considered by each supplier when setting prices. This is because the benchmark does not take account of the fact that suppliers hedge their costs. Each supplier has a different hedging strategy and these strategies have changed over time.

53. We plotted each firm's expected costs, where this data was available, against the one-year cost benchmark and the SVT price (See Figures 4 to 8 in Annex B). We observe that:

(a) Most firms were not affected, or affected to a lesser degree, by the increase in the cost outlook in 2011.

(b) The recent wholesale cost reduction in 2014 and 2015 has so far only had a muted impact on each of the suppliers' own cost forecasts. This is because the suppliers purchased energy forward at higher prices than the prices currently prevailing in the market.

Analysis of asymmetric cost pass-through in SVT prices

54. Asymmetric cost pass-through, also known as 'rockets and feathers', occurs when rising costs are passed through to prices quicker than decreasing costs. Analysis of this phenomenon has previously been conducted by Ofgem (see Appendix 5 to Energy Supply Probe – Initial Findings Report[27] and Appendix 2 to State of the Market Assessment[28]). We consider this issue in three steps. First, we consider submissions and analysis done by the parties and Ofgem. Second, we review academic literature to assess the relevance of this

[27] See Ofgem (2008), *Energy Supply Probe – Initial Findings Report.*
[28] See Ofgem (2014), *State of the Market Assessment.*

phenomenon for theory of harm 4. Third, we conduct analysis using empirical methods that we consider to be appropriate for the data at hand.

Background and parties' submissions

55. It should be noted first that asymmetric cost pass-through can take two distinct forms:

(a) Amount asymmetry. Cost increases are passed through to prices at a higher rate than cost reductions. This would mean that, with costs increasing overall over time, the gap between prices and costs (margins) would also increase.

(b) Speed asymmetry (rockets and feathers). Cost increases are passed through to prices quicker than cost decreases. This assumes that there is an equilibrium level of margins that is constant over the long run, and, as costs change, prices eventually return fully to this equilibrium, but at a speed that differs depending on the direction of the adjustment.

56. The two forms of asymmetry are different in nature and can have different causes and implications. The analysis previously conducted by Ofgem tested the presence of speed asymmetry. Ofgem performed the analysis using an econometric model (an error correction model). In both its initial analysis[29] and the updated analysis in the State of the Market Assessment, Ofgem found empirical evidence that prices were adjusting up faster than down.

57. The parties made submissions in this regard in response to the updated issues statement:

(a) Centrica, EDF Energy, RWE and SSE commented on the analysis presented in our Working Paper and updated issues statement and said that the apparent widening of the gap between prices and expected costs was in part explained by the use of inaccurate or incomplete cost measures, simple averages of prices, incorrect consumption assumptions and by the fact that prices in the earlier part of the period analysed were unsustainably low.

(b) Scottish Power submitted an analysis replicating and adjusting the econometric analysis that had been carried out by Ofgem and argued that Ofgem's finding of asymmetric cost pass-through was due to errors in the modelling approach.

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[29] Ofgem (21 March 2011), Do energy bills respond faster to rising costs than falling costs?.

(c) Centrica submitted an analysis showing that there was no systematic rocket and feather pattern in that cost increases (reductions) both lagged and led price increases (reductions) throughout the period. Centrica used its actual costs as well as forecast costs for this analysis.

58. We note that the parties' submissions with respect to 57(a) are directly relevant to amount asymmetry and not to speed asymmetry. We address these points in paragraph 77. With regards to 57(b) and 57(c) we set out our view below.

Academic literature

59. We reviewed academic literature and found that a clear link between the degree of competition in a market and asymmetric cost pass-through has not been established. A number of different possible causes of asymmetry have been put forward by economists, including collusion, consumer search costs and menu costs (see, for example, Chesnes (2012),[30] Bonnet and Villas-Boas (2013),[31] Deltas (2008)[32] and Noel (2007)[33]). Empirical studies have found links between each of these features and asymmetry in specific markets. A study by Peltzman (2000) found asymmetric cost pass-through to be present in a large number of producer and consumer goods but did not find a clear relationship between the presence of this phenomenon and competition.[34]

Empirical analysis

60. In any event, we do not consider the data relating to prices and costs in the domestic energy markets to be sufficiently rich to conduct a robust assessment of asymmetric speed in price responses, for the following reasons:

(a) SVT prices change infrequently, often only once a year. This means that despite having collected monthly data spanning over 11 years (over 130 months), in more than half of these months prices were not changing, and there were only 20 months when at least one supplier was reducing its SVT price. The number of independent observations of price reductions is even smaller considering that suppliers may be reducing their prices in consecutive months.

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[30] Chesnes, M (2012), *Asymmetric Pass-Through in U.S. Gasoline Prices*.
[31] Bonnet, C, Villas-Boas, SB, (2013, working paper), *An Analysis of Asymmetric Consumer Price Responses and Asymmetric Cost Pass-Through in the French Coffee Market*.
[32] Deltas, G (2008), *Retail Gasoline Price Dynamics and Local Market Power*.
[33] Noel, MD (2007), *Edgeworth Price Cycles, Cost-Based Pricing, and Sticky Pricing in Retail Gasoline Markets*.
[34] Peltzman, S (2000), *Prices Rise Faster Than They Fall*.

(b) There have been relatively few periods of decreasing costs over the 11-year period we observed. In order to compare the speed of price adjustments when costs are rising or falling we need to observe sufficiently enough instances of both rising and falling costs of a material magnitude, over time periods that are sufficiently long for prices to adjust.

(c) There have been a number of significant regulatory changes affecting the suppliers' pricing behaviour throughout the 11-year period. Analysis of only the recent years that are more likely to characterise current pricing behaviour (or, similarly, analysis of the full period that allows for structural breaks) would need to rely on an even smaller number of independent observations.

61. Due to these data limitations and because of the lack of clear evidence on the nature of drivers that could cause rockets and feathers in the domestic energy markets, we did not attempt to fit an error correction or similar econometric model to test the presence of this phenomenon.

62. Nonetheless, we summarise the data to characterise and compare cost and price increases and reductions. Table 2 sets out the key summary statistics: the number of months when either costs or prices were rising or falling, and the average magnitude of these changes.

Table 2: Summary statistics of cost (one-year cost benchmark) and price (simple average SVT price across the Six Large Energy Firms) movements on a monthly frequency between January 2004 and March 2015

	Costs (one-year benchmark)	*Prices (simple average SVT)*
Number of months when rising	74	45
Number of months when falling	61	20
Average increase in months when rising	£25.1	£20.9
Average decrease in months when falling	£23.0	£10.6
Average increase per month over the period 2004 to March 2015	£13.7	£6.9
Average decrease per month over the period 2004 to March 2015	£10.5	£1.6
Ratio of increases to decreases	1.3	4.3

Source: CMA analysis of data collected from Ofgem and ICIS.

63. We make the following observations based on Table 2:

(a) Costs have risen and fallen at approximately the same speed (on average £25 and £23 per month respectively). In contrast, price increases have been approximately twice as large as price reductions (£21 and £11 per month respectively).

(b) Over the period of analysis, for every £1 of cost reductions there were £1.3 pounds of cost increases; for every £1 of price reductions there were

£4.3 of price increases. This suggests amount asymmetry, in that prices have adjusted upwards more than downwards.

64. We consider this to suggest that there may be asymmetric price response in the domestic energy markets, in that cost reductions have not been passed through to prices. We did not identify the precise form and size of this asymmetry and we do not take a view on the mechanism that may lead to this outcome. We turn to Part B of the analysis for an assessment of whether gross margins have increased over time.

Part A key findings

65. Our key findings from the analysis above are:

(a) one-year fixed-tariff prices follow more closely the short-term cost movements;

(b) SVT prices change infrequently and are less volatile than wholesale energy costs; that is, suppliers engage in smoothing; and

(c) SVT price rises over the period of analysis have been larger than SVT price reductions.

Part B: long-term analysis of gross margins

66. This part of our analysis assesses the evolution of average realised prices and average direct costs of energy supply to domestic customers. Whilst Part A focuses on stylised price and cost measures that are based on representative customers, in this section we use measures of prices and costs that reflect the mix of different levels of consumption, methods of payment and other customer and tariff characteristics that may affect the actual prices customers pay and direct costs of delivering energy to those customers. As such, this part of the analysis can be used to understand the trends in gross margins.

Measures of realised costs and prices

67. We collected data on the average realised price per unit of gas and electricity for each of the Six Large Energy Firms for the period between 2011 and 2014, on average across the customer base and separately for SVT and NST customers. Revenue is that arising from the supply of electricity and gas

volumes. The data excludes VAT and is net of discounts.[35] The revenue data includes an estimate of unbilled value for the amount of unbilled volume supplied. In order to harmonise revenue definitions across suppliers, we asked suppliers to reassign items where these are material.[36]

68. We collected data on the average direct cost. The cost items included are:

(a) cost of wholesale energy, including costs of shaping, transmission losses or theft, and costs of balancing and imbalance;

(b) network costs (transmission and distribution); and

(c) environmental and social obligations including the Warm Home Discount Scheme, Cold Weather Payments, CERT, CESP, ECO, ROC, FIT, WHD and LEC/CCL.[37]

Analysis

69. We illustrate the evolution of realised prices and costs graphically.

70. Figure 7 below presents the evolution of the weighted average realised price and weighted average direct cost across the SVTs and NSTs of the Six Large Energy Firms. The weights represent each of the suppliers' market share (based on customer numbers – meter points) in that year within domestic gas or electricity supply.

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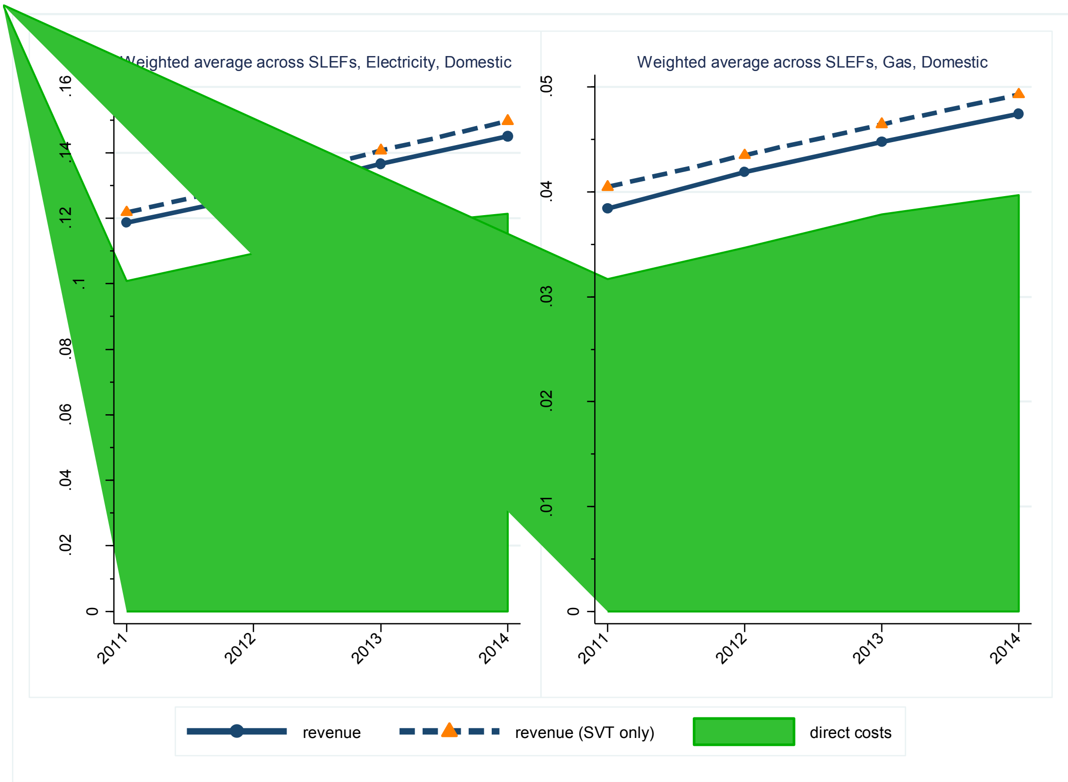
[35] The exception is social tariff discounts (for example the Warm Home Discount Scheme and Cold Weather Payments) that are assigned to direct costs (social and environmental obligations) rather than netted off revenue. The exception for the period up to March 2014 is SSE where the cost of social tariffs has been netted off income rather than being included in direct costs. For further details on revenue and cost definitions, see Appendix 7.5: Descriptive statistics (retail).

[36] The revenue data includes revenues from early termination fees and excludes the value of the write-back of unclaimed credit balances as well as revenues from energy services (such as energy efficiency installations).

[37] Costs relating to the administration of the various environmental and social obligation schemes (for example, managing and reporting compliance against the delivery of the scheme, filing returns, settlement costs) are assigned to indirect costs and not included in this analysis. The exception is SSE who include metering costs and all indirect costs within the profiled cost data that they submitted. We will discuss with SSE providing revised results where indirect costs and metering costs are excluded from the direct costs data submitted.

Figure 7: Weighted average realised price and weighted average direct cost across the SVTs and NSTs of the Six Large Energy Firms



Source: CMA analysis of profiled revenue and cost data submitted by suppliers.

71. We observe from Figure 7 that:

(a) average gross margin (the gap between revenues and costs) has been relatively stable over the four years observed; the trend growth rate for revenue has been slightly higher than costs for electricity and slightly lower for gas in 2011 to 2014;[38] and

(b) average revenue per unit for SVTs only has remained constantly higher than overall average revenue.

72. Figures 8 to 13 present the evolution of the average realised price and average direct cost for the SVTs and NSTs of each of the Six Large Energy Firms separately.

Figure 8: Evolution of Centrica's average revenue and average direct cost per unit of electricity and gas

[✄]

Source: CMA analysis of profiled supplier data.

[38] For electricity, the compound growth rate is 5.2% for revenue and 4.7% for direct costs. For gas, the compound growth rate is 5.4% for revenue and 5.8% for direct costs.

Figure 9: Evolution of EDF Energy's average revenue and average direct cost per unit of electricity and gas

[✄]

Source: CMA analysis of profiled revenue and cost data submitted by suppliers.

Figure 10: Evolution of E.ON's average revenue and average direct cost per unit of electricity and gas

[✄]

Source: CMA analysis of profiled revenue and cost data submitted by suppliers.

Figure 11: Evolution of RWE's average revenue and average direct cost per unit of electricity and gas

[✄]

Source: CMA analysis of profiled revenue and cost data submitted by suppliers.

Figure 12: Evolution of Scottish Power's average revenue and average direct cost per unit of electricity and gas

[✄]

Source: CMA analysis of profiled revenue and cost data submitted by the supplier.

Figure 13: Evolution of SSE's average revenue and average direct cost per unit of electricity and gas

[✄]

Source: CMA analysis of profiled revenue and cost data submitted by suppliers.

Note: SSE include metering costs and all indirect costs within the profiled cost data that they submitted. We will discuss with SSE providing revised results where indirect costs and metering costs are excluded from the direct costs data submitted.

73. We observe from Figures 8 to 13 that:

(a) The evolution of actual (incurred) direct costs is markedly smoother than the forward prices observed in Figure 1. This is due to suppliers adopting hedging strategies.

(b) The evolution of actual (incurred) direct costs differs across the suppliers. For example, the timing and magnitude of the cost shock around 2008 varies between suppliers.

(c) There is no clear cost pass-through pattern that would be common to all suppliers, as seen on an annual basis. It is not the case that average realised revenues would follow costs closely (so that realised gross margins vary from year to year).

(d) All of the suppliers' average SVT unit revenues have consistently increased since 2010. During the same period most of the suppliers' direct unit costs have also increased, but less so.

Part B key findings

74. Our analysis of historical incurred costs and realised revenues shows that gross margins have varied over time for each supplier, but have been relatively stable on average across the Six Large Energy Firms over the period 2011 to 2014. Unlike decreasing spot and forward energy prices observed in the market in 2014, costs incurred by the suppliers during that year continued to increase albeit at a lower rate.[39] This is consistent with the suppliers having purchased energy ahead of time at higher prices.

Parties' views

75. The parties submitted responses to the Working Paper commenting on the methodology and interpretation of our analysis. Where relevant, we commented on these submissions above, and made appropriate adjustments to the methodology where necessary. This section summarises the parties' views and our responses.

Interpretation

76. The parties made the following arguments in response to the Working Paper and updated issues statement:

(a) Centrica, EDF Energy, RWE and SSE said that there was no evidence to suggest a widening in the gap between costs and prices as was suggested in the updated issues statement, or that the widening was overstated, because of the omission or understatement of certain variable cost elements from our analysis, the use of average SVT prices or the lack of consideration of changes in consumption over the period. Centrica, EDF Energy, RWE and SSE also said that to the extent that there had been an increase in margins, this was partly because the levels of prices in 2009 were unsustainably low.

(b) With regards to the comparisons of pass-through between SVT and NST prices, Centrica argued that the difference in observed pass-through for the two types of tariffs was not necessarily informative about the intensity of competition, and could reflect differences in supply, demand or menu

[39] The exception is SSE where electricity direct costs fell slightly in 2014.

costs. SSE conducted econometric analysis comparing the trends between SVTs and NSTs and argued that no statistically significant differences could be found.

(c) RWE argued that it was misleading to analyse SVTs and NSTs in isolation [✂].

(d) The one-year forward cost benchmark was an unrealistic measure of costs because it ignored price smoothing and the way suppliers purchased energy over time (EDF Energy, Centrica), and was not an appropriate benchmark for both the SVTs and NSTs with different contract lengths because the costs of procuring energy differed between such tariffs (RWE).

77. With respect to point 76(a), we accept that a number of direct cost items were excluded from the analysis in Part A (for example, costs of gas reconciliation by difference, costs of unbilled volumes); we do not believe that these omissions affect the conclusions drawn from Part A since the omitted cost items are not material in size and, to our knowledge, have not changed materially on a monthly, quarterly or annual basis. To the extent that these costs are relevant for the calculation of gross margins, we included these costs in the analysis of the trends in gross margins in Part B.

78. With respect to points 76(b) and 76(c), we accept that our analysis in this appendix does not identify the cause of differences in cost pass-through between SVT and NST prices, and we believe that econometric methods are not entirely suitable in this context for quantifying and testing such differences statistically Our overall assessment of how suppliers compete with regards to SVTs and NSTs draws upon Appendix 7.3: The pricing strategies of the Six Large Energy Firms and Appendix 8.4: Price discrimination in addition to the analysis presented here.

79. With respect to point 76(d), we acknowledge that price smoothing, as observed for the SVT, may require the suppliers to smooth the movements of their costs by hedging. We also recognise that the one-year forward-looking cost benchmark departs from each firm's cost outlook in one way or another. However, the advantage of using the benchmark is that it does not involve any assumptions about the hedging decisions that should or could have been made by all firms in the market, and as such it is an appropriate benchmark for understanding the market as a whole. Adopting a certain firm's hedging strategy or a stylised hedging strategy would produce a benchmark that would bias the analysis to the benefit of one or a few firms.

Methodology

80. The parties also commented on the methodology for constructing the forward-looking cost benchmarks and price measures in Part A and, in particular, what cost items should be included in the analysis and how they should be measured:

(a) Centrica, EDF Energy and SSE commented that our analysis, by using an assumption of constant typical consumption values, did not account for the impact of changing consumption levels over time as a result of the long-term reduction in average consumption and short-term weather related changes. RWE and SSE argued that the use of a typical level of consumption was inappropriate because pricing was done on a customer portfolio basis. Centrica also argued that this approach ignored the impact of weather on suppliers' profitability and therefore pricing decisions.

(b) EDF Energy questioned our use of simple averages and argued that this method misstated the actual price changes in October 2009 and October 2010 when SLC25A and SLC27.2 were introduced.

(c) EDF Energy also pointed out that our methodology used a weighted average of transmission and distribution costs and this was inconsistent with the use of a simple average for other cost items and prices.

(d) EDF Energy stated that the BSUoS charges in our Working Paper were overstated up to July 2012 and the Warm Home Discount Scheme charges were understated in 2013.

(e) Centrica, EDF Energy and RWE argued that our cost measures did not include all direct costs. They argued that the increasing costs of the smart metering programme, electricity imbalance costs, gas reconciliation by difference, demand forecast errors and unbilled volume costs should be included.

(f) Centrica, RWE and SSE argued that indirect costs were also relevant to pricing and should be included in the analysis. Some of these costs were variable on a per customers basis (for example, metering), and in any case it would be unsustainable for firms to ignore fixed costs in the long run. RWE also suggested that revenue leakage and return on risk-adjusted capital should be included in the analysis.

(g) Centrica, EDF Energy and RWE said that Ofgem's measures of CERT/CESP ECO costs, used in our analysis, had historically underestimated the actual cost of delivering the schemes at different stages in each programme,.

(h) EDF Energy, RWE and SSE said that our analysis did not sufficiently account for costs of shaping.

(i) RWE argued that our analysis disregarded discounts and indirect financial benefits, which had been important to competition.

(j) EDF Energy and RWE noted that our cost measures excluded VAT, whereas the price measures included it.

(k) Centrica said that our cost benchmarks in the Working Paper appeared to include the government rebate despite indicating that it was excluded.

(l) SSE argued that we did not use genuinely forward-looking government scheme costs and that our measures were ex-post cost forecasts instead.

81. We note that our analysis in Part B addresses directly the concerns raised by the parties in points 80(a), 80(b), (e) and (i); as a sensitivity in relation to 80(a), we also reproduced Figure 4 using different assumptions on typical domestic consumption values (see Annex B, Figures 10 and 11). We made appropriate corrections to our methodology of Part A in response to points 80(c), (d), (g), (h), (j) and (k) (see Annex A for the detailed methodology). Our analysis in paragraphs 36 to 38 addresses point (l).

82. With regards to point 80(f), we explained above that only marginal costs are relevant in this analysis. We accept that some indirect costs, such as metering costs, are marginal, but we consider them unlikely to vary materially over the shorter term so as to affect pricing decisions. We have looked at the evolution of metering costs, which are the largest proportion of indirect costs, and did not find them to vary materially over time (see Annex B, Figure 12). We have also looked at the evolution of indirect costs per customer over the period 2007 to 2013, and find that on average these have fallen over this period.[40] We therefore do not believe that the omission of indirect variable costs affects the conclusions drawn from our analysis. Our analysis of retail profitability (see Appendix 10.2: Retail energy supply profit margin analysis) assesses the levels of net profits and so takes account of other indirect costs.

Summary

83. The analysis of cost pass-through showed that:

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[40] Based on CMA analysis of P&L information provided by the Six Large Energy Firms, 'Putback margin 1' workbook, Indirect costs.

(a) SVT prices change infrequently and are less volatile than wholesale energy costs; that is, suppliers engage in price smoothing.

(b) Suppliers hedge their costs and have not been exposed to the large wholesale cost movements observed over the period of analysis.

(c) One-year fixed-tariff prices follow more closely the short-term cost movements.

(d) SVT price rises over the period of analysis have been larger than SVT price reductions.

(e) In the most recent period (2014 to early 2015) energy costs in the wholesale market have fallen. This reduction has not been fully passed through to SVT prices, but was followed closely by NST prices.

(f) Suppliers' costs did not reduce in 2014. This is consistent with suppliers having purchased energy for delivery in 2014 at higher prices that prevailed in the past.

Annex A: Cost benchmark methodology

1. Table 1 below summarises the assumptions used in constructing the forward-looking cost benchmarks, and compares these assumptions to Ofgem's assumptions in the construction of the SMI.

Table 1: Wholesale cost assumptions

Assumption	*Forward-looking cost benchmarks (one-year and two-year)*	*SMI (adjusted by the CMA and presented in our analysis)*	*SMI (as published by Ofgem)*
Wholesale cost	70% baseload, 30% peak (current forward prices of future products)	70% baseload and 30% peak load (historical forward prices of future products)	70% baseload and 30% peak load, hedging
Carbon cost	Embedded in wholesale energy prices	Embedded in wholesale energy prices	Embedded in wholesale energy prices
Transmission/distribution losses (electricity only)	Yes, 8% loss assumed	Yes, 8% loss assumed	Yes, 8% loss assumed
Imbalance (cash-out) costs (electricity)	Yes, 0.15 £/MWh	Yes, 0.15 £/MWh	Yes, see SMI methodology
Shaping costs	Implemented as the weighted average of baseload and peak product prices (see above) A further 3% cost added for electricity and 1% cost for gas respectively.[41]	Implemented as the weighted average of baseload and peak product prices (see above)	Implemented as the weighted average of baseload and peak product prices (see above)
Gas reconciliation by difference cost	No	No	Yes, see SMI methodology
Demand forecast error (gas)	No	No	Yes, see SMI methodology
Unbilled volumes (such as theft, unmetered consumption)	No	No	Yes, see SMI methodology
VAT	Yes	Yes	Yes

Source: CMA and Ofgem analysis.

2. Table 2 below summarises the other cost items included in the indices. The assumptions used to construct these cost items are set out in the *Methodology for the Supply Market Indicator* (Ofgem).[42]

[41] Based on analysis done by NERA.
[42] See Ofgem's SMI methodology.

Table 2: Other cost assumptions

Cost category	*Forward-looking cost benchmarks (one-year and two-year)*	*SMI (adjusted by the CMA and presented in our analysis)*	*SMI (as published by Ofgem)*
Gas distribution charges	Yes	Yes	Yes
Gas transmission charges	Yes	Yes	Yes
Electricity distribution charges	Yes	Yes	Yes
Electricity transmission charges	Yes	Yes	Yes
BSUoS	Yes	Yes	Yes
Supplier operating costs	No	No	Yes
Smart metering costs	No	No	Yes
Depreciation and amortisation	No	No	Yes
ROCs	Yes	Yes	Yes
FITs	Yes	Yes	Yes
ECO	Yes	Yes	Yes
Warm Home Discount Scheme	Yes	Yes	Yes
CfDs	No	No	Yes
Government funded rebate	No	No	Yes

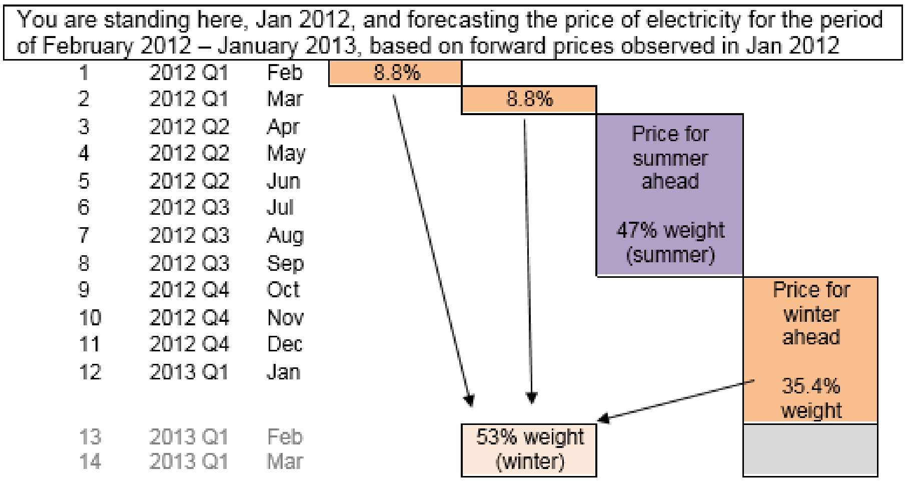
Source: CMA and Ofgem analysis.

3. Figures 1 and 2 below illustrate how the one-year benchmark was calculated for baseload electricity at two different points in time. The gas index was calculated similarly; however, we have used quarterly gas products rather than seasonal. We note that our electricity benchmark is constructed using the same method for baseload and peak product prices.

Figure 1: Illustration of the method for calculating the one-year forward-looking cost benchmark for September

Source: CMA analysis.

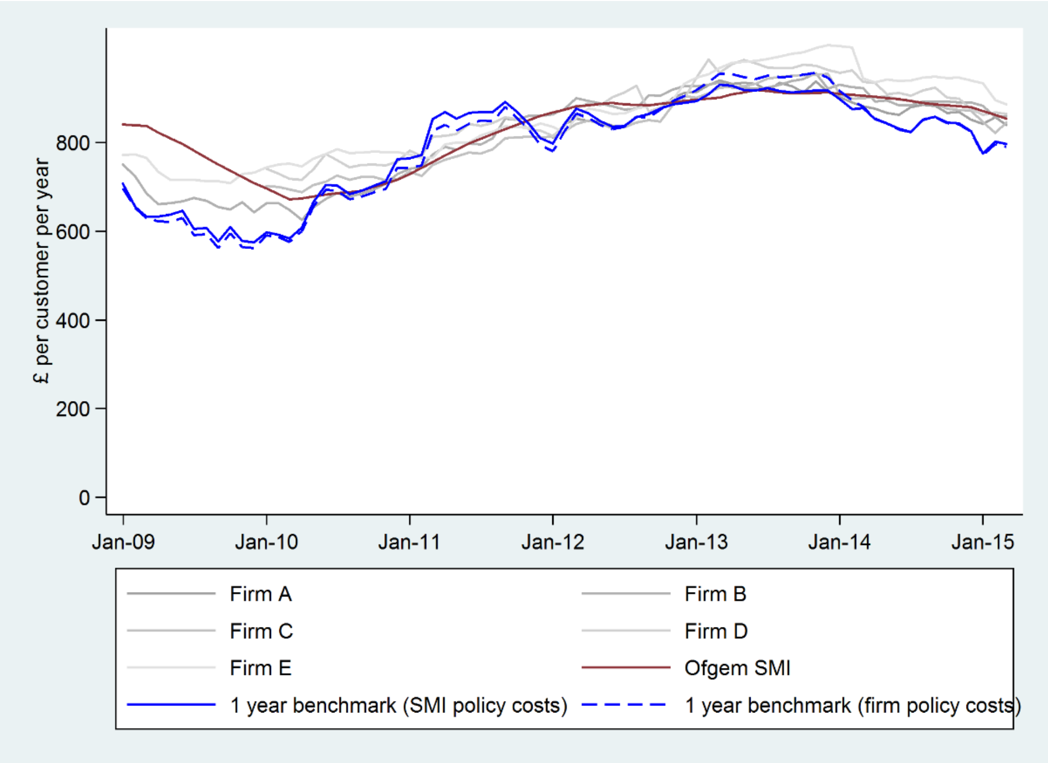
Figure 2: Illustration of the method for calculating the one-year forward-looking cost benchmark for January



Source: CMA analysis.

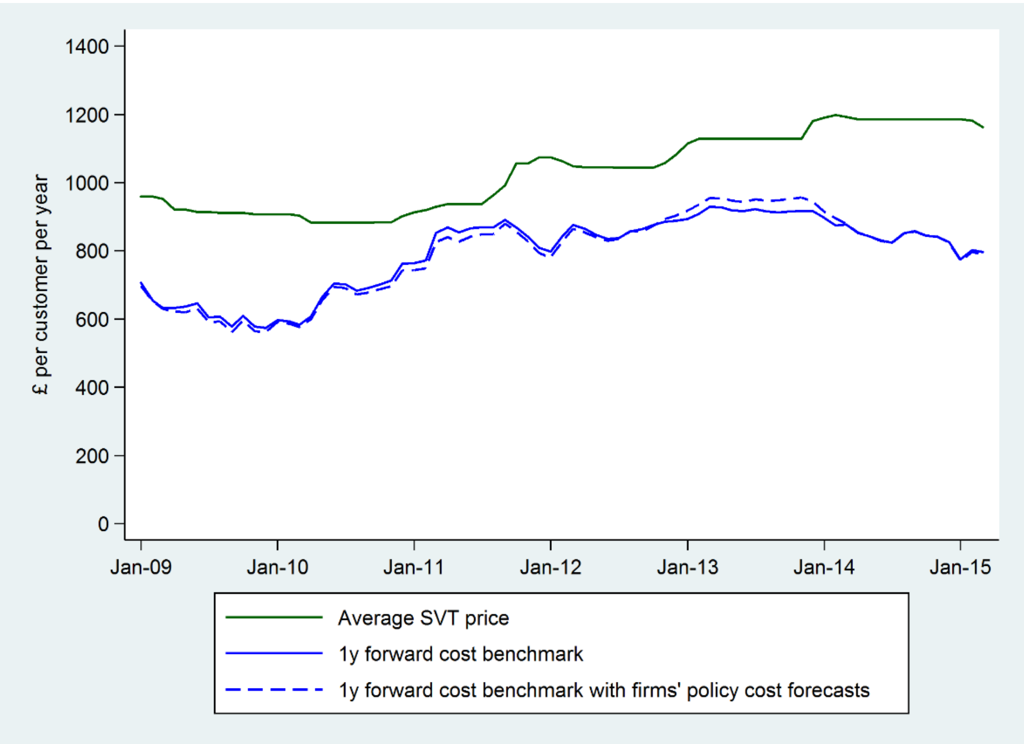
Annex B: Further results

Figure 1: Comparison of industry cost benchmarks and firm-level forecasts of energy and other costs



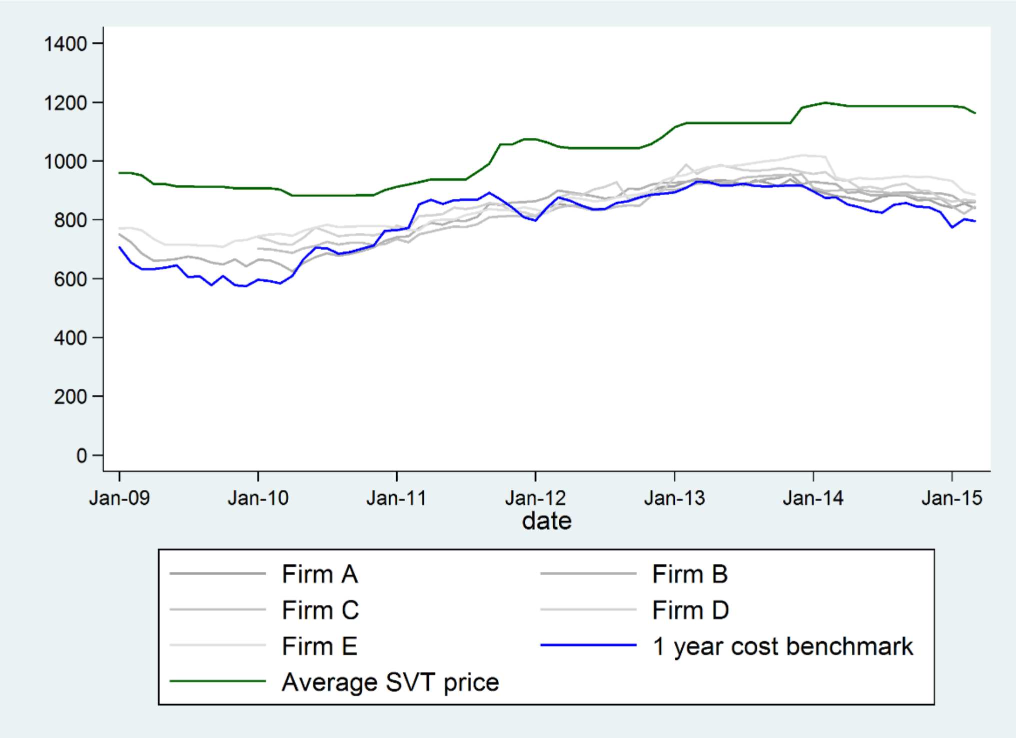
Source: CMA analysis of data collected from ICIS, Ofgem and five of the Six Large Energy Firms.
Note: [✄].

Figure 2: Average SVT price and a forward-looking industry-level benchmark of direct costs, using different measures of policy cost forecasts



Source: CMA analysis of data collected from five of the Six Large Energy Firms, Ofgem and ICIS.

Figure 3: Average SVT price, one-year forward-looking benchmarks and firm-level one-year cost forecasts



Source: CMA analysis of data collected from ICIS, Ofgem and five of the Six Large Energy Firms
Note: [✂].

Figure 4: Firm-level cost forecast and SVT price: E.ON

[✂]

Source: CMA analysis of data collected from ICIS, Ofgem and E.ON.

Figure 5: Firm-level cost forecast and SVT price: RWE

[✂]

Source: CMA analysis of data collected from ICIS, Ofgem and RWE.

Figure 6: Firm-level cost forecast and SVT price: Centrica

[✂]

Source: CMA analysis of data collected from ICIS, Ofgem and Centrica.

Figure 7: Firm-level cost forecast and SVT price: EDF Energy

[✂]

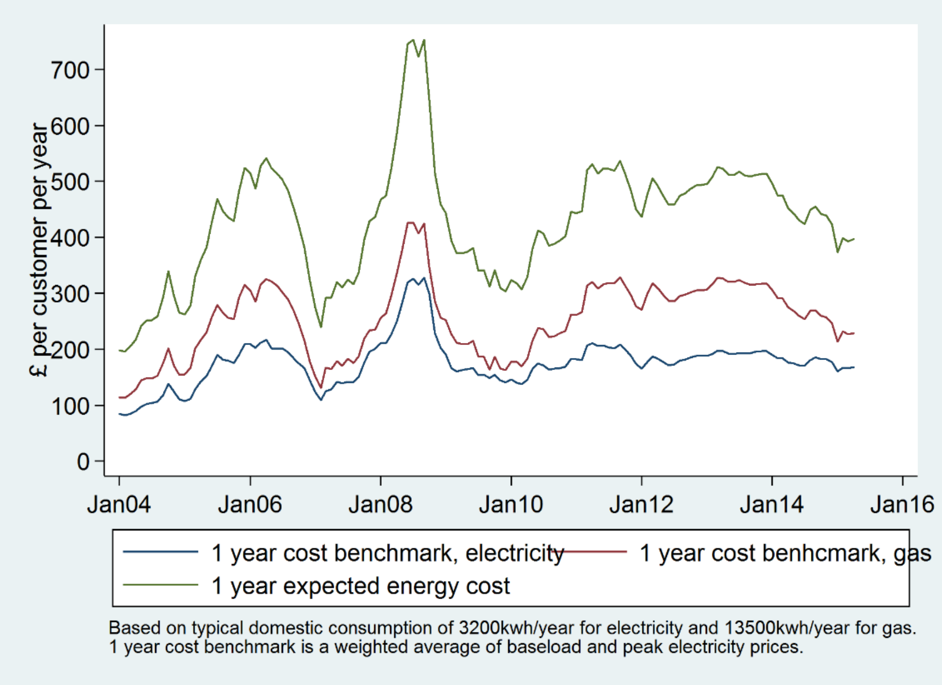
Source: CMA analysis of data collected from ICIS, Ofgem and EDF Energy.

Figure 8: Firm-level cost forecast and SVT price: Scottish Power

[✂]

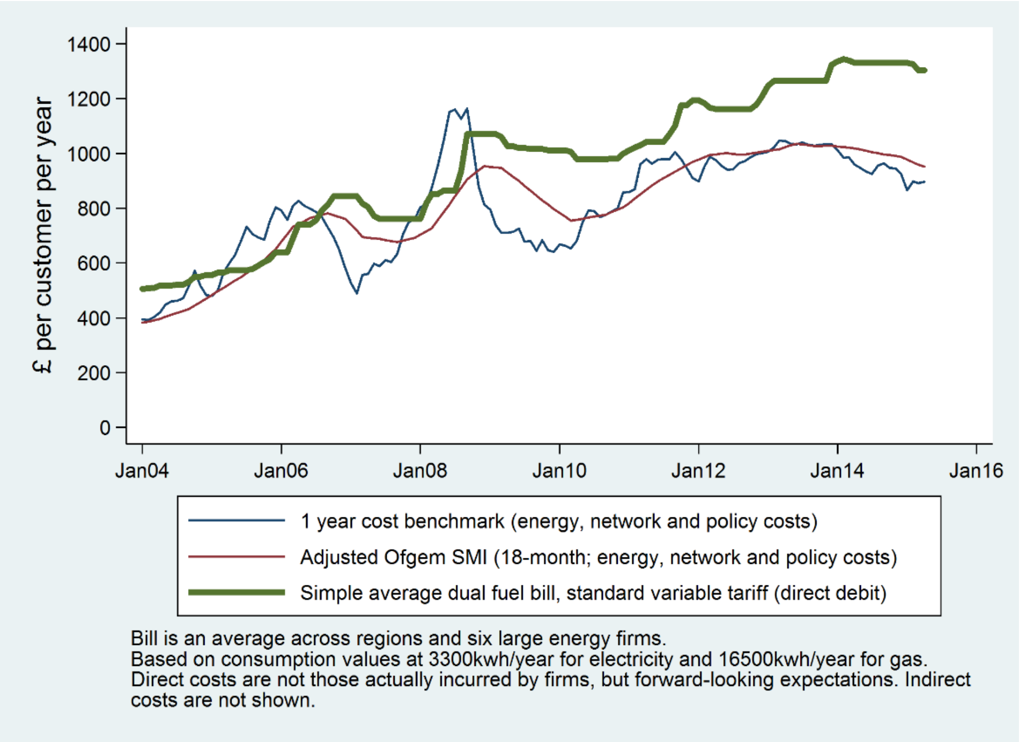
Source: CMA analysis of data collected from ICIS, Ofgem and Scottish Power.

Figure 9: Evolution of the one-year forward-looking energy cost benchmark: comparison of gas and electricity



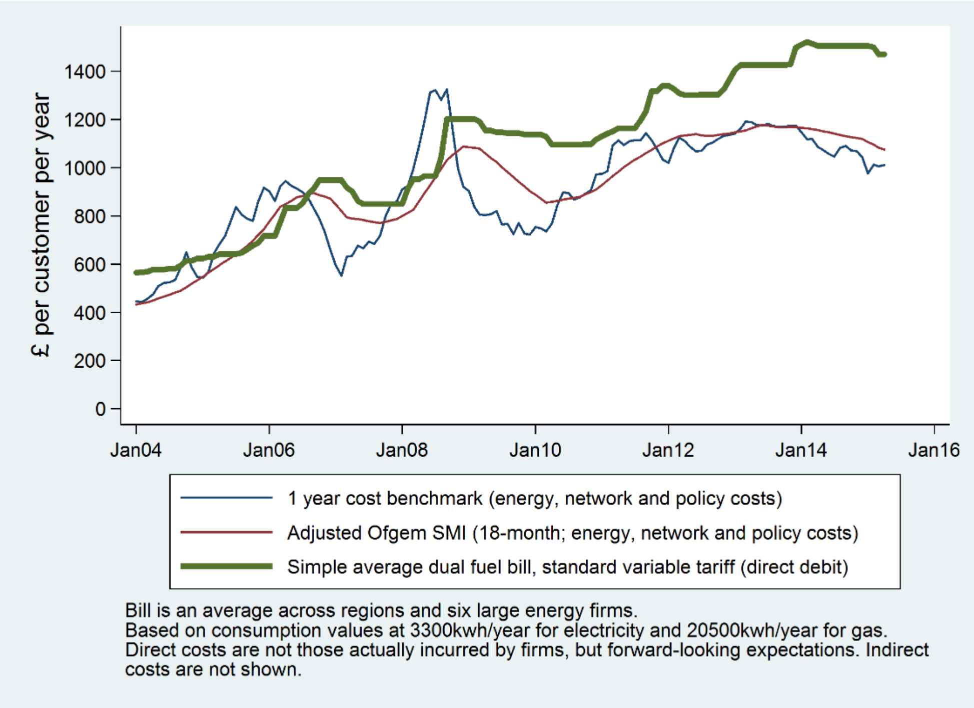
Source: CMA analysis of data collected from ICIS.

Figure 10: Average SVT price and a forward-looking industry-level benchmark of direct costs: typical consumption figures used in 2011–2013



Source: CMA analysis of data collected from ICIS.

Figure 11: Average SVT price and a forward-looking industry-level benchmark of direct costs: typical consumption figures used in 2004–2011



Source: CMA analysis of data collected from ICIS.

Figure 12: Evolution of metering costs per domestic customer account by supplier

[✂]

Source: CMA analysis of P&L information of Six Large Energy Firms.

Annex C: Comparison of pass-through rate for standard variable tariffs and non-standard tariffs

1. This annex sets out the methodology for quantifying the difference in the rate of cost pass-through between SVT and NST prices.

2. To account for a possible delay in the adjustment of prices to costs, we use regression analysis. We estimate an equation of the following form:[43]

$$\Delta p_t = \alpha + \sum_{l=0}^{L} \beta_l * \Delta costs_{t-l} + \sum_{l=0}^{L} \delta_l * nst * \Delta costs_{t-l} + \varepsilon_t$$

3. Table 1 presents the results of estimating this equation using the changes in the simple average SVT price and minimum non-standard one-year fixed-tariff price (Six Large Energy Firms only) for sale as the dependent variable, and the changes in one-year forward-looking cost benchmark (including energy and other costs) on the right hand side, all aggregated to quarterly frequency.

4. We estimated this from Q1 2007 onwards (the earliest period where there is enough data to measure one-year fixed-tariff prices), or from Q1 2009 onwards (excluding the period of high cost volatility and regulatory change).

5. Table 1 presents the baseline results. Specifications (1)–(3) use data from 2007, whereas specifications (4)–(6) use data from 2009. The first three rows present coefficient estimates for the quarterly changes in costs (β_l); we added up to two lagged changes. The next three rows present the coefficient estimates for the interactions of lagged quarterly changes with an indicator for NST prices (δ_l).

6. The cumulative cost pass-through rate is a sum of the coefficient estimates for each of the lagged cost changes, as reported at the bottom of the table. The parameter of interest is the difference between the cumulative pass-through rate for SVT and NST prices; this is reported in the last two rows of the table, showing also the t-statistic. As this parameter is estimated to be larger than zero, the result suggests that one-year fixed-tariff prices follow costs more closely than SVT prices. However, this parameter is only statistically significant when the estimation excludes the years 2007 and 2008 (specifications (4), (5) and (6)).

[43] We use Ordinary Least Squares.

Table 1: Comparison of the rate of pass-through of cost shocks to SVT and NST prices

	Quarterly, from 2007			*Quarterly, from 2009*		
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
d_cost	0.105 (1.13)	–0.0542 (–0.92)	–0.00843 (–0.16)	0.0931 (1.64)	–0.0164 (–0.30)	0.0476 (0.82)
L.d_cost		0.349*** (5.33)	0.254*** (3.66)		0.204*** (4.72)	0.132** (2.41)
L2.d_cost			0.167**			0.138
			(2.06)			(1.39)
nst_x_d_costs	0.226	0.269*	0.279*	0.280*	0.337*	0.404**
	(1.50)	(1.97)	(1.93)	(1.78)	(1.81)	(2.13)
L.nst_x_d_costs		–0.0992	–0.113		–0.104	–0.182
		(-0.91)	(–0.83)		(–0.99)	(– 1.16)
L2.nst_x_d_costs			0.0195			0.138
			(0.15)			(0.81)
Constant	8.151 (1.56)	7.108 (1.53)	6.541 (1.48)	4.362 (0.85)	5.186 (1.02)	4.906 (1.02)
N	65	65	65	51	51	51
Adjusted R-squared	0.118	0.296	0.342	0.128	0.142	0.240
Cumulative cost pass-through rate of SVT		0.295	0.412		0.188	0.317
Cumulative cost pass-through rate of NST		0.464	0.597		0.421	0.678
Difference between SVT and NST rate	0.226 (1.50)	0.169 (0.126)	0.185 (0.170)	0.280* (1.78)	0.233* (0.138)	0.361 0.216

Source: CMA analysis.
Notes:
1. T-statistics presented in brackets.
2. Levels of statistical significant are denoted as * p<0.1, ** p<0.05 and *** p<0.01, based on a two-sided test.

7. We emphasise that the time period (the sample) is very short for an analysis of this type and does not allow to explore more flexible specifications. We also note that we explored modifications to the above methodology:

   (a) Conducting the analysis at a monthly frequency (this increases the sample size, however, SVT prices are not adjusted that frequently).

   (b) Varying the number of lagged variables further.

   (c) Estimating the equation in levels instead of first differences.

   (d) Using different industry price measures (for example, the minimum SVT price instead of the mean).

   (e) We considered using firm-level price observations instead of industry-level averages; this was not feasible because the one-year fixed-tariff price measure has many missing observations at the firm level in the earlier part of the period of analysis.

8. We found the results are sensitive to modifications in the specification of the equation and the data used, and lack statistical precision in all specifications.

This may be because the time period is too short, or because we fail to control for other factors that affect pricing.