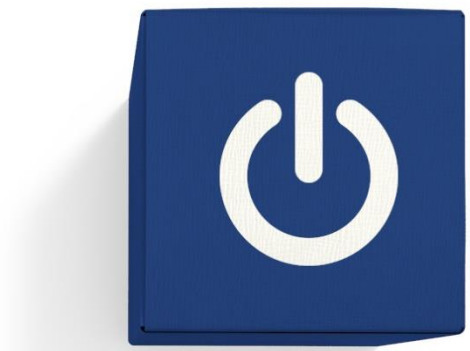
Default Tariff Cap cost of capital

Ofgem

25 August 2022



FINAL REPORT

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FOREWORD

These are challenging times for energy consumers. Over the coming winter (2022/23), the Default Tariff Cap (DTC) set by Ofgem will rise significantly, with typical bills potentially exceeding £4,000 in 2023. This will create significant financial hardship for many households when there are already other pressures on the cost of living.

At the same time, Ofgem must chart a course to a more financially resilient retail energy supply sector following the fallout from the issues created by unsustainable market entry and recent commodity market volatility. Sustainable, but also profitable, retail energy supplier businesses and business models are needed to achieve this long-term financial resilience objective.

In this context, CEPA was asked by Ofgem to consider a technical question related to the DTC and specifically the Earnings before Interest and Tax (EBIT) ('profit margin') allowance in the price cap. What is a supplier's cost of capital in the current GB retail energy market? If the DTC is set with the objective that GB retail energy suppliers can expect to earn a 'normal' level of profit (i.e., the minimum level of profits required to keep the factors of production in their current use) then the rate of return on capital employed in the supply business would, in the long run, be expected to be equal to the opportunity cost of capital of energy retail activity.

In this report we analyse a range of market evidence and factors that we would expect in theory to affect the cost of capital of GB retail energy suppliers today. We have also carefully reviewed the findings of the Competition and Markets Authority (CMA) at the time of its Energy Market Investigation (EMI), which has to date provided the basis for Ofgem's DTC EBIT allowance, including the underlying assumption of energy retailers' cost of capital.

Overall, we conclude that if taking a longer-term, perhaps more historical, perspective of the cost of capital of the sector, there would be some justification for Ofgem continuing to use the CMA's overall findings on the cost of capital which have underpinned the DTC since its inception (i.e., a 10% pre-tax nominal expected rate of return). This conclusion is consistent with a plausible narrative that there has been a fall in the risk-free rate[1] and the rate of corporation tax since the time period of the CMA's analysis, counteracted by an increase in the risk premium that an investor would demand (over and above the risk-free rate) for their investment in an energy retailer.

However, there are also factors now that mean investing in energy retail supply can be considered riskier than in normal market conditions, with the likelihood that higher returns are required by investors. There is a limited body of market evidence to support a precise estimate of the impact; however, we find that retail energy suppliers' cost of capital in the current market could be as high as 12-15% (pre-tax nominal rate of return) while market conditions remain stressed, unless shorter-term risks that could reduce investors' returns are compensated elsewhere within the DTC.[2]

We appreciate these will be difficult conclusions for consumers in the current economic environment with its expected hardships. However, given Ofgem's need to ensure that holders of supply licenses who operate efficiently are able to finance activities authorised by the licence, we consider Ofgem needs to take into consideration the trading risks and the significant uncertainty of energy retailer's cost of capital in the current market, and in particular what can be inferred of investors expected returns from current market evidence.

We hope this report is useful for both Ofgem and wider stakeholders in the retail energy sector in supporting consultation feedback on this important topic.

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[1] The compensation an investor requires for a zero-risk investment.

[2] For example, a number of risks that retailers currently face from operating in the retail energy market appear asymmetric in their impact on the balance of risks and returns for investors in energy supply companies. They are not standard 'beta risks' as typically captured in investment asset pricing models used by economic regulators, including Ofgem and the CMA. Rather than increasing the cost of capital, via beta, where possible a more justifiable treatment within the DTC may be for Ofgem to amend energy retailers' cost allowances – e.g., for the higher probability of bad debts over the winter – to account for these risks and ensure that the price cap (ex-ante) provides for investors' expected returns. This is consistent with the policy treatment Ofgem has only relatively recently adopted for backwardation costs under the price cap.

EXECUTIVE SUMMARY

From the introduction of the Default Tariff Cap (DTC), Ofgem has applied an Earnings Before Interest and Tax (EBIT) allowance based on analysis of the cost of capital for a standalone energy retailer undertaken by the Competition and Markets Authority (CMA) during the Energy Market Investigation (EMI). The CMA concluded on a 10% (pre-tax, nominal) cost of capital for the retail energy sector during the EMI, premised on the assumptions of a fully equity financed energy retail company and the CMA's judgement that the risk of investment in an energy retailer was broadly equivalent to a market-wide investment in the stock market.[3]

Ofgem has not updated that analysis since the November 2018 final decision on the design and implementation of the DTC, and now wishes to assess if the underlying assumptions remain robust in the current market context for energy retail.

Assessing an appropriate cost of capital for the energy retail sector is not straightforward, particularly in the current market context of regulatory change and economic headwinds. However, to support Ofgem's ambition to complete its own assessment of the energy retail cost of capital for the first time, CEPA has completed a cost of capital assessment following a methodology that draws on key aspects of the original analysis completed by the CMA, while seeking to maintain consistency with Ofgem's existing regulatory policies on the cost of capital. Where possible, we have also sought to draw on new sources of market evidence.

OUR APPROACH

A key feature of our approach, which we have carried forward from the CMA, is the assumption that a standalone energy retailer would be entirely equity financed.

This is an assumption that may require further development as Ofgem gains further evidence on the current commercial status of energy retailers and the implications of its approach to strengthening retail financial resilience. However, given the current energy retail trading conditions and that energy retailers can have few physical assets, large swings in working capital and forms of trading intermediary arrangements that can limit access to certain sources of debt finance, we consider a fully equity financed retailer to remain both a prudent and realistic assumption.

Like the CMA, we estimate a nominal cost of capital given Ofgem's approach to setting the DTC EBIT allowance and we calculate a pre-tax cost of equity to reflect the fact that the actual return to shareholders will be reduced by the rate of corporation tax, assumed to be 25% for the purposes of this report.[4]

Consistent with current UK regulatory practice, we have estimated the retailer's cost of equity using the Capital Asset Pricing Model (CAPM) under the following formula.

$$CAPM\ nominal\ cost\ of\ equity = Nominal\ RFR + MRP \times Equity\ beta$$

We have used a CAPM-Total Market Returns (TMR) framework for our analysis and assume that the real TMR (the expected return for an investor that holds a theoretical 'market portfolio' of all assets available in the investible universe) is stable over time. The TMR can be decomposed into the risk-free rate (RFR) and the Market Risk Premium (MRP) and a CAPM-TMR approach assumes movements in the RFR are offset by movements in the MRP.

Because we assume the notional standalone energy retailer is fully equity financed, and does not employ long-term debt as part of its capital structure, its de-levered beta (i.e., asset beta) for the purpose of our analysis is equivalent to its equity beta, again consistent with CMA's EMI cost of capital analysis.

[3] After accounting for the impact of the average level of financial gearing of the market portfolio.

[4] The current corporation tax rate is 19% but is set to rise to 25% from April 2023.

Risk-free rate

UK Government nominal gilt and index-linked gilt (ILG) yields are the primary source of evidence we have used to assess the nominal and real (CPI-stripped) RFR values for energy retailers.

We focused our analysis on five and ten-year tenors to help capture differences in the time horizon for investment in energy retail, compared to energy networks, where Ofgem has recently focused on 20-year tenors. Using a one-month trailing average of nominal gilt yields to a cut-off date of 18th August 2022, we estimated a nominal RFR range of 1.80% to 2.07%. Using the same estimation period, we estimated a real RFR range of -1.12% to -0.86%, adjusting ILG yields upwards for an 'RPI-CPI' inflation wedge calculated from inflation swap data.

We recommend that Ofgem refresh the analysis of gilts and inflation swaps closer to when any an updated DTC cost of capital would be applied.

Market risk premium

For the purpose of this study, we align our view of the real (CPI-based) TMR to the 6.25% to 6.75% range from Ofgem's recent published positions for energy networks. Combined with our proposed range for the real (CPI-stripped) RFR, this results in a MRP range of 7.37% to 7.61%.

Beta

In an ideal world, we would be able to empirically estimate the asset beta for an energy retailer drawing on a large number of UK listed pure play energy supply businesses. Unfortunately, the set of listed companies, in the UK and in other countries, that meet this criterion is currently limited. As such, it is necessary to consider alternative approaches to estimate and draw conclusions on beta. Similar to the CMA, we have undertaken analysis to assess the riskiness of an energy retailer *relative* to the market overall and specific comparator sectors in the economy.

Overall, we conclude that if taking a longer-term, perhaps more historical, perspective of the beta and the riskiness of an energy retailer operating in GB, we would concur with the conclusions that the CMA reached at the time of the EMI. That is, an asset beta of 0.7-0.8, implying the riskiness of an investment in a standalone GB energy retailer (excluding gearing effects) is broadly consistent with an investment in the market overall. Energy retailers face many risks, but the extent to which they are non-diversified for portfolio investors is debatable.

However, we consider there is both some market evidence, and reasons in principle and in practice, to conclude the appropriate beta assumption for setting the DTC cost of capital may currently need to be higher than 0.7-0.8.

We consider that in the current circumstances of energy markets in the UK and globally, an energy retailer might be subject to higher market/systematic (i.e., non-diversifiable) risk, as captured by the CAPM's beta parameter, than under 'normal' market conditions. There are also several other risks which investors may be concerned about – e.g., political/ regulatory risks and possible asymmetries in the balance of risk and reward in the sector and the DTC[5] – that will influence their expected returns in the current market.

In the current context of the energy market, we think it would not be implausible for Ofgem to conclude that the asset beta, for a standalone energy retailer under the DTC, may need to be as high as 1.0-1.2, broadly equivalent to an investment in an airline, in order to compensate investors for the risks they face where these are not accounted for elsewhere within the price cap. We think the conclusion that the rate of return that investors may require in retail energy is currently elevated is supported by a range of market evidence cross-checks including:

- Short-term estimates of Centrica's traded 'equity beta', and the direction of travel of Centrica's 'asset beta' (i.e., after accounting for changes in gearing) in the past 6-12 months.

[5] For example, the risk that as wholesale prices fall many customers are likely to move off the cap tariff onto cheaper tariffs. The retailer they leave will be left with excess supply of energy, which would have been purchased at a higher cost (before wholesale prices fell). This is the reverse of the situation that has been observed in recent price cap periods.

- Recent valuation multiples and trends in Centrica's share price data, together with evidence from recent retail energy supplier transactions and Credit Default Swap (CDS) pricing.

A number of material risks that energy retailers currently face in operating in the GB retail energy market appear asymmetric in terms of their impact on the balance of risks and returns for their investors. It is important that Ofgem's price cap does not double count the remuneration of those risks – to the extent they exist and are borne by the retail supply company and its investors – via other DTC allowances, or changes that Ofgem may already be seeking to introduce to the price cap. However, these are also not standard 'beta risks' as typically captured in standard investment asset pricing models used by economic regulators, including the CMA.

Rather than increasing the cost of capital, via beta, a more justifiable treatment within the DTC may be to amend retailers' cost allowances – e.g., for the higher probability of bad debt – to ensure that the price cap (ex-ante) provides for investors' expected returns. Rather than uplifting the cost of capital, this would in effect 'price in' any asymmetries within the DTC,[6] either via: changes to the headroom allowance (or a separate uplift in the allowed EBIT margin – e.g., over and above what might be implied by a WACC x capital base calculation); and/or changes to the design of the price cap regime itself (e.g., as Ofgem has adopted for backwardation, or changes to the price cap reset process itself (e.g., more regular updates)). This may provide a more targeted regulatory approach for Ofgem to ensure that the price cap (ex-ante) provides for investors' expected returns, without having to depart too far from the conclusions that we draw above of longer-term beta estimates for the sector.

Cost of equity

We present two ranges for the cost of capital: short-term and long-term, as set out in Table 1 below.

Our longer-term range relies on longer-term evidence of beta and we would consider more consistent with 'normal' market conditions. Our short-term estimates are anchored to a shorter-term risk outlook and place greater weight on the inferences drawn from the market cross check evidence.

Table 1: Cost of capital ranges

Ref.	Approach	Long-term		Short-term		Derivation
	Range	**Low**	**High**	**Low**	**High**	
A	Real risk-free rate (%)	-1.12	-0.86	-1.12	-0.86	Assumption
B	Nominal risk-free rate (%)	1.80	2.07	1.80	2.07	Assumption
C	Real total market return (TMR)	6.25	6.75	6.25	6.75	Assumption
D	Market risk premium (MRP)	7.37	7.61	7.37	7.61	D = C – A
E	Asset beta	0.70	0.80	1.00	1.20	Assumption
F	Gearing (%)	0.00	0.00	0.00	0.00	Assumption
G	Equity beta	0.70	0.80	1.00	1.20	G = E / (1 – F)
H	Nominal post-tax cost of equity (%)	6.96	8.16	9.17	11.20	H = B + (D x G)
I	Tax rate (%)[7]	25.00	25.00	25.00	25.00	Assumption
J	**Nominal pre-tax cost of equity (%)**	**9.28**	**10.88**	**12.23**	**14.94**	J = H / (1 – I)

Source: CEPA analysis. Note: figures shown include rounding and adopt the simplification of not applying the Fisher equation in a number of steps of the calculations.

In conclusion, we can see a plausible narrative that would support Ofgem continuing to use **10% as a longer-term / 'normal' market conditions estimate of an energy retailers' cost of capital**, assuming it its fully equity financed.

[6] Consistent with how a company with the freedom to set its own prices might approach the issue.

[7] The current corporation tax rate is 19% but is set to rise to 25% from April 2023.

This would be consistent with a narrative that:

- there has been a fall in the RFR (and the rate of corporation tax rate) since the time period of the CMA's EMI analysis of cost of capital; and
- this has been counteracted by an increase in the market risk premium an investor would demand (above the RFR) for their investment in a GB energy retailer.

However, there are also factors at the moment that mean that investing in energy retail can be considered riskier than in normal market conditions, with the likelihood that higher returns may be required by investors. In the current retail market context, we consider that there could be issues with Ofgem placing too great an emphasis on standard asset pricing models such as CAPM and their longer-term parameter estimates, and this may underestimate investors' required rate of return. There is limited market evidence to support a precise estimate of the impact; however, **a cost of capital in the range of 12-15%** could be appropriate while market conditions remain stressed.

Where within this range of evidence is the appropriate cost of capital assumption for the purposes of the setting the default tariff cap, we suggest is dependent on:

- the extent to which the current commodity procurement and retail (e.g., bad debt) trading conditions in the energy supply sector are considered to impact beta;
- given the GEMA's[8] duties under the Tariff Act, whether Ofgem should be seeking to determine a longer-term estimate of the cost of capital, over the course of an economic cycle, or more of a shorter-term estimate that better reflects views of current market conditions;
- the degree to which possible remaining asymmetries in the balance of risk and reward of supplying customers under the DTC are considered to be addressed elsewhere within the price cap, or need to be accounted for in the estimate of the cost of capital used to the set the DTC; and
- how important it is for the level of the DTC – and its EBIT allowance component – to be suitably market based, and able to attract new equity investment in the current market.

Given Ofgem's need to *"ensure that holders of supply licenses who operate efficiently are able to finance activities authorised by the licence",*[9] we consider that Ofgem will need to take into consideration the significant uncertainty of retailer's cost of capital in the current market, and in particular shorter-term evidence.

While we note that Ofgem has avoided an explicit policy of aiming up in its recent onshore networks cost of capital determinations, given the uncertainty of a retailer's cost of capital, we consider that there may be a good justification for selecting a point estimate in the upper half of the range of evidence in these particular circumstances, or recognising, via the methodology that is used to set the EBIT allowance, that there is a potentially wide range of estimates and relevant evidence for the cost of capital in the current circumstances.

It will also be important for Ofgem to consider if a perceived increase in risk, and the impacts this may have on investors expected returns in the sector, are best accounted for by increasing the beta parameter in the CAPM (as discussed above), or by adjusting other elements of the DTC methodology – e.g., to directly account for asymmetric trading and bad debt risks where they are considered to exist.

We hope this report is useful for both Ofgem and wider stakeholders in the retail energy sector in supporting consultation feedback on this important topic.

[8] Gas and Electricity Markets Authority

[9] Domestic Gas and Electricity (Tariff Cap) Act 2018, 6(b)

1. INTRODUCTION

Since the start of 2019, Ofgem has set a 'Default Tariff Cap' (DTC) as an upper limit on the charges energy retail companies can offer 'Standard Variable Tariff' (SVT) customers. The DTC is built up from a series of allowances updated for each 'Charge Restriction Period'. One of those allowances is for energy retailers' 'Earnings Before Interest and Tax' (EBIT). Ofgem sets the EBIT allowance to reflect the *"normal rate of return for a supplier who is carrying out wholesale trading activities itself"*.[10]

The EBIT allowance is currently set as 1.9% of all other DTC allowances, except 'headroom' and VAT.[11] This part of the DTC methodology has not changed since Ofgem's November 2018 final decision on the design and implementation of the DTC, where Ofgem based the EBIT allowance on analysis completed by the Competition and Markets Authority (CMA) as part of the Energy Market Investigation (EMI).[12]

In adopting a 1.9% EBIT margin from the CMA, Ofgem set out that it was also accepting the CMA's 'Return on Capital Employed' (ROCE) approach, where EBIT is assessed as the product of a cost of capital estimate and an assumed level of capital employed:[13]

$$EBIT = Cost\ of\ Capital \times Capital\ Employed$$

In June 2022, Ofgem announced it would review its EBIT margin approach, including whether assumptions on companies' returns remain robust.[14] To support that aim, Ofgem commissioned a study from CEPA on the cost of capital assumptions for the DTC. This report summarises our findings.

CMA ASSESSMENT OF ENERGY RETAILER RETURNS

The CMA launched the EMI in 2014 after Ofgem referred the energy market for full investigation. It concluded the review in 2016, with one aspect covered being an assessment of the ROCE realised by energy retail businesses between 2007 and 2014.

To assess the profitability of energy retailers, the CMA compared realised EBIT margins with its view of a 'normal' level of profit. CMA guidelines for market investigations define normal profits as:[15]

> *"the minimum level of profits required to keep the factors of production in their current use in the long run, i.e. the rate of return on capital employed for a particular business activity would be equal to the opportunity cost of capital for that activity."*

The CMA stated that the cost of capital of an individual business will be affected by its capital structure, driven by factors such as the ability to raise debt, the risk appetite of equity holders, and relative costs of debt and equity financing. Although a range of business models exist in the energy retail sector, the CMA assumed a specific

[10] Page 6, Appendix 9 – EBIT, Ofgem (2018), Default Tariff Cap: Decision, November.

[11] The DTC includes a 'headroom' allowance to cover *"uncertain cost pressures that are not already included in [Ofgem's] efficient benchmark"*. Page 5, Appendix 2 – Cap level analysis and headroom, Ofgem (2018), Default Tariff Cap: Decision, November.

[12] Page 5, Appendix 9 – EBIT, Ofgem (2018), Default Tariff Cap: Decision, November.

[13] Capital employed represents the different resources that the business employs to generate profits; for instance, the paid in equity, retained profits and long-term debt that finance the business.

[14] Page 80, Ofgem (2022), Policy Consultation – Strengthening Retail Financial Resilience, June.

[15] Page 28, Competition Commission (2013) Guidelines for market investigations, April.

business model to ensure internal consistency within its workings, then applied the estimated cost of capital across the industry to ensure equal treatment of all firms.

The CMA focused on a firm engaged solely in energy retail—that is, an 'independent' company not held as part of a 'vertically integrated' group with upstream gas or electricity generation interests. In coming to a view on its benchmark Weighted Average Cost of Capital (WACC) for its profitability analysis, the CMA sought to reflect a sustainable level of gearing, cost of equity and cost of debt that a hypothetical *stand-alone* operator in the GB retail energy market would incur when undertaking the relevant activities.

The CMA examined the appropriate financial structure and commercial arrangements for such a company, and focused on so-called 'mid-tier' companies, the largest players outside the 'Six Large Energy Firms' under investigation. For those mid-tier companies, a major feature of their business models was whether they paid a trading intermediary to engage in wholesale energy markets on their behalf. At the provisional findings stage, the CMA determined it would be more cost effective to manage business risk through such arrangements compared to the cost of additional capital needed to engage directly in wholesale energy markets.[16]

The CMA received evidence during the EMI that, as part of commercial arrangements with trading intermediaries, energy retailers give security over their assets in return for access to credit, notably through the ability to pay for wholesale energy costs after delivery. Because such arrangements mean security cannot be given to any other party, the CMA assumed that the energy retailer would be 100% equity financed. It noted this as a potentially conservative assumption given evidence of some independent energy retailers operating at the time being able to secure debt on unsecured terms.[17]

Given its assumption that a notional energy retailer would be entirely equity financed, the CMA assessed the WACC as a nominal pre-tax cost of equity, estimated using a Capital Asset Pricing Model (CAPM) framework. The CAPM relates the firm's cost of equity to the risk-free rate (RFR), the expected additional return over the RFR on the market portfolio of investments (the 'market risk premium' (MRP)) and a firm-specific measure of investors' exposure to systematic risk (beta).

The CMA's workings are summarised in Table 1.1 below.

[16] Page 25, Appendix 10.3 'Analysis of retail supply profitability – ROCE and economic profit', CMA (2015), Energy market investigation provisional findings report, July.

[17] See Table 7 'Gearing level of energy firms, Page 29, Appendix 9.12 – Cost of capital, CMA (2016), Energy market investigation final report, June.

Table 1.1: Nominal pre-tax cost of equity and associated components estimated by the CMA

Ref	Parameter	Low	High
A	Real risk-free rate (%)	1.0	1.0
B	Nominal risk-free rate	4.0	4.0
C	Market risk premium (MRP)	4.0	5.5
D	Asset beta	0.7	0.8
E	Gearing (%)	0.0	0.0
F	Equity beta (= D / (1 – E))	0.7	0.8
G	Nominal post-tax cost of equity (%) (= B + (C x F))	6.8	8.4
H	Tax rate (%)	27.0	27.0
I	**Nominal pre-tax cost of equity (= G / (1 – H))**	**9.3**	**11.5**

Source: CEPA analysis of CMA (2016) [18]

As shown in Table 1.1, the CMA estimated a cost of equity range of 9.3% to 11.5%. However, it adopted a 10.0% assumption as the basis for its assessment of 'normal' profits, approximately the midpoint of its range.

Estimating the DTC cost of capital

As Ofgem did not complete its own assessment of the cost of capital for energy retail when introducing the DTC—in 2018 the EMI still represented a relatively recent determination—the CMA's 2016 assessment remains the most important precedent for assessing the cost of capital for the energy retail industry in GB. This study seeks to build on that work with new market data, updates for Ofgem regulatory precedent and consideration of further updates that might be justified in the current market context and current market data.

We have carried forward the CMA's assumption that the notional energy retailer would be entirely equity financed, and that the CAPM provides the best framework for considering that cost. Consistent with how Ofgem, and a number of other economic regulators in the UK currently estimates the cost of equity for regulated utilities, we employ a CAPM-Total Market Return (CAPM-TMR) approach which assumes the real TMR (the expected return for an investor that holds a theoretical 'market portfolio' of all assets available in the investible universe) is stable over time.[19]

In assessing the cost of equity for the DTC, we have needed to consider some additional factors compared to the CMA's 2016 analysis:

- **State of the energy retail market:** Levels of profitability in the GB retail energy market have declined markedly in recent years, with many (but not all) companies earning negative EBIT margins.[20] This has resulted in a number of companies exiting the market (following their collapse) and eroded the balance sheets of companies that remain active in the sector.
- **Role of the cost of capital assessment:** The CMA was clear that it saw its cost of capital assessment as producing *"indicative rather than precise estimates"* of the cost of capital.[21] However, with the DTC biting

[18] Page 1, Appendix 9.12 – Cost of capital, CMA (2016), Energy market investigation final report, June.

[19] The TMR can be decomposed into the risk-free rate and MRP and a CAPM-TMR approach assumes that movements in the risk-free rate are offset by movements in the MRP.

[20] Pages 54 to 55, Oxera (2022), Review of Ofgem's regulation of the energy supply market, May.

[21] Page 39, Appendix 9.12 – Cost of capital, CMA (2016), Energy market investigation final report, June.

for many customers in GB, Ofgem's determination of the EBIT allowance will have a direct impact on customer bills and energy retailer finances, in a period where both parties face financial pressure.

- **Macroeconomic headwinds:** The UK currently faces a challenging macroeconomic outlook with material uncertainty on future inflation and interest rates. The EMI covered a period of even greater economic distress—the Global Financial Crisis—but was completed with the benefit of hindsight as an ex-post assessment of returns from 2007 to 2014.

In addition to the points listed above, we note that Ofgem's policy consultation on strengthening retail financial resilience raised a range of policies that might affect the cost of capital for a standalone energy retail business. We recommend that Ofgem continue to engage with energy retailers and industry stakeholders to understand the impacts of those policies, whether on the cost of capital or the level of capital employed.

Key questions include whether ringfencing proposals for prepaid customer credit balance balances and Renewable Obligation (RO) payments, which might otherwise be used by retailers as a source of additional short-term liquidity, might lead to new short-term debt costs for retailers or affect their equity beta if persistently drawn. There are also key questions about if it might be possible for energy retailers to meet liquidity and/or capital adequacy requirements more efficiently with the participation of long-term debt alongside shareholder equity, or potentially with the use of callable equity. Plentiful access to liquidity through CCBs and RO balances, and the historical approach to prudential regulation in the sector, has meant that these are issues that energy retailers have not needed to consider in practice, or that could be seen in their current financing arrangements. However, they may become more live issues as Ofgem proceeds with its reforms to the energy retail market.

It has not been possible for us to determine the precise impact of those Financial Risk and Controls (FRC) policies at this stage. However, we note that in current market conditions there may be challenges for standalone energy retailers to access commercial debt, even on a short-term basis. Furthermore, energy retailers can have few physical assets, large swings in working capital and forms of trading intermediary arrangements that can limit their access to certain sources of debt finance, and so we consider a fully equity financed retailer to remain both a prudent and realistic assumption for our analysis.

Report structure

Following this introduction, the remainder of this paper is structured as follows, based around the key components of the CAPM framework:

- Section 2 presents our analysis of the risk-free rate;
- Section 3 discusses the choice of 'total market returns' assumptions;
- Section 4 addresses the appropriate choice of beta; and
- Section 5 brings together our analysis to present our findings on the cost of capital.

Further supporting analysis is provided in a series of appendices.

2. RISK-FREE RATE

The risk-free rate (RFR) provides the foundation of the cost of equity in a CAPM framework. Within a CAPM-TMR approach, it is also used to identify the portion of equity returns affected by a company's exposure to non-diversifiable risk—the market risk premium (MRP).

As we are assessing a nominal cost of equity, Ofgem requires both a nominal RFR and a real RFR. It needs a nominal RFR to state the cost of equity in nominal terms and needs a real RFR to derive the MRP estimate from a real terms estimate of the TMR required for the market-wide portfolio.

$$CAPM\ nominal\ cost\ of\ equity = Nominal\ RFR + MRP \times Equity\ beta$$

$$MRP = Real\ TMR - Real\ RFR$$

In this section we set out our approach to estimating the RFR and present our findings.

2.1. RISK-FREE RATE ESTIMATION APPROACH

UK Government nominal gilt and index-linked gilt (ILG) yields are the primary source of evidence we used to assess the RFR in this study.[22] In this section, we set out our preferred approach for using that evidence to estimate the RFR in the context of the DTC. We consider the time horizons and adjustments we might need to produce suitable values for our CAPM-TMR cost of equity estimates.

Time horizon

We consider the time horizon for assessing the RFR in terms of which gilt tenors to analyse and whether it would be preferable to rely on yields for a specific date or a longer trailing average.

Gilt tenors

Ofgem currently uses twenty-year ILG yields to set the RFR in RIIO-2 price controls and the CMA stated its preference in the EMI for long maturities to reflect the *"indefinite"* maturity of equity finance.[23] However, we consider there are good reasons to focus on shorter time horizons for in the context of the DTC:

- customers are not tied to a single company based on their location, meaning there is no guarantee for an energy retailer that it will not lose its customer base over time;
- fixed assets have materially shorter lives than for network businesses, potentially allowing equity investment to be returned to shareholders over a shorter time horizon; and
- there have been significant periods of market entry and exit in recent years, suggesting shareholders may not find it appropriate to focus on very long or indefinite time horizons when considering return requirements for investments in the energy retail sector.

As such, we considered three gilt yield tenors: 5 years, 10 years and 20 years. We consider that no assumption of the investor's time horizon for estimating the cost of capital is perfect and, as a result, we consider the market evidence across these different tenors to reach in the round conclusions for the specific purposes of this study.

[22] Focusing on gilt yields is consistent with Ofgem's approach for setting the RFR in the RIIO-2 price controls. See discussion in pages 26 to 31, Ofgem (2021), RIIO-2 Final Determinations – Finance Annex (REVISED), February.

[23] Paragraph 19, Appendix 9.12 – Cost of capital, CMA (2016), Energy market investigation final report, June.

Observation periods

Over the last year there have been significant movements in gilt yields, reflecting a changing macroeconomic environment for the UK and world economy. As such, it is important to consider which dates' yields should be used to assess the RFR.

We have focused our analysis of gilt yields on spot (i.e., single date) and one-month trailing averages to a cut-off date of 18th August 2022. Both options cover relatively short periods to ensure estimates are responsive to current market conditions. Spot evidence is useful for seeing a consistent market view of nominal and index-linked yields on a single day and ensuring data is as up to date as possible. The one-month trailing average brings in more data, helping remove day-to-day volatility from the results while remaining reasonably up to date.

A one-month trailing average is also the period used by Ofgem in its RIIO-2 cost of equity indexation.[24] As such, using that trailing average length may provide a basis for Ofgem to refresh our RFR analysis at a later date or even if it wished to apply a form of cost of equity indexation, as it does for RIIO-2.

Yield adjustments

Nominal gilt and ILG yields are an established source of evidence for estimating the RFR. However, it may sometimes be appropriate to adjust market yields for certain known phenomena. In this study, we have considered two such cases: (i) the 'RPI wedge'; and (ii) the 'inflation risk premium'.

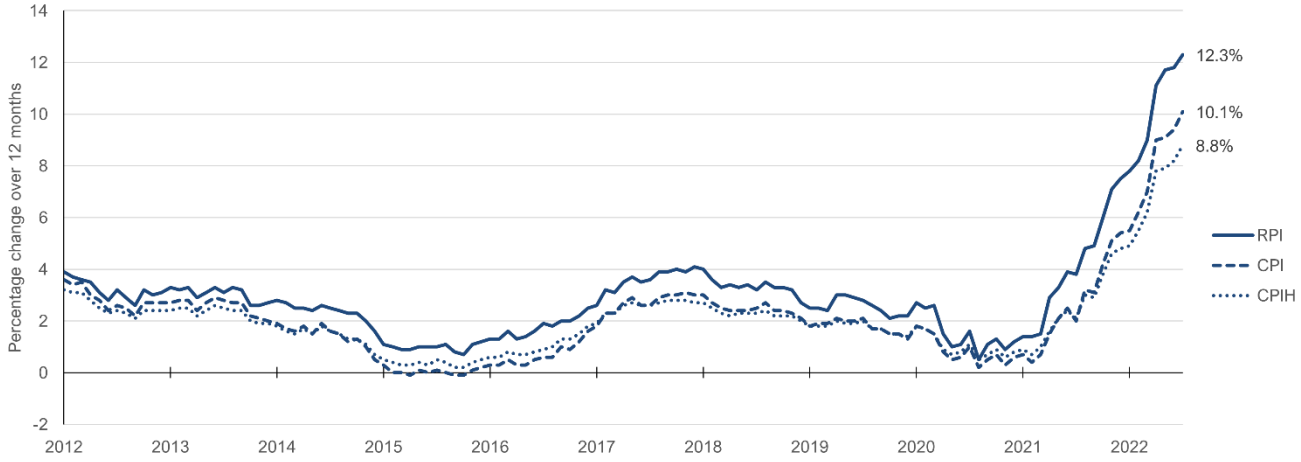
RPI wedge

UK ILGs are linked to RPI. RPI was historically the leading measure of consumer price inflation in the UK. However, the Government and sectoral economic regulators (including Ofgem) have moved away from using it as overstates inflation because of simplifications in how it aggregates prices.

The Government announced it will address the underlying issue with RPI by aligning the calculation of RPI with CPIH in 2030.[25] However, in the meantime, ILG holders will be compensated for artificially high inflation, depressing the yield they require on that security.

This known effect on ILG yields means that to estimate a more accurate measure of the 'true' real RFR, we must add an estimate of the additional 'wedge' of inflation recorded by RPI compared to an accepted measure of inflation, such as CPI or CPIH. Figure 2.1 compares those three inflation measures over the past three years.

Figure 2.1: Comparison of RPI, CPI and CPIH (Jan 2012 to July 2022)



[24] Pages 25 to 27, Ofgem (2021), RIIO-2 Final Determinations – Finance Annex (REVISED), February.

[25] CPIH is another measure of consumer price inflation including housing-related costs.

Source: CEPA analysis of ONS data [26]

As shown by Figure 2.1, the 'wedge' between RPI wedge and other inflation measures varies over time. It is currently particularly large, with RPI rising 2.2 percent faster than CPI and 3.5 percent faster than CPIH over the 12 months to July 2022. There is also currently a material wedge between CPI and CPIH as housing costs have not risen as fast as non-housing consumer prices. Despite their current differences, CPI and CPIH normally track each other closely and we would not expect this to persist over long periods of time.

On a forward-looking basis, better information exists to estimate the wedge between RPI and CPI inflation, rather than the wedge over CPIH. We can examine a market-driven estimate of the RPI-CPI wedge by comparing the pricing of RPI and CPI swaps. We can also examine differences in independent forecasts for RPI and CPI—fewer forecasts of CPIH are available.

Table 2.1 below presents evidence from UK inflation swaps to 18th August 2022 showing a persistent expected RPI-CPI wedge over five-, ten- and twenty-year tenors. We note that both the ten-year and twenty-year tenors show lower RPI-CPI wedges than for the five-year tenor, consistent with the expectation that RPI should align to CPIH from 2030 onwards.[27]

Table 2.1: Inflation swap rates to 18th August 2022

Ref.	Tenor	5 years		10 years		20 years	
	Reference period	**Spot**	**1 month**	**Spot**	**1 month**	**Spot**	**1 month**
A	RPI swap	5.22	4.58	4.46	4.09	3.81	3.59
B	CPI swap	4.31	3.80	3.76	3.46	3.31	3.17
C	Implied RPI-CPI wedge (= A – B)	0.91	0.78	0.69	0.63	0.49	0.42

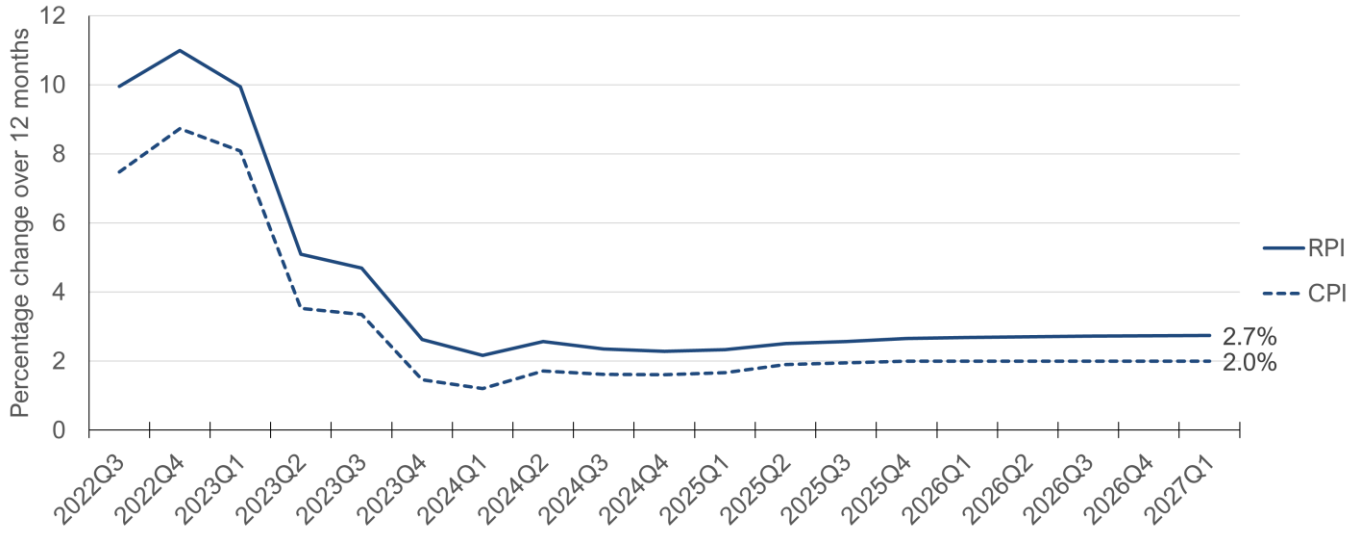
Source: CEPA analysis of Bloomberg data, rounded to two decimal places

Swap price evidence on the RPI-CPI wedge is valuable as it is market driven and can give a snapshot of expected levels on a given day. However, it is possible that these findings may be affected by factors other than the RPI-CPI wedge (e.g., relative market depth and liquidity). As such, it is useful to cross-check those findings with independent forecaster estimates of CPI and RPI, which seek to only estimate the statistic in question. However, they have limitations compared to market evidence as publicly available sources are published infrequently (e.g., quarterly or semi-annually) and generally cover relatively short forecast periods (typically less than five years). We focus on estimates from the Office of Budget Responsibility (OBR) as a leading source for such information. Figure 2.2 presents OBR forecasts of RPI and CPI inflation from March 2022.

[26] ONS Consumer Price Inflation data published 17 August 2022.

[27] See HMT/UK Statistics Authority (2020), A response to the Consultation on the Reform to Retail Prices Index (RPI) methodology, November.

Figure 2.2: OBR RPI and CPI inflation forecasts, March 2022



Source: CEPA analysis of OBR data [28]

As shown in Figure 2.2 above, the OBR forecast a significant RPI-CPI wedge persisting into early 2023, falling to 70bp by the end of its forecast period, a level consistent with the evidence from five- and ten-year inflation swaps summarised in Table 2.1 above. We expect that the lower RPI-CPI wedge implied from inflation swaps at the 20-year maturity can be explained by the Government's plan to align the calculation of RPI with CPIH from 2030, eliminating much of the reason for there being wedge between RPI and CPI.

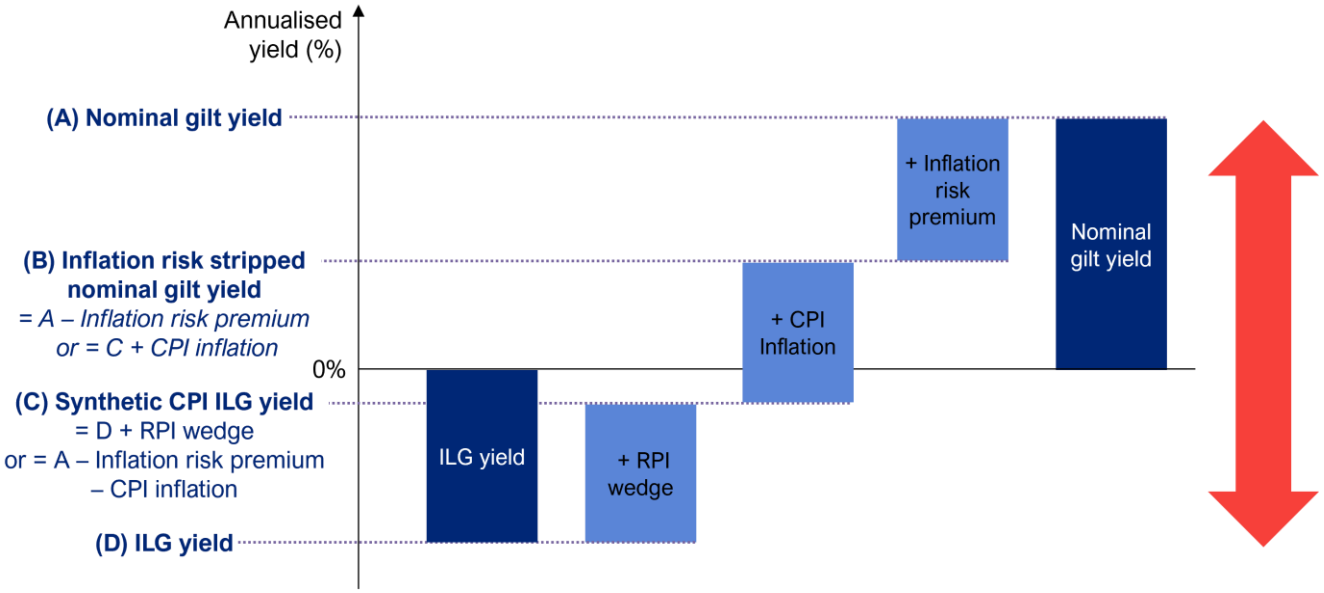
Inflation risk premium

The RPI-CPI wedge explains some of the difference in yields on nominal gilts and ILGs. In theory, the remaining gap should be largely explained by: (i) CPI inflation expectations; and (ii) any premium that investors require on nominal gilt yields for inflation risk. Figure 2.3 below presents a stylised version of this three-part gilt yield decomposition.[29]

[28] Table 1.7 'Inflation', OBR (2022), Economic and fiscal outlook – supplementary economy tables, March.

[29] Please note that Figure 2.3 shows the case where ILG yields are negative, as is currently the case in the UK for the tenors we examine. We note that historically ILGs have had positive yields and so the figure shown here should not be taken to suggest ILG yields should always be negative.

*Figure 2.3: Stylised gilt yield decomposition **



*Source: CEPA; * Diagram not to scale*

Decomposing nominal gilt and ILG yields into these three parts is useful for understanding what might drive differences in yields and what (if any) adjustments might be appropriate before using them in a CAPM-TMR approach, particularly for selecting the nominal RFR.

We considered the three-part yield decomposition above and found that for the DTC it would be preferable to base the nominal RFR on nominal gilt yields, with no adjustment for any inflation risk premium. This finding was based on methodological and practical grounds.

Methodological basis for nominal RFR approach

For Ofgem's onshore price controls, it may be reasonable to assume investors in energy network companies are substantially protected from inflation risk: both regulated asset values (RAV) and allowed revenues are updated each year for forecast and outturn inflation. Because of this, Ofgem might reasonably justify seeking to avoid any remuneration for inflation risk in networks' cost of capital, whether expressed in real or equivalent nominal terms.

The context for the DTC is different. Notably, there is no inflation-linked RAV that can guarantee remuneration of outturn inflation. As such, the cost of capital is set in nominal terms and investors effectively face the same sort of inflation risk as most other investments—a risk that should be remunerated somewhere within the cost of capital (or at least not be subtracted from it).

If investors in energy retail companies must be remunerated for bearing inflation risk, it is relevant to consider if that risk should be captured in the nominal RFR or the MRP in a CAPM-TMR framework. We consider it would be more appropriate to capture this risk directly in the nominal RFR. This is because it is not clear that the required remuneration of inflation risk should be any lower or higher for a company simply based on its beta—the implication of including an inflation risk premium in the MRP. As such, we consider that capturing the inflation risk premium in the nominal RFR (by using nominal gilt yields) is a simpler and more defensible approach in the context of the DTC.

Practical basis for nominal RFR approach

During the EMI, the CMA acknowledged the existence of the inflation risk premium when considering adjustments to nominal gilt yields as one of two routes to a real RFR estimate. The CMA stated that it would have subtracted

from nominal gilt yields an estimate of the inflation risk premium if it were aware of a reliable estimate.[30] It did not comment on if it would have ideally subtracted such a premium when setting the nominal RFR.

Like the CMA, we are not aware of any reliable estimates of the inflation risk premium—it is typically estimated *ex post* by comparing expected and outturn inflation. However, analysis presented in a 2015 BoE Staff Working Paper that decomposed gilt and swap yields from 1992 to 2014 found an inflation risk premium of 15 basis points on average, with a maximum of 75bp and a minimum of -40bp.[31]

We find it difficult to interpret the meaning of a negative inflation risk premium and expect that current market conditions may have driven any inflation risk premium higher than the average for the period considered in the BoE staff paper. Therefore, even with the benefit of that evidence, we consider that it would be difficult to establish a robust inflation risk premium estimate to be subtracted from nominal gilt yields.

2.2. ANALYSIS OF RISK-FREE RATE MARKET EVIDENCE

Following the approach set out above, we produced the following RFR estimates based on market data to 18th August 2022. We use the synthetic CPI ILG yield as the basis for the real RFR and nominal gilt yields as the basis for the nominal RFR.

Table 2.2: Risk-free rate estimates (%), based on data to 18th August 2022

Ref.	Tenor	5 years		10 years		20 years	
	Reference period	**Spot**	**1 month**	**Spot**	**1 month**	**Spot**	**1 month**
A	ILG yield	-2.26	-1.89	-1.61	-1.49	-0.98	-0.93
B	RPI-CPI wedge based on swaps	0.91	0.78	0.69	0.63	0.49	0.42
C	Synthetic CPI ILG yield (= A + B)	-1.35	-1.12	-0.92	-0.86	-0.49	-0.51
D	Nominal gilt yield	2.15	1.80	2.34	2.07	2.74	2.59

Source: CEPA analysis of BoE and Bloomberg data, rounded to two decimal places

As shown in Rows A and C of Table 2.2, the RFR estimates based on gilt rates increase with tenor, implying an upward sloping yield curve. This finding is consistent with what we might observe in normal market conditions. However, recently that has not always been the case. To cross-check our findings, we produced a set of inflation forecasts to match the tenors considered in Table 2.2. We then used those forecasts to calculate the inflation risk premium *implied* by the gilt yields after accounting for the RPI-CPI wedge, assuming investors' inflation expectations are consistent with these forecasts. Table 2.3 below presents our findings, focusing on spot data for August 2022.

[30] Pages 7 to 8, Appendix 9.12 – Cost of capital, CMA (2016), Energy market investigation final report, June.

[31] Page 13, BoE (2015), Staff Working Paper No. 551 - The informational content of market-based measures of inflation expectations derived from government bonds and inflation swaps in the United Kingdom, Zhuoshi Liu, Elisabetta Vangelista, Iryna Kaminska and Jon Relleen.

Table 2.3: Risk-free rate cross-check (%), based on 18th August 2022 spot data

Ref.	Tenor	5 years	10 years	20 years
A	Synthetic CPI ILG yield (Line C, Table 2.2)	-1.35	-0.92	-0.49
B	CPI inflation forecast from Q3 2022 [32]	3.63	2.81	2.41
C	**Implied inflation risk premium (= D – A – B)**	**-0.13**	**0.45**	**0.81**
D	Nominal gilt yield	2.15	2.34	2.74

Source: CEPA analysis of BoE and Bloomberg data, rounded to two decimal places

As shown in Table 2.3, we found that after accounting for the RPI-CPI wedge, traded gilt yields appeared to imply a negative inflation risk premium for five-year tenors. This finding does not fit with our analysis of the inflation risk premium in Section 2.1, which highlighted difficulties in estimating that premium, but at a minimum suggested its value should be positive, not negative. We cannot identify what is driving this unusual result with any precision or whether it is affecting the nominal gilt yields more than ILG yields.

One rationale could be market conditions driving investors to safe assets such as government bonds, particularly highly liquid short tenors that can easily be held to maturity. Another rationale is that investors' gilt pricing simply reflects different assumptions of the RPI-CPI wedge, CPI inflation expectations and/or the inflation risk premium.[33] As an illustration of this, Table 2.4 below calculates an *implied* CPI inflation forecast using the same market data as the cross-check in Table 2.3 but with a varying inflation risk premium assumption in the calculations for the 5-, 10- and 20-year gilt tenors respectively.[34] This cross-check results in slightly lower *implied* CPI forecasts than Table 2.3, as a result of adopting fixed inflation risk premium assumptions in the analysis.

Table 2.4: Alternative risk-free rate cross-check (%), based on 18th August 2022 spot data

Ref.	Tenor	5 years	10 years	20 years
A	CPI-stripped RFR (Line C, Table 2.2)	-1.35	-0.92	-0.49
B	**Implied CPI forecast (= D – A – C)**	**3.25**	**2.76**	**2.48**
C	Inflation risk premium assumption	0.25	0.50	0.75
D	Nominal gilt yield	2.15	2.34	2.74

Source: CEPA analysis of BoE and Bloomberg data, rounded to two decimal places

2.3. Conclusions

We consider the cross checks above illustrate that seeking to decompose the RFR calculations into specific components and forecast assumptions can raise a number of challenges. As a result, for the purposes of our DTC cost of capital calculation, our preferred approach for arriving at a range of RFR estimates is to adopt as simple and

[32] To forecast inflation over these periods we used the BoE's CPI inflation forecasts published alongside its August 2022 Monetary Policy Report. We use its median forecast assuming the 1.75% base rate adopted in August 2022. We assume a 2.0% inflation assumption after Q3 2025, the end of its forecast period. To match the estimates with the market data we use, we use Q3 annual inflation values starting from Q3 2023 (i.e., forecast inflation from Q3 2022 to Q3 2023) until Q3 2025, the end of the BoE's forecast period. We use a terminal assumption of 2.0% inflation thereafter, taking a geometric average of each year's estimate. Ofgem used a similar approach based on OBR's March 2022 forecasts as part of a RPI wedge crosschecks for the RIIO-ED2 Draft Determination. See page 30, Ofgem (2022), RIIO-ED2 Draft Determinations – Finance Annex, June.

[33] Our analysis also ignores the impact of liquidity on prices, and it is possible that the RPI-CPI wedge assumption that is used to derive the synthetic CPI ILG yield may not result in a fully accurate decomposition of the inflation risk premium or reflect that RPI and CPI exposure may not carry the same inflation risk premium by investors.

[34] A varying inflation risk premium is in itself an assumption and one we adopt in this specific case for illustration purposes to demonstrate the variability of the findings to different assumptions.

replicable methodology as possible that most importantly is rooted in observed market evidence. A methodology with these core objectives in mind should also allow Ofgem to easily update the RFR that is used to the set the price cap should this be considered a justifiable policy.

As discussed above, there is a considerable body of regulatory precedent for using ILGs to set real RFRs and nominal gilts to inform nominal RFRs, as the CMA adopted in its EMI analysis.

As a result, our proposed approach in this case, is to set the nominal RFR with reference to nominal gilt rates of appropriate tenors (see discussion above for why we think this is appropriate approach in the context of a nominal CAPM) and a real (CPI-stripped) RFR using ILG data and an RPI-CPI wedge based on inflation swap data. Decomposing yields further for inflation expectations and an inflation risk premium is a useful exercise for interrogating market data and challenging its application, but that is best placed to apportion yields between distinct elements, rather than changing the gap between the nominal and real RFRs.

On this basis we have prepared nominal and real RFRs ranges for producing cost of equity ranges in later sections of this report as set out in the table below. We have produced the RFR ranges in Table 2.5 based on the 1-month trailing averages for the five- and ten-year tenors set out on lines C and D of Table 2.2 above. We recommend that Ofgem refresh the RFR analysis presented above closer to when any an updated DTC cost of capital would be applied.

Table 2.5: Proposed range for the risk-free rate (%)

	Low	High
Real (CPI) RFR	-1.12	-0.86
Nominal RFR	1.80	2.07

Source: CEPA analysis

3. TOTAL MARKET RETURNS

TMR represents the total return required by investors for investing in the 'market' – that is, a diversified portfolio of assets. As discussed earlier in this report, the real TMR can be decomposed into the RFR (discussed in Section 2) and the MRP required to compensate investors for bearing the additional risk of the market portfolio above that of a risk-free asset. By following a CAPM-TMR approach, we assume that movements in the RFR are fully offset by changes in the MRP to maintain a constant level of TMR in real terms.

As noted by the CMA in the RIIO-2 price control appeals, there are currently three main types of TMR approach: [35]

- **Historical ex post approaches**, which assume historical realised returns match investor expectations.
- **Historical ex ante approaches**, which seek to control for periods of good or bad fortune in historic realised returns, which might not be expected to be repeated.
- **Forward-looking approaches**, which use survey data and current market prices to derive expectations, such as through the use of a dividend growth model (DGM).

In the EMI, the CMA considered a real (net of RPI) TMR range of 5.0% to 6.5%, drawing on historic (ex post and ex ante) approaches, as well as forward-looking evidence (albeit to a lesser extent). The CMA's EMI approach is broadly similar to Ofgem's current approach, which is consistent across various recent determinations and is based largely on analysis using a historical ex post approach, supported by some forward-looking evidence.

Ofgem's recent RIIO-2 cost of capital determinations use a real TMR range of 6.25% to 6.75%, regardless of whether it takes a long- or short-term view of the cost of capital; for example:

- The RIIO-2 price controls (T2, GD2 and ED2) take a long-term view of the cost of capital, given the long economic life of network assets.[36] In the RIIO-GD2 and T2 appeals, the CMA ruled that Ofgem was "not wrong" to use a 6.25-6.75% range for a real (CPI-based) TMR.
- In its decisions on interest during construction (IDC) for offshore transmission and interconnectors, Ofgem takes a shorter-term view of the cost of capital to align with the length of the average construction period for such assets.[37] In its latest decision, Ofgem used a nominal TMR range of 9.44% to 9.95%, calculated using the real TMR from RIIO-2 and a 3.0% CPI inflation assumption.[38]

In considering the appropriate TMR assumption for the energy retail sector, we do not consider there to be strong grounds to use an alternative approach to that used by Ofgem in the RIIO-2 price controls or its most recent IDC decisions:

- In its final determination on the RIIO-GD2 and T2 appeals, the CMA noted that *"there is no universally accepted method for deriving the TMR, because it is concerned with investors' ex-ante expectations of returns, which are largely unobservable"* and thus no alternative method may be clearly 'better' than Ofgem's current approach.

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[35] CMA (2021) *Cadent Gas Limited, National Grid Electricity Transmission plc, National Grid Gas plc, Northern Gas Networks Limited, Scottish Hydro Electric Transmission plc, Southern Gas Networks plc and Scotland Gas Networks plc, SP Transmission plc, Wales & West Utilities Limited vs the Gas and Electricity Markets Authority, Final determination Volume 2A: Joined Grounds: Cost of equity*.

[36] This is also reflected in the use of 20-year ILGs to determine the RFR.

[37] As illustrated by the use of five-year UK gilts to determine the RFR.

[38] Applying the Fisher equation and the CPI inflation assumption of 3.0% to the RIIO-2 real TMR gives the nominal TMR range, as (1+6.25%)*(1+3.00%) – 1 = 9.44% and (1+ 6.75%)*(1+3.00%) – 1 = 9.95

- The TMR is a market-wide parameter, which in theory should not vary by sector. This is reflected in Ofgem's decision to use the same real TMR in both its network price controls and IDC decisions, despite the varying time horizons under consideration.

In light of this precedent, we choose to align our real TMR for this report to the 6.25% to 6.75% range from Ofgem's recent published positions as described above. Table 3.1 below summarises our chosen parameter values for constructing the MRP used to estimate the cost of equity in later sections of this report.

Table 3.1: MRP range (%)

Ref.	Parameter	Low	High
A	Real (CPI-stripped) RFR	-1.12	-0.86
B	Real TMR	6.25	6.75
C	**MRP (= B – A)**	**7.37**	**7.61**

Source: CEPA analysis

As shown in the table, we have used a simplified arithmetic derivation of the MRP, rather than following a more accurate derivation using the Fisher equation. We consider this approach proportionate given uncertainty on the underlying parameter values.

4. BETA

This section sets out our assessment of beta for the notional energy retailer. In an ideal world, we would be able to empirically estimate the asset beta for an energy retailer drawing on a large number of UK-listed pureplay energy retail businesses. Unfortunately, the set of listed companies, in the UK and in other countries, that meet that criterion is currently limited (as we discuss below).

As such, in assessing the appropriate beta assumption for the energy retail sector, it is necessary to consider alternative approaches. We have sought to identify comparators that, considered alongside a relative risk assessment of the GB retail energy supply sector, can act as a reference point as a comparable **substitute for investment in an energy retailer currently operating in the GB market**. The process to identify suitable comparator companies has as consequence, been central to our work.

As a **first step**, we assess the expected riskiness of energy retailers operating in GB. We consider the risks faced by those companies and how they are perceived by investors. We then assess how correlated these risks are likely to be compared to the 'market' or the UK economy, more generally.

As a **second step,** we undertake quantitative beta analysis of relevant comparator sectors considered by the CMA in the EMI. We apply a set of selection criteria to ensure that the companies we use to produce empirical estimates of beta remain fit for purpose. From this analysis, we produce a beta spectrum which we use to inform our judgements on where the beta for an energy retailer in GB might sit under longer-term 'normal' market conditions. We then consider the current market context and whether there are reasons to consider that GB energy retailers might be temporarily exposed to greater risk than under 'normal' market conditions.

As a **third and final step**, we examine market cross checks, including Centrica's current activities, asset beta and share price as an anchor point for judgements relating to asset betas in the energy retail sector, similar to how National Grid is used by Ofgem as in its RIIO-2 determinations.

4.1. ASSESSMENT OF ENERGY RETAIL RISK PROFILE

4.1.1. Energy retailer risks in principle

Ofgem's June 2022 consultation on strengthening retail financial resilience provides a key reference for the scope of risks faced by energy retailers operating in GB.[39] We do not repeat that list here but note that we agree that the most significant risks faced by an energy retailer are those arising from the procurement of wholesale energy costs to meet their customers' needs, potentially alongside the risk of bad debt.

For energy retailers that enter into long-term fixed price contracts with their customers they may face a number of commodity trading risks:

- Short- and long-term price risks arising from the interaction between the prices customers pay and the prices at which the energy commodity is procured by the retailer. As Ofgem notes in the June 2022 consultation, the level of price risk a retailer is exposed to can be considerably reduced through adopting effective hedging strategies.
- Churn/volume/demand risks i.e., the *"impact of significant shifts in customers, as well as in customer demand – for example caused by unexpected weather conditions can leave suppliers over or under-hedged to meet demand, and having to secure supply they did not anticipate needing, or with excess supply."* We understand that churn/volume/demand risks can be particularly challenging for retailers to manage.

[39] Page 84, Ofgem (2022), Policy Consultation on Strengthening Retail Financial Resilience, June.

Even if retailers could perfectly forecast the exact expected consumption profile of their customers, they may not be able to procure/hedge that exact profile in the market (e.g., because of limits on the hedging products that are available to them). As Ofgem noted in the June 2022 consultation, retailers may also have to adjust their procurement closer to delivery in a way that can leave them exposed to trading risks both when wholesale prices are rising (e.g., if the retailer has to go into the market to procure a shortfall of energy say if winter temperatures are colder than expected) and when wholesale prices are falling (e.g., if winter is warmer than expected).[40]

These risks also exist for retailers serving customers under the DTC. As Ofgem highlighted in its recent statutory consultation on changes to the price cap's wholesale methodology:

> *"During cap period seven (October 2021 to April 2022), as energy prices sharply rose, the cap became the cheapest tariff, bringing an unexpected increase in the number of customers on this tariff. This meant that suppliers had not secured sufficient energy in advance and had to purchase additional supply for those customers at prevailing, very high, prices. As the cap is fixed on a 6-month basis, suppliers were unable to recover the full cost of the energy they brought on the market when prices were higher."*
>
> *"To date suppliers have faced the costs of volume risk in a rising market, but when wholesale energy prices fall in future they will be exposed to falling price volume risk. When prices fall many customers are likely to move off the cap tariff onto cheaper tariffs. The supplier they leave will be left with excess supply of energy, which would have been purchased at a higher cost (before wholesale prices fell). This is the inverse of the costs incurred in period seven."*[41]

While Ofgem has sought to introduce a number of changes to the DTC to reduce the exposure of energy retailers to these risks – including recently introducing shorter (three-month) periods for resetting the price cap, the 'Market Stabilisation Charge' (MSC)[42] and other changes to DTC cost allowances (e.g., to address backwardation risks) – these risks will not have been removed entirely.

In addition, there is also a high possibility in the current retail market that:

- customer bad debts may increase (potentially considerably) as customers are either not willing or are unable to pay (see discussion below); and/or
- demand is even more challenging to forecast and hedge for retailers (e.g., if energy consumption is more price elastic to current high retail prices than in 'normal' market conditions).

Again, while it is possible that Ofgem may introduce further changes to the DTC to help address these risks,[43] all other things being equal, it may be fair to conclude that the risks an energy retailer currently faces in the GB retail energy market are likely to be greater than in past 'normal' market conditions, both in terms of the commodity procurement risks that retailers face alongside the DTC retail prices, and the increasing risk of bad debt.

4.1.2. Energy retailer risks from an investor perspective

Energy retailers, like all businesses, are subject to a range of commercial and operating risks **but not all necessarily affect the rate of return required by investors**. For the purposes of estimating the beta in the CAPM,

[40] For discussion of this issue see Frontier Economics (2021), 'Gas prices: on thin ice'.

[41] Ibid

[42] The MSC temporarily requires all domestic suppliers acquiring a domestic customer to pay a charge to the losing supplier when wholesale prices fall considerably below the relevant wholesale price cap index. The MSC was introduced as a temporary measure, coming into effect on 14 April 2022 and is due to expire on 30 September 2022, unless GEMA decides to extend the charge further.

[43] For example, Ofgem could update (ex-ante or ex-post) the component of the DTC set to capture the cost of bad debt.

the CAPM considers systematic and non-systematic (or idiosyncratic) risks separately. The latter can in theory be diversified away by a portfolio investor, while systematic risks cannot.

Beta specifically is also a relative rather than absolute measure of risk, analysing the covariance of returns for a company *relative* to returns from the stock market. As a result, the assessment of risk for the purposes of estimating beta should be premised on the relative risk of energy retail compared to the market portfolio, rather than its absolute risk exposure. As the CMA noted during the EMI in the specific context of retail energy:

> *"we accept [suppliers'] argument that there can be significant volatility in the profits of a retail supply business due to weather-related demand fluctuations, government scheme costs and input price changes, we note that these would only have an effect on beta to the extent that the volatility is correlated with overall market returns. Neither volumetric risk arising from fluctuations in the weather, nor changes in government scheme costs, exhibit this correlation."*[44]

Another important point to note is that in the current retail energy market, where the majority of GB households are on the DTC, energy retailers are exposed to a number of cost recovery risks. These arise from the methodology used to set the cost allowances in the cap (for example, medium-term issues around backwardation risks) and the risk that, should wholesale prices fall in future, customer churn (i.e., switching) could leave retailers with significant losses,[45] even with the MSC. Such risks – by their nature in the current retail market circumstances – are asymmetric.

While they are risks that an investor would be expected to be (very) concerned about currently, they are at odds with the underlying assumption of the CAPM that the risks that will affect the normal rate of profit/rate of return required by investors are symmetric around this given expected rate of return. A clear asymmetry in the balance of risk and reward might instead be expected by investors to be addressed in offers that their energy retailer would make; otherwise, their investment would not be a "fair bet" from their perspective.[46]

In the current retail energy market circumstances, asymmetries in the balance of risk and returns are likely to be concerning for investors. However, rather than capturing this effect via an adjustment to the cost of capital, we consider that in principle[47] it may be more appropriate to "price in" these asymmetries within the price cap, either via:

- changes to the headroom allowance (or a separate uplift in the allowed EBIT margin – e.g., over and above what might be implied by a WACC x capital base calculation); and/or
- changes to the design of the price cap regime itself (e.g., as Ofgem has adopted for backwardation, or via changes to the price cap reset process (e.g., more regular updates)).

That said, asymmetric risks, as with diversifiable and non-diversifiable risks for a portfolio investor, are not always easy to clearly differentiate. There are also a number of reasons to consider that the current circumstances of the retail energy market could impact beta, as we discuss further below.

4.1.3. Relative risk of a retail energy retailer

As noted above, we would ideally use a set of 'pure-play' comparators – i.e., traded companies with substantial energy retail activities in the GB/UK market – to empirically estimate relative systematic risk and beta for our

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[44] Paragraph 67, Appendix 9.12 – Cost of capital, CMA (2016), Energy market investigation final report, June.

[45] As a result of the retailer having to unwind contractual positions, they may have entered into in the procurement of the commodity to meet retail demand, as customers switch to another retailer.

[46] This is sometimes referred to as addressing the risk in the underlying cash-flows of an investment as opposed to an adjustment to the cost of capital/discount rate that is used for investment appraisal.

[47] Consistent with how a company with the freedom to set its own prices might approach the issue.

purposes. However, similar to the conclusions that the CMA reached in its EMI analysis, there are limited comparators that meet this criterion. The comparators we are aware do exist are either to limited to solely rely on and/or are unlikely to produce sufficiently reliable beta estimates for our purposes. For example:

- **Centrica's** beta and share price offers a potentially important anchor point for judgements relating to asset betas in the energy retail sector, similar to how National Grid's beta is used by Ofgem in its RIIO-2 determinations. However, Centrica is not sufficiently 'pure play' to rely on its beta as a single and only data point. We discuss Centrica further below.
- **Just Energy**, a Canada-based natural gas and electricity retailer operating in Canadian and American markets, whose beta the CMA considered as part of the EMI, is a large, listed 'pure play' energy retailer which could offer a point of comparison. However, its beta does not constitute a reliable single reference point for the purposes of our analysis, especially since the company filed for bankruptcy protection in March 2021.
- **Yü Energy**, a retailer of gas and electricity to SME businesses in the UK and appointed as a Supplier of Last Resort (SoLR) for three failed retailers since the second half of 2020,[48] is directly engaged in activities that are relevant to our assessment and so in principle would be a very relevant comparator. However, its raw equity beta has been very volatile, and we do not consider it a sufficiently reliable source given the stock's low liquidity (i.e., wide bid-ask spreads).

As a result, consistent with the CMA, we have needed to consider the relative risk and beta of an energy retailer using a wider source of evidence, including analysis of:

- energy retail relative to the market as a whole (via consideration of how correlated retailer returns may be to the economic cycle);
- the relative risk of energy retail compared to other sectors of the UK economy where there is a more extensive data set produce empirical estimates of beta.

This then allows us to triangulate the relative systematic risk of an energy retailer compared to other sectors of the economy. This broadly mirrors the approach the CMA took to its analysis.

Relative risk of energy retail compared to the market/general economy

We have sought to assess how correlated key risks energy retailers face (see Section 4.1.1 above) are with the economy and its economic cycle, giving reference to the comments the CMA raised at the time of the EMI – see Table 4.1 overleaf. Like the CMA's findings, this largely theoretical analysis is inconclusive of where energy retail might be considered to sit relative to the market overall – which by definition has an equity beta of 1. The CMA concluded that an energy retailer in the GB energy market was likely to be around the market average asset beta of 0.7 to 0.8 (i.e., accounting for gearing[49]). Looked at from a largely theoretical perspective, and given the nature of the risks that an energy retailer faces, the CMA's position appears to us to continue to be reasonably supportable, although the CMA's conclusions were framed by where the asset betas for grocery companies and Just Energy (the Canadian energy retailer referenced above) were at the time of its analysis:

- For grocery companies, our analysis suggests the beta range has widened since the CMA's analysis, with empirical estimates haven fallen slightly since the onset of the Covid-19 pandemic in early 2020.

[48] Yü Group Annual Report 2021

[49] The CMA noted that *"with a beta of 1 (by definition) and average gearing among firms of approximately 30%, UK equities generally can be thought of as having an asset beta of around 0.7."* Paragraph 74, Appendix 9.12 – Cost of capital, CMA (2016), Energy market investigation final report, June.

- Just Energy's asset and equity beta has continued to be volatile, as the CMA observed at the time of its analysis. Looking at the period prior to 2019/2020, the company's equity beta was generally less than 1 and its asset beta lower than this, approximately in the range of 0.4-0.6 between 2012 and 2017.

As is hinted at in the CMA's findings, it is also plausible to conclude, that while energy retailers face a number of commodity procurement risks, in theory at least, they may not normally be particularly well correlated with the overall cycle of the economy / risk of the market portfolio (see Table 4.1 below).

Table 4.1: Relevant risks for energy retailers

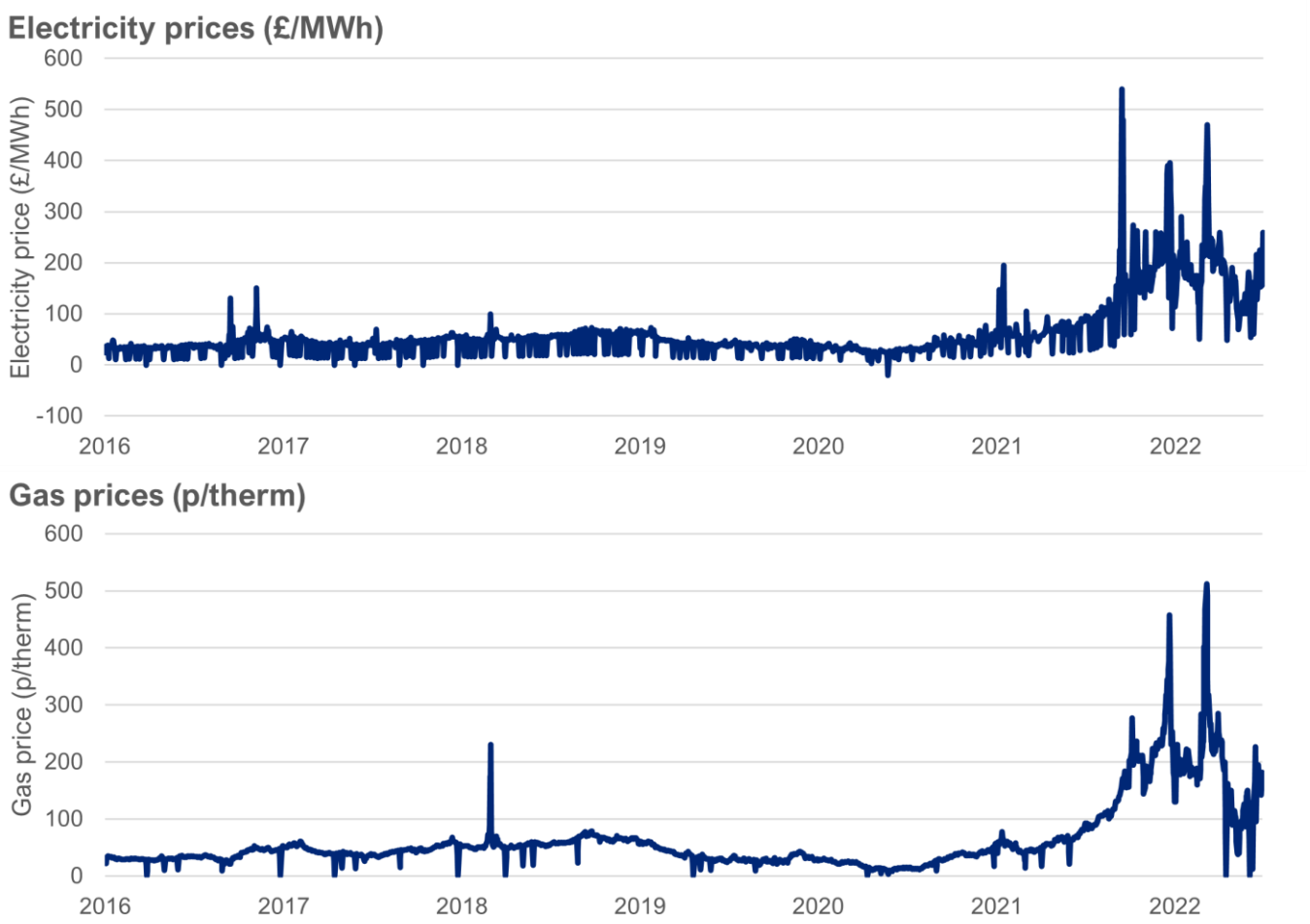
Risk	Correlated with economic cycle?
Price risk	**Yes and No** Price movements are largely driven by global fluctuations in supply and demand, which are often correlated with the economic cycle - for example, a significant global downturn will reduce demand for energy. However, as Ofgem note in its recent FRC consultation, the level of price risk a retailer is exposed to can be considerably reduced through effective hedging strategies. There is also an argument that in normal market conditions, price risks for a well hedged supplier may have the opposite directional effect on suppliers' returns than the overall market portfolio (e.g., if supplier profits increase as wholesale price rise, where margins are a % of the bill).
Churn/ volume/ demand risk	**Yes and No** The CMA noted that *"demand for energy fluctuates from year-to-year in response to warmer/colder weather, with a relatively significant impact on the profits earned by energy firms. However, the occurrence of warm or cold winters is uncorrelated with the economic cycle. In general, we reasoned that demand for energy is likely to be less variable than overall demand in response to the economic cycle as energy is a basic necessity for domestic customers."*[50] However, in the current market environment it is possible that consumption/demand risk, may be more sensitive to circumstances in the wider economy, particularly where retail energy prices are a key driver of headline inflation. For example, while household demand for energy is typically price inelastic, in the short-term (where energy bills are a high proportion of disposable income) customers may have lower or more volatile consumption than is expected, creating a range of extenuated trading risks for retailers. There may be greater uncertainty in customer numbers, consumption volume per customer and in the shape of consumption, that increases the volatility of supplier profits, with the impacts potentially greater if this coincides with a wider downturn in the wider economy and other pressures on households' disposable income (see discussion below).
Counterparty risk	**Yes and no** The global financial system is highly interlinked. A counterparty default at one point in the chain can cause ripple effects throughout the rest of the system – that is, further counterparty failures – as seen during the Global Financial Crisis. Thus, counterparty risk can to a degree be seen as correlated with the health of the broader financial system and the economic cycle.
Credit/bad debt risk	**Yes and No** Consumers' ability to pay energy bills is likely to be correlated with the economic cycle. An economic downturn which leads to an increase in unemployment and more consumers under financial distress. However, Ofgem provides an implicit allowance in the price-cap for debt-related costs incurred by efficient. Ofgem state that *"if there is an external shock, and Ofgem efficient costs have increased, Ofgem would consider any need to change the cap methodology to provide additional allowance for debt-related costs, and any need to do this in an expedited way (for example, using initial estimated costs to provide relief)".*

Source: CEPA analysis. Quotes from Ofgem Strengthening Financial Resilience consultation.

[50] Paragraph 69, Appendix 9.12 – Cost of capital, CMA (2016), Energy market investigation final report, June.

That said, gas and electricity markets have experienced significant (systematic) disruptions since mid-2020, with charts of wholesale gas prices (in p/therm) and electricity prices (£/MWh) between 2016 and 2022, showing a significant increase in prices and price volatility from mid-2020 onwards (see Figure 4.1 below).

Figure 4.1: Wholesale energy prices since 2016



Source: CEPA analysis of Bloomberg data

Since the CMA's analysis:

- There have been significant changes in the regulatory environment for energy retail alongside supply shocks in the wholesale trading environment.
- Energy costs have become a key driver of consumer price inflation in the general economy – and is expected to remain so at least in the short term.
- Energy costs are an increasing proportion of household disposable incomes (see below), which as discussed above potentially increases bad debt risk – particularly if prospects for the UK economy also worsen in tandem with this, even if policy interventions are being considered.[51]

[51] We understand that Government is taking forward the Energy Bills Support Scheme (EBSS) and Ofgem are taking a series of actions to reduce credit risk for retailers. The EBSS will subsidise household energy bills by £400 starting in October 2022, spread over six instalments.

The Bank of England's (BoE) August 2022 Monetary Policy Report helps to highlight how energy retail and UK economy in general have become more systematically linked than perhaps ever before:

- The BoE notes that the direct contribution of energy prices to CPI inflation alone is expected to peak at 6½ percentage points in 2022 Q4 and is expected to continue to make a significant contribution to headline inflation in 2023 as well.
- The BoE also comments that it expects the UK economy to enter a recession in late 2022/2023 and as high commodity energy prices feed through to retail energy prices, it will exacerbate the recent fall in real incomes for UK households:

  "The United Kingdom is now projected to enter recession from the fourth quarter of this year. Real household post-tax income is projected to fall sharply in 2022 and 2023, while consumption growth turns negative … Spending on goods, as indicated by retail sales volumes, fell in May and June. While this may partly reflect some rotation of spending back from goods to services, it also probably reflects the impact of higher prices … The impact of higher prices is likely to be felt more acutely by those on lower incomes, because items such as food and energy make up a higher proportion of their spending." [52]

In the next 12-24 months, the forecast rise in retail energy bills will result in household energy costs representing an unprecedented (at least in recent times) proportion of household disposable income. Charities such as National Energy Action (NEA) have predicted that more than 8 million households in the UK – one in three – could be in fuel poverty in October, and potentially more than 10 million in January.[53]

In the short-term at least, we consider these may be relevant factors for beta, as they may contribute, with a forward-looking view, to a perception of greater market risk and covariance of returns from GB energy retail and the wider market portfolio. This may provide some justification for considering that in the current retail energy market environment, the relative risk of investing in an energy retailer (i.e., relative to the market) has increased and may be higher than when the CMA undertook its analysis, as we discuss further below.

Relative risk of energy retail compared to other sectors

Sectors considered in the analysis

Our comparative beta analysis covers the set of publicly listed comparator companies examined by the CMA, along with recent regulatory decisions on asset beta in the UK and Ireland. Please see Appendix A for a full description of each of the comparator companies considered by the CMA.

The comparators fall into the following broad industry groups:

- Large energy (UK and Europe)
- Vertically integrated energy (non-UK)
- Electricity generation (global)
- Energy retail (UK and US)
- Groceries (UK)
- High street retail (UK)

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[52] BoE (2022), Monetary Policy Report August 2022

[53] See National Energy Action's Fuel Poverty Statistics Explainer (updated July 2022), available on the following webpage: https://www.nea.org.uk/energy-crisis/fuel-poverty-statistics-explainer/ (accessed 23rd August 2022).

- Airlines (UK)

The relevance of the first four groups is obvious – all operating in the energy sector, albeit at different levels of the supply chain and in different geographies. Groceries and high street retail represent the non-discretionary and discretionary parts of the retail sector respectively, while the airline sector provides a helpful example of a more cyclical sector with a higher exposure to systemic risk.

We have first applied a filtering process for the selection of individual stocks (see Appendix B). For each industry group, we then derive an asset beta range using averages of historical daily beta estimates for each of the constituent companies (see Appendix C).[54] These historical estimates are calculated using two-, five- and ten-year windows of high frequency data between 30 April 2012 and 29 April 2022. For each comparator company, the beta estimates are (in the first instance) calculated relative to the default local index allocated by Bloomberg (such as the FTSE 100 index for UK-listed stocks, the DAX index for German-listed stocks, etc.) but we have tested the sensitivity of the results to an alternative index choice. We also tested the sensitivity of the beta estimates to different assumptions on gearing (see Appendix D).

Figure 4.2 below illustrates the long-term industry asset beta ranges that we conclude from our analysis, alongside the corresponding ranges determined by the CMA in the EMI in 2016.[55] As another point of comparison for judging relative risk, Figure 4.3 shows recent regulatory decisions on asset betas in the UK and Ireland. In general, the asset beta ranges from our analysis are consistent with (although slightly wider than) those of the CMA.

Figure 4.2: Estimated long term asset beta ranges for energy industry comparator groups as estimated by the CMA (in red – top of chart) and CEPA (in teal – bottom of chart)

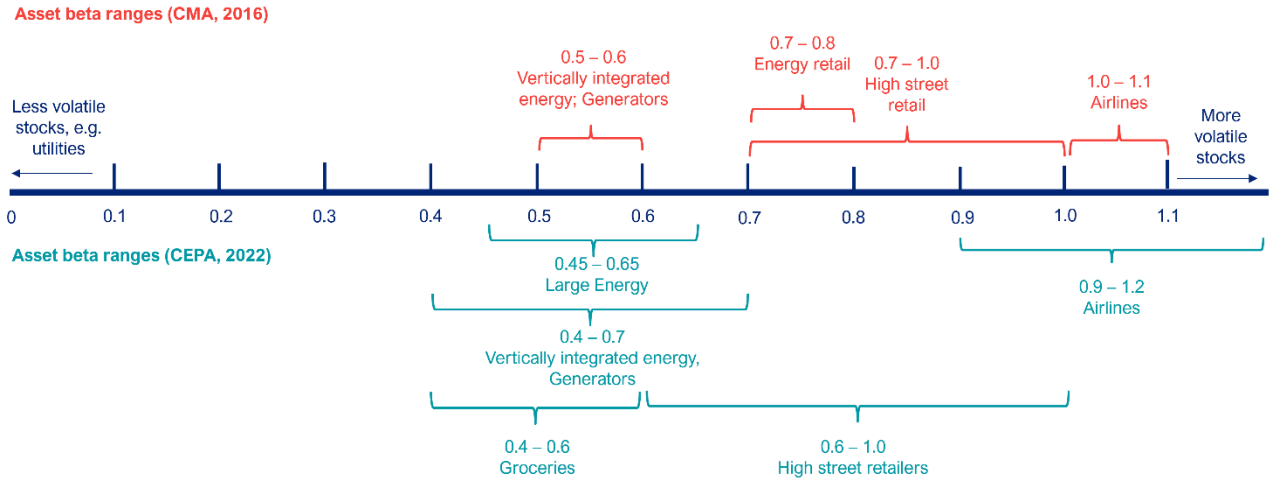
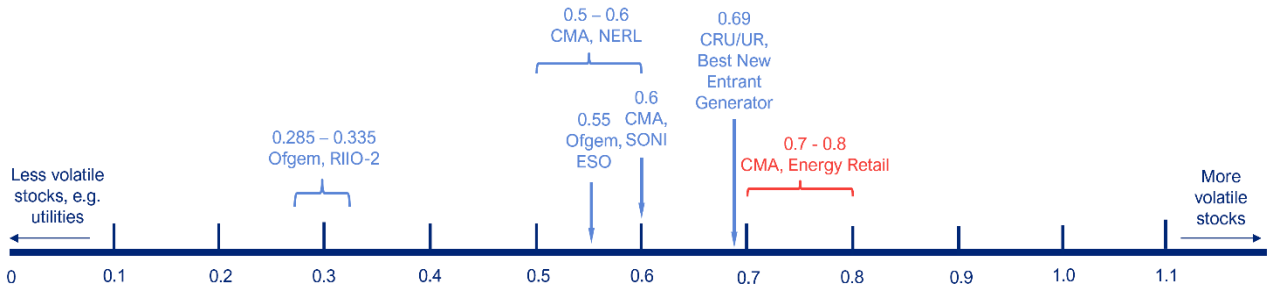


Figure 4.3: UK/Ireland regulatory decisions on asset betas



Source: CEPA analysis

[54] We note that the CMA used monthly and quarterly betas, rather than daily.

[55] See Appendix C for discussion of how we produced these ranges.

Based on this analysis, we consider that **the arguments presented by the CMA to justify their recommended range of 0.7 to 0.8 can still be considered plausible and supportable as a long-term, forward-looking view of the relative (market) risk of an energy retailer**:

- As discussed above, energy is a basic necessity for domestic consumers, as for many businesses, so demand for energy is in general likely to be less variable than overall demand throughout the economic cycle. This might suggest that energy retailers should have an asset beta less than 0.8.[56]
- Similarly, energy retailers should experience lower volatility in demand in response to the economic cycle relative to high street retailers and airlines, due to the more discretionary nature of their product offering and the higher operational gearing of these other businesses[57]. This might support an asset beta towards the lower end of the high street retail range.
- Energy retailers are more exposed to losses from volatility in demand than regulated network utilities, so should have an asset beta above network utilities and the 0.5-0.6 asset betas determined by Ofgem and the CMA for asset light TSO businesses (ESO and SONI).
- Integrated energy companies have tended to have asset betas in the range 0.5-0.7 and we might expect that energy retailers – given the nature of their activities – would have higher market risk, although decomposing the relative size of the effect is challenging.
- The limited longer-term market evidence that we do have on beta for companies that are more involved in energy retail and that are more 'pure play' than integrated energy companies, is not inconsistent with a conclusion that the asset beta of an energy retailer should sit in the range 0.7-0.8:
    - Just Energy's equity beta was generally less than 1 between 2012 and 2017 and its asset beta lower than this, approximately in the range of 0.4-0.6.
    - Centrica's asset beta, even as the business has focused more on retailing, has tended to be no higher than 0.8, and has been lower than this when viewed over a long-time estimation horizon.

Overall, we do not consider that the comparative beta analysis presents compelling evidence to alter the CMA's relative positioning of energy retail compared to other sectors, at least when viewed within the context of 'normal' market conditions. We note that an asset beta of 0.7-0.8 implies an investment that is broadly consistent with an investment in the market portfolio with many sectors of the economy that face demand and supply risks (including vertically integrated energy) having long term empirical betas that are below this.

However, as discussed above, the current circumstances are not 'normal' market conditions. For the reasons set out above, there are a number of reasons to consider that GB energy retailers can be considered temporarily exposed to greater risk, in particular, linked to energy costs being such a high proportion of disposable income:

- While household demand for energy is typically price inelastic, in the short-term customers may have lower or more volatile consumption than expected, creating a range of extenuated cost recovery risks for retailers than are normally envisaged or managed.
- The level of bad debt risk (over and above the provisions in the DTC) could potentially be considerable, and while Ofgem has/may seek to provide energy retailers with a range of protections against this via the

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[56] As noted above, by construction, the average equity beta in the CAPM is 1. Average market asset betas are in the region of 0.7 to 0.8, which accounts for average gearing levels across the market.

[57] The CMA noted in its EMI conclusions that "*these comparators tended to have higher operational gearing (greater proportion of fixed costs) than an energy retailer due to their store portfolios/aircraft leasing commitments"* and that the large majority of energy retailers' costs are variable rather than fixed. "*A firm with higher operational gearing will experience a greater percentage decline in profits in response to a given percentage decline in revenues than a firm with lower operational gearing would."* Paragraph 72, Appendix 9.12 – Cost of capital, CMA (2016), Energy market investigation final report, June.

design of the price cap, the sector is still exposed to losses (e.g., through ongoing competition that does not enable retailers to earn the EBIT margin assumed in the DTC).

- Recent survey data shows that total consumer debt on energy bills is three times higher than in September 2021, with a quarter of households owing £206 on average.[58]
- Although Ofgem has introduced a number of regulatory protections for retailers via the DTC, it remains a default tariff, and it is possible that this would be given limited weight in investor perceptions of the relative riskiness currently of investing in energy retail, particularly given some of the risks that retailers may be exposed to related to customer churn and bad debt.

In the current retail energy market, we therefore think it would not be implausible to conclude that investors required returns in energy retail may be significantly higher in the current market.

While some of the drivers may not be purely systematic risks from the perspective of the CAPM – although for the reasons set out above, we consider it is entirely plausible to conclude that beta in its more narrow technical sense (i.e., a measure of relative market risk), has increased since the CMA's findings – we consider the energy retailer beta might need to be high as 1-1.2, broadly equivalent to an investment in an airline, to compensate investors for the trading and bad risks they may face *where these are not accounted for elsewhere within the price cap* (we return to this point as part of the conclusions to this section of the report).

We consider this conclusion justified on the basis of a number of market cross checks we have undertaken alongside the longer-term beta analysis outlined above. In the current retail market context, we consider that there may be issues with Ofgem placing too great an emphasis on the assumptions of the CAPM and its parameters, and this may risk underestimating investors required returns in the current market.

4.2. MARKET CROSS-CHECKS

The subsections below consider evidence from Centrica's share price, credit default swaps and recent transactions in the retail energy sector as market cross-checks to the long-term beta analysis outlined above. Overall, we conclude these cross-checks are supportive of higher required returns in the current retail market context.

Centrica share price evidence

We have already noted above the absence of a set of pure play comparators that might inform an assessment of beta for an energy retailer. If anything, the retail energy comparators that were available to the CMA at the time of its analysis have become less useful in the current context.

We do, however, consider that evidence of Centrica's beta and share price offers a potentially important cross check and anchor point for judgements relating to asset betas in the energy retail sector, similar to how National Grid's beta is used by Ofgem in its RIIO-2 determinations, for the following reasons:

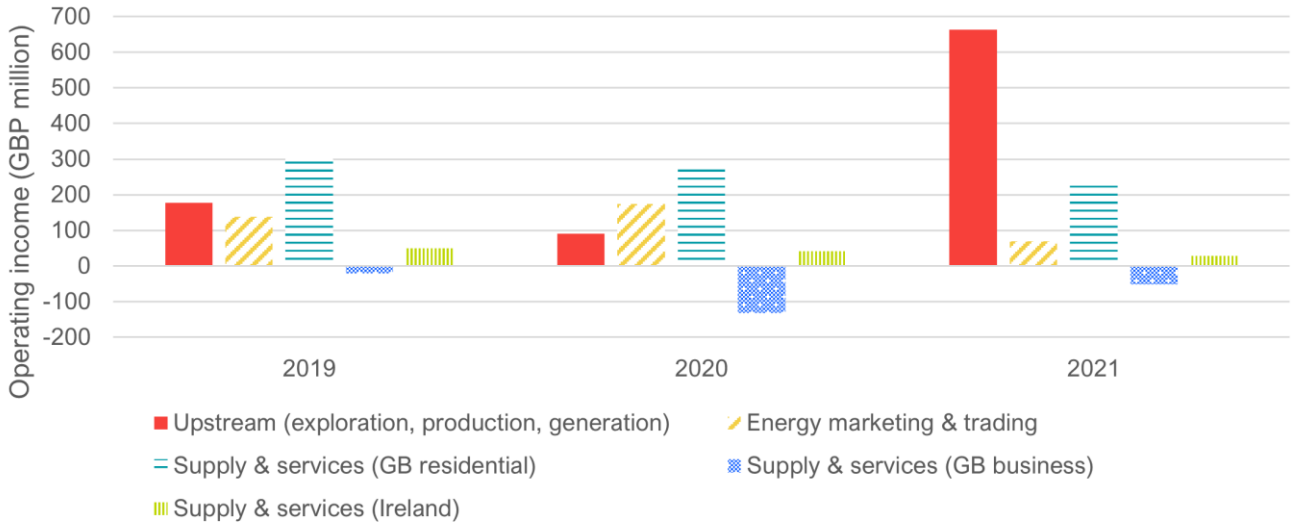
- Centrica is GB domiciled, active in the regulated energy retail sector in question, and has divested a lot of its upstream gas businesses in recent years.
- It has increasingly become more of a pure play retail and trading business (albeit with activities in a range of wholesale and retail markets, including in Ireland).
- In 2019 and 2020, 'energy supply and services' made up the largest proportion of Centrica's operating income with energy marketing and trading also a key business activity.

[58] BBC News (10 August 2022) Martin Lewis: Energy bill crisis is on scale of pandemic

- Similar justifications have been used by Ofgem in the context of RIIO-2 for focusing on National Grid's beta to inform its judgements on where energy network companies' beta may lie.

Figure 4.4 below shows how energy supply and services made up the largest proportion of Centrica's operating income in 2019 and 2020.[59] We note that energy supply and services make up a relatively lower proportion of Centrica's 2021 operating income (c. 50% in 2019, falling to c. 25% in 2021) due to a substantial increase in operating income from Centrica's upstream business segment as a result of high wholesale commodity prices flowing through to achieved oil and gas prices.[60] However, we still consider Centrica a useful comparator given the restructuring process its business has gone through in the past few years.

Figure 4.4: Centrica operating income by business segment, 2019-2021



Source: CEPA analysis of published accounts

In this context, we consider there are two pieces of market evidence related to Centrica's share price that are potentially relevant to judgements on GB energy retailer cost of capital: (i) shorter-term evidence of its equity and asset beta; and (ii) evidence of Centrica's EV/EBITDA[61] ratio and earnings yields.

Centrica's short-term asset beta (estimated in rolling two-year windows and de-levered using two-year average gearing) has increased in the past year (see Figure 4.5 below) and is currently towards the top end of the longer term 0.7-0.8 range the CMA adopted in its EMI findings. We note that during 2022 Centrica's asset beta has risen significantly above the 0.7-0.8 range when estimated on shorter windows: current estimates using one-year and six-month windows are approximately 1.0 and 1.1, respectively.

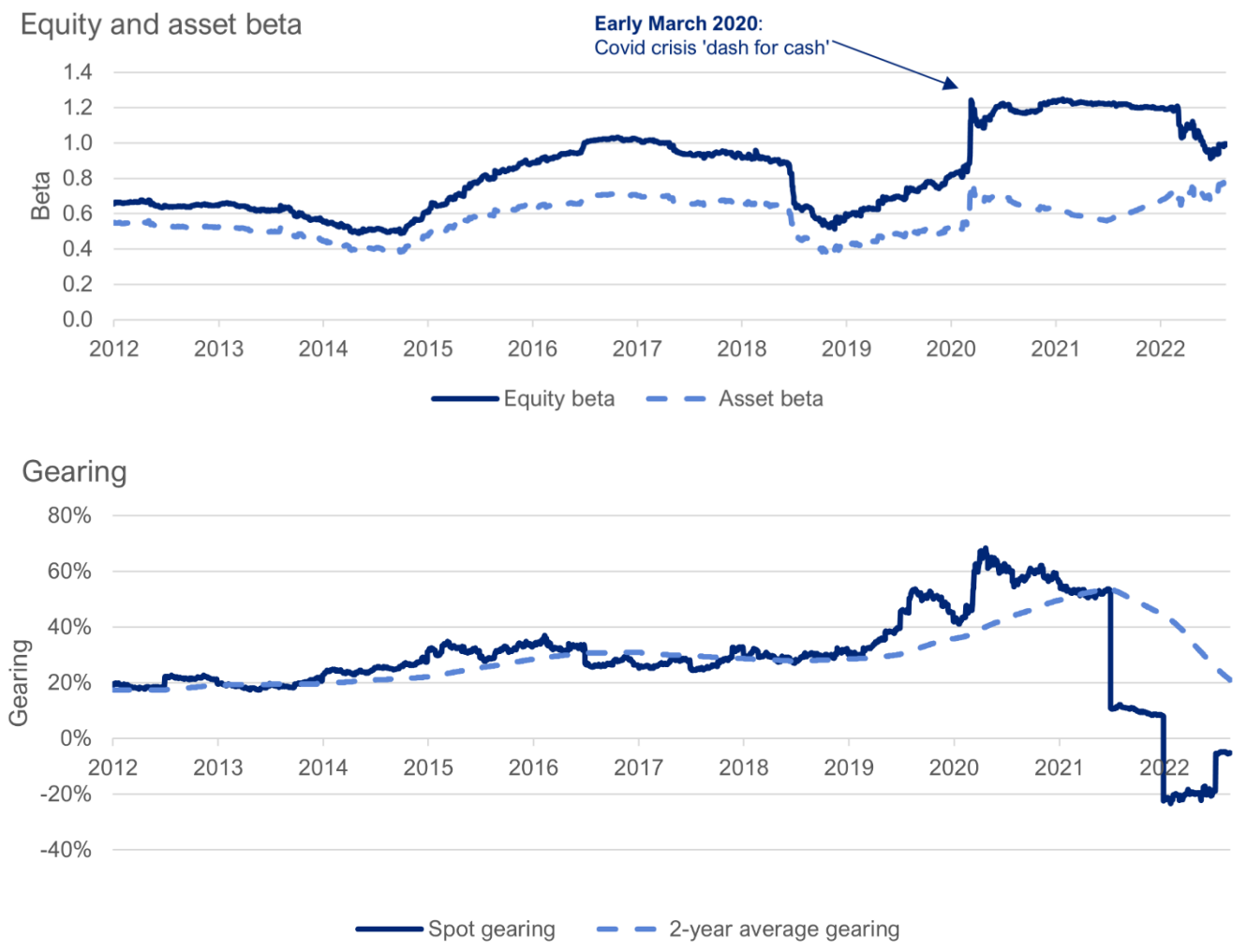
While part of this trend will be driven by changes in gearing (as is illustrated in Figure 4.5), it provides some indication that energy retail supply beta may be increasing and may be higher than the 0.7 to 0.8 range that was adopted by the CMA (although as we have noted above, while Centrica has considerable supply and service operations, other business units within the company will have had some influence on its beta, particularly with the rise in wholesale energy prices).

[59] CEPA classification of business segments: 'Upstream' includes Centrica's Spirit Energy, CSL and Nuclear segments; 'Supply & services (GB residential)' includes British Gas Energy and British Gas Services & Solutions; 'Supply & services (GB business) includes Centrica Business Solutions; and 'Supply & services (Ireland)' includes Bord Gais Energy.

[60] See Page 11, Centrica (2022), Centrica plc preliminary results for the year ended 31 December 2021, February.

[61] The enterprise-value-to-EBITDA ratio is calculated by dividing EV by EBITDA or earnings before interest, taxes, depreciation, and amortization.

Figure 4.5: Analysis of Centrica gearing and beta (two-year rolling windows)



Source: CEPA analysis of Bloomberg data

We also note that Centrica's raw (i.e., traded) equity beta has been in the range 1.0-1.2 since 2020. Again, while this will be influenced by gearing, it is another reference point for the conclusions we reached above, not least that in the last 12 months – due to disposals and acquisitions – Centrica's gearing has fallen significantly. As Centrica has become more of a pure play supply business, we would expect its beta to become increasingly influenced by operating income from supply and trading activities, and while it is challenging to decompose the effect, this might suggest that investing in retail energy is currently considered riskier than normal.

We have also considered recent trends in Centrica's share price and its EV / EBITDA multiple. While there are known limitations with using EV / EBITDA multiples for equity valuation and analytic purposes, in particular in terms of the inferences that can be drawn for investors' cost of capital, we consider that in the current context they provide a useful form of market-based cross-check to explore recent trends in investor perceptions of the sector in question, particularly given the events in the past 12-24 months.

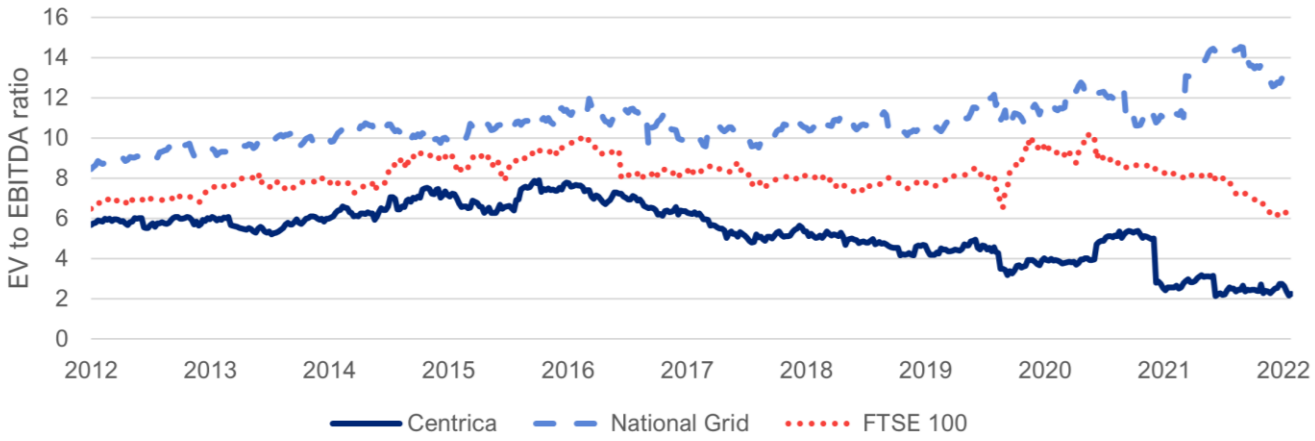
Centrica has a low EV to EBITDA multiple, a result of the ratio declining significantly since the start of 2016 (see Figure 4.6 below). While the longer-term trend will in part relate to Centrica's core energy retail business, British Gas, experiencing a period of decline as domestic customers defected to rivals offering cut price deals, we consider its current level and more recent trends are indicative of an increase in cost of capital:

- Centrica's EV to EBITDA ratio has been falling while we observe network companies like National Grid have a rising EV to EBITDA ratio.

- While Centrica's growth and earnings prospects have seen some improvement in the last few years, and while its share price has risen, the EV/EBITDA multiple still remains low.[62]

While these trends could be due to a number of factors, one very plausible view is that investors' discount rate (cost of capital) has increased.

Figure 4.6: Centrica EV/EBITDA ratio vs. FTSE 100 and National Grid



Source: CEPA analysis of Bloomberg data

A related piece of market evidence is Centrica's earnings yield. Centrica's forward price to earnings ratio has averaged approximately 7x since the start of 2022 and 6x in over the past three months, implying an earnings yield of c. 14-16%. We note that this is significantly higher than the cost of equity estimates that can be derived from the long-term CAPM parameters estimated elsewhere within this report and is instead more consistent with estimates that use an assumption for asset beta closer to 1.0-1.2 (see tables of cost of capital ranges in Section 5). As a result, we find it difficult to reconcile this market evidence with an asset beta of 0.7 or 0.8 for retail energy supply in the current market.

Figure 4.7: Centrica price / next year earnings ratio

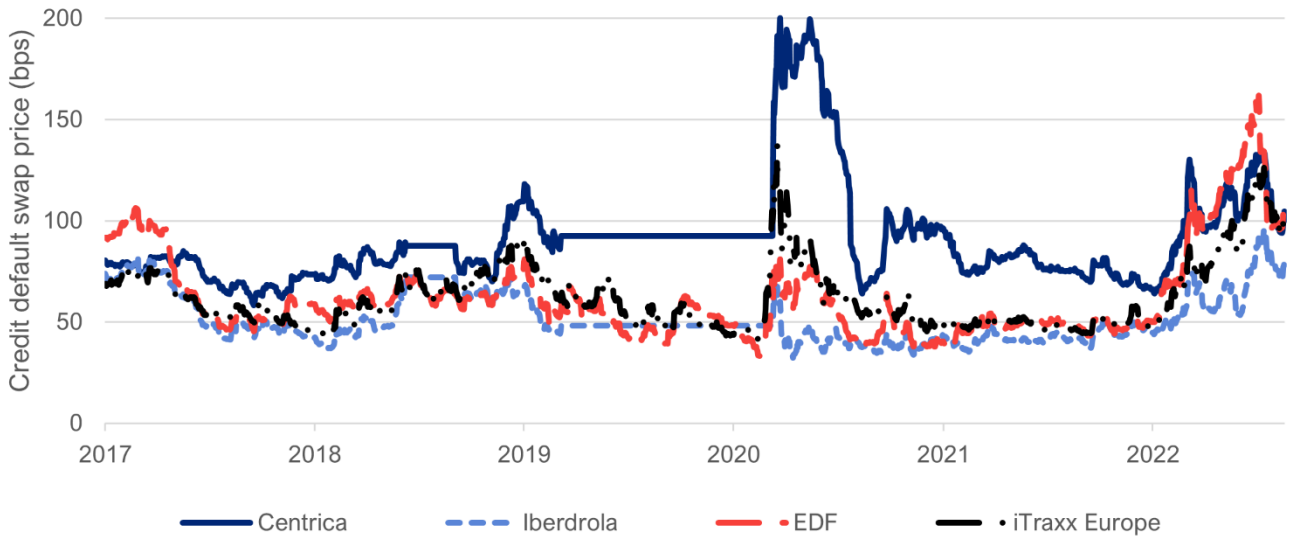
Source: CEPA analysis of Bloomberg data

[62] Centrica has been amongst the top performing stocks in the FTSE 100 over the last year and has been the 6th best performing stock over the last two years.

Credit default swaps

Another source of evidence we have considered that may be informative of investor risk sentiment is market pricing of credit default swaps (CDS) for companies participating in energy supply and trading activities. While this market pricing relates to debt investment, we think it is still informative of how both debt and equity investors may perceive the energy sector in the current market circumstances. Figure 4.8 below compares 5-year CDS prices for three large energy groups compared to the 5-year iTraxx Europe CDS index.[63]

Figure 4.8: Large energy corporate 5-year CDS prices compared to iTraxx Europe CDS index



Source: CEPA analysis of Bloomberg data

We would suggest that the trend observed (since the start of 2022) in Figure 4.8 is also supportive of investors increasing their risk perception of companies involved in the energy sector, although the rise in swap prices is a trend that is observed more widely as illustrated by the iTraxx Europe index.

Other market cross checks

There are a number of other pieces of market evidence/cross checks that are potentially informative of investor perceptions of risk and cost of capital in the retail energy sector.

SSE Energy Services was sold to Ovo Energy in January 2020 for an EV of £500m.[64] For the year ended 31 March 2019 SSE had reported adjusted EBITDA for the business of £140m,[65] which would imply an EV/EBITDA ratio of 3.5x assuming EBITDA were to continue at the reported 2019 levels. We note this valuation multiple is not inconsistent with Centrica's equivalent ratio at the time of the transaction (see Figure 4.6 above) although Centrica's EV/EBITDA ratio appears to have been slightly higher at the time and has subsequently fallen.

For the reasons set out above, we find it hard to reconcile these valuation multiples, and in particular the trend in Centrica's ratio alongside the information from the SSE/Ovo transaction, with a view of the cost of capital that would be implied by a 0.7-0.8 asset beta, in particular given that the multiple at which the SSE/Ovo transaction was completed was before the recent market volatility and challenges in GB.

[63] The iTraxx Europe index comprises the 125 most liquid CDS for European investment grade credits.

[64] https://www.sse.com/news-and-views/2020/01/sse-plc-to-complete-sale-of-sse-energy-services-to-ovo-energy/

[65] See SSE (2019): 'Preliminary Full Year Results for the 12 months to 31 March 2019', p. 67

The UK Government is also reported as only having managed to attract a single bid for **Bulb Energy** in the recent auction process for the company.[66] While we understand there are a number of specific features and challenges with that transaction, we consider this process, alongside the defaults and transfers that have taken place via the SoLR process since 2020, it is at least indicative of the heightened risks from operating in the sector, and the challenges of attracting investment into the sector in the current trading environment.

4.3. CONCLUSIONS

Overall, we conclude that if taking a longer-term, perhaps more historical, perspective of the beta and the riskiness of an energy retailer operating in GB, we would concur with the conclusions that the CMA reached at the time of the EMI. That is, an asset beta of 0.7-0.8 implying the riskiness of an investment in a standalone GB energy retailer (excluding gearing effects) is broadly consistent with an investment in the market overall. Energy retailers face many risks, but the extent to which they are non-diversified for portfolio investors is debatable.

However, we consider there is both current market evidence, and reasons in principle and in practice, to conclude the appropriate beta assumption for the DTC cost of capital may currently be higher than 0.7-0.8.

We consider that in the current circumstances of energy markets in the UK and globally, an energy retailer might be subject to higher market/systematic (i.e., non-diversifiable) risk, as captured by the CAPM's beta parameter, than under 'normal' market conditions. There are also several other risks which investors may be concerned about – e.g., political/ regulatory risks and possible asymmetries in the balance of risk and reward in the sector and the DTC[67] – that may influence their expected returns in the current market.

In the current context of the energy market, we think it would not be implausible for **Ofgem to conclude that the asset beta, for a standalone energy retailer under the DTC, may need to be as high as 1.0-1.2, broadly equivalent to an investment in an airline**, in order to compensate investors for the risks they face where these are not accounted for elsewhere within the price cap.

We think the conclusion that the rate of return that investors may require in retail energy is currently elevated is supported by our market cross-checks including:

- Short-term estimates of Centrica's traded 'equity beta', and the direction of travel of Centrica's 'asset beta' (i.e., after accounting for changes in gearing) in the past 6-12 months.
- Recent valuation multiples and trends in Centrica's share price data, together with evidence from recent retail energy supplier transactions and CDS pricing.

In the current retail market context, we consider that there may be issues with Ofgem placing too great an emphasis on the assumptions of the CAPM and its long-term parameters, and this may risk underestimating investors required returns in the current market.

However, we note that a number of material risks energy retailers currently face in operating in the GB retail market appear asymmetric in terms of their impact on the balance of risks and returns for investors.

It is important that Ofgem's price cap does not double count the remuneration of those risks – to the extent they exist and are borne by the retail supply company and its investors – via other DTC allowances or changes that Ofgem may already be seeking to introduce to the price cap. These are also not standard 'beta risks' as typically captured in standard investment asset pricing models used by economic regulators, including the CMA.

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[66] See FT article on 22 July 2022, available here.

[67] For example, the risk that as wholesale prices fall many customers are likely to move off the cap tariff onto cheaper tariffs. The retailer they leave will be left with excess supply of energy, which would have been purchased at a higher cost (before wholesale prices fell). This is the reverse of the situation that has been observed in recent price cap periods.

Rather than increasing the cost of capital, via beta, a more justifiable treatment within the DTC may as a result be to amend energy retailers' cost allowances – e.g., for the higher probability of bad debt – to ensure that the price cap (ex-ante) provides for investors' expected returns. Rather than uplifting the cost of capital, this would in effect[68] 'price in' these asymmetries within the DTC, either via:

- changes to the headroom allowance (or a separate uplift in the allowed EBIT margin – e.g., over and above what might be implied by a WACC x capital base calculation); and/or
- changes to the design of the price cap regime itself (e.g., as Ofgem has adopted for backwardation, or changes to the price cap reset process itself (e.g., more regular updates)).

Asymmetric risks, as with the differentiation of diversifiable and non-diversifiable risks for a portfolio investor, are not necessarily easy to differentiate from other factors that will impact the future balance of risks and returns to investors in energy retail. However, this may provide a more targeted regulatory approach for Ofgem to ensure that the price cap (ex-ante) provides for investors' expected returns, without having to depart too far from the conclusions we draw above on beta from longer-term CAPM evidence.

[68] Consistent with how a company with the freedom to set its own prices might approach the issue.

5. COST OF CAPITAL

In this section we draw each piece of analysis together to calculate an estimate of the nominal pre-tax cost of cost of capital. As discussed in the introduction, we assume that the notional retailer is fully equity financed and we use the current expected rate for corporation tax in 2023 (25%) to calculate a pre-tax cost of equity.

In Table 5.1 below, we show two cost of capital calculations to reflect a longer-term and short-term view of the cost of capital in the retail energy sector. Our longer-term range relies on longer-term evidence of beta and we would consider more consistent with 'normal' market conditions. Our short-term estimates are anchored to a shorter-term risk outlook and place greater weight on the inferences drawn from the market cross check evidence.

Table 5.1: Cost of capital ranges

Ref.	Approach	Long-term		Short-term		Derivation
	Range	**Low**	**High**	**Low**	**High**	
A	Real risk-free rate (%)	-1.12	-0.86	-1.12	-0.86	Assumption
B	Nominal risk-free rate (%)	1.80	2.07	1.80	2.07	Assumption
C	Real total market return (TMR)	6.25	6.75	6.25	6.75	Assumption
D	Market risk premium (MRP)	7.37	7.61	7.37	7.61	D = C – A
E	Asset beta	0.70	0.80	1.00	1.20	Assumption
F	Gearing (%)	0.00	0.00	0.00	0.00	Assumption
G	Equity beta	0.70	0.80	1.00	1.20	G = E / (1 – F)
H	Nominal post-tax cost of equity (%)	6.96	8.16	9.17	11.20	H = B + (D x G)
I	Tax rate (%)[69]	25.00	25.00	25.00	25.00	Assumption
J	**Nominal pre-tax cost of equity (%)**	**9.28**	**10.88**	**12.23**	**14.94**	J = H / (1 – I)

Source: CEPA analysis. Note: figures shown include rounding and adopt the simplification of not applying the Fisher equation in a number of steps of the calculations.

In conclusion, we can see a plausible narrative that would support Ofgem continuing to use **10% as a longer-term / 'normal market conditions' estimate of an energy retailers' cost of capital**, assuming it its fully equity financed.

This would be consistent with a narrative that:

- there has been a fall in the RFR (and the rate of corporation tax rate) since the time period of the CMA's EMI analysis of cost of capital; and
- this has been counteracted by an increase in the market risk premium an investor would demand (above the RFR) for their investment in a GB energy retailer.

However, there are also factors at the moment that mean that investing in energy retail supply can be considered riskier than in normal market conditions, with the likelihood that higher returns are required by investors. In the current retail market context, we consider that there may be issues with Ofgem placing too great an emphasis on standard asset pricing models such as CAPM and their longer-term parameter estimates, and this may risk underestimating investors' required rate of return in the current market.

[69] The current corporation tax rate is 19% but is set to rise to 25% from April 2023.

There is limited market evidence to support a precise estimate of the impact; however, **a cost of capital in the range of 12-15%** could be appropriate while market conditions remain stressed. We consider a conclusion that the sector's cost of capital is currently elevated can be supported by a range of market cross check evidence including:

- Short-term estimates of Centrica's traded 'equity beta', and the direction of travel of Centrica's 'asset beta' (i.e., after accounting for changes in gearing) in the past 6-12 months.
- Recent valuation multiples and trends in Centrica's share price data, together with evidence from recent retail energy supplier transactions and CDS pricing.

Where within this range of evidence is the appropriate cost of capital assumption for the purposes of the setting the default tariff cap, we suggest is dependent on:

- the extent to which the current commodity procurement and retail (e.g., bad debt) trading conditions in the energy supply sector are considered to impact beta;
- given GEMA's duties under the Tariff Act, whether Ofgem should be seeking to determine a longer-term estimate of the cost of capital, over the course of an economic cycle, or more of a shorter-term estimate that better reflects views of current market conditions;
- the degree to which possible remaining asymmetries in the balance of risk and reward of supplying customers under the DTC are considered to be addressed elsewhere within the price cap, or need to be accounted for in the estimate of the cost of capital used to the set the DTC; and
- how important it is for the level of the DTC – and its EBIT allowance component – to be suitably market based, and able to attract new equity investment in the current market.

Given Ofgem's need to ensure that holders of supply licenses who operate efficiently are able to finance activities authorised by the licence, we consider that Ofgem will need to take into consideration the significant uncertainty of retailer's cost of capital in the current market, and in particular shorter-term evidence.

While we note that Ofgem has avoided an explicit policy of aiming up in its recent onshore networks cost of capital determinations, given the uncertainty of a retailer's cost of capital, we consider that there may be a good justification for selecting a point estimate in the upper half of the range of evidence in these particular circumstances, or recognising, via the methodology that is used to set the EBIT allowance, that there is a potentially wide range of estimates and relevant evidence for the cost of capital in the current circumstances.

It will also be important for Ofgem to consider if a perceived increase in risk, and the impacts this may have on investors expected returns in the sector, are best accounted for by increasing the beta parameter in the CAPM, or by adjusting other elements of the DTC methodology – e.g., to directly account for asymmetric trading and bad debt risks where they are considered to exist.

APPENDIX A **BETA COMPARATORS**

Company	Bloomberg ticker	Description	Revenue breakdown by activity[70]	Operating income by activity[70]	Market capitalisation (USD billion)[71]	Local index
Large energy						
Centrica	CAN LN Equity	Centrica PLC operates as an integrated energy company offering a wide range of home and business energy solutions. The Company sources, generates, processes, stores, trades, saves, and supplies energy and provides a range of related services.	11.1% exploration & generation; [72] 28.7% energy marketing & trading; 59.2% energy supply & services	69.9% exploration & generation; 7.4% energy marketing & trading; 22.7% energy supply & services	5.9	FTSE 100 (UK)
SSE	SSE LN Equity	SSE plc generates, transmits, distributes, and supplies electricity to industrial, commercial, and domestic customers in the United Kingdom and Ireland. The Company also stores and distributes natural gas, and operates a telecommunications network that offers bandwidth and capacity to companies, public sector organizations, Internet service providers, and others.	26.3% generation & storage; 38.3% energy marketing & trading; 9.7% networks;[73] 24.9% energy supply; 0.9% discontinued operations	28.0% generation & storage; 49.2% energy marketing & trading; 29.0% networks; 0.2% energy supply -6.5% discontinued operations	25.1	FTSE 100 (UK)
EDF	EDF FP Equity	Electricité de France (EDF) produces, transmits, distributes, imports and exports electricity. The Company, using nuclear power, coal and gas, provides electricity for French energy consumers.	69.8% generation; 20.1% distribution; 10.1% other.	Not available	34.2	CAC 40 (France)

[70] FY 2021 unless otherwise stated. Figures may not total 100% due to rounding. We have tried to use consistent labelling of activities across companies to aid comparison where possible.

[71] As of 29 April 2022

[72] Centrica intends to divest some of its exploration and generation activities (Spirit Energy and nuclear).

[73] SSE has since sold its share in Scotia Gas Networks.

Company	Bloomberg ticker	Description	Revenue breakdown by activity[70]	Operating income by activity[70]	Market capitalisation (USD billion)[71]	Local index
E.ON	EOAN GR Equity	E.ON SE operates as an international and privately-owned energy supplier. The Company's main segments are renewable, developing and operating renewable assets, energy networks, power and gas distribution business, and customer solutions which develops energy solutions.	10.7% generation; 42.1% networks; 47.2% energy supply & services	22.7% generation; 58.9% networks; 18.4% energy supply & services	27.6	DAX (Germany)
Iberdrola	IBE SM Equity	Iberdrola, S.A. generates, distributes, trades, and markets electricity in the United Kingdom, United States, Spain, Portugal, and Latin America. The Company specializes in clean energy and more specifically wind power.	62.6% electricity production and customers; 37.4% networks	56.1% renewable generation; 46.2% networks; -2.3% generation & supply	74.8	IBEX 35 (Spain)
RWE	RWE GR Equity	RWE Aktiengesellschaft is a globally active energy company. The Company generates and trades electricity. RWE has a capacity of about 10 gigawatts based on renewable sources, as well as gas fleet and an internationally active energy trading business. RWE serves clients in Europe, Asia-Pacific, and the United States.	21.1% generation; 78.8% supply & trading	68.5% generation; 31.5% supply & trading	28.0	DAX (Germany)
Vertically integrated energy (non-UK)						
Enel	ENEL IM Equity	Enel SpA operates as a multinational power company and an integrated player in the global power, gas, and renewables markets. The Company produces energy and distributes electricity for business and household end users globally. Enel manages wind, solar, geothermal, and hydropower	10.8% renewable generation; 37.7% conventional generation & global trading; 23.5% networks; 44.0% retail; -16.0% other	40.1% renewable generation; -33.7% conventional generation & global trading; 56.6% networks; 36.5% supply and services; 0.4% demand response	66.7	FTSE MIB (Italy)

Company	Bloomberg ticker	Description	Revenue breakdown by activity[70]	Operating income by activity[70]	Market capitalisation (USD billion)[71]	Local index
		plants in Europe, the Americas, Africa, Asia, and Oceania.				
Gas Natural (Naturgy)	NTGY SM Equity	Naturgy Energy Group S.A. provides gas and electricity. The Company has energy operations in natural gas procurement, liquefaction, storage, regasification, transportation, distribution, and marketing. Naturgy Energy Group serves customers worldwide.	2.3% renewables and new businesses; 20.2% networks; 50.6% energy management; 26.9% commercialisation	13.1% renewables and new businesses 64.9% networks; 31.6% energy management; -9.6% commercialisation	29.4	IBEX 35 (Spain)
EnBW	EBK GR Equity	EnBW Energie Baden-Wuerttemberg AG is a full-service energy company that provides electricity, gas as well as energy and environmental services. The Company's environmental services include waste disposal and recycling.	42.7% sustainable generation infrastructure; 13.7% system critical infrastructure; 43.6% smart infrastructure for customers	48.3% sustainable generation infrastructure; 41.8% system critical infrastructure; 9.8% smart infrastructure for customers	29.2	DAX (Germany)
Verbund	VER AV Equity	Verbund AG provides integrated electric generations, transmission, and distribution services. The Company produces power through the operation of hydro-electric, thermal, and wind power generators. Verbund transmits and distributes power to customers worldwide.	22.5% hydro and renewables generation; 17.6% grid (networks); 54.5% sales; 5.4% other	**(EBITDA)** 71.4% hydro and new renewables generation; 20.4% grid (networks); 3.7% sales; 4.5% other	37.5	Austrian Traded Index
Fortum	FORTUM FH Equity	Fortum Oyj provides a full range of energy related products and services. The Company's activities cover the generation, distribution, and sale of electricity and heat and steam, as well as the operation of power plants and energy-related services. Fortum operates worldwide but mainly in Northern Europe.	93.1% Uniper (energy generation, trading and optimisation) 2.5% Generation (generation, trading and optimisation); 0.8% Russia (generation and sales) 1.1% City Solutions;	**(Adjusted operating income)** 44.2% Uniper 43.8% Generation; 10.3% Russia (generation and sales); 5.3% City Solutions; 2.1% Consumer Solutions (energy retail); -5.6% other	14.9	OMX Helsinki 25 (Finland)

Company	Bloomberg ticker	Description	Revenue breakdown by activity[70]	Operating income by activity[70]	Market capitalisation (USD billion)[71]	Local index
			2.3% Consumer Solutions; 0.1% other			
Contact Energy	CEN NZ Equity	Contact Energy Limited is a diversified and integrated energy company which focuses on the generation of electricity and the sale of electricity and gas in New Zealand.	63.1% wholesale; 36.9% customer	Not available	4.1	NZX 50 (New Zealand)
Trust Power (Manawa)	MNW NZ Equity	Manawa Energy Limited is a renewable energy company. The Company generate powers through hydro power stations and wind farms throughout Australasia. Manawa Energy is also engaged in electricity distribution.	21.3% generation; 78.7% retail	Not available	1.4	NZX 50 (New Zealand)
NRG	NRG US Equity	NRG Energy, Inc. owns and operates a diverse portfolio of power-generating facilities primarily in the United States. The Company offers energy production and cogeneration facilities, thermal energy production, and energy resource recovery facilities.	**(2018)** 74.0% retail; 37.8% generation; -11.8% corporate	Not available	8.7	S&P 500 (US)
Origin Energy	ORG AU Equity	Origin Energy Limited is an integrated energy company. The Company is an energy retailer in Australia across electricity, gas and LPG. Origin Energy also holds a generation portfolio and fuel position and a renewable energy portfolio, as well as unconventional gas and LNG interests.	4.9% liquified petroleum gas; 44.9% business & wholesale; 2.9% solar & energy services; 1.4% integrated gas; 46.0% retail	89.5% Energy Market; 10.5% Integrated Gas	8.5	ASX 200 (Australia)
AGL	AGL AU Equity	AGL Energy Limited sells and distributes gas and electricity. The Company retails and wholesales energy and fuel products to customers throughout Australia.	7.2% wholesale; 22.1% pool; 56.3% consumer;	84.1% Integrated Energy; 15.3% Customer Markets; 0.7% Investments	4.1	ASX 200 (Australia)

Company	Bloomberg ticker	Description	Revenue breakdown by activity[70]	Operating income by activity[70]	Market capitalisation (USD billion)[71]	Local index
			14.1% business; 0.2% other			
GDF Suez (Engie)	ENGI FP Equity	Engie SA offers a full range of electricity, gas and associated energy and environment services throughout the world. The Company produces, trades, transports, stores, and distributes natural gas, and offers energy management and climatic and thermal engineering services.	20.7% generation; 17.8% networks; 61.5% supply and client solutions	53.9% generation; 37.4% networks; 8.7% supply and client solutions	29.1	CAC 40 (France)
AEP	AEP US Equity	American Electric Power Company, Inc. (AEP) operates as a public utility holding company. The Company generates, transmits, distributes, and sells electricity to residential and commercial customers. AEP serves customers in the United States.	11.9% generation and marketing; 33.1% transmission and distribution; 55.0% vertically integrated utilities	4.9% generation and marketing; 49.7% transmission and distribution; 45.4% vertically integrated utilities	50.9	S&P 500 (US)
Electricity generation						
Drax	DRX LN Equity	Drax Group PLC is a renewable energy company engaged in renewable and flexible power generation and sales to business customers. The Company operates a portfolio of biomass, hydro-electric and pumped hydro storage generation assets across the UK and is a large source of renewable electricity. Drax Group also operates a global sustainable biomass supply chain.	52.1% generation; 3.2% pellet production; 44.7% customers	**(Gross profit)** 65.8% generation; 21.8% pellet production; 12.4% customers	4.1	FTSE 100 (UK)
AES Corp	AES US Equity	The AES Corporation is an electric power distribution company. The Company acquires, develops, owns, and operates renewable energy power plants. AES serves customers globally.	74.3% non-regulated utility; 25.7% regulated utilities	Not available	13.6	S&P 500 (US)

Company	Bloomberg ticker	Description	Revenue breakdown by activity[70]	Operating income by activity[70]	Market capitalisation (USD billion)[71]	Local index
Calpine	CPN US Equity	Calpine Corporation acquires, develops, owns, and operates power generation facilities, as well as sells electricity in the United States. The Company also provides thermal energy for commercial, residential, industrial customers. Calpine serves customers in the United States.	100% electric power generation	100% electric power generation	5.5[74]	S&P 500 (US)
Energy retail						
Good Energy Group plc	GOOD LN Equity	Good Energy Group PLC invests in renewable energy providers. The Company, through subsidiaries, owns and operates wind farms and supplies electricity generated from renewable resources.	95.9% energy supply; 3.6% FIT administration; 0.4% generation	65.2% energy supply; 35.1% total supply companies; 23.0% FIT administration; -5.4% energy generation; -17.9% holding companies	0.1	FTSE 100 (UK)
Telecom Plus	TEP LN Equity	Telecom plus PLC supplies fixed wire and mobile telecommunications services, gas, and electricity to residential and small business customers in the United Kingdom.	46.6% electricity supply; 30.6% gas supply; 13.4% fixed communications; 4.8% other; 4.6% mobile	Not available	1.7	FTSE 100 (UK)
Just Energy	JENGQ US Equity	Just Energy Group, Inc. sells natural gas and/or electricity to residential and commercial customers under long term fixed-price and price-protected contracts. The Company also offers its customers the option to receive all or part of their electricity and natural gas from renewable sources. Just Energy operates in Canada and the United States.	55.9% consumer division; 44.1% commercial division		0.04	S&P 500 (US)

[74] As of delisting on 8 March 2018.

Company	Bloomberg ticker	Description	Revenue breakdown by activity[70]	Operating income by activity[70]	Market capitalisation (USD billion)[71]	Local index
High Street retail						
M&S	MKS LN Equity	Marks & Spencer Group Plc is a holding company. The Company, through its subsidiaries, provides retail of clothing, food, and home products.	N/A	N/A	3.4	FTSE 100 (UK)
Dixons	CURY LN Equity	Currys PLC operates as an electrical and telecommunications retailer and services company. The Company offers a wide range of electrical and mobile products, as well as connectivity and after-sales services. Currys serves customers in Europe.	N/A	N/A	1.3	FTSE 100 (UK)
Travis Perkins	TPK LN Equity	Travis Perkins plc markets and distributes products to the UK construction and building trade industries, including timber, building, and plumbing and heating materials.	N/A	N/A	3.3	FTSE 100 (UK)
Next	NXT LN Equity	Next Plc conducts retailing, home shopping, and customer services management operations. The company's retail stores sell ladies, men, and children wears, as well as housewares.	N/A	N/A	9.9	FTSE 100 (UK)
Groceries						
Tesco	TSCO LN Equity	Tesco PLC, through its subsidiaries, operates as a food retailer. The Company offers online retailing, brick and mortar supermarkets, and a private-label brand of products. Tesco provides its services primarily throughout Europe, with additional activities in Asia.	N/A	N/A	26.1	FTSE 100 (UK)

Company	Bloomberg ticker	Description	Revenue breakdown by activity[70]	Operating income by activity[70]	Market capitalisation (USD billion)[71]	Local index
Sainsbury	SBRY LN Equity	J Sainsbury PLC retails food. The Company offers convenience stores, as well as internet-based home delivery service. J Sainsbury serves customers in the United Kingdom.	N/A	N/A	6.9	FTSE 100 (UK)
Morrisons	MRW LN Equity	Wm Morrison Supermarkets PLC retails groceries through a chain of supermarkets and an online home delivery service in England. The Company offers food and groceries, much of which it sources and processes through fully own manufacturing facilities.	N/A	N/A	9.5 [75]	FTSE 100 (UK)
Airlines						
IAG	IAG LN Equity	International Consolidated Airlines Group S.A. provides transportation services. The Company offers international and domestic air passenger and cargo transportation services. International Consolidated Airlines Group serves customers worldwide.	N/A	N/A	9.0	FTSE 100 (UK)
EasyJet	EZJ LN Equity	easyJet plc, a low-cost passenger airline, conducts operations throughout the United Kingdom and mainland Europe. The Company sells the majority of its tickets through its Web site.	N/A	N/A	5.3	FTSE 100 (UK)

[75] As of delisting on 25 October 2021.

APPENDIX B COMPARATOR SELECTION

Six years have passed since the CMA undertook its beta analysis. To ensure the set of comparator companies remains suitable for our purposes, we assess each company against the criteria set out in Table B.1 below.

For our assessment, we exported the following data on each comparator company between 30 April 2012 and 29 April 2022 from Bloomberg:

- the bid-ask spread (%);
- net debt;
- market capitalisation; and
- equity betas, estimated over rolling two-year windows.

The equity betas are then converted to asset betas using average gearing over the two-year window, assuming a zero debt beta.[76]

Table B.1: Comparator selection criteria

Criterion	Description	Rationale	Measurement
Liquidity	The trading liquidity of the shares of each comparator.	Low liquidity implies infrequent trading, which may lead to a lower correlation with market movements and a downward bias in beta estimates.	Spread between bid and ask prices, as a percentage of the share price. A bid-ask spread above 1% suggests liquidity issues.
Gearing	The leverage of the company over time.	Gearing is used to convert equity betas to asset betas. Negative gearing can produce counterintuitive beta estimates.	Gearing over time and the proportion of the sample period for which the company has negative gearing.
Beta volatility	The volatility of estimated asset betas over time.	Excessive noise or volatility in estimated betas may suggest a lack of robustness.	Difference between the maximum and minimum values of estimated asset betas between 2012 and 2020. We also visually examine the overall time series of beta estimates for excessive volatility.
Index choice	The sensitivity of estimated betas to the choice of reference index.	It is important that the reference index represents the general 'market'. Some of the default local indices (e.g., the IBEX 35 index) have fewer constituent companies and may be a less appropriate choice relative to the large, Europe-wide STOXX Europe 600 index.	Difference in European asset betas estimated relative to local index or STOXX Europe 600 index when averaged over a five- or ten-year period (i.e., 2017-2022 or 2012-2022).

Source: CEPA analysis

The performance of the comparator companies against the selection criteria is summarised in Table B.2 below. The table shows Red ('R'), Amber ('A') and Green ('G') ratings for each company and criterion.

[76] We define gearing as net debt divided by the sum of net debt and market capitalization.

Table B.2: Performance against selection criteria

Company	Liquidity		Gearing		Beta volatility[77]		Local vs. European index		
	Av bid-ask spread (%)	RAG	Periods with negative gearing	RAG	Max-min range	RAG	Difference in 5-year average beta	Difference in 10-year average beta	RAG
Large energy									
Centrica	0.08	G	Jan 2022 - date	A	0.35	G	0.03	0.06	G
SSE	0.08	G	None	G	0.38	G	0.04	0.06	G
EDF	0.07	G	None	G	0.31	G	-0.06	-0.08	G
E.ON	0.04	G	Apr - Sep 2017	A	0.65	A	-0.07	-0.08	G
Iberdrola	0.05	G	None	G	0.26	G	-0.01	-0.04	G
RWE	0.06	G	Jul 2018 - Mar 2020; Oct 2020 - Sep 2021	R	0.31	A	-0.16	-0.12	A
Vertically integrated									
Enel	0.06	G	None	G	0.20	G	-0.06	-0.09	G
Gas Natural	0.08	G	None	G	0.23	G	-0.03	-0.05	G
EnBW	2.61	R	Jul - Sep 2017	A	0.25	G	-0.03	-0.02	G
Verbund	0.19	G	None	G	0.34	G	-0.12	-0.07	A
Fortum	0.07	G	Jul 2015 - Jun 2017	R	0.73	A	0.07	0.05	G
Contact Energy	0.26	G	None	G	0.47	A	N/A - NZ listed	N/A - NZ listed	
Trust Power	0.55	G	None	G	0.13	G	N/A - NZ listed	N/A - NZ listed	
NRG	0.05	G	None	G	0.30	G	N/A - US listed	N/A - US listed	
Origin Energy	0.15	G	None	G	0.52	A	N/A - AU listed	N/A - AU listed	
AGL	0.08	G	None	G	0.37	G	N/A - AU listed	N/A - AU listed	
GDF Suez (Engie SA)	0.05	G	None	G	0.35	G	-0.03	-0.04	
AEP Corp	0.03	G	None	G	0.36	A	N/A - US listed	N/A - US listed	

[77] Beta volatility RAG scoring is also informed by examining the overall time series of beta estimates for obvious instability.

Company	Liquidity		Gearing		Beta volatility[77]		Local vs. European index		
	Av bid-ask spread (%)	RAG	Periods with negative gearing	RAG	Max-min range	RAG	Difference in 5-year average beta	Difference in 10-year average beta	RAG
Electricity generation									
Drax	0.21	G	Jul 2012 - Jun 2014	A	0.63	R	0.02	0.06	G
AES Corp	0.07	G	None	G	0.48	A	N/A - US listed	N/A - US listed	
Calpine	0.07	G	None	G	0.27	G	N/A - US listed	N/A - US listed	
Energy retail									
Good Energy Group	4.30	R	Jan - Jun 2013	A	0.16	G	-0.05	-0.04	G
Telecom Plus	0.47	G	Oct 2012 - Sep 2013; Apr - Sep 2017	A	0.47	A	0.00	0.02	G
Just Energy	0.58	A	None	G	0.51	A	N/A - US listed	N/A - US listed	
High street retail									
M&S	0.09	G	None	G	0.53	A	-0.08	-0.02	G
Dixons	0.28	G	Oct 2012 - Sep 2013	A	0.44	A	-0.08	-0.03	G
Travis Perkins	0.12	G	None	G	0.79	R	-0.07	0.07	G
Next	0.08	G	None	G	0.45	A	0.13	-0.05	A
Groceries									
Tesco	0.05	G	None	G	0.42	G	0.06	0.09	G
Sainsbury	0.07	G	None	G	0.39	G	0.06	0.13	A
Morrisons	0.07	G	None	G	0.39	G	-0.50	-0.54	R
Airlines									
IAG	0.09	G	July - Dec 2018	A	0.71	R	-0.44	-0.19	R
EasyJet	0.12	G	Apr 2013 - Mar 2019	R	0.87	R	0.30	0.40	R

Source: CEPA analysis of Bloomberg data

In light of the results in Table B.2 above, we choose to exclude EnBW and Good Energy Group from our analysis, as their bid-ask spread suggests that the shares are illiquid and the beta estimates likely to be unreliable. We note that Just Energy has experienced a large increase in its bid-ask spread since 2021, but we choose to retain the company in our sample as this represents only a small part of the period of 2012-2022.

Closer examination of gearing and beta estimates over time highlights that several companies (e.g., Centrica and RWE) show volatility in asset beta estimates due to sharp 'jumps' in gearing (in part related to the quarterly reporting schedule for earnings and other financial data). As we average beta estimates over time to inform our ranges for each industry group, we do not consider this volatility to be severe enough to warrant the exclusion of these companies. As a robustness check of our results, we place a floor on gearing at 0% (i.e., replace negative gearing observations with zero gearing) – these results are shown in Appendix D. The results from this robustness check suggests that negative gearing does not have a significant impact on our long-term asset beta estimates.

The asset beta estimates for Morrisons, IAG and EasyJet all show considerable sensitivity to the choice of index. In some ways, this is unsurprising for IAG and EasyJet, which both show high volatility in their estimated asset betas. Morrisons is more difficult to explain – but given the company performs well under the other criteria, we choose to retain it within our sample. IAG and EasyJet perform less well against the other criteria (including gearing and beta volatility). Nevertheless, we retain these airlines for our analysis, given that their main purpose is to provide an example of a riskier sector with higher asset betas.

As part of our review of comparator selection we have also reviewed the classification of the vertically integrated and generation companies into their respective groups, as it is possible that some companies have consolidated or diversified their market positioning. We notice discrepancies for the following companies:

- **Fortum** was classified by the CMA as a vertically integrated energy company. We note that following Fortum's acquisition of a 75% share in Uniper (whose core activities are electricity generation and energy trading) in June 2018, a large portion of Fortum's revenue and operating income can be attributed to generation activities. However, as this shift in positioning is relatively recent, we retain Fortum's classification as a vertically integrated energy company.
- **Engie SA** was classified by the CMA as an electricity generation company. However, the majority of Engie's revenues for FY 2021 originated from its networks (gas distribution) and supply businesses, at approximately 35% and 20%, respectively. A similar pattern can be observed in previous years. We accordingly choose to reclassify Engie SA as a vertically integrated energy company.
- **American Electric Power** (AEP) was classified by the CMA as an electricity generation company. AEP owns 26GW of generation assets, but also the largest electricity transmission network in the US, contributing around 25% of the company's revenue. AEP also owns a retail electricity and gas business with around 700,000 customers.[78] In light of this, we choose to reclassify AEP as a vertically integrated energy company.

[78] See AEP.com

APPENDIX C COMPARATOR BETA ANALYSIS

In this appendix we set out our analysis of historical asset betas estimated in rolling two-, five- and ten-year windows between 30 April 2012 and 29 April 2022 for the comparator sectors and companies.

Consistent with a long-term view of beta, we focus on the time series of asset betas estimated over ten-year windows, converted from equity to asset betas using average gearing over the ten-year window.

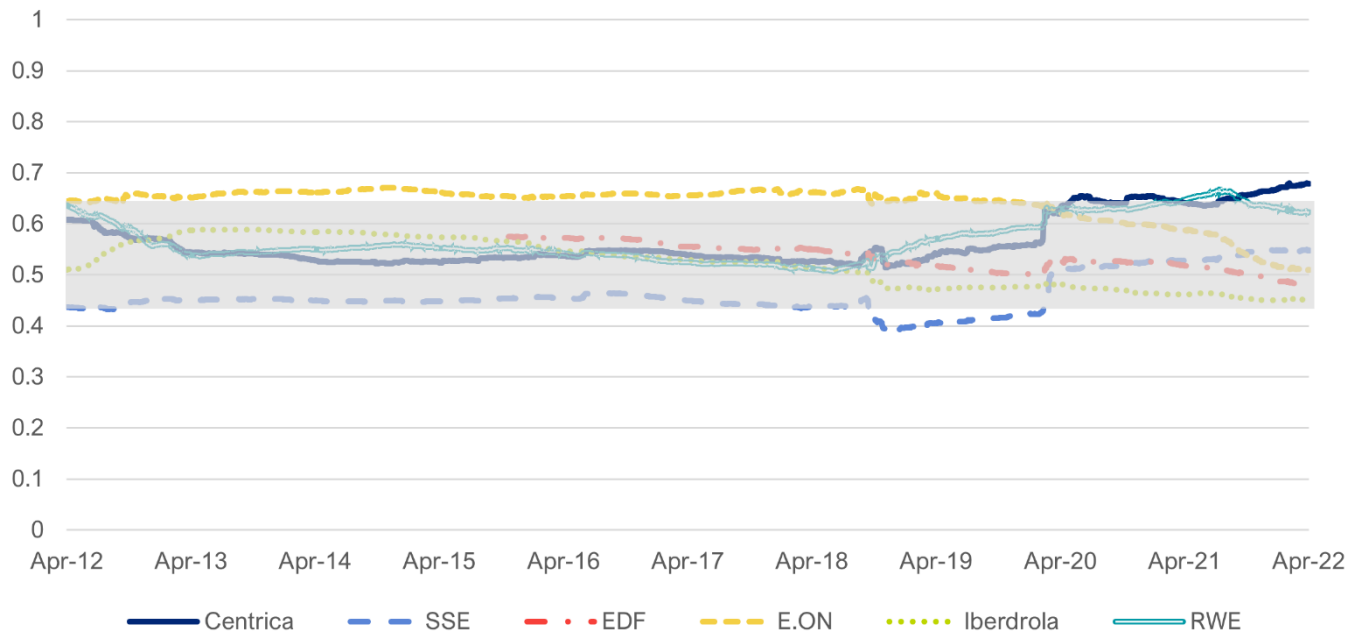
We also examine average betas estimated over two- and five-year windows, converted from equity to asset betas using average gearing over the corresponding window.

Large energy

Figure C.1 below shows asset betas for the large energy comparator companies estimated using a ten-year rolling window (de-levered using ten-year average gearing), while Table C.1 below shows the average asset betas over various estimation windows and averaging periods (de-levered using average gearing over the relevant window).

In general, both industry average betas and individual company asset betas over time tend to fall between 0.45 and 0.65 (shown in grey in Figure C.1).

Figure C.1: Asset betas over time for large energy companies (estimated in ten-year rolling windows and de-levered using ten-year average gearing)



Source: CEPA analysis of Bloomberg data. Grey shaded area indicates industry range.

Table C.1 Asset betas for large energy companies, estimated over windows of varying length

Estimation window	Averaging period	Centrica	SSE	EDF	E.ON	Iberdrola	RWE	Average
2-year	Spot	0.74	0.48	0.39	0.26	0.38	0.57	**0.47**
2-year	2-year	0.64	0.60	0.47	0.34	0.43	0.91	**0.56**
2-year	5-year	0.59	0.51	0.45	0.50	0.42	0.72	**0.53**
2-year	10-year	0.57	0.48	0.48	0.56	0.44	0.61	**0.52**
5-year	Spot	0.70	0.56	0.46	0.39	0.43	0.76	**0.55**
5-year	2-year	0.68	0.57	0.47	0.49	0.42	0.75	**0.56**
5-year	5-year	0.65	0.54	0.47	0.61	0.41	0.63	**0.55**
5-year	10-year	0.59	0.48	0.52	0.62	0.46	0.58	**0.54**
10-year	Spot	0.68	0.55	0.48	0.51	0.45	0.62	**0.55**
10-year	2-year	0.65	0.53	0.51	0.57	0.46	0.64	**0.56**
10-year	5-year	0.58	0.47	0.52	0.62	0.48	0.58	**0.54**
10-year	10-year	0.56	0.46	0.53	0.64	0.52	0.57	**0.55**

Source: CEPA analysis of Bloomberg data

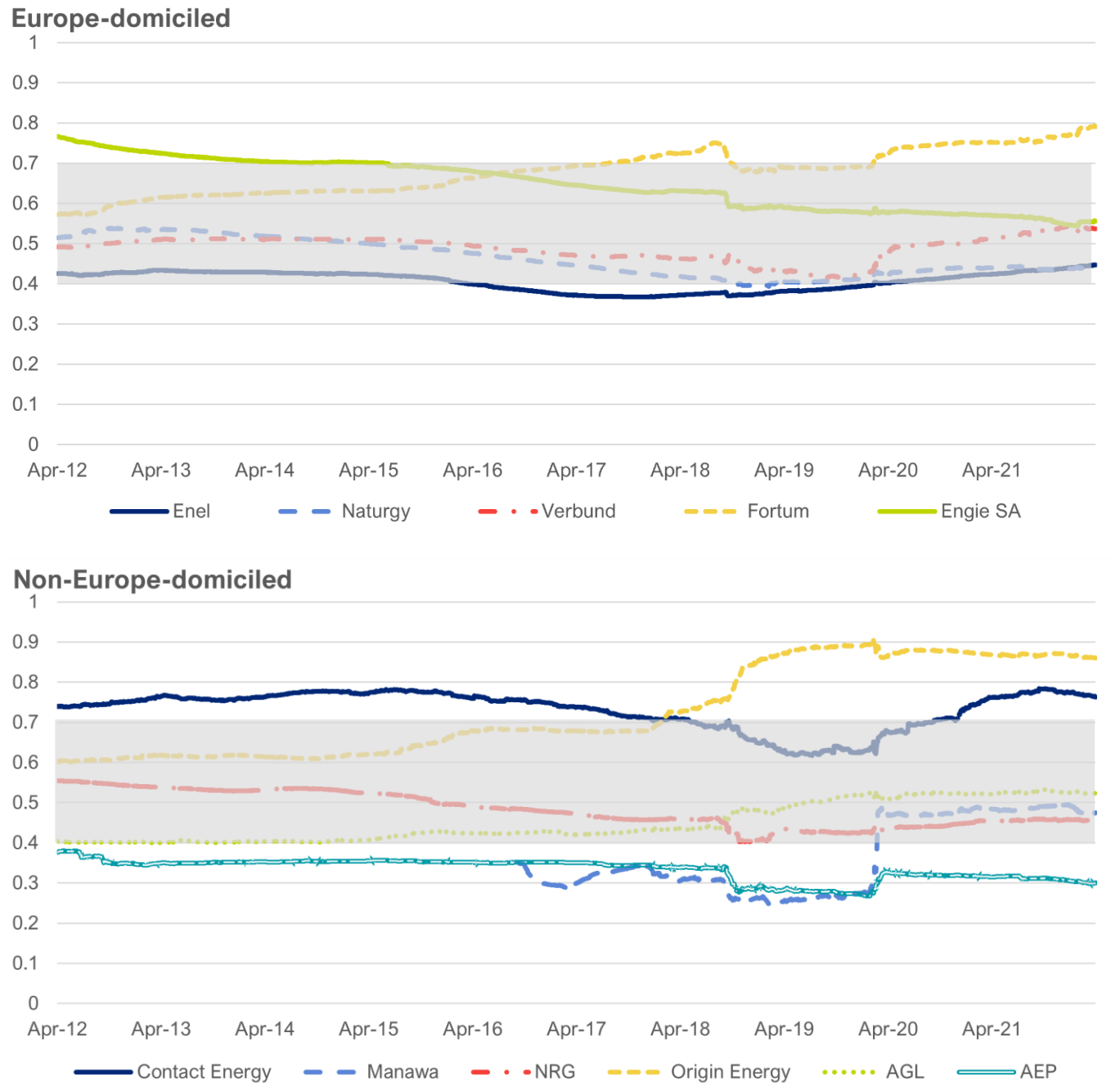
Vertically integrated energy

Figure C.2 below shows asset betas for the vertically integrated energy comparator companies estimated using a ten-year rolling window (de-levered using ten-year average gearing), while Table C.2 and Table C.3 below shows the average asset betas over various estimation windows and averaging periods (de-levered using average gearing over the relevant window).

As with the large energy comparator companies above, the proportion of the companies' operating income which comes from certain activities can help to explain the relative position of the estimated asset betas. Gas Natural (Naturgy) (in light strips of blue) and Enel (in navy blue full line) had approximately 65% and 55% of their operating income for FY 2021, respectively, coming from their networks activities, and these two companies have relatively low asset betas compared to the rest of the industry group. At the other end of the spectrum, 88% of Fortum's FY 2021 operating income was sourced from generation activities, which may help to explain the company's relatively higher asset beta (in yellow striped line).

The industry group shows a relatively wide range set of asset betas, but overall, most companies' asset betas tend to fall between 0.4 and 0.7 (shown in grey). This is in line with (but slightly wider than) the range of 0.5 to 0.6 which the CMA proposed for the sector.

Figure C.2: Asset betas over time for vertically integrated energy companies (estimated in ten-year rolling windows and de-levered using ten-year average gearing)



Source: CEPA analysis of Bloomberg data. Grey shaded area indicates industry range.

Table C.2: Asset betas for vertically integrated companies (Europe-domiciled), estimated over windows of varying length

Estimation window	Averaging period	Enel	Gas Natural	Verbund	Fortum	GDF Suez (Engie SA)	Average
2-year	Spot	0.51	0.40	0.64	0.77	0.56	**0.58**
2-year	2-year	0.50	0.47	0.81	0.81	0.55	**0.63**
2-year	5-year	0.45	0.42	0.62	0.84	0.54	**0.57**
2-year	10-year	0.42	0.42	0.50	0.75	0.56	**0.53**
5-year	Spot	0.48	0.43	0.70	0.82	0.56	**0.60**
5-year	2-year	0.45	0.44	0.66	0.89	0.56	**0.60**
5-year	5-year	0.43	0.43	0.51	0.87	0.57	**0.57**
5-year	10-year	0.40	0.42	0.47	0.74	0.59	**0.52**
10-year	Spot	0.45	0.44	0.54	0.79	0.56	**0.55**
10-year	2-year	0.42	0.44	0.51	0.75	0.57	**0.54**
10-year	5-year	0.40	0.42	0.47	0.72	0.59	**0.52**
10-year	10-year	0.41	0.46	0.49	0.68	0.65	**0.54**

Source: CEPA analysis of Bloomberg data.

Table C.3: Asset betas for vertically integrated energy companies (non-Europe-domiciled), estimated over windows of varying length

Estimation window	Averaging period	Contact Energy	Trust Power	NRG	Origin Energy	AGL	AEP	Average
2-year	Spot	1.00	0.33	0.52	0.87	0.54	0.20	**0.58**
2-year	2-year	0.93	0.71	0.62	0.84	0.50	0.37	**0.66**
2-year	5-year	0.70	0.53	0.50	0.89	0.54	0.23	**0.56**
2-year	10-year	0.70	0.53	0.44	0.86	0.53	0.27	**0.56**
5-year	Spot	0.83	0.56	0.53	0.84	0.53	0.30	**0.60**
5-year	2-year	0.77	0.57	0.50	0.86	0.53	0.32	**0.59**
5-year	5-year	0.68	0.40	0.44	0.91	0.55	0.28	**0.54**
5-year	10-year	0.69	0.38	0.45	0.85	0.50	0.30	**0.53**
10-year	Spot	0.76	0.47	0.45	0.86	0.52	0.30	**0.56**
10-year	2-year	0.74	0.48	0.45	0.87	0.52	0.32	**0.56**
10-year	5-year	0.70	0.37	0.44	0.82	0.49	0.31	**0.52**
10-year	10-year	0.73	0.36	0.48	0.73	0.45	0.33	**0.51**

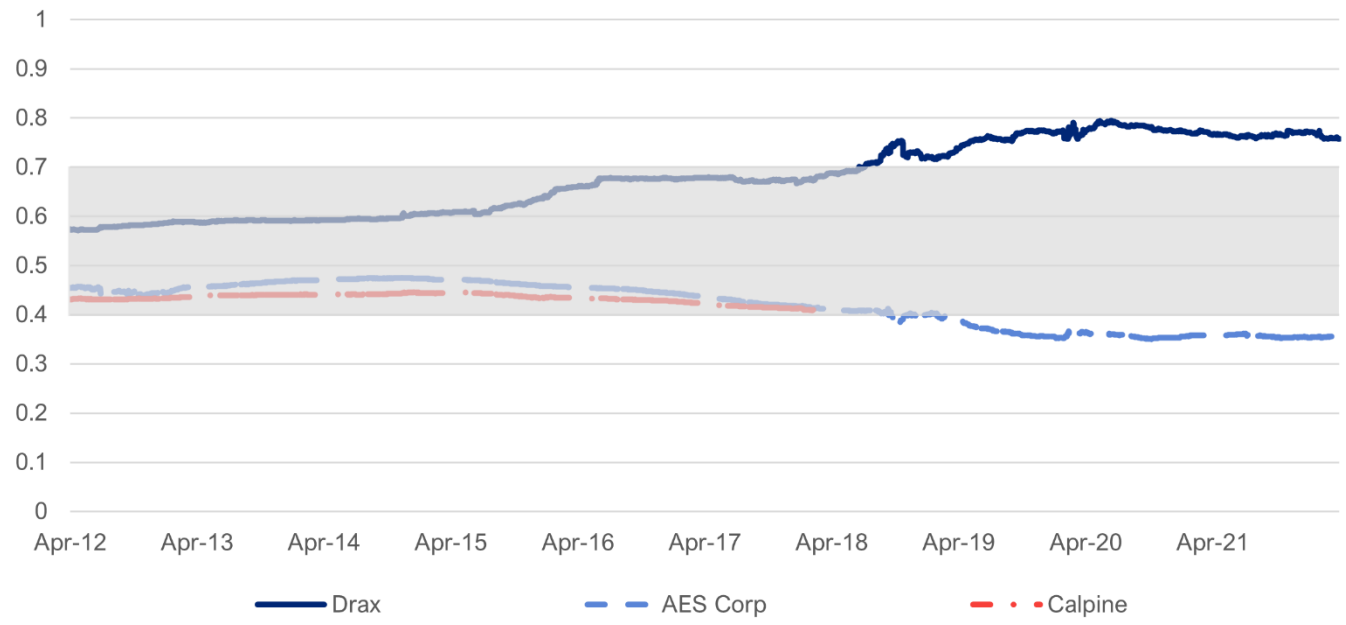
Source: CEPA analysis of Bloomberg data

Electricity generation

Figure C.3 below shows asset betas for the electricity generation comparator companies estimated using a ten-year rolling window (de-levered using ten-year average gearing), while Table C.4 below shows the average asset betas over various estimation windows and averaging periods (de-levered using average gearing over the relevant window).

Having reclassified Engie SA and AEP as vertically integrated energy companies, the set of generator companies is now very small. This makes it difficult to draw a conclusion regarding an appropriate asset beta range for the industry, but overall, the industry group appears to generally have asset betas between 0.4 and 0.7 (shown in grey). This is in line with (but slightly wider than) the range of 0.5 to 0.6 which the CMA proposed for the sector.

Figure C.3: Asset betas over time for electricity generation companies (estimated in ten-year rolling windows and de-levered using ten-year average gearing)



Source: CEPA analysis of Bloomberg data. Grey shaded area indicates industry range.

Table C.4: Asset betas for electricity generation companies, estimated over windows of varying length

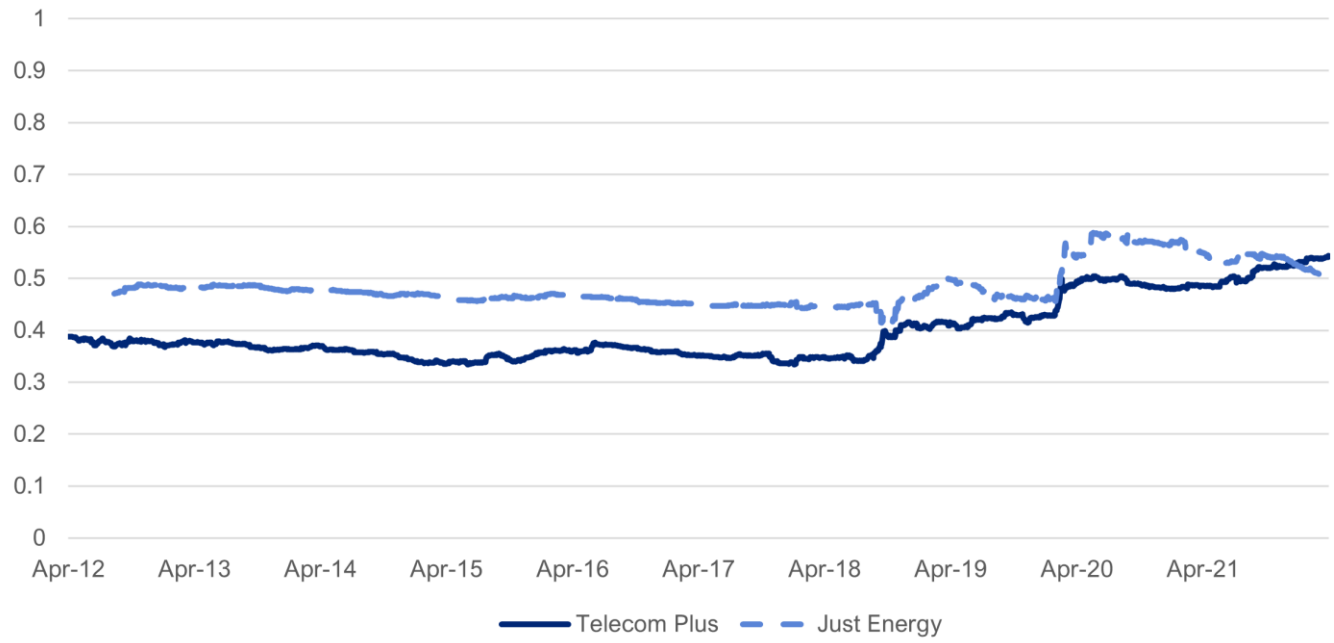
Estimation window	Averaging period	Drax	AES Corp	Calpine	Average
2-year	Spot	0.51	0.48		**0.50**
2-year	2-year	0.56	0.45		**0.50**
2-year	5-year	0.70	0.32	0.33	**0.45**
2-year	10-year	0.75	0.34	0.36	**0.48**
5-year	Spot	0.60	0.38		**0.49**
5-year	2-year	0.69	0.35		**0.52**
5-year	5-year	0.83	0.31	0.31	**0.48**
5-year	10-year	0.77	0.37	0.35	**0.49**
10-year	Spot	0.76	0.36		**0.56**
10-year	2-year	0.77	0.36		**0.56**
10-year	5-year	0.74	0.38	0.42	**0.51**
10-year	10-year	0.68	0.42	0.43	**0.51**

Source: CEPA analysis of Bloomberg data

Energy retail

Given the small comparator set, we do not consider it appropriate to use the estimated asset betas for Telecom Plus and Just Energy to draw conclusions about an appropriate asset beta for a notional GB energy retailer. We present the results below for completeness. Figure C.4 below shows asset betas for the energy retail comparator companies estimated using a ten-year rolling window (de-levered using ten-year average gearing), while Table C.5 below shows the average asset betas over various estimation windows and averaging periods (de-levered using average gearing over the relevant window).

Figure C.4: Asset betas over time for energy retail companies (estimated in ten-year rolling windows and de-levered using ten-year average gearing)



Source: CEPA analysis of Bloomberg data. Grey shaded area indicates industry range.

Table C.5: Asset betas for energy retail companies, estimated over windows of varying length

Estimation window	Averaging period	Telecom Plus	Just Energy	Average
2-year	Spot	0.53	0.23	**0.38**
2-year	2-year	0.56	0.34	**0.45**
2-year	5-year	0.52	0.33	**0.42**
2-year	10-year	0.47	0.44	**0.46**
5-year	Spot	0.46	0.50	**0.48**
5-year	2-year	0.57	0.39	**0.48**
5-year	5-year	0.55	0.51	**0.53**
5-year	10-year	0.54	0.48	**0.51**
10-year	Spot	0.40	0.48	**0.44**
10-year	2-year	0.54	0.50	**0.52**
10-year	5-year	0.50	0.55	**0.53**
10-year	10-year	0.43	0.50	**0.46**

Source: CEPA analysis of Bloomberg data

High street retail

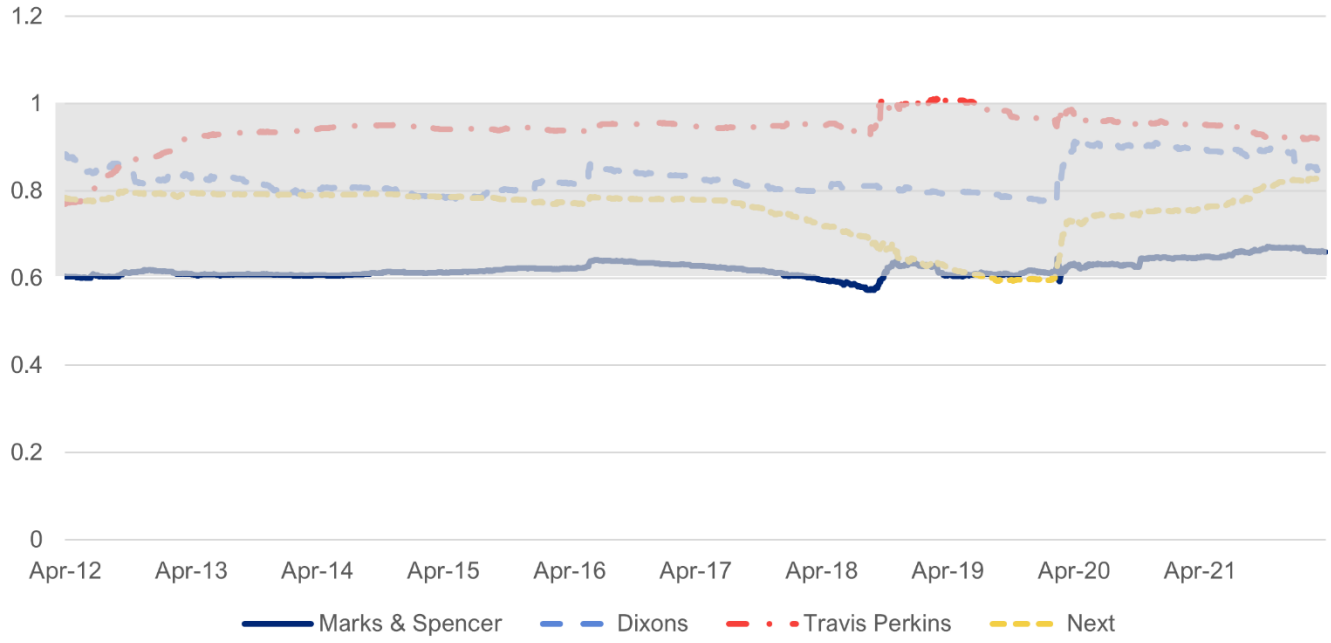
Figure C.5 below shows asset betas for the high street retail comparator companies estimated using a ten-year rolling window (de-levered using ten-year average gearing), while Table C.6 below shows the average asset betas over various estimation windows and averaging periods (de-levered using average gearing over the relevant window). The various product offerings for each of the companies provides a potential explanation for the wide range of betas of 0.6 to 1.0 (shown in grey):

- Around two thirds of M&S's revenue for FY 2021/2022 came from its food business, which may explain its relatively low beta of around 0.6, which is close to that of the groceries sector (discussed in the following subsection).

- Dixons, Travis Perkins and Next represent the more 'discretionary' end of high street retail, which makes them more vulnerable to fluctuations in consumer sentiment and demand and may explain their higher betas relative to M&S.

Note that a range of 0.7 to 1.0 is in line with the range of 0.7 to 1.0 proposed by the CMA.

Figure C.5: Asset betas over time for high street retail (estimated in ten-year rolling windows and de-levered using ten-year average gearing)



Source: CEPA analysis of Bloomberg data. Grey shaded area indicates industry range.

Table C.6: Asset betas for high street retail companies, estimated over windows of varying length

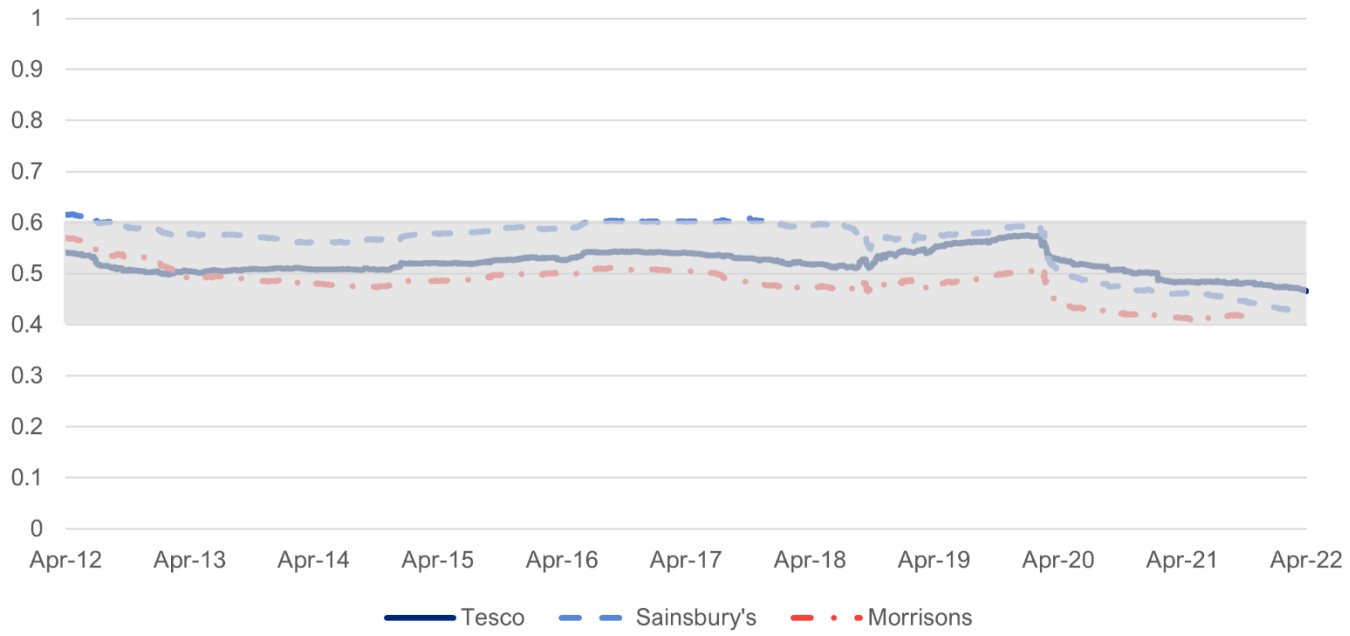
Estimation window	Averaging period	M&S	Dixons	Travis Perkins	Next	Average
2-year	Spot	0.57	0.55	0.87	0.93	**0.73**
2-year	2-year	0.51	0.73	0.85	0.99	**0.77**
2-year	5-year	0.50	0.73	0.76	0.74	**0.68**
2-year	10-year	0.59	0.78	0.88	0.67	**0.73**
5-year	Spot	0.58	0.84	0.88	0.92	**0.81**
5-year	2-year	0.61	0.89	0.87	0.90	**0.82**
5-year	5-year	0.63	0.84	0.85	0.74	**0.76**
5-year	10-year	0.63	0.83	0.92	0.69	**0.77**
10-year	Spot	0.66	0.84	0.92	0.83	**0.81**
10-year	2-year	0.65	0.89	0.95	0.77	**0.81**
10-year	5-year	0.63	0.89	0.96	0.71	**0.80**
10-year	10-year	0.62	0.89	0.94	0.75	**0.80**

Source: CEPA analysis of Bloomberg data

Groceries

Figure C.6 below shows asset betas for the groceries comparator companies estimated using a ten-year rolling window (de-levered using ten-year average gearing), while Table C.7 below shows the average asset betas over various estimation windows and averaging periods (de-levered using average gearing for the relevant window). The sector shows relatively stable asset betas over time, generally falling between 0.4 to 0.6 (shown in grey), although there is a noticeable decrease following the onset of the Covid-19 pandemic in 2020.

Figure C.6: Asset betas over time for groceries (estimated in ten-year rolling windows and de-levered using ten-year average gearing)



Source: CEPA analysis of Bloomberg data. Grey shaded area indicates industry range.

Table C.7: Asset betas for groceries, estimated over windows of varying length

Estimation window	Averaging period	Tesco	Sainsbury	Morrisons	Average
2-year	Spot	0.23	0.23		**0.23**
2-year	2-year	0.28	0.18	0.27	**0.24**
2-year	5-year	0.43	0.43	0.51	**0.46**
2-year	10-year	0.53	0.53	0.51	**0.52**
5-year	Spot	0.31	0.26		**0.28**
5-year	2-year	0.38	0.33	0.36	**0.36**
5-year	5-year	0.56	0.55	0.52	**0.55**
5-year	10-year	0.55	0.56	0.49	**0.53**
10-year	Spot	0.47	0.42		**0.44**
10-year	2-year	0.49	0.46	0.42	**0.46**
10-year	5-year	0.52	0.54	0.46	**0.51**
10-year	10-year	0.52	0.56	0.48	**0.52**

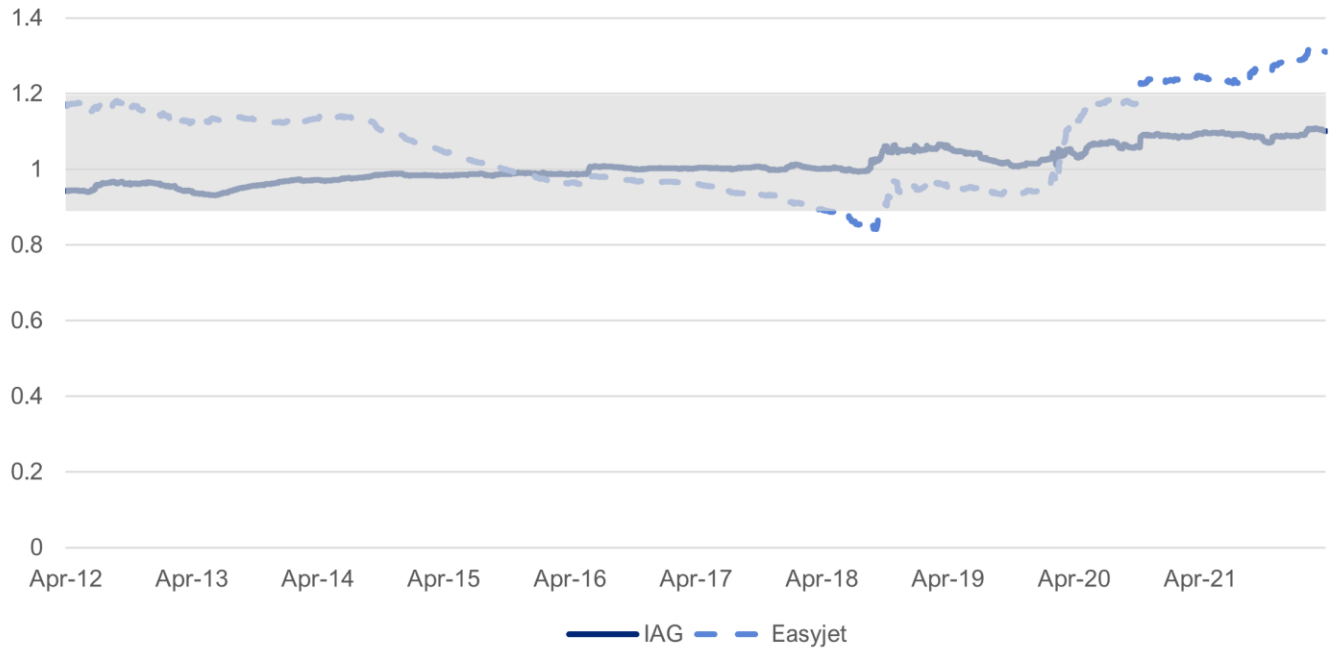
Source: CEPA analysis of Bloomberg data

Airlines

Figure C.7 below shows asset betas for the airline comparator companies estimated using a ten-year rolling window (de-levered using ten-year average gearing), while Table C.8 below shows the average asset betas over various estimation windows and averaging periods (de-levered using average gearing over the relevant window).

In general, the asset betas fall within a range of 0.9 to 1.2 (shown in grey). This is in line with (but slightly wider than) the range of 1.0 to 1.1 proposed for the sector by the CMA.

Figure C.7: Asset betas over time for airlines (estimated in ten-year rolling windows and de-levered using ten-year average gearing)



Source: CEPA analysis of Bloomberg data. Grey shaded area indicates industry range.

Table C.8: Asset betas for airlines, estimated over windows of varying length

Estimation window	Averaging period	IAG	EasyJet	Average
2-year	Spot	0.86	1.59	**1.23**
2-year	2-year	0.88	1.49	**1.18**
2-year	5-year	0.89	1.10	**1.00**
2-year	10-year	0.97	1.07	**1.02**
5-year	Spot	1.07	1.48	**1.27**
5-year	2-year	1.09	1.40	**1.25**
5-year	5-year	1.03	1.10	**1.07**
5-year	10-year	1.02	1.04	**1.03**
10-year	Spot	1.10	1.31	**1.21**
10-year	2-year	1.08	1.23	**1.16**
10-year	5-year	1.05	1.05	**1.05**
10-year	10-year	1.01	1.06	**1.04**

Source: CEPA analysis of Bloomberg data

APPENDIX D GEARING SENSITIVITY TESTING

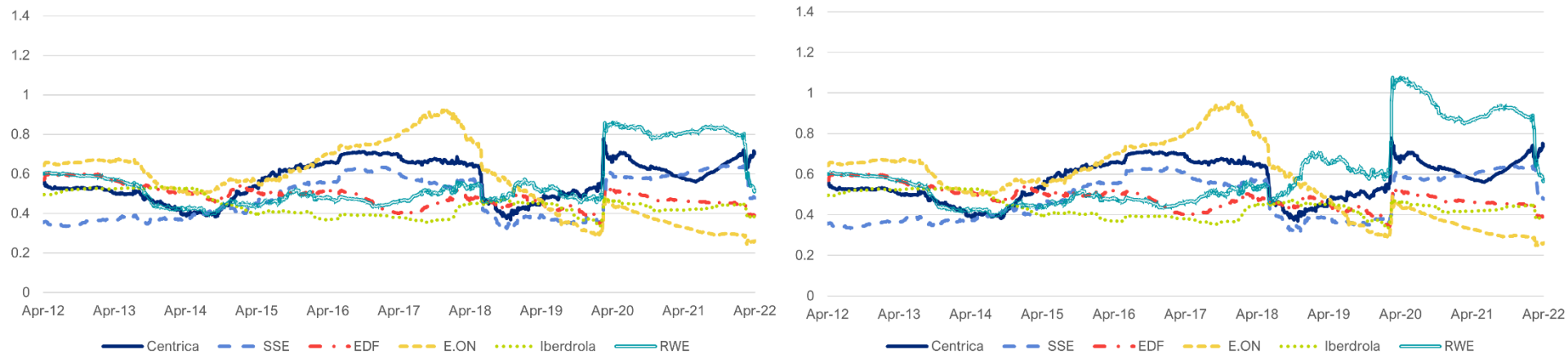
D.1. PLACING A FLOOR ON GEARING AT ZERO

Below we present charts of asset betas for each industry comparator group, estimated in two-year rolling windows between 30 April 2012 and 29 April 2022 and de-levered using average gearing over that the window. The left panel of each figure presents asset betas which have been converted from equity betas after imposing a floor of 0% on estimated spot gearing, while the right panel presents the estimated asset betas with no floor imposed on gearing. Overall, imposing a floor on gearing has a large impact on only a handful of companies, and within that only for a small part of the sample period. Consequently, we conclude that negative gearing does not pose a significant issue for our comparative beta analysis. We discuss each comparator sector in more detail below.

Large energy

As shown in Figure D.1, imposing a floor on spot gearing at 0% noticeably reduces the estimated asset betas for RWE, which has significant periods of negative gearing (when calculated using net debt data from Bloomberg) between July 2018 and March 2020, and between October 2020 and September 2021. We note that RWE has significant provisions which are not included in net debt as reported by Bloomberg, so we conduct additional sensitivity testing of gearing and beta using net debt as per RWE's published accounts in Section D.2.

Figure D.1: Asset betas for large energy companies estimated in two-year rolling windows with (left) and without (right) a floor on gearing

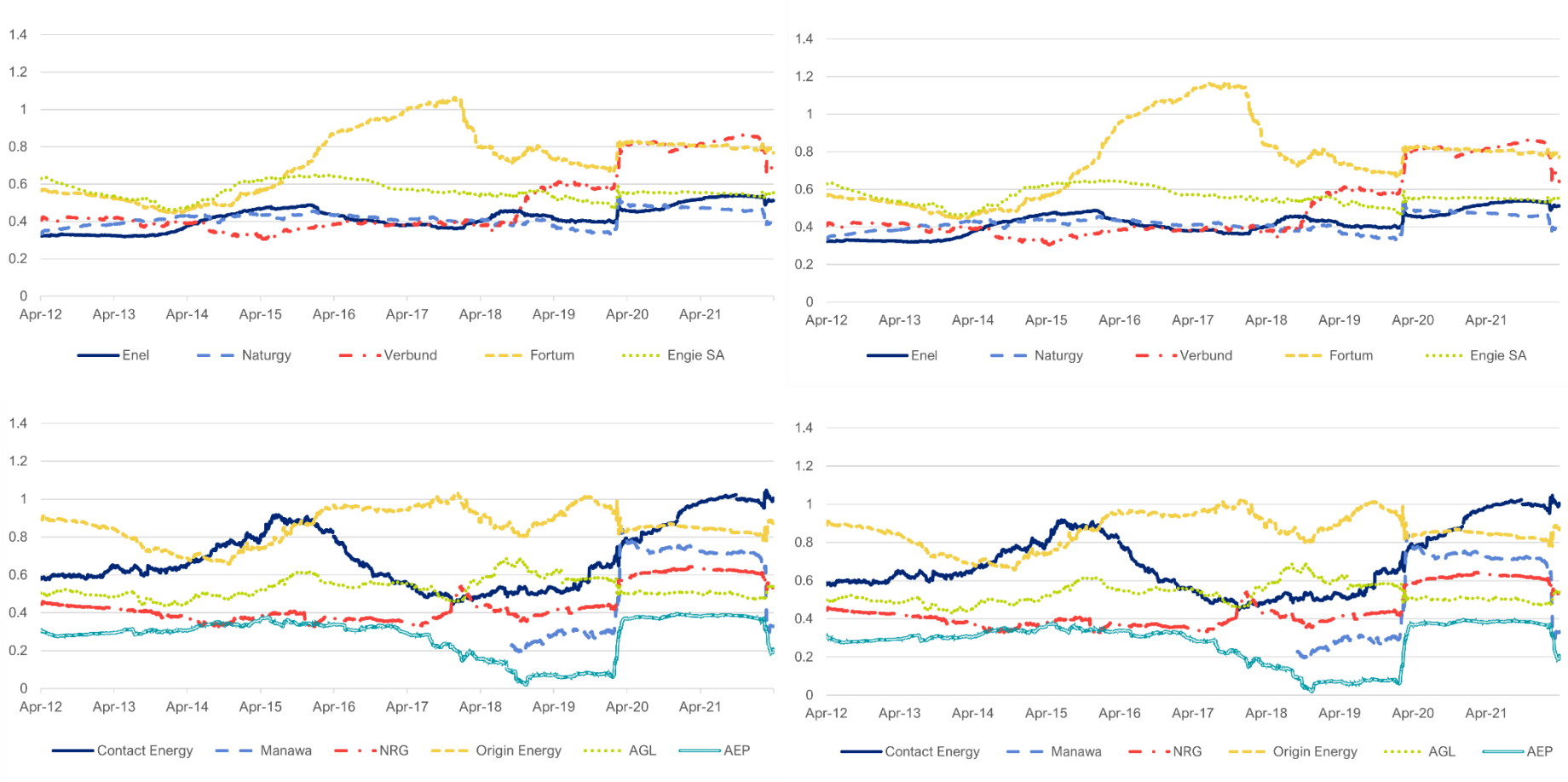


Source: CEPA analysis of Bloomberg data

Vertically integrated energy

For the vertically integrated energy companies, imposing a floor on gearing only affects Fortum, reducing its estimated asset beta between July 2015 and June 2017 (see Figure D.2 below) as all other companies do not display negative gearing observations.

Figure D.2: Asset betas for Europe-domiciled (top) and non-Europe-domiciled (bottom) vertically integrated energy companies estimated in two-year rolling windows with (left) and without (right) a floor on gearing

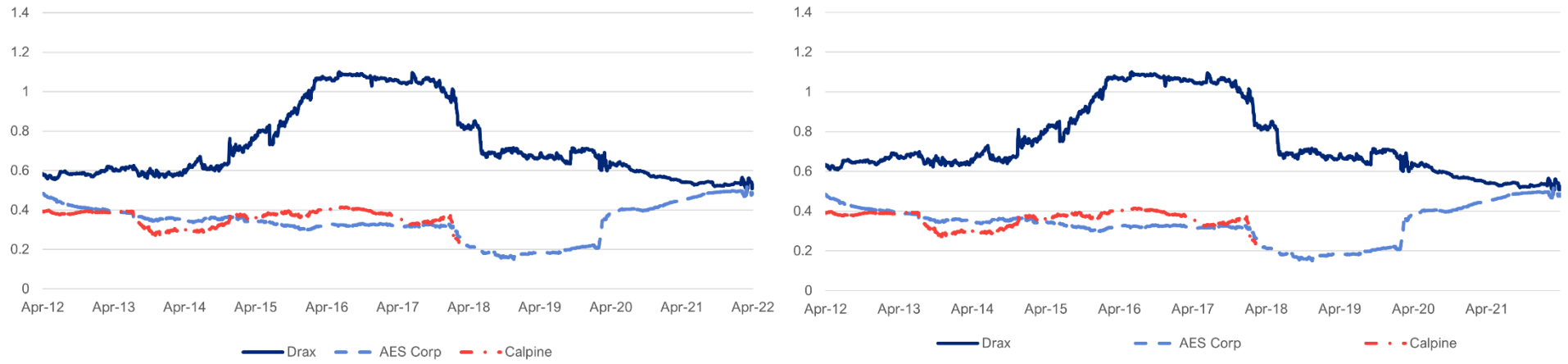


Source: CEPA analysis of Bloomberg data

Electricity generation

Of the electricity generation companies, imposing the floor on gearing has a minor impact on the estimated asset beta for Drax between 2012 and 2014, the period in which the company has negative gearing, as shown in Figure D.3 below.

Figure D.3: Asset betas for electricity generation companies estimated in two-year rolling windows with (left) and without (right) a floor on gearing

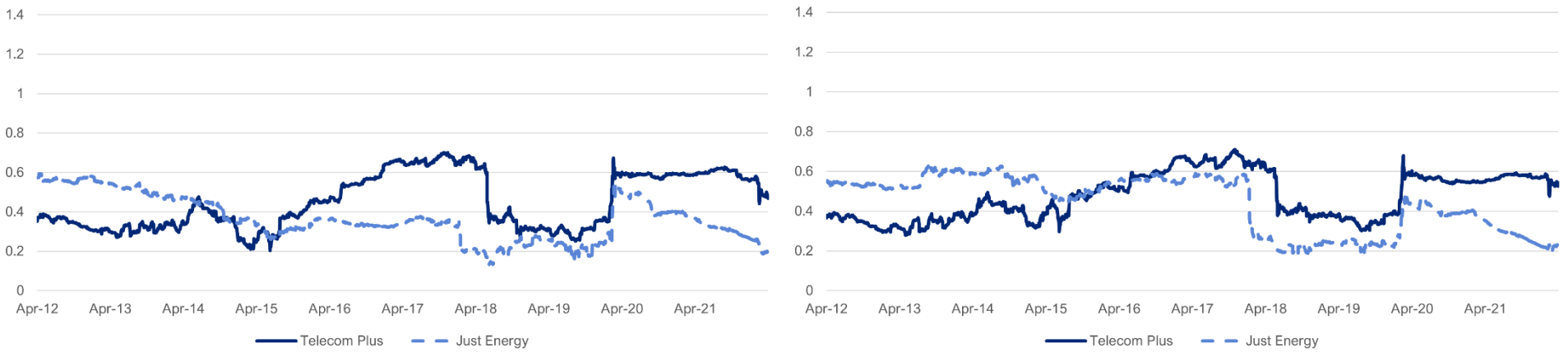


Source: CEPA analysis of Bloomberg data

Energy retail

Imposing a floor on gearing has significant impacts on the estimated asset beta for Just Energy, as shown in Figure D.4 below

Figure D.4: Asset betas for energy retail companies estimated in two-year rolling windows with (left) and without (right) a floor on gearing

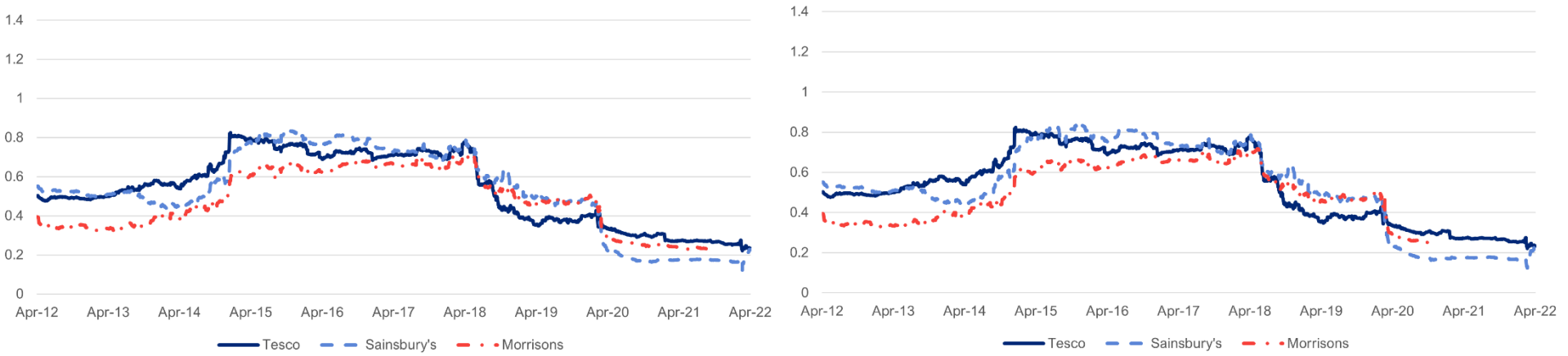


Source: CEPA analysis of Bloomberg data

Groceries

Imposing a floor on gearing has no impact on the estimated asset betas for the groceries comparator companies, as shown in Figure D.5 below, as none of the companies exhibits negative gearing over the sample period.

Figure D.5: Asset betas for groceries estimated in two-year rolling windows with (left) and without (right) a floor on gearing

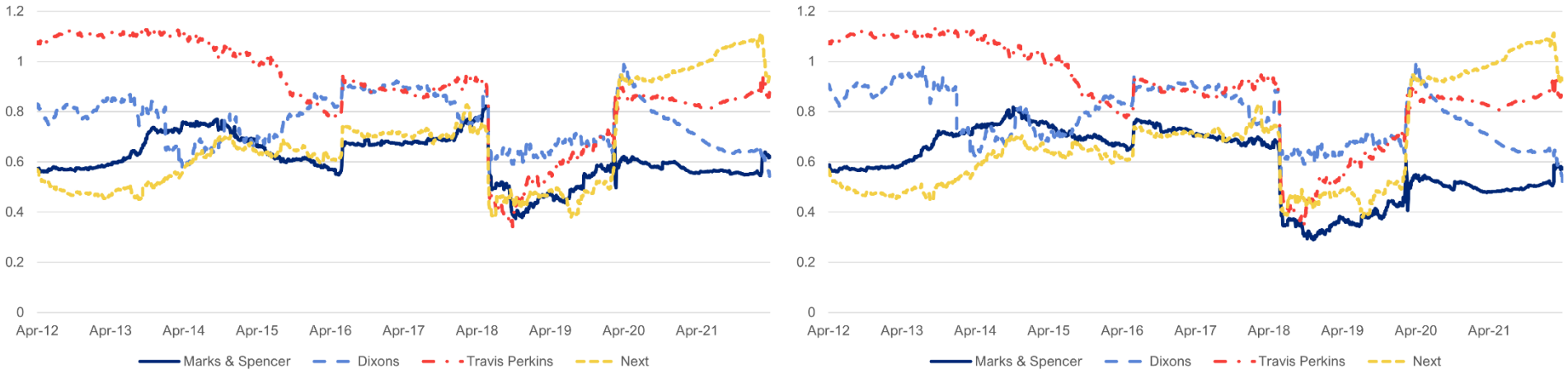


Source: CEPA analysis of Bloomberg data

High street retail

Of the high street retail comparator companies, only Dixons has a period of negative gearing, between October 2012 and September 2013. As shown in Figure D.6 below, imposing a floor on gearing has a small impact on the estimated asset beta for Dixons over this period.

Figure D.6 Asset betas for high street retail companies estimated in two-year rolling windows with (left) and without (right) a floor on gearing

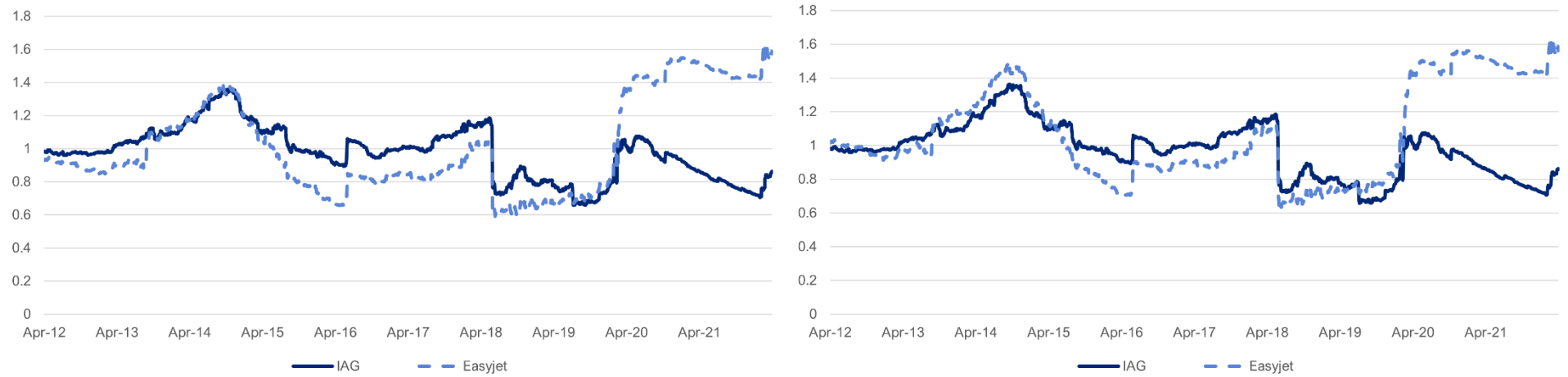


Source: CEPA analysis of Bloomberg data

Airlines

Figure D.7 below shows the impact of applying a floor on gearing on the estimated asset betas for the airline comparator companies. IAG has a short period of negative gearing in the second half of 2018, but this has only a limited impact on the estimated asset beta as gearing only reaches -6% at its lowest. EasyJet, by contrast, exhibits negative gearing between April 2013 and March 2019, so imposing a floor on gearing slightly reduces its estimated asset beta over this period.

Figure D.7: Asset betas for airlines estimated in two-year rolling windows with (left) and without (right) a floor on gearing



Source: CEPA analysis of Bloomberg data

D.2. USING NET DEBT FROM PUBLISHED ACCOUNTS

In this appendix we present asset betas estimated for a selection of companies which are known to have provisions and liabilities which are not captured within data vendors' (e.g., Bloomberg) company net debt figures:

- **RWE's** liabilities include provisions for pensions, the dismantling of wind farms and nuclear waste management.[79]
- **EDF** primarily refers to 'net indebtedness' in its annual reports. Net indebtedness is not defined in accounting standards but *"comprises total loans and financial liabilities, less cash and cash equivalents and liquid assets. Liquid assets are financial assets consisting of funds or securities with initial maturity of over three months that are readily convertible into cash and are managed according to a liquidity-oriented policy".*[80]
- **E.ON** primarily refers to 'economic net debt' in its annual reports, which comprises net financial debt, as well as pension and asset retirement obligations.[81]
- **IAG:** As of September 2021, British Airways (part of IAG) had pension scheme liabilities of over £25bn, several times larger than IAG's current market capitalisation.[82]

For each company, we obtain alternative net debt data from published financial reports from 2010 to 2022,[83] and combined these with historical market capitalisation data from Bloomberg to construct an alternative time series of company gearing between 2010 and 2022. We use these to calculate alternative estimates of asset betas, using two-year windows and de-levered using average gearing over the estimation window.

Across the four companies, using net debt data from published accounts leads to higher estimated gearing and thus lower asset beta estimates.[84] We discuss each company in more detail below.

RWE

Figure D.8 below shows RWE's asset beta estimated over two-year rolling windows, converted from equity beta using two-year average gearing based on net debt from Bloomberg versus net debt data from RWE's published annual and interim reports. The choice of net debt data has a substantial impact on RWE's estimated asset beta – using data from RWE's annual reports results in an asset beta around 0.2 below that calculated using net debt data from Bloomberg.

We note that in Figure D.8 RWE's estimated ten-year asset beta was approximately in the range of 0.55 to 0.65. On the basis of the results in Figure D.8, de-levering the ten-year equity beta using net debt data from RWE's published financial reports would likely result in an estimated asset beta of around 0.35 to 0.45, which is marginally below our long-term asset beta range for the large energy companies of 0.45 to 0.65.

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[79] RWE Annual Report 2021 p. 29, available here

[80] EDF Group 2021 Management Report p. 22, available here

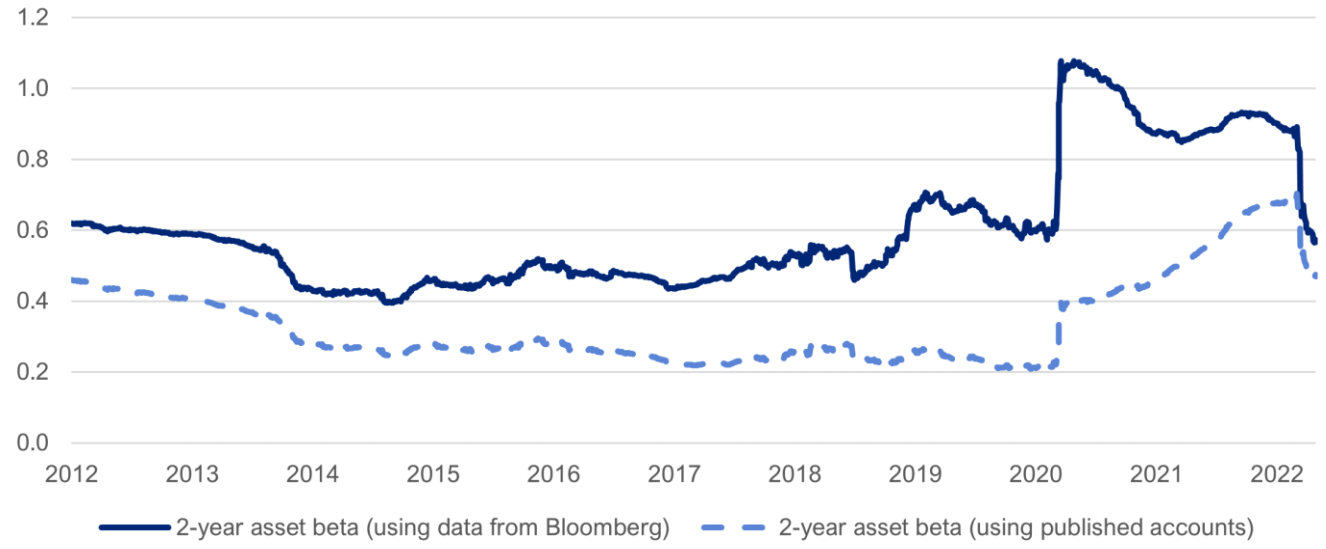
[81] E.ON Annual Report 2021 p. 40, available here

[82] This Is Money (September 2021), *Shareholders in IAG warned of looming crunch for British Airways' giant £25.8billion pension scheme,* available here

[83] Availability of published accounts prevented us from extending this time period further backwards, so we were unable to conduct the same analysis on betas estimated over ten-year windows and de-levered using ten-year average gearing.

[84] Assuming a debt beta of zero, $asset\ beta = equity\ beta \times (1 - gearing)$, so for the same estimated equity beta, higher gearing leads to a lower estimated asset beta.

Figure D.8: Asset beta over time for RWE, estimated in two-year rolling windows, converted from equity beta using gearing calculated either using net debt data from Bloomberg or net debt data from published accounts

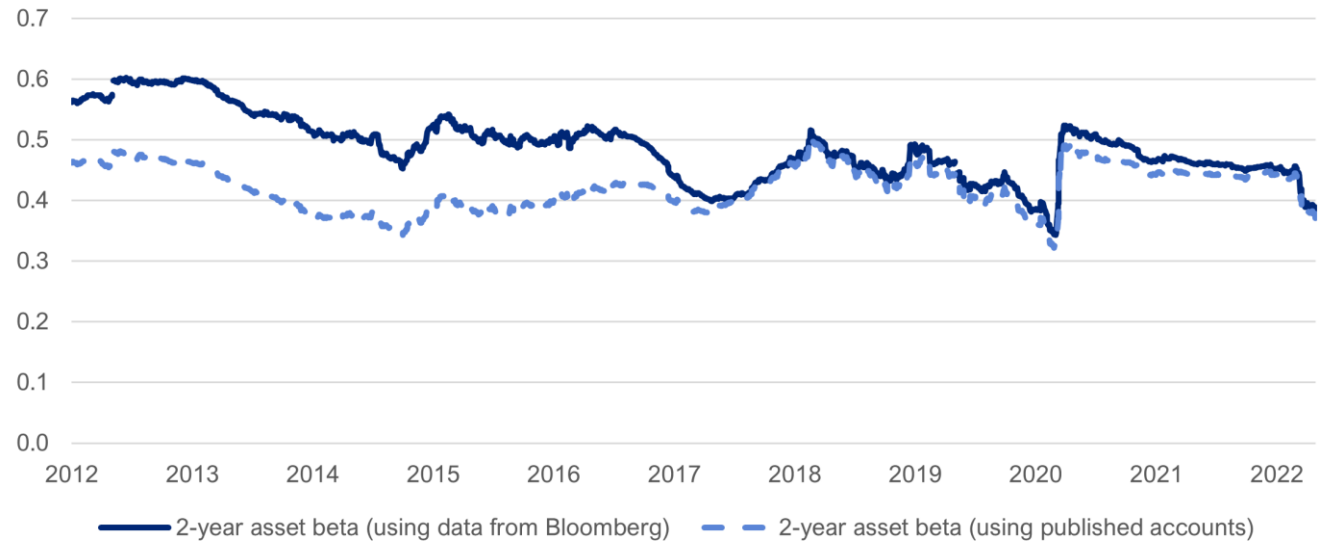


Source: CEPA analysis of Bloomberg data and published accounts

EDF

Figure D.9: below shows EDF's asset beta estimated over two-year rolling windows, converted from equity beta using two-year average gearing based on net debt from Bloomberg versus 'net indebtedness' data from EDF's published annual and interim reports. The choice of net debt data has a relatively small impact on EDF's estimated asset beta – the difference between the two sets of estimates is approximately 0.1 between 2012 and 2017, and closely aligned thereafter.

Figure D.9: Asset beta over time for EDF, estimated in two-year rolling windows, converted from equity betas using gearing calculated either using net debt data from Bloomberg or 'net indebtedness' data from published accounts



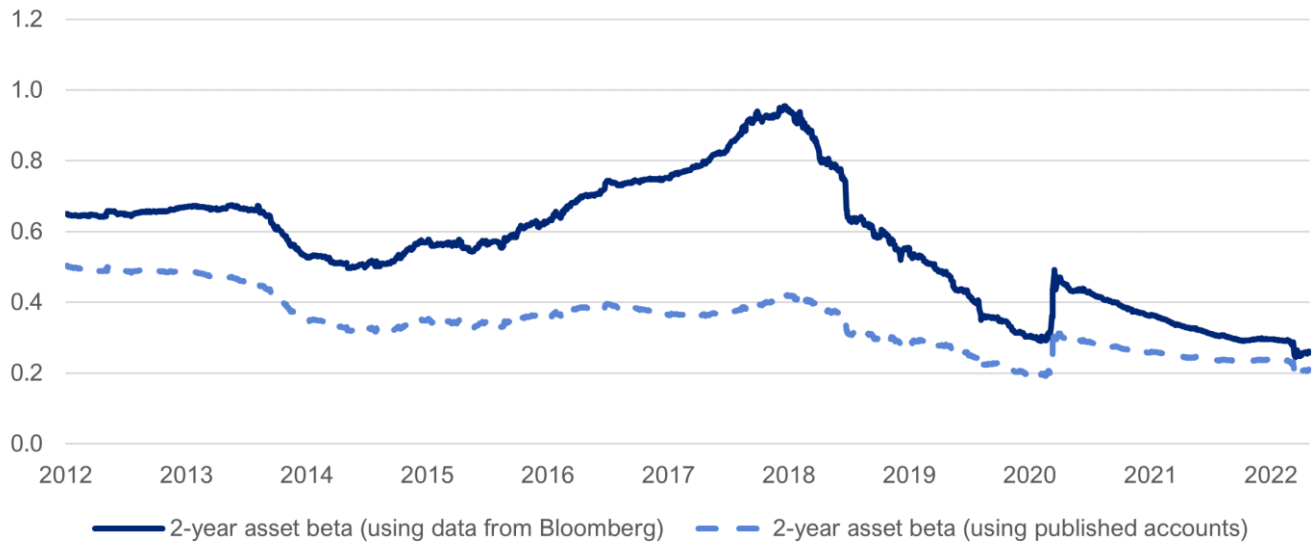
Source: CEPA analysis of Bloomberg data and published accounts

E.ON

Figure D.10: below shows E.ON's asset beta estimated over two-year rolling windows, converted from equity beta using two-year average gearing based on net debt from Bloomberg versus 'economic net debt' data from E.ON's published annual and interim reports. The choice of net debt data has a variable impact on E.ON's estimated asset beta: the gap between the two series is around 0.1-0.2 until 2015, after which the gap widens to around 0.5 by 2018 before narrowing again.

We note that in Appendix C, E.ON's estimated ten-year asset beta was stable at around 0.65, until 2020 when it began to steadily decline to reach c. 0.5 in 2022. The average difference between the two series in Figure D.10: over the time period is 0.23 – so we could expect that de-levering the ten-year equity beta using 'economic net debt' data would result in an estimated asset beta towards the bottom end of our long-term asset beta range for the large energy companies of 0.45 to 0.65.

Figure D.10: Asset beta over time for E.ON, estimated in two-year rolling windows, converted from equity betas using gearing calculated either using net debt data from Bloomberg or 'economic net debt' data from published accounts



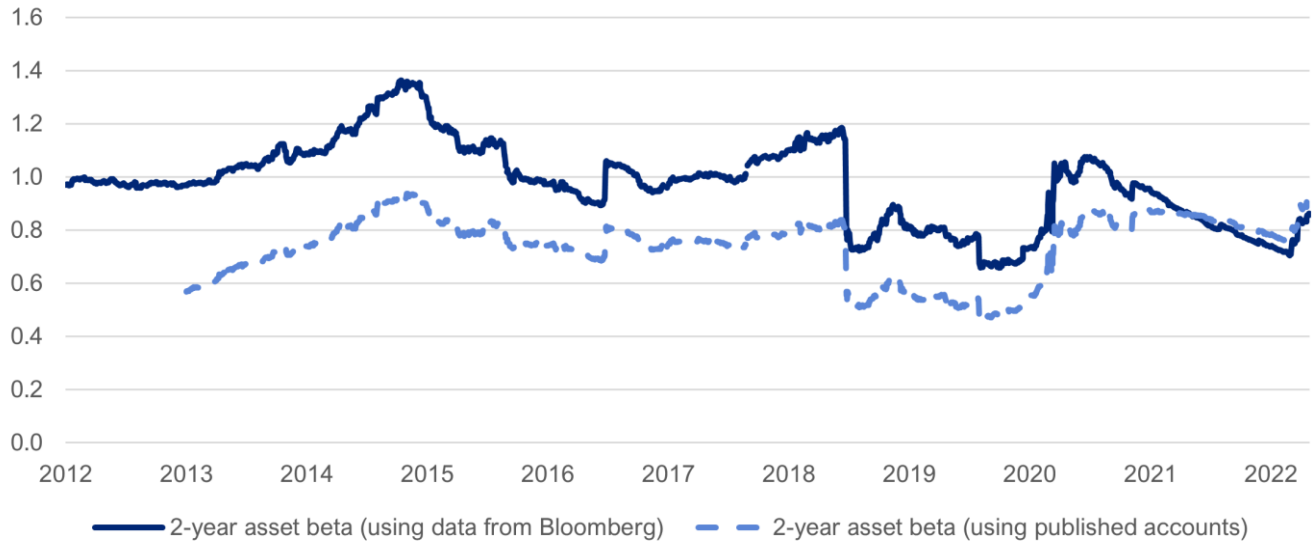
Source: CEPA analysis of Bloomberg data and published accounts

IAG

Figure D.11: below shows IAG's asset beta estimated over two-year rolling windows, converted from equity beta using two-year average gearing based on net debt from Bloomberg versus net debt data from IAG's published annual and interim reports. The choice of net debt data has a sizeable impact on IAG's estimated asset beta – the difference between the two sets of estimates is approximately 0.2 over the sample period, although the gap has narrowed more recently.

We note that in Appendix C, IAG's estimated ten-year asset beta was approximately in the range of 0.9 to 1.1. On the basis of the results in Figure D.11, de-levering the ten-year equity beta using net debt data from IAG's published financial reports may produce estimates of a ten-year asset beta of around 0.7 to 0.9.

Figure D.11: Asset beta over time for IAG, estimated in two-year rolling windows, converted from equity betas using gearing calculated either using net debt data from Bloomberg or net debt data from published accounts



Source: CEPA analysis of Bloomberg data and published accounts

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