The Impact of Liberalization and Environmental Policy on the Financial Returns of European Energy Utilities

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ABSTRACT

European energy utilities face a range of policy induced challenges that are materially affecting their financial returns. Accordingly, in this paper we examine the impact of liberalization, energy efficiency, renewable energy, and security of supply legislation on European energy utilities' returns between 1996 and 2013. We implement an event study portfolio analysis using a comprehensive list of major regulatory changes, the largest utility sample to date, and a novel asset pricing model that controls for sector-level stock-market, term premium, and commodity risk factors. The results show EU policies that focus on liberalization and energy efficiency have a significant negative impact on the energy sector's financial returns. This reflects changes in the fundamental risk-reward trade-off of European energy utilities and investors' recognition of the economic impact of EU legislations on the sector. Contrary to assertions by the financial press, renewable energy objectives have no significant impact on returns at sector-level; the impact is mostly concentrated on the natural gas utilities. Our results highlight a tension between liberalization and environmental objectives, negatively impacting the sector's ability to raise the estimated $2.2 trillion investment capital needed to ensure reliable and increasingly environmentally-friendly energy supply.

Keywords: Liberalization, Environmental Policy, Financial Risk, Financial Return

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1. INTRODUCTION

Over the last two decades, European energy utilities have been impacted by a myriad of European Union (EU) interventions which have materially affected financial returns. Most prominently, the EU has sought to liberalize the sector in an effort to create a single European energy market. Liberalization has transformed the energy sector from one largely dominated by state-owned enterprises, with vertically integrated structure and regional monopolies, to an unbundled, competitive, privately-owned energy sector. Another major EU-led reform thrust that has built up particular momentum over the last decade is related to the environmental objectives of the sector and the 'greening' of energy supply. This has focused on reducing demand through energy efficiency legislations and through policies that promote renewable energies. In addition to the liberalization and environmental policies, EU utilities have also been subject to a range of legislations related to

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enhancing security of supply. Overall, restructuring the EU energy sector represents the largest cross-border reform of energy networks in the world (Jamasb and Pollitt, 2005). This naturally leads to the question: how have these regulatory changes impacted the returns of EU energy utilities? This question matters as the EU has 503 million citizens[1] and collectively represents the largest economy in the world (measured in nominal GDP).[2]

In a recent report entitled ‘How to lose half a trillion euros’, *The Economist* newspaper suggests that the renewable objectives of restructuring are responsible for a decline in sector market capitalization of €500 billion since 2008 (The Economist, 2013). A decline which, to date, utilities have not fully recovered from. We posit that additional restructuring objectives, beyond renewables, are affecting financial returns. Accordingly, we explore market reactions to four major restructuring streams in the EU energy utility sector, namely: Internal Energy Market,[3] Energy Efficiency, Renewable Energies, and Security of Supply streams.

As is well known, policymakers are asking utilities to increase their use of green-energy technologies and make massive investments in a smart, decarbonized energy grid. Simultaneously, to ensure reliable and increasingly environmentally-friendly energy supply, the International Energy Agency (IEA) projects up to $2.2 trillion of total power sector investment is needed in the EU between 2014 and 2035 (IEA, 2014). Of this value, $1.6 trillion is allocated for new generation capacity, three-quarters of which will be invested in renewables. The proportion of renewables in energy generation will increase from 24% in 2012 to 44% in 2035 (IEA, 2014). If EU policies significantly impact the returns of European utilities this can, in turn, affect utilities’ cost of capital and capital-raising ability. The yields on RWE and E.ON stocks used to track 10-year government bonds, but since 2008 the yields have climbed to around 10% while government bonds have remained relatively stable (The Economist, 2013). Put differently, the shift towards liberalization appears to conflict with the policy objectives of enhancing security of supply and encouraging investment in low-emission generating technology, as it does not provide a sound basis for investment in the sector.

Research for the US has shown that deregulating the power sector exposes utilities to the profit effects of cost and demand shocks, leading to greater earnings variability and systematic risk (Nwaeze, 2000). Beyond the impact on operating performance, privatization also removes government-backed debt guarantees, exposing firms to the real threat of bankruptcy, and affects the perceived riskiness of financial investment (Megginson et al., 1994, Delmas and Tokat, 2005). Compliance with environmental policies can introduce non-recoverable costs to operations and force utilities to adopt relatively immature technologies—inducing technological risk (Hart and Ahuja, 1996). Empirical evidence has also shown that the cost of abatement is significantly greater for high-emitting technologies (Koch and Bassen, 2013).

This paper implements an event study analysis, using a comprehensive augmented-four-factor asset pricing model. We extend the augmented-CAPM models of two papers which examine returns on the European energy utilities sector (Oberndorfer, 2009; Koch and Bassen, 2013), by integrating stock-market risk factors from the four-factor model of Fama and French (1993) and Carhart (1997). We approach the analysis using a large sample of 88 European energy utilities, which controls for survivorship bias, and compile a comprehensive list of 54 important regulatory

1. 2014 data extracted from EUROPA: http://europa.eu/about-eu/facts-figures/living/index_en.htm

2. 2014 data extracted from EUROPA: http://europa.eu/about-eu/facts-figures/economy/index_en.htm and http://ec.europa.eu/trade/policy/eu-position-in-world-trade/

3. The Internal Energy Market stream proxies for liberalization objectives.

changes extracted from European law archives. Controlling for a variety of risk factors, we explore the impact of 54 regulatory events using daily data between 1996 and 2013. We delineate the four restructuring streams (Internal Energy Market, Energy Efficiency, Renewable Energies, and Security of Supply) to examine their individual impacts surrounding key stages of the ordinary legislative procedure. We also examine the differential impacts of twelve energy portfolios grouped on similarity of characteristics.[4] At the time of writing, no prior study has explored the magnitude of impact for the four restructuring streams, over such a broad sample of utilities, range of variables, and time period. As such, this paper represents the most thorough investigation to date of the impact of EU policies on the return profiles of European energy utilities.

The main results are as follows. The Internal Energy Market stream produces cumulative average abnormal returns (CAARs) up to −1.32% in the early stages of the legislative procedure. The stream fundamentally changes the regulatory and operating environment of utilities. Investors will be aware that a legislative proposal is in gestation and thus it will be anticipated. The Energy Efficiency stream also induces CAARs of −1.60% in the early stages of the legislative procedure. The stream focuses on reducing energy demand by limiting the energy consumption of appliances and buildings at the user-end of the supply chain. Contrary to the financial press, we find no significant impact for Renewable Energies at sector-level, but a strong negative reaction for natural gas utilities in the early stages of the legislative procedure. We find significant CAARs up to −6.25% for natural gas utilities. While we find significant CAARs for the Security of Supply stream, the results indicate that the stream is difficult to process and the impact is not fully known by the market.

From a policy perspective, this paper contributes to the literature by showing that the Internal Energy Market and Energy Efficiency streams have a significant cross-sectional impact in the energy sector and are anticipated. In contrast to press commentators, the Renewable Energies and Security of Supply streams have limited, firm-specific impacts. Importantly, it shows that the impact of regulatory changes can be idiosyncratic depending on the characteristics of the underlying firm affected. While the results are congruent with theory, it suggests that the press is subject to focalism.

The paper proceeds as follows. Section 2 presents the theoretical framework of the paper, reviews the literature, and develops the paper's hypotheses. Section 3 outlines the data, sample, and event study approach. Section 4 presents the descriptive statistics and event study results. Section 5 concludes and discusses the policy implications of the paper.

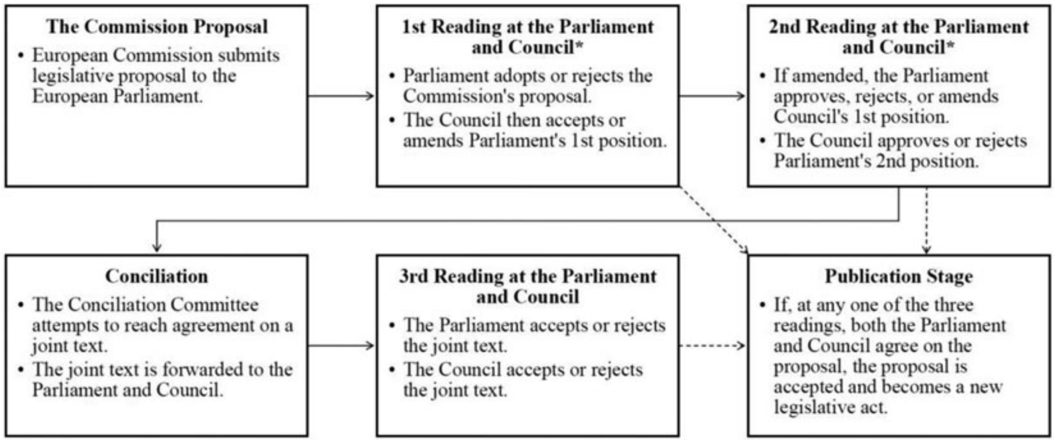
2. THEORETICAL FRAMEWORK AND HYPOTHESES

A. The Legislative Procedure and Timing of Market Reaction

To measure the timing of market reaction, we must first outline how legislation are adopted in the EU. The majority of legislation follow the 'ordinary legislative procedure', a co-decision procedure designed to enhance transparency and accountability in the EU legislative process. The procedure is summarized in Figure 1.

4. The twelve energy utility portfolios include: 1) the energy sector, 2) small utilities, 3) big utilities, 4) high-book-to-market (BE/ME) utilities, 5) mid-BE/ME utilities, 6) low-BE/ME utilities, 7) upper-momentum utilities, 8) medium-momentum utilities, 9) down-momentum utilities, 10) electricity-only utilities, 11) natural gas-only utilities, and 12) multi-utilities. For brevity, these results are provided in an online appendix.

Figure 1: The Ordinary Legislative Procedure



Note: If both the Parliament and the Council accept a proposal, or the former amends and the latter accepts the amendments, the proposal passes through to publication and skips the subsequent readings. A failure to agree results in the proposal being rejected. Figure adapted from European Parliament (2015).

The ordinary legislative procedure can be delineated into four key stages. The first key stage, the announcement of the '1st position', represents the date at which the first political institution (typically the Parliament) has voted to principally adopt, or amend, a legislative proposal. The second key stage, the announcement of the '2nd position', represents the date at which the second political institution (typically the Council) has also voted to principally adopt the legislative proposal, including any prior amendments. Following the 2nd position, a legal-linguistic phase begins, finalizing the legal terms in the documents. Changes to the proposal at this stage may only be made with explicit agreement, at the appropriate level, from both the Parliament and the Council (European Parliament et al., 2007). The third key stage, the 'signature date', involves the Presidents of the Parliament and the Council simultaneously signing the text in a joint ceremony, organized on a monthly basis in the presence of the media. Finally, the fourth key stage is the 'publication date', where the jointly signed text is published in *The Official Journal of the European Union*, the central law archive for European legislation. The majority of legislation pass through these four stages; thus the process will be carefully monitored by investors.

Investors will use their knowledge of the procedure to determine the likelihood that a legislative proposal will become law, continually adjusting the probability of adoption and adjusting asset prices accordingly (Schwert, 1981). Rational investors are expected to consider all scenarios (Griffin et al., 2015). As, the latter two stages are ceremonial, market efficiency dictates that a rational market reaction will occur during the voting stages: the 1st and 2nd positions. The 2nd position represents the date at which it is known with certainty that a proposal will become law and the document is effectively finalized. However, we temper this proposition with caution. As Schwert (1981) notes, the assumption of market efficiency does not imply that investors have perfect information or foresight regarding the future effect of a regulation. It is possible that the *ex-post,* realized effect of the regulation is different to the *ex-ante*¸ anticipated effect. Further, investors often exhibit a lagged response for a variety of reasons, including: investor inattention (Dyck and Zingales, 2003, Dellavigna and Pollet, 2009); investor bias, including overconfidence and self-attribution (Daniel et al., 1998, Hirshleifer, 2001); hard-to-value information, including hard (quantitative) and soft (qualitative) information (Demers and Vega, 2008, Engelberg, 2008, Kumar, 2009); and media coverage and bias (Solomon, 2012). Griffin et al. (2015) also argue investors may not respond to information for numerous reasons, including: 1) remote and uncertain consequences for the firm regarding the long-term nature of increased investment risk, 2) the expectation of full mitigation from government policies, or 3) the ability to mitigate risk individually. It is important that the analysis can capture these anticipated and lagged effects.

B. The Impact of the Four Restructuring Streams

Four restructuring streams are expected to impact the financial return of European energy utilities. The first stream addresses liberalization objectives of the energy sector, the Internal Energy Market stream. The second and third streams address environmental objectives of the sector: The Energy Efficiency and Renewable Energies streams. The fourth stream focuses on security of oil and energy supplies in the EU, the Security of Supply stream. The following paragraphs develop hypotheses for each stream.

The first stream, the Internal Energy Market, focuses on liberalizing the energy sector and inducing competition. The liberalization literature argues that deregulation of markets is expected to lower entry barriers, increase competition from large international competitors, and expose energy utilities to the real threat of bankruptcy through removal of government-backed debt guarantees (Beneish, 1991, Megginson et al., 1994, Gual, 1999). Deregulation also brings additional expenses such as reorganization costs, increased brand awareness, and cutting unit costs to gain market share (Beneish, 1991, Gual, 1999, Nwaeze, 2000, Delmas and Tokat, 2005). Vertically unbundling utilities, a key component of energy sector liberalization, is expected to reduce insurance against fluctuations in commodities and the buffering effect from cost and demand shocks (Beneish, 1991, Nwaeze, 2000, Jamasb and Pollitt, 2005). We expect the market to react negatively to the Internal Energy Market stream. Energy utilities now lose their natural regional monopolies and are forced to compete with a large number of competitors on price and services, where marginal pricing dictates that remunerations from energy supply will decrease. Accordingly, the first hypothesis is:

> $\boldsymbol{H_1}$: Liberalization objectives related to the Internal Energy Market stream will negatively impact the financial return of energy utilities.

The environmental objectives are addressed through two streams: Energy Efficiency and Renewable Energies. The environmental policy literature finds mixed results with respect to the impact of environmental objectives on profitability and future cash flows. Both retrofitting existing energy plants and compliance with environmental regulations are costly, decreasing utilities' productivity (Bragdon and Marlin, 1972, Gollop and Roberts, 1983). Further, the financial cost of environmental compliance means allocating resources away from other goals which could benefit the firm, including investment projects, equipment maintenance, and plant upgrades (Walley and Whitehead, 1994, Dobes et al., 2014). However, in some instances, environmental regulations can increase productivity, as it encourages firms to innovate, provides new market opportunities, and can identify many low-cost savings in operations (Walley and Whitehead, 1994, Hart and Ahuja, 1996). Further, technological innovation, the social benefit of renewable energies, and lower firm emissions may increase firm value as socially responsible investors reward these firms through impact investment. The likely impact of environmental objectives will depend on the informational content within the two distinct restructuring streams—outlined below.

The second restructuring stream, the Energy Efficiency stream, focuses on reducing energy consumption from the most energy-intensive end-user appliances and housing stock in the EU. Energy-intensive appliances are systematically identified, labelled according to energy consumption, and subject to maximum energy consumption limits. End-users are expected to be incentivized to purchase energy efficient products through economic savings on fuel bills. The legislation also focuses on improving the energy efficiency of homes. Buildings represent 40% the EU's total energy consumption.[5] Of the housing stock, 75% is considered energy inefficient.[6] The Energy Efficiency stream requires substantial improvements on existing housing stock, and all new-builds to be carbon-neutral by 2020. Though, this reduction in energy demand must be balanced against expected population growth in the EU and electrification of other sectors, discussed shortly. The expected impact from energy efficiency legislation is a decline in overall energy demand between 10% to 20% (Delarue et al., 2011). The second hypothesis tested is:

> ***H_2***: Environmental objectives related to the Energy Efficiency stream will negatively impact the financial return of energy utilities through reducing overall energy consumption.

The third stream, the Renewable Energies stream, focuses on increasing the penetration of renewable energy sources (RES) and setting minimum targets for electrification of other EU sectors. The Economist (2013) argues that grid priority for RES has resulted in renewable generators being able to sell energy at the expense of conventional generators. The increasing penetration of RES, whose marginal cost of electricity is effectively zero, is changing the investment landscape by depressing wholesale prices through the merit order effect. The merit order effect reduces remunerations for conventional generators and raises the cost of capital for further energy investment (see Tveten et al., 2013, Azofra et al., 2014, and Cludius et al., 2014). The issue is exacerbated as RES typically operate during peak hours, when the energy sources are available, which have historically been the most profitable hours for conventional generators.

These intraday disadvantages must be counterbalanced by the second objectives of Renewable Energies legislation: the electrification of the transport sector. By 2020, the amount of energy from RES must triple to 20%, 10% of which requires a biofuels component for transport fuel (da Graça Carvalho, 2012). Importantly, the EU estimates an eight-fold increase in electricity demand from the transport sector between 2005 and 2050, with up to 80% of private road transport being electrified by 2050.[7] If there is to be any impact from the Renewable Energies legislation, the impact will predominantly affect natural gas utilities. This impact is expected to be smaller, if not negligible, for electric- and multi-utilities, which respectively have the option of short- and long-term fuel-switching in electricity generation, and diversified business operations which mitigate regulatory risk (Söderholm, 1998, 2001, Scope, 2015). The third hypothesis tested is:

> ***H_3***: Environmental objectives related to the Renewable Energies stream will negatively impact the financial return of energy utilities, in particular hydrocarbon-intensive utilities.

5. Directive 2010/31/EU
6. European Commission (2015b)
7. European Commission (2015a)

Finally, the fourth restructuring stream relates to enhancing security of supply for oil and energy at EU-level. The first objective of the Security of Supply stream focuses on diminishing the harmful effects from difficulties in securing crude oil and petroleum products. The overall objectives are: 1) to provide authorities with powers to partially regulate oil prices in order to prevent abnormal price rises,[8] 2) establish bi-lateral emergency fuel reserves, 3) maintain sufficient oil and gas inventories to mitigate physical interruptions in supply, and 4) the strategic use of existing inventories by giving energy utility companies priority with respect to the consumption of these reserves. The stream is expected to indirectly affect energy utilities through oil prices.

A large literature shows empirical evidence of oil impacting general stock returns and the returns of oil-related industries (Faff and Brailsford, 1999, Sadorsky, 1999, 2001, El-Sharif et al., 2005, Boyer and Filion, 2007, Nandha and Faff, 2008, Oberndorfer, 2009, Arouri, 2011, Elyasiani et al., 2011, Ramos and Veiga, 2011). Investors are expected to efficiently capitalize the cash flow implications for any industry which uses oil as an input or output to operations, or where oil is related to sector valuation (Huang et al., 1996, Faff and Brailsford, 1999). For electric utilities in isolation, the impact of oil has been mixed, where insignificant (Arouri, 2011, Elyasiani et al., 2011, Koch and Bassen, 2013) and negative relationships have also been observed (Oberndorfer, 2009). Declining oil prices also negatively impact industries where oil is a major output, such as the oil & gas and mining sector (Scholtens and Yurtsever, 2012). *A priori*, based on the expected positive relationship between sector returns and oil prices, regulations which limit abnormal price rises should also negatively impact the energy sector. In particular, there should a decline in the value of natural gas utilities, which experience a 'missing money' issue when higher strategic reserves are designed to prevent abnormally high prices during periods of scarcity. Accordingly, this paper tests the following hypothesis:

> $\boldsymbol{H_4}$: Measures to safeguard the European energy supply, related to the Security of Supply stream, will negatively impact the financial return of energy utilities.

In all cases, the null hypothesis is that there is no significant impact from regulatory changes.

3. METHODOLOGY

A. The Event Study Portfolio Approach

Using financial data, we implement an event study approach to measure market response to regulatory changes related to European energy utilities. The regulatory changes represent economic events which affect the expected profitability and risk of a portfolio of energy utilities. The theory regarding the event study methodology is grounded in the efficient market hypothesis.

The event study methodology is well accepted and has been implemented at both firm- and market-level. While the event study approach is common in finance and accounting literature, its versatility has resulted in adoption in many other academic fields. A range of examples, across disciplines, include: measuring security price performance (Brown and Warner, 1980), using financial data to measure the impact of regulatory changes (Schwert, 1981), measuring the impact of innovation on patent value in the biotechnology industry (Austin, 1993), examining the impact of

8. Council Directive 73/238/EEC.

celebrity endorsement on stock prices (Agrawal and Kamakura, 1995), exploring firm sensitivity to key stages of the Japanese banking crisis of 1995–2000 (Miyajima and Yafeh, 2007), measuring the effect of piracy laws on music sales (Danaher et al., 2014), and examining the stock market's reaction to press articles regarding unburnable carbon (Griffin et al., 2015). Our paper is positioned between Schwert (1981), Agrawal and Kamakura (1995), and Griffin et al. (2015): we use financial data to measure investor's recognition of the economic impact of regulatory changes. An overview of the event study methodology and related advances are widely available in academic literature (Bowman, 1983, Brown and Warner, 1985, Boehmer et al., 1991, MacKinlay, 1997, McWilliams and Siegel, 1997, Park, 2004).

To measure the impact of regulatory change, this paper adopts an investor's perspective. As stated in Section 2.A, investors are assumed to be rational, wealth-optimizing individuals who consider all possible scenarios, regardless of probability. When information regarding an economic event is anticipated or becomes public knowledge, it is immediately impounded into stock prices; any sudden change in value implies that the market has changed its assessment of future cash flows (Schwert, 1981, Klassen and McLaughlin, 1996). The present value of a stock is

$$P_{i,t} = \sum_{k=1}^{\infty} \frac{d_{i,t+k}}{(1+r_i)^k}, \qquad (1)$$

where $P_{i,t}$ denotes the asset's current market price, $d_{i,t+k}$ denotes the current cash flow, r_i denotes the discount rate—a proxy for estimated riskiness and required rate of return, and k denotes the holding period. Changes in cash flows or discount rate affect the present value of stock. The total impact of a regulatory change can be estimated from the change in stock prices around regulatory events (Schwert, 1981; Beneish, 1991). We calculate stock returns ($R_{i,t}$) as the first-log difference in prices ($P_{i,t}$), in excess of the one-month Treasury bill rate.

We establish normal returns over an estimation window using a sector-level augmented four-factor model (AFFM). The advantage of this economic approach is the more precise measure of normal return using economic restrictions (MacKinlay, 1997). The model specification is

$$R_{i,t} = \alpha_{i,t} + b_i R_{m,t} + s_i SMB_t + h_i HML_t + m_i UMD_t + tp_i R_{tp,t} + o_i R_{o,t} + c_i R_{c,t} + g_i R_{g,t} + e_{i,t}, \qquad (2)$$

where $\alpha_{i,t}$ denotes the intercept, b_i denotes the market factor coefficient, $R_{m,t}$ denotes the excess return on the market factor, s_i denotes the SMB coefficient, SMB_t denotes the size premium, h_i denotes the HML coefficient, HML_t denotes the value premium, m_i denotes the UMD coefficient, and UMD_t denotes the momentum premium, tp_i denotes the term premium coefficient, $R_{tp,t}$ denotes the term premium, o_i denotes the oil price risk coefficient, $R_{o,t}$ denotes the return on oil price, c_i denotes the coal price risk coefficient, $R_{c,t}$ denotes the return on coal price, g_i denotes the natural gas price risk coefficient, $R_{g,t}$ denotes the return on natural gas price, and $e_{i,t}$ denotes the error term.

The standard approach to control for parameter instability over long-horizons is estimating model parameters prior to each event (Meznar et al., 1994, Agrawal and Kamakura, 1995, MacKinlay, 1997, McWilliams and Siegel, 1997). The estimation window is set to 100 days (day $t-121$ to day $t-21$, relative to event day, $t=0$) prior to each event. Standard diagnostic tests for unit roots, autocorrelation, and heteroscedasticity are included. For illustrative purposes, Table 1 presents the mean model parameters across the 54 regulatory events. Estimated values are within the range of coefficients observed in relevant literature.

Table 1: The Mean Estimated Coefficients from the Sector-level AFFM

	1st Position	2nd Position	Signature Date	Publication Date
$\bar{b}_i$	0.5975	0.5981	0.6054	0.6121
$\bar{s}_i$	−0.2934	−0.2765	−0.2913	−0.2876
$\bar{h}_i$	−0.1021	−0.1015	−0.0858	−0.0958
$\bar{m}_i$	−0.0225	−0.0336	−0.0419	−0.0498
$\overline{tp}_i$	−0.0379	−0.0670	0.1056	0.5260
$\bar{o}_i$	0.0161	0.0089	0.0100	0.0112
$\bar{c}_i$	−0.0486	−0.0331	−0.0311	−0.0382
$\bar{g}_i$	0.0054	0.0004	0.0006	−0.0003
$\bar{\alpha}_i$	0.0005	0.0008	0.0004	−0.0004
$\overline{Adj.R^2}$	0.7347	0.7243	0.7540	0.7621

Note: This table reports the mean estimated coefficients across the 54 regulatory events in Appendix B. Broadly, the results show that broad market returns are the greatest determinants of stock returns, followed by stock-market risk factors, then term premia and commodities. The mean adjusted R^2 values range between 0.7243 and 0.7621; a high goodness of fit. As these values represent mean coefficients, tests of significance are not included.

The model parameters from the AFFM during the estimation window are extrapolated to predict normal, or expected, return ($\hat{R}_{i,\tau}$) during the event window τ. Abnormal return ($AR_{i,\tau}$), with regard to event date τ, can be defined as:

$$AR_{i,\tau} = R_{i,\tau} - \hat{R}_{i,\tau} \tag{3}$$

where

$$\hat{R}_{i,\tau} = \hat{\alpha}_{i,\tau} + \hat{b}_i R_{m,\tau} + \hat{s}_i SMB_\tau + \hat{h}_i HML_\tau + \hat{m}_i UMD_\tau + \widehat{tp}_i R_{tp,\tau} + \hat{o}_i R_{o,\tau} + \hat{c}_i R_{c,\tau} + \hat{g}_i R_{g,\tau}. \tag{4}$$

The standard approach is to define the event window to be larger than the specific period of interest, examining the period surrounding the suspected event (Meznar et al., 1994, MacKinlay, 1997). The benefit of this approach is twofold. First, testing various event windows allows for some uncertainty regarding the timing of the event's impact. Anticipated and lagged responses may affect when information is impounded into stock prices. Second, the impact may be spread over a few days as information diffuses into the market. Testing a range of CAARs enables the researcher to capture the cumulative effect of an event. Overall, the objective is minimizing Type I and Type II errors. Similar to existing papers, see Meznar et al. (1994) and Agrawal and Kamakura (1995), this paper tests CAARs over eight different event windows to capture immediate and short-term impacts, denoted (T_1,T_2). To calculate CAARs, abnormal returns are aggregated across events (cross-sectionally) and through time (temporally) over the event, defined as:

$$CAAR_{i,\tau} = \sum_{\tau = T_1}^{T_2} \overline{AR}_{i,\tau}, \tag{5}$$

where $CAAR_{i,\tau}$ is the cumulative average abnormal return for portfolio i, over the event window T_1 to T_2, and $\overline{AR}_{i,\tau}$ is the average abnormal return for portfolio i across all regulatory events tested.

We independently test the null hypothesis that $CAAR_{i,\tau} = 0$ during the eight event windows, against the alternative that cumulative return is significantly different from zero. We report standard *t*-tests in line with similar event study papers, such as Klassen and McLaughlin (1996) and Griffin et al. (2015). We control for heteroscedasticity using pre-Whitened residuals.

We are motivated to use the event study methodology for various reasons. First, a measure of a regulation's economic impact can be examined using stock prices and a relatively short time period. In contrast, measuring impacts on operating profits and productivity-related measures may require months, if not years, to manifest. It would not be possible to reliably attribute the change in operational performance to a regulatory event without considerable possibility of confounding events during the interim period. Second, although it may be impossible to measure the direct impact of the regulatory change on the operating performance of the firm, we can infer the financial implications through investor's judgement of the future profit impact. Ultimately, discounted future cash flows are immediately reflected in stock returns. Therefore, measuring changes in firm value serves as an unbiased estimate of the value of the economic event (Brown and Warner, 1985).

B. Data

The dataset is a combination of daily stock market and annual accounting values. All data are extracted from Thomson Reuters Datastream. The daily stock prices and market capitalizations of the energy utilities cover the period 30 June 1995 to 28 June 2013 (4,435 daily observations).[9] Momentum premium, discussed shortly, consumes the first year of data; the empirical analysis occurs between 01 July 1996 and 28 June 2013.[10] Stock prices are measured in euros at day close and adjusted for capital actions, such as dividends, stock splits, and mergers. At stated, daily financial returns for all stocks and risk factors are calculated as the first-log difference of price. Excess returns for equities are calculated as the difference between daily returns and the daily yield on the one-month UK Treasury bill, denoted $R_{i,t}$.

The first four independent variables represent stock-market risk factors expected to affect a broad range of equities. The STOXX® 600 Europe index ($R_{m,t}$) is used as a proxy for broad market returns, representing large-, mid-, and small capitalization firms across 18 countries of the EU. The three remaining stock-market risk-factors of size (SMB_t), value (HML_t), and momentum (UMD_t) premia are calculated using the extensive portfolio method outlined by Fama and French (1993) and Carhart (1997), with annual portfolio rebalancing. The inclusion of stock market risk factors from the finance literature typically explains a greater proportion of average stock returns compared with existing asset pricing models (Fama and French, 1993). The three stock-market risk-factors are calculated using sector-level data, as opposed to broad market-level data, which improves regression fits (Moskowitz and Grinblatt, 1999, Fama and French, 2012). The specification this far represents the standard four-factor model of Fama and French (1993) and Carhart (1997).

We review the asset pricing literature to identify a further four independent variables specific to energy utilities. We augment the four-factor model to include additional term structure and commodity risk factors based on empirical evidence of their significance in explaining oil industry and energy utility returns (Sadorsky, 2001, El-Sharif et al., 2005, Oberndorfer, 2009, Koch

9. Based on Fama and French (1993), the portfolios are rebalanced annually on 01 July. This six-month lag is due to Alford et al. (1994), who find that 19.8% of U.S. firms fail to submit their 10-K reports with the SEC within 90 days of fiscal year end. Similarly, Conover et al. (2008) find the mean percentage of late reports is 24% across all European countries.

10. At the time of writing, incomplete accounting data for 2014 resulted in the time period being limited to 2013.

and Bassen, 2013). Term premium represents the risk-free short-term discount rate and is an indicator of the present state of the economy, tending to be lower during economic downturns and higher during growth (Sadorsky, 2001). Term premium controls for macroeconomic effects. Term premium ($R_{tp,t}$) is calculated as the difference between the daily yields on the three- and one-month UK Treasury bills (Harvey, 1989). Returns on the London Brent Crude Oil Index proxies for oil price risk, sourced from the Intercontinental Exchange (ICE), denoted $R_{o,t}$. Returns on a European-specific coal index, sourced from the Hamburg Institute of International Economics, proxies for coal price risk, denoted $R_{c,t}$. Returns on the one-month forward index, also sourced from the ICE, proxies for natural gas price risk, denoted $R_{g,t}$.

Griffin et al. (2015) argue that the inclusion of variables, such as crude oil price changes, can result in both Type I and Type II errors. Including too many commodities can obscure some of the energy-related impacts the paper seeks to identify, while excluding the commodities can incorrectly attribute market reactions to regulatory changes which are, in fact, commodity impacts. Oberndorfer (2009) also argues that investors may benchmark utilities' prices against seemingly related commodities, using oil as a proxy for developments in the energy market as a whole. This econometric issue may be exacerbated when faced with uncertainty regarding regulatory changes. If true, then it is possible that commodities may affect abnormal return surrounding the regulatory change. Additional robustness checks, reported in Section 4.C, will explore the influence of commodities and stock market risk factors on CAARs surrounding regulatory changes. The methodological approach is outlined in Section A of Appendix A.

Restructuring events

The regulatory changes used in analysis are listed in Appendix B. This paper constructs the most comprehensive list of regulatory changes to date. This is achieved by identify an overview[11] of EU energy utility legislation which is currently in force, produced by the Department (Directorate-General) for Energy (DG ENER), forming the initial sample of legislation. This sample is expanded by extracting summaries[12] of energy-specific legislation from the *EUROPA* website, dedicated to archiving important EU legislation. Using *EUROPA*[13] and *The Official Journal of the European Union,* the list of legislation is expanded through chain sampling to identify other important documents. As a measure of relative importance, we omit all minor revisions, repeals, or amendments, instead focusing on major regulatory changes. In total, 54 eligible regulatory changes are identified, published over 45 unique dates, between July 1996 and June 2013. The legislation covers the onset of sector restructuring. For the publication dates, nine were located on non-trading days and therefore assumed to impact on the next trading day when markets open (Meznar et al., 1994). Additional robustness checks, also reported in Section 4.C, examine the impact of confounding events. Section B of Appendix A outlines the methodological procedure for addressing confounding events. The regulatory changes are categorized into their relevant four streams. The Internal Energy Market stream contains 19 legislation, the Energy Efficiency stream contains 27 legislation, the Renewable Energies stream contains three legislation, and the Security of Supply stream contains five pieces of legislation.

11. *DG ENER*'s latest publication is available at: http://ec.europa.eu/energy/doc/energy_legislation_by_policy_areas.pdf [updated April 2014]

12. http://eur-lex.europa.eu/summary/chapter/energy.html?root_default = SUM_1_CODED = 18

13. http://eur-lex.europa.eu/

C. Sample Selection

We identify 88 eligible energy utilities for analysis. The STOXX® 600 Europe Utilities index is used to provide an initial list of 28 European utilities currently operating and traded on equity markets. All utilities whose primary revenue is derived from waste or water operations are removed from the sample as these firms may bias estimated coefficients. The sample is expanded by including companies explicitly mentioned in energy sector restructuring legislation. This includes electricity utilities identified as elected members of the European Distribution System Operators' Association (EDSO), ENTSO-E, or mentioned in annexes in the electricity-specific legislation. Moreover, utilities operating in the natural gas industry are also identified by their membership in Gas Infrastructure Europe (GIE), Gas Transmission Europe (GTE), Gas Storage Europe (GSE), Gas LNG Europe (GLE), ENTSO-G, Eurogas, and the annexes of the natural gas–specific legislation.

The newly formed sample is expanded further using Standard Industrial Classification (SIC) codes. Research Insight is used to expand the sample further by including all active and non-active energy utilities registered under the same product segments and SICs. The inclusion of non-active companies controls for survivorship bias; an improvement over Oberndorfer (2009) and Koch and Bassen (2013). Screening for duplicate entries, the sample consists of 91 European energy utility companies across both the electricity and natural gas industries. Three companies were removed from the sample due to incomplete accounting data. As mentioned in the introduction, the sample is still considerably larger than that of Oberndorfer (2009) and Koch and Bassen (2013). We create a value-weighted portfolio for the 88 European energy utilities.

Beyond examining returns for the energy sector as a whole, the 88 European energy utilities are also sorted into various value-weighted portfolios based on similarity of characteristics. We examine the returns on: two portfolios based on firm-size, three portfolios based on BE/ME, three portfolios based on momentum, and three portfolios based on industry classification.[4] In total, 12 portfolios are examined.[14] This method of industry grouping is a novel contribution to the energy economics literature and is also an improvement on Oberndorfer (2009) and Koch and Bassen (2013).

4. RESULTS

The results section of this paper is structured as follows. Section A presents the descriptive statistics of the paper. Section B presents the econometric results of the event study regarding the impact of the four distinct restructuring streams, addressing $\boldsymbol{H_1}$ to $\boldsymbol{H_4}$.

A. Descriptive Results

Table 2 presents the descriptive statistics of the data. Typically, excess returns on energy utilities are −1.31% per annum, while the market factor is 0.95% per annum. The size, value, and momentum premia report that: small utilities significantly outperform big utilities by 6.78% per annum, high BE/ME utilities outperform low BE/ME utilities by 0.43%, and upper-momentum (winner) utilities significantly outperform down-momentum (loser) utilities by 8.45% per annum.

14. For brevity, the detailed methodology of for the 12 portfolios and detailed event study results are presented in the Online Appendix.

Table 2: Descriptive Statistics Regarding the Variables

	$R_{i,t}$	$R_{m,t}$	SMB_t	HML_t	UMD_t	$R_{tp,t}$	$R_{o,t}$	$R_{c,t}$	$R_{g,t}$
N	4435	4435	4436	4436	4436	4435	4435	4435	4435
Mean Daily	−0.0051%	0.0036%	0.0252%	0.0017%	0.0312%	0.0262%	0.0383%	0.0158%	0.0424%
***t*-Mean**	(−0.30)	(0.19)	(3.06)***	(0.18)	(1.81)*	(11.10)***	(1.43)	(0.78)	(0.76)
Std. Dev. Daily	1.11%	1.26%	0.55%	0.62%	1.15%	0.16%	1.78%	1.36%	3.73%
Annualized Return	−1.31%	0.95%	6.78%	0.43%	8.45%	7.04%	10.46%	4.20%	11.66%
Min	−8.10%	−7.94%	−3.47%	−7.29%	−7.27%	−0.71%	−11.35%	−16.08%	−28.13%
Max	13.60%	9.40%	4.68%	4.29%	7.55%	0.36%	12.56%	19.78%	47.77%
Skew	0.09	−0.17	−0.29	−0.07	−0.48	−1.06	−0.27	0.80	2.57
Kurt	14.80	7.96	7.21	11.19	7.72	4.74	6.17	38.75	28.85

Note: This table presents descriptive statistics for the energy sectors and eight risk factors, including: number of daily observations (N), mean daily return, the *t*-statistic of the mean, standard deviation of mean daily return, annualised mean daily return, minimum and maximum observations, skewness, and kurtosis. The *t*-mean statistic is the ratio of the mean to its standard error. The variables include: energy utilities ($R_{i,t}$), market factor ($R_{m,t}$), size premium (SMB_t), value premium (HML_t), momentum premium (UMD_t) term premium ($R_{tp,t}$), oil price risk ($R_{o,t}$), coal price risk ($R_{c,t}$), and natural gas price risk ($R_{g,t}$).
* Significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.

Table 3: Descriptive Statistics Regarding Regulatory Changes

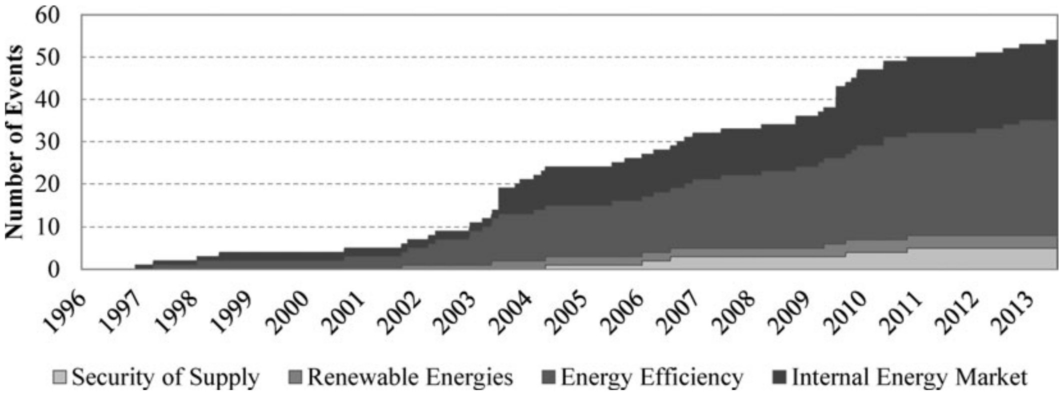
	(A) 1st Position to 2nd Position (days)	(B) 2nd Position to Signature date (days)		(C) Signature date to Publication date (days)
		Unadjusted	**Adjusted**	
Mean	58.0	37.1	25.3	22.8
Median	40.0	18.0	18.0	20.5
Standard Deviation	51.2	78.8	22.8	14.1
25th Percentile	12.0	10.0	10.0	10.5
75th Percentile	91.0	32.0	29.5	31.5
Minimum	2.0	0.0	0.0	1.0
Maximum	236.0	532.0	94.0	65.0

Note: Descriptive statistics regarding the four stages of the ordinary legislative procedure. The lag between the announcement of the 2nd position and the signature date, column (B), are biased by a single outlier (532 days). Additional adjusted statistics are presented which omit this single outlier.

All values are consistent with Fama and French (1993) and Carhart (1997). The term premium indicates an increasing spread between 3- and 1-month Treasury bills; however, both yields fell dramatically after the GFC. Oil, coal, and natural gas prices typically increased in value over the sample period.

Table 3 presents descriptive statistics regarding the key stages of ordinary legislative procedure: the 1st position, 2nd position, signature date, and publication date. On average, the number of days between the key stages range from 22.8 to 58.0 days. Column A shows that the time taken between both political institutions agreeing on a legislative proposal varied between two days to a little under a year. Column B shows that documents are typically signed one month later (25.3 days). In some cases, the proposal is agreed upon and signed on the same day, indicating that the text is already finalized. Column C shows publication typically occurs 22.8 days later, well within

Figure 2: Number of Regulatory Events Through Time



Note: This figure represents the cumulative number of regulatory events between 01 July 1996 and 28 June 2013. The signature date is chosen as it represents the date at which a legislative proposal is finalized and signed. All legislation has signature dates.

the expected two-month limit. The lag between each key stage lends some support to the ability to examine the unique impact at each stage of the legislative procedure.

Using the signature date, Figure 2 shows the cumulative number of regulatory events that occur through time, delineated by restructuring stream. For all regulatory changes, the figure shows a relatively linear relationship through time, with an unusually large amount of legislation being signed in 2003 and 2009. These two dates represent the second and third packages of liberalization; major events in the Internal Energy Market stream. The Renewable Energies and Security of Supply streams contain relatively few publications, which are sporadic and infrequent through time.

B. Main Results of the Event Study

The timing of market reaction

We first examine the timing of market reaction, across all legislation, surrounding the four key stages. We do so to ensure the four key stages capture lagged and anticipated reactions during the legislative procedure. Furthermore, we identify whether information is incorporated into prices at the early or latter stages of the legislative procedure. Tests of significance across eight event windows are presented in Table 4.

The results show distinct market reactions surrounding the four key stages of the legislative procedure. There is a significant negative market reaction in the (−10,−1) event window preceding the announcement of the 1st position, and where the majority of the reaction occurs in the narrow (−1,1) and (−2,2) event windows. There is also a significant negative market reaction in the (−20,−1) and (−10,−1) event windows preceding the announcement of the 2nd position. There is a small but significant positive market reaction on day 0 of the 2nd position, suggesting a minor correction to prices at the announcement. This is consistent with a stock rebound following an overreaction in the lead up to the announcement or, alternatively, selling stocks prior to the announcement in an effort to de-risk and then re-risking once the full impact of the announcement is known. Table 4 shows that the latter stages of the legislative procedure, the signature and publication dates, are mostly ceremonial and have no significance at sector-level. Online Appendix A, Tables

Table 4: CAARs for Windows Surrounding Event Days

Event Window	1st Position Announcement	2nd Position Announcement	Signature Date	Publication Date
(−20,20)	−1.27%	−1.32%	−0.47%	0.09%
(−20,−1)	−0.72%	−1.08%*	−0.74%	0.25%
(−10,−1)	−0.66%*	−0.62%**	−0.23%	−0.04%
(0,0)	−0.08%	0.14%*	0.05%	−0.02%
(−1,1)	−0.41%*	0.13%	0.08%	−0.14%
(−2,2)	−0.48%*	−0.24%	0.08%	0.08%
(1,10)	−0.48%	−0.91%	−0.10%	0.06%
(1,20)	−0.47%	−0.39%	0.22%	−0.13%

Note: This table presents the CAARs for various event windows surrounding the event day for the four key stages of the legislative procedure: announcement of the 1st position, announcement of the 2nd position, signature date and publication date. A *t*-test identifies whether the reported CAAR is statistically different from zero.
* Significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.

A.1 to A.4 and Figures A.1 to A.4, show these results are generally consistent across various portfolios of energy utilities.

Rationally, the results are congruent with our expectations. The announcement of the 1st position often occurs after lengthy consultations and informal trilogues.[15] The first announcement to accept or amend a proposal is a strong indicator that it is likely to pass into law. Investors will be aware that a policy is in gestation, as was evident from their reaction to the 1st position. The announcement of the 2nd position represents the point at which the two political institutions vote to adopt a reasonably finalized version of the legislative proposal, the document is no longer subject to change, and the policy will become law. Around 72% of legislative proposals were agreed upon in the first reading by Parliament and Council, while 23% were agreed upon in the second reading (European Parliament et al., 2007, European Commission, 2009). The signature and publication stages contain no new informational content. Overall, these results show that the majority of the market reaction occurs in the early stages of the legislative procedure.

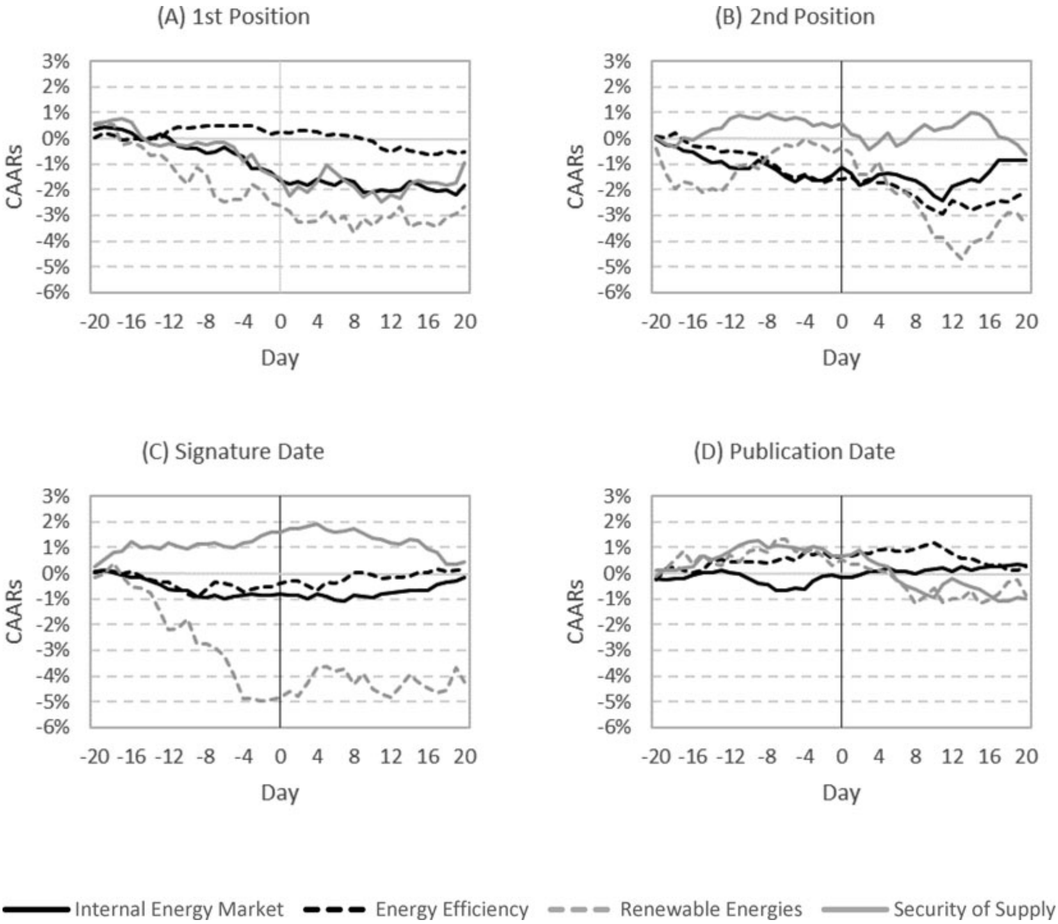
The market's response to the four regulatory streams

This section addresses the main contribution of the paper, examining the impact of the four regulatory streams, namely the: Internal Energy Market, Energy Efficiency, Renewable Energies, and Security of Supply streams. In doing so, we address hypotheses $\boldsymbol{H_1}$ to $\boldsymbol{H_4}$. Plots A to D of Figure 3 illustrate the CAARs of the four restructuring streams, surrounding the four key stages of the ordinary legislative procedure. Table 5 presents the tests of significance in the eight event windows, delineated by the four restructuring streams and the four key stages. The online appendices contain supplementary results regarding the heterogeneous impact of the restructuring events on 12 portfolios of energy utilities. The following paragraphs address each hypothesis of the paper.

For the Internal Energy Market stream, the majority of the market reaction occurs in the weeks prior to the 1st position, with a small rebound on the announcement of the 2nd position. Plot

15. Trilogues represent three way communications between the Commission, the Council, and the Parliament to facilitate an early agreement on a legislative proposal (European Parliament et al., 2007).

Figure 3: CAARs for the Four Restructuring Streams



Note: Delineating the CAARs into the four distinct restructuring streams, this figure presents the CAARs for the energy utility sector surrounding the four key stages of the ordinary legislative procedure. The CAARs are plot relative to day zero for the announcement of the 1st position (Plot A), announcement of the 2nd position (Plot B), signature date (Plot C) and the publication date (Plot D). Table 5 reports tests of significance.

A of Figure 3 and Table 5 show negative and significant CAARs in the weeks preceding the announcement of the 1st position. In the $(-20,-1)$ and $(-10,-1)$ event windows preceding the 1st position, CAARs are respectively -1.32% and -1.04%, with corresponding significance of $p \leq 0.1$ and $p \leq 0.05$. There is also a negative market reaction on event day 0 and the narrow $(-1,1)$ event window, with CAARs of -0.32% and -0.62%, both significant at $p \leq 0.05$. For the announcement of the 2nd position, Plot B of Figure 3 and Table 5 show a rebound in prices on day 0. The market has a positive reaction of 0.32% ($p \leq 0.05$). There is no significant reaction for any other event window surrounding the 2nd position, the signature date, or publication date. Overall, the results reject the null of $\boldsymbol{H_1}$: the Internal Energy Market stream has a significant and negative impact on the financial returns of European energy utilities. Online Appendix B, Table B.1, shows that the reaction surrounding the 1st position is consistent across most portfolios. Table B.2 shows the rebound is typically present in big and electric utility portfolios.

From a policy perspective, the results are expected. As noted, the Internal Energy Market stream has three overarching objectives: 1) to open national borders, allowing access to previously

Table 5: CAARs Significance Tests for the Four Restructuring Streams

		CAARs Surrounding the Signature Date Event Windows and Significance Test							
Stream	**Key Stage**	**(−20,20)**	**(−20,−1)**	**(−10,−1)**	**(0,0)**	**(−1,1)**	**(−2,2)**	**(1,10)**	**(1,20)**
Internal Energy Market	**1st Position**	−1.85%	−1.32%*	−1.04%**	−0.32%**	−0.62%**	−0.53%	−0.47%	−0.21%
	2nd Position	−0.83%	−1.46%	−0.27%	0.32%**	0.28%	−0.15%	−1.12%	0.31%
	Signature Date	0.16%	−0.51%	0.08%	0.11%	0.23%	0.30%	0.31%	0.56%
	Publication Date	0.24%	0.58%	0.15%	0.09%	−0.19%	0.04%	0.50%	−0.43%
Energy Efficiency	**1st Position**	−0.52%	0.18%	−0.28%	0.08%	−0.15%	−0.19%	−0.39%	−0.77%
	2nd Position	−2.13%	−1.60%**	−1.07%**	0.01%	0.25%	−0.19%	−1.22%	−0.54%
	Signature Date	−0.18%	−0.86%	−0.18%	0.03%	−0.03%	−0.05%	−0.12%	0.65%
	Publication Date	0.29%	−0.06%	−0.04%	−0.10%	−0.07%	0.24%	0.31%	0.45%
Renewable Energies	**1st Position**	−2.65%	−2.50%	−1.08%	−0.13%	−0.82%	−1.49%	−0.75%	−0.01%
	2nd Position	−3.35%	−0.59%	0.51%	0.22%	−0.30%	−1.19%	−3.48%	−2.98%
	Signature Date	−4.23%	−4.90%	−2.77%	0.07%	0.38%	0.13%	0.34%	0.60%
	Publication Date	−0.85%	0.31%	−0.14%	0.20%	−0.30%	−0.61%	−1.08%	−1.37%
Security of Supply	**1st Position**	−0.97%	−1.41%	−1.16%	−0.12%	−1.02%	−1.28%**	−0.52%	0.56%
	2nd Position	−0.64%	0.44%	−0.46%	0.11%	−0.41%*	−0.42%	−0.24%	−1.20%
	Signature Date	0.42%	1.59%*	0.54%	0.02%	0.29%	0.50%	−0.26%	−1.19%
	Publication Date	−0.99%	0.69%	−0.38%	−0.04%	−0.26%	−0.14%	−1.60%**	−1.64%**

Note: Delineated by restructuring stream, this table presents the CAARs for various event windows surrounding the event day for the four key stages of the legislative procedure: announcement of the 1st position, announcement of the 2nd position, signature date and publication date. A *t*-test identifies whether the reported CAAR is statistically different from zero.
* Significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.

isolated markets; 2) to legally unbundle vertically integrated utilities, both operationally and in terms of ownership; and 3) to induce competition into the energy sector, addressing market dominance issues. Overall, the stream is expected to have major impacts on future cash flows, particularly for large, incumbent utilities which lose access to transmission networks and are forced to compete for grid access. As a result, large utilities have an increased risk of asset stranding due to underutilized base load capacities and the inability to scale back operations—which can be costly. The stream is expected to be the most anticipated since it results in large changes in the regulatory and operating environment of the energy sector. Informal discussions regarding a possible 'fourth package' for the Internal Energy Market have already begun, despite no legislative proposal existing to date and unlikely to be tabled for some time yet—potentially years away (FSR Energy, 2015). The discussion outlines potential directions for the fourth package of liberalization, including the types of utilities which are likely to be affected, showing anticipation by interested parties.

Addressing H_2 and the Energy Efficiency stream, the results show no market reaction surrounding the 1st position but a large CAARs in the weeks preceding the announcement of the 2nd position. For the 2nd position, the $(-20,-1)$ and $(-10,-1)$ event windows have respective CAARs of -1.60% and -1.07%, both significant at $p \leq 0.05$. No other event windows were statistically significant across all four key stages. Online Appendix C, Table C.1, shows the reaction preceding the 2nd position occurs in most energy portfolios. The market reactions were among the greatest observed and also the most statistically significant for the energy sector as a whole. This is hardly surprising, as the stream represents over half of all legislation tested: 27 in total (see Appendix B). The lack of market reaction surrounding the 1st position may be due to the informational content of the Energy Efficiency legislation. Whereas the Internal Energy Market legislation require substantial negotiations and lengthy legal-linguistic finalization between political institutions, including definitions of which utilities may be impacted, the content of the Energy Efficiency legislation is fundamentally numerical. From the onset, the proposal identifies an energy-related issue for an appliance or building and sets targets for reduced energy consumption, producing a narrow, well-defined impact. Further, the legislation reduces energy demand from the user end, which affects all energy utilities simultaneously. The numerical targets for reducing overall energy consumption are akin to the hard information described by Demers and Vega (2008) and Engelberg (2008). The quantitative nature of the legislation means investors are less prone to the investment mistakes suggested by Kumar (2009). There is less policy uncertainty regarding the Energy Efficiency stream, and thus the 2nd position, where the proposal becomes law, is the most anticipated date. Overall, the results show support for H_2: the Energy Efficiency stream negatively impacts the financial returns of European energy utilities.

For H_3 and the Renewable Energies stream, the results report large CAARs across event windows but none were statistically significant at sector-level. Online Appendix D, Tables D.1 to D.4, show that the results are highly dependent on the characteristics of the utility examined. Table D.1 shows that the natural gas utilities experience negative CAARs of -5.36% ($p \leq 0.05$) in the narrow $(-2,2)$ event window, and -6.25% ($p \leq 0.1$) in the (1,10) event window following the 1st position. Natural gas utilities have a relatively small rebound at later stages of the legislative procedure (see Tables D.3 and D.4). The Renewable Energies stream was expected to have a negative impact on the natural gas sector, which potentially loses revenue through reduced reliance on hydrocarbons and the electrification of the transport sector. Table D.2 shows electric utilities experience negative CAARs of -2.11% ($p \leq 0.05$) in the $(-20,1)$ event window preceding the 2nd position, but experience a stock rebound on day 0 with CAARs of 0.44% ($p \leq 0.1$). Interestingly, Table D.3 shows multi-utilities experience positive impacts surrounding the signature date, with

CAARs up to 1.72% ($p \leq 0.05$) in the (-2,2) event window. Multi-utilities have economy of scope, where diverse business operations are less likely to be exposed to the negative regulatory and operational risks of single utilities. Multi-utilities can switch operations between the electric and natural gas industries.

Contrary to The Economist's (2013) claims, the Renewable Energy legislation has had little impact on the sector as a whole, but in fact has specific impacts based on firm characteristics. In their defense, the article in The Economist (2013) mostly considers the impact of renewables on a selection of large, combination-fuel generators,[16] which also have large stakes in the natural gas industry or use emission-intensive fuels such as coal. Such carbon-intensive utilities are at risk of having assets stranded as a result of increased penetration of renewable energies and the policies that support them. Some large utilities have begun to acknowledge the declining role of hydrocarbons in energy generation and are either adapting operations to accommodate or beginning to hive-off operations. For example, Drax has begun making considerable efforts to move away from coal-based generation to a predominantly biomass-fueled generation (Drax Group plc, 2015). Therefore, we cannot reject the null of $\boldsymbol{H_3}$ at sector-level, but there is some support for hydrocarbon-intensive utilities, which experience negative and significant CAARs due to Renewable Energies legislation.

The final hypothesis focuses on the Security of Supply stream, which is expected to indirectly affect utilities through oil prices. Prior empirical evidence shows either no relationship or a negative relationship between energy utilities and oil returns. Our results find a variety of market reactions to the Security of Supply legislation. Table 5 reports negative CAARs of -1.28% ($p \leq 0.05$) in the narrow (-2,2) event window surrounding the announcement of the 1st position. Negative CAARs of -0.41% ($p \leq 0.1$) are also present in the narrow (-1,1) event window surrounding the announcement of the 2nd position. There is some market reaction preceding the signature date for the energy sector, with CAARs of 1.59% ($p \leq 0.1$). While, negative CAARs of -1.60% and -1.64%, both significant at $p \leq 0.05$ are observed in the weeks following publication. Online Appendix E, Table E.4, shows similar results; most energy portfolios show a lagged reaction to the Security of Supply stream. Addressing $\boldsymbol{H_4}$, the overall results show that the Security of Supply stream mostly provokes a negative market reaction, but the impact is less clear compared with the other streams. The Security of Supply stream is the only restructuring stream to find significant CAARs, at sector-level, surrounding the signature and publication dates. Moreover, it is the only stream that produces significant positive CAARs in any event window at sector-level. The results suggest that the Security of Supply stream is difficult to process and the impact is not fully known by the market; this is expected, as the legislation indirectly affects utilities through oil prices.

C. Robustness Tests

Excluding confounding events

Contemporaneous regulatory changes have the potential for contaminating estimates of CAARs. Appendix B shows that confounding events include overlaps between some Internal Energy Market legislation and those from both the Energy Efficiency and Security of Supply streams. This section examines the impact of contemporaneous regulatory changes on estimates of CAARs and associated significance tests.

We repeat the event study, omitting the confounding events.[17] The results show little change in estimates of CAARs and associated significance. Across all significance tests, the results are

16. E.ON, RWE, Drax, GDF Suez, and EnBW

17. For brevity, the results are not reported. Results are available upon request.

qualitatively the same as those obtained in Section 4.B and Table 5. While still consistent with previously observed results, five test statistics produced marginally different magnitudes of significance. Only two test statistics produced inconsistent results; discussed below.

The first inconsistent result relates to a series of Internal Energy Market and Energy Efficiency legislation. The confounding events include the 2nd position, signature date, and publication dates of events 15 to 19 (Appendix B). These events include the second packages of liberalization, legislation regarding trans-national exchanges in energy, and developing an energy efficiency program for Europe. From a policy perspective, this paper expects the Internal Energy Market legislation to be the most anticipated of the two competing streams due to its high policy impact. The results are congruent with expectations. When deleting the events, the Energy Efficiency results are qualitatively unaffected. However, deleting the events resulted in a change in significance for the Internal Energy Market: the (0,0) event window surrounding the publication date becomes significant at $p \leq 0.1$. Beyond these minor impacts, the results are generally consistent with those outlined previously.

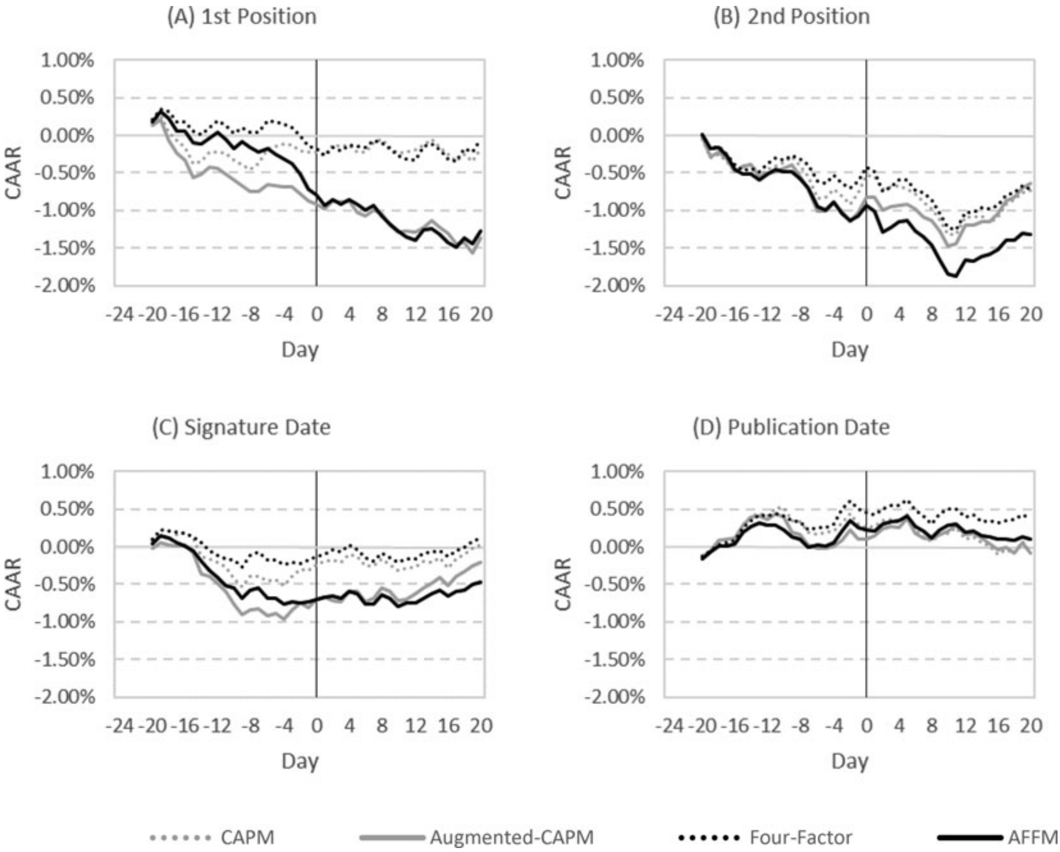
The second inconsistent result relates to confounding events between the Internal Energy Market and the Security of Supply Stream. Appendix B shows an overlap in the 1st positions of events 40 to 44. The events include the third packages of liberalization for the Internal Energy Market stream. Again, the Internal Energy Market stream is expected to have greater policy importance. When omitting the confounding event, the Internal Energy Market stream loses significance in the $(-1,1)$ event window surrounding the 1st position. Overall, the impact is minor as event day 0 and the weeks preceding the announcement of the 1st position remain significant. The omission had a minor impact on the Security of Supply results, but did not produced inconsistent results. The results were expected as the third package of liberalization is a major regulatory reform which is expected to have a large impact on competition in the energy sector. The overall conclusion is that the legislation is weighted towards affecting the Internal Energy Market stream and had little impact on the Security of Supply stream (which was insignificant regardless).

Comparison of alternative models to the AFFM

As argued by Griffin et al. (2015), the number of control variables can influence the likelihood of Type I or Type II errors occurring. This section compares results from the AFFM specification against three alternative model specifications: the CAPM, augmented-CAPM, and four-factor model. Alternative model specifications can be found in Section B of Appendix A, Equations (A.1) to (A.3). The purpose is to examine the influence of commodities and/or stock market risk factors on the CAARs surrounding the four key stages of the ordinary legislative procedure.

The CAARs surrounding the key stages are presented in Figure 4. The first observation regarding the results, across all key stages, is that the four model specifications produce two distinct CAAR patterns. The CAPM and four-factor models produce similar CAARs to one another, while the augmented-CAPM and AFFM also produce similar CAARs. This leads to the conclusion that major differences in abnormal returns are influenced by the inclusion or exclusion of term premium and commodity risk factors. Plot A shows that the models which control for commodities, the augmented-CAPM and AFFM, produce negative CAARs of greater magnitude surrounding the 1st position. Further, the stock market risk factors influence CAARs in the weeks prior to the announcement. Across the event window, the CAARs between the CAPM and augmented-CAPM differ by -1.19%, while the four-factor and AFFM differ by -1.21%. In both cases, term premium and commodity risk factors explain the difference in CAARs. This is consistent with Oberndorfer

Figure 4: Comparison of Event Study using various Asset Pricing Models



Note: The figure shows the CAARs extracted from the event study approach for the energy sector portfolio, using four different asset pricing specifications: the CAPM, augmented-CAPM, sector-level four-factor model, and the sector-level AFFM. Specifications which include term premium and commodities are represented with a solid line, while specifications which omit term premium and commodities are represented with a dotted line. Grey lines represent the CAPM specification and the augmented extension, while the black lines represent the sector-level four-factor specification and the augmented extension.

(2009): investors benchmark utilities against commodities. Investors are processing the likely impact of the potential regulatory change and seek risk factors which help determine expected returns. Commodities appear to 'support' energy utility stock prices in times of uncertainty.

Regarding the 2nd position (Plot B), the impact of stock market risk factors and commodities is less pronounced. Overall, the four asset pricing models produce similar results. The CAPM and four-factor models are near identical through time, whereas the augmented-CAPM and AFFM begin to differentiate after the announcement of the 2nd position. Overall, the spread in CAARs from the four specifications is lower, with the greatest difference in CAARs is −0.68%. By the 2nd position, the market has process the informational content of the regulatory change, reducing pricing errors and reducing the role of commodities in stock valuation.

Surrounding the signature date (Plot C), there is some minor decoupling between stock-market and commodity risk premia. This occurs during the legal-linguistic stage, where informational content and legal definitions are determined. Again, there is the potential for uncertainty regarding the finalization of the legislative text during this event window. In the weeks preceding the signature date, there is some minor impact from stock market factors and commodities. However, the greatest deviation between the four model specifications is less than 0.75%, and the CAARs remain relatively stable after the signature date.

The publication date (Plot D) is expected to have little to no impact on CAARs, as all the informational content regarding the regulatory change should already be impounded into stock prices. As expected, all four model specifications produce similar CAARs which fluctuate close to zero, showing that stock market and commodity risk factors are relatively unimportant at this stage.

Overall, the robustness tests above show support for Griffin et al. (2015), namely that the control variables can increase the likelihood of Type I and II errors. However, the majority of this impact occurs surrounding the 1st position and, to a lesser extent, the signature date. As the AFFM often produces the greatest adjusted R^2, we are inclined to conclude that the model is the most accurate at forecasting normal returns and thus isolating abnormal returns. To isolate the impact of the regulatory changes on a firm, the commodities must be controlled for during the event study procedure. As demonstrated above, a failure to control for commodities will often result in false negative results.

5. CONCLUSIONS AND POLICY IMPLICATIONS

The European energy utility sector has been subjected to a myriad of regulatory changes which have materially affected performance. This paper examined the market's response to four distinct restructuring streams: Internal Energy Market, Energy Efficiency, Renewable Energies and Security of Supply. We tested four hypotheses regarding the impact of each stream; all four hypotheses predicted a negative market reaction. We identified four key stages of the ordinary legislative procedure where the market was expected to react to the informational content of the legislation. For each stage, we examined market reaction using an event study methodology and an augmented four-factor asset pricing model. The model controlled for sector-level stock-market risk factors (the market factor, size premium, value premium, and momentum premium), term premium and commodities (oil, coal and natural gas). We examined market response at energy-sector level and across 12 distinct energy portfolios grouped on similarity of characteristics. Broadly, the results found support for the negative impact of the Internal Energy Market and Energy Efficiency streams. The null could not be rejected for the Renewable Energies, while the Security of Supply stream suggested large uncertainty in asset pricing.

Regarding the first hypothesis, the results showed a significant and negative market reaction to the Internal Energy Market stream—designed to liberalize the energy sector. We observed negative CAARs up to -1.32% in the weeks preceding the 1st position. The announcement sent a strong signal to the market that the proposal, trilogues, and lengthy consultations were near finalization, and the finalized text was agreeable between the two voting political institutions (the Parliament and the Council). At the 2nd position, when the legislation became law, there was small but significant rebound in prices on day 0, consistent with a stock rebound following an overreaction or re-risking. There was no significant reaction during later stages of the legislative procedure, suggesting investors had already incorporated the informational content into asset prices. This stream fundamentally changed the regulatory and operating environment of utilities, and was therefore the most likely to be anticipated.

For the second hypothesis, the results showed a significant and negative market reaction to the Energy Efficiency stream. The stream focused on reducing energy demand by lowering the energy consumption of appliances and buildings at the user-end of the supply chain. We observed a strong negative market reaction in the weeks preceding the 2nd position, with CAARs up to −1.60%. Results were congruent with expectations: declining energy consumption decreased potential future remunerations to utilities. Furthermore, we argued that the quantitative nature of the legislation meant investors were less prone to the investment mistakes and thus the point at which the proposal became law, the 2nd position, was the most anticipated date.

The third hypothesis predicted a negative market reaction to the Renewable Energies stream, designed to decrease reliance on hydrocarbons and electrify other sectors. Contrary to press commentators, we found that the Renewable Energies stream had no significant impact on the energy sector as a whole. Further analysis showed a large negative market reaction for natural gas utilities, with CAARs up to −6.25% surrounding the 1st position. This impact for natural gas utilities was likely due to their undiversified operations and limited options to adapt to regulation. By way of contrast, prior literature argued that fuel-switching is a viable option for the electricity sector (see Söderholm, 1998; 2001). We also observed some positive CAARs for multi-utilities, which were able to adapt operations. We could not reject the null of $\boldsymbol{H_3}$ at sector-level.

Finally, the fourth hypothesis predicted a negative market reaction to the Security of Supply stream, which focused on diminishing the harmful effects of securing oil and petroleum (including by-products) within Europe. The Security of Supply stream mostly found a negative market reaction, but found significance in the latter stages of the legislative procedure—including positive market reactions. The results indicated that the Security of Supply stream was difficult to process and the impact was not fully known by the market. This was expected as the legislation indirectly affected utilities through oil prices. It's inclusion in analysis was still relevant, as the EU archives recognized the stream as important and the legislation still produced significant CAARs.

Overall, our results contribute to the literature by demonstrating that the press is subject to focalism; our results show a variety of restructuring streams impact energy sector returns. Moreover, the financial press erroneously extrapolate the impact of regulation on the gas majors to the entire energy sector. Superficially, this bias can be justified to some extent as the gas majors typically represent some of the largest energy utilities in the EU; therefore, any impact to their valuation can also influence total sector valuation. However, as one utility falls out of favor, another will take its place. Rather than solely focusing on the myopic impacts of regulation today, the questions regarding the regulation of the sector should be framed in the context of designing the energy system of the future—namely, which utilities have the potential to grow and fulfil the EU's future energy demand?

Placing this research in a broader context, it is noteworthy that the European utilities sector has been subject to wide spread criticism in the popular media because it is perceived that it has been profiteering at the expense of end consumers. The evidence presented in this paper shows that their risk-return trade-off has fundamentally changed as a result of sector liberalization and environmental policies. Our results show that utilities now face a range of policy induced challenges that are materially affecting their financial return. However, it is not only renewable energy policies which affect financial return, but also liberalization, energy efficiency, and security of supply policies too. Thus, this paper highlights a tension between policy objectives, in particular liberalization and environmental objectives. Sector restructuring is resulting in investors demanding greater returns for risk borne, increasing cost of capital and negatively impacting the capital-raining ability of utilities. Concurrently, utilities are being required to make major investments, measured in the trillions, to 'green' their energy supply and enhance security of supply (IEA, 2014).

The point is not to abandon liberalization or even environmental objectives, nor is it to recommend an overhaul of the legislative procedure, but it is important to acknowledge that tension exists between different pieces of legislation and within the legislation procedure. EU institutions should bear in mind that the policy mix utilities are being exposed to is making it harder to achieve decarbonization and security investment goals. There are potentially many ways Brussels can help, ranging from providing a stable regulatory environment to ensuring governments are co-investors or underwriters of projects. This paper does not recommend any one particular solution; rather, the aim is to highlight that Brussels needs to ensure its policies are consistent across different policy goals. Our evidence suggests this is not the case currently.

APPENDIX A. EVENT STUDY ROBUSTNESS CHECKS

A. The Impact of Commodities on CAARs

Griffin et al. (2015) argue that the inclusion of additional variables can mask or reinforce the impact of a regulatory change. We compare the CAARs obtained using Equation (2) against three alternative model specifications, including: the CAPM, the augmented-CAPM, and the four-factor model. The following paragraphs outline the model specifications. The standard CAPM, where broad market returns are expected to explain stock returns, is specified as:

$$R_{i,t} = \alpha_{i,t} + b_i R_{m,t} + e_{i,t} \quad \text{(A.1)}$$

The augmented-CAPM is primarily extracted from the energy economics literature (Oberndorfer, 2009; Koch and Bassen, 2013). We also include risk factors from the oil & gas literature (Sadorsky, 2001; Elyasiani et al., 2011). The augmented-CAPM is specified as:

$$R_{i,t} = \alpha_{i,t} + b_i R_{m,t} + tp_i R_{tp,t} + o_i R_{o,t} + c_i R_{c,t} + g_i R_{g,t} + e_{i,t}, \quad \text{(A.2)}$$

where ($R_{i,t}$) denotes the excess stock returns, $\alpha_{i,t}$ denotes the intercept, b_i denotes the market factor coefficient, $R_{m,t}$ denotes the excess return on the market factor, tp_i denotes the term premium coefficient, $R_{tp,t}$ denotes the term premium, o_i denotes the oil price risk coefficient, $R_{o,t}$ denotes the return on oil price, c_i denotes the coal price risk coefficient, $R_{c,t}$ denotes the return on coal price, g_i denotes the natural gas price risk coefficient, $R_{g,t}$ denotes the return on natural gas price and $e_{i,t}$ denotes the error term.

Finally, we implement the four-factor model of Fama and French (1993) and Carhart (1997). The four-factor model is specified as:

$$R_{i,t} = \alpha_{i,t} + b_i R_{m,t} + s_i SMB_t + h_i HML_t + m_i UMD_t + e_{i,t} \quad \text{(A.3)}$$

where $\alpha_{i,t}$ denotes the intercept, b_i denotes the market factor coefficient, $R_{m,t}$ denotes the excess return on the market factor, s_i denotes the SMB coefficient, SMB_t denotes the size premium, h_i denotes the HML coefficient, HML_t denotes the value premium, m_i denotes the UMD coefficient, UMD_t denotes the momentum premium, and $e_{i,t}$ denotes the error term.

B. Confounding Events

Failing to control for confounding events can affect the validity of the empirical results and calls into question the true impact of each regulation on stock prices (McWilliams and Siegel, 1997, Konchitchki and O'Leary, 2011). This paper adopts two of Foster's (1980) solutions to address confounding events. First, the analysis will continue assuming the confounding event has little to no impact. The argument for this approach is that each event is centered on day 0, creating a portfolio of abnormal returns which are averaged across all events; therefore, the net effect of the single confounding event will be minimal (Foster, 1980). Further, the confounding events include overlaps between the second and third packages of liberalization (Internal Energy Market stream) and other streams; both are expected to have high policy impact. The second approach is to delete an 'appropriate' time surrounding the confounding event, examining to what extent the significance tests change when excluding the contemporaneous observations. This latter control has been adopted, or recommended, by Dyckman and Smith (1979), Meznar et al. (1994), McWilliams and Siegel (1997) and Konchitchki and O'Leary (2011).

APPENDIX B. RESTRUCTURING LEGISLATION FOR THE EUROPEAN ENERGY UTILITY SECTOR

Legislation Title	Reference	Restructuring Stream	1st Position (Adopt/Amend)	2nd Position (Adopt)	Signature Date	Publication Date
1. Common rules for the internal market in electricity	Directive 96/92/EC	Internal Energy Market	11 Dec 1996	19 Dec 1996	19 Dec 1996	30 Jan 1997
2. Energy labelling of household dishwashers	Commission Directive 97/17/EC	Energy Efficiency			16 Apr 1997	7 May 1997
3. Energy labelling of household lamps	Commission Directive 98/11/EC	Energy Efficiency			27 Jan 1998	10 Mar 1998
4. Common rules for the internal market in natural gas	Directive 98/30/EC	Internal Energy Market	30 Apr 1998	11 May 1998	22 Jun 1998	21 Jul 1998
5. Energy efficiency requirements for ballasts for fluorescent lighting	Directive 2000/55/EC	Energy Efficiency	30 May 2000	5 Jul 2000	18 Sep 2000	1 Nov 2000
6. Renewable energy: the promotion of electricity from renewable energy sources	Directive 2001/77/EC	Renewable Energies	4 Jul 2001	7 Sep 2001	27 Sep 2001	27 Oct 2001
7. Community energy efficiency labelling programme for office equipment	Regulation (EC) No 2422/2001	Energy Efficiency	30 May 2001	3 Oct 2001	6 Nov 2001	15 Dec 2001
8. Energy labelling of household air-conditioners	Commission Directive 2002/31/EC	Energy Efficiency			22 Mar 2002	3 Apr 2002
9. Energy labelling of household electric ovens	Commission Directive 2002/40/EC	Energy Efficiency			8 May 2002	15 May 2002
10. Energy performance of buildings	Directive 2002/91/EC	Energy Efficiency	10 Oct 2002	25 Nov 2002	16 Dec 2002	4 Jan 2003
11. Statute for executive agencies to be entrusted with certain tasks in the management of Community programmes	Council Regulation (EC) No 58/2003	Energy Efficiency		5 Jul 2001	19 Dec 2002	16 Jan 2003
12. Establishing the European Community Energy Star Board	Commission Decision 2003/168/EC	Energy Efficiency			11 Mar 2003	12 Mar 2003
13. Promotion of the use of biofuels or other renewable fuels for transport	Directive 2003/30/EC	Renewable Energies	12 Mar 2003	8 Apr 2003	8 May 2003	17 May 2003
14. Rules of procedure of the European Community Energy Star Board	Commission Decision 2003/367/EC	Energy Efficiency			15 May 2003	21 May 2003
15. Cross-border exchanges in electricity	Regulations (EC) No 1228/2003	Internal Energy Market	4 Jun 2003	16 Jun 2003	26 Jun 2003	15 Jul 2003
16. “Intelligent Energy for Europe” programme (2003-2006)	Decision No 1230/2003/EC	Energy Efficiency	13 May 2003	16 Jun 2003	26 Jun 2003	15 Jul 2003
17. Internal market for energy (until March 2011)	Directive 2003/54/EC	Internal Energy Market	4 Jun 2003	16 Jun 2003	26 Jun 2003	15 Jul 2003
18. Internal market for natural gas	Directive 2003/55/EC	Internal Energy Market	4 Jun 2003	16 Jun 2003	26 Jun 2003	15 Jul 2003
19. Trans-European energy networks	Decision No 1229/2003/EC	Internal Energy Market	4 Jun 2003	16 Jun 2003	26 Jun 2003	15 Jul 2003
20. Greenhouse gas emission allowance trading scheme	Directive 2003/87/EC	Internal Energy Market	2 Jul 2003	22 Jul 2003	13 Oct 2003	25 Oct 2003
21. European Regulators Group for Electricity and Gas	Commission Decision 2003/796/EC	Internal Energy Market			11 Nov 2003	14 Nov 2003
22. Cogeneration based on a useful heat demand in the internal energy market	Directive 2004/8/EC	Energy Efficiency	18 Dec 2003	26 Jan 2004	11 Feb 2004	21 Feb 2004
23. Rules applicable to procurement by entities operating in the water, energy, transport and postal services sectors until 2016	Directive 2004/17/EC	Internal Energy Market	29 Jan 2004	3 Feb 2004	31 Mar 2004	30 Apr 2004
24. Security of supply of natural gas	Council Directive 2004/67/EC	Security of Supply		20 Apr 2004	26 Apr 2004	29 Apr 2004
25. Ecodesign requirements for energy-using products	Directive 2005/32/EC	Energy Efficiency	13 Apr 2005	23 May 2005	6 Jul 2005	22 Jul 2005
26. Conditions for access to the gas transmission networks	Regulation (EC) No 1775/2005	Internal Energy Market	8 Mar 2005	12 Jul 2005	28 Sep 2005	3 Nov 2005
27. Security of supply of electricity	Directive 2005/89/EC	Security of Supply	5 Jul 2005	1 Dec 2005	18 Jan 2006	4 Feb 2006
28. Energy end-use efficiency and energy services	Directive 2006/32/EC	Energy Efficiency	13 Dec 2005	14 Mar 2006	5 Apr 2006	27 Apr 2006
29. Strategic Oil Stocks	Council Directive 2006/67/EC	Security of Supply			24 Jul 2006	8 Aug 2006
30. Trans-European energy networks	Decision No 1364/2006/EC	Internal Energy Market	4 Apr 2006	24 Jul 2006	6 Sep 2006	22 Sep 2006
31. Competitiveness and Innovation Framework Programme (CIP) (2007-2013)	Decision 1639/2006/EC	Energy Efficiency	1 Jun 2006	12 Oct 2006	24 Oct 2006	9 Nov 2006

(continued)

Legislation Title	Reference	Restructuring Stream	1st Position (Adopt/Amend)	2nd Position (Adopt)	Signature Date	Publication Date
32. Energy efficiency of office equipment: The Energy Star Programme (EU-US)	Council Decision 2006/1005/EC	Energy Efficiency			18 Dec 2006	28 Dec 2006
33. Rules for the granting of Community financial aid in the field of the trans-European transport and energy networks	Regulation (EC) No 680/2007	Energy Efficiency	22 Mar 2007	23 May 2007	20 Jun 2007	22 Jun 2007
34. Framework for the setting of ecodesign requirements for energy-using products	Directive 2008/28/EC	Energy Efficiency	11 Jul 2007	3 Mar 2008	11 Mar 2008	20 Mar 2008
35. Transparency of gas and electricity prices	Directive 2008/92/EC	Internal Energy Market	17 Jun 2008	25 Sep 2008	22 Oct 2008	7 Nov 2008
36. Adapting a number of instruments subject to the procedure laid down in Article 251 of the Treaty to Council Decision 1999/468/EC, with regard to the regulatory procedure with scrutiny	Regulation (EC) No 1137/2008	Energy Efficiency	18 Jun 2008	25 Sep 2008	22 Oct 2008	21 Nov 2008
37. Ecodesign requirements for fluorescent lamps, for high intensity discharge lamps, and for their ballasts	Commission Regulation (EC) No 245/2009	Energy Efficiency			18 Mar 2009	24 Mar 2009
38. Promotion of the use of energy from renewable sources	Directive 2009/28/EC	Renewable Energies	17 Dec 2008	6 Apr 2009	23 Apr 2009	5 Jun 2009
39. Internal market in gas (from March 2011)	Directive 2009/73/EC	Internal Energy Market	22 Apr 2009	25 Jun 2009	13 Jul 2009	14 Aug 2009
40. Internal market in electricity (from March 2011)	Directive 2009/72/EC	Internal Energy Market	22 Apr 2009	25 Jun 2009	13 Jul 2009	14 Aug 2009
41. Agency for the Cooperation of Energy Regulators	Regulation (EC) No 713/2009	Internal Energy Market	22 Apr 2009	25 Jun 2009	13 Jul 2009	14 Aug 2009
42. Cross-border exchanges in electricity (from 2011)	Regulation (EC) No 714/2009	Internal Energy Market	22 Apr 2009	25 Jun 2009	13 Jul 2009	14 Aug 2009
43. Conditions for access to the natural gas transmission networks	Regulation (EC) No 715/2009	Internal Energy Market	22 Apr 2009	25 Jun 2009	13 Jul 2009	14 Aug 2009
44. Stocks of crude oil and petroleum products (from 2012)	Council Directive 2009/119/EC	Security of Supply	22 Apr 2009	12 Jun 2009	14 Sep 2009	9 Oct 2009
45. Framework for the setting of ecodesign requirements for energy-related products	Directive 2009/125/EC	Energy Efficiency	24 Apr 2009	25 Sep 2009	21 Oct 2009	31 Oct 2009
46. Labelling of tyres with respect to fuel efficiency and other essential parameters	Regulation (EC) No 1222/2009	Energy Efficiency	20 Nov 2009	25 Nov 2009	25 Nov 2009	22 Dec 2009
47. Community financial aid to trans-European networks	Regulation (EC) No 67/2010	Internal Energy Market	24 Nov 2009	26 Nov 2009	30 Nov 2009	30 Jan 2010
48. Energy performance of buildings	Directive 2010/31/EU	Energy Efficiency	14 Apr 2010	18 May 2010	19 May 2010	18 Jun 2010
49. Indication by labelling and standard product information of the consumption of energy and other resources by energy-related products	Directive 2010/30/EU	Energy Efficiency	14 Apr 2010	19 May 2010	19 May 2010	18 Jun 2010
50. Security of supply of natural gas	Regulation (EU) No 994/2010	Security of Supply	21 Sep 2010	11 Oct 2010	20 Oct 2010	12 Nov 2010
51. A comparative methodology framework for calculating cost-optimal levels of minimum energy performance requirements for buildings and building elements	Commission Delegated Regulation (EU) No 244/2012	Energy Efficiency			16 Jan 2012	21 Mar 2012
52. Competitiveness and Innovation Framework Programme (2007–2013)	Regulation (EU) No 670/2012	Energy Efficiency	5 Jul 2012	10 Jul 2012	11 Jul 2012	31 Jul 2012
53. Stepping up EU energy efficiency efforts	Directive 2012/27/EU	Energy Efficiency	12 Sep 2012	4 Oct 2012	25 Oct 2012	14 Nov 2012
54. Guidelines for trans-European energy infrastructure	Regulation (EU) No 347/2013	Internal Energy Market	12 Mar 2013	21 Mar 2013	17 Apr 2013	25 Apr 2013

Note: This table presents a list of regulatory events expected to affect European energy utilities. The table presents the legislation title, reference, and restructuring stream for each legislation. Dates regarding the key stages of the legislative procedure are also presented. The reference is comprised of the legislation type and its identification number.

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