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How do firms cope with economic shocks in real time?

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Abstract

We study how businesses adjust to significant rises in energy costs. This matters for both the current energy crisis and the longer-term shift towards Net Zero. Using firm-level real-time survey and administrative data backed by a pre-registered analysis plan, we examine how firms respond to the energy price shock triggered by Russia's invasion of Ukraine along output, price, input, process and survival margins. We find that, on average, firms pass on some cost increases, build up cash reserves, and face higher debt, but do not yet see layoffs or bankruptcies. However, effects are highly heterogeneous by size and industry: for instance, small firms tend to increase cash reserves and prices, while large firms invest more in capital. We estimate separate elasticities for many small industry cells and subsequently use k-means clustering techniques on the estimated effects to identify high-dimensional firm-adaptation archetypes. These estimates can help tailor firm support in the energy transition both in the short and the long term. More generally, the machinery developed in this paper enables policymakers to evaluate and adjust economic policy in near-real time.

JEL Classification: D22; D24; H23; L11; O30
Keywords: energy price shock; firm dynamics; climate change; high-dimensional analysis

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1 Introduction

Energy is a fundamental input into many firms' production processes. As economies transition towards Net Zero, policymakers need to understand how firms might react to large increases in energy prices (such as those that would result, for instance, from Pigouvian energy taxes). Only with this understanding can they identify the relevant trade-offs and design welfare-improving business support policies. More imminently, governments around the world are grappling with how best to support businesses affected by the large and sudden change in energy prices triggered by Russia's ongoing war in Ukraine. But economic shocks often have heterogeneous impacts across different parts of the economy, meaning that effective business support may need to be finely targeted and potentially embedded in a wider framework of industrial policy to transform the economic system in light of the climate crisis.

Of course, policymakers cannot provide targeted support for what they cannot measure accurately and in a timely manner (Fetzer et al., 2024; Feld & Fetzer, 2024). Evaluating firm responses to these shocks, and designing optimal policies, is further complicated by the fact that firms may adapt on many different margins: they might adjust their output prices or quantity, their input mix, their production processes or might exit the market altogether. Different types of firms will generally respond differently. Supply-side factors such as size (Kalemli-Ozcan & Saffie, 2021), production technology (Durante et al., 2022), market structure (Duso & Szücs, 2017) and firm management (Lamorgese et al., 2021; Jones et al., 2024) can affect the precise bundle of actions an affected firm might take. So can demand-side factors (Fabra & Reguant, 2014). The heterogeneity in responses is as important to understand as the average treatment effects and may shed light on the economic narratives that emerge.

This paper builds the machinery to solve the three problems of timeliness, multiple response margins and heterogeneity in firm responses and provides the first evidence of firm adaptations in response to the ongoing energy crisis triggered by Russia's invasion of Ukraine. In order to do so, we combine and cross-validate high-frequency, real-time, firm-level administrative and survey data from the UK Office for National

Statistics (ONS). Many of these data sources are novel or have not been used for firm-level research before. The high frequency and close to real-time nature of the data allow us to see how firms' adjustments evolve over the short, medium and longer term at different margins with little delay. Combining administrative and survey data helps us to supplement the reliability and coverage of the former with the richness of the latter. At the same time, differences between the two types of data also raise conceptual questions around statistical measurement where legal and economic definitions of the firm differ.[1]

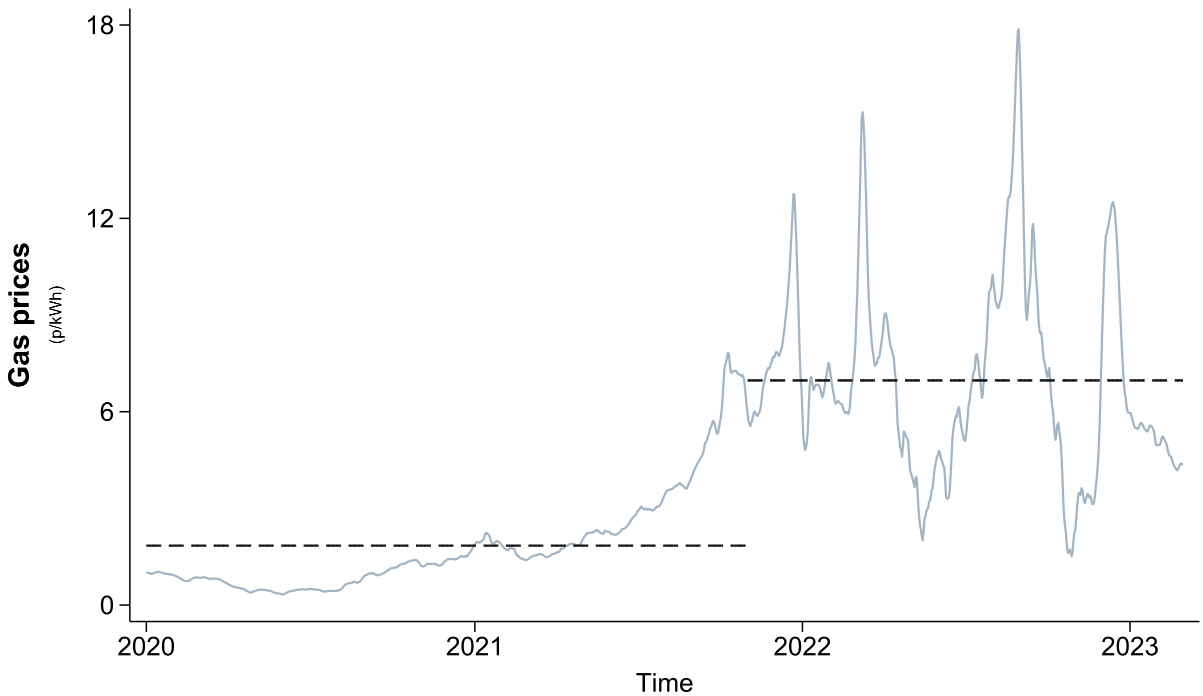
To identify causal effects of the energy price shock, we follow a shift-share identification strategy (Bartik, 1991; Borusyak et al., 2022) that exploits pre-shock energy intensity at the firm level and the unforeseen nature of Russia's invasion of Ukraine. Figure 1 shows the magnitude of the resulting energy price shock: within a few months, wholesale energy prices in the UK quadrupled. To isolate the effect of the energy price shock, we saturate the specification with more and more granular fixed effects to trace out the underlying variation that is used to identify the effects.

Having established the average treatment effects across a broad set of interconnected economic variables, we estimate the model separately for hundreds of different industry cells. This allows us to characterise the heterogeneity in firm responses, and to cluster firms, based on their response profile, with the help of a k-means algorithm into archetypal categories. This clustering approach enables us to characterise a range of prototype responses of firms to the energy price shock. To discipline our analysis, at the beginning of the project we publicly pre-registered an analysis plan (`https://osf.io/5entz/`). We believe that this combination of novel real-time data drawn from different sources, along with a pre-registered analysis provides a blueprint for how policymakers worldwide may – with the right data infrastructure in place – engage with data on ongoing economic changes in a timely and disciplined manner.

Using quarterly administrative data, we find that on average firms exposed to the shock do not appear to reduce labour inputs. Only small firms are slightly more likely to exit the market. For the smaller sample of firms in the Business Insights and Conditions

[1] For instance, survey responses may treat the organisation or physical location where economic activity takes place as "the firm", even though legally some assets may be held, and labour employed, in other legal entities.

Figure 1: System Average Price for natural gas in Great Britain



Notes: This is the average price of all gas traded through the balancing market. Market participants post bids or offers for volumes of gas as day-ahead and within-day trades. The SAP aggregates the trades conducted on the On-the-Day Commodity Market (OCM). This is the market that National Grid use in their role as residual balancer. Other markets exist for wholesale gas trading in Great Britain. These data can be used to understand the general trend of gas prices within Great Britain. The daily SAP is used to determine the futures price and is therefore a useful indicator of supply constraints and demand pressures.

Survey (BICS), we additionally observe rich qualitative outcomes at high frequency. On average, energy-intensive firms increase their output prices as they see the prices of their inputs rise. Turnover expectations adjust downwards. Both large and small firms shift towards working from home in response to the energy price shock. We find no significant increase in the perceived risk of insolvency or in reported trading status. However, debt indicators rise differentially for energy-intensive firms.

But large and small firms also react differently in important ways. Smaller firms are twice as likely to increase their output prices as large firms. This may reflect imperfect pass-through by firms with market power. On the other hand, only larger firms significantly adjust their capital. We find differences in the dynamics between large and small firms too. While smaller firms increase their stock levels in response to the shock, there is no evidence larger firms do likewise. This split in responsiveness between small and large firms echoes Choi et al. (2024) who find similar results for the transmission of monetary policy shocks.

Finally, we show that differences in elasticities are systematically correlated across response margins. For instance, manufacturing firms see a relatively muted response on price margins and large impacts on indebtedness. Wholesalers and retail traders react much more on price and stock level margins, but do not invest in capital. Construction companies invest heavily and see no effects on prices.

This paper makes three contributions. The first is methodological: we combine real-time administrative and survey microdata with a pre-registered analysis plan to understand firm responses to ongoing, relevant economic shocks in near-real time. Pre-registering quasi-experimental research is still uncommon in economics[2] but even for randomised controlled trials (RCTs), Brodeur et al. (2022) find that a posted pre-analysis plan reduces the likelihood of p-hacking and publication bias.[3] Being explicit about our hypotheses and plans going into this project disciplines our empirical analysis even as we explore heterogeneity in firm responses along a large number of dimensions. We can thus identify mechanisms characterised by joint distributions over marginal effects and test economic theories and narratives across multiple coefficients.

Our second contribution is to the emerging literature on the impact of the recent energy price shock and Russia's war in Ukraine more generally. Recent papers have explored fiscal (Bachmann et al., 2022; Auclert et al., 2023), trade (Itskhoki & Mukhin, 2022; Babina et al., 2023) and inflationary (Lafrogne-Joussier et al., 2023) effects of the war and the resulting energy price spike. This paper is among the first to investigate the real effects on firm behaviour across a variety of margins. Despite wide-ranging policies to support firms in the face of higher energy prices, much of our evidence of how firms respond to such shocks comes from the experience of the oil price shocks in the 1970s and is thus decades out of date (Kilian, 2008, 2014). Recent exceptions are Fontagné et al. (2023), who examine the responses of French manufacturing firms to energy price

[2] For a recent exception, see Clemens & Lewis (2022).

[3] Decker & Ottaviani (2023) similarly find that merely pre-registering a trial reduces p-hacking for medical studies.

fluctuations, and André et al. (2023) who look across countries on firm-level responses to sectoral price changes. However, both data series stop short of the current crisis. Alpino et al. (2023) design a custom survey module on an existing Italian firm-level survey and estimate same-year energy demand elasticities in response to the Ukraine price shock and price impacts. Ari et al. (2022) pull together some lessons for policymakers.

Finally, this paper contributes to a large and growing literature on the Green Transition and the structural transformation required to reach a carbon-neutral "Net Zero" economy (Gillingham & Stock, 2018; Glennerster & Jayachandran, 2023). Most papers in this literature argue that higher carbon taxes will be required along the transition path (Metcalf, 2009; Marron & Toder, 2014). Conceptually, a proportional carbon tax on carbon-intensive inputs is similar to the observed energy price shock generated by Russia's war in Ukraine.[4] Therefore, the estimated elasticities in this paper can be used to design optimal taxation and business support policies to smooth the path towards Net Zero. Our results suggest that large firms with market power act as "shock absorbers" by incompletely passing cost increases through.[5] Our results also suggest that at least in the short to medium term bankruptcies are unlikely to be a large concern at the price differentials we observe. However, firms' financial positions worsen, which may impact their survival rate in the longer term as financing conditions change. Finally, without targeted subsidies, capital investments to help the economy move away from energy-intensive production seem to be concentrated in larger firms, which may entrench the dominant position of some firms in a new, longer-term energy price equilibrium.

This paper is part of a wider research program to estimate consumer, financial markets, firm and political responses to energy price shocks in real time (Fetzer et al., 2022; Fetzer, 2023a,b; Feld & Fetzer, 2024). Together, these papers highlight the social value of timely access to research data, coupled with the right set of skills within the public sector to enable more evidence-based policy decisions. Real-time estimates can serve as evidence-based checks-and-balances on the more anecdote-driven narratives that often

[4]Of course, an intentionally designed policy may consider other dimensions as well: for instance, adjustment horizons may be longer and policymakers may deliberately aim to reduce uncertainty about future prices.

[5]In finding evidence of incomplete pass-through our paper is consistent with a large literature. For instance, see Gron & Swenson (2000), Nakamura & Zerom (2010) and Hong & Li (2017).

dominate economic policy debates. This may be even more relevant given the dramatic changes in how media content is produced, disseminated and consumed in recent decades (Gavazza et al., 2019; Cagé, 2020; Cagé et al., 2022).

The rest of the paper is structured as follows. Section 2 outlines our conceptual framework and our pre-analysis plan. Section 3 describes the data construction and main variables of interest. Section 4 explains the sources of variation and our empirical strategy. Section 5 covers our empirical results. Section 6 discusses implications for policy design and a brief final section concludes.

2 Conceptual framework and pre-analysis plan

2.1 The conceptual framework

We start from a simple model of a profit-maximising firm. The firm will choose labour L_i, capital K_i, intermediate inputs M_i and energy E_i at their respective input prices w, r, p_M, and p_E. It produces a single output Y_i subject to its particular production function $Y_i = f_i(K_i, L_i, M_i, E_i)$ which it sells at output price P_i. It may have power in some input or output markets, but is a price taker in the energy market. Additionally, as is standard, the firm only operates as long as profits are weakly positive, $\Pi_i \geq 0$.

An increase in the price of energy, p_E can lead to adjustments along all of the firm's endogenous margins. Unambiguously, the quantity of energy consumed, E_i will weakly decrease due to the own-price effect. The impact on the other inputs (labour, capital and intermediate consumption) will depend on the shape of the production function and the market structure in input and output markets. Additionally, firms will change their output and may be able to pass some of their cost increase on to customers if they have market power. Firms may also adapt their technological or organisational processes in response to the price shock, changing the shape of the production function f_i. Finally, following the energy price increase the firm may no longer be able to satisfy its non-negative profit constraint and may choose to cease operating. Table 1 summarises the potential adjustment margins and how they map into our key outcome variables.

Table 1: Conceptual framework

Margin	Variable	Hypothesis
Output Q	Turnover, exports	Expect Q to go down
Output price P	Prices for goods and services sold	Expect P to go up
Input mix (K, L, M, E)	Capital, imports, redundancies	Expect E to go down (K, L, M) ambiguous
Process $f(\cdot)$	Cash reserves, stock levels, working from home	Expect cash levels and stock reserves to go up
Survival	Risk of insolvency, debt, operational status	Expect survival indicators to go down

2.2 The pre-registered analysis plan

We posted a pre-analysis plan (PAP) publicly and irreversibly on 1 December, 2022 at the Open Science Foundation (OSF) using the URL https://osf.io/5entz/. Posting the PAP predates our earliest data linking and analysis in the ONS Secure Research Service (SRS) which began in early December 2022.

The stated goal of the PAP was not to limit analysis to only those hypotheses that seemed plausible before handling the data, but rather to create a transparent, public record of the order of hypothesis generation and testing. As per the initial PAP, and to further prevent data mining, we built the energy intensity measure E_i separately from the construction of the outcome panel dataset. An update to the PAP on 1 April 2023 set out additional predictions due to a change in energy support policies for UK firms. This evaluation remains work in progress.

3 Data sources and key variables

3.1 Data structure

Unit of analysis. The unit of analysis in this project is an individual firm i, measured at the UK Office for National Statistics (ONS) reporting unit level (RUREF).[6] A firm

[6]More precisely, the reporting unit is the economically meaningful entity at which ONS surveys are administered. Some larger firms may consist of multiple reporting units.

might have multiple establishments or local units, denoted by the local unit reference (LUREF) and may be part of an enterprise (ENTREF) or an enterprise group, denoted by the Who-Owns-What reference (WOWREF).

Energy data. We use the Annual Purchases Survey (APS) to obtain firm-level pre-shock energy cost shares. The APS records detailed information on annual input expenditures.[7] The APS is described in more detail in the next subsection. Energy-shock exposure variables follow the energy intensity measures reported in ONS (2022).

Outcome data. We use two main outcome data sources. The first is the Business Insights and Conditions Survey (BICS), a large, voluntary business survey running since the early days of the Covid-19 pandemic.The second is the Longitudinal Business Database, a new administrative data product derived from the UK's business register. This provides sparse but near-universal information for the UK's business population. The next subsection gives more information on specific sources.

3.2 Data sources

The Annual Purchases Survey. The Annual Purchases Survey (APS) collects detailed information on business expenditures classified as intermediate consumption. We use the latest pre-energy crisis year[8] available, APS 2018, to construct our baseline energy intensity measure, E_{1i}. E_{1i} can be a scalar value of overall energy expenditure or a vector of expenditures on specific energy inputs (for instance, natural gas, electricity, diesel) divided by total purchases for intermediate consumption. As our baseline, in this paper we report the former. If a firm is not sampled in APS 2018, we go back to APS 2017. For robustness, we also estimate results for an expanded sample where we impute energy

[7] We also produced alternative estimates using the Annual Business Survey (ABS), the UK's structural business survey. Because the ABS reports less fine-grained and potentially more noisy input information for individual purchase items such as energy, we consider the APS more appropriate for the purposes of this work.

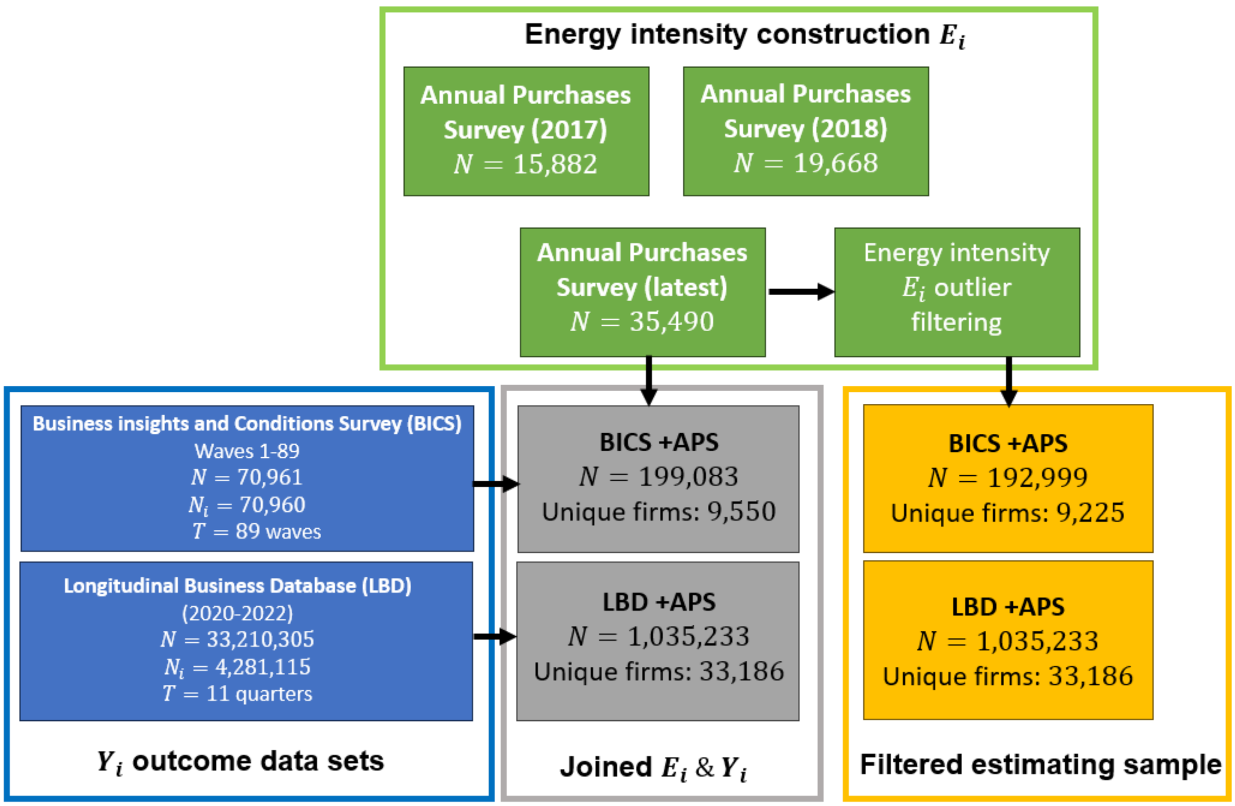
[8] The APS was re-introduced as a survey in 2015 and runs annually. Processing for the 2019 and 2020 APS was de-prioritised during the Covid-19 pandemic and data for these years have not been published. Source: ONS Quality and Methodology Information, 2023.

input intensities as average energy intensities in the same industry-region-size cell for firms not present in either wave.

The Longitudinal Business Database. The Longitudinal Business Database (LBD) is an experimental ONS data infrastructure project, aimed at allowing the quick assembly of firm-level linked datasets from a variety of sources for microdata analysis (Lui et al., 2023). The LBD is a quarterly, linked, firm-level dataset constructed using the UK's business register, the Inter-Departmental Business Register (IDBR). The IDBR captures the universe of UK firms that either pay value-addded tax (VAT) or contribute to pay-as-you-earn (PAYE) income tax schemes. In a given quarter, active firms on the IDBR number approximately 3 million. A first version of the LBD is now available in the ONS Secure Research Service (SRS). We use survival, employment, and establishment count at a quarterly frequency as outcome variables in our analysis. The LBD also contains turnover (which can be used to construct labour productivity). However, since turnover and to some extent employment is recorded on the IDBR from a variety of sources and with variable lags, additional results using these variables should be treated with caution.

The Business Insights and Conditions Survey. The Business Insights and Conditions Survey (BICS) is a qualitative, fortnightly, voluntary, topical business survey established during the pandemic. The BICS is sent to approximately 50,000 businesses every two weeks, with a response rate of roughly 25%. Large businesses often receive many consecutive survey waves, whereas small firms are rotated in and out to reduce survey burden. The BICS provides rich and timely information for a sample of the UK business population. We use three types of variables from the BICS. First, we use a set of questions on firm input, output, pricing and innovation behaviour, as well as firms' subjective measures of financial and economic health, as the main outcome variables in this project. The exact variables of interest as well as how we construct the BICS panel can be found in appendix A. Second, we use questions about a firm's climate attitudes and behaviour as well as their perceived exposure to the energy shock. A list of these questions is provided in the appendix. Third, as a robustness check we explored a set of questions intermittently asked on the BICS about the length and coverage of businesses' electricity and gas contracts. We use this to construct a third energy intensity measure, E_{3i} which interacts E_{2i} with a dummy for contracts that expire in the near term or cover gas and electricity costs only partially.

Figure 2: Data linking and cleaning



Notes: Figure illustrates the data components and the associated sample sizes that we work with in the analysis as they arise when we merge different datasets together. The resulting samples are notably smaller then the underlying populations but the analysis still covers around **90%** of all employment in the United Kingdom.

3.3 Data linking and cleaning

Figure 2 summarises the data linking process. We link BICS waves 1-89, corresponding to March 2020 to August 2023, by RUREF to our units of analysis. We harmonise responses to BICS questions on variables of interest, over time. For some variables a sufficiently long pre- and post-treatment panel exists to test anticipation effects. For others, we only have a post-treatment panel or even a single cross section.

We then link BICS respondents to the APS 2018 and 2017 using the latest available data point for each RUREF. The resulting sample consists of 9,550 firms and 199,083 observations. We strip our energy intensity measure of outliers by trimming observations below the first and above the 99th percentile in each two-digit SIC (Standard Industrial Classification) industry. The resulting sample consists of 9,225 firms and 192,999 observations.

3.4 Key variable construction

Energy intensity measure. We measure energy intensity E_i as a share of total costs. This presents three problems. First, there may be firm-specific idiosyncratic variation in the energy cost shares that is not due to the technical requirements in the production processes used by firm i. Second, firms may be exposed to the energy price shocks *indirectly*, through the costs they pay for other inputs if the production of these inputs is energy-intensive (or in turn requires energy-intensive inputs). Third, to the extent that some firms have long-term energy contracts or do not pay for their energy costs directly, their energy input may not reflect the financial cost they bear. While we do not observe the necessary data to shed light on these hypotheses at the firm level, we investigate them here with industry-level data.

Comparisons to direct energy quantity measures. The ONS environmental accounts provide energy measures of (absolute) gross calorific values, million tonnes of oil equivalent (Mtoe). This is only available at the relatively coarse sector level.[9] Figure A.4 in the appendix compares this direct measure of energy intensity quantities with our cost share measures and shows that the two are highly correlated at this broad industry level.

Indirect exposure to energy shocks. We compute total industry-level energy intensity by inverting the ONS input-output supply-and-use tables.[10] These are available at the

[9]See ONS energy use by industry, source and fuel, 2024.
[10]See ONS input-output supply-and-use tables, 2023.

two-digit SIC level. Figure A.5 in the appendix shows that direct and indirect energy exposure are highly positively correlated at the two-digit industry level.

Cash flow measures of energy input costs. In Figure A.6 in the appendix, we compare a sector-level measure of actual real-time energy expenditure payment flows from ONS (2023a) against our energy intensity measure aggregated to the industry level. Energy payment flows are positively correlated with energy input use. This suggests that firms with higher energy *use* are indeed more exposed to the energy input price shock.

Comparison to per unit price changes in gas and electricity. In Figure A.7 in the appendix we show prices per unit of electricity and gas paid by users of different volumes of energy. Prices per unit see a sharp increase across all users, suggesting that contracts did not shield firms (large consumers of energy in particular) fully from the shock. Therefore, expenditure on energy before the crisis is likely a good approximation of a firm's exposure.

4 Empirical methodology

This section explains the empirical methodology we employ. It describes the estimating equation and assumptions required for causal inference, outlines how we explore heterogeneity and quantile effects and finally explains how we explore correlations across adjustment margins by clustering on industry-specific estimates.

4.1 Estimating equation

We pre-registered our main estimating equation in the initial Pre-Analysis Plan (PAP). This estimating equation takes the following form:

$$Y_{ist} = \alpha_i + \beta_{st} + \xi \times Post_t \times E_i + \nu \times X_{ist} + \varepsilon_{ist} \quad (1)$$

Here, α_i captures a firm i fixed effect, absorbing any time-invariant firm characteristics. We also control for time-fixed effects β_{st}. These account for time-varying non-linear shocks that are common to all firms. These time-fixed effects could be specific to a group the firm belongs to, such as the industry or region that a firm i operates in, as indicated by subscript s.[11]

E_i denotes our energy intensity measure. The indicator $Post_t$ is a binary variable that captures the time period after the energy price shock. Figure 1 indicates that by November 2021 an invasion was seen as likely, leading to an anticipatory spike in the energy price. We therefore use this as our baseline treatment. Since November 2021, spot market prices for natural gas have averaged around 7 p/kWh. This is 4.3 times the average for the period from 2018 to October 2021 inclusive. For robustness, we also estimate our results with the treatment time defined as 24 February 2022, the day the invasion began.

We also allow for the inclusion of potentially other sets of control variables, X_{ist}. The degree to which the empirical specification can be saturated with more demanding fixed effects or additional controls ultimately depends on the amount of *intra-industry* variation in the energy intensity measure across firms, E_i, the expected estimated effect size and its distribution. These parameters were of course unknown ex ante, when we formulated our PAP. We therefore estimate our estimating equation with progressively more demanding fixed effects and show results across all specifications.

Logic of the estimation protocol There are three empirical design choices facing applied researchers studying the impact of the energy crisis at the firm level. First, every firm i is mapped to an industry s through a mapping $s = g(i)$. The industry mapping can have different granularities that arise from the nomenclature used to classify the economic activities of a firm. The UK's Standard Industrial Classification (SIC) distinguishes between 732 industry codes.[12] Second, we observe the energy intensities E_i measured either directly at the firm or, when imputed, as an industry-level characteristic, $E_{g(i)}$. Third, we face a decision over the functional form of the energy intensity measure. When we use a continuous measure $E_{g(i)}$, implicitly, we assume that we can identify the

[11]For conciseness, in the rest of the paper we refer to a firm grouping s as "industry".
[12]See Companies House, 2024.

treatment effect through the differential "dose intensity" that is captured by the energy intensities of a firm. An alternative way of parameterising the shock is to dummify the continuous measure $E_{g(i)}$, (for example, above or below the mean or median). The binary indicator can be computed relative to a changing reference point for ease of interpretation. For example, we can discretise the exposure measure to identify firms that, *within industry*, have an above median or mean energy intensity. An alternative is to construct a discretisation that contrasts *between industry* variation. The validity and the underlying variation that such a discretised indicator will contain depend on the level of the fixed effects. If a discretisation into above- or below median (or other percentiles of) energy intensity is constructed across firms between sectors, this raises the possibility that in specifications where we control for granular industry-by-time fixed effects, the estimand β effectively starts to become collinear with the industry-by-time fixed effects.

In this paper, we therefore present results from the full menu of least- to most-demanding specification. This approach allows us to assess at which levels of variation the hypothesised result disappears, speaks to the overall robustness and generalisability of the exercise and highlights the variation that is being exploited. In our setting, the outcome data varies at the firm-by-time level with firms being classified into industries with up to five digits. Table 3 illustrates what this means in practice. In the table, estimable models are indicated with a cross ("x"). For example, we can estimate a model with firm fixed effects and time fixed effects that are specific up to the full five-digit SIC industry level. Naturally, with such a model, if energy intensity E_i varies predominantly *between industries*, there is a risk that our estimand ξ on the interaction term $Post_t \times E_i$ becomes collinear with the granular industry-by-time fixed effects.

The evolution of the estimated size of the estimand ξ across specifications, in conjunction with the in-sample R^2 can provide valuable clues as to the correct specification. Stable estimand sizes across different designs with more or less granular fixed effects indicate an overall robust result. But results may start to become notably less precisely estimated or attenuated as the granularity of the fixed effects increases. This can be due to very saturated models controlling for many irrelevant covariates resulting in ordinary least squares becoming inefficient (loss of the "best" property of the class of linear unbiased estimators). Likewise, inherent measurement error may induce attenuation bias.

Figure 3: Set of estimable two-way fixed effects models

		Unit FE				
		Firm only	SIC	Region	SIC & Region	SIC x Region
	Wave only	x				
	SIC1		x	x	x	x
Time FE	SIC2		x	x	x	x
	SIC3		x	x	x	x
	SIC4		x	x	x	x
	SIC5		x	x	x	x

Even where the estimand ξ is stable across a broad menu of specifications, it is useful to test the implicit "dose intensity" assumption by discretising the exposure measure E_i. This should focus on exploiting *between firms* variation in E_i within the level at which the unit fixed effect is specified. That is, for example, if we estimate a model with three-digit industry by time fixed effects, in addition to the unit fixed effects, we explicitly exploit variation between firms *within three-digit industries*. The energy intensity measure E_i should then be discretised *within the respective three-digit industry*. This explicitly contrasts the relative performance of more or less energy intensive firms that operate within the same industry.

Finally, we can estimate industry-aggregated models. Aggregation of data can improve challenges that arise from imprecise measurement in both the energy intensity E_i as well as in the outcome measures. It also implicitly leads to a re-weighting of the data since the unit of analysis now becomes an industry-by-time cell. A focus on variation at a higher industry level also reduces the risk of demand spillovers from treated to untreated firms, which may otherwise lead to violations of the Stable Unit Treatment Value Assumption (SUTVA), as pointed out recently by Alves et al. (2023).

Estimation of the treatment effect. The causal effect in these regressions is estimated by interacting common, unanticipated shocks to energy prices with pre-existing variation in the exposure to the shock, as measured by a firm's energy intensity before the shock. In the empirical specification this is captured by the estimated coefficient ξ on the interaction term $Post_t \times E_i$. This identification strategy is in the spirit of the shift-share approach pioneered by Bartik (1991) and recently characterised in much fuller detail by Borusyak et al. (2022). For brevity we report here the treatment effect estimates obtained from the continuous exposure measure E_i, after confirming that the monotonicity assumption in the treatment effects appears to hold.

4.2 Methods for higher-dimensional analysis and clustering

Most econometric analysis in existing economic research is explicitly one-dimensional, focusing on simple causal chains. This may be quite powerful if such a linear causal chain is indeed empirically robust and economically significant. Yet in reality, complex shocks may induce a broad range of adjustments that may only be correctly measurable across a large set of potential outcomes. We conduct heterogeneity analysis to discover joint distribution patterns that can provide insights into firm behaviours beyond the partial, single-variable analysis. After verifying whether the estimated average treatment effects are robust, we separately estimate elasticities for small industry cells. These estimates allow us to trace out non-parametrically the response function across the firm population.

To achieve this, we estimate heterogeneous treatment effects across a broad range of industry cells resulting in a vector of estimates $\boldsymbol{\xi_s} = (\xi_{s1}, ...\xi_{sk})$ capturing the relationship between the energy-price shock exposure of firms in industry cell s on an outcome variable j as ξ_{sj}. We focus on eleven different outcomes that are estimated for dozens of different industry cells. The estimated vectors $\boldsymbol{\xi_s}$ can be thought of as capturing the joint distribution of the impact of the energy price shock on a representative firm within industry cell s. As before, we carry out the analysis at different industry granularities.

Clustering on the $\boldsymbol{\xi_s}$ vector We employ a k-means clustering algorithm to identify common archetypes or patterns in how variables co-move across industries in response to the energy price shock. This approach may highlight whether the often simple one-dimensional economic narratives that attract media attention are consistent with the potentially more complex narratives suggested by the joint distributions found in the data. We then examine this heterogeneity by industry characteristics to explain differences found, such as why some industries adjust capital while others increase stock levels.

K-means clustering is a suitable choice in this setting as we can compute Euclidian distances between the vectors that capture a specific industry's estimated effect distribution from that of another industry $\boldsymbol{\zeta_s}$. K-means clustering identifies clusters of response profiles $\boldsymbol{\zeta_s}$ across industries that stand out by having high *intra-cluster* similarity in the distribution of the effects and high *inter-cluster* dissimilarity. The resulting set of clusters allow us to speak both more generally about the extent to which there are common archetypes and what distinguishes these archetypes from one another. This can be an important tool for identifying dominant or robust narratives.[13]

5 Results

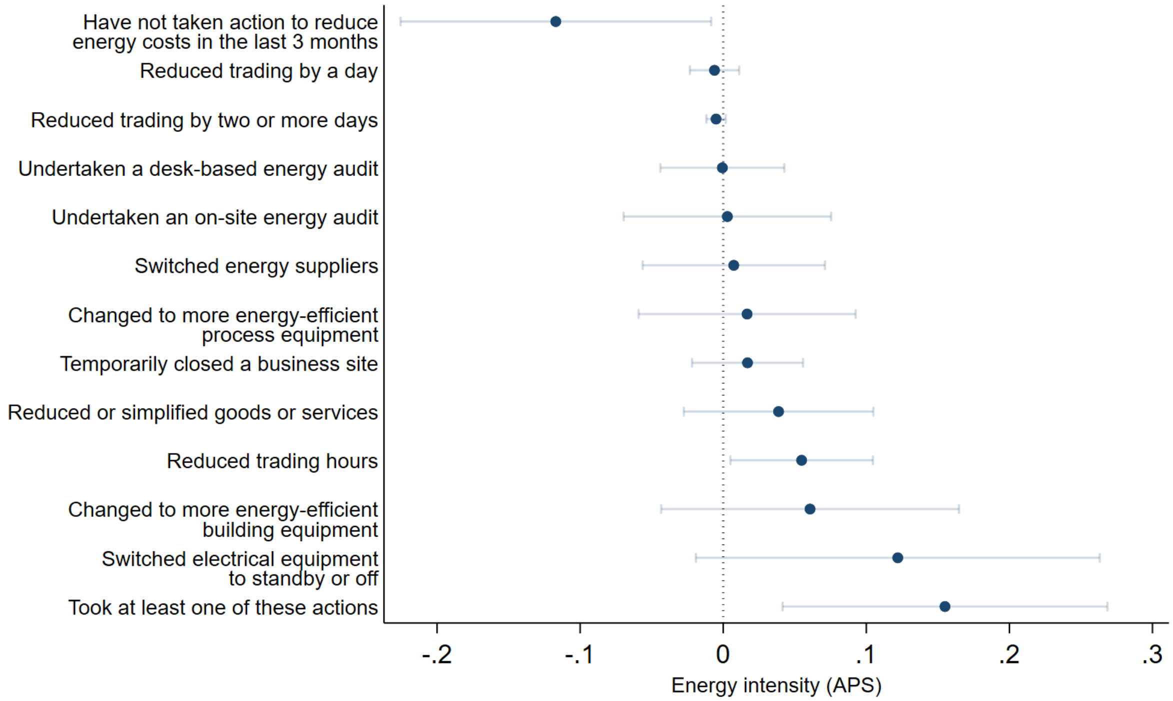
5.1 Cross-sectional estimates of direct energy mitigation

In a few select waves, the BICS asked firms directly about their actions to mitigate the impact of high energy input prices. To motivate the causal analysis in the remainder of this paper, we report these results here. Because of the cross-sectional nature of the data, these results however are only motivational.

Figure 4 shows that less energy-intensive firms were significantly less likely to report taking actions to reduce energy use in the aftermath of the energy price shock. Likewise, firms with higher energy intensity were significantly more likely to have taken at least some action. Actions common among energy-intensive firms were switching electrical equipment to standby or off, switching to more energy-efficient equipment, reducing trading hours and temporarily closing an establishment. Figure C.1 in the appendix similarly shows cross-sectional regressions on what firms perceived the impact of rising

[13] An alternative way to perform the clustering is through hierarchical clustering techniques. The results, not reported here for brevity, are comparable. We prefer the k-means exercise due to its easy geometric interpretation of distance in high-dimensional vector space. As yet another alternative, generative Large Language Models can turn the underlying distributions of estimated coefficients into cohesive text. This method and the general approach can be used to both test and validate narratives, and their appearance in social phenomena such as parliamentary speech, interest group representation or the media.

Figure 4: Relationship between energy expenditure share and direct energy mitigation measures



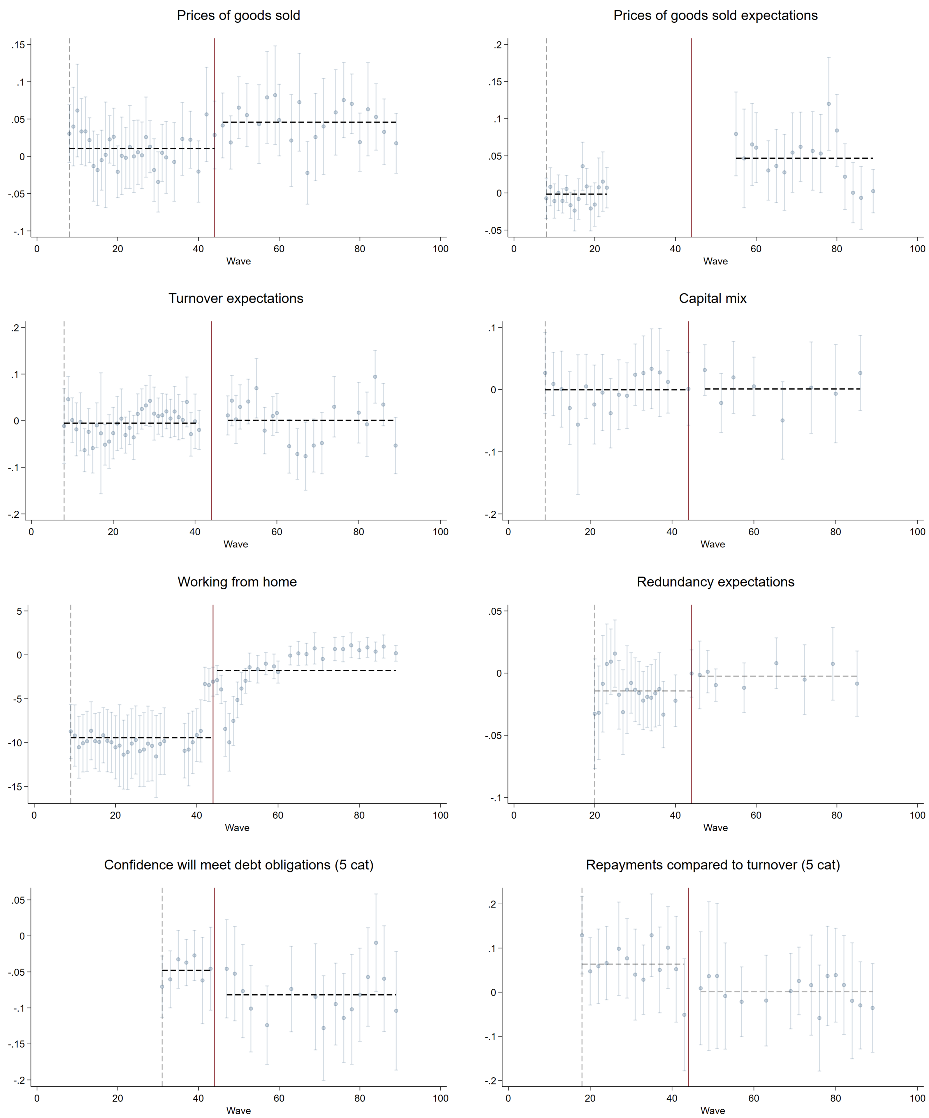
Notes: Figure shows the coefficient of energy intensity in a cross sectional regression of firms' responses to the question "What actions, if any, has your business taken to reduce energy costs in the last three months?" in Wave 75. Each response is coded as zero if a business has not reported taking this action and one if it has. We can't distinguish non-response to the question from reporting not taking this action. We control for the firm's employment size band, 5 digit industry and region. Standard errors are clustered by 2 digit industry.

energy prices to be. More energy-intensive firms were more likely to pass on price increases, change suppliers, reduce staff working hours and discontinue lines of sale.

5.2 Pre-trends

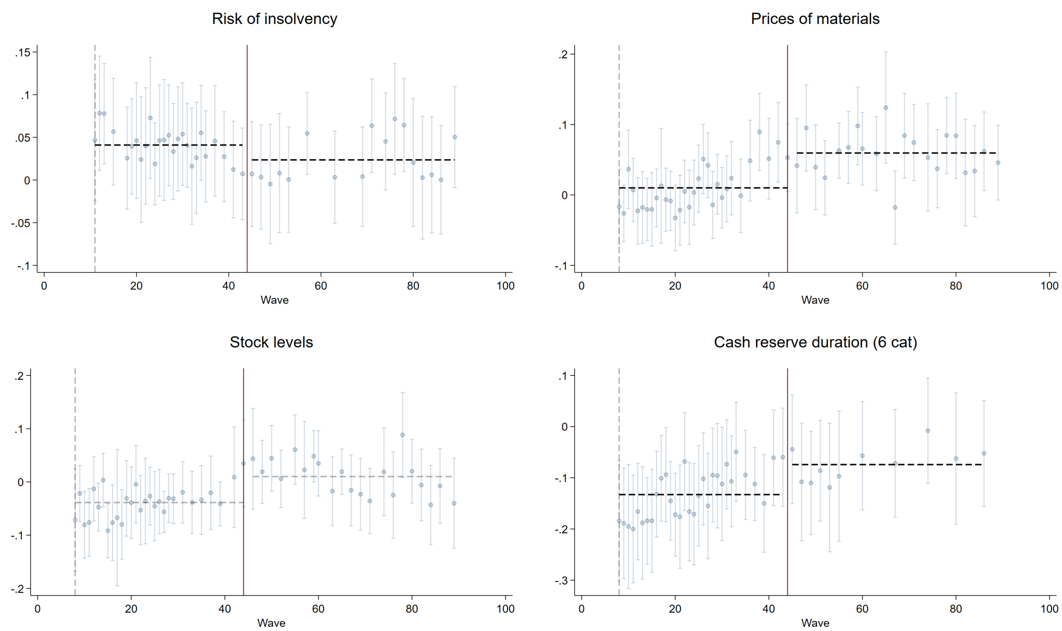
This subsection reports pre-trends for our key outcome variables using an event study design in line with Sun & Abraham (2021). Figure 5 shows the set of variables for which there are no clear pre-trends, with the trend break happening at or after the time of Russia's invasion in early 2022. These include prices, capital expenditures, debt and working practices. Figure 6 instead shows the outcome variables that show slight anticipation effects. These include material input prices, cash reserves, stock levels and the risk of insolvency. These anticipation effects are consistent with firms reacting to uncertainty by taking precautionary actions.

Figure 5: No pre-trends for most outcome margins



Notes: Figures present Difference-in-Differences coefficients with energy-intensity defined as above or below the two-digit industry median and time-periods defined by survey wave. The regressions control for three-digit industry fixed effects and two-digit industry specific time fixed effects. Standard errors are clustered at industry division. 95% confidence bands indicated.

Figure 6: Some anticipation effects for forward-looking outcome margins



Notes: Figures present Difference-in-Differences coefficients with energy-intensity defined as above or below the two-digit industry median and time-periods defined by survey wave. The regressions control for three-digit industry fixed effects and two-digit industry specific time fixed effects. Standard errors are clustered at industry division. 95% confidence bands indicated.

5.3 Average treatment effects

Tables 2 to 4 report coefficients from our main specification using the linked waves of the Business Insights and Conditions Survey (BICS). We find significant effects on the following adjustment margins: output and input prices; the capital and working practices; cash reserves; and expectations over future turnover and survival.

Panel A of Table 2 shows average treatment effects for price variables. The coefficient of interest for materials prices (which include energy) is 0.370 for all firms. At 0.326, it is slightly smaller for large firms (defined as firms with more than 250 employees) than for small firms (for whom the coefficient is 0.456). On average, energy-intensive firms increase their output prices as they see the prices of their inputs rise. This average treatment effect is driven by small firms (coefficient of 0.389 and significant at the 1% level) but not large firms (coefficient of 0.185 and not statistically significant).

Table 2: Impacts of the energy price shock on prices and output, for large and small firms

Panel A: Average treatment effects, firm prices

Prices		Estimate (ξ Treatment $\times$ Energy intensity) all	large	sme
Price of materials	ξ	0.370***	0.326**	0.456***
	se	(0.103)	(0.141)	(0.0988)
	R^2	0.392	0.359	0.434
	N	94321	58584	35706
Price of goods sold	ξ	0.249**	0.185	0.389***
	se	(0.115)	(0.129)	(0.119)
	R^2	0.350	0.321	0.392
	N	97954	61229	36687
Prices of goods sold expectations	ξ	0.162*	0.163	0.155*
	se	(0.0908)	(0.112)	(0.0844)
	R^2	0.365	0.335	0.404
	N	66702	42277	24353

Panel B: Average treatment effects, firm output

Output		Estimate (ξ Treatment $\times$ Energy intensity) all	large	sme
Turnover change (3 cat)	ξ	0.0781	0.0831	0.0685
	se	(0.112)	(0.126)	(0.190)
	R^2	0.374	0.361	0.397
	N	115592	72300	43244
Turnover expectations (3 cat)	ξ	-0.164***	-0.173**	-0.157*
	se	(0.0573)	(0.0694)	(0.0855)
	R^2	0.274	0.257	0.304
	N	103876	65011	38865
Export status (3 cat)	ξ	-0.0704	-0.0464	-0.100
	se	(0.0538)	(0.0715)	(0.0606)
	R^2	0.942	0.938	0.946
	N	75718	45647	30071

Notes: Estimated treatment effects from regressions with firm and wave fixed effects. Standard errors are clustered by wave and two-digit SIC industry. Outcome variables are ordinal indicators of the direction of change during the reference period. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors with stars indicating *** $p<0.01$, ** $p<0.05$, * $p<0.10$

Table 3: Impacts of the energy price shock on inputs and processes, for large and small firms

Panel A: Average treatment effects, firm input mix

Input mix		Estimate (ξ Treatment × Energy intensity) all	large	sme
Capital	ξ	0.161	0.152	0.220
	se	(0.105)	(0.180)	(0.231)
	R^2	0.644	0.624	0.676
	N	32354	21217	11137
Capital mix	ξ	0.225**	0.262**	0.203
	se	(0.0943)	(0.120)	(0.163)
	R^2	0.490	0.472	0.518
	N	37758	24722	13036
Redundancies (share)	ξ	0.141	0.00461	0.413
	se	(0.321)	(0.241)	(0.675)
	R^2	0.230	0.214	0.254
	N	138778	87177	51601
Redundancy expectations	ξ	0.0125	-0.0158	0.0526
	se	(0.0337)	(0.0481)	(0.0359)
	R^2	0.501	0.479	0.542
	N	43003	25538	17465

Panel B: Average treatment effects, firm processes

Production process		Estimate (ξ Treatment × Energy intensity) all	large	sme
Stock levels	ξ	0.0329	-0.0256	0.164
	se	(0.135)	(0.181)	(0.120)
	R^2	0.359	0.335	0.397
	N	68668	42271	26397
Hybrid working	ξ	-5.769**	-6.404	-5.131
	se	(2.816)	(4.714)	(3.126)
	R^2	0.787	0.768	0.817
	N	58129	35349	22780
Working from home	ξ	51.39***	63.11***	30.00***
	se	(10.96)	(15.19)	(7.288)
	R^2	0.725	0.718	0.734
	N	126124	79111	47013
Working from normal place of work	ξ	16.63**	13.07	20.34**
	se	(8.160)	(9.261)	(8.627)
	R^2	0.739	0.741	0.732
	N	126124	79111	47013

Notes: Estimated treatment effects from regressions with firm and wave fixed effects. Standard errors are clustered by wave and two-digit SIC industry. Outcome variables are ordinal indicators of the direction of change during the reference period. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors with stars indicating *** $p<0.01$, ** $p<0.05$, * $p<0.10$

Table 4: Impacts of the energy price shock on liquidity and survival, for large and small firms

Panel A: Average treatment effects, firm liquidity **Panel B**: Average treatment effects, firm survival

Debt & liquidity		Estimate (ξ Treatment × Energy intensity) all	large	sme	Survival		Estimate (ξ Treatment × Energy intensity) all	large	sme
Cash reserve duration (5 cat)	ξ	0.263*	0.245	0.288**	Insolvency risk	ξ	-0.162**	-0.0800	-0.263**
	se	(0.140)	(0.177)	(0.135)		*se*	(0.0800)	(0.0967)	(0.100)
	R^2	0.787	0.786	0.786		R^2	0.666	0.664	0.669
	N	77355	48748	28607		N	81177	49908	31269
Confidence will meet obligations (5 cat)	ξ	-0.278***	-0.266**	-0.293**	Change in insolvency risk	ξ	0.0239	0.0361	0.0274
	se	(0.0870)	(0.101)	(0.125)		*se*	(0.0773)	(0.108)	(0.0835)
	R^2	0.663	0.645	0.690		R^2	0.500	0.475	0.542
	N	40204	24308	15896		N	40037	24954	15083
Repayments over turnover (5 cat)	ξ	-0.438***	-0.231	-0.778***	Confidence of 3m survival	ξ	0.0803	0.0369	0.169*
	se	(0.149)	(0.171)	(0.200)		*se*	(0.0593)	(0.0735)	(0.0877)
	R^2	0.693	0.677	0.716		R^2	0.703	0.692	0.714
	N	26521	15612	10909		N	59784	37104	22680

Notes: The cash reserve duration, confidence the firm will meet debt obligations and repayments compared to turnover variables have 5 possible responses. Estimated treatment effects from regressions with firm and wave fixed effects. Standard errors are clustered by wave and two-digit SIC industry. Outcome variables are ordinal indicators of the direction of change during the reference period. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors with stars indicating *** $p<0.01$, ** $p<0.05$, * $p<0.10$

These results are consistent with a theory of incomplete pass-through by firms with market power (proxied here by size) and complete pass-through by a competitive fringe of small firms. Future price expectations are directionally similar but attenuated and only marginally significant for small firms.

As Panel B of Table 2 shows, there were no immediate turnover effects but turnover expectations varied between large and small firms. Large companies anticipated declines in revenue due to the energy cost increases (coefficient of -0.173, statistically significant at the 5% level). However, small firms did not expect decreases to the same degree. These differences may be due to differences in forecasting abilities, because small firms feel insulated through supply contracts or because they view themselves as price takers.

Firms' confidence levels showed an interesting divergence. Contrary to expectations, small businesses were surprisingly bullish about their survival prospects despite raising stock levels and not adjusting capital. In contrast, large companies became less optimistic about the future despite making capital adjustments. This mismatch between behaviors and expectations warrants further investigation.

Panel A of Table 3 shows the average treatment effects for a firm's input mix. Overall, firms change their capital in response to the energy price shock (coefficient of 0.225 significant at the 5% level). This effect is driven by large firms. The effect for SMEs is smaller in magnitude and not significant. This indicates larger companies anticipated needing to adapt their production process in response to the energy cost increases. Realised redundancies and redundancy expectations do not respond significantly for either large firms or small firms, and in fact yield precisely estimated null effects in most cases.

Panel B of Table 3 shows the effects on firm processes: the stock levels held on premises (a measure of their efficiency, and expectations about future uncertainty) and their homeworking practices. The latter is particularly relevant as homeworking may allow firms to offload energy costs onto their employees. We do not find significant effects on stock levels, overall or for either size category. Working from home increases significantly overall (coefficient of 51.39 significant at the 1% level), and for both large (coefficient of 63.11 significant at the 1% level) and small firms (coefficient of 30.00 significant at the 1% level. This increase in working from home is accompanied by a significant decrease in hybrid working. For small firms but not for large firms there is a bifurcation in working practices, with office attendance also increasing significantly (coefficient of 20.34 significant at the 5% level).

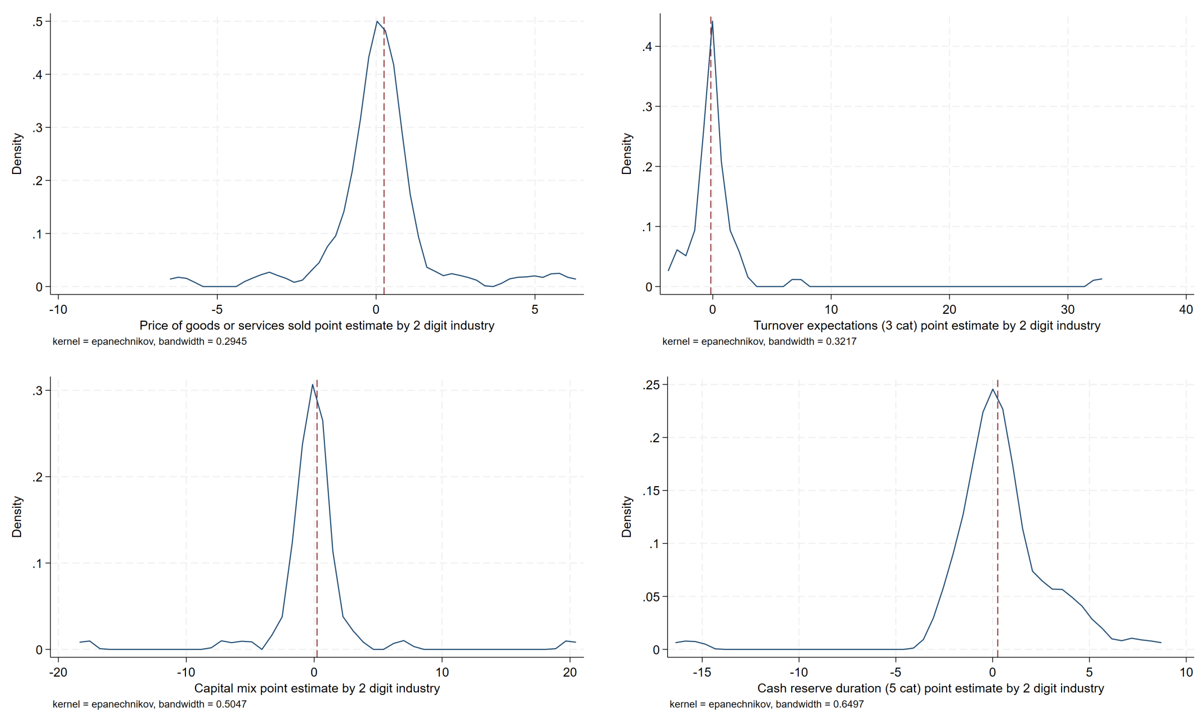
Finally, Table 4 shows the average treatment effects on firm liquidity and firm survival. Panel A focuses on firm liquidity. On average firms built up cash reserves. This is driven predominantly by small firms (coefficient of 0.288 significant at the 5% level). All firms were significantly less confident they would meet their debt obligations (coefficient of -0.278, significant at the 1% level). The estimated effects for large and small firms are similar in size and significance in this regard. Additionally, affected firms saw a significant deterioration of their ratio of debt repayments over turnover (coefficient of -0.438 significant at the 1% level). This overall effect is driven predominantly by small firms (coefficient of -0.778 significant at the 1% level).

Panel B focuses on firm survival. The average treatment effects we estimate are small and insignificant for firms' confidence to survive the next three months and the change in insolvency risk. We find a decrease in insolvency risk (coefficient of -0.162 significant at the 5% significance level) driven predominantly by smaller firms. This is likely related to the increase in cash reserves we observe among the same firms.

Using quarterly data on employment, number of business sites and survival from the Longitudinal Business Database (LBD) we find similar results, shown in Table C.1 in the appendix. We find no statistically significant drops in firm-level employment for affected firms following the energy price shock. The LBD results do show an increase in firm exits among more energy-intensive small firms.

For our baseline outcome variables, we also exploit the panel nature of most questions on the BICS to investigate the dynamics of firms' response to the energy price shock. Figure C.2 in the appendix plots the dynamics for a selection of key outcome variables at quarterly frequency: the capital mix, output prices, stock levels, debt repayments and working from home. Debt repayments for instance rose compared to turnover after April 2022 and peaked during the summer. The results also show key differences between short- and long-run responses and between large and small firms. Smaller firms affected by the input price shock adjusted their prices almost instantaneously, within the first three months of the shock. The effect size rose from January to March 2022, peaked in the window April to June 2022 and petered out in the summer of 2022. Turnover expectations dropped following the peak in price rises. The observed increase in confidence was driven by the early stages of the shock and was positive and significant in the first quarter of 2022 before the price increase effect peaked. The effect became insignificant from April 2022 onwards.

Figure 7: Coefficient distributions over industries



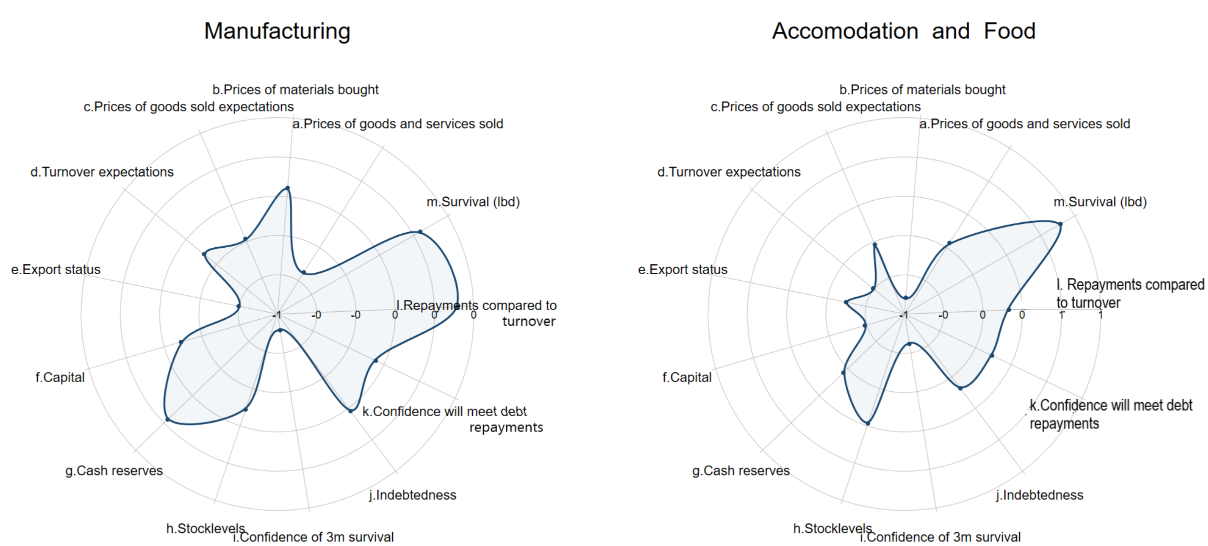
Notes: Figure shows the distribution of average treatment effects estimated separately for each industry division against the sample-wide average treatment effect denoted by the red dotted line.

5.4 Heterogeneous industry effects

The average effects estimated in the previous subsection mask significant heterogeneity. Firms adjust differently on different margins based on their production function, market structure or management capabilities. In addition to firm size, in our PAP we conjectured that industry is an important dimension of heterogeneity. In this subsection, we show that there is indeed large variation between fine-grained industries across all margins. Figure 7 plots the distribution of the estimated coefficients from restricted sample regressions over two-digit industries. For all margins, the variation across two-digit industries swamps the difference between estimated average effects and zero.

Not only do firms display significant heterogeneity, but responses are correlated across response margins in predictable ways. Figure 8 shows the distribution of the estimated responses of firms in coarse industry sectors s across response margins j, $\boldsymbol{\zeta_s} = (\zeta_{s1}, ...\zeta_{sj}, ...\zeta_{sk})$, for two example sectors, manufacturing and hospitality. Even at high levels of aggregation, firms across these industries display starkly different adaptation behaviours. For instance, manufacturing sees large adaptations on indebtedness, debt repayment, turnover expectations and stock levels, but a moderate capital response and no response in their cash reserves. Accommodation and food services see large impacts on their stock levels, indebtedness and survival, but no capital investment. Figure C.5 shows that these correlations across margins are not particular to the two example sectors, but apply more broadly: for instance, wholesale and retail trade sees large impacts on input and output prices, and substantial adjustment on capital and debt margins.

Figure 8: Adjustments across margins: manufacturing and hospitality



Adaptations likewise differ substantially by firm size. Figure C.4 in the appendix shows that large firms are more likely to adjust on output price, capital, cash, and debt repayment margins. By contrast, small businesses are more likely to adjust stock levels and to see their survival prospects worsen.

5.5 Higher-dimensional analysis and clustering

Much economic research traditionally focuses on a few narrow adjustment margins. But the data generating process shaping how firms respond to an economic shock implies joint distributions and estimated elasticities that are systematically correlated across the different response margins. To uncover the structure of these joint distributions from the estimates, this section reports results from a simple k-means clustering exercise.

The algorithm uncovers six distinct groupings of industries. Based on their responses, we call them "the passthrough-financed investors", "the survivors", "the cruisers", "the disinvestors", "the wrecked" and "the cash-constrained". Appendix table C.3 and Figure C.7 give more detail about the industries in each cluster and the average treatment effect along each margin. Here, we focus on industry characteristics that may explain the differences in responses, as shown in Table 5.

"Passthrough-financed investors" are predominantly drawn from ICT, engineering and real estate and represent about 12% of economy-wide Gross Value Added (GVA). The typical firm in this cluster is small, well-managed and relatively investment-intensive. In line with the small firm size, industry concentration in this cluster is quite low but markups and profit margins are nonetheless on the upper end of the spectrum. "The survivors" in contrast represent the most energy-intensive cluster and make up almost 33% of GVA, including business services, health and education and some manufacturing. This cluster features on average larger firms by turnover and employment and the highest investment intensity. Concentration, profit margins and markups are among the lowest of all clusters. "The cruisers" have intermediate energy intensities of about 10% and represent a further 16% of GVA, including wholesale and retail, telecoms and waste collection. They are characterised by somewhat higher concentration but low profit margins and markups. Firms in this cluster fall in the upper range of investment and come from the middle of the management distribution.

Table 5: Characteristics of firms in each cluster

	The passthrough-financed investors	The survivors	The cruisers	The disinvestors	The wrecked	The cash constrained
Description	ICT, engineering and real estate	Complex manufacturing chemicals, metals, food products, and non-business services such as human health and education	Manufacturing of wood, textiles, electrical equipment, and business services such as wholesale and retail trade and land transport, telecoms, and waste collection	Pharmaceuticals, furniture, arts, and motion picture and other professional scientific activities	Printing and reproduction media	Scientific research and development and advertising
Energy intensity	13%	14%	10%	10%	8%	7%
Average turnover (£000)	1,821	8,800	5,269	7,453	795	3,584
Average employment	9	35	23	18	8	15
Management practices	0.54	0.50	0.49	0.48	0.47	0.53
Investment intensity (NGFCF/GVA)	15%	19%	16%	8%	10%	6%
Concentration index (Turnover HHI)	537	740	1106	635	1358	381
Average profit margin	0.24	0.18	0.12	0.26	0.20	0.22
Average IC markup	1.40	1.38	1.27	1.40	1.19	1.28
Average labour markup	2.27	1.84	2.18	3.02	2.03	4.18
Number of divisions	9	27	13	5	1	2
% GVA	12.1%	32.7%	15.9%	6.7%	1.2%	2.9%

Notes: The table presents unweighted averages of the weighted averages of each industry division in each cluster. Average employment and turnover are the author's calculations using the 2021 IDBR universe, investment intensity is the author's calculations using net gross fixed capital formation over GVA at basic prices from the 2021 ABS, management practices are taken from the 2020 Management and Expectations Survey. The source of the turnover concentration index is CMA calculations using the 2021 Business Structure Database. % of GVA in each cluster is calculated using the UK 2021 GVA by industry division published by the ONS in "Regional gross value added (balanced) by industry" (ONS, 2024). The average profit margin, IC and labour mark-up are from the ONS' dataset accompanying the publication "Trends in UK business dynamism" calculated using the 2021 ABS (ONS, 2023b).

Finally, there are three smaller clusters of industries that adjust less well to the energy price shock, namely “the disinvestors” (7% of GVA, including pharmaceuticals, arts and some scientific activities), “the wrecked” (1% of GVA, printing and reproduction media) and “the cash constrained” (3% of GVA, scientific research and advertising). These industries feature relatively less exposure to the energy price shock, mostly lower management quality, significantly lower investment intensity and relatively high profit margins.

6 Implications for policy design

This paper presents a methodology for estimating firm responses to economic shocks in near-real time, using the energy price shock from Russia’s ongoing war in Ukraine as a test case. The resulting estimates in this paper can inform policy design in two ways. First, in the short term, they provide evidence on firms’ response to the energy crisis triggered by Russia’s ongoing war in Ukraine. We show that even one year after the initial invasion, direct energy price shocks have not led to increased business deaths for more affected firms, but debt loads have increased and firms have built cash buffers, so long-term effects on firm survival remain to be seen. Updates to this paper will speak to this issue and inform policymakers in near-real time. Additionally, we see large firms invest in capital to adapt to the shock and act as “shock absorbers” by passing through less of the input price increases. Small firms on the other hand increase their stock levels and mostly pass through input price increases to their customers.

When we estimate elasticities separately for small industry cells and use a machine-learning algorithm to divide firms into archetypes, we see that not all firms cope with the increase in energy prices equally well. Large firms and those in construction and manufacturing invest in capital to mitigate the energy price shock. Other parts of the economy, and particularly small firms, rely on stock levels, cash reserves and price pass-through to weather the shock instead. Many see their debt position worsen as a result, even though we do not yet see major redundancies or bankruptcies. This implies that business support in the current crisis may need to be targeted to the specific needs of different segments of the business population. The observed heterogeneity will also force policymakers to make their value judgements explicit: is the aim to help the economy adapt as quickly as possible, or to provide aid to struggling businesses? And what weights are policymakers willing to attach to these outcomes?

Second, the elasticities estimated in this paper have policy relevance beyond the immediate crisis too. For any level of a proportional carbon tax, there is a comparable energy price shock. In other words, the short- and long-run elasticities estimated here are to some extent informative of the behavioural responses to targeted taxes and subsidies that dynamically maximise the policymaker's desired social welfare function on the path to Net Zero. What is the trade-off between the speed of transition and consumer purchasing power? How will green financing impact employment gains and losses along the transition path? How will a policy affect input reallocation and the survival of small businesses?

There are however two major differences between the energy price shock and environmental taxation that may limit the direct applicability of our estimates, and a methodological difficulty. First, environmental taxation will generally allow firms to prepare and adapt over a longer time horizon. This is particularly true given the gradual nature of conventionally proposed "climate ramps" (Nordhaus, 2007; Weitzman, 2007; Stern, 2008). Second, the uncertainty around future energy prices due to environmental taxation lies to a much larger extent within the control of policymakers. Given the direct impact uncertainty can have on firms' decisions (Bloom et al., 2007; Bloom, 2009, 2014), this is an important choice variable that this paper cannot speak to. Finally, methodologically it is unclear what the right measure of energy price exposure would be. We document that direct energy expenditure is highly correlated with both calorific measures of energy quantity in use and also with wider, indirect energy exposure at the industry level. We do not however observe these measures at the firm level. Moreover, many firms may not be directly exposed to the energy shock, at least in the short term, because their energy expenditure is covered by long-term contracts or part of the lease for the property they use. Again, we show that cash-flow and balance-sheet measures of energy expenditure are highly correlated at the industry level, but do not observe this data at the firm level.

Debates around the optimal design of environmental damage abatement incentives are not new (Metcalf, 2009). Following Acemoglu et al. (2012), a lively literature emphasises the complications and unintended consequences when designing environmental taxation to promote the switch to clean technologies. Generally a mix of carbon taxation and innovation incentives is necessary to maximise welfare dynamically, and the optimal amount of taxation of dirty innovation and production depends crucially on the substitutability of the inputs firms use. Empirical work on the global car industry (Aghion et al., 2016) and the US shale boom (Acemoglu et al., 2023) supports this view. Similarly, Phan et al. (2019) find that crude oil uncertainty can depress corporate investment in both producer and consumer countries.

Two additional strands of the literature indicate environmental taxes and subsidies need to be tailored to firms to be successful and cost-efficient. Colmer et al. (2022) and Dechezleprêtre & Kruse (2022) both find that environmental incentives affect behaviour of directly targeted firms and sectors, but not along the wider supply chain. Martin et al. (2023) find that credit constraints and firm management are key barriers for different types of green investment. Consistent with these results, this paper finds that firms' responses on the investment margin is dependent on their financial position. Additionally, it provides the necessary granular elasticities to make such targeted policy possible. Second, the comparison of alternative energy measures (for instance, using the full breakdown of fuels consumed by a firm) would allow policymakers in principle to back out partial and total fuel elasticities in line with Hyland & Haller (2018) and Alpino et al. (2023). As the former note, it is crucial to account for both inter-fuel and inter-factor substitution when considering environmental taxation. This paper shows that in addition to these margins, some firms will also adjust on pricing, output, process and survival margins.

Finally, this paper argues that access to high-quality, high-frequency and high-resolution data is fundamental to successful policymaking. By linking together commonly accessible UK data in novel ways, and exploiting under-utilised microdata, this paper combines the richness of qualitative survey data with the universal coverage of (admittedly sparse) administrative data. But we also document instances where our different data sources disagree, or where for the moment we have to rely on coarse, subjective proxies for variables that are recorded in real time in the course of the administration of fiscal and economic policy. Advances in open access to these real-time data sources, combined with judicious supplementary surveys administered and augmented by generative Large Language Models, will hopefully make this type of pre-planned, real-time evaluation of multidimensional narratives easier, and eventually commonplace.

7 Conclusion

Understanding how firms react to energy price shocks is crucial in both the short and the long run, but doing so in a timely manner, and capturing all relevant adjustment margins, is a tall order. In this paper, we bring together three components in order to do just that. First, we build a data pipeline from a variety of high-frequency firm-level administrative and survey data sources. Second, we publicly pre-register an analysis plan to discipline our analysis. Third, we explore the adaptation of firms in a shift-share design, starting from average effects on all relevant margins, then estimating heterogeneous treatment effects for dozens of industry cells, and clustering cells on their elasticities to extract behavioural firm archetypes.

Affected firms are on average no more likely to reduce labour inputs or exit the market. However, turnover expectations adjust downwards. Both large and small firms increase their cash reserves to some extent and debt indicators worsen for energy-intensive firms. Smaller firms pass through their input price increases through higher output prices. Large firms do so to a much lesser extent. Smaller firms also increase their stock levels. Only larger firms on the other hand increase their capital spending in response to the shock. When we estimate coefficients for small industry cells and cluster across response margins, we see that different firms respond to the same shocks quite differently. Few for instance adjust their capital stock to reduce their energy use.

Our results have direct policy implications in the short-term for optimal business support in the energy crisis and on the long-term path towards Net Zero. Recent papers have emphasised three features of optimal environmental incentives for firms. First, they need to take the dynamics into account as short- and long-run responses may differ. This includes the risk of bad equilibria that lower the green innovation rate in the long term. Second, they need to be firm- and sector-specific to take into account the large amount of heterogeneity in firm responses to higher energy prices. Third, a single elasticity is not enough for policymaking: firms respond on many different margins, substituting between different types of fuels, different inputs and changing prices, quantities and production processes.

This paper makes progress on all three fronts and provides policymakers with granular elasticities, in the short and in the long term to design environmental taxes and subsidies. Perhaps more importantly, it also creates a blueprint for evaluating firm responses to economic shocks in near-real time, across all relevant adjustment margins and with some discipline on the hypothesis generation. We believe this approach provides policymakers with the means to check emerging economic narratives, and design nuanced policies as shocks emerge. What shape these policies take, and how this may depend on the preferences of the policymakers themselves, is an open question for future work.

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A Data appendix

Table A.1: BICS variables

variables	Waves	description	response options
turnover change (3 cat)	67	W 6-43: How does your business' turnover for the last two weeks compare to normal expectations for this time of year? W 47-53: How does your business' turnover over the last month compare to normal expectations for this time of year? W 54-89: How did your business' turnover in [survey reference period] compare to the previous calendar month?	2-Higher than normal 1-Within normal range 0-lower than normal
turnover change (6 cat)	48	W 6-43: How does your business' turnover for the last two weeks compare to normal expectations for this time of year? W 47-53: How does your business' turnover over the last month compare to normal expectations for this time of year?	6-Turnover has increased by more than 50% 5-Turnover has increased between 20% and 50% 4-Turnover has increased up to 20% 3-Turnover has not been affected 2-Turnover has decreased between 20% and 50% 1-Turnover has decreased by up to 20% 0-Turnover has decreased by more than 50%
turnover expectations	63	W 1-23: Please explain how the coronavirus pandemic affected your business' turnover compared with normal expectations this time last year? W 24-42: What are your expectations about turnover for the next two weeks? W 43-54: What are your expectations about turnover for the next month? W 55-89: How did your business turnover in [survey reference period] compared to last month?	2-Expect turnover to increase 1-Expect turnover to stay the same 0-Expect turnover to decrease
turnover expectations	46	W 1-23: Please explain how the coronavirus pandemic affected your business' turnover compared with normal expectations this time last year? W 24-42: What are your expectations about turnover for the next two weeks? W 43-54: What are your expectations about turnover for the next month? W 55-89: How did your business turnover in [survey reference period] compared to last month?	4-Expect turnover to substantially increase 3-Expect turnover to increase a little 2-Expect turnover to stay the same 1-Expect turnover to decrease a little 0-Expect turnover to substantially decrease

Table A.2: BICS variables

variables	Waves	description	response options
trading status (6 cat)	88	W 2-89: Which of the following statements best describes your business' trading status?	6 - Currently fully trading 5 - Currently partially trading 4 - Started trading within the last two weeks after a pause in trading 3 - Paused trading but intends to restart in the next two weeks 2 - Paused trading and does not intend to restart in the next two weeks/ Has temporarily closed or paused trading / No, the business has temporarily closed or paused trading 1 - Permanently ceased trading
trading status (2 cat)	88	W 2-89: Which of the following statements best describes your business' trading status?	2 - Currently trading 1-Paused trading
price of materials	60	W 1-40: How did the prices of materials, goods or services bought by your business change in the last two weeks, compared with normal price fluctuations? W 42-52: How did the prices of materials, goods or services bought by your business change over the last month, compared with normal price fluctuations? W 55-89: How did the prices of goods and services bought by your business in [survey reference period] compared with previous calendar month?	3-Prices increased 2-Prices stayed the same 1-Some increased, some decreased 0-Prices decreased
price of goods sold	59	W 1-40: How did the prices of materials, goods or services sold by your business change in the last two weeks, compared with normal price fluctuations? W 42-52: How did the prices of materials, goods or services sold by your business change over the last month, compared with normal price fluctuations? W 55-89: How did the prices of goods and services sold by your business in [survey reference period] compared with previous calendar month?	3-Prices increased 2-Prices stayed the same 1-Some increased, some decreased 0-Prices decreased
price of goods sold expectations	40	W 1-23: What are your expectations about changes in prices of goods or services that your business will sell over the next two weeks? W 55-89: what are your expectations about the goods and services sold by your business in [month following the reference period]?	2-Prices will increase 1-Prices will stay the same 1-Prices decreased

Table A.3: BICS variables

variables	Waves	description	response options
export status (2 cat)	63	W 4-87: Has your business exported in the last 12 months?	1-Yes 0-No
export status (3 cat)	48	W 10-87: Which of the following best describes your business' export status?	2-Exported in the last 12 months 1-Exported more than 12 months ago 0-Never exported and do not have goods or services that could be developed for export / Never exported but have goods or services that could be developed for export
export change	66	W1-20: How has your business' exporting been affected by covid in the last 2 weeks? W 21-42: How does your business' exporting in the last two weeks compare with normal expectations for this time of year? W 43-53: How does your business' exporting over the last month compare with normal expectations for this time of year? W 54-89: How didi your business' exporting in [survey reference period] compare with this calendar month?	3-Exporting as normal 2-Exporting but less than normal 1-Inable to export
imports change	63	W 9-20: How has your business' importing of goods and services been affected by Covid in the last two weeks? W 21-41: How does your business' importing in the last two weeks compare with normal expectations for this time of year? W 43-53: How does your business' importing over the last month compare with normal expectations for this time of year? W 56-89: How didi your business' importing in [survey reference period] compare with this calendar month last year?	4 - Importing more than normal 3-Importing as normal 2-Importing but less than normal 1-Not been able to import
import status (2 cat)	64	W 4-34: Has your business imported goods and services in the last 12 months? W 35-89: Which of the following best describes your importing status? Yes imported more than 12 months ago/ No imported more than 12 months ago or never imported	1 - Yes 0-No
import status (3 cat)	32	W 35-89: Which of the following best describes your importing status?	2 -Imported in the last 12 months 1 -Imported more than 12 months ago 0-Never imported

Table A.4: BICS variables

variables	Waves	description	response options
capital	23	W 7-23: How has the covid pandemic affected your business capital expenditure? W 25-52: How does your business' capital expenditure for the last two weeks compare to normal expectations for this time last year?	0-Capital expenditure has stopped 1-Capital expenditure is lower than normal 2-Capital expenditure has not been affected 3-Capital expenditure is higher than normal
capital mix	29	W 7-23: How has the covid pandemic affected your business capital expenditure? W 25-52: How does your business' capital expenditure for the last two weeks compare to normal expectations for this time last year? W 55-74: What are your business' expectations for capital expenditure over the next three months?	1-Capital expenditure is lower than normal/ will decrease 2-Capital expenditure has not been affected/ will stay the same 3-Capital expenditure is higher than normal / will increase
cash reserve duration (5 cat)	46	W 4-86: How long do you think/expect your business' cash reserves will last?	0-No cash reserves 1-Less than 1 months 2-1 to 3 months 3-4 to 6 months 4-More than 6 months
cash reserve duration (2 cat)	46	W 4-86: How long do you think/expect your business' cash reserves will last?	0-No cash reserves 1-Any cash reserve duration
cash reserve duration (3 cat)	46	W 4-86: How long do you think/expect your business' cash reserves will last?	0-No cash reserves 1-Less than 1 months or 1 to 3 months 2- 4 to 6 months or More than 6 months
stock levels	51	W 7:23: How has the coronavirus pandemic affected your business' stock levels? W 23-52: How do your business' stock levels for the past two weeks, compare to normal expectations for this time last year? W 55-74: How did your business' stock levels of raw materials in [survey reference period] compare with the previous calendar month? How did your business' stock levels of finished materials in [survey reference period] compare with the previous calendar month?	0 - Stock levels were lower 1-Stock levels have not changed 2-Stock levels are higher

Table A.5: BICS variables

variables	Waves	description	response options
Risk of insolvency	43	W 18-89: What is your business' risk of insolvency?	4-The business is insolvent 3-Severe risk 2-Moderate risk 1-Low risk 0-No risk
Change in risk of insolvency	20	W 18-23: How has the coronavirus pandemic affected your risk of insolvency? W 24-46: How has your business' risk of insolvency changed in the last two weeks? W 47-51: How has your business' risk of insolvency changed in the last two months?	2-Risk has increased 1-Risk has stayed the same 0-Risk has decreased
Confidence of 3 month survival	30	W 14-69: What is your confidence you will survive the next 3 months?	3-High confidence 2-Moderate confidence 1-Low confidence 0-No confidence
Confidence will meet debt repayments	25	W 31-89: How much confidence does your business have that it will meet its debt obligations?	3-High confidence 2-Moderate confidence 1-Low confidence 0-No confidence
Confidence will meet debt repayments	25	W 31-89: How much confidence does your business have that it will meet its debt obligations?	4-Do not have any debt obligations 3-High confidence 2-Moderate confidence 1-Low confidence 0-No confidence
Indebtedness	25	W 31-89: How much confidence does your business have that it will meet its debt obligations?	2-Do not have any debt obligations 1-otherwise
Repayments compared to turnover	29	W 19-53: Over the last month, how did your business' debt repayments compare with turnover? W 57-89: In the survey reference period how did your business' debt repayments compare with turnover?	4-Repayments were more than 100% of turnover 3-Repayments were between 50% and 100% of turnover 2- Repayments were between 20% and 50% of turnover 1-Repayments were up to 20% of turnover
Repayments compared to turnover	29	W 19-53: Over the last month, how did your business' debt repayments compare with turnover? W 57-89: In the survey reference period how did your business' debt repayments compare with turnover?	4-Repayments were more than 100% of turnover 3-Repayments were between 50% and 100% of turnover 2- Repayments were between 20% and 50% of turnover 1-Repayments were up to 20% of turnover 0-No repayments

Table A.6: BICS variables

variables	Waves	description	response options
Made permanently redundant	66	W 5-53: In the last two weeks, approximately what percentage of your workforce were made permanently redundant? W 55-89: In [month previous to survey reference period] what percentage of your workforce were made permanently redundant?	%
share of workers expect to make redudant	28	W 8-16: In the next two weeks, approximately what percentage of your workforce will be made redundant? W 15-	%
redundancy expectations	32	Does your business expect to make any of your workforce redundant over the next 3 months?	0-No 1-Yes
Hybrid working	66	W 5-53: In the last two weeks, approximately what percentage of your workforce were hybrid working? W 55-89: In [month previous to survey reference period] what percentage of your workforce were hybrid working?	%
Working from home	66	W 5-53: In the last two weeks, approximately what percentage of your workforce were working from home? W 55-89: In [month previous to survey reference period] what percentage of your workforce were working from home?	%
Working from usual place of work	66	W 5-53: In the last two weeks, approximately what percentage of your workforce were working from the usual place of work? W 55-89: In [month previous to survey reference period] what percentage of your workforce were working from the usual place of work?	%

Figure A.1: Rurefs by wave

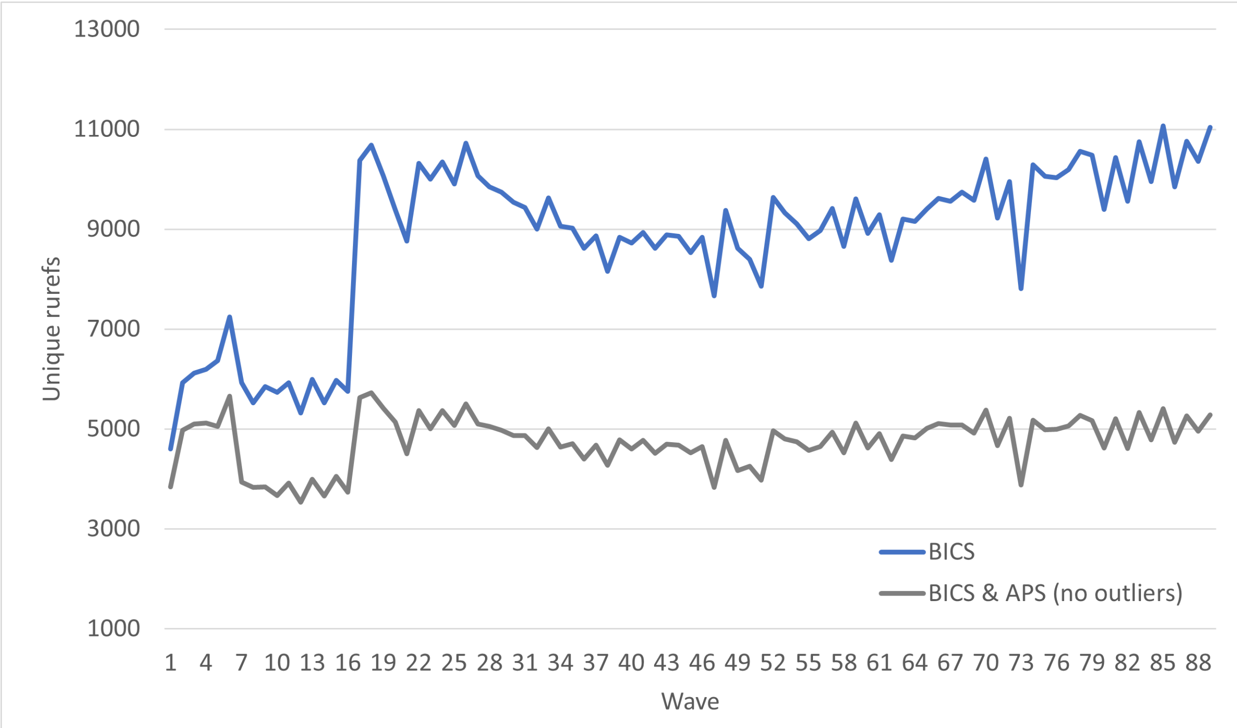


Table A.7: BICS variable descriptives

Variables	BICS & APS		BICS only	
	mean	sd	mean	sd
Turnover change (3 cat)	0.789	0.716	0.800	0.680
Turnover change (6 cat)	2.377	1.275	2.392	1.254
Turnover expectations (3 cat)	1.061	0.594	1.022	0.599
Turnover expectations (5 cat)	2.042	0.667	1.967	0.719
Export status (2 cat)	0.388	0.487	0.188	0.390
Export status(3 cat)	0.638	0.909	0.305	0.695
Export change	2.773	0.587	2.812	0.616
Prices of materials	2.232	0.594	2.338	0.607
Prices of goods and services sold	2.047	0.496	2.080	0.538
Prices of goods sold expectations	2.144	0.408	2.210	0.462
Capital	1.596	0.762	1.640	0.858
Capital (backward & forward looking)	1.864	0.581	1.973	0.585
Import change	2.671	0.645	2.665	0.695
Import status (2 cat)	0.488	0.500	0.224	0.417
Import status (3 cat)	1.026	0.974	0.496	0.840
Stock levels	1.028	0.608	0.931	0.598
Cash reserves (2 cat)	3.154	1.080	2.743	1.235
Cash reserves (3 cat)	0.965	0.183	0.922	0.268
Cash reserves (6 cat)	1.679	0.536	1.493	0.637
Hybrid working (%)	21.714	33.601	19.528	34.822
Working from home (%)	17.045	29.060	15.605	31.294
Working from normal place of work (%)	61.554	38.801	56.353	43.697
Redundancies (%)	0.277	2.639	0.345	4.054
% of workers expect to make redundant	2.300	8.730	4.789	15.575
Redundancy expectations	0.067	0.250	0.045	0.207
Confidence will meet debt repayments (5 cat)	2.753	0.473	2.601	0.603
Confidence will meet debt repayments (4 cat)	3.017	0.660	2.964	0.803
Indebtedness	1.211	0.408	1.259	0.438
Repayments compared to turnover (4 cat)	1.341	0.733	1.558	0.925
Repayments compared to turnover (5 cat)	0.867	0.871	0.964	1.050
Risk of insolvency	0.729	0.645	0.794	0.731
Change in the risk of insolvency	1.162	0.449	1.181	0.471
Confidence of 3 month survival	2.731	0.491	2.528	0.647
Trading status (2 cat)	5.868	0.685	5.669	1.055
Trading status (6 cat)	1.975	0.155	1.944	0.231

Table A.8: Energy intensity cross-sectional regression on a basic set of firm characteristics

Energy intensity (APS)	Estimate		
	(1)	(2)	(3)
both in BICS & APS	-0.00224	-0.000836	
	(0.00313)	(0.00361)	
10-49 employees	-0.0354***	-0.0875***	-0.119**
	(0.00479)	(0.00681)	(0.0427)
50-99 employees	-0.0380***	-0.0960***	-0.116**
	(0.00573)	(0.00861)	(0.0425)
10-249 employees	-0.0387***	-0.0972***	-0.116**
	(0.00516)	(0.00803)	(0.0425)
more than 250 employees	-0.0479***	-0.108***	-0.129**
	(0.00597)	(0.00905)	(0.0425)
East of England	-0.00755	-0.00697	-0.00591
	(0.00540)	(0.00448)	(0.00777)
London	-0.0489***	-0.0472***	-0.0424***
	(0.00507)	(0.00556)	(0.00721)
North East	0.0120	0.0144	0.0102
	(0.00811)	(0.00777)	(0.0139)
North West	-0.00469	-0.0000485	-0.00347
	(0.00450)	(0.00490)	(0.00805)
Scotland	0.000847	-0.000339	0.00298
	(0.00481)	(0.00493)	(0.00694)
South East	-0.0212***	-0.0201***	-0.0244**
	(0.00397)	(0.00398)	(0.00746)
South West	-0.00904*	-0.00885*	-0.00541
	(0.00428)	(0.00423)	(0.00679)
Wales	0.0179**	0.0109	0.0116
	(0.00540)	(0.00601)	(0.00884)
West Midlands	-0.00476	-0.00357	0.000331
	(0.00438)	(0.00441)	(0.00735)
Yorkshire and the Humber	-0.00264	-0.00279	-0.00544
	(0.00518)	(0.00400)	(0.00621)
Mining & quarrying	-0.0713	-0.0784	0.175***
	(0.0448)	(0.0482)	(0.0323)
Manufacturing	-0.121***	-0.126***	0.0167
	(0.0100)	(0.0127)	(0.0187)
Electricity, gas, steam	0.0501***	0.0766***	0.695***
	(0.00916)	(0.0118)	(0.0195)
Water supply, sewerage, waste management	-0.0250	-0.0332*	0.126***
	(0.0138)	(0.0156)	(0.0250)
Construction	-0.106***	-0.122***	0.0279
	(0.0215)	(0.0203)	(0.0264)
Wholesale & retail, repair of motor vehicles	-0.0834***	-0.0902***	0.0644**
	(0.0106)	(0.0124)	(0.0201)
Transportation & storage	0.0620	0.0695	0.234**
	(0.0533)	(0.0610)	(0.0783)
Accomodation & food services	-0.101***	-0.109***	0.0429
	(0.0155)	(0.0196)	(0.0253)
Information & communication	-0.134***	-0.117***	0.0259
	(0.0117)	(0.0132)	(0.0203)
Financial & Insurance activities	-0.156***	-0.153***	-0.00730
	(0.00935)	(0.0119)	(0.0185)
Real estate	-0.121***	-0.116***	0.0202
	(0.00907)	(0.0117)	(0.0181)
Professional, scientific & technical activities	-0.137***	-0.109***	0.00576
	(0.0119)	(0.0145)	(0.0188)
Admin & support services	-0.0965***	-0.0824***	0.0510*
	(0.0168)	(0.0177)	(0.0239)
Education	-0.116***	-0.0978***	0.0344
	(0.00907)	(0.0117)	(0.0184)
Human health & social work	-0.100***	-0.0944***	0.0422*
	(0.0154)	(0.0167)	(0.0182)
Arts, entertainment & recreation	-0.0670***	-0.0589***	0.102***
	(0.0167)	(0.0154)	(0.0205)
Other services	-0.0765***	-0.0880***	0.0861**
	(0.0113)	(0.0138)	(0.0289)
Constant	0.246***	0.303***	0.178***
	(0.0101)	(0.0135)	(0.0471)
R^2	0.103	0.182	0.193
N	32780	26311	8391

Notes: Table presents estimates of region, industry section and sizeband dummies regressed against energy intensity. Energy intensity granularity is at ruref level and reflects the ratio of energy purchases to total purchases in the 2018 APS or in the 2017 APS if 2018 is missing. (1) is estimated on the entire sample of 2017-2018 firms in the APS, (2) strips the sample of outliers by dropping firms below the 1st and above the 99th percentile of energy intensity within their industry division. (3) strips the sample of outliers and uses only firms that appear in both the APS and the BICS. The base categories for the industry, region and sizeband dummies are firms in Agriculture, Forestry and Fishing, in East Midlands with 0-9 employees. For the matched sample dummy the base category are firms only in the APS. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors by 2 digit industry with stars indicating *** $p<0.001$, ** $p<0.01$, * $p<0.05$

Table A.9: Average energy intensity total and specific fuels

Energy item	Energy intensity (%)								
	mean			standard deviation			median		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Total energy intensity	9.348	10.878	12.537	12.786	15.876	14.955	4.448	4.444	6.667
Total energy intensity (2018)	9.358	10.832	12.065	12.733	15.559	14.718	4.572	4.660	6.316
Total energy intensity (2017)	8.996	10.384	11.667	12.513	15.288	14.414	4.302	4.320	5.980
Diesel	3.489	4.188	4.830	9.385	11.070	11.041	0.000	0.000	0.000
Electricty	3.856	3.654	4.225	6.667	7.679	7.118	1.766	1.098	1.818
Petrol	0.667	1.478	1.648	3.293	6.642	6.372	0.000	0.000	0.000
Gas supply from mains	0.776	0.782	0.933	2.314	2.820	2.924	0.089	0.000	0.000
Gas oils	0.244	0.353	0.418	1.687	2.756	2.921	0.000	0.000	0.000
Lubricating petroleum gas	0.084	0.114	0.132	0.956	1.434	1.427	0.000	0.000	0.000
Liquefied petroleum gas	0.074	0.102	0.113	0.696	1.436	1.324	0.000	0.000	0.000
Other fuel oils	0.036	0.064	0.074	0.795	1.390	1.437	0.000	0.000	0.000
Steam and air conditioning	0.048	0.041	0.050	0.618	0.703	0.776	0.000	0.000	0.000
Natural gas, liquefied/gaseous	0.015	0.028	0.033	0.395	1.147	1.205	0.000	0.000	0.000
Coke oven products	0.026	0.024	0.027	0.842	0.854	0.882	0.000	0.000	0.000
Crude petroleum and tar sands	0.006	0.019	0.022	0.570	1.184	1.272	0.000	0.000	0.000
Other refined petroleum products	0.010	0.016	0.019	0.443	0.771	0.817	0.000	0.000	0.000
Coal and lignite	0.018	0.016	0.016	1.056	0.876	0.780	0.000	0.000	0.000

Notes: Table presents average, median and standard deviation of firm total energy intensity (EI_i) and energy intensity for specific fuels using a firm's 2018 APS ratio of energy purchases to total purchases or data from 2017 when 2018 data is missing. Columns labeled with (1) correspond to firms that appear in the matched BICS APS sample stripped of outliers by dropping firms below the 1st and above the 99th percentile of EI_i within their industry division, (2) for all firms in the 2018-2017 APS (3) for all firms in the 2018-2017 APS stripped of outliers.

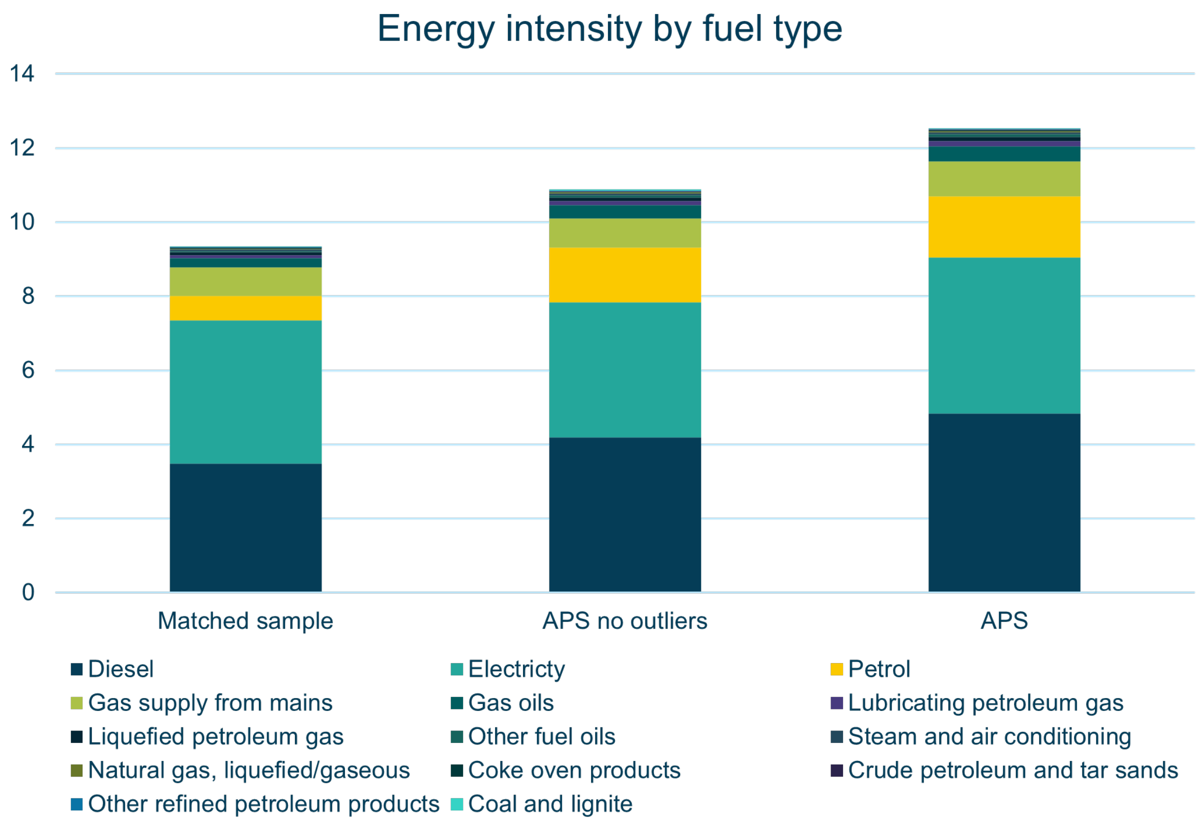


Figure A.2: Composition of average energy intensity by specific fuels

Table A.10: Energy intensity by industry division ranked in different firm samples

Sic 2 digits	Industry description	(1)		(2)		(3)		(4)		(5)		(Outlier %)	
		rank	EI_i	rank	EI_i	rank	EI_i	rank	EI_i	rank	EI_i	(1)	(2)
35	Electricity, gas, steam and air conditioning supply	1	.	5	0.239	5	0.266	1	.	1	.	12.8	.
49	Land transport and transport via pipelines	2	0.419	1	0.374	1	0.411	2	0.430	2	0.421	11.2	0.6
37	Sewerage	3	0.259	7	0.232	8	0.232	3	0.310	3	0.247	0.0	0.0
08	Other mining and quarrying	4	0.242	6	0.234	6	0.249	4	0.251	4	0.221	8.5	0.0
36	Water collection, treatment and supply	5	0.217	10	0.193	10	0.193	5	0.238	6	0.202	0.0	0.0
92	Gambling and betting activities	6	.	13	0.175	13	0.180	14	.	5	.	6.3	.
53	Postal and courier activities	7	0.186	3	0.298	2	0.312	11	0.156	7	0.192	4.5	2.9
52	Warehousing and support activities for transportation	8	0.179	15	0.171	15	0.177	6	0.178	11	0.161	8.9	2.9
87	Residential care activities	9	.	33	0.130	37	0.131	7	.	13	.	3.5	.
05	Mining of coal and lignite	10	.	11	.	12	.	9	.	10	.	.	.
38	Waste collection, treatment and disposal activities; materials recovery	11	0.162	12	0.176	14	0.177	13	0.149	12	0.160	3.9	1.3
80	Security and investigation activities	12	0.162	18	0.159	17	0.169	17	0.139	9	0.167	8.5	3.4
96	Other personal service activities	13	0.160	29	0.138	29	0.150	10	0.164	14	0.148	12.1	5.3
93	Sports activities and amusement and recreation activities	14	0.154	23	0.148	21	0.158	12	0.150	15	0.143	9.9	2.5
12	Manufacture of tobacco products	15	.	21	.	28	.	60	.	8	.	.	.
45	Wholesale & retail trade & repair of motor vehicles	16	0.148	22	0.150	23	0.155	15	0.148	16	0.140	7.4	0.8
77	Rental and leasing activities	17	0.146	24	0.147	19	0.163	16	0.145	17	0.134	14.1	3.1
39	Remediation activities and other waste management services.	18	0.140	19	0.155	25	0.155	8	.	18	0.131	0.0	0.0
23	Manufacture of other non-metallic mineral products	19	0.130	30	0.134	35	0.133	20	0.125	20	0.127	3.0	0.0
47	Retail trade, except of motor vehicles and motorcycles	20	0.125	28	0.142	32	0.139	19	0.125	22	0.119	4.7	1.4
91	Libraries, archives, museums and other cultural activities	21	0.124	31	0.133	36	0.133	18	0.133	19	0.127	0.0	0.0
81	Services to buildings and landscape activities	22	0.122	17	0.161	16	0.172	21	0.121	21	0.123	11.1	4.2
55	Accommodation	23	0.113	34	0.126	38	0.123	24	0.115	23	0.107	3.5	0.5
24	Manufacture of basic metals	24	0.108	43	0.101	52	0.098	23	0.117	29	0.094	4.3	3.1
46	Wholesale trade, except of motor vehicles and motorcycles	25	0.108	35	0.118	40	0.119	26	0.107	24	0.106	7.8	2.6
95	Repair of computers and personal and household goods	26	0.107	14	0.171	11	0.191	22	0.118	36	0.079	10.6	3.0
43	Specialised construction activities	27	0.106	26	0.144	26	0.152	25	0.109	27	0.099	11.7	1.1
02	Forestry and logging	28	.	9	0.193	9	0.208	78	.	26	.	10.1	.
90	Creative, arts and entertainment activities	29	0.096	60	0.080	42	0.116	28	0.099	28	0.097	35.7	12.9
22	Manufacture of rubber and plastic products	30	0.095	40	0.105	47	0.102	27	0.106	30	0.088	2.3	1.4
33	Repair and installation of machinery and equipment	31	0.093	32	0.132	34	0.137	38	0.075	25	0.103	9.5	3.0
20	Manufacture of chemicals and chemical products	32	0.091	44	0.100	49	0.101	30	0.091	35	0.079	9.7	2.9
42	Civil engineering	33	0.089	27	0.143	22	0.156	29	0.096	37	0.078	13.2	0.0
86	Human health activities	34	0.088	42	0.103	39	0.121	36	0.078	31	0.088	19.2	5.0
11	Manufacture of beverages	35	0.086	41	0.104	46	0.106	33	0.082	32	0.088	8.4	0.0
61	Telecommunications	36	0.084	39	0.106	44	0.110	31	0.083	34	0.080	8.9	3.6
63	Information service activities	37	0.082	56	0.083	53	0.097	34	0.081	33	0.086	23.0	11.1
16	Manufacture of wood and of products of wood and cork, except furniture	38	0.077	46	0.095	54	0.097	41	0.071	41	0.070	5.1	2.0
85	Education	39	0.075	49	0.092	43	0.113	42	0.071	47	0.061	23.3	4.8
21	Manufacture of basic pharmaceutical products	40	0.073	71	0.065	75	0.065	37	0.077	38	0.072	0.0	0.0
13	Manufacture of textiles	41	0.072	50	0.088	57	0.087	39	0.075	39	0.071	2.9	0.0
62	Computer programming, consultancy and related activities	42	0.072	72	0.064	55	0.094	48	0.064	46	0.062	41.7	28.0
50	Water transport	43	.	25	0.146	30	0.146	51	.	56	.	0.0	.
25	Manufacture of fabricated metal products, except machinery and equipment	44	0.070	53	0.085	60	0.083	45	0.067	42	0.069	3.8	0.6
59	Motion picture, video, TV & music production, sound recording	45	0.069	55	0.084	50	0.101	32	0.082	54	0.057	25.2	16.4
17	Manufacture of paper and paper products	46	0.069	58	0.082	63	0.079	43	0.070	51	0.060	2.6	0.0
78	Employment activities	47	0.068	74	0.062	71	0.073	46	0.067	45	0.063	23.4	15.8
31	Manufacture of furniture	48	0.068	59	0.080	61	0.081	57	0.053	40	0.071	4.9	0.0
82	Office administrative, office support & other business support	49	0.066	38	0.106	24	0.155	49	0.063	48	0.061	37.7	14.2
56	Food and beverage service activities	50	0.066	52	0.087	59	0.083	47	0.064	53	0.057	6.5	3.7
32	Other manufacturing	51	0.064	54	0.084	58	0.085	44	0.069	59	0.051	6.0	1.7
68	Real estate activities	52	0.064	51	0.087	45	0.109	50	0.061	52	0.058	27.8	7.9
27	Manufacture of electrical equipment	53	0.063	65	0.073	70	0.074	40	0.071	49	0.061	6.8	1.5
10	Manufacture of food products	54	0.062	57	0.082	62	0.079	55	0.056	50	0.060	4.9	0.7
79	Travel agency, tour operator & other related activities	55	0.061	69	0.070	64	0.077	35	0.079	43	0.068	18.4	7.0
71	Architectural & engineering activities	56	0.060	37	0.110	20	0.161	53	0.058	55	0.055	37.0	2.9
30	Manufacture of other transport equipment	57	0.057	47	0.095	48	0.101	52	0.060	61	0.050	13.1	4.5
60	Programming and broadcasting activities	58	0.055	78	0.055	79	0.055	61	0.047	64	0.045	0.0	0.0
28	Manufacture of machinery and equipment n.e.c.	59	0.055	66	0.072	72	0.070	59	0.049	58	0.052	3.6	0.7
74	Other professional, scientific and technical activities	60	0.054	45	0.097	33	0.137	71	0.032	44	0.066	36.3	6.0
18	Printing and reproduction of recorded media	61	0.054	62	0.075	68	0.074	56	0.055	62	0.049	5.0	0.0
72	Scientific research and development	62	0.052	79	0.048	77	0.058	62	0.046	57	0.053	27.9	7.4
75	Veterinary activities	63	0.051	67	0.072	66	0.076	54	0.058	67	0.041	12.9	0.0
65	Insurance and pension funding, not compulsory social security	64	.	84	0.026	84	0.024	88	.	60	.	18.9	.
73	Advertising and market research	65	0.046	76	0.060	65	0.076	58	0.051	70	0.035	27.8	13.4
26	Manufacture of computer, electronic and optical products	66	0.045	73	0.063	76	0.063	63	0.045	66	0.042	8.6	0.0
15	Manufacture of leather and related products	67	0.044	80	0.047	82	0.047	73	0.029	63	0.047	0.0	0.0
14	Manufacture of wearing apparel	68	0.042	63	0.075	67	0.075	68	0.038	65	0.045	0.0	0.0
29	Manufacture of motor vehicles, trailers and semi-trailers	69	0.040	75	0.060	80	0.055	66	0.042	68	0.036	2.7	0.7
06	Extraction of crude petroleum and natural gas	70	.	64	0.074	69	0.074	67	.	74	.	0.0	.
70	Activities of head offices; management consultancy activities	71	0.039	68	0.071	31	0.144	65	0.043	72	0.033	55.3	21.0
41	Construction of buildings	72	0.038	61	0.078	56	0.089	69	0.035	69	0.035	22.3	2.5
69	Legal and accounting activities	73	0.035	77	0.057	74	0.065	70	0.034	73	0.033	22.4	13.1
01	Crop & animal production, hunting & related activities	74	.	8	0.218	7	0.235	64	.	77	.	7.2	.
58	Publishing activities	75	0.027	83	0.040	83	0.042	74	0.026	75	0.022	15.3	5.3
64	Financial service activities, except insurance and pension funding	76	.	82	0.041	81	0.048	72	.	71	.	28.6	.
88	Social work activities without accommodation	77	.	48	0.095	51	0.100	75	.	81	.	9.7	.
66	Activities auxiliary to financial services and insurance activities	78	0.020	81	0.045	78	0.056	76	.	76	.	26.0	8.3
09	Mining support service activities	79	.	70	0.069	73	0.069	77	.	85	.	0.0	.
19	Manufacture of coke and refined petroleum products	80	.	2	0.305	3	0.305	86	.	84	.	0.0	.
51	Air transport	81	.	20	0.152	27	0.152	82	.	82	.	0.0	.
99	Activities of extraterritorial organisations and bodies	82	.	89	.	87	.	80	.	88	.	.	.
98	Undifferentiated goods & services activities of households	83	.	88	.	86	.	87	.	78	.	.	.
07	Mining of metal ores	84	.	16	.	18	.	79	.	86	.	.	.
84	Public administration and defence; compulsory social security	85	.	85	.	85	.	81	.	87	.	.	.
97	Activities of households as employers of domestic personnel	86	.	86	.	88	.	84	.	80	.	.	.
03	Fishing and aquaculture	87	.	4	0.267	4	0.285	83	.	83	.	9.4	.
94	Activities of membership organisations	88	.	36	0.117	41	0.117	85	.	79	.	0.0	.

Notes: Table presents average energy intensity (EI_i) by 2 digit industry using the 2018 APS or 2017 when 2018 is missing. The cells show the average ratio of a firm's energy purchases to total purchases in a given industry. Cells have been blanked for disclosure. Column (1) shows average EI_i and respective industry rank in the matched BICS APS sample stripped of outliers by dropping firms below the 1st and above the 99th percentile of EI_i within their industry division, (2) shows average EI_i and respective rank in the entire APS sample of firms, (3) shows average EI_i and respective rank in the entire APS sample of firms stripped of outliers (4) shows average EI_i and respective industry rank in the matched BICS APS 2018 sample stripped of outliers (5) the same as (4) but for 2017. Columns outliers show the share of firms in a given industry dropped under our outliering method. Column (1) shows the share dropped in the entire APS sample whereas column (2) the share dropped in the matched BICS APS sample.

Figure A.3: Distribution of industry group average energy intensities by employment size-band

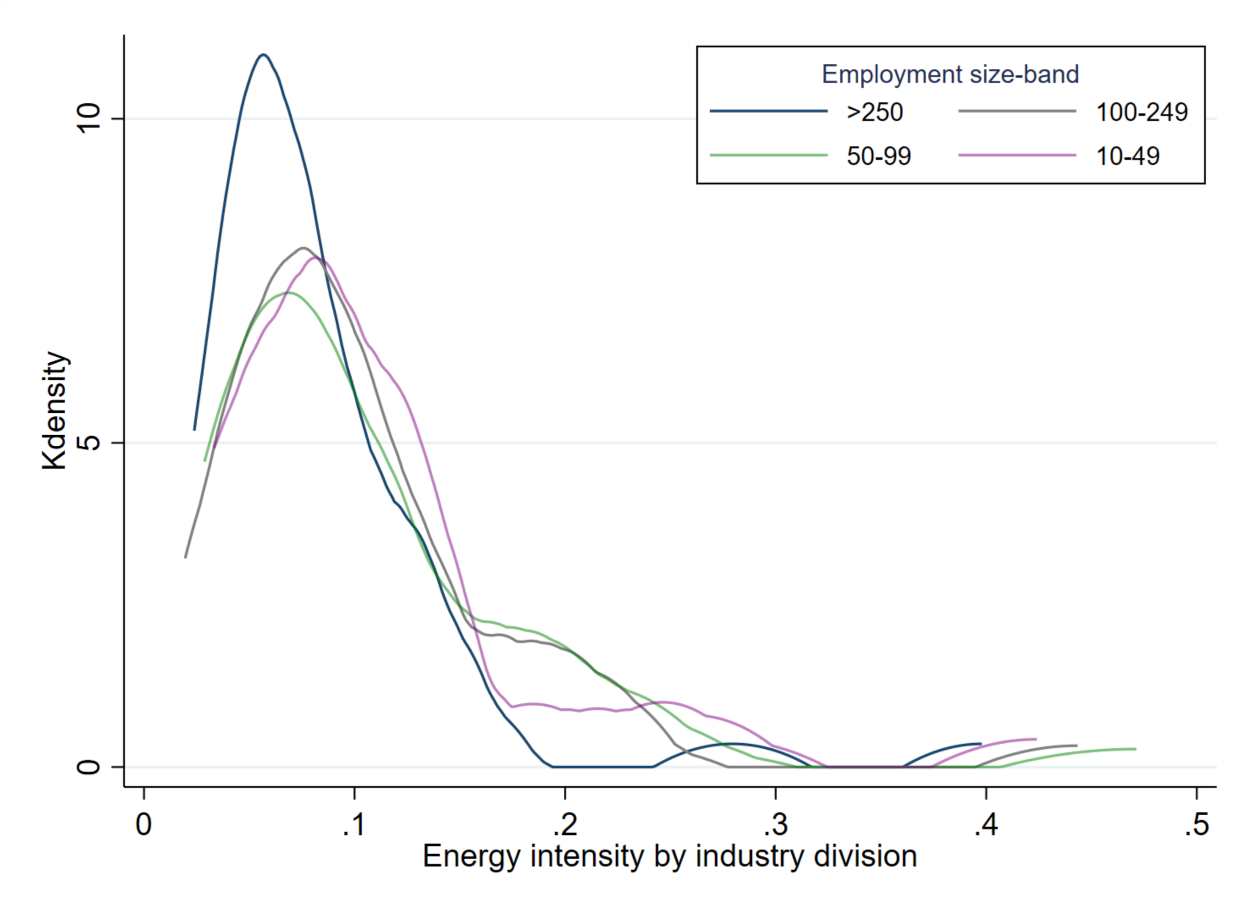


Figure A.4: Gross calorific tones of energy used compared to APS energy intensity measure by 2 digit industry

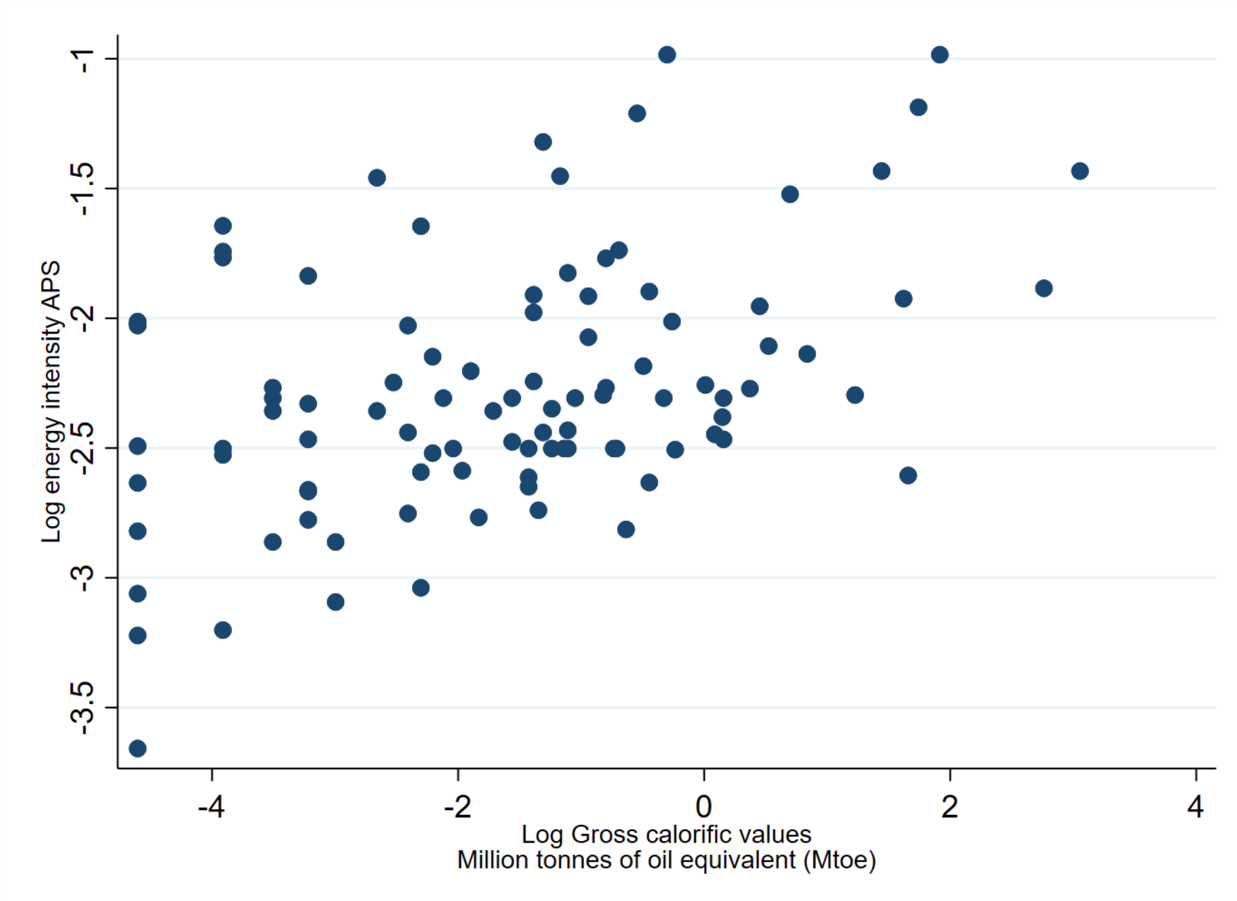
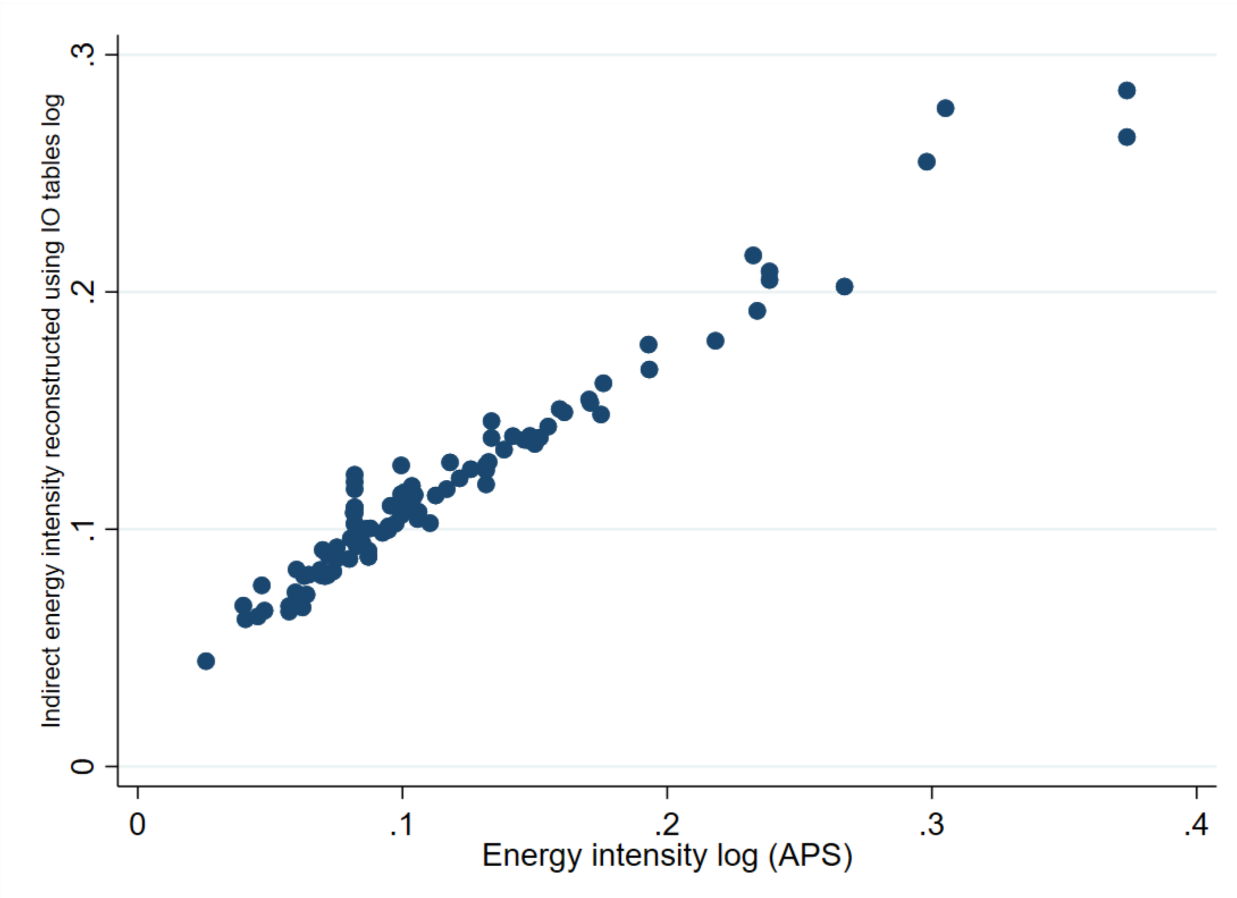
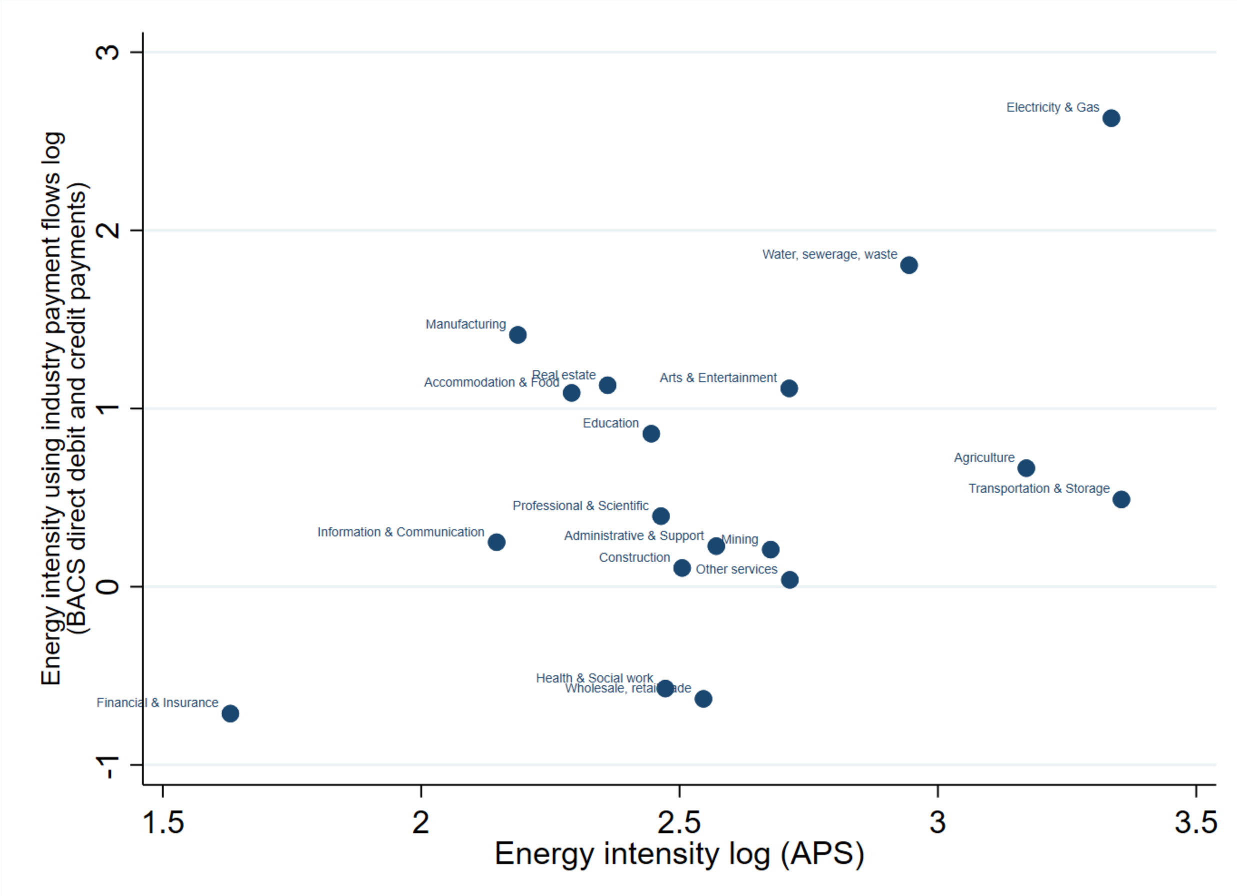


Figure A.5: Indirect energy intensity against direct energy intensity measure



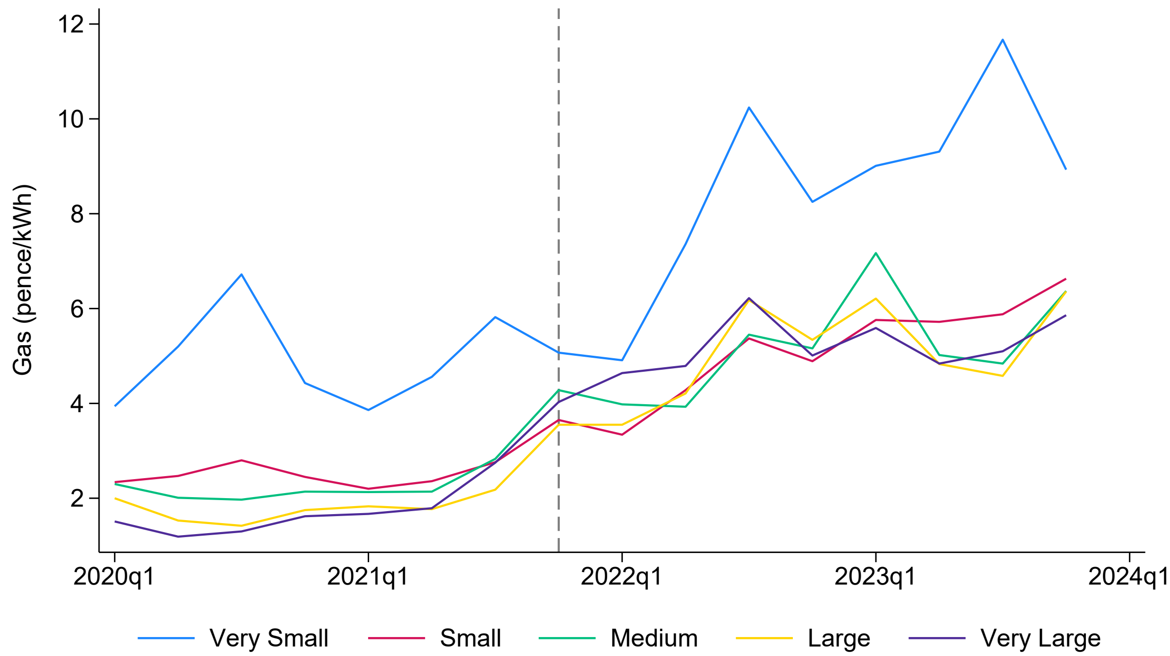
Notes: Figure suggests that using the direct energy intensity measure that we obtain from the survey-based measures serves as a good proxy for the overall energy intensity at the second level taking into account input-output relationships and embodied energy intensity in intermediate good consumption.

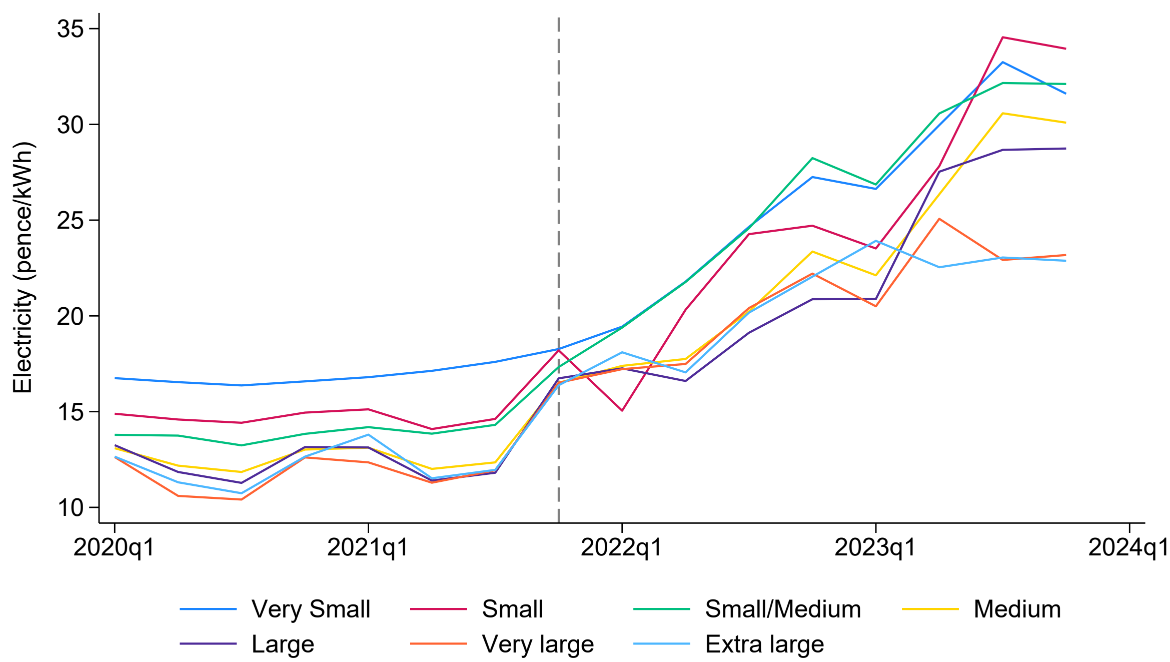
Figure A.6: Energy intensity in the APS against BACS transaction energy intensity



Notes: Figure plots the energy intensity from the survey-based measure that we use across industries on the horizontal against a payment-flow based energy intensity measure that can be derived from industry-to-utility transaction level payment flows data. We observe that the survey based measure and the transaction-level data are highly correlated.

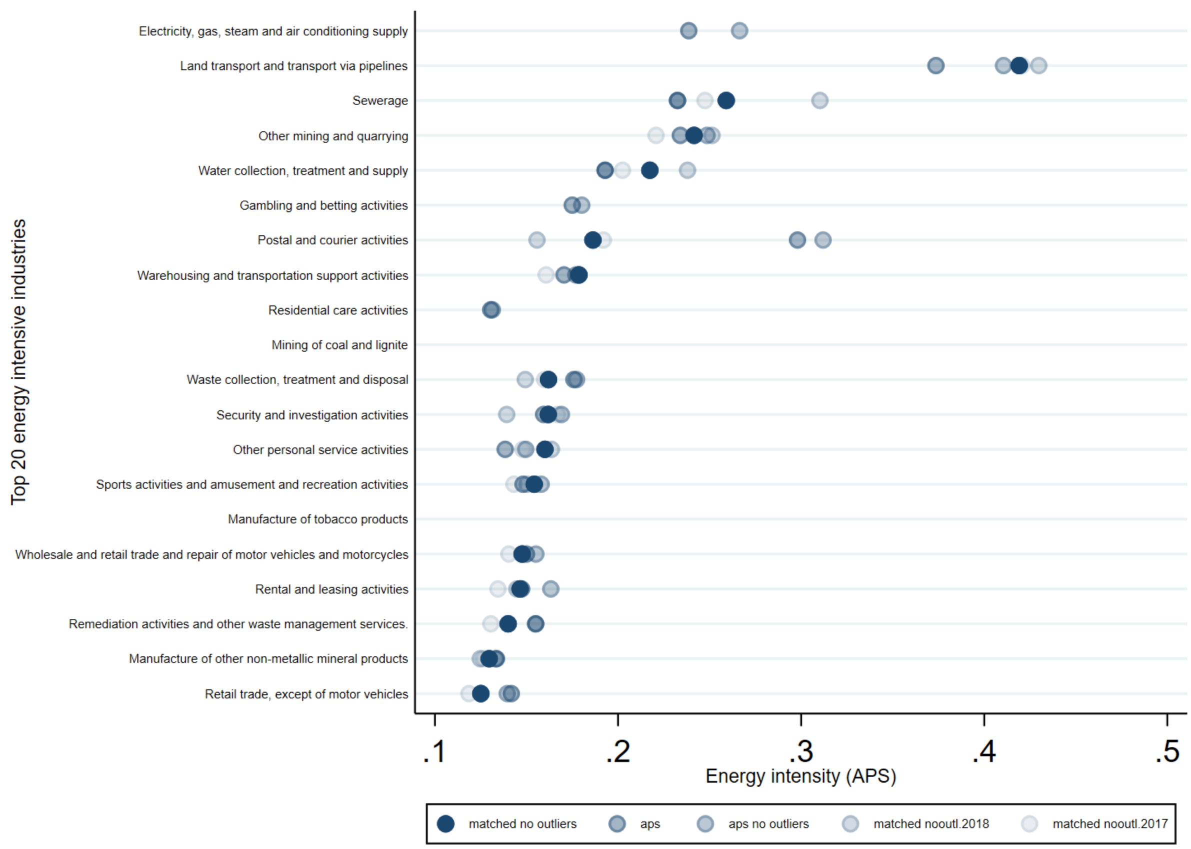
Figure A.7: Prices of gas and electricity purchased by non-domestic consumers in different consumption bands in the United Kingdom





The date come from "Non-Domestic Energy Prices" statistics published by the Department for Energy Security and Net Zero on 28th March 2024. The prices include the Climate Change Levy (CCL) equivalent to 0.7p/kWh for electricity and 0.4-0.7p/kWh for gas. The CCL does not affect the relative trends between the consumers of different size bands. For gas, very small consumption corresponds to annual consumption less than 278 MWh, small - 278-2,777, medium - 2,778-27,777, large - 27,778 - 277,777, very large - 277,778 - 1,111,112. For electricity: very small corresponds to annual consumption of 0-20 MWh, small - 20-499, small/medium - 500 - 1,999, medium - 2,000 - 19,999, large - 20,000 - 69,999, very large - 70,000 - 150,000, extra large - ¿150,000.

Figure A.8: Top 20 energy intensive industries



B Institutional details

The UK government introduced the ”Energy Bill Relief Scheme” (EBRS) which ran from 1st October 2022 to 31st March 2023. The scheme was replaced by the Energy Bills Discount Scheme which supported businesses and organisations from 1 April 2023.

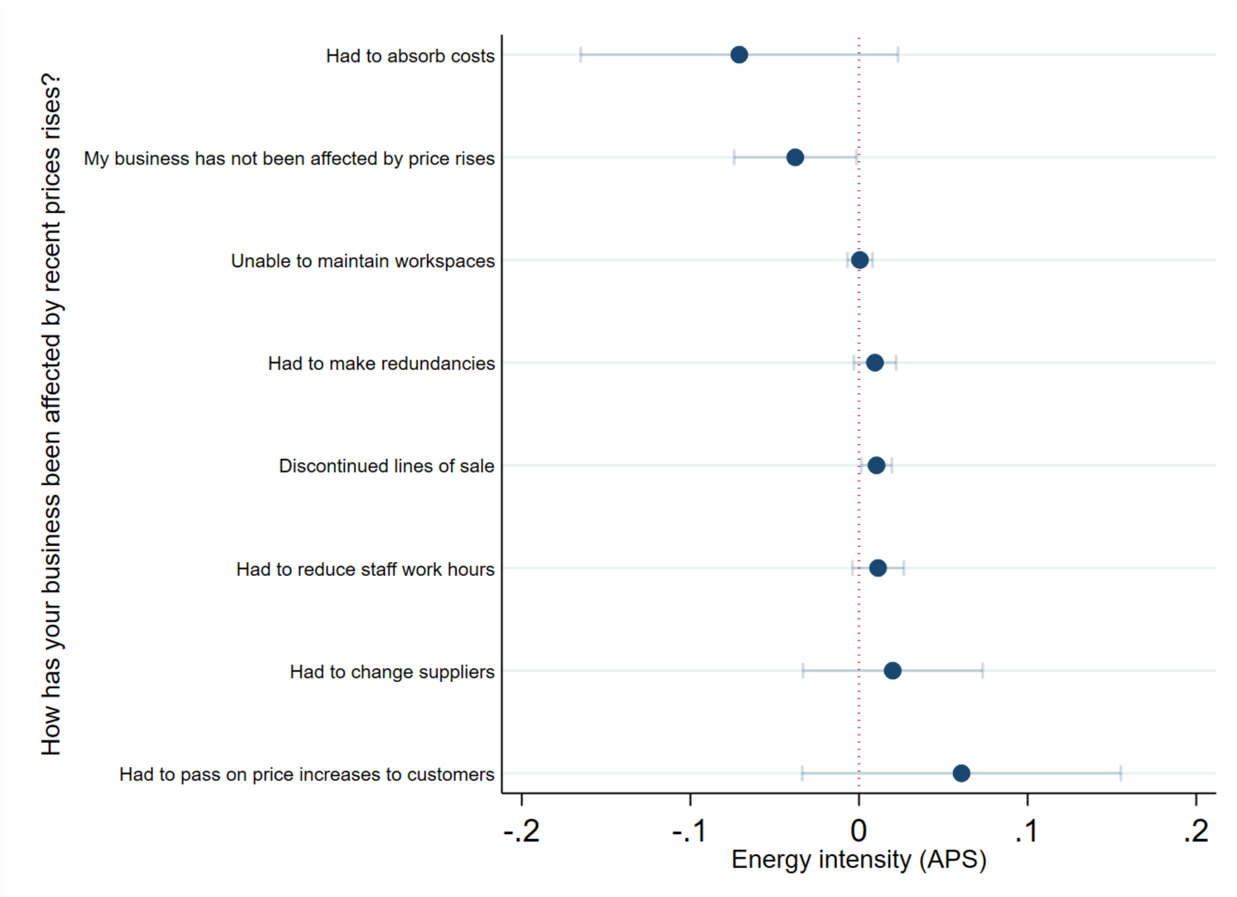
The scheme was available to everyone with a non-domestic utilities contract including businesses, charities and public sector organisations who were on existing fixed price contracts that were agreed on or after December 2021, who were signing new fixed price contracts, who were on deemed/out of contract or standard variable tariffs, on flexible purchase or similar contracts, or on “Day Ahead Index” tariffs for Northern Ireland.

Under the scheme, suppliers automatically applied a reduction to the bills of all eligible non-domestic customers. The discount was applied to the estimated wholesale portion of the unit price compared to a baseline “government supported price”. For all non-domestic energy users in Great Britain and Northern Ireland the government supported price was set at 21.1 pence per KWh and gas at 7.5 pence per KWh. This price was based on the implied wholesale element of the Energy Price Guarantee. For fixed contracts the discount reflected the difference between the government supported price and the relevant wholesale reference price for the day the contract was agreed. Customers who signed their fixed rate contract before 1 December 2021 were not eligible for support as they would not have been exposed to volatile wholesale prices. For variable, deemed and all other contracts, the discount reflects the difference between the government-supported price and relevant wholesale price, subject to a “maximum discount” of £345 per MWh for electricity and £91 per MWh for gas.

The UK government offered a fixed payment of £150 to all UK non-domestic consumers who are off the gas grid and use alternative fuels, with additional “top-up” payments for large users of heating oil, based on actual usage. These schemes excluded non-domestic organisation where gas and/or electricity was not supplied via a licensed supplier. Some large energy users could protect themselves from price volatility exposure by “hedging” in the energy or financial markets. If certain criteria of exposure were met, the level of EBRS support was amended by the energy supplier to account for this.

C Figures and tables

Figure C.1: Relationship between energy expenditure share and self-reported impacts of the energy price rise.



Notes: Figure shows the coefficient of energy intensity in a cross sectional regression of firms' responses to the question "How has your business been affected by recent energy price rises?" asked every 2 waves between Waves 52 - 89. Each response is coded as zero if a business has not reported taking this action and one if it has. We can't distinguish non-response to the question from reporting not taking this action. We control for the firm's employment size band, 5 digit industry and region. Standard errors are clustered by 2 digit industry.

Table C.1: Average treatment effects for firms' survival in the LBD

Survival (LBD)		Estimate (ξ Treatment $\times$ Energy intensity) all	large	sme
Log employment (LBD)	ξ	0.0186	-0.0615***	0.0422***
	se	(0.0177)	(0.0212)	(0.0149)
	R^2	0.985	0.985	0.979
	N	299650	69542	230000
Local sites (LBD)	ξ	-0.0718	-1.988	0.0439
	se	(0.497)	(2.137)	(0.0400)
	R^2	0.964	0.963	0.920
	N	285430	67684	217580
Survival (LBD)	ξ	-0.0926***	0.00806	-0.100***
	se	(0.0224)	(0.0233)	(0.0226)
	R^2	0.632	0.651	0.637
	N	299790	69542	230141

Notes: Table represents estimated treatment effects with firm and quarter fixed effects. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors by 2 digit industry with stars indicating *** p<0.01, ** p<0.05, * p<0.10

Figure C.2: Dynamic effects for key margins of adjustment, by firm size

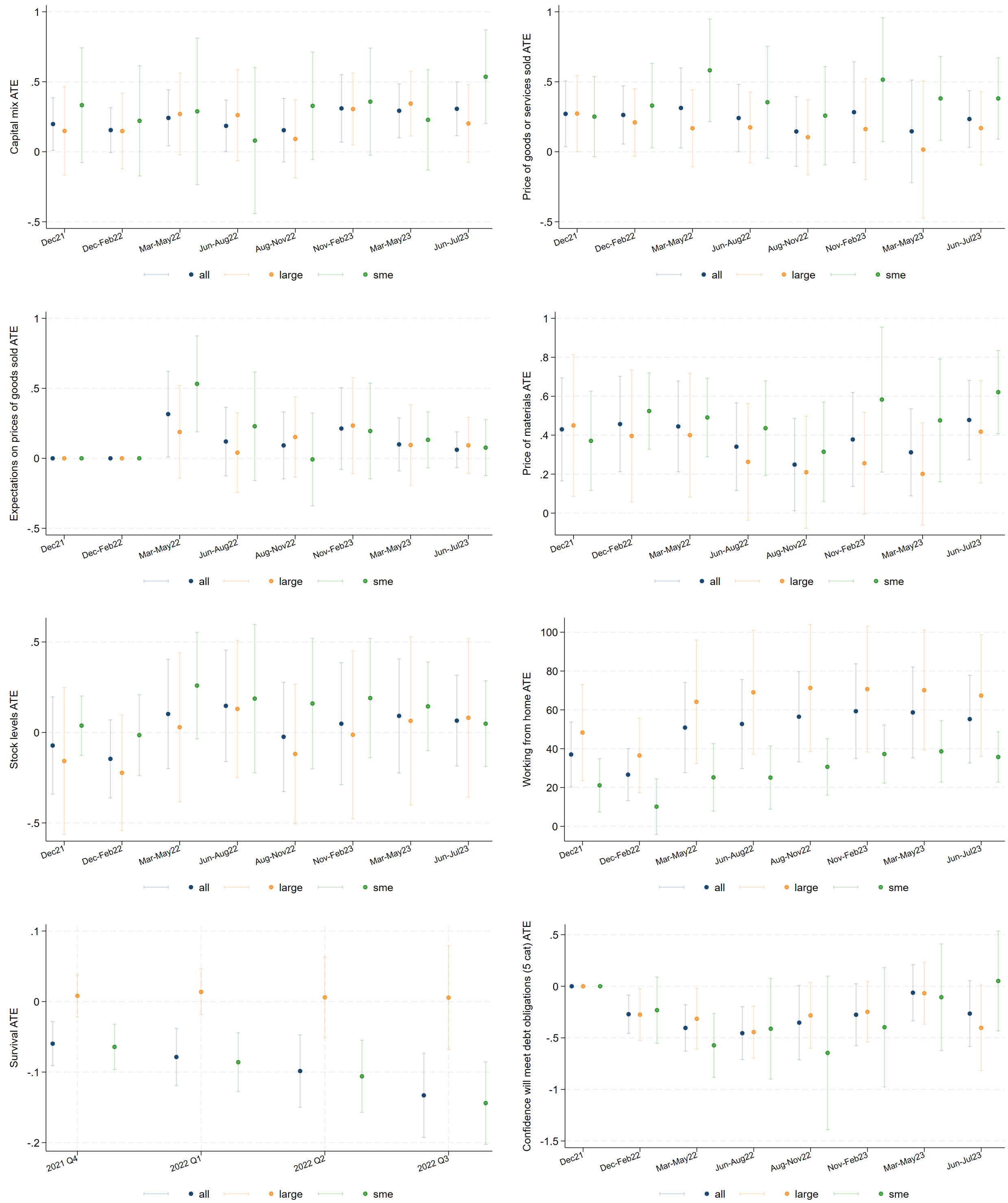


Figure C.3: Coefficient distributions over industries

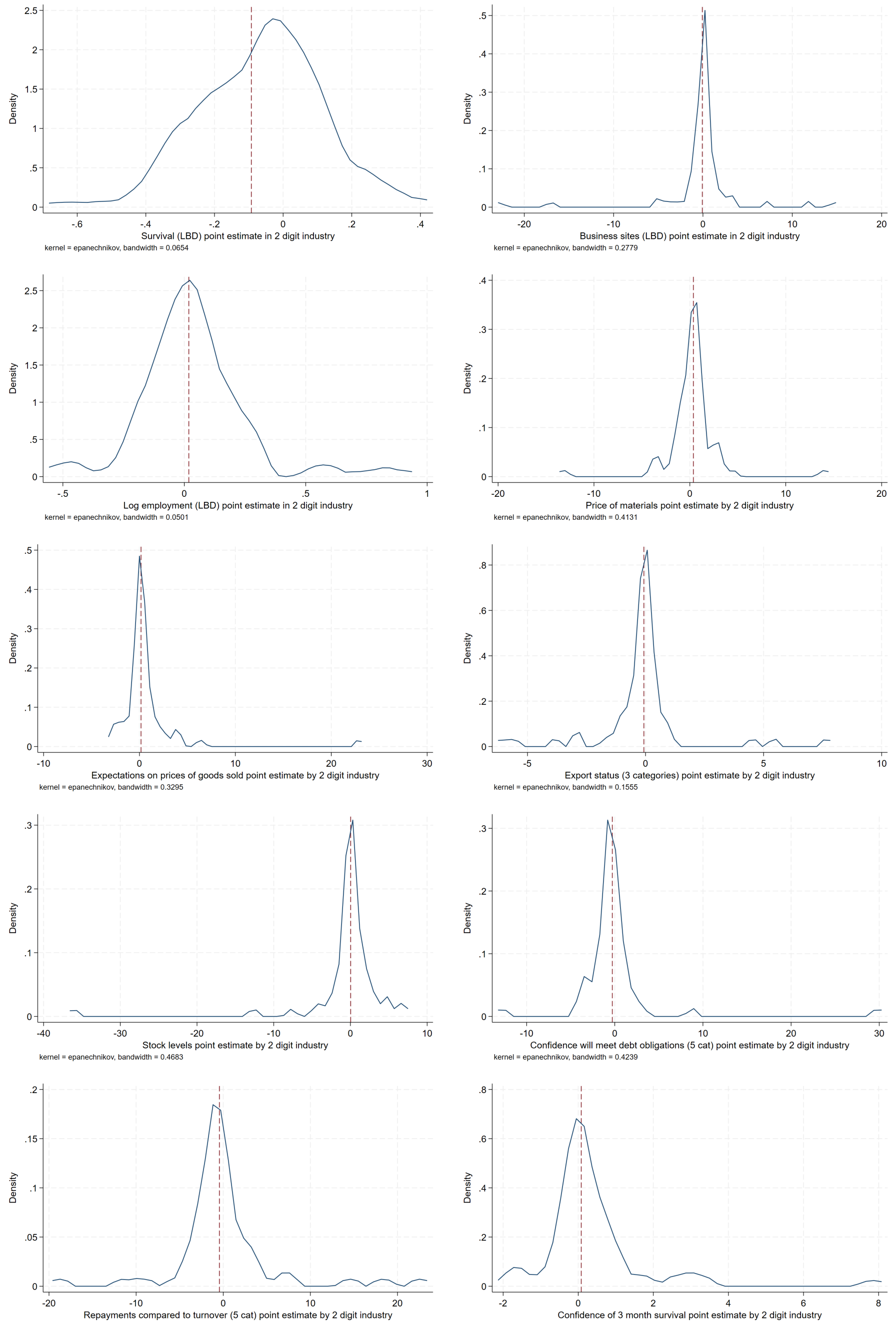


Figure C.4: Average coefficients by firm size: baseline outcomes

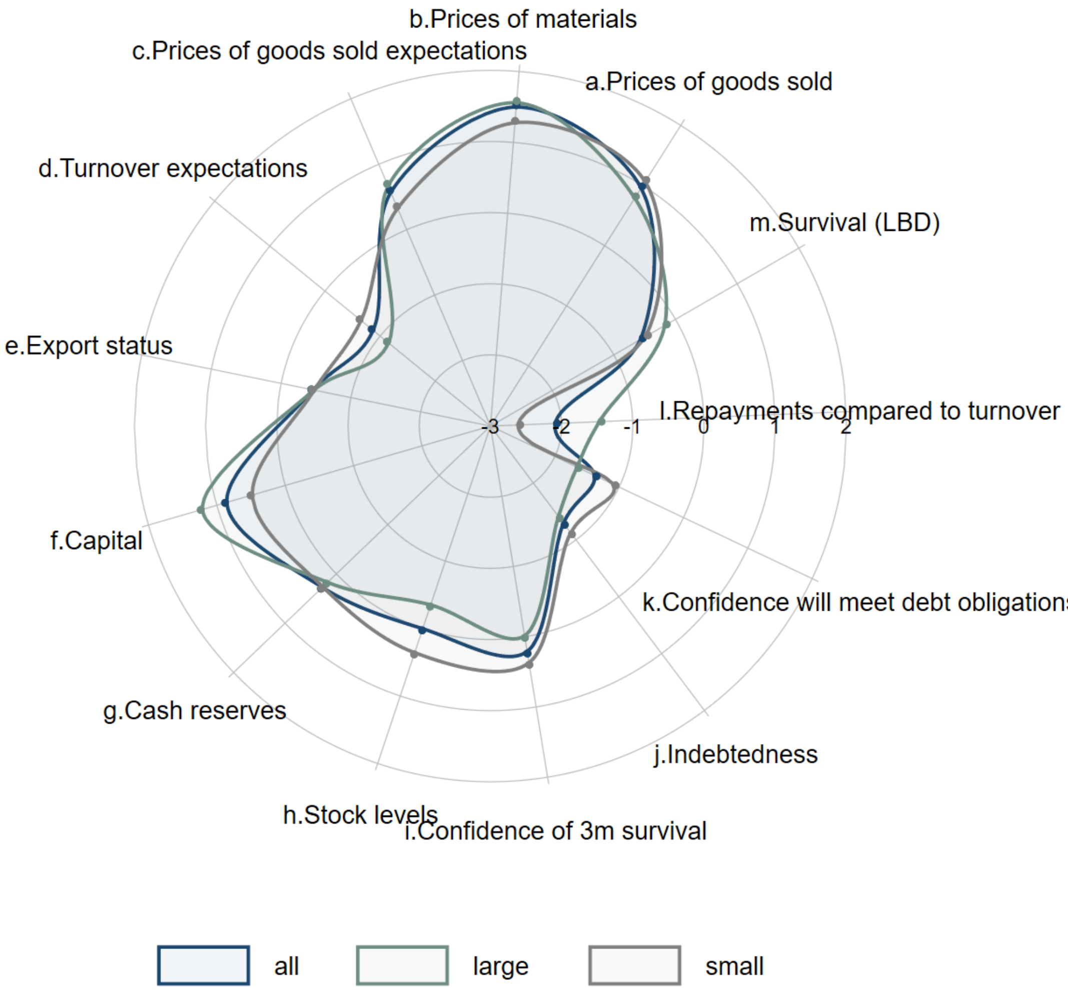


Figure C.5: Adjustments across margins by industry

Figure C.6: K-means Cluster diagnostics

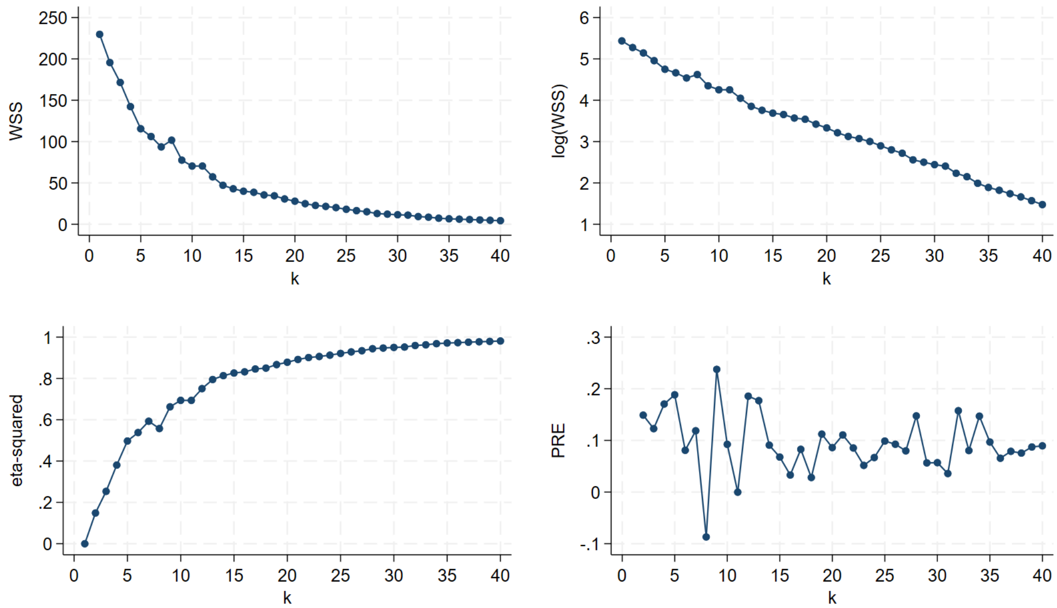


Table C.2: Excluded industries from kmeans clustering

Description	Industry division (2 digit sic)
Crop and animal production, hunting and related service activities	01
Forestry and logging	02
Fishing and aquaculture	03
Mining of coal and lignite	05
Extraction of crude petroleum and natural gas	06
Mining of metal ores	07
Mining support service activities	09
Manufacture of tobacco products	12
Manufacture of wearing apparel	14
Manufacture of leather and related products	15
Manufacture of coke and refined petroleum products	19
Electricity, gas, steam and air conditioning supply	35
Sewerage	37
Remediation activities and other waste management services	39
Water transport	50
Air transport	51
Programming and broadcasting activities	60
Financial service activities, except insurance and pension funding	64
Insurance, reinsurance and pension funding, except compulsory social security	65
Activities auxiliary to financial services and insurance activities	66
Veterinary activities	75
Public administration and defence; compulsory social security	84
Residential care activities	87
Social work activities without accommodation	88
Gambling and betting activities	92
Activities of membership organisations	94
Repair of computers and personal and household goods	95
Activities of households as employers of domestic personnel	97
Undifferentiated goods- and services-producing activities of private households for own use	98
Activities of extraterritorial organisations and bodies	99

Table C.3: Division cluster assignment

Cluster 1
Manufacture of beverages
Civil engineering
Accommodation
Computer programming, consultancy and related activities
Information service activities
Real estate activities
Activities of head offices; management consultancy activities
Architectural and engineering activities; technical testing and analysis
Office administrative, office support and other business support activities
Other personal service activities

Cluster 2
Manufacture of food products
Manufacture of chemicals and chemical products
Manufacture of basic metals
Manufacture of fabricated metal products, except machinery and equipment
Manufacture of machinery and equipment
Manufacture of other transport equipment
Repair and installation of machinery and equipment
Water collection, treatment and supply
Waste collection, treatment and disposal activities; materials recovery
Construction of buildings
Specialised construction activities
Wholesale and retail trade and repair of motor vehicles and motorcycles
Wholesale trade, except of motor vehicles and motorcycles
Retail trade, except of motor vehicles and motorcycles
Land transport and transport via pipelines
Warehousing and support activities for transportation
Postal and courier activities
Food and beverage service activities
Publishing activities
Legal and accounting activities
Rental and leasing activities
Employment activities
Security and investigation activities
Services to buildings and landscape activities
Education
Human health activities
Sports activities and amusement and recreation activities

Cluster 3
Other mining and quarrying
Manufacture of textiles
Manufacture of wood products and cork, straw and plaiting
Manufacture of paper and paper products
Manufacture of rubber and plastic products
Manufacture of other non-metallic mineral products
Manufacture of computer, electronic and optical products
Manufacture of electrical equipment
Manufacture of motor vehicles, trailers and semi-trailers
Other manufacturing
Telecommunications
Travel agency, tour operator and other reservation service activities
Libraries, archives, museums and other cultural activities

Cluster 4
Manufacture of basic pharmaceutical products and preparations
Manufacture of furniture
Motion picture, video, television, sound recording and music publishing
Other professional, scientific and technical activities
Creative, arts and entertainment activities

Cluster 5
Printing and reproduction of recorded media

Cluster 6
Scientific research and development
Advertising and market research

Figure C.7: Cluster archetypes

Cluster archetype	number of industry divisions	Turnover expectations	Price of goods sold	Prices of materials	Price expectations	Stocklevels	Cash reserves	Capital mix	Confidence will meet debt repayments	Repayments compared to turnover	Survival
The passthrough-financed investors	10	-0.14	1.23	0.94	0.33	0.43	1.06	0.54	-0.08	0.92	-0.19
The survivors	24	-0.10	-0.04	0.16	0.18	0.05	0.20	-0.22	0.33	-0.78	-0.09
The cruisers	15	0.50	-0.43	0.28	0.02	-0.34	-0.65	-0.70	-1.66	0.26	0.09
The disinvestors	5	-1.06	0.64	1.65	1.57	1.36	5.08	-1.34	-1.82	-9.37	-0.13
The wrecked	1	7.08	-6.20	-0.93	-2.57	7.04	2.66	-0.10	3.08	14.57	-0.62
The cash constrained	2	1.04	-0.42	-2.08	-0.69	3.75	-1.72	-0.56	-2.24	20.48	-0.15

Table C.4: Average treatment effects on firms' output under increasingly demanding fixed effects, all firms

Output	Sic digits		Estimate (ξ Treatment × Energy intensity) (1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Export status (3 cat)	1	ξ	-0.0704	-0.107**	-0.0974**	-0.105**	-0.0984*	-0.0994**	-0.103*	-0.122*
		se	(0.0538)	(0.0497)	(0.0480)	(0.0473)	(0.0554)	(0.0494)	(0.0564)	(0.0616)
		R^2	0.942	0.942	0.943	0.943	0.949	0.945	0.949	0.953
		N	75718	75716	75716	75716	74224	75151	74542	69470
	2	ξ	-0.0704	-0.137**	-0.124**	-0.131**	-0.138***	-0.121**	-0.133**	-0.145**
		se	(0.0538)	(0.0564)	(0.0552)	(0.0526)	(0.0516)	(0.0580)	(0.0503)	(0.0622)
		R^2	0.942	0.945	0.945	0.946	0.960	0.951	0.958	0.960
		N	75718	75544	75543	75543	65912	73023	68111	55217
	3	ξ	-0.0704	-0.115*	-0.102*	-0.112*	-0.157*	-0.0938	-0.157*	-0.165
		se	(0.0538)	(0.0614)	(0.0596)	(0.0602)	(0.0917)	(0.0621)	(0.0866)	(0.124)
		R^2	0.942	0.949	0.949	0.949	0.963	0.955	0.962	0.964
		N	75718	74520	74519	74519	52439	68579	57306	42833
	4	ξ	-0.0704	-0.119*	-0.101*	-0.117*	-0.111	-0.125*	-0.118*	-0.0746
		se	(0.0538)	(0.0614)	(0.0580)	(0.0621)	(0.0847)	(0.0698)	(0.0697)	(0.0713)
		R^2	0.942	0.953	0.953	0.953	0.967	0.959	0.965	0.966
		N	75718	71917	71917	71917	40123	61721	46510	33344
	5	ξ	-0.0704	-0.123*	-0.105*	-0.121*	-0.118	-0.137*	-0.132*	-0.0739
		se	(0.0538)	(0.0621)	(0.0590)	(0.0628)	(0.0870)	(0.0725)	(0.0703)	(0.0741)
		R^2	0.942	0.953	0.954	0.954	0.968	0.960	0.966	0.966
		N	75718	71098	71098	71098	37753	60288	44147	31430
Turnover change (3 cat)	1	ξ	0.0781	0.0413	0.0273	0.0924	0.110	0.101	0.133	0.163
		se	(0.112)	(0.121)	(0.121)	(0.115)	(0.124)	(0.123)	(0.129)	(0.136)
		R^2	0.374	0.389	0.391	0.397	0.446	0.419	0.448	0.476
		N	115592	115590	115541	115541	113631	114845	113981	107369
	2	ξ	0.0781	-0.0139	-0.0241	0.0483	0.151	0.0794	0.175	0.149
		se	(0.112)	(0.133)	(0.132)	(0.124)	(0.173)	(0.139)	(0.168)	(0.167)
		R^2	0.374	0.418	0.419	0.425	0.554	0.468	0.539	0.562
		N	115592	115459	115412	115412	101179	112112	104366	85662
	3	ξ	0.0781	-0.0444	-0.0502	0.0194	0.0336	0.0602	0.0256	-0.0455
		se	(0.112)	(0.157)	(0.157)	(0.146)	(0.243)	(0.159)	(0.236)	(0.240)
		R^2	0.374	0.456	0.457	0.462	0.621	0.515	0.605	0.618
		N	115592	113822	113774	113774	80791	105338	87770	66738
	4	ξ	0.0781	-0.0254	-0.0254	0.0357	-0.162	0.0567	-0.180	-0.226
		se	(0.112)	(0.159)	(0.159)	(0.147)	(0.233)	(0.191)	(0.217)	(0.218)
		R^2	0.374	0.504	0.505	0.510	0.646	0.560	0.639	0.637
		N	115592	109779	109729	109729	60365	94696	70025	51182
	5	ξ	0.0781	-0.00211	-0.000924	0.0610	-0.0900	0.0861	-0.136	-0.129
		se	(0.112)	(0.170)	(0.170)	(0.160)	(0.291)	(0.216)	(0.250)	(0.274)
		R^2	0.374	0.511	0.512	0.517	0.658	0.567	0.652	0.650
		N	115592	108457	108407	108407	56690	92351	66562	48205
Turnover expectations (3 cat)	1	ξ	-0.164***	-0.130**	-0.134**	-0.117**	-0.122*	-0.110**	-0.140**	-0.142**
		se	(0.0573)	(0.0587)	(0.0586)	(0.0571)	(0.0620)	(0.0530)	(0.0536)	(0.0612)
		R^2	0.274	0.299	0.301	0.309	0.371	0.336	0.373	0.408
		N	103876	103874	103871	103871	102188	103232	102516	96448
	2	ξ	-0.164***	-0.0886	-0.0920	-0.0711	-0.0520	-0.0496	-0.0778	-0.0345
		se	(0.0573)	(0.0646)	(0.0645)	(0.0623)	(0.0768)	(0.0601)	(0.0706)	(0.0807)
		R^2	0.274	0.332	0.334	0.341	0.493	0.393	0.477	0.501
		N	103876	103764	103761	103761	90918	100712	93859	76744
	3	ξ	-0.164***	-0.103*	-0.105*	-0.0803	-0.0875	-0.0691	-0.0940	0.0349
		se	(0.0573)	(0.0609)	(0.0605)	(0.0592)	(0.0831)	(0.0672)	(0.0861)	(0.105)
		R^2	0.274	0.373	0.375	0.381	0.566	0.445	0.548	0.557
		N	103876	102303	102300	102300	72398	94573	78710	59669
	4	ξ	-0.164***	-0.0980	-0.0928	-0.0623	0.0268	0.00862	-0.00992	0.153
		se	(0.0573)	(0.0689)	(0.0699)	(0.0680)	(0.120)	(0.0776)	(0.122)	(0.140)
		R^2	0.274	0.422	0.424	0.430	0.584	0.490	0.580	0.570
		N	103876	98666	98657	98657	54067	85035	62866	45771
	5	ξ	-0.164***	-0.0848	-0.0791	-0.0506	0.0593	0.0263	0.0122	0.196
		se	(0.0573)	(0.0775)	(0.0788)	(0.0764)	(0.136)	(0.0841)	(0.135)	(0.152)
		R^2	0.274	0.430	0.432	0.438	0.600	0.499	0.596	0.586
		N	103876	97525	97516	97516	50671	82940	59661	43016

Notes: Table presents estimated effects with differentially saturated two-way fixed effect specifications. The variables are ordinal outcomes indicating the direction of change of a given variable ie. if it increased or decreased in the survey reference period. The data granularity is at the ruref level and the specification includes ruref fixed effects throught. Time fixed effects are added at differential spatial and industry granularity across columns. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors by 2 digit industry with stars indicating *** $p<0.01$, ** $p<0.05$, * $p<0.10$

Table C.5: Average treatment effects on firms' prices under increasingly demanding fixed effects, all firms

Prices	Sic digits		Estimate (ξ Treatment × Energy intensity) (1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Price of goods sold	1	ξ	0.249**	0.260***	0.275***	0.293***	0.237**	0.275***	0.240**	0.213*
		se	(0.115)	(0.0924)	(0.0946)	(0.0889)	(0.103)	(0.0931)	(0.101)	(0.109)
		R^2	0.350	0.368	0.370	0.375	0.432	0.402	0.436	0.466
		N	97954	97951	97911	97911	96073	97243	96425	90395
	2	ξ	0.249**	0.259**	0.272**	0.285***	0.313**	0.285**	0.297**	0.310**
		se	(0.115)	(0.104)	(0.105)	(0.100)	(0.134)	(0.111)	(0.123)	(0.121)
		R^2	0.350	0.396	0.398	0.403	0.543	0.453	0.531	0.552
		N	97954	97809	97769	97769	84600	94662	87432	71204
	3	ξ	0.249**	0.199**	0.216**	0.238***	0.222**	0.232**	0.208*	0.181
		se	(0.115)	(0.0855)	(0.0853)	(0.0814)	(0.103)	(0.0894)	(0.107)	(0.113)
		R^2	0.350	0.434	0.436	0.441	0.613	0.502	0.597	0.603
		N	97954	96202	96162	96162	66870	88665	73013	55049
	4	ξ	0.249**	0.216**	0.237***	0.266***	0.184**	0.292**	0.211**	0.138
		se	(0.115)	(0.0852)	(0.0846)	(0.0806)	(0.0906)	(0.112)	(0.0999)	(0.110)
		R^2	0.350	0.480	0.481	0.487	0.631	0.543	0.630	0.614
		N	97954	92497	92458	92458	49215	79066	57538	41615
	5	ξ	0.249**	0.232**	0.253***	0.282***	0.207*	0.305***	0.228**	0.165
		se	(0.115)	(0.0888)	(0.0885)	(0.0835)	(0.105)	(0.112)	(0.108)	(0.127)
		R^2	0.350	0.485	0.487	0.493	0.645	0.550	0.642	0.624
		N	97954	91364	91325	91325	46071	77033	54449	39061
Price of materials	1	ξ	0.370***	0.317***	0.322***	0.307***	0.234**	0.285***	0.244**	0.243*
		se	(0.103)	(0.104)	(0.107)	(0.102)	(0.117)	(0.107)	(0.112)	(0.124)
		R^2	0.392	0.412	0.414	0.420	0.476	0.447	0.481	0.508
		N	94321	94317	94283	94283	92401	93628	92729	86790
	2	ξ	0.370***	0.334***	0.335***	0.323***	0.271*	0.328**	0.234*	0.320*
		se	(0.103)	(0.109)	(0.110)	(0.107)	(0.159)	(0.126)	(0.137)	(0.160)
		R^2	0.392	0.440	0.442	0.447	0.589	0.497	0.576	0.593
		N	94321	94175	94141	94141	80860	91049	83769	67681
	3	ξ	0.370***	0.306***	0.310***	0.303***	0.128	0.266**	0.143	0.114
		se	(0.103)	(0.0924)	(0.0943)	(0.0925)	(0.141)	(0.106)	(0.120)	(0.162)
		R^2	0.392	0.475	0.477	0.482	0.646	0.541	0.632	0.635
		N	94321	92524	92487	92487	63352	84937	69420	52109
	4	ξ	0.370***	0.286***	0.301***	0.301***	0.0885	0.281**	0.137	0.0238
		se	(0.103)	(0.0889)	(0.0909)	(0.0917)	(0.186)	(0.125)	(0.153)	(0.183)
		R^2	0.392	0.520	0.522	0.527	0.664	0.581	0.663	0.649
		N	94321	88706	88668	88668	46121	75288	54278	38878
	5	ξ	0.370***	0.283***	0.297***	0.295***	0.147	0.239**	0.187	0.0746
		se	(0.103)	(0.0862)	(0.0890)	(0.0884)	(0.167)	(0.119)	(0.139)	(0.161)
		R^2	0.392	0.525	0.527	0.533	0.676	0.586	0.674	0.659
		N	94321	87557	87519	87519	43142	73260	51332	36491
Prices of goods sold expectations	1	ξ	0.162*	0.192***	0.185***	0.179**	0.130*	0.159**	0.121*	0.145**
		se	(0.0908)	(0.0638)	(0.0645)	(0.0681)	(0.0681)	(0.0681)	(0.0671)	(0.0614)
		R^2	0.365	0.386	0.388	0.393	0.452	0.420	0.453	0.489
		N	66702	66700	66626	66626	65372	66110	65537	61574
	2	ξ	0.162*	0.208***	0.200***	0.191**	0.178**	0.205***	0.158**	0.217***
		se	(0.0908)	(0.0699)	(0.0713)	(0.0750)	(0.0831)	(0.0746)	(0.0782)	(0.0748)
		R^2	0.365	0.414	0.416	0.421	0.566	0.471	0.551	0.575
		N	66702	66606	66532	66532	57351	64411	59279	48361
	3	ξ	0.162*	0.168**	0.165**	0.162**	0.147*	0.170**	0.143*	0.213***
		se	(0.0908)	(0.0691)	(0.0712)	(0.0758)	(0.0847)	(0.0789)	(0.0820)	(0.0776)
		R^2	0.365	0.448	0.450	0.455	0.628	0.517	0.614	0.620
		N	66702	65493	65420	65420	45299	60353	49315	37608
	4	ξ	0.162*	0.164**	0.169**	0.169**	0.244**	0.221***	0.244**	0.233**
		se	(0.0908)	(0.0653)	(0.0655)	(0.0702)	(0.108)	(0.0812)	(0.110)	(0.105)
		R^2	0.365	0.496	0.498	0.503	0.651	0.561	0.647	0.627
		N	66702	62926	62860	62860	33346	53869	38992	28479
	5	ξ	0.162*	0.152**	0.157**	0.158**	0.295***	0.221***	0.282**	0.281**
		se	(0.0908)	(0.0669)	(0.0675)	(0.0717)	(0.110)	(0.0769)	(0.109)	(0.107)
		R^2	0.365	0.503	0.505	0.510	0.666	0.568	0.661	0.642
		N	66702	62172	62104	62104	31326	52559	37001	26828

Notes: Table presents estimated effects with differentially saturated two-way fixed effect specifications. The variables are ordinal outcomes indicating the direction of change of a given variable ie. if it increased or decreased in the survey reference period. The data granularity is at the ruref level and the specification includes ruref fixed effects throught. Time fixed effects are added at differential spatial and industry granularity across columns. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors by 2 digit industry with stars indicating *** p<0.01, ** p<0.05, * p<0.10

Table C.6: Average treatment effects on firms' input mix under increasingly demanding fixed effects, all firms

Input mix	Sic digits		Estimate (ξ Treatment $\times$ Energy intensity) (1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Capital	1	ξ	0.161	0.173	0.183	0.186	0.181	0.277**	0.215*	0.205
		se	(0.105)	(0.113)	(0.116)	(0.116)	(0.123)	(0.125)	(0.123)	(0.138)
		R^2	0.644	0.652	0.655	0.658	0.693	0.676	0.695	0.710
		N	32354	32353	32352	32352	31715	32124	31817	29620
	2	ξ	0.161	0.132	0.154	0.152	0.167	0.162	0.221	0.148
		se	(0.105)	(0.129)	(0.131)	(0.131)	(0.146)	(0.144)	(0.145)	(0.170)
		R^2	0.644	0.667	0.669	0.672	0.761	0.704	0.754	0.759
		N	32354	32304	32303	32303	27612	31124	28669	23171
	3	ξ	0.161	0.0790	0.104	0.0982	0.0332	0.131	0.0473	0.123
		se	(0.105)	(0.139)	(0.143)	(0.139)	(0.208)	(0.149)	(0.181)	(0.230)
		R^2	0.644	0.686	0.689	0.692	0.789	0.725	0.784	0.779
		N	32354	31754	31753	31753	21380	29048	23480	17739
	4	ξ	0.161	0.0574	0.0761	0.0597	0.0165	0.0442	-0.00433	0.0554
		se	(0.105)	(0.167)	(0.173)	(0.165)	(0.309)	(0.177)	(0.286)	(0.329)
		R^2	0.644	0.712	0.714	0.717	0.790	0.744	0.798	0.781
		N	32354	30487	30486	30486	15640	25751	18465	13607
	5	ξ	0.161	0.0613	0.0800	0.0481	-0.0145	0.0166	-0.0369	0.0235
		se	(0.105)	(0.173)	(0.179)	(0.170)	(0.307)	(0.188)	(0.291)	(0.330)
		R^2	0.644	0.718	0.720	0.723	0.798	0.748	0.807	0.789
		N	32354	30064	30063	30063	14563	25070	17394	12777
Capital mix	1	ξ	0.225**	0.148	0.168*	0.196**	0.128	0.190**	0.133	0.128
		se	(0.0943)	(0.0936)	(0.0943)	(0.0893)	(0.0899)	(0.0907)	(0.0937)	(0.112)
		R^2	0.490	0.498	0.501	0.507	0.561	0.529	0.564	0.583
		N	37758	37757	37755	37755	36878	37397	37038	34339
	2	ξ	0.225**	0.0463	0.0709	0.0993	0.124	0.0828	0.0843	0.0761
		se	(0.0943)	(0.0948)	(0.0933)	(0.0879)	(0.112)	(0.0982)	(0.113)	(0.114)
		R^2	0.490	0.526	0.529	0.533	0.667	0.574	0.657	0.662
		N	37758	37689	37687	37687	31618	36159	32989	26495
	3	ξ	0.225**	-0.0197	0.0156	0.0421	-0.0903	0.00933	-0.136	-0.0448
		se	(0.0943)	(0.125)	(0.124)	(0.114)	(0.174)	(0.117)	(0.148)	(0.165)
		R^2	0.490	0.562	0.565	0.569	0.711	0.612	0.705	0.699
		N	37758	36980	36978	36978	23975	33561	26607	19925
	4	ξ	0.225**	0.0119	0.0426	0.0676	-0.230	-0.0304	-0.111	-0.157
		se	(0.0943)	(0.147)	(0.150)	(0.138)	(0.221)	(0.140)	(0.229)	(0.239)
		R^2	0.490	0.599	0.601	0.606	0.714	0.640	0.722	0.702
		N	37758	35250	35244	35244	17281	29430	20546	14970
	5	ξ	0.225**	0.0386	0.0687	0.0860	-0.285	-0.00744	-0.166	-0.212
		se	(0.0943)	(0.164)	(0.165)	(0.155)	(0.283)	(0.171)	(0.284)	(0.308)
		R^2	0.490	0.607	0.609	0.614	0.725	0.646	0.732	0.713
		N	37758	34727	34721	34721	16054	28604	19271	14003

Notes: Table presents estimated effects with differentially saturated two-way fixed effect specifications. The variables are ordinal outcomes indicating the direction of change of a given variable ie. if it increased or decreased in the survey reference period. The data granularity is at the ruref level and the specification includes ruref fixed effects throught. Time fixed effects are added at differential spatial and industry granularity across columns. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors by 2 digit industry with stars indicating *** $p<0.01$, ** $p<0.05$, * $p<0.10$

Table C.7: Average treatment effects on firms' input mix under increasingly demanding fixed effects, all firms

Input mix	Sic digits		Estimate (ξ Treatment $\times$ Energy intensity) (1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Redundancies (share)	1	ξ	0.141	0.320	0.360	0.248	0.154	0.232	0.105	0.127
		se	(0.321)	(0.388)	(0.388)	(0.352)	(0.397)	(0.365)	(0.395)	(0.401)
		R^2	0.230	0.238	0.243	0.248	0.304	0.277	0.300	0.350
		N	138778	138776	138775	138775	137016	138116	137386	130119
	2	ξ	0.141	0.468	0.488	0.385	-0.0747	0.298	-0.124	-0.118
		se	(0.321)	(0.436)	(0.440)	(0.396)	(0.303)	(0.411)	(0.324)	(0.326)
		R^2	0.230	0.262	0.263	0.268	0.417	0.330	0.392	0.424
		N	138778	138675	138674	138674	124517	135307	127824	106053
	3	ξ	0.141	0.359	0.372	0.283	-0.0693	0.236	-0.117	0.0685
		se	(0.321)	(0.419)	(0.423)	(0.374)	(0.320)	(0.410)	(0.349)	(0.286)
		R^2	0.230	0.293	0.294	0.299	0.487	0.377	0.450	0.465
		N	138778	137218	137217	137217	101455	127993	109389	84033
	4	ξ	0.141	0.476	0.488	0.386	0.0823	0.536*	-0.0300	0.541*
		se	(0.321)	(0.329)	(0.333)	(0.292)	(0.472)	(0.299)	(0.399)	(0.274)
		R^2	0.230	0.342	0.344	0.349	0.485	0.431	0.480	0.474
		N	138778	133268	133266	133266	77261	116276	88909	65355
	5	ξ	0.141	0.434	0.445	0.337	0.0135	0.486	-0.110	0.502**
		se	(0.321)	(0.335)	(0.338)	(0.298)	(0.505)	(0.303)	(0.411)	(0.247)
		R^2	0.230	0.349	0.351	0.355	0.486	0.437	0.485	0.475
		N	138778	131897	131895	131895	72958	113547	84779	61688
Redundancy expectations	1	ξ	0.0125	0.0424	0.0418	0.0186	-0.0324	0.00371	-0.0269	-0.0479
		se	(0.0337)	(0.0522)	(0.0527)	(0.0493)	(0.0518)	(0.0537)	(0.0511)	(0.0596)
		R^2	0.501	0.508	0.509	0.515	0.563	0.534	0.563	0.586
		N	43003	43003	43003	43003	42145	42698	42339	39139
	2	ξ	0.0125	0.0796*	0.0772*	0.0571	0.0257	0.0592	0.0367	0.0129
		se	(0.0337)	(0.0434)	(0.0439)	(0.0412)	(0.0586)	(0.0477)	(0.0568)	(0.0627)
		R^2	0.501	0.531	0.532	0.537	0.664	0.578	0.650	0.670
		N	43003	42935	42935	42935	36326	41318	37785	29775
	3	ξ	0.0125	0.0695	0.0663	0.0476	0.114	0.0696	0.101	0.0506
		se	(0.0337)	(0.0457)	(0.0467)	(0.0457)	(0.0804)	(0.0579)	(0.0661)	(0.0856)
		R^2	0.501	0.564	0.565	0.570	0.705	0.613	0.694	0.698
		N	43003	42215	42214	42214	27596	38305	30778	22184
	4	ξ	0.0125	0.0934**	0.0866*	0.0721	0.154	0.106*	0.170*	0.134
		se	(0.0337)	(0.0462)	(0.0477)	(0.0462)	(0.117)	(0.0623)	(0.0903)	(0.121)
		R^2	0.501	0.606	0.607	0.613	0.721	0.649	0.718	0.714
		N	43003	40317	40312	40312	20219	33772	24133	16936
	5	ξ	0.0125	0.0911*	0.0827*	0.0646	0.162	0.103	0.180*	0.144
		se	(0.0337)	(0.0481)	(0.0492)	(0.0473)	(0.126)	(0.0634)	(0.0988)	(0.134)
		R^2	0.501	0.612	0.614	0.619	0.728	0.654	0.729	0.721
		N	43003	39781	39776	39776	18595	32764	22500	15720

Notes: Table presents estimated effects with differentially saturated two-way fixed effect specifications. The variables are ordinal outcomes indicating the direction of change of a given variable ie. if it increased or decreased in the survey reference period. The data granularity is at the ruref level and the specification includes ruref fixed effects throught. Time fixed effects are added at differential spatial and industry granularity across columns. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors by 2 digit industry with stars indicating *** $p<0.01$, ** $p<0.05$, * $p<0.10$

Table C.8: Average treatment effects on firms' processes under increasingly demanding fixed effects, all firms

Process $f()$	Sic digits		Estimate (ξ Treatment × Energy intensity) (1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Stock levels	1	ξ	0.0329	0.173	0.181	0.195	0.193	0.157	0.189	0.173
		se	(0.135)	(0.120)	(0.118)	(0.119)	(0.164)	(0.128)	(0.153)	(0.189)
		R^2	0.359	0.374	0.376	0.383	0.428	0.410	0.437	0.456
		N	68668	68662	68659	68659	66819	67984	67269	62517
	2	ξ	0.0329	0.129	0.137	0.149	0.270	0.138	0.221	0.253
		se	(0.135)	(0.125)	(0.125)	(0.128)	(0.216)	(0.148)	(0.205)	(0.247)
		R^2	0.359	0.402	0.404	0.411	0.544	0.462	0.536	0.552
		N	68668	68424	68421	68421	57307	65726	59603	48019
	3	ξ	0.0329	0.140	0.139	0.146	0.379**	0.142	0.394*	0.440**
		se	(0.135)	(0.119)	(0.122)	(0.123)	(0.180)	(0.126)	(0.202)	(0.220)
		R^2	0.359	0.441	0.443	0.450	0.627	0.517	0.614	0.621
		N	68668	67043	67040	67040	43284	60677	48061	35357
	4	ξ	0.0329	0.141	0.133	0.130	0.457	0.123	0.427	0.514
		se	(0.135)	(0.146)	(0.150)	(0.150)	(0.293)	(0.169)	(0.303)	(0.327)
		R^2	0.359	0.503	0.505	0.512	0.665	0.574	0.667	0.647
		N	68668	63959	63947	63947	29697	52897	35934	25091
	5	ξ	0.0329	0.162	0.152	0.147	0.494	0.156	0.438	0.556
		se	(0.135)	(0.152)	(0.157)	(0.154)	(0.306)	(0.155)	(0.319)	(0.337)
		R^2	0.359	0.510	0.513	0.519	0.673	0.580	0.675	0.655
		N	68668	63070	63058	63058	27806	51456	33985	23777

Notes: Table presents estimated effects with differentially saturated two-way fixed effect specifications. The variables are ordinal outcomes indicating the direction of change of a given variable ie. if it increased or decreased in the survey reference period. The data granularity is at the ruref level and the specification includes ruref fixed effects throught. Time fixed effects are added at differential spatial and industry granularity across columns. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors by 2 digit industry with stars indicating *** $p<0.01$, ** $p<0.05$, * $p<0.10$

Table C.9: Average treatment effects on firms' processes under increasingly demanding fixed effects, all firms

Process $f()$	Sic digits		Estimate (ξ Treatment $\times$ Energy intensity) (1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Hybrid working	1	ξ	-5.769**	-6.036*	-6.560**	-6.839**	-3.094	-5.726	-4.875	-1.413
		se	(2.816)	(3.177)	(3.232)	(3.230)	(3.629)	(3.446)	(3.455)	(3.902)
		R^2	0.787	0.795	0.796	0.797	0.816	0.805	0.816	0.826
		N	58129	58129	58129	58129	57257	57792	57456	54346
	2	ξ	-5.769**	-5.365*	-5.843*	-6.157*	-3.447	-5.261	-3.681	-5.199
		se	(2.816)	(3.090)	(3.226)	(3.263)	(4.680)	(3.815)	(3.942)	(5.459)
		R^2	0.787	0.803	0.804	0.806	0.852	0.821	0.846	0.851
		N	58129	58072	58072	58072	51871	56666	53258	43878
	3	ξ	-5.769**	-5.000	-5.488	-5.476	-8.288	-3.876	-4.984	-7.024
		se	(2.816)	(3.414)	(3.551)	(3.526)	(6.066)	(4.205)	(5.132)	(7.380)
		R^2	0.787	0.813	0.814	0.815	0.869	0.833	0.863	0.865
		N	58129	57398	57398	57398	42020	53351	45479	34729
	4	ξ	-5.769**	-4.650	-4.923	-4.718	-0.524	-2.429	0.750	-1.976
		se	(2.816)	(3.362)	(3.478)	(3.585)	(7.589)	(4.610)	(6.068)	(9.310)
		R^2	0.787	0.828	0.830	0.831	0.884	0.849	0.879	0.877
		N	58129	55625	55625	55625	31654	48174	36702	26396
	5	ξ	-5.769**	-3.819	-4.031	-3.922	0.848	-0.802	-1.404	-0.206
		se	(2.816)	(3.557)	(3.672)	(3.829)	(8.956)	(5.154)	(6.970)	(10.65)
		R^2	0.787	0.832	0.833	0.834	0.887	0.852	0.883	0.878
		N	58129	55060	55060	55060	29951	47009	35019	24911
Working from home	1	ξ	51.39***	38.59***	36.61***	33.64***	34.96***	34.54***	34.59***	37.46***
		se	(10.96)	(7.805)	(8.104)	(7.725)	(7.982)	(7.995)	(7.986)	(8.835)
		R^2	0.725	0.765	0.767	0.770	0.794	0.779	0.793	0.807
		N	126124	126122	126122	126122	124507	125515	124847	118232
	2	ξ	51.39***	36.56***	34.28***	30.78***	36.63***	34.52***	35.57***	41.61***
		se	(10.96)	(7.909)	(8.149)	(7.754)	(9.783)	(8.427)	(9.701)	(11.71)
		R^2	0.725	0.780	0.782	0.786	0.839	0.804	0.831	0.845
		N	126124	126024	126024	126024	113104	123005	116124	96200
	3	ξ	51.39***	31.36***	28.69***	25.35***	31.39***	30.23***	25.97***	33.15***
		se	(10.96)	(6.332)	(6.412)	(6.165)	(9.781)	(6.870)	(8.955)	(11.43)
		R^2	0.725	0.795	0.797	0.801	0.864	0.821	0.853	0.865
		N	126124	124683	124683	124683	92177	116329	99379	76214
	4	ξ	51.39***	32.39***	29.67***	26.42***	29.14**	30.95***	26.77**	28.49*
		se	(10.96)	(6.893)	(7.101)	(6.815)	(12.88)	(7.814)	(11.01)	(14.70)
		R^2	0.725	0.810	0.812	0.815	0.877	0.835	0.869	0.877
		N	126124	121094	121093	121093	70134	105600	80764	59199
	5	ξ	51.39***	31.99***	29.17***	25.93***	30.41**	30.71***	26.67**	29.02*
		se	(10.96)	(6.950)	(7.169)	(6.932)	(13.90)	(8.002)	(11.79)	(15.87)
		R^2	0.725	0.813	0.815	0.818	0.879	0.838	0.871	0.879
		N	126124	119842	119841	119841	66226	103107	77020	55881
Working from normal place of work	1	ξ	16.63**	12.44*	10.03	10.65*	11.80**	10.47*	12.65**	10.51
		se	(8.160)	(6.641)	(6.683)	(6.361)	(5.637)	(6.270)	(5.940)	(6.303)
		R^2	0.739	0.759	0.760	0.763	0.786	0.774	0.786	0.799
		N	126124	126122	126122	126122	124507	125515	124847	118232
	2	ξ	16.63**	7.626	4.977	5.306	5.400	3.641	6.452	3.138
		se	(8.160)	(6.584)	(6.691)	(6.276)	(7.298)	(6.438)	(6.732)	(7.798)
		R^2	0.739	0.772	0.773	0.775	0.830	0.797	0.823	0.836
		N	126124	126024	126024	126024	113104	123005	116124	96200
	3	ξ	16.63**	8.359	5.699	5.921	3.994	3.834	4.703	0.548
		se	(8.160)	(6.959)	(7.015)	(6.659)	(9.877)	(7.063)	(8.515)	(10.22)
		R^2	0.739	0.787	0.788	0.790	0.857	0.815	0.847	0.857
		N	126124	124683	124683	124683	92177	116329	99379	76214
	4	ξ	16.63**	6.807	4.469	4.307	-1.659	0.802	4.801	-4.628
		se	(8.160)	(6.274)	(6.296)	(6.008)	(8.703)	(6.610)	(8.004)	(9.617)
		R^2	0.739	0.806	0.807	0.809	0.871	0.834	0.866	0.868
		N	126124	121094	121093	121093	70134	105600	80764	59199
	5	ξ	16.63**	5.508	3.244	2.812	-4.506	-0.701	2.290	-7.111
		se	(8.160)	(6.376)	(6.415)	(6.160)	(9.224)	(6.692)	(8.211)	(10.36)
		R^2	0.739	0.809	0.811	0.812	0.874	0.837	0.870	0.870
		N	126124	119842	119841	119841	66226	103107	77020	55881

Notes: Table presents estimated effects with differentially saturated two-way fixed effect specifications. The variables are ordinal outcomes indicating the direction of change of a given variable ie. if it increased or decreased in the survey reference period. The data granularity is at the ruref level and the specification includes ruref fixed effects throught. Time fixed effects are added at differential spatial and industry granularity across columns. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors by 2 digit industry with stars indicating *** $p<0.01$, ** $p<0.05$, * $p<0.10$

Table C.10: Average treatment effects on firms' survival under increasingly demanding fixed effects, all firms

Survival (Debt & liquidity)	Sic digits		Estimate (ξ Treatment $\times$ Energy intensity) (1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Confidence will meet debt obligations (5 cat)	1	ξ	-0.278***	-0.242**	-0.216**	-0.192**	-0.157	-0.199**	-0.185	-0.127
		se	(0.0870)	(0.0935)	(0.0894)	(0.0952)	(0.108)	(0.0967)	(0.111)	(0.117)
		R^2	0.663	0.667	0.669	0.671	0.701	0.686	0.703	0.719
		N	40204	40204	40203	40203	39492	39926	39613	37192
	2	ξ	-0.278***	-0.253**	-0.221**	-0.195*	-0.119	-0.203*	-0.136	-0.167
		se	(0.0870)	(0.0984)	(0.0932)	(0.0989)	(0.0991)	(0.104)	(0.113)	(0.116)
		R^2	0.663	0.679	0.680	0.683	0.759	0.710	0.752	0.760
		N	40204	40149	40147	40147	34947	38931	36114	29322
	3	ξ	-0.278***	-0.261**	-0.233**	-0.212**	-0.132	-0.203*	-0.0739	-0.208
		se	(0.0870)	(0.100)	(0.0975)	(0.102)	(0.108)	(0.114)	(0.0974)	(0.128)
		R^2	0.663	0.697	0.698	0.700	0.790	0.733	0.780	0.782
		N	40204	39579	39576	39576	27398	36354	30111	22498
	4	ξ	-0.278***	-0.227*	-0.205*	-0.191*	-0.140	-0.118	-0.0235	-0.227
		se	(0.0870)	(0.115)	(0.112)	(0.113)	(0.161)	(0.111)	(0.144)	(0.181)
		R^2	0.663	0.717	0.718	0.721	0.804	0.753	0.801	0.793
		N	40204	38113	38109	38109	20150	32341	23851	16839
	5	ξ	-0.278***	-0.206*	-0.183	-0.172	-0.0953	-0.0799	-0.0117	-0.180
		se	(0.0870)	(0.115)	(0.110)	(0.112)	(0.160)	(0.109)	(0.141)	(0.185)
		R^2	0.663	0.721	0.722	0.725	0.810	0.756	0.807	0.798
		N	40204	37692	37688	37688	18945	31544	22656	15863
Repayments compared to turnover (5 cat)	1	ξ	-0.438***	-0.565***	-0.535***	-0.514***	-0.469**	-0.496***	-0.558**	-0.487*
		se	(0.149)	(0.168)	(0.171)	(0.171)	(0.192)	(0.168)	(0.214)	(0.250)
		R^2	0.693	0.701	0.703	0.708	0.757	0.728	0.761	0.777
		N	26521	26509	26506	26506	25428	26097	25501	22620
	2	ξ	-0.438***	-0.377***	-0.359**	-0.339**	-0.187	-0.0935	-0.374	-0.175
		se	(0.149)	(0.139)	(0.142)	(0.147)	(0.253)	(0.151)	(0.265)	(0.282)
		R^2	0.693	0.721	0.723	0.728	0.814	0.760	0.809	0.815
		N	26521	26330	26324	26324	19797	24480	21109	15894
	3	ξ	-0.438***	-0.482***	-0.464***	-0.449**	0.0513	-0.209	-0.203	0.0139
		se	(0.149)	(0.175)	(0.166)	(0.176)	(0.263)	(0.197)	(0.304)	(0.293)
		R^2	0.693	0.740	0.741	0.746	0.838	0.780	0.835	0.834
		N	26521	25492	25486	25486	14364	22103	16323	11586
	4	ξ	-0.438***	-0.414**	-0.385**	-0.368*	0.107	-0.194	-0.171	0.000640
		se	(0.149)	(0.201)	(0.189)	(0.208)	(0.316)	(0.214)	(0.350)	(0.335)
		R^2	0.693	0.760	0.762	0.767	0.831	0.792	0.840	0.829
		N	26521	23788	23781	23781	10383	18890	12381	8848
	5	ξ	-0.438***	-0.381*	-0.362*	-0.370*	0.0886	-0.273	-0.323	-0.159
		se	(0.149)	(0.217)	(0.202)	(0.211)	(0.483)	(0.181)	(0.408)	(0.464)
		R^2	0.693	0.765	0.767	0.772	0.836	0.797	0.847	0.835
		N	26521	23417	23410	23410	9514	18315	11490	8205

Notes: Table presents estimated effects with differentially saturated two-way fixed effect specifications. The variables are ordinal outcomes indicating the direction of change of a given variable ie. if it increased or decreased in the survey reference period. The data granularity is at the ruref level and the specification includes ruref fixed effects throught. Time fixed effects are added at differential spatial and industry granularity across columns. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors by 2 digit industry with stars indicating *** p<0.01, ** p<0.05, * p<0.10

Table C.11: Average treatment effects on firms' survival under increasingly demanding fixed effects, all firms

Survival (Debt & liquidity)	Sic digits		Estimate (ξ Treatment $\times$ Energy intensity) (1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Cash reserve duration (5 cat)	1	ξ	0.263*	0.266**	0.253**	0.289***	0.374***	0.283**	0.392***	0.384***
		se	(0.140)	(0.112)	(0.111)	(0.105)	(0.114)	(0.112)	(0.121)	(0.139)
		R^2	0.787	0.793	0.794	0.796	0.817	0.806	0.818	0.830
		N	77355	77353	77352	77352	76062	76847	76236	71248
	2	ξ	0.263*	0.275**	0.267**	0.293***	0.278**	0.254**	0.332***	0.252*
		se	(0.140)	(0.106)	(0.102)	(0.100)	(0.118)	(0.114)	(0.121)	(0.150)
		R^2	0.787	0.802	0.802	0.804	0.860	0.825	0.853	0.863
		N	77355	77262	77260	77260	66732	74717	69122	55763
	3	ξ	0.263*	0.312***	0.308***	0.337***	0.363*	0.371**	0.369**	0.246
		se	(0.140)	(0.111)	(0.108)	(0.111)	(0.214)	(0.147)	(0.183)	(0.214)
		R^2	0.787	0.814	0.815	0.817	0.881	0.840	0.874	0.877
		N	77355	76120	76118	76118	52245	69837	57391	43022
	4	ξ	0.263*	0.350***	0.339***	0.358***	0.113	0.346**	0.216	0.0485
		se	(0.140)	(0.123)	(0.115)	(0.116)	(0.229)	(0.151)	(0.175)	(0.248)
		R^2	0.787	0.829	0.829	0.831	0.885	0.853	0.883	0.881
		N	77355	73102	73099	73099	38943	62523	45574	33061
	5	ξ	0.263*	0.398***	0.386***	0.409***	0.283	0.417**	0.365*	0.237
		se	(0.140)	(0.138)	(0.128)	(0.127)	(0.242)	(0.180)	(0.189)	(0.263)
		R^2	0.787	0.831	0.832	0.834	0.887	0.856	0.885	0.883
		N	77355	72145	72142	72142	36190	60844	42856	30946

Notes: Table presents estimated effects with differentially saturated two-way fixed effect specifications. The variables are ordinal outcomes indicating the direction of change of a given variable ie. if it increased or decreased in the survey reference period. The data granularity is at the ruref level and the specification includes ruref fixed effects throught. Time fixed effects are added at differential spatial and industry granularity across columns. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors by 2 digit industry with stars indicating *** $p<0.01$, ** $p<0.05$, * $p<0.10$

Table C.12: Average treatment effects on firms' survival under increasingly demanding fixed effects, all firms

Survival (Trading status)	Sic digits		Estimate (ξ Treatment × Energy intensity) (1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Change in risk of insolvency	1	ξ	0.0239	-0.0140	0.0134	0.0144	0.0247	-0.00713	0.0294	0.0119
		se	(0.0773)	(0.0852)	(0.0845)	(0.0890)	(0.127)	(0.0957)	(0.124)	(0.146)
		R^2	0.500	0.527	0.529	0.534	0.579	0.553	0.581	0.604
		N	40037	40037	40035	40035	39417	39788	39518	36961
	2	ξ	0.0239	-0.0110	0.0221	0.0199	-0.00773	0.0644	0.0258	0.0319
		se	(0.0773)	(0.0951)	(0.0928)	(0.0979)	(0.203)	(0.114)	(0.184)	(0.227)
		R^2	0.500	0.551	0.553	0.557	0.662	0.591	0.655	0.671
		N	40037	39983	39979	39979	34613	38612	35899	29042
	3	ξ	0.0239	0.00266	0.0348	0.0373	0.209	0.0981	0.220	0.274
		se	(0.0773)	(0.0913)	(0.0889)	(0.0951)	(0.249)	(0.113)	(0.208)	(0.281)
		R^2	0.500	0.577	0.579	0.583	0.713	0.625	0.705	0.707
		N	40037	39406	39402	39402	27161	36127	29884	22156
	4	ξ	0.0239	0.0389	0.0664	0.0826	0.308	0.123	0.301	0.374
		se	(0.0773)	(0.104)	(0.102)	(0.108)	(0.355)	(0.131)	(0.331)	(0.374)
		R^2	0.500	0.610	0.612	0.616	0.724	0.656	0.724	0.720
		N	40037	37904	37899	37899	20171	32276	23616	17036
	5	ξ	0.0239	0.0619	0.0879	0.102	0.119	0.151	0.135	0.177
		se	(0.0773)	(0.109)	(0.104)	(0.110)	(0.193)	(0.129)	(0.179)	(0.207)
		R^2	0.500	0.617	0.619	0.623	0.734	0.662	0.735	0.728
		N	40037	37424	37419	37419	18774	31404	22230	15958
Risk of insolvency	1	ξ	-0.162**	-0.140	-0.126	-0.162	-0.139	-0.162	-0.129	-0.121
		se	(0.0800)	(0.102)	(0.104)	(0.101)	(0.101)	(0.0998)	(0.103)	(0.109)
		R^2	0.666	0.670	0.671	0.674	0.705	0.688	0.706	0.725
		N	81177	81177	81177	81177	80025	80707	80246	75510
	2	ξ	-0.162**	-0.131	-0.119	-0.158	-0.114	-0.129	-0.112	-0.0484
		se	(0.0800)	(0.118)	(0.120)	(0.116)	(0.156)	(0.123)	(0.145)	(0.162)
		R^2	0.666	0.681	0.682	0.685	0.761	0.713	0.752	0.767
		N	81177	81102	81102	81102	71414	78796	73691	60220
	3	ξ	-0.162**	-0.113	-0.102	-0.137	-0.0724	-0.114	-0.0944	-0.0322
		se	(0.0800)	(0.128)	(0.131)	(0.130)	(0.190)	(0.137)	(0.187)	(0.186)
		R^2	0.666	0.697	0.698	0.701	0.791	0.734	0.780	0.789
		N	81177	80077	80077	80077	56912	74074	62132	46642
	4	ξ	-0.162**	-0.104	-0.0944	-0.133	0.0164	-0.120	-0.0909	0.0209
		se	(0.0800)	(0.126)	(0.128)	(0.131)	(0.214)	(0.149)	(0.200)	(0.214)
		R^2	0.666	0.718	0.719	0.721	0.802	0.755	0.798	0.797
		N	81177	77372	77370	77370	42392	66485	49572	35556
	5	ξ	-0.162**	-0.101	-0.0901	-0.129	-0.00516	-0.112	-0.107	-0.00517
		se	(0.0800)	(0.129)	(0.133)	(0.134)	(0.245)	(0.154)	(0.223)	(0.246)
		R^2	0.666	0.721	0.722	0.724	0.809	0.757	0.804	0.802
		N	81177	76523	76521	76521	39756	64827	47044	33429

Notes: Table presents estimated effects with differentially saturated two-way fixed effect specifications. The variables are ordinal outcomes indicating the direction of change of a given variable ie. if it increased or decreased in the survey reference period. The data granularity is at the ruref level and the specification includes ruref fixed effects throught. Time fixed effects are added at differential spatial and industry granularity across columns. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors by 2 digit industry with stars indicating *** $p<0.01$, ** $p<0.05$, * $p<0.10$

Table C.13: Average treatment effects on firms' survival under increasingly demanding fixed effects, all firms

Survival (Trading status)			Estimate (ξ Treatment × Energy intensity)							
	Sic digits		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Confidence of 3m survival	1	ξ	0.0803	0.0928	0.0921	0.107*	0.148**	0.126*	0.133*	0.136*
		se	(0.0593)	(0.0615)	(0.0624)	(0.0611)	(0.0680)	(0.0643)	(0.0721)	(0.0741)
		R^2	0.703	0.710	0.711	0.713	0.736	0.726	0.739	0.755
		N	59784	59784	59784	59784	58956	59458	59153	55741
	2	ξ	0.0803	0.0932	0.0912	0.103	0.153	0.107	0.151	0.107
		se	(0.0593)	(0.0663)	(0.0673)	(0.0663)	(0.0944)	(0.0737)	(0.0950)	(0.105)
		R^2	0.703	0.719	0.720	0.722	0.787	0.748	0.780	0.792
		N	59784	59739	59739	59739	53012	58103	54643	44806
	3	ξ	0.0803	0.115*	0.116*	0.128**	0.0848	0.127*	0.129	0.0500
		se	(0.0593)	(0.0608)	(0.0622)	(0.0614)	(0.108)	(0.0745)	(0.0956)	(0.121)
		R^2	0.703	0.733	0.734	0.736	0.815	0.766	0.806	0.809
		N	59784	59046	59046	59046	42552	54791	46266	35024
	4	ξ	0.0803	0.0932*	0.0966*	0.105*	0.115	0.125	0.191	0.0809
		se	(0.0593)	(0.0528)	(0.0555)	(0.0560)	(0.141)	(0.0775)	(0.125)	(0.151)
		R^2	0.703	0.749	0.750	0.752	0.821	0.781	0.819	0.814
		N	59784	57217	57216	57216	32179	49456	37285	27141
	5	ξ	0.0803	0.0962*	0.0977	0.108*	0.134	0.125	0.200	0.101
		se	(0.0593)	(0.0574)	(0.0596)	(0.0619)	(0.178)	(0.0850)	(0.150)	(0.191)
		R^2	0.703	0.752	0.753	0.755	0.826	0.783	0.825	0.819
		N	59784	56550	56549	56549	30162	48147	35359	25524
Trading status (2 cat)	1	ξ	0.0384	0.0258	0.0225	0.0286	0.0409	0.0370	0.0387	0.0449
		se	(0.0472)	(0.0269)	(0.0275)	(0.0267)	(0.0302)	(0.0296)	(0.0304)	(0.0347)
		R^2	0.379	0.519	0.519	0.523	0.579	0.542	0.578	0.590
		N	184341	184339	184287	184287	182033	183413	182460	173091
	2	ξ	0.0384	-0.00146	-0.00624	-0.000798	-0.000180	0.00173	-0.00124	-0.000191
		se	(0.0472)	(0.0214)	(0.0228)	(0.0210)	(0.0257)	(0.0247)	(0.0242)	(0.0320)
		R^2	0.379	0.571	0.571	0.574	0.678	0.602	0.670	0.684
		N	184341	184213	184160	184160	165786	179862	169961	141304
	3	ξ	0.0384	-0.00350	-0.00705	0.000771	0.0208	0.00993	0.0112	0.0252
		se	(0.0472)	(0.0221)	(0.0231)	(0.0218)	(0.0256)	(0.0257)	(0.0224)	(0.0297)
		R^2	0.379	0.613	0.613	0.617	0.744	0.651	0.734	0.745
		N	184341	182311	182258	182258	135379	170331	145730	112084
	4	ξ	0.0384	-0.00362	-0.00613	0.000902	0.00638	0.00297	0.00122	0.0117
		se	(0.0472)	(0.0148)	(0.0145)	(0.0143)	(0.0242)	(0.0188)	(0.0172)	(0.0244)
		R^2	0.379	0.659	0.659	0.662	0.771	0.692	0.768	0.769
		N	184341	177226	177170	177170	103489	155012	118791	87107
	5	ξ	0.0384	-0.00726	-0.00992	-0.00375	-0.00722	-0.00143	-0.00853	-0.000349
		se	(0.0472)	(0.0142)	(0.0137)	(0.0134)	(0.0189)	(0.0181)	(0.0147)	(0.0199)
		R^2	0.379	0.671	0.671	0.674	0.788	0.704	0.784	0.785
		N	184341	175452	175395	175395	97908	151482	113386	82303

Notes: Table presents estimated effects with differentially saturated two-way fixed effect specifications. The variables are ordinal outcomes indicating the direction of change of a given variable ie. if it increased or decreased in the survey reference period. The data granularity is at the ruref level and the specification includes ruref fixed effects throught. Time fixed effects are added at differential spatial and industry granularity across columns. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors by 2 digit industry with stars indicating *** $p<0.01$, ** $p<0.05$, * $p<0.10$

Table C.14: Average treatment effects on firms' survival in the LBD under increasingly demanding fixed effects, all firms

Survival (LBD)			Estimate (ξ Treatment × Energy intensity)							
	Sic digits		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Local sites (LBD)	1	ξ	-0.0718	-0.0192	-0.216	-0.0594	0.225	0.0493	0.0320	-0.00890
		se	(0.497)	(0.557)	(0.387)	(0.277)	(0.253)	(0.273)	(0.247)	(0.260)
		R^2	0.964	0.964	0.964	0.964	0.964	0.964	0.964	0.965
		N	285430	285429	285429	285417	285368	285417	285368	284237
	2	ξ	-0.0718	0.534	0.279	0.435	0.131	0.151	0.225	0.272
		se	(0.497)	(0.513)	(0.355)	(0.376)	(0.294)	(0.299)	(0.383)	(0.375)
		R^2	0.964	0.964	0.964	0.964	0.965	0.965	0.965	0.966
		N	285430	285429	285429	285417	284473	285356	284526	274278
	3	ξ	-0.0718	0.268	0.0320	0.191	-0.242	-0.108	-0.228	-0.160
		se	(0.497)	(0.396)	(0.287)	(0.284)	(0.263)	(0.246)	(0.214)	(0.241)
		R^2	0.964	0.964	0.964	0.964	0.966	0.964	0.966	0.967
		N	285430	285403	285403	285391	278501	284316	279810	253485
	4	ξ	-0.0718	0.251	0.0179	0.178	-0.485	-0.237	-0.310	-0.363
		se	(0.497)	(0.406)	(0.306)	(0.295)	(0.336)	(0.223)	(0.251)	(0.301)
		R^2	0.964	0.964	0.964	0.965	0.966	0.964	0.966	0.965
		N	285430	285117	285117	285105	265091	281176	270047	227118
	5	ξ	-0.0718	0.292	0.0603	0.220	-0.473	-0.196	-0.291	-0.343
		se	(0.497)	(0.413)	(0.310)	(0.299)	(0.352)	(0.230)	(0.268)	(0.313)
		R^2	0.964	0.964	0.964	0.965	0.966	0.964	0.966	0.965
		N	285430	285044	285044	285032	261191	279880	267249	221148
Log employment (LBD)	1	ξ	0.0186	0.0292*	0.0336***	0.0293***	0.0331***	0.0294***	0.0280***	0.0222**
		se	(0.0177)	(0.0150)	(0.0105)	(0.0105)	(0.0109)	(0.0107)	(0.0106)	(0.0110)
		R^2	0.985	0.985	0.993	0.993	0.994	0.994	0.994	0.995
		N	299650	299648	299648	299637	299588	299637	299588	298520
	2	ξ	0.0186	0.0196	0.0278**	0.0238**	0.0237**	0.0159	0.0221*	0.00663
		se	(0.0177)	(0.0146)	(0.0112)	(0.0109)	(0.0113)	(0.0106)	(0.0116)	(0.0116)
		R^2	0.985	0.986	0.993	0.993	0.995	0.994	0.994	0.996
		N	299650	299648	299648	299637	298750	299599	298806	288555
	3	ξ	0.0186	0.0195	0.0300**	0.0260**	0.0145	0.0171	0.0152	0.00307
		se	(0.0177)	(0.0147)	(0.0119)	(0.0116)	(0.0118)	(0.0115)	(0.0112)	(0.00919)
		R^2	0.985	0.987	0.994	0.994	0.996	0.995	0.995	0.997
		N	299650	299626	299626	299615	292905	298594	294186	267549
	4	ξ	0.0186	0.0192	0.0273**	0.0233**	0.00935	0.0116	0.00824	-0.00539
		se	(0.0177)	(0.0134)	(0.0108)	(0.0107)	(0.0134)	(0.0114)	(0.0122)	(0.00933)
		R^2	0.985	0.987	0.994	0.994	0.996	0.996	0.996	0.997
		N	299650	299365	299365	299354	279448	295479	284403	240366
	5	ξ	0.0186	0.0181	0.0275**	0.0238**	0.00793	0.0115	0.00855	-0.00542
		se	(0.0177)	(0.0131)	(0.0112)	(0.0112)	(0.0136)	(0.0114)	(0.0124)	(0.00978)
		R^2	0.985	0.988	0.994	0.994	0.997	0.996	0.996	0.997
		N	299650	299278	299278	299267	275625	294205	281596	234318
Survival (LBD)	1	ξ	-0.0926***	-0.0987***	-0.0438***	-0.0474***	-0.0441***	-0.0430***	-0.0487***	-0.0482***
		se	(0.0224)	(0.0222)	(0.0156)	(0.0155)	(0.0146)	(0.0148)	(0.0157)	(0.0159)
		R^2	0.632	0.635	0.645	0.645	0.653	0.650	0.651	0.666
		N	299790	299788	299788	299776	299727	299776	299727	298659
	2	ξ	-0.0926***	-0.0991***	-0.0488***	-0.0522***	-0.0529***	-0.0493***	-0.0565***	-0.0573***
		se	(0.0224)	(0.0223)	(0.0162)	(0.0160)	(0.0155)	(0.0150)	(0.0169)	(0.0175)
		R^2	0.632	0.639	0.648	0.648	0.673	0.657	0.667	0.700
		N	299790	299788	299788	299776	298891	299738	298947	288702
	3	ξ	-0.0926***	-0.0963***	-0.0488***	-0.0519***	-0.0576***	-0.0499***	-0.0614***	-0.0726***
		se	(0.0224)	(0.0214)	(0.0161)	(0.0160)	(0.0157)	(0.0151)	(0.0171)	(0.0176)
		R^2	0.632	0.645	0.653	0.653	0.699	0.669	0.686	0.723
		N	299790	299767	299767	299755	293031	298732	294312	267684
	4	ξ	-0.0926***	-0.0958***	-0.0496***	-0.0525***	-0.0645***	-0.0514***	-0.0663***	-0.0735***
		se	(0.0224)	(0.0202)	(0.0155)	(0.0155)	(0.0163)	(0.0151)	(0.0173)	(0.0181)
		R^2	0.632	0.652	0.659	0.659	0.720	0.683	0.703	0.735
		N	299790	299505	299505	299493	279563	295605	284518	240482
	5	ξ	-0.0926***	-0.0970***	-0.0504***	-0.0534***	-0.0658***	-0.0524***	-0.0670***	-0.0751***
		se	(0.0224)	(0.0202)	(0.0156)	(0.0155)	(0.0159)	(0.0153)	(0.0168)	(0.0184)
		R^2	0.632	0.654	0.660	0.661	0.725	0.685	0.707	0.740
		N	299790	299413	299413	299401	275731	294328	281702	234425

Notes: Table presents estimated effects with differentially saturated two-way fixed effect specifications. The variables are ordinal outcomes indicating the direction of change of a given variable ie. if it increased or decreased in the survey reference period. The data granularity is at the ruref level and the specification includes ruref fixed effects throught. Time fixed effects are added at differential spatial and industry granularity across columns. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors by 2 digit industry with stars indicating *** p<0.01, ** p<0.05, * p<0.10

Table C.15: Average treatment effects on firms' output under increasingly demanding fixed effects, small and medium sized firms only

Output	Sic digits		Estimate (ξ Treatment × Energy intensity) (1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Export status (3 cat)	1	ξ	-0.100	-0.0729	-0.0755	-0.0694	-0.0814	-0.0459	-0.102	-0.109
		se	(0.0606)	(0.0558)	(0.0551)	(0.0543)	(0.0679)	(0.0601)	(0.0640)	(0.0836)
		R^2	0.946	0.948	0.948	0.949	0.957	0.952	0.958	0.960
		N	30071	30067	30067	30067	27940	29519	28233	25069
	2	ξ	-0.100	-0.0968	-0.0996	-0.101	-0.117	-0.0760	-0.0863	-0.136
		se	(0.0606)	(0.0666)	(0.0661)	(0.0657)	(0.0943)	(0.0794)	(0.0782)	(0.124)
		R^2	0.946	0.953	0.953	0.954	0.967	0.960	0.967	0.967
		N	30071	29793	29792	29792	20451	27627	22220	16298
	3	ξ	-0.100	-0.0671	-0.0696	-0.0664	-0.00164	-0.0145	-0.0501	-0.0382
		se	(0.0606)	(0.0836)	(0.0813)	(0.0787)	(0.200)	(0.113)	(0.155)	(0.222)
		R^2	0.946	0.957	0.957	0.959	0.972	0.965	0.970	0.973
		N	30071	28260	28259	28259	14082	24301	16406	10998
	4	ξ	-0.100	-0.130	-0.130	-0.115	0.0305	-0.151	-0.00417	0.0498
		se	(0.0606)	(0.0932)	(0.0879)	(0.0903)	(0.179)	(0.149)	(0.148)	(0.181)
		R^2	0.946	0.963	0.963	0.964	0.976	0.971	0.974	0.976
		N	30071	25641	25641	25641	9224	20016	11554	7343
	5	ξ	-0.100	-0.118	-0.117	-0.103	0.0982	-0.123	0.00439	0.133
		se	(0.0606)	(0.0963)	(0.0895)	(0.0888)	(0.125)	(0.128)	(0.0951)	(0.121)
		R^2	0.946	0.963	0.964	0.965	0.978	0.972	0.976	0.978
		N	30071	24994	24994	24994	8507	19281	10753	6722
Turnover change (3 cat)	1	ξ	0.0685	-0.0543	-0.0543	-0.00872	0.00859	0.00393	0.00911	-0.0233
		se	(0.190)	(0.211)	(0.210)	(0.200)	(0.273)	(0.222)	(0.261)	(0.291)
		R^2	0.397	0.419	0.422	0.435	0.511	0.470	0.517	0.547
		N	43244	43225	43224	43224	40510	42570	40806	36814
	2	ξ	0.0685	-0.0788	-0.0803	-0.0321	-0.00222	0.0256	0.00160	-0.198
		se	(0.190)	(0.231)	(0.230)	(0.224)	(0.444)	(0.261)	(0.387)	(0.500)
		R^2	0.397	0.473	0.476	0.488	0.636	0.548	0.628	0.637
		N	43244	42925	42923	42923	29052	40050	31467	23565
	3	ξ	0.0685	0.0602	0.0790	0.137	0.221	0.195	0.248	-0.0295
		se	(0.190)	(0.214)	(0.214)	(0.215)	(0.612)	(0.264)	(0.499)	(0.658)
		R^2	0.397	0.524	0.527	0.538	0.709	0.610	0.693	0.695
		N	43244	40641	40639	40639	19947	34985	23340	15655
	4	ξ	0.0685	-0.0887	-0.0648	-0.00511	-0.395	0.0672	-0.143	-0.442
		se	(0.190)	(0.216)	(0.219)	(0.233)	(0.787)	(0.393)	(0.723)	(0.802)
		R^2	0.397	0.574	0.577	0.590	0.729	0.659	0.727	0.717
		N	43244	36649	36638	36638	12414	28470	15899	10218
	5	ξ	0.0685	-0.112	-0.0875	-0.0227	-0.398	0.0212	-0.242	-0.481
		se	(0.190)	(0.230)	(0.235)	(0.246)	(0.880)	(0.423)	(0.796)	(0.873)
		R^2	0.397	0.578	0.582	0.595	0.736	0.665	0.735	0.725
		N	43244	35738	35727	35725	11364	27366	14779	9391
Turnover expectations (3 cat)	1	ξ	-0.157*	-0.141	-0.138	-0.123	-0.149	-0.117	-0.174*	-0.189*
		se	(0.0855)	(0.0913)	(0.0908)	(0.0868)	(0.118)	(0.0859)	(0.0905)	(0.107)
		R^2	0.304	0.331	0.335	0.351	0.448	0.395	0.455	0.492
		N	38865	38854	38851	38851	36410	38248	36678	32931
	2	ξ	-0.157*	-0.210*	-0.209*	-0.201**	-0.322**	-0.221**	-0.343***	-0.361**
		se	(0.0855)	(0.109)	(0.107)	(0.0967)	(0.143)	(0.101)	(0.121)	(0.150)
		R^2	0.304	0.396	0.399	0.414	0.589	0.485	0.583	0.590
		N	38865	38590	38587	38587	25972	35926	28219	20811
	3	ξ	-0.157*	-0.219**	-0.220**	-0.208**	-0.309	-0.273**	-0.382**	-0.238
		se	(0.0855)	(0.0926)	(0.0889)	(0.0796)	(0.192)	(0.108)	(0.171)	(0.230)
		R^2	0.304	0.457	0.460	0.475	0.666	0.557	0.656	0.646
		N	38865	36529	36526	36526	17628	31296	20760	13689
	4	ξ	-0.157*	-0.255**	-0.242**	-0.221**	0.131	-0.134	-0.143	0.105
		se	(0.0855)	(0.117)	(0.119)	(0.105)	(0.381)	(0.151)	(0.319)	(0.373)
		R^2	0.304	0.516	0.520	0.536	0.679	0.613	0.697	0.664
		N	38865	32968	32959	32959	10869	25446	14076	8814
	5	ξ	-0.157*	-0.288**	-0.277**	-0.255**	0.0784	-0.227	-0.133	0.0300
		se	(0.0855)	(0.115)	(0.117)	(0.0985)	(0.383)	(0.141)	(0.350)	(0.355)
		R^2	0.304	0.523	0.527	0.543	0.691	0.624	0.706	0.677
		N	38865	32158	32149	32147	9916	24444	13041	8086

Notes: Table presents estimated effects with differentially saturated two-way fixed effect specifications. The variables are ordinal outcomes indicating the direction of change of a given variable ie. if it increased or decreased in the survey reference period. The data granularity is at the ruref level and the specification includes ruref fixed effects throught. Time fixed effects are added at differential spatial and industry granularity across columns. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors by 2 digit industry with stars indicating *** p<0.01, ** p<0.05, * p<0.10

Table C.16: Average treatment effects on firms' prices under increasingly demanding fixed effects, small and medium sized firms only

Prices	Sic digits		Estimate (ξ Treatment × Energy intensity) (1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Price of goods sold	1	ξ	0.389***	0.409***	0.411***	0.438***	0.462***	0.424***	0.423***	0.373**
		se	(0.119)	(0.128)	(0.133)	(0.128)	(0.151)	(0.137)	(0.148)	(0.177)
		R^2	0.392	0.412	0.416	0.428	0.505	0.466	0.517	0.542
		N	36687	36666	36664	36664	34134	36043	34445	30768
	2	ξ	0.389***	0.362**	0.361**	0.364**	0.623***	0.412**	0.563***	0.607***
		se	(0.119)	(0.143)	(0.149)	(0.151)	(0.223)	(0.176)	(0.169)	(0.164)
		R^2	0.392	0.463	0.466	0.479	0.641	0.545	0.640	0.640
		N	36687	36306	36303	36303	23876	33686	26041	19213
	3	ξ	0.389***	0.287**	0.289**	0.315**	0.573***	0.435***	0.594***	0.483***
		se	(0.119)	(0.122)	(0.127)	(0.126)	(0.157)	(0.162)	(0.146)	(0.135)
		R^2	0.392	0.522	0.525	0.538	0.707	0.616	0.703	0.688
		N	36687	34275	34272	34272	16042	29226	18989	12520
	4	ξ	0.389***	0.387**	0.386**	0.395**	0.522**	0.612***	0.620***	0.501*
		se	(0.119)	(0.154)	(0.160)	(0.151)	(0.260)	(0.172)	(0.214)	(0.267)
		R^2	0.392	0.584	0.588	0.601	0.731	0.678	0.748	0.708
		N	36687	30642	30636	30636	9567	23371	12512	7820
	5	ξ	0.389***	0.421***	0.419**	0.424***	0.486*	0.659***	0.566**	0.464*
		se	(0.119)	(0.153)	(0.159)	(0.149)	(0.266)	(0.158)	(0.224)	(0.275)
		R^2	0.392	0.590	0.594	0.607	0.738	0.685	0.753	0.713
		N	36687	29817	29811	29809	8673	22412	11528	7113
Price of materials	1	ξ	0.456***	0.429***	0.432***	0.384***	0.348**	0.364***	0.389***	0.361***
		se	(0.0988)	(0.108)	(0.108)	(0.114)	(0.132)	(0.108)	(0.115)	(0.123)
		R^2	0.434	0.461	0.464	0.477	0.555	0.515	0.565	0.587
		N	35706	35680	35677	35677	33184	35072	33404	29882
	2	ξ	0.456***	0.473***	0.475***	0.406***	0.435**	0.422***	0.399***	0.489***
		se	(0.0988)	(0.120)	(0.120)	(0.129)	(0.164)	(0.159)	(0.117)	(0.121)
		R^2	0.434	0.509	0.512	0.526	0.669	0.590	0.667	0.671
		N	35706	35301	35297	35297	22872	32732	25063	18434
	3	ξ	0.456***	0.360***	0.368***	0.341**	0.228	0.326**	0.380**	0.230
		se	(0.0988)	(0.118)	(0.117)	(0.131)	(0.208)	(0.161)	(0.185)	(0.227)
		R^2	0.434	0.556	0.559	0.573	0.724	0.647	0.722	0.713
		N	35706	33240	33236	33236	15199	28253	18121	12004
	4	ξ	0.456***	0.311**	0.342***	0.358**	0.283	0.473***	0.308	0.267
		se	(0.0988)	(0.126)	(0.123)	(0.144)	(0.430)	(0.162)	(0.316)	(0.409)
		R^2	0.434	0.608	0.610	0.626	0.735	0.695	0.755	0.730
		N	35706	29584	29572	29572	9018	22401	11784	7400
	5	ξ	0.456***	0.331***	0.359***	0.372***	0.139	0.421***	0.222	0.126
		se	(0.0988)	(0.119)	(0.116)	(0.132)	(0.392)	(0.150)	(0.282)	(0.389)
		R^2	0.434	0.612	0.615	0.631	0.752	0.701	0.766	0.737
		N	35706	28775	28763	28761	8221	21428	10901	6781
Prices of goods sold expectations	1	ξ	0.155*	0.169	0.171	0.174	0.116	0.115	0.0655	0.0652
		se	(0.0844)	(0.102)	(0.105)	(0.109)	(0.114)	(0.112)	(0.131)	(0.127)
		R^2	0.404	0.426	0.429	0.441	0.523	0.481	0.528	0.562
		N	24353	24341	24339	24339	22667	23855	22774	20421
	2	ξ	0.155*	0.185*	0.187*	0.176	0.189**	0.185*	0.248**	0.254**
		se	(0.0844)	(0.0990)	(0.103)	(0.109)	(0.0918)	(0.105)	(0.103)	(0.124)
		R^2	0.404	0.480	0.483	0.495	0.641	0.560	0.637	0.640
		N	24353	24080	24077	24077	15442	22308	16797	12411
	3	ξ	0.155*	0.0880	0.100	0.115	0.125	0.0837	0.347	0.219
		se	(0.0844)	(0.102)	(0.104)	(0.113)	(0.266)	(0.107)	(0.270)	(0.380)
		R^2	0.404	0.531	0.535	0.547	0.702	0.622	0.702	0.690
		N	24353	22676	22673	22673	10321	19320	12179	8172
	4	ξ	0.155*	0.217	0.247*	0.210	0.115	0.204	0.213	0.0832
		se	(0.0844)	(0.139)	(0.148)	(0.138)	(0.470)	(0.156)	(0.437)	(0.497)
		R^2	0.404	0.592	0.596	0.609	0.738	0.685	0.752	0.712
		N	24353	20154	20150	20150	6215	15486	8101	5140
	5	ξ	0.155*	0.201	0.232	0.195	0.117	0.217	0.202	0.0960
		se	(0.0844)	(0.142)	(0.150)	(0.138)	(0.470)	(0.162)	(0.449)	(0.493)
		R^2	0.404	0.599	0.603	0.617	0.748	0.693	0.763	0.722
		N	24353	19671	19667	19665	5671	14888	7500	4735

Notes: Table presents estimated effects with differentially saturated two-way fixed effect specifications. The variables are ordinal outcomes indicating the direction of change of a given variable ie. if it increased or decreased in the survey reference period. The data granularity is at the ruref level and the specification includes ruref fixed effects throught. Time fixed effects are added at differential spatial and industry granularity across columns. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors by 2 digit industry with stars indicating *** $p<0.01$, ** $p<0.05$, * $p<0.10$

Table C.17: Average treatment effects on firms' input mix under increasingly demanding fixed effects, small and medium sized firms only

Input mix	Sic digits		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
			Estimate (ξ Treatment × Energy intensity)							
Capital	1	ξ	0.220	0.0919	0.0877	0.130	0.232	0.441	0.335	0.445
		se	(0.231)	(0.236)	(0.233)	(0.238)	(0.331)	(0.293)	(0.331)	(0.423)
		R^2	0.676	0.690	0.695	0.703	0.759	0.732	0.763	0.780
		N	11137	11134	11133	11133	10206	10919	10300	8991
	2	ξ	0.220	0.0375	0.0353	0.0419	0.212	0.187	0.279	0.164
		se	(0.231)	(0.264)	(0.267)	(0.280)	(0.614)	(0.391)	(0.502)	(0.779)
		R^2	0.676	0.725	0.729	0.737	0.831	0.786	0.827	0.826
		N	11137	10992	10991	10991	6591	10008	7338	5162
	3	ξ	0.220	0.104	0.111	0.112	0.106	0.295	0.0188	0.146
		se	(0.231)	(0.242)	(0.242)	(0.244)	(0.434)	(0.376)	(0.365)	(0.516)
		R^2	0.676	0.755	0.759	0.767	0.877	0.818	0.866	0.856
		N	11137	10275	10274	10274	4115	8469	5059	3116
	4	ξ	0.220	-0.101	-0.0784	-0.0822	-0.489	-0.0625	-0.394	-0.484
		se	(0.231)	(0.254)	(0.254)	(0.260)	(0.570)	(0.395)	(0.589)	(0.580)
		R^2	0.676	0.790	0.794	0.802	0.872	0.847	0.877	0.857
		N	11137	9033	9029	9029	2409	6450	3187	1970
	5	ξ	0.220	-0.0580	-0.0153	-0.0293	-0.448	-0.0947	-0.430	-0.438
		se	(0.231)	(0.271)	(0.274)	(0.280)	(0.583)	(0.431)	(0.582)	(0.589)
		R^2	0.676	0.794	0.798	0.807	0.873	0.853	0.879	0.859
		N	11137	8776	8772	8769	2134	6162	2917	1795
Capital mix	1	ξ	0.203	0.0129	0.0168	-0.00773	-0.0279	0.103	0.0560	0.0595
		se	(0.163)	(0.165)	(0.173)	(0.180)	(0.278)	(0.192)	(0.272)	(0.363)
		R^2	0.518	0.536	0.541	0.557	0.633	0.596	0.642	0.662
		N	13036	13019	13017	13017	11814	12691	11944	10376
	2	ξ	0.203	-0.0272	-0.0381	-0.0756	-0.0814	-0.0439	-0.133	-0.305
		se	(0.163)	(0.214)	(0.224)	(0.238)	(0.662)	(0.309)	(0.576)	(0.792)
		R^2	0.518	0.596	0.600	0.614	0.736	0.678	0.732	0.725
		N	13036	12793	12787	12787	7424	11567	8224	5900
	3	ξ	0.203	-0.202	-0.184	-0.194	0.155	-0.280	0.0885	0.210
		se	(0.163)	(0.239)	(0.243)	(0.231)	(0.566)	(0.266)	(0.529)	(0.682)
		R^2	0.518	0.648	0.651	0.665	0.791	0.733	0.783	0.766
		N	13036	11836	11830	11830	4543	9658	5577	3559
	4	ξ	0.203	-0.223	-0.214	-0.187	-0.492	-0.462	-0.0704	-0.501
		se	(0.163)	(0.306)	(0.319)	(0.302)	(0.781)	(0.312)	(0.990)	(0.781)
		R^2	0.518	0.690	0.693	0.709	0.790	0.770	0.800	0.769
		N	13036	10267	10254	10254	2660	7242	3432	2202
	5	ξ	0.203	-0.179	-0.160	-0.140	-0.579	-0.515	-0.160	-0.572
		se	(0.163)	(0.323)	(0.339)	(0.321)	(0.716)	(0.309)	(1.083)	(0.720)
		R^2	0.518	0.696	0.699	0.716	0.797	0.778	0.804	0.778
		N	13036	9959	9946	9943	2385	6917	3137	2006

Notes: Table presents estimated effects with differentially saturated two-way fixed effect specifications. The variables are ordinal outcomes indicating the direction of change of a given variable ie. if it increased or decreased in the survey reference period. The data granularity is at the ruref level and the specification includes ruref fixed effects throught. Time fixed effects are added at differential spatial and industry granularity across columns. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors by 2 digit industry with stars indicating *** p<0.01, ** p<0.05, * p<0.10

Table C.18: Average treatment effects on firms' input mix under increasingly demanding fixed effects, small and medium sized firms only

Input mix	Sic digits		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
			Estimate (ξ Treatment × Energy intensity)							
Redundancies (share)	1	ξ	0.413	0.608	0.603	0.446	0.259	0.467	0.321	0.575
		se	(0.675)	(0.864)	(0.877)	(0.803)	(1.067)	(0.917)	(1.086)	(1.174)
		R^2	0.254	0.276	0.286	0.301	0.420	0.345	0.418	0.477
		N	51601	51593	51592	51592	48889	50963	49250	44547
	2	ξ	0.413	0.566	0.551	0.333	-1.019	0.234	-1.051	-0.661
		se	(0.675)	(1.014)	(1.028)	(0.923)	(0.747)	(1.090)	(0.713)	(0.617)
		R^2	0.254	0.327	0.329	0.343	0.584	0.429	0.559	0.581
		N	51601	51359	51358	51358	36489	48330	39185	29261
	3	ξ	0.413	0.525	0.521	0.375	0.241	0.235	-0.159	0.373
		se	(0.675)	(0.952)	(0.977)	(0.863)	(0.417)	(1.115)	(0.400)	(0.450)
		R^2	0.254	0.390	0.392	0.406	0.672	0.504	0.656	0.668
		N	51601	49081	49080	49080	25374	42595	29510	19803
	4	ξ	0.413	0.636	0.631	0.473	0.726	0.727	0.499	0.835
		se	(0.675)	(0.976)	(1.009)	(0.927)	(0.531)	(1.461)	(0.441)	(0.547)
		R^2	0.254	0.466	0.469	0.484	0.704	0.583	0.692	0.702
		N	51601	44800	44797	44797	15934	35048	20402	12976
	5	ξ	0.413	0.634	0.639	0.435	0.815	0.470	0.596	0.953
		se	(0.675)	(1.010)	(1.042)	(0.961)	(0.583)	(1.524)	(0.517)	(0.604)
		R^2	0.254	0.462	0.465	0.481	0.713	0.585	0.699	0.711
		N	51601	43790	43787	43787	14566	33742	18955	11873
Redundancy expectations	1	ξ	0.0526	0.0845**	0.0776*	0.0735*	0.0165	0.0546	0.0257	0.00791
		se	(0.0359)	(0.0418)	(0.0437)	(0.0383)	(0.0567)	(0.0498)	(0.0557)	(0.0707)
		R^2	0.542	0.557	0.560	0.572	0.645	0.601	0.652	0.677
		N	17465	17465	17465	17465	16121	17172	16309	14415
	2	ξ	0.0526	0.114**	0.105**	0.0996**	0.0879	0.110*	0.0707	0.0873
		se	(0.0359)	(0.0488)	(0.0522)	(0.0449)	(0.0629)	(0.0617)	(0.0707)	(0.0977)
		R^2	0.542	0.602	0.604	0.616	0.754	0.673	0.752	0.765
		N	17465	17292	17292	17292	11176	15920	12298	8865
	3	ξ	0.0526	0.156***	0.143***	0.151***	0.0964	0.171**	0.0884	0.0672
		se	(0.0359)	(0.0489)	(0.0514)	(0.0448)	(0.0896)	(0.0685)	(0.0745)	(0.0871)
		R^2	0.542	0.647	0.649	0.661	0.792	0.717	0.794	0.773
		N	17465	16261	16260	16260	7258	13629	8824	5625
	4	ξ	0.0526	0.125**	0.107*	0.108**	0.0226	0.146**	0.0970	-0.00731
		se	(0.0359)	(0.0558)	(0.0553)	(0.0441)	(0.0883)	(0.0697)	(0.0746)	(0.0544)
		R^2	0.542	0.691	0.693	0.706	0.789	0.746	0.807	0.775
		N	17465	14638	14630	14630	4493	10895	5848	3725
	5	ξ	0.0526	0.138**	0.119**	0.118**	-0.0549	0.142**	0.0312	-0.0493
		se	(0.0359)	(0.0588)	(0.0541)	(0.0449)	(0.0827)	(0.0673)	(0.102)	(0.0782)
		R^2	0.542	0.701	0.703	0.716	0.785	0.756	0.808	0.772
		N	17465	14178	14170	14170	3968	10391	5297	3331

Notes: Table presents estimated effects with differentially saturated two-way fixed effect specifications. The variables are ordinal outcomes indicating the direction of change of a given variable ie. if it increased or decreased in the survey reference period. The data granularity is at the ruref level and the specification includes ruref fixed effects throught. Time fixed effects are added at differential spatial and industry granularity across columns. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors by 2 digit industry with stars indicating *** $p<0.01$, ** $p<0.05$, * $p<0.10$

Table C.19: Average treatment effects on firms' processes under increasingly demanding fixed effects, small and medium sized firms only

Process $f()$	Sic digits		Estimate (ξ Treatment × Energy intensity) (1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Stock levels	1	ξ	0.164	0.160	0.162	0.162	0.122	0.135	0.120	0.0573
		se	(0.120)	(0.155)	(0.158)	(0.158)	(0.262)	(0.182)	(0.249)	(0.279)
		R^2	0.397	0.413	0.417	0.434	0.489	0.473	0.506	0.522
		N	26397	26356	26353	26353	23900	25763	24259	21706
	2	ξ	0.164	0.0878	0.0840	0.0992	0.322	0.0906	0.200	0.181
		se	(0.120)	(0.174)	(0.184)	(0.183)	(0.401)	(0.236)	(0.362)	(0.390)
		R^2	0.397	0.465	0.469	0.486	0.609	0.552	0.612	0.607
		N	26397	25916	25913	25913	16716	23768	18241	13475
	3	ξ	0.164	0.0885	0.0720	0.0760	-0.0495	0.0552	0.0369	-0.0336
		se	(0.120)	(0.125)	(0.141)	(0.140)	(0.338)	(0.177)	(0.343)	(0.375)
		R^2	0.397	0.524	0.528	0.547	0.694	0.628	0.695	0.677
		N	26397	24255	24251	24251	10426	20018	12535	8180
	4	ξ	0.164	0.203	0.158	0.176	-0.139	0.217	-0.0733	-0.171
		se	(0.120)	(0.202)	(0.224)	(0.211)	(0.514)	(0.285)	(0.538)	(0.498)
		R^2	0.397	0.596	0.601	0.619	0.733	0.698	0.753	0.718
		N	26397	21147	21125	21125	5709	15349	7676	4691
	5	ξ	0.164	0.171	0.120	0.153	-0.0708	0.150	-0.0518	-0.122
		se	(0.120)	(0.220)	(0.247)	(0.236)	(0.563)	(0.305)	(0.586)	(0.540)
		R^2	0.397	0.601	0.605	0.625	0.733	0.705	0.753	0.717
		N	26397	20540	20518	20516	5191	14674	7079	4332

Notes: Table presents estimated effects with differentially saturated two-way fixed effect specifications. The variables are ordinal outcomes indicating the direction of change of a given variable ie. if it increased or decreased in the survey reference period. The data granularity is at the ruref level and the specification includes ruref fixed effects throught. Time fixed effects are added at differential spatial and industry granularity across columns. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors by 2 digit industry with stars indicating *** p<0.01, ** p<0.05, * p<0.10

Table C.20: Average treatment effects on firms' processes under increasingly demanding fixed effects, small and medium sized firms only

Process $f()$	Sic digits		Estimate (ξ Treatment $\times$ Energy intensity) (1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Hybrid working	1	ξ	-5.131	-4.249	-5.041	-5.419	0.615	-4.707	0.565	2.667
		se	(3.126)	(3.347)	(3.466)	(3.669)	(3.442)	(3.822)	(3.677)	(3.684)
		R^2	0.817	0.823	0.825	0.828	0.856	0.840	0.858	0.868
		N	22780	22778	22778	22778	21518	22444	21665	19732
	2	ξ	-5.131	-2.544	-3.491	-3.324	-2.795	-0.751	0.557	-2.755
		se	(3.126)	(4.117)	(4.238)	(4.227)	(4.208)	(4.706)	(4.851)	(5.236)
		R^2	0.817	0.837	0.839	0.842	0.891	0.865	0.885	0.888
		N	22780	22664	22664	22664	16057	21379	17258	12990
	3	ξ	-5.131	-2.794	-3.713	-2.854	-5.654	1.119	-2.465	-5.612
		se	(3.126)	(4.098)	(4.280)	(4.318)	(7.752)	(5.223)	(6.856)	(8.230)
		R^2	0.817	0.849	0.851	0.854	0.908	0.878	0.901	0.906
		N	22780	21626	21626	21626	11416	18822	13171	9022
	4	ξ	-5.131	-4.196	-5.520	-3.670	5.736	3.784	7.660	7.986
		se	(3.126)	(6.292)	(6.548)	(6.881)	(15.33)	(10.13)	(15.15)	(16.53)
		R^2	0.817	0.871	0.872	0.876	0.931	0.902	0.926	0.928
		N	22780	19648	19648	19648	7093	15544	9037	5692
	5	ξ	-5.131	-1.503	-2.455	-1.550	5.622	7.703	0.828	8.967
		se	(3.126)	(6.008)	(6.320)	(6.804)	(16.90)	(9.280)	(13.77)	(18.24)
		R^2	0.817	0.874	0.875	0.879	0.932	0.904	0.928	0.926
		N	22780	19172	19172	19172	6512	14919	8437	5220
Working from home	1	ξ	30.00***	24.45***	23.82***	20.10***	20.29**	21.33***	19.62**	23.22***
		se	(7.288)	(7.522)	(7.494)	(7.038)	(7.911)	(7.855)	(8.337)	(7.603)
		R^2	0.734	0.759	0.762	0.769	0.808	0.784	0.807	0.827
		N	47013	47006	47006	47006	44545	46424	44855	40589
	2	ξ	30.00***	22.72**	22.44**	18.96**	27.37**	25.44***	20.23	30.40**
		se	(7.288)	(8.744)	(8.649)	(8.065)	(11.37)	(8.753)	(12.61)	(12.91)
		R^2	0.734	0.784	0.787	0.793	0.858	0.824	0.848	0.857
		N	47013	46793	46793	46793	33223	44073	35680	26554
	3	ξ	30.00***	20.70**	19.51**	16.02*	25.42*	25.08***	9.805	26.50*
		se	(7.288)	(8.449)	(8.034)	(8.068)	(14.45)	(7.875)	(16.07)	(14.23)
		R^2	0.734	0.801	0.805	0.810	0.881	0.840	0.868	0.873
		N	47013	44723	44723	44723	23095	38838	26842	17939
	4	ξ	30.00***	21.05**	20.08**	17.25*	19.57*	22.83**	2.082	15.55
		se	(7.288)	(10.03)	(9.602)	(9.606)	(11.00)	(8.840)	(13.47)	(10.97)
		R^2	0.734	0.823	0.826	0.832	0.889	0.858	0.885	0.885
		N	47013	40809	40807	40807	14427	31910	18515	11675
	5	ξ	30.00***	20.12**	18.79**	16.24*	16.66	23.81***	-2.370	15.61
		se	(7.288)	(9.345)	(8.886)	(8.975)	(11.38)	(8.277)	(13.68)	(11.35)
		R^2	0.734	0.826	0.830	0.836	0.890	0.862	0.890	0.888
		N	47013	39891	39889	39889	13164	30709	17205	10681
Working from normal place of work	1	ξ	20.34**	21.38**	20.43**	19.85**	22.83**	21.64***	23.11**	21.12**
		se	(8.627)	(8.435)	(8.178)	(8.008)	(9.372)	(7.810)	(9.756)	(10.14)
		R^2	0.732	0.750	0.751	0.756	0.796	0.774	0.798	0.810
		N	47013	47006	47006	47006	44545	46424	44855	40589
	2	ξ	20.34**	21.95**	20.62**	19.60**	28.21*	19.92**	27.37*	26.40*
		se	(8.627)	(9.917)	(9.554)	(9.285)	(14.15)	(8.861)	(14.21)	(14.81)
		R^2	0.732	0.772	0.774	0.779	0.855	0.811	0.847	0.859
		N	47013	46793	46793	46793	33223	44073	35680	26554
	3	ξ	20.34**	24.96**	23.34**	22.55**	34.05**	22.16**	38.80***	32.02**
		se	(8.627)	(10.79)	(10.18)	(9.612)	(13.56)	(9.365)	(13.00)	(14.51)
		R^2	0.732	0.793	0.794	0.800	0.889	0.835	0.876	0.883
		N	47013	44723	44723	44723	23095	38838	26842	17939
	4	ξ	20.34**	23.39**	21.89**	20.86**	17.97	19.51*	35.92*	16.67
		se	(8.627)	(10.71)	(10.19)	(9.964)	(18.58)	(10.93)	(19.80)	(19.22)
		R^2	0.732	0.823	0.824	0.829	0.895	0.860	0.892	0.889
		N	47013	40809	40807	40807	14427	31910	18515	11675
	5	ξ	20.34**	19.33*	17.48	16.91	13.29	15.40	30.79	13.16
		se	(8.627)	(11.13)	(10.59)	(10.40)	(20.36)	(12.02)	(20.31)	(20.76)
		R^2	0.732	0.825	0.826	0.831	0.896	0.862	0.894	0.889
		N	47013	39891	39889	39889	13164	30709	17205	10681

Notes: Table presents estimated effects with differentially saturated two-way fixed effect specifications. The variables are ordinal outcomes indicating the direction of change of a given variable ie. if it increased or decreased in the survey reference period. The data granularity is at the ruref level and the specification includes ruref fixed effects throught. Time fixed effects are added at differential spatial and industry granularity across columns. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors by 2 digit industry with stars indicating *** p<0.01, ** p<0.05, * p<0.10

Table C.21: Average treatment effects on firms' survival under increasingly demanding fixed effects, small and medium sized firms only

Survival (Debt & liquidity)	Sic digits		Estimate (ξ Treatment $\times$ Energy intensity) (1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Confidence will meet debt obligations (5 cat)	1	ξ	-0.293**	-0.345***	-0.309**	-0.306**	-0.248*	-0.291**	-0.252*	-0.169
		se	(0.125)	(0.123)	(0.127)	(0.128)	(0.146)	(0.130)	(0.139)	(0.181)
		R^2	0.690	0.697	0.699	0.705	0.751	0.729	0.755	0.767
		N	15896	15892	15891	15891	14890	15627	14982	13481
	2	ξ	-0.293**	-0.300***	-0.274**	-0.240*	-0.213	-0.268**	-0.188	-0.268
		se	(0.125)	(0.106)	(0.112)	(0.120)	(0.144)	(0.125)	(0.167)	(0.249)
		R^2	0.690	0.725	0.727	0.733	0.806	0.769	0.804	0.802
		N	15896	15769	15767	15767	10661	14714	11581	8527
	3	ξ	-0.293**	-0.284***	-0.244**	-0.169	-0.137	-0.0150	-0.0354	-0.270
		se	(0.125)	(0.105)	(0.119)	(0.119)	(0.262)	(0.179)	(0.258)	(0.292)
		R^2	0.690	0.750	0.752	0.759	0.833	0.801	0.831	0.824
		N	15896	14920	14917	14917	7219	12748	8510	5715
	4	ξ	-0.293**	-0.295*	-0.268	-0.221	0.175	0.220	0.242	0.204
		se	(0.125)	(0.165)	(0.189)	(0.183)	(0.377)	(0.233)	(0.386)	(0.393)
		R^2	0.690	0.775	0.777	0.785	0.847	0.828	0.855	0.838
		N	15896	13423	13421	13421	4398	10276	5767	3574
	5	ξ	-0.293**	-0.283	-0.256	-0.211	0.329	0.279	0.295	0.337
		se	(0.125)	(0.174)	(0.195)	(0.186)	(0.379)	(0.250)	(0.380)	(0.408)
		R^2	0.690	0.780	0.782	0.790	0.853	0.832	0.862	0.843
		N	15896	13053	13051	13051	4003	9835	5316	3231
Repayments compared to turnover (5 cat)	1	ξ	-0.778***	-0.614**	-0.642***	-0.806***	-0.883***	-0.837***	-0.953***	-0.977***
		se	(0.200)	(0.239)	(0.237)	(0.219)	(0.251)	(0.228)	(0.258)	(0.313)
		R^2	0.716	0.731	0.734	0.747	0.817	0.775	0.821	0.834
		N	10909	10867	10864	10863	9551	10487	9595	7975
	2	ξ	-0.778***	-0.518*	-0.547**	-0.796***	-0.175	-0.415*	-0.349	-0.157
		se	(0.200)	(0.269)	(0.266)	(0.256)	(0.144)	(0.216)	(0.254)	(0.149)
		R^2	0.716	0.767	0.770	0.782	0.878	0.824	0.877	0.873
		N	10909	10540	10534	10533	5569	9130	6318	4332
	3	ξ	-0.778***	-0.556	-0.701*	-0.983**	0.293	-0.441	0.0906	0.381
		se	(0.200)	(0.405)	(0.390)	(0.418)	(0.401)	(0.418)	(0.575)	(0.425)
		R^2	0.716	0.796	0.799	0.812	0.900	0.856	0.904	0.893
		N	10909	9646	9640	9637	3302	7476	4052	2642
	4	ξ	-0.778***	0.0298	-0.122	-0.644	0.535	0.00976	0.467	0.594
		se	(0.200)	(0.547)	(0.546)	(0.492)	(0.393)	(0.439)	(0.472)	(0.384)
		R^2	0.716	0.810	0.814	0.828	0.897	0.867	0.902	0.890
		N	10909	8170	8161	8160	2096	5703	2584	1716
	5	ξ	-0.778***	0.137	-0.0149	-0.457	0.628	0.0517	0.467	0.615
		se	(0.200)	(0.595)	(0.595)	(0.532)	(0.432)	(0.380)	(0.524)	(0.425)
		R^2	0.716	0.812	0.816	0.831	0.895	0.871	0.904	0.889
		N	10909	7878	7869	7866	1886	5388	2378	1567

Notes: Table presents estimated effects with differentially saturated two-way fixed effect specifications. The variables are ordinal outcomes indicating the direction of change of a given variable ie. if it increased or decreased in the survey reference period. The data granularity is at the ruref level and the specification includes ruref fixed effects throught. Time fixed effects are added at differential spatial and industry granularity across columns. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors by 2 digit industry with stars indicating *** $p<0.01$, ** $p<0.05$, * $p<0.10$

Table C.22: Average treatment effects on firms' survival under increasingly demanding fixed effects, small and medium sized firms only

Survival (Debt & liquidity)	Sic digits		Estimate (ξ Treatment × Energy intensity) (1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Cash reserve duration (5 cat)	1	ξ	0.288**	0.248	0.246	0.270*	0.331*	0.305*	0.425**	0.468**
		se	(0.135)	(0.153)	(0.159)	(0.153)	(0.182)	(0.164)	(0.205)	(0.217)
		R^2	0.786	0.795	0.796	0.801	0.837	0.818	0.839	0.851
		N	28607	28591	28590	28590	26612	28125	26777	23768
	2	ξ	0.288**	0.318**	0.317**	0.349**	0.406**	0.340**	0.431**	0.616***
		se	(0.135)	(0.148)	(0.154)	(0.155)	(0.166)	(0.164)	(0.190)	(0.188)
		R^2	0.786	0.814	0.815	0.820	0.889	0.848	0.884	0.887
		N	28607	28357	28355	28355	18187	26163	19932	14438
	3	ξ	0.288**	0.351**	0.366**	0.435**	1.098***	0.559**	0.967***	1.306***
		se	(0.135)	(0.169)	(0.177)	(0.172)	(0.402)	(0.226)	(0.357)	(0.348)
		R^2	0.786	0.836	0.837	0.842	0.914	0.870	0.908	0.905
		N	28607	26672	26670	26670	11759	22468	13990	9110
	4	ξ	0.288**	0.480**	0.507***	0.546***	1.077**	0.663***	0.654	1.092**
		se	(0.135)	(0.188)	(0.191)	(0.186)	(0.445)	(0.211)	(0.458)	(0.460)
		R^2	0.786	0.855	0.856	0.862	0.924	0.888	0.923	0.918
		N	28607	24059	24052	24052	7420	18142	9542	6070
	5	ξ	0.288**	0.535***	0.552***	0.572***	1.142**	0.696***	0.761	1.134**
		se	(0.135)	(0.197)	(0.202)	(0.200)	(0.490)	(0.202)	(0.502)	(0.504)
		R^2	0.786	0.857	0.858	0.864	0.924	0.891	0.924	0.919
		N	28607	23417	23410	23410	6695	17365	8735	5505

Notes: Table presents estimated effects with differentially saturated two-way fixed effect specifications. The variables are ordinal outcomes indicating the direction of change of a given variable ie. if it increased or decreased in the survey reference period. The data granularity is at the ruref level and the specification includes ruref fixed effects throught. Time fixed effects are added at differential spatial and industry granularity across columns. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors by 2 digit industry with stars indicating *** p<0.01, ** p<0.05, * p<0.10

Table C.23: Average treatment effects on firms' survival under increasingly demanding fixed effects, small and medium sized firms only

Survival (Trading status)	Sic digits		Estimate (ξ Treatment × Energy intensity) (1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Change in risk of insolvency	1	ξ	0.0274	0.0340	0.0477	-0.00411	-0.120	-0.0607	-0.109	-0.0294
		se	(0.0835)	(0.0823)	(0.0781)	(0.0788)	(0.142)	(0.122)	(0.150)	(0.194)
		R^2	0.542	0.565	0.567	0.577	0.648	0.609	0.656	0.674
		N	15083	15080	15078	15078	14069	14851	14196	12589
	2	ξ	0.0274	0.0463	0.0565	0.0226	0.0940	0.0697	-0.0146	0.200
		se	(0.0835)	(0.0926)	(0.0874)	(0.0829)	(0.0921)	(0.130)	(0.193)	(0.188)
		R^2	0.542	0.608	0.611	0.620	0.733	0.667	0.731	0.732
		N	15083	14955	14951	14951	9883	13781	10815	7836
	3	ξ	0.0274	-0.0489	-0.0276	-0.0327	0.261	0.00179	0.201	0.234
		se	(0.0835)	(0.0986)	(0.0889)	(0.0883)	(0.166)	(0.225)	(0.222)	(0.220)
		R^2	0.542	0.647	0.650	0.658	0.788	0.715	0.784	0.766
		N	15083	14141	14137	14137	6444	11897	7700	4894
	4	ξ	0.0274	-0.0902	-0.0855	-0.108	0.00266	-0.113	-0.0667	0.00188
		se	(0.0835)	(0.0997)	(0.0871)	(0.0888)	(0.173)	(0.215)	(0.202)	(0.155)
		R^2	0.542	0.681	0.683	0.693	0.796	0.743	0.801	0.784
		N	15083	12702	12696	12696	4005	9524	5132	3214
	5	ξ	0.0274	-0.0649	-0.0577	-0.0843	0.157	-0.117	-0.0240	0.151
		se	(0.0835)	(0.102)	(0.0900)	(0.0935)	(0.141)	(0.185)	(0.216)	(0.143)
		R^2	0.542	0.689	0.691	0.701	0.806	0.752	0.809	0.791
		N	15083	12361	12355	12355	3592	9124	4722	2907
Risk of insolvency	1	ξ	-0.263**	-0.295***	-0.301***	-0.346***	-0.339***	-0.371***	-0.289***	-0.400***
		se	(0.100)	(0.0986)	(0.0996)	(0.0932)	(0.0892)	(0.0937)	(0.0964)	(0.124)
		R^2	0.669	0.678	0.680	0.687	0.737	0.708	0.739	0.758
		N	31269	31262	31262	31262	29499	30818	29685	26674
	2	ξ	-0.263**	-0.287**	-0.293***	-0.343***	-0.380**	-0.313**	-0.343**	-0.335
		se	(0.100)	(0.109)	(0.110)	(0.107)	(0.169)	(0.123)	(0.165)	(0.242)
		R^2	0.669	0.706	0.708	0.715	0.803	0.751	0.796	0.804
		N	31269	31084	31084	31084	21460	29046	23242	17148
	3	ξ	-0.263**	-0.285**	-0.290**	-0.359***	-0.430**	-0.371**	-0.320*	-0.435*
		se	(0.100)	(0.119)	(0.123)	(0.125)	(0.209)	(0.153)	(0.190)	(0.230)
		R^2	0.669	0.734	0.736	0.743	0.838	0.784	0.832	0.833
		N	31269	29573	29573	29573	14565	25386	17134	11277
	4	ξ	-0.263**	-0.258**	-0.244**	-0.326***	-0.447	-0.387**	-0.376	-0.399
		se	(0.100)	(0.107)	(0.113)	(0.121)	(0.282)	(0.174)	(0.289)	(0.304)
		R^2	0.669	0.762	0.763	0.771	0.852	0.812	0.854	0.851
		N	31269	26826	26823	26823	9015	20608	11682	7259
	5	ξ	-0.263**	-0.279**	-0.264**	-0.336***	-0.405	-0.423**	-0.295	-0.337
		se	(0.100)	(0.113)	(0.121)	(0.124)	(0.299)	(0.193)	(0.295)	(0.323)
		R^2	0.669	0.765	0.766	0.774	0.855	0.816	0.858	0.852
		N	31269	26158	26155	26155	8141	19782	10798	6565

Notes: Table presents estimated effects with differentially saturated two-way fixed effect specifications. The variables are ordinal outcomes indicating the direction of change of a given variable ie. if it increased or decreased in the survey reference period. The data granularity is at the ruref level and the specification includes ruref fixed effects throught. Time fixed effects are added at differential spatial and industry granularity across columns. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors by 2 digit industry with stars indicating *** p<0.01, ** p<0.05, * p<0.10

Table C.24: Average treatment effects on firms' survival under increasingly demanding fixed effects, small and medium sized firms only

Survival (Trading status)	Sic digits		Estimate (ξ Treatment × Energy intensity) (1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Confidence of 3m survival	1	ξ	0.169*	0.151	0.152	0.172	0.261**	0.233**	0.214*	0.255*
		se	(0.0877)	(0.0984)	(0.101)	(0.103)	(0.122)	(0.110)	(0.117)	(0.130)
		R^2	0.714	0.723	0.725	0.730	0.767	0.749	0.772	0.791
		N	22680	22677	22677	22677	21365	22372	21550	19359
	2	ξ	0.169*	0.206**	0.202*	0.225**	0.425***	0.302***	0.354***	0.371***
		se	(0.0877)	(0.101)	(0.105)	(0.105)	(0.113)	(0.0988)	(0.106)	(0.114)
		R^2	0.714	0.747	0.749	0.753	0.839	0.789	0.832	0.845
		N	22680	22562	22562	22562	15706	21096	17004	12550
	3	ξ	0.169*	0.207**	0.201*	0.219**	0.459**	0.313***	0.434***	0.365*
		se	(0.0877)	(0.0968)	(0.102)	(0.100)	(0.185)	(0.113)	(0.131)	(0.184)
		R^2	0.714	0.773	0.774	0.779	0.872	0.819	0.864	0.866
		N	22680	21518	21518	21518	10811	18495	12654	8355
	4	ξ	0.169*	0.181*	0.181	0.210*	0.652*	0.456**	0.610**	0.588
		se	(0.0877)	(0.104)	(0.110)	(0.110)	(0.383)	(0.177)	(0.233)	(0.396)
		R^2	0.714	0.797	0.799	0.804	0.883	0.843	0.882	0.879
		N	22680	19622	19620	19620	6778	15028	8665	5503
	5	ξ	0.169*	0.196*	0.192*	0.214*	0.789*	0.492**	0.690***	0.706*
		se	(0.0877)	(0.107)	(0.113)	(0.109)	(0.403)	(0.193)	(0.252)	(0.417)
		R^2	0.714	0.799	0.801	0.806	0.881	0.844	0.882	0.876
		N	22680	19142	19140	19140	6092	14434	7993	4979
Trading status (2 cat)	1	ξ	0.0252	0.00505	0.00451	0.000548	0.0106	0.0194	0.0165	0.0172
		se	(0.0307)	(0.0218)	(0.0226)	(0.0222)	(0.0286)	(0.0241)	(0.0306)	(0.0366)
		R^2	0.427	0.540	0.542	0.553	0.646	0.582	0.642	0.638
		N	69249	69239	69237	69237	65801	68397	66216	60142
	2	ξ	0.0252	-0.0343	-0.0358	-0.0365	-0.0453	-0.0253	-0.0464	-0.0674
		se	(0.0307)	(0.0286)	(0.0289)	(0.0296)	(0.0408)	(0.0294)	(0.0468)	(0.0628)
		R^2	0.427	0.600	0.603	0.612	0.746	0.653	0.742	0.737
		N	69249	68955	68953	68953	49519	65077	52954	39835
	3	ξ	0.0252	-0.0129	-0.0142	-0.0166	0.0242	-0.000201	0.0301	0.0138
		se	(0.0307)	(0.0278)	(0.0279)	(0.0272)	(0.0351)	(0.0240)	(0.0346)	(0.0407)
		R^2	0.427	0.648	0.651	0.660	0.799	0.703	0.793	0.795
		N	69249	65973	65971	65971	34709	57624	40017	27186
	4	ξ	0.0252	-0.0206	-0.0229	-0.0291	0.0247	-0.0212	-0.00324	0.0234
		se	(0.0307)	(0.0203)	(0.0196)	(0.0218)	(0.0409)	(0.0256)	(0.0340)	(0.0442)
		R^2	0.427	0.700	0.702	0.711	0.819	0.743	0.820	0.816
		N	69249	60363	60359	60359	22007	47815	27870	17864
	5	ξ	0.0252	-0.0256	-0.0289	-0.0346*	0.0171	-0.0249	-0.00680	0.0143
		se	(0.0307)	(0.0196)	(0.0187)	(0.0207)	(0.0460)	(0.0247)	(0.0395)	(0.0486)
		R^2	0.427	0.708	0.711	0.720	0.821	0.750	0.822	0.817
		N	69249	59013	59009	59009	20207	46097	25898	16394

Notes: Table presents estimated effects with differentially saturated two-way fixed effect specifications. The variables are ordinal outcomes indicating the direction of change of a given variable ie. if it increased or decreased in the survey reference period. The data granularity is at the ruref level and the specification includes ruref fixed effects throught. Time fixed effects are added at differential spatial and industry granularity across columns. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors by 2 digit industry with stars indicating *** p<0.01, ** p<0.05, * p<0.10

Table C.25: Average treatment effects on firms' survival in the LBD under increasingly demanding fixed effects, small and medium sized firms only

Survival (LBD)			Estimate (ξ Treatment × Energy intensity)							
	Sic digits		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Local sites (LBD)	1	ξ	0.0439	0.0477	0.0336	0.0266	0.0278	0.0263	0.0209	0.0177
		se	(0.0400)	(0.0425)	(0.0368)	(0.0391)	(0.0393)	(0.0392)	(0.0378)	(0.0393)
		R^2	0.920	0.921	0.921	0.921	0.924	0.922	0.924	0.934
		N	217580	217579	217579	217567	217494	217567	217494	216555
	2	ξ	0.0439	0.0480	0.0349	0.0273	0.0372	0.0410	0.0188	0.0388
		se	(0.0400)	(0.0527)	(0.0459)	(0.0480)	(0.0416)	(0.0466)	(0.0440)	(0.0407)
		R^2	0.920	0.921	0.921	0.921	0.934	0.924	0.933	0.954
		N	217580	217579	217579	217567	216367	217513	216400	208525
	3	ξ	0.0439	0.0316	0.0177	0.00979	0.0200	0.0226	-0.0155	0.0159
		se	(0.0400)	(0.0507)	(0.0436)	(0.0469)	(0.0370)	(0.0463)	(0.0465)	(0.0308)
		R^2	0.920	0.922	0.922	0.922	0.944	0.927	0.941	0.964
		N	217580	217527	217527	217515	210088	216678	211117	191842
	4	ξ	0.0439	0.0184	0.00355	-0.00241	-0.00416	-0.0106	-0.0289	-0.00900
		se	(0.0400)	(0.0423)	(0.0343)	(0.0369)	(0.0355)	(0.0373)	(0.0441)	(0.0313)
		R^2	0.920	0.926	0.926	0.926	0.948	0.935	0.945	0.968
		N	217580	217225	217225	217213	197991	214084	201762	171106
	5	ξ	0.0439	0.0194	0.00412	-0.00154	-0.00862	-0.0135	-0.0354	-0.00357
		se	(0.0400)	(0.0435)	(0.0351)	(0.0379)	(0.0371)	(0.0365)	(0.0487)	(0.0260)
		R^2	0.920	0.926	0.926	0.926	0.948	0.936	0.944	0.969
		N	217580	217078	217078	217066	194750	213095	199358	166578
Log employment (LBD)	1	ξ	0.0422***	0.0492***	0.0428***	0.0391***	0.0390***	0.0395***	0.0371***	0.0343***
		se	(0.0149)	(0.0145)	(0.0119)	(0.0121)	(0.0133)	(0.0122)	(0.0126)	(0.0125)
		R^2	0.979	0.979	0.988	0.988	0.989	0.989	0.989	0.991
		N	230000	229998	229998	229987	229933	229987	229933	229037
	2	ξ	0.0422***	0.0289**	0.0308**	0.0273**	0.0248*	0.0256**	0.0243*	0.0139
		se	(0.0149)	(0.0128)	(0.0120)	(0.0122)	(0.0133)	(0.0121)	(0.0135)	(0.0125)
		R^2	0.979	0.980	0.989	0.989	0.991	0.990	0.990	0.993
		N	230000	229998	229998	229987	228895	229956	228923	220982
	3	ξ	0.0422***	0.0272**	0.0339***	0.0300**	0.0149	0.0261*	0.0131	0.00911
		se	(0.0149)	(0.0132)	(0.0127)	(0.0128)	(0.0130)	(0.0131)	(0.0128)	(0.0107)
		R^2	0.979	0.981	0.989	0.989	0.993	0.991	0.992	0.994
		N	230000	229956	229956	229945	222817	229156	223780	204081
	4	ξ	0.0422***	0.0234*	0.0307**	0.0274**	0.00847	0.0214	0.00505	-0.000133
		se	(0.0149)	(0.0131)	(0.0124)	(0.0125)	(0.0152)	(0.0140)	(0.0137)	(0.0116)
		R^2	0.979	0.983	0.990	0.990	0.994	0.992	0.992	0.995
		N	230000	229685	229685	229674	210575	226579	214347	182602
	5	ξ	0.0422***	0.0236*	0.0312**	0.0282**	0.00786	0.0211	0.00611	0.000151
		se	(0.0149)	(0.0126)	(0.0124)	(0.0125)	(0.0154)	(0.0137)	(0.0137)	(0.0123)
		R^2	0.979	0.983	0.990	0.990	0.994	0.992	0.992	0.995
		N	230000	229540	229540	229529	207357	225610	211887	177981
Survival (LBD)	1	ξ	-0.100***	-0.101***	-0.0519***	-0.0562***	-0.0547***	-0.0525***	-0.0589***	-0.0572***
		se	(0.0226)	(0.0220)	(0.0171)	(0.0171)	(0.0161)	(0.0162)	(0.0172)	(0.0171)
		R^2	0.637	0.641	0.649	0.650	0.659	0.653	0.657	0.671
		N	230141	230139	230139	230127	230073	230127	230073	229177
	2	ξ	-0.100***	-0.101***	-0.0563***	-0.0599***	-0.0608***	-0.0570***	-0.0650***	-0.0645***
		se	(0.0226)	(0.0226)	(0.0176)	(0.0175)	(0.0169)	(0.0162)	(0.0184)	(0.0180)
		R^2	0.637	0.646	0.653	0.653	0.682	0.661	0.677	0.704
		N	230141	230139	230139	230127	229033	230096	229061	221130
	3	ξ	-0.100***	-0.0973***	-0.0552***	-0.0588***	-0.0656***	-0.0556***	-0.0704***	-0.0783***
		se	(0.0226)	(0.0220)	(0.0178)	(0.0178)	(0.0172)	(0.0165)	(0.0186)	(0.0184)
		R^2	0.637	0.652	0.658	0.659	0.707	0.673	0.696	0.725
		N	230141	230096	230096	230084	222944	229295	223907	204219
	4	ξ	-0.100***	-0.0963***	-0.0556***	-0.0589***	-0.0704***	-0.0573***	-0.0724***	-0.0780***
		se	(0.0226)	(0.0209)	(0.0172)	(0.0172)	(0.0178)	(0.0165)	(0.0189)	(0.0190)
		R^2	0.637	0.660	0.666	0.666	0.725	0.686	0.711	0.735
		N	230141	229830	229830	229818	210693	226706	214463	182721
	5	ξ	-0.100***	-0.0974***	-0.0566***	-0.0599***	-0.0703***	-0.0584***	-0.0720***	-0.0790***
		se	(0.0226)	(0.0210)	(0.0173)	(0.0173)	(0.0173)	(0.0166)	(0.0183)	(0.0192)
		R^2	0.637	0.662	0.667	0.668	0.730	0.688	0.715	0.740
		N	230141	229682	229682	229670	207466	225734	211994	178089

Notes: Table presents estimated effects with differentially saturated two-way fixed effect specifications. The variables are ordinal outcomes indicating the direction of change of a given variable ie. if it increased or decreased in the survey reference period. The data granularity is at the ruref level and the specification includes ruref fixed effects throught. Time fixed effects are added at differential spatial and industry granularity across columns. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors by 2 digit industry with stars indicating *** p<0.01, ** p<0.05, * p<0.10

Table C.26: Average treatment effects on firms' output under increasingly demanding fixed effects, large firms only

Output	Sic digits		Estimate (ξ Treatment × Energy intensity) (1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Export status (3 cat)	1	ξ	-0.0464	-0.103	-0.103	-0.127*	-0.127	-0.127*	-0.127	-0.127
		se	(0.0715)	(0.0664)	(0.0664)	(0.0686)	(0.0813)	(0.0686)	(0.0813)	(0.0813)
		R^2	0.938	0.940	0.940	0.941	0.948	0.941	0.948	0.948
		N	45647	45632	45632	45632	44401	45632	44401	44401
	2	ξ	-0.0464	-0.117	-0.117	-0.139*	-0.147*	-0.139*	-0.147*	-0.147*
		se	(0.0715)	(0.0800)	(0.0800)	(0.0782)	(0.0781)	(0.0782)	(0.0787)	(0.0781)
		R^2	0.938	0.944	0.944	0.945	0.956	0.945	0.956	0.956
		N	45647	45396	45396	45396	38919	45396	38919	38919
	3	ξ	-0.0464	-0.0943	-0.0943	-0.119	-0.190	-0.119	-0.190	-0.190
		se	(0.0715)	(0.0767)	(0.0767)	(0.0779)	(0.150)	(0.0779)	(0.151)	(0.150)
		R^2	0.938	0.949	0.949	0.949	0.960	0.949	0.960	0.960
		N	45647	44278	44278	44278	31835	44278	31835	31835
	4	ξ	-0.0464	-0.0845	-0.0845	-0.119	-0.0948	-0.119	-0.0948	-0.0948
		se	(0.0715)	(0.0777)	(0.0777)	(0.0830)	(0.0994)	(0.0830)	(0.101)	(0.0994)
		R^2	0.938	0.953	0.953	0.953	0.963	0.953	0.963	0.963
		N	45647	41705	41705	41705	26001	41705	26001	26001
	5	ξ	-0.0464	-0.106	-0.106	-0.140*	-0.109	-0.140*	-0.109	-0.109
		se	(0.0715)	(0.0778)	(0.0778)	(0.0830)	(0.0966)	(0.0830)	(0.0978)	(0.0966)
		R^2	0.938	0.953	0.953	0.954	0.963	0.954	0.963	0.963
		N	45647	41007	41007	41007	24708	41007	24708	24708
Turnover change (3 cat)	1	ξ	0.0831	0.0815	0.0815	0.157	0.251	0.157	0.251	0.251
		se	(0.126)	(0.158)	(0.158)	(0.164)	(0.194)	(0.164)	(0.194)	(0.194)
		R^2	0.361	0.381	0.381	0.391	0.441	0.391	0.441	0.441
		N	72300	72275	72275	72275	70555	72275	70555	70555
	2	ξ	0.0831	0.0124	0.0124	0.105	0.254	0.105	0.254	0.254
		se	(0.126)	(0.175)	(0.175)	(0.182)	(0.249)	(0.182)	(0.250)	(0.249)
		R^2	0.361	0.416	0.416	0.425	0.535	0.425	0.535	0.535
		N	72300	72062	72062	72062	62097	72062	62097	62097
	3	ξ	0.0831	-0.0715	-0.0715	0.00867	-0.0490	0.00867	-0.0490	-0.0490
		se	(0.126)	(0.172)	(0.172)	(0.162)	(0.209)	(0.162)	(0.211)	(0.209)
		R^2	0.361	0.462	0.462	0.470	0.597	0.470	0.597	0.597
		N	72300	70353	70353	70353	51083	70353	51083	51083
	4	ξ	0.0831	-0.0220	-0.0220	0.0538	-0.190	0.0538	-0.190	-0.190
		se	(0.126)	(0.212)	(0.212)	(0.207)	(0.192)	(0.207)	(0.194)	(0.192)
		R^2	0.361	0.513	0.513	0.520	0.619	0.520	0.619	0.619
		N	72300	66226	66226	66226	40964	66226	40964	40964
	5	ξ	0.0831	0.0297	0.0297	0.104	-0.0674	0.104	-0.0674	-0.0674
		se	(0.126)	(0.240)	(0.241)	(0.236)	(0.255)	(0.236)	(0.258)	(0.255)
		R^2	0.361	0.520	0.520	0.527	0.633	0.527	0.633	0.633
		N	72300	64985	64985	64985	38814	64985	38814	38814
Turnover expectations (3 cat)	1	ξ	-0.173**	-0.138**	-0.138**	-0.106	-0.121*	-0.106	-0.121*	-0.121*
		se	(0.0694)	(0.0689)	(0.0689)	(0.0656)	(0.0719)	(0.0656)	(0.0719)	(0.0719)
		R^2	0.257	0.289	0.289	0.299	0.361	0.299	0.361	0.361
		N	65011	64984	64984	64984	63517	64984	63517	63517
	2	ξ	-0.173**	-0.0141	-0.0141	0.0286	0.0567	0.0286	0.0567	0.0567
		se	(0.0694)	(0.0714)	(0.0714)	(0.0650)	(0.0829)	(0.0650)	(0.0835)	(0.0829)
		R^2	0.257	0.330	0.330	0.339	0.467	0.339	0.467	0.467
		N	65011	64786	64786	64786	55933	64786	55933	55933
	3	ξ	-0.173**	-0.0413	-0.0413	0.00308	0.0912	0.00308	0.0912	0.0912
		se	(0.0694)	(0.0759)	(0.0759)	(0.0741)	(0.119)	(0.0741)	(0.120)	(0.119)
		R^2	0.257	0.378	0.378	0.387	0.531	0.387	0.531	0.531
		N	65011	63277	63277	63277	45980	63277	45980	45980
	4	ξ	-0.173**	-0.00577	-0.00577	0.0455	0.161	0.0455	0.161	0.161
		se	(0.0694)	(0.0885)	(0.0885)	(0.0857)	(0.154)	(0.0857)	(0.156)	(0.154)
		R^2	0.257	0.427	0.427	0.436	0.549	0.436	0.549	0.549
		N	65011	59589	59589	59589	36957	59589	36957	36957
	5	ξ	-0.173**	0.0385	0.0385	0.0889	0.226	0.0889	0.226	0.226
		se	(0.0694)	(0.0975)	(0.0976)	(0.0912)	(0.166)	(0.0912)	(0.168)	(0.166)
		R^2	0.257	0.436	0.436	0.445	0.565	0.445	0.565	0.565
		N	65011	58496	58496	58496	34930	58496	34930	34930

Notes: Table presents estimated effects with differentially saturated two-way fixed effect specifications. The variables are ordinal outcomes indicating the direction of change of a given variable ie. if it increased or decreased in the survey reference period. The data granularity is at the ruref level and the specification includes ruref fixed effects throught. Time fixed effects are added at differential spatial and industry granularity across columns. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors by 2 digit industry with stars indicating *** p<0.01, ** p<0.05, * p<0.10

Table C.27: Average treatment effects on firms' prices under increasingly demanding fixed effects, large firms only

Prices	Sic digits		Estimate (ξ Treatment $\times$ Energy intensity) (1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Price of goods sold	1	ξ	0.185	0.172*	0.172*	0.188**	0.136	0.188**	0.136	0.136
		se	(0.129)	(0.0888)	(0.0888)	(0.0857)	(0.0905)	(0.0857)	(0.0905)	(0.0905)
		R^2	0.321	0.349	0.349	0.357	0.418	0.357	0.418	0.418
		N	61229	61200	61200	61200	59627	61200	59627	59627
	2	ξ	0.185	0.205**	0.205**	0.223**	0.222**	0.223**	0.222**	0.222**
		se	(0.129)	(0.0978)	(0.0978)	(0.0950)	(0.109)	(0.0950)	(0.110)	(0.109)
		R^2	0.321	0.385	0.385	0.393	0.512	0.393	0.512	0.512
		N	61229	60976	60976	60976	51991	60976	51991	51991
	3	ξ	0.185	0.126	0.126	0.154*	0.114	0.154*	0.114	0.114
		se	(0.129)	(0.0851)	(0.0852)	(0.0846)	(0.122)	(0.0846)	(0.123)	(0.122)
		R^2	0.321	0.428	0.428	0.436	0.574	0.436	0.574	0.574
		N	61229	59439	59439	59439	42529	59439	42529	42529
	4	ξ	0.185	0.145	0.145	0.196	0.0727	0.196	0.0727	0.0727
		se	(0.129)	(0.113)	(0.113)	(0.118)	(0.126)	(0.118)	(0.128)	(0.126)
		R^2	0.321	0.470	0.470	0.479	0.590	0.479	0.590	0.590
		N	61229	55695	55695	55695	33795	55695	33795	33795
	5	ξ	0.185	0.153	0.153	0.204*	0.109	0.204*	0.109	0.109
		se	(0.129)	(0.116)	(0.116)	(0.122)	(0.144)	(0.122)	(0.145)	(0.144)
		R^2	0.321	0.478	0.478	0.487	0.602	0.487	0.602	0.602
		N	61229	54621	54621	54621	31948	54621	31948	31948
Price of materials	1	ξ	0.326**	0.245*	0.245*	0.241*	0.189	0.241*	0.189	0.189
		se	(0.141)	(0.139)	(0.139)	(0.133)	(0.149)	(0.133)	(0.149)	(0.149)
		R^2	0.359	0.382	0.382	0.392	0.452	0.392	0.452	0.452
		N	58584	58556	58556	58556	56908	58556	56908	56908
	2	ξ	0.326**	0.280*	0.280*	0.285*	0.272	0.285*	0.272	0.272
		se	(0.141)	(0.147)	(0.147)	(0.144)	(0.190)	(0.144)	(0.191)	(0.190)
		R^2	0.359	0.420	0.420	0.429	0.553	0.429	0.553	0.553
		N	58584	58317	58317	58317	49247	58317	49247	49247
	3	ξ	0.326**	0.232*	0.232*	0.245*	0.0889	0.245*	0.0889	0.0889
		se	(0.141)	(0.126)	(0.126)	(0.130)	(0.198)	(0.130)	(0.199)	(0.198)
		R^2	0.359	0.466	0.466	0.474	0.603	0.474	0.603	0.603
		N	58584	56684	56684	56684	40105	56684	40105	40105
	4	ξ	0.326**	0.224	0.224	0.229	-0.0194	0.229	-0.0194	-0.0194
		se	(0.141)	(0.151)	(0.151)	(0.157)	(0.222)	(0.157)	(0.225)	(0.222)
		R^2	0.359	0.511	0.511	0.521	0.624	0.521	0.624	0.624
		N	58584	52887	52887	52887	31478	52887	31478	31478
	5	ξ	0.326**	0.191	0.191	0.191	0.0650	0.191	0.0650	0.0650
		se	(0.141)	(0.143)	(0.143)	(0.145)	(0.196)	(0.145)	(0.198)	(0.196)
		R^2	0.359	0.517	0.517	0.526	0.636	0.526	0.636	0.636
		N	58584	51832	51832	51832	29710	51832	29710	29710
Prices of goods sold expectations	1	ξ	0.163	0.196***	0.196***	0.184**	0.183***	0.184**	0.183***	0.183***
		se	(0.112)	(0.0687)	(0.0687)	(0.0721)	(0.0687)	(0.0721)	(0.0687)	(0.0687)
		R^2	0.335	0.364	0.364	0.373	0.438	0.373	0.438	0.438
		N	42277	42255	42255	42255	41153	42255	41153	41153
	2	ξ	0.163	0.229***	0.229***	0.214**	0.206**	0.214**	0.206**	0.206**
		se	(0.112)	(0.0824)	(0.0825)	(0.0856)	(0.0938)	(0.0856)	(0.0944)	(0.0938)
		R^2	0.335	0.400	0.400	0.408	0.542	0.408	0.542	0.542
		N	42277	42103	42103	42103	35950	42103	35950	35950
	3	ξ	0.163	0.204**	0.204**	0.202**	0.212**	0.202**	0.212**	0.212**
		se	(0.112)	(0.0932)	(0.0932)	(0.0962)	(0.105)	(0.0962)	(0.106)	(0.105)
		R^2	0.335	0.442	0.442	0.450	0.593	0.450	0.593	0.593
		N	42277	41033	41033	41033	29436	41033	29436	29436
	4	ξ	0.163	0.226***	0.226***	0.226**	0.257**	0.226**	0.257**	0.257**
		se	(0.112)	(0.0846)	(0.0847)	(0.0903)	(0.100)	(0.0903)	(0.102)	(0.100)
		R^2	0.335	0.488	0.488	0.497	0.603	0.497	0.603	0.603
		N	42277	38383	38383	38383	23339	38383	23339	23339
	5	ξ	0.163	0.220**	0.220**	0.222**	0.314***	0.222**	0.314***	0.314***
		se	(0.112)	(0.0844)	(0.0844)	(0.0872)	(0.103)	(0.0872)	(0.104)	(0.103)
		R^2	0.335	0.495	0.495	0.504	0.619	0.504	0.619	0.619
		N	42277	37671	37671	37671	22093	37671	22093	22093

Notes: Table presents estimated effects with differentially saturated two-way fixed effect specifications. The variables are ordinal outcomes indicating the direction of change of a given variable ie. if it increased or decreased in the survey reference period. The data granularity is at the ruref level and the specification includes ruref fixed effects throught. Time fixed effects are added at differential spatial and industry granularity across columns. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors by 2 digit industry with stars indicating *** p<0.01, ** p<0.05, * p<0.10

Table C.28: Average treatment effects on firms' input mix under increasingly demanding fixed effects, large firms only

Input mix	Sic digits		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
			Estimate (ξ Treatment × Energy intensity)							
Capital	1	ξ	0.152	0.210	0.210	0.209	0.128	0.209	0.128	0.128
		se	(0.180)	(0.137)	(0.137)	(0.140)	(0.144)	(0.140)	(0.144)	(0.144)
		R^2	0.624	0.636	0.636	0.640	0.673	0.640	0.673	0.673
		N	21217	21206	21206	21205	20629	21205	20629	20629
	2	ξ	0.152	0.150	0.150	0.154	0.145	0.154	0.145	0.145
		se	(0.180)	(0.151)	(0.151)	(0.156)	(0.177)	(0.156)	(0.178)	(0.177)
		R^2	0.624	0.654	0.654	0.658	0.737	0.658	0.737	0.737
		N	21217	21117	21117	21116	18009	21116	18009	18009
	3	ξ	0.152	0.0953	0.0953	0.0896	0.120	0.0896	0.120	0.120
		se	(0.180)	(0.151)	(0.151)	(0.150)	(0.258)	(0.150)	(0.260)	(0.258)
		R^2	0.624	0.676	0.676	0.680	0.761	0.680	0.761	0.761
		N	21217	20580	20580	20579	14623	20579	14623	14623
	4	ξ	0.152	0.0842	0.0842	0.0687	0.133	0.0687	0.133	0.133
		se	(0.180)	(0.194)	(0.195)	(0.192)	(0.332)	(0.192)	(0.336)	(0.332)
		R^2	0.624	0.699	0.699	0.703	0.768	0.703	0.768	0.768
		N	21217	19302	19302	19301	11637	19301	11637	11637
	5	ξ	0.152	0.0738	0.0738	0.0416	0.0877	0.0416	0.0877	0.0877
		se	(0.180)	(0.199)	(0.199)	(0.197)	(0.331)	(0.197)	(0.336)	(0.331)
		R^2	0.624	0.704	0.704	0.709	0.777	0.709	0.777	0.777
		N	21217	18909	18909	18908	10982	18908	10982	10982
Capital mix	1	ξ	0.262**	0.194	0.194	0.227*	0.150	0.227*	0.150	0.150
		se	(0.120)	(0.126)	(0.126)	(0.119)	(0.137)	(0.119)	(0.137)	(0.137)
		R^2	0.472	0.485	0.485	0.493	0.547	0.493	0.547	0.547
		N	24722	24707	24707	24706	23963	24706	23963	23963
	2	ξ	0.262**	0.0883	0.0883	0.125	0.147	0.125	0.147	0.147
		se	(0.120)	(0.134)	(0.134)	(0.124)	(0.150)	(0.124)	(0.151)	(0.150)
		R^2	0.472	0.518	0.518	0.525	0.644	0.525	0.644	0.644
		N	24722	24593	24593	24592	20595	24592	20595	20595
	3	ξ	0.262**	0.0554	0.0554	0.0802	-0.0812	0.0802	-0.0812	-0.0812
		se	(0.120)	(0.138)	(0.138)	(0.120)	(0.193)	(0.120)	(0.195)	(0.193)
		R^2	0.472	0.559	0.559	0.565	0.685	0.565	0.685	0.685
		N	24722	23904	23904	23903	16366	23903	16366	16366
	4	ξ	0.262**	0.0326	0.0326	0.0549	-0.113	0.0549	-0.113	-0.113
		se	(0.120)	(0.177)	(0.177)	(0.154)	(0.238)	(0.154)	(0.241)	(0.238)
		R^2	0.472	0.592	0.592	0.599	0.690	0.599	0.690	0.690
		N	24722	22189	22189	22188	12768	22188	12768	12768
	5	ξ	0.262**	0.0773	0.0773	0.0919	-0.164	0.0919	-0.164	-0.164
		se	(0.120)	(0.206)	(0.206)	(0.184)	(0.319)	(0.184)	(0.324)	(0.319)
		R^2	0.472	0.599	0.599	0.607	0.701	0.607	0.701	0.701
		N	24722	21688	21688	21687	11997	21687	11997	11997

Notes: Table presents estimated effects with differentially saturated two-way fixed effect specifications. The variables are ordinal outcomes indicating the direction of change of a given variable ie. if it increased or decreased in the survey reference period. The data granularity is at the ruref level and the specification includes ruref fixed effects throught. Time fixed effects are added at differential spatial and industry granularity across columns. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors by 2 digit industry with stars indicating *** p<0.01, ** p<0.05, * p<0.10

Table C.29: Average treatment effects on firms' input mix under increasingly demanding fixed effects, large firms only

Input mix	Sic digits		Estimate (ξ Treatment $\times$ Energy intensity) (1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Redundancies (share)	1	ξ	0.00461	0.195	0.195	0.0900	-0.0969	0.0900	-0.0969	-0.0969
		se	(0.241)	(0.221)	(0.221)	(0.193)	(0.208)	(0.193)	(0.208)	(0.208)
		R^2	0.214	0.223	0.223	0.229	0.273	0.229	0.273	0.273
		N	87177	87153	87153	87153	85572	87153	85572	85572
	2	ξ	0.00461	0.408*	0.408*	0.330*	0.0487	0.330*	0.0487	0.0487
		se	(0.241)	(0.236)	(0.236)	(0.196)	(0.266)	(0.196)	(0.268)	(0.266)
		R^2	0.214	0.255	0.255	0.262	0.364	0.262	0.364	0.364
		N	87177	86977	86977	86977	76792	86977	76792	76792
	3	ξ	0.00461	0.309	0.309	0.236	-0.00105	0.236	-0.00105	-0.00105
		se	(0.241)	(0.279)	(0.279)	(0.231)	(0.343)	(0.231)	(0.346)	(0.343)
		R^2	0.214	0.291	0.291	0.297	0.411	0.297	0.411	0.411
		N	87177	85398	85398	85398	64230	85398	64230	64230
	4	ξ	0.00461	0.546**	0.546**	0.477**	0.487	0.477**	0.487	0.487
		se	(0.241)	(0.218)	(0.218)	(0.181)	(0.305)	(0.181)	(0.307)	(0.305)
		R^2	0.214	0.339	0.339	0.346	0.413	0.346	0.413	0.413
		N	87177	81228	81228	81228	52379	81228	52379	52379
	5	ξ	0.00461	0.550**	0.550**	0.491***	0.418	0.491***	0.418	0.418
		se	(0.241)	(0.220)	(0.220)	(0.185)	(0.262)	(0.185)	(0.264)	(0.262)
		R^2	0.214	0.347	0.347	0.354	0.416	0.354	0.416	0.416
		N	87177	79805	79805	79805	49815	79805	49815	49815
Redundancy expectations	1	ξ	-0.0158	0.0112	0.0112	-0.0252	-0.0726	-0.0252	-0.0726	-0.0726
		se	(0.0481)	(0.0781)	(0.0781)	(0.0749)	(0.0781)	(0.0749)	(0.0781)	(0.0780)
		R^2	0.479	0.490	0.490	0.499	0.546	0.499	0.546	0.546
		N	25538	25526	25526	25526	24724	25526	24724	24724
	2	ξ	-0.0158	0.0654	0.0654	0.0372	-0.00832	0.0372	-0.00832	-0.00832
		se	(0.0481)	(0.0673)	(0.0673)	(0.0655)	(0.0826)	(0.0655)	(0.0834)	(0.0826)
		R^2	0.479	0.525	0.525	0.533	0.641	0.533	0.641	0.641
		N	25538	25398	25398	25398	20910	25398	20910	20910
	3	ξ	-0.0158	0.0587	0.0587	0.0335	0.0460	0.0335	0.0460	0.0460
		se	(0.0481)	(0.0702)	(0.0702)	(0.0709)	(0.109)	(0.0709)	(0.110)	(0.109)
		R^2	0.479	0.564	0.564	0.571	0.681	0.571	0.681	0.681
		N	25538	24676	24676	24676	16559	24676	16559	16559
	4	ξ	-0.0158	0.116	0.116	0.0949	0.169	0.0949	0.169	0.169
		se	(0.0481)	(0.0769)	(0.0769)	(0.0750)	(0.155)	(0.0750)	(0.157)	(0.155)
		R^2	0.479	0.607	0.607	0.615	0.701	0.615	0.701	0.701
		N	25538	22877	22877	22877	13211	22877	13211	13211
	5	ξ	-0.0158	0.121	0.121	0.0925	0.190	0.0925	0.190	0.190
		se	(0.0481)	(0.0817)	(0.0818)	(0.0790)	(0.170)	(0.0790)	(0.173)	(0.170)
		R^2	0.479	0.611	0.611	0.619	0.711	0.619	0.711	0.711
		N	25538	22373	22373	22373	12389	22373	12389	12389

Notes: Table presents estimated effects with differentially saturated two-way fixed effect specifications. The variables are ordinal outcomes indicating the direction of change of a given variable ie. if it increased or decreased in the survey reference period. The data granularity is at the ruref level and the specification includes ruref fixed effects throught. Time fixed effects are added at differential spatial and industry granularity across columns. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors by 2 digit industry with stars indicating *** $p<0.01$, ** $p<0.05$, * $p<0.10$

Table C.30: Average treatment effects on firms' processes under increasingly demanding fixed effects, large firms only

Process $f()$			Estimate (ξ Treatment $\times$ Energy intensity)							
	Sic digits		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Stock levels	1	ξ	-0.0256	0.171	0.171	0.169	0.223	0.169	0.223	0.223
		se	(0.181)	(0.144)	(0.144)	(0.145)	(0.181)	(0.145)	(0.181)	(0.181)
		R^2	0.335	0.356	0.356	0.367	0.415	0.367	0.415	0.415
		N	42271	42221	42221	42221	40811	42221	40811	40811
	2	ξ	-0.0256	0.164	0.164	0.159	0.273	0.159	0.273	0.273
		se	(0.181)	(0.151)	(0.151)	(0.157)	(0.241)	(0.157)	(0.244)	(0.241)
		R^2	0.335	0.395	0.395	0.406	0.528	0.406	0.528	0.528
		N	42271	41958	41958	41958	34544	41958	34544	34544
	3	ξ	-0.0256	0.180	0.180	0.171	0.553**	0.171	0.553**	0.553**
		se	(0.181)	(0.149)	(0.149)	(0.150)	(0.242)	(0.150)	(0.245)	(0.242)
		R^2	0.335	0.445	0.445	0.456	0.601	0.456	0.601	0.601
		N	42271	40659	40659	40659	27177	40659	27177	27177
	4	ξ	-0.0256	0.130	0.130	0.0979	0.656*	0.0979	0.656*	0.656*
		se	(0.181)	(0.185)	(0.185)	(0.182)	(0.342)	(0.182)	(0.348)	(0.342)
		R^2	0.335	0.507	0.507	0.518	0.629	0.518	0.629	0.629
		N	42271	37548	37548	37548	20400	37548	20400	20400
	5	ξ	-0.0256	0.187	0.187	0.158	0.709**	0.158	0.709**	0.709**
		se	(0.181)	(0.170)	(0.170)	(0.159)	(0.332)	(0.159)	(0.338)	(0.332)
		R^2	0.335	0.514	0.514	0.526	0.639	0.526	0.639	0.639
		N	42271	36782	36782	36782	19445	36782	19445	19445

Notes: Table presents estimated effects with differentially saturated two-way fixed effect specifications. The variables are ordinal outcomes indicating the direction of change of a given variable ie. if it increased or decreased in the survey reference period. The data granularity is at the ruref level and the specification includes ruref fixed effects throught. Time fixed effects are added at differential spatial and industry granularity across columns. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors by 2 digit industry with stars indicating *** $p<0.01$, ** $p<0.05$, * $p<0.10$

Table C.31: Average treatment effects on firms' processes under increasingly demanding fixed effects, large firms only

Process $f()$	Sic digits		Estimate (ξ Treatment $\times$ Energy intensity) (1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Hybrid working	1	ξ	-6.404	-6.252	-6.252	-6.495	-4.003	-6.495	-4.003	-4.003
		se	(4.714)	(5.148)	(5.148)	(5.438)	(5.912)	(5.438)	(5.913)	(5.908)
		R^2	0.768	0.780	0.780	0.782	0.803	0.782	0.803	0.803
		N	35349	35348	35348	35348	34614	35348	34614	34614
	2	ξ	-6.404	-7.501	-7.501	-7.999	-6.233	-7.999	-6.233	-6.233
		se	(4.714)	(5.185)	(5.187)	(5.539)	(7.276)	(5.539)	(7.321)	(7.276)
		R^2	0.768	0.793	0.793	0.796	0.836	0.796	0.836	0.836
		N	35349	35287	35287	35287	30888	35287	30888	30888
	3	ξ	-6.404	-6.523	-6.523	-6.471	-7.489	-6.471	-7.489	-7.489
		se	(4.714)	(6.156)	(6.159)	(6.425)	(9.352)	(6.425)	(9.421)	(9.352)
		R^2	0.768	0.806	0.806	0.809	0.851	0.809	0.851	0.851
		N	35349	34529	34529	34529	25707	34529	25707	25707
	4	ξ	-6.404	-5.284	-5.284	-4.848	-4.272	-4.848	-4.272	-4.272
		se	(4.714)	(6.339)	(6.342)	(6.680)	(10.52)	(6.680)	(10.62)	(10.52)
		R^2	0.768	0.823	0.823	0.826	0.864	0.826	0.864	0.864
		N	35349	32630	32630	32630	20704	32630	20704	20704
	5	ξ	-6.404	-4.302	-4.302	-3.920	-2.416	-3.920	-2.416	-2.416
		se	(4.714)	(6.239)	(6.242)	(6.645)	(11.64)	(6.645)	(11.76)	(11.64)
		R^2	0.768	0.827	0.827	0.830	0.866	0.830	0.866	0.866
		N	35349	32090	32090	32090	19691	32090	19691	19691
Working from home	1	ξ	63.11***	44.90***	44.90***	42.53***	44.56***	42.53***	44.56***	44.56***
		se	(15.19)	(10.18)	(10.18)	(9.698)	(10.54)	(9.698)	(10.54)	(10.54)
		R^2	0.718	0.769	0.769	0.773	0.798	0.773	0.798	0.798
		N	79111	79091	79091	79091	77643	79091	77643	77643
	2	ξ	63.11***	42.46***	42.46***	39.03***	45.02***	39.03***	45.02***	45.02***
		se	(15.19)	(10.46)	(10.46)	(9.940)	(13.10)	(9.940)	(13.17)	(13.10)
		R^2	0.718	0.789	0.789	0.793	0.839	0.793	0.839	0.839
		N	79111	78932	78932	78932	69646	78932	69646	69646
	3	ξ	63.11***	35.68***	35.68***	32.30***	34.67**	32.30***	34.67**	34.67**
		se	(15.19)	(9.072)	(9.075)	(8.557)	(13.07)	(8.557)	(13.15)	(13.07)
		R^2	0.718	0.807	0.807	0.811	0.863	0.811	0.863	0.863
		N	79111	77491	77491	77491	58275	77491	58275	58275
	4	ξ	63.11***	36.61***	36.61***	33.44***	30.84*	33.44***	30.84*	30.84*
		se	(15.19)	(10.08)	(10.08)	(9.605)	(16.76)	(9.605)	(16.90)	(16.76)
		R^2	0.718	0.823	0.823	0.826	0.875	0.826	0.875	0.875
		N	79111	73690	73690	73690	47524	73690	47524	47524
	5	ξ	63.11***	35.67***	35.67***	32.72***	31.49*	32.72***	31.49*	31.49*
		se	(15.19)	(10.20)	(10.20)	(9.868)	(18.08)	(9.868)	(18.23)	(18.08)
		R^2	0.718	0.825	0.825	0.829	0.876	0.829	0.876	0.876
		N	79111	72398	72398	72398	45200	72398	45200	45200
Working from normal place of work	1	ξ	13.07	2.726	2.726	3.722	5.224	3.722	5.224	5.224
		se	(9.261)	(6.862)	(6.862)	(6.389)	(6.124)	(6.389)	(6.124)	(6.122)
		R^2	0.741	0.767	0.767	0.771	0.791	0.771	0.791	0.791
		N	79111	79091	79091	79091	77643	79091	77643	77643
	2	ξ	13.07	-5.158	-5.158	-4.454	-3.934	-4.454	-3.934	-3.934
		se	(9.261)	(6.821)	(6.823)	(6.168)	(6.427)	(6.168)	(6.462)	(6.427)
		R^2	0.741	0.783	0.783	0.786	0.827	0.786	0.827	0.827
		N	79111	78932	78932	78932	69646	78932	69646	69646
	3	ξ	13.07	-3.795	-3.795	-3.503	-6.639	-3.503	-6.639	-6.639
		se	(9.261)	(7.810)	(7.813)	(7.049)	(9.842)	(7.049)	(9.906)	(9.842)
		R^2	0.741	0.801	0.801	0.804	0.849	0.804	0.849	0.849
		N	79111	77491	77491	77491	58275	77491	58275	58275
	4	ξ	13.07	-5.159	-5.159	-4.940	-8.498	-4.940	-8.498	-8.498
		se	(9.261)	(7.317)	(7.320)	(6.576)	(9.594)	(6.576)	(9.671)	(9.594)
		R^2	0.741	0.819	0.819	0.822	0.862	0.822	0.862	0.862
		N	79111	73690	73690	73690	47524	73690	47524	47524
	5	ξ	13.07	-5.192	-5.192	-5.389	-10.84	-5.389	-10.84	-10.84
		se	(9.261)	(7.413)	(7.416)	(6.651)	(10.36)	(6.651)	(10.44)	(10.36)
		R^2	0.741	0.823	0.823	0.826	0.865	0.826	0.865	0.865
		N	79111	72398	72398	72398	45200	72398	45200	45200

Notes: Table presents estimated effects with differentially saturated two-way fixed effect specifications. The variables are ordinal outcomes indicating the direction of change of a given variable ie. if it increased or decreased in the survey reference period. The data granularity is at the ruref level and the specification includes ruref fixed effects throught. Time fixed effects are added at differential spatial and industry granularity across columns. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors by 2 digit industry with stars indicating *** $p<0.01$, ** $p<0.05$, * $p<0.10$

Table C.32: Average treatment effects on firms' survival under increasingly demanding fixed effects, large firms only

Survival (Debt & liquidity)	Sic digits		Estimate (ξ Treatment $\times$ Energy intensity) (1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Confidence will meet debt obligations (5 cat)	1	ξ	-0.266**	-0.184*	-0.184*	-0.153	-0.111	-0.153	-0.111	-0.111
		se	(0.101)	(0.107)	(0.107)	(0.112)	(0.137)	(0.112)	(0.137)	(0.137)
		R^2	0.645	0.652	0.652	0.656	0.690	0.656	0.690	0.690
		N	24308	24299	24299	24299	23711	24299	23711	23711
	2	ξ	-0.266**	-0.203*	-0.203*	-0.178	-0.142	-0.178	-0.142	-0.142
		se	(0.101)	(0.118)	(0.118)	(0.126)	(0.138)	(0.126)	(0.139)	(0.138)
		R^2	0.645	0.670	0.670	0.674	0.743	0.674	0.743	0.743
		N	24308	24217	24217	24217	20795	24217	20795	20795
	3	ξ	-0.266**	-0.280**	-0.280**	-0.253*	-0.196	-0.253*	-0.196	-0.196
		se	(0.101)	(0.131)	(0.131)	(0.141)	(0.149)	(0.141)	(0.151)	(0.149)
		R^2	0.645	0.691	0.691	0.695	0.768	0.695	0.768	0.768
		N	24308	23606	23606	23606	16783	23606	16783	16783
	4	ξ	-0.266**	-0.208*	-0.208*	-0.186	-0.297	-0.186	-0.297	-0.297
		se	(0.101)	(0.121)	(0.121)	(0.125)	(0.203)	(0.125)	(0.205)	(0.203)
		R^2	0.645	0.711	0.711	0.716	0.781	0.716	0.781	0.781
		N	24308	22065	22065	22065	13265	22065	13265	13265
	5	ξ	-0.266**	-0.170	-0.170	-0.147	-0.265	-0.147	-0.265	-0.265
		se	(0.101)	(0.119)	(0.119)	(0.120)	(0.204)	(0.120)	(0.207)	(0.204)
		R^2	0.645	0.714	0.714	0.719	0.787	0.719	0.787	0.787
		N	24308	21709	21709	21709	12632	21709	12632	12632
Repayments compared to turnover (5 cat)	1	ξ	-0.231	-0.434**	-0.434**	-0.345*	-0.324	-0.345*	-0.324	-0.324
		se	(0.171)	(0.200)	(0.200)	(0.199)	(0.308)	(0.199)	(0.308)	(0.307)
		R^2	0.677	0.689	0.689	0.696	0.745	0.696	0.745	0.745
		N	15612	15610	15610	15610	14645	15610	14645	14645
	2	ξ	-0.231	-0.116	-0.116	0.0201	-0.179	0.0201	-0.179	-0.179
		se	(0.171)	(0.174)	(0.174)	(0.180)	(0.341)	(0.180)	(0.346)	(0.341)
		R^2	0.677	0.716	0.716	0.723	0.794	0.723	0.794	0.794
		N	15612	15350	15350	15350	11562	15350	11562	11562
	3	ξ	-0.231	-0.294	-0.294	-0.164	-0.0428	-0.164	-0.0428	-0.0428
		se	(0.171)	(0.193)	(0.193)	(0.197)	(0.331)	(0.197)	(0.338)	(0.331)
		R^2	0.677	0.736	0.736	0.743	0.816	0.743	0.816	0.816
		N	15612	14627	14627	14627	8944	14627	8944	8944
	4	ξ	-0.231	-0.445*	-0.445*	-0.222	-0.0856	-0.222	-0.0856	-0.0856
		se	(0.171)	(0.224)	(0.224)	(0.230)	(0.386)	(0.230)	(0.396)	(0.386)
		R^2	0.677	0.753	0.753	0.761	0.813	0.761	0.813	0.813
		N	15612	13187	13187	13187	7132	13187	7132	7132
	5	ξ	-0.231	-0.457**	-0.457**	-0.313	-0.340	-0.313	-0.340	-0.340
		se	(0.171)	(0.211)	(0.211)	(0.189)	(0.510)	(0.189)	(0.524)	(0.510)
		R^2	0.677	0.758	0.758	0.766	0.821	0.766	0.821	0.821
		N	15612	12927	12927	12927	6638	12927	6638	6638

Notes: Table presents estimated effects with differentially saturated two-way fixed effect specifications. The variables are ordinal outcomes indicating the direction of change of a given variable ie. if it increased or decreased in the survey reference period. The data granularity is at the ruref level and the specification includes ruref fixed effects throught. Time fixed effects are added at differential spatial and industry granularity across columns. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors by 2 digit industry with stars indicating *** $p<0.01$, ** $p<0.05$, * $p<0.10$

Table C.33: Average treatment effects on firms' survival under increasingly demanding fixed effects, large firms only A

Survival (Debt & liquidity)	Sic digits		Estimate (ξ Treatment × Energy intensity) (1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Cash reserve duration (5 cat)	1	ξ	0.245	0.236	0.236	0.272*	0.345**	0.272*	0.345**	0.345**
		se	(0.177)	(0.143)	(0.143)	(0.142)	(0.166)	(0.142)	(0.166)	(0.165)
		R^2	0.786	0.794	0.794	0.797	0.817	0.797	0.817	0.817
		N	48748	48722	48722	48722	47480	48722	47480	47480
	2	ξ	0.245	0.195	0.195	0.215	0.143	0.215	0.143	0.143
		se	(0.177)	(0.146)	(0.146)	(0.145)	(0.176)	(0.145)	(0.177)	(0.176)
		R^2	0.786	0.806	0.806	0.809	0.853	0.809	0.853	0.853
		N	48748	48554	48554	48554	41325	48554	41325	41325
	3	ξ	0.245	0.278*	0.278*	0.306*	0.0198	0.306*	0.0198	0.0198
		se	(0.177)	(0.152)	(0.152)	(0.161)	(0.217)	(0.161)	(0.219)	(0.217)
		R^2	0.786	0.820	0.820	0.823	0.869	0.823	0.869	0.869
		N	48748	47369	47369	47369	33912	47369	33912	33912
	4	ξ	0.245	0.249	0.249	0.268	-0.126	0.268	-0.126	-0.126
		se	(0.177)	(0.171)	(0.172)	(0.170)	(0.275)	(0.170)	(0.278)	(0.275)
		R^2	0.786	0.834	0.834	0.837	0.872	0.837	0.872	0.872
		N	48748	44381	44381	44381	26991	44381	26991	26991
	5	ξ	0.245	0.311	0.311	0.350*	0.0811	0.350*	0.0811	0.0811
		se	(0.177)	(0.211)	(0.211)	(0.209)	(0.304)	(0.209)	(0.308)	(0.304)
		R^2	0.786	0.837	0.837	0.839	0.874	0.839	0.874	0.874
		N	48748	43479	43479	43479	25441	43479	25441	25441

Notes: Table presents estimated effects with differentially saturated two-way fixed effect specifications. The variables are ordinal outcomes indicating the direction of change of a given variable ie. if it increased or decreased in the survey reference period. The data granularity is at the ruref level and the specification includes ruref fixed effects throught. Time fixed effects are added at differential spatial and industry granularity across columns. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors by 2 digit industry with stars indicating *** p<0.01, ** p<0.05, * p<0.10

Table C.34: Average treatment effects on firms' survival under increasingly demanding fixed effects, large firms only D

Survival (Trading status)	Sic digits		Estimate (ξ Treatment × Energy intensity) (1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Change in risk of insolvency	1	ξ	0.0361	0.00546	0.00546	0.0186	0.0289	0.0186	0.0289	0.0289
		se	(0.108)	(0.122)	(0.122)	(0.130)	(0.194)	(0.130)	(0.194)	(0.193)
		R^2	0.475	0.513	0.513	0.519	0.567	0.519	0.567	0.567
		N	24954	24937	24937	24937	24372	24937	24372	24372
	2	ξ	0.0361	0.0483	0.0483	0.0626	-0.0127	0.0626	-0.0127	-0.0127
		se	(0.108)	(0.136)	(0.136)	(0.147)	(0.282)	(0.147)	(0.284)	(0.282)
		R^2	0.475	0.542	0.542	0.548	0.649	0.548	0.649	0.649
		N	24954	24831	24831	24831	21206	24831	21206	21206
	3	ξ	0.0361	0.107	0.107	0.125	0.282	0.125	0.282	0.282
		se	(0.108)	(0.130)	(0.130)	(0.141)	(0.341)	(0.141)	(0.344)	(0.341)
		R^2	0.475	0.575	0.575	0.581	0.692	0.581	0.692	0.692
		N	24954	24230	24230	24230	17262	24230	17262	17262
	4	ξ	0.0361	0.130	0.130	0.170	0.427	0.170	0.427	0.427
		se	(0.108)	(0.142)	(0.142)	(0.152)	(0.417)	(0.152)	(0.422)	(0.417)
		R^2	0.475	0.613	0.613	0.620	0.707	0.620	0.707	0.707
		N	24954	22752	22752	22752	13822	22752	13822	13822
	5	ξ	0.0361	0.164	0.164	0.200	0.181	0.200	0.181	0.181
		se	(0.108)	(0.144)	(0.144)	(0.147)	(0.232)	(0.147)	(0.234)	(0.232)
		R^2	0.475	0.619	0.619	0.626	0.715	0.626	0.715	0.715
		N	24954	22280	22280	22280	13051	22280	13051	13051
Risk of insolvency	1	ξ	-0.0800	-0.0133	-0.0133	-0.0422	0.00671	-0.0422	0.00671	0.00671
		se	(0.0967)	(0.131)	(0.131)	(0.131)	(0.141)	(0.131)	(0.141)	(0.141)
		R^2	0.664	0.671	0.671	0.674	0.706	0.674	0.706	0.706
		N	49908	49889	49889	49889	48836	49889	48836	48836
	2	ξ	-0.0800	-0.0116	-0.0116	-0.0399	0.0348	-0.0399	0.0348	0.0348
		se	(0.0967)	(0.150)	(0.150)	(0.149)	(0.188)	(0.149)	(0.190)	(0.188)
		R^2	0.664	0.684	0.684	0.688	0.751	0.688	0.751	0.751
		N	49908	49750	49750	49750	43072	49750	43072	43072
	3	ξ	-0.0800	0.00457	0.00457	-0.0211	0.0509	-0.0211	0.0509	0.0509
		se	(0.0967)	(0.159)	(0.159)	(0.159)	(0.201)	(0.159)	(0.203)	(0.201)
		R^2	0.664	0.702	0.702	0.705	0.773	0.705	0.773	0.773
		N	49908	48688	48688	48688	35365	48688	35365	35365
	4	ξ	-0.0800	-0.0315	-0.0315	-0.0519	0.0875	-0.0519	0.0875	0.0875
		se	(0.0967)	(0.163)	(0.163)	(0.164)	(0.235)	(0.164)	(0.237)	(0.235)
		R^2	0.664	0.723	0.723	0.727	0.781	0.727	0.781	0.781
		N	49908	45877	45877	45877	28297	45877	28297	28297
	5	ξ	-0.0800	-0.0144	-0.0144	-0.0368	0.0492	-0.0368	0.0492	0.0492
		se	(0.0967)	(0.167)	(0.167)	(0.168)	(0.267)	(0.168)	(0.270)	(0.267)
		R^2	0.664	0.726	0.726	0.730	0.789	0.730	0.789	0.789
		N	49908	45045	45045	45045	26864	45045	26864	26864

Notes: Table presents estimated effects with differentially saturated two-way fixed effect specifications. The variables are ordinal outcomes indicating the direction of change of a given variable ie. if it increased or decreased in the survey reference period. The data granularity is at the ruref level and the specification includes ruref fixed effects throught. Time fixed effects are added at differential spatial and industry granularity across columns. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors by 2 digit industry with stars indicating *** p<0.01, ** p<0.05, * p<0.10

Table C.35: Average treatment effects on firms' survival under increasingly demanding fixed effects, large firms only

Survival (Trading status)	Sic digits		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
			Estimate (ξ Treatment × Energy intensity)							
Confidence of 3m survival	1	ξ	0.0369	0.0537	0.0537	0.0686	0.0851	0.0686	0.0851	0.0851
		se	(0.0735)	(0.0694)	(0.0694)	(0.0672)	(0.0858)	(0.0672)	(0.0858)	(0.0857)
		R^2	0.692	0.702	0.702	0.706	0.729	0.706	0.729	0.729
		N	37104	37086	37086	37086	36382	37086	36382	36382
	2	ξ	0.0369	0.0169	0.0169	0.0264	0.0339	0.0264	0.0339	0.0339
		se	(0.0735)	(0.0811)	(0.0811)	(0.0796)	(0.120)	(0.0796)	(0.121)	(0.120)
		R^2	0.692	0.714	0.714	0.717	0.768	0.717	0.768	0.768
		N	37104	37007	37007	37007	32256	37007	32256	32256
	3	ξ	0.0369	0.0577	0.0577	0.0661	-0.0196	0.0661	-0.0196	-0.0196
		se	(0.0735)	(0.0832)	(0.0833)	(0.0845)	(0.135)	(0.0845)	(0.136)	(0.135)
		R^2	0.692	0.727	0.727	0.731	0.789	0.731	0.789	0.789
		N	37104	36296	36296	36296	26669	36296	26669	26669
	4	ξ	0.0369	0.0385	0.0385	0.0460	-0.00323	0.0460	-0.00323	-0.00323
		se	(0.0735)	(0.0784)	(0.0784)	(0.0823)	(0.155)	(0.0823)	(0.157)	(0.155)
		R^2	0.692	0.742	0.742	0.746	0.795	0.746	0.795	0.795
		N	37104	34428	34428	34428	21638	34428	21638	21638
	5	ξ	0.0369	0.0312	0.0312	0.0438	0.00101	0.0438	0.00101	0.00101
		se	(0.0735)	(0.0857)	(0.0858)	(0.0923)	(0.201)	(0.0923)	(0.203)	(0.201)
		R^2	0.692	0.746	0.746	0.750	0.804	0.750	0.804	0.804
		N	37104	33713	33713	33713	20545	33713	20545	20545
Trading status (2 cat)	1	ξ	0.0512	0.0363	0.0363	0.0476	0.0585	0.0476	0.0585	0.0585
		se	(0.0647)	(0.0406)	(0.0406)	(0.0408)	(0.0457)	(0.0408)	(0.0457)	(0.0456)
		R^2	0.352	0.514	0.514	0.520	0.570	0.520	0.570	0.570
		N	115042	115016	115016	115016	112949	115016	112949	112949
	2	ξ	0.0512	0.00542	0.00542	0.0153	0.0201	0.0153	0.0201	0.0201
		se	(0.0647)	(0.0308)	(0.0309)	(0.0298)	(0.0346)	(0.0298)	(0.0348)	(0.0346)
		R^2	0.352	0.573	0.573	0.577	0.667	0.577	0.667	0.667
		N	115042	114785	114785	114785	101469	114785	101469	101469
	3	ξ	0.0512	0.00165	0.00165	0.0141	0.0278	0.0141	0.0278	0.0278
		se	(0.0647)	(0.0321)	(0.0321)	(0.0320)	(0.0368)	(0.0320)	(0.0371)	(0.0368)
		R^2	0.352	0.624	0.624	0.628	0.732	0.628	0.732	0.732
		N	115042	112707	112707	112707	84898	112707	84898	84898
	4	ξ	0.0512	-0.00300	-0.00300	0.0107	0.00958	0.0107	0.00958	0.00958
		se	(0.0647)	(0.0232)	(0.0232)	(0.0246)	(0.0292)	(0.0246)	(0.0294)	(0.0292)
		R^2	0.352	0.669	0.669	0.673	0.758	0.673	0.758	0.758
		N	115042	107197	107197	107197	69243	107197	69243	69243
	5	ξ	0.0512	-0.00767	-0.00767	0.00571	-0.00306	0.00571	-0.00306	-0.00306
		se	(0.0647)	(0.0212)	(0.0212)	(0.0224)	(0.0249)	(0.0224)	(0.0251)	(0.0249)
		R^2	0.352	0.682	0.682	0.686	0.777	0.686	0.777	0.777
		N	115042	105385	105385	105385	65909	105385	65909	65909

Notes: Table presents estimated effects with differentially saturated two-way fixed effect specifications. The variables are ordinal outcomes indicating the direction of change of a given variable ie. if it increased or decreased in the survey reference period. The data granularity is at the ruref level and the specification includes ruref fixed effects throught. Time fixed effects are added at differential spatial and industry granularity across columns. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors by 2 digit industry with stars indicating *** $p<0.01$, ** $p<0.05$, * $p<0.10$

Table C.36: Average treatment effects on firms' survival in the LBD under increasingly demanding fixed effects, large firms only D

Survival (LBD)	Sic digits		Estimate (ξ Treatment × Energy intensity) (1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Local sites (LBD)	1	ξ	-1.988	-1.205	-1.205	-0.174	-0.244	-0.174	-0.244	-0.244
		se	(2.137)	(2.386)	(2.386)	(1.800)	(1.934)	(1.800)	(1.934)	(1.933)
		R^2	0.963	0.963	0.963	0.963	0.964	0.963	0.964	0.964
		N	67684	67684	67684	67684	67516	67684	67516	67516
	2	ξ	-1.988	-0.800	-0.800	0.612	1.285	0.612	1.285	1.285
		se	(2.137)	(2.271)	(2.271)	(2.213)	(2.565)	(2.213)	(2.568)	(2.565)
		R^2	0.963	0.964	0.964	0.964	0.965	0.964	0.965	0.965
		N	67684	67677	67677	67677	65592	67677	65592	65592
	3	ξ	-1.988	-2.676	-2.676	-1.195	-1.858	-1.195	-1.858	-1.858
		se	(2.137)	(2.210)	(2.211)	(1.895)	(2.142)	(1.895)	(2.145)	(2.142)
		R^2	0.963	0.963	0.963	0.963	0.966	0.963	0.966	0.966
		N	67684	67470	67470	67470	61496	67470	61496	61496
	4	ξ	-1.988	-3.185	-3.185	-1.657	-3.223	-1.657	-3.223	-3.223
		se	(2.137)	(2.287)	(2.287)	(1.877)	(2.735)	(1.877)	(2.740)	(2.735)
		R^2	0.963	0.963	0.963	0.963	0.964	0.963	0.964	0.964
		N	67684	66925	66925	66925	55883	66925	55883	55883
	5	ξ	-1.988	-2.968	-2.968	-1.435	-3.059	-1.435	-3.059	-3.059
		se	(2.137)	(2.400)	(2.400)	(1.963)	(2.905)	(1.963)	(2.909)	(2.905)
		R^2	0.963	0.963	0.963	0.963	0.964	0.963	0.964	0.964
		N	67684	66621	66621	66621	54447	66621	54447	54447
Log employment (LBD)	1	ξ	-0.0615***	-0.0421*	-0.0421*	-0.0490**	-0.0565***	-0.0490**	-0.0565***	-0.0565***
		se	(0.0212)	(0.0218)	(0.0218)	(0.0200)	(0.0194)	(0.0200)	(0.0194)	(0.0194)
		R^2	0.985	0.985	0.985	0.985	0.986	0.985	0.986	0.986
		N	69542	69542	69542	69542	69376	69542	69376	69376
	2	ξ	-0.0615***	-0.0391*	-0.0391*	-0.0458**	-0.0560***	-0.0458**	-0.0560***	-0.0560***
		se	(0.0212)	(0.0223)	(0.0223)	(0.0197)	(0.0157)	(0.0197)	(0.0158)	(0.0157)
		R^2	0.985	0.985	0.985	0.986	0.988	0.986	0.988	0.988
		N	69542	69535	69535	69535	67470	69535	67470	67470
	3	ξ	-0.0615***	-0.0503**	-0.0503**	-0.0547***	-0.0499**	-0.0547***	-0.0499**	-0.0499**
		se	(0.0212)	(0.0203)	(0.0203)	(0.0190)	(0.0196)	(0.0190)	(0.0196)	(0.0196)
		R^2	0.985	0.986	0.986	0.986	0.990	0.986	0.990	0.990
		N	69542	69329	69329	69329	63370	69329	63370	63370
	4	ξ	-0.0615***	-0.0560***	-0.0560***	-0.0596***	-0.0649***	-0.0596***	-0.0649***	-0.0649***
		se	(0.0212)	(0.0194)	(0.0194)	(0.0193)	(0.0219)	(0.0193)	(0.0219)	(0.0219)
		R^2	0.985	0.987	0.987	0.987	0.991	0.987	0.991	0.991
		N	69542	68791	68791	68791	57674	68791	57674	57674
	5	ξ	-0.0615***	-0.0556***	-0.0556***	-0.0584***	-0.0645***	-0.0584***	-0.0645***	-0.0645***
		se	(0.0212)	(0.0200)	(0.0200)	(0.0197)	(0.0236)	(0.0197)	(0.0237)	(0.0236)
		R^2	0.985	0.987	0.987	0.987	0.991	0.987	0.991	0.991
		N	69542	68488	68488	68488	56246	68488	56246	56246
Survival (LBD)	1	ξ	0.00806	0.00996	0.00996	0.00706	0.00698	0.00706	0.00698	0.00698
		se	(0.0233)	(0.0217)	(0.0217)	(0.0232)	(0.0232)	(0.0232)	(0.0232)	(0.0232)
		R^2	0.651	0.654	0.654	0.654	0.665	0.654	0.665	0.665
		N	69542	69542	69542	69542	69376	69542	69376	69376
	2	ξ	0.00806	-0.00165	-0.00165	-0.00450	-0.00793	-0.00450	-0.00793	-0.00793
		se	(0.0233)	(0.0253)	(0.0253)	(0.0272)	(0.0305)	(0.0272)	(0.0305)	(0.0305)
		R^2	0.651	0.658	0.658	0.659	0.694	0.659	0.694	0.694
		N	69542	69535	69535	69535	67470	69535	67470	67470
	3	ξ	0.00806	-0.0116	-0.0116	-0.0137	-0.0257	-0.0137	-0.0257	-0.0257
		se	(0.0233)	(0.0252)	(0.0252)	(0.0267)	(0.0351)	(0.0267)	(0.0352)	(0.0351)
		R^2	0.651	0.665	0.665	0.666	0.719	0.666	0.719	0.719
		N	69542	69329	69329	69329	63370	69329	63370	63370
	4	ξ	0.00806	-0.0184	-0.0184	-0.0203	-0.0355	-0.0203	-0.0355	-0.0355
		se	(0.0233)	(0.0286)	(0.0286)	(0.0302)	(0.0434)	(0.0302)	(0.0435)	(0.0434)
		R^2	0.651	0.677	0.677	0.677	0.737	0.677	0.737	0.737
		N	69542	68791	68791	68791	57674	68791	57674	57674
	5	ξ	0.00806	-0.0196	-0.0196	-0.0208	-0.0432	-0.0208	-0.0432	-0.0432
		se	(0.0233)	(0.0287)	(0.0287)	(0.0306)	(0.0429)	(0.0306)	(0.0430)	(0.0429)
		R^2	0.651	0.678	0.678	0.679	0.743	0.679	0.743	0.743
		N	69542	68488	68488	68488	56246	68488	56246	56246

Notes: Table presents estimated effects with differentially saturated two-way fixed effect specifications. The variables are ordinal outcomes indicating the direction of change of a given variable ie. if it increased or decreased in the survey reference period. The data granularity is at the ruref level and the specification includes ruref fixed effects throught. Time fixed effects are added at differential spatial and industry granularity across columns. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors by 2 digit industry with stars indicating *** p<0.01, ** p<0.05, * p<0.10

Table C.37: Average treatment effects on firms' output at different post-treatment windows, all firms

Output		Estimate (ξ Treatment $\times$ Energy intensity)							
		Dec21	Dec21-Feb22	Mar-May22	Jun-Aug22	Aug-Nov22	Nov22-Feb23	Mar-May23	Jun-Jul23
Turnover change (3 cat)	ξ	0.00494	0.0124	0.224	0.289**	-0.136	-0.196	-0.00702	0.293
	se	(0.123)	(0.0975)	(0.173)	(0.144)	(0.206)	(0.251)	(0.205)	(0.176)
	R^2	0.485	0.476	0.459	0.457	0.462	0.473	0.464	0.465
	N	77203	83458	83174	81059	81058	77128	80522	78968
Turnover expectations (3 cat)	ξ	0	-0.0549	-0.0407	-0.376***	-0.545***	-0.117	0.105	-0.172
	se	(.)	(0.0579)	(0.0938)	(0.0886)	(0.127)	(0.190)	(0.141)	(0.108)
	R^2	0.345	0.336	0.328	0.329	0.327	0.336	0.335	0.332
	N	68042	74594	75551	73523	73511	69654	72970	71502
Export status (3 cat)	ξ	-0.106**	-0.0440	-0.0651	-0.0268	-0.0778	-0.0524	-0.114	-0.133
	se	(0.0497)	(0.0376)	(0.0642)	(0.0762)	(0.0842)	(0.0781)	(0.0844)	(0.0891)
	R^2	0.966	0.962	0.958	0.957	0.957	0.951	0.953	0.960
	N	32305	35061	37930	37880	36489	39716	36237	31897

Notes: Table presents estimated effects for different non-overlapping post-treatment windows. The variables are ordinal outcomes indicating the direction of change of a given variable ie. if it increased or decreased in the survey reference period. The data granularity is at the ruref level and the specification includes ruref fixed effects. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors by 2 digit industry with stars indicating *** $p<0.01$, ** $p<0.05$, * $p<0.10$

Table C.38: Average treatment effects on firms' input at different post-treatment windows, all firms

Input mix		Estimate (ξ Treatment × Energy intensity)							
		Dec21	Dec21-Feb22	Mar-May22	Jun-Aug22	Aug-Nov22	Nov22-Feb23	Mar-May23	Jun-Jul23
Capital	ξ	0.161	0.166*	0.161	0.161	0.161	0.161	0.161	0.161
	se	(0.124)	(0.0953)	(0.124)	(0.124)	(0.124)	(0.124)	(0.124)	(0.124)
	R^2	0.659	0.652	0.659	0.659	0.659	0.659	0.659	0.659
	N	28975	30625	28975	28975	28975	28975	28975	28975
Capital mix	ξ	0.198**	0.155*	0.242**	0.185*	0.154	0.310**	0.293***	0.307***
	se	(0.0959)	(0.0819)	(0.102)	(0.0940)	(0.116)	(0.123)	(0.0981)	(0.0980)
	R^2	0.604	0.595	0.579	0.579	0.575	0.575	0.577	0.577
	N	25739	27310	27033	26954	27024	27000	26829	26864
Redundancies (share)	ξ	-0.258	-0.238	-0.111	-0.143	0.820	0.446	0.00990	0.0240
	se	(0.337)	(0.333)	(0.377)	(0.381)	(0.740)	(0.552)	(0.268)	(0.240)
	R^2	0.261	0.253	0.254	0.254	0.259	0.255	0.258	0.261
	N	90159	95117	94531	92229	92238	92560	91678	89997
Redundancy expectations	ξ	0.00944	0.00316	0.00795	0.0273	0.0142	0.0381	0.00668	0.0142
	se	(0.0344)	(0.0368)	(0.0406)	(0.0358)	(0.0356)	(0.0390)	(0.0389)	(0.0356)
	R^2	0.593	0.583	0.589	0.588	0.605	0.565	0.578	0.605
	N	31363	32799	31153	31036	29716	32771	31061	29716

Notes: Table presents estimated effects for different non-overlapping post-treatment windows. The variables are ordinal outcomes indicating the direction of change of a given variable ie. if it increased or decreased in the survey reference period. The data granularity is at the ruref level and the specification includes ruref fixed effects. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors by 2 digit industry with stars indicating *** $p<0.01$, ** $p<0.05$, * $p<0.10$

Table C.39: Average treatment effects on firms' prices at different post-treatment windows, all firms

Prices		Estimate (ξ Treatment $\times$ Energy intensity)							
		Dec21	Dec21-Feb22	Mar-May22	Jun-Aug22	Aug-Nov22	Nov22-Feb23	Mar-May23	Jun-Jul23
Price of materials	ξ	0.450**	0.396**	0.400**	0.263*	0.210	0.256*	0.201	0.418***
	se	(0.186)	(0.173)	(0.162)	(0.153)	(0.147)	(0.133)	(0.134)	(0.134)
	R^2	0.370	0.371	0.388	0.377	0.366	0.349	0.349	0.346
	N	38456	39354	40495	40399	40402	40609	40236	39392
Price of goods sold	ξ	0.273*	0.210*	0.168	0.174	0.104	0.162	0.0155	0.169
	se	(0.139)	(0.123)	(0.140)	(0.129)	(0.137)	(0.184)	(0.250)	(0.134)
	R^2	0.399	0.394	0.387	0.384	0.383	0.376	0.378	0.378
	N	40460	41405	42585	42459	42457	42709	42270	41447
Prices of goods sold expectations	ξ	0	0	0.188	0.0406	0.152	0.234	0.0952	0.0928
	se	(.)	(.)	(0.169)	(0.145)	(0.146)	(0.175)	(0.147)	(0.102)
	R^2	0.332	0.332	0.359	0.351	0.354	0.343	0.323	0.315
	N	25406	25406	28433	28274	28321	28512	28154	27334

Notes: Table presents estimated effects for different non-overlapping post-treatment windows. The variables are ordinal outcomes indicating the direction of change of a given variable ie. if it increased or decreased in the survey reference period. The data granularity is at the ruref level and the specification includes ruref fixed effects. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors by 2 digit industry with stars indicating *** $p<0.01$, ** $p<0.05$, * $p<0.10$

Table C.40: Average treatment effects on firms' processes at different post-treatment windows, all firms

Process $f()$		Estimate (ξ Treatment $\times$ Energy intensity)							
		Dec21	Dec21-Feb22	Mar-May22	Jun-Aug22	Aug-Nov22	Nov22-Feb23	Mar-May23	Jun-Jul23
Stock levels	ξ	-0.0723	-0.146	0.102	0.147	-0.0242	0.0482	0.0915	0.0651
	se	(0.137)	(0.110)	(0.154)	(0.157)	(0.154)	(0.172)	(0.161)	(0.128)
	R^2	0.517	0.514	0.488	0.485	0.485	0.476	0.481	0.492
	N	42308	43483	44957	44838	44849	44965	44274	43246
Hybrid working	ξ	3.135	12.84***	-10.88**	-8.226**	-13.60***	-13.15***	-7.321	-4.792
	se	(2.406)	(4.390)	(4.331)	(4.040)	(4.798)	(4.948)	(4.516)	(3.828)
	R^2	0.862	0.771	0.851	0.852	0.864	0.869	0.842	0.851
	N	9632	14577	13924	11484	11488	11799	10840	9045
Working from home	ξ	37.00***	26.62***	50.86***	52.72***	56.45***	59.30***	58.66***	55.23***
	se	(8.544)	(6.855)	(11.86)	(11.70)	(11.86)	(12.46)	(11.94)	(11.53)
	R^2	0.832	0.819	0.812	0.821	0.821	0.819	0.821	0.827
	N	77408	82403	81847	79551	79550	79870	78973	77260
Working from normal place of work	ξ	10.31	14.86*	18.03**	16.00**	19.76**	14.43	14.49*	9.944
	se	(7.918)	(7.727)	(8.420)	(7.696)	(8.183)	(8.805)	(7.408)	(7.217)
	R^2	0.755	0.751	0.754	0.756	0.756	0.755	0.752	0.758
	N	77408	82403	81847	79551	79550	79870	78973	77260

Notes: Table presents estimated effects for different non-overlapping post-treatment windows. The variables are ordinal outcomes indicating the direction of change of a given variable ie. if it increased or decreased in the survey reference period. The data granularity is at the ruref level and the specification includes ruref fixed effects. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors by 2 digit industry with stars indicating *** p<0.01, ** p<0.05, * p<0.10

Table C.41: Average treatment effects on firms' survival (debt) at different post-treatment windows, all firms

Survival (Debt & liquidity)		Estimate (ξ Treatment $\times$ Energy intensity)							
		Dec21	Dec21-Feb22	Mar-May22	Jun-Aug22	Aug-Nov22	Nov22-Feb23	Mar-May23	Jun-Jul23
Cash reserve duration (5 cat)	ξ	0.281*	0.141	0.133	0.298	0.339	0.0827	0.636***	0.414*
	se	(0.159)	(0.164)	(0.189)	(0.193)	(0.215)	(0.175)	(0.175)	(0.213)
	R^2	0.828	0.822	0.820	0.826	0.823	0.823	0.823	0.823
	N	62042	64557	63701	61760	61835	61711	61539	61538
Confidence will meet debt obligations (5 cat)	ξ	0	-0.271***	-0.404***	-0.455***	-0.353*	-0.276*	-0.0626	-0.265
	se	(.)	(0.0943)	(0.115)	(0.131)	(0.184)	(0.153)	(0.139)	(0.163)
	R^2	0.699	0.693	0.685	0.682	0.683	0.687	0.671	0.676
	N	12535	17153	16227	13937	15914	18235	16265	15819
Repayments compared to turnover (5 cat)	ξ	0	-0.155	-0.376	-0.644**	-0.332	-0.631***	-0.504**	-0.533**
	se	(.)	(0.182)	(0.261)	(0.304)	(0.236)	(0.180)	(0.221)	(0.235)
	R^2	0.715	0.712	0.711	0.712	0.709	0.709	0.704	0.704
	N	16777	18236	17947	17231	17843	18724	18586	18032

Notes: Table presents estimated effects for different non-overlapping post-treatment windows. The variables are ordinal outcomes indicating the direction of change of a given variable ie. if it increased or decreased in the survey reference period. The data granularity is at the ruref level and the specification includes ruref fixed effects. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors by 2 digit industry with stars indicating *** $p<0.01$, ** $p<0.05$, * $p<0.10$

Table C.42: Average treatment effects on firms' survival (trading status) at different post-treatment windows, all firms

Survival (Trading status)		Estimate (ξ Treatment $\times$ Energy intensity)							
		Dec21	Dec21-Feb22	Mar-May22	Jun-Aug22	Aug-Nov22	Nov22-Feb23	Mar-May23	Jun-Jul23
Risk of insolvency	ξ	-0.0182	-0.0279	-0.0939	0.0547	-0.159	-0.151	-0.294*	-0.335**
	se	(0.101)	(0.0740)	(0.0722)	(0.0971)	(0.118)	(0.125)	(0.148)	(0.146)
	R^2	0.717	0.714	0.710	0.712	0.707	0.699	0.700	0.702
	N	52344	55119	54222	52009	53951	56266	55496	53955
Change in risk of insolvency	ξ	0	0.0239	0	0	0	0	0	0
	se	(.)	(0.0773)	(.)	(.)	(.)	(.)	(.)	(.)
	R^2	0.513	0.500	0.513	0.513	0.513	0.513	0.513	0.513
	N	37336	40037	37336	37336	37336	37336	37336	37336
Trading status (2 cat)	ξ	0.0213	0.0144	0.0240	0.0260	0.0315	0.0470	0.0627	0.0472
	se	(0.0380)	(0.0377)	(0.0431)	(0.0430)	(0.0428)	(0.0567)	(0.0563)	(0.0506)
	R^2	0.464	0.457	0.448	0.449	0.452	0.440	0.444	0.453
	N	97903	102867	108456	106111	104397	110611	106110	102157
Confidence of 3m survival	ξ	0.0859	0.0965	0.00131	0	0.0748	0	0	0
	se	(0.0524)	(0.0616)	(0.0826)	(.)	(0.127)	(.)	(.)	(.)
	R^2	0.721	0.714	0.719	0.724	0.715	0.724	0.724	0.724
	N	49163	54099	48988	47216	48738	47216	47216	47216

Notes: Table presents estimated effects for different non-overlapping post-treatment windows. The variables are ordinal outcomes indicating the direction of change of a given variable ie. if it increased or decreased in the survey reference period. The data granularity is at the ruref level and the specification includes ruref fixed effects. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors by 2 digit industry with stars indicating *** $p<0.01$, ** $p<0.05$, * $p<0.10$

Table C.43: Average treatment effects on firms' survival from the LBD at different post-treatment windows, all firms

Survival (LBD)		Estimate (ξ Treatment × Energy intensity)			
		2021 Q4	2022 Q1	2022 Q2	2022 Q3
Survival (LBD)	ξ	-0.0597***	-0.0786***	-0.0985***	-0.133***
	se	(0.0159)	(0.0208)	(0.0262)	(0.0304)
	R^2	0.627	0.612	0.594	0.580
	N	217919	217919	217919	217919
Local sites (LBD)	ξ	0.164	-0.271	-0.0191	-0.234
	se	(0.502)	(0.498)	(0.523)	(0.610)
	R^2	0.965	0.964	0.964	0.964
	N	210405	210177	209891	209614
Log employment (LBD)	ξ	0.0160	0.0154	0.0202	0.0227
	se	(0.0148)	(0.0211)	(0.0209)	(0.0232)
	R^2	0.990	0.988	0.988	0.987
	N	217839	217836	217832	217831
Employment (LBD)	ξ	0.726	-12.44	-19.02	-18.73
	se	(13.10)	(11.13)	(15.47)	(16.26)
	R^2	0.997	0.996	0.995	0.994
	N	217919	217919	217919	217919

Notes: Table presents estimated effects for different non-overlapping post-treatment windows. The data granularity is at the ruref level and the specification includes ruref fixed effects. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors by 2 digit industry with stars indicating *** p<0.01, ** p<0.05, * p<0.10

Table C.44: Average treatment effects on firms' output at different post-treatment windows, large firms

Output		Estimate (ξ Treatment × Energy intensity)							
		Dec21	Dec21-Feb22	Mar-May22	Jun-Aug22	Aug-Nov22	Nov22-Feb23	Mar-May23	Jun-Jul23
Turnover change (3 cat)	ξ	0.0695	0.0707	0.211	0.349**	-0.240	-0.269	-0.0713	0.200
	se	(0.173)	(0.163)	(0.170)	(0.158)	(0.247)	(0.268)	(0.215)	(0.158)
	R^2	0.469	0.460	0.439	0.440	0.444	0.459	0.448	0.451
	N	49502	53275	53052	51746	51717	49589	51565	50654
Turnover expectations (3 cat)	ξ	0	-0.0610	-0.0393	-0.310***	-0.588***	-0.183	0.117	-0.174
	se	(.)	(0.0769)	(0.109)	(0.0937)	(0.129)	(0.203)	(0.177)	(0.153)
	R^2	0.330	0.320	0.309	0.311	0.307	0.319	0.318	0.317
	N	43778	47735	48234	46966	46962	44875	46800	45933
Export status (3 cat)	ξ	-0.0561	0.0231	-0.0542	0.000229	-0.107	-0.0817	-0.0764	-0.0950
	se	(0.0486)	(0.0686)	(0.0767)	(0.104)	(0.0972)	(0.0906)	(0.100)	(0.107)
	R^2	0.967	0.963	0.958	0.955	0.953	0.946	0.949	0.959
	N	19660	21330	23101	23028	22162	24143	22171	19648

Notes: Table presents estimated effects for different non-overlapping post-treatment windows. The variables are ordinal outcomes indicating the direction of change of a given variable ie. if it increased or decreased in the survey reference period. The data granularity is at the ruref level and the specification includes ruref fixed effects. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors by 2 digit industry with stars indicating *** p<0.01, ** p<0.05, * p<0.10

Table C.45: Average treatment effects on firms' input at different post-treatment windows, large firms

Input mix		Estimate (ξ Treatment × Energy intensity)							
		Dec21	Dec21-Feb22	Mar-May22	Jun-Aug22	Aug-Nov22	Nov22-Feb23	Mar-May23	Jun-Jul23
Capital	ξ	0.148	0.170	0.148	0.148	0.148	0.148	0.148	0.148
	se	(0.245)	(0.172)	(0.245)	(0.245)	(0.245)	(0.245)	(0.245)	(0.245)
	R^2	0.645	0.636	0.645	0.645	0.645	0.645	0.645	0.645
	N	19083	20158	19083	19083	19083	19083	19083	19083
Capital mix	ξ	0.149	0.148	0.270*	0.262	0.0918	0.305**	0.344***	0.202
	se	(0.161)	(0.138)	(0.149)	(0.166)	(0.142)	(0.131)	(0.118)	(0.142)
	R^2	0.591	0.580	0.564	0.563	0.561	0.563	0.566	0.565
	N	17347	18385	18228	18172	18239	18255	18125	18114
Redundancies (share)	ξ	-0.192	-0.0849	0.0441	0.123	0.107	-0.120	-0.00601	-0.00104
	se	(0.323)	(0.283)	(0.300)	(0.302)	(0.272)	(0.255)	(0.299)	(0.300)
	R^2	0.252	0.244	0.242	0.240	0.251	0.245	0.244	0.250
	N	57825	60856	60423	58976	58956	59311	58797	57791
Redundancy expectations	ξ	-0.0228	-0.0348	-0.00212	0.0410	0.00393	0.00929	-0.00607	0.00393
	se	(0.0509)	(0.0557)	(0.0581)	(0.0493)	(0.0638)	(0.0555)	(0.0636)	(0.0638)
	R^2	0.589	0.577	0.585	0.580	0.604	0.554	0.575	0.604
	N	18703	19580	18676	18642	17722	19611	18669	17722

Notes: Table presents estimated effects for different non-overlapping post-treatment windows. The variables are ordinal outcomes indicating the direction of change of a given variable ie. if it increased or decreased in the survey reference period. The data granularity is at the ruref level and the specification includes ruref fixed effects. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors by 2 digit industry with stars indicating *** $p<0.01$, ** $p<0.05$, * $p<0.10$

Table C.46: Average treatment effects on firms' prices at different post-treatment windows, large firms

Prices		Estimate (ξ Treatment × Energy intensity)							
		Dec21	Dec21-Feb22	Mar-May22	Jun-Aug22	Aug-Nov22	Nov22-Feb23	Mar-May23	Jun-Jul23
Price of materials	ξ	0.450**	0.396**	0.400**	0.263*	0.210	0.256*	0.201	0.418***
	se	(0.186)	(0.173)	(0.162)	(0.153)	(0.147)	(0.133)	(0.134)	(0.134)
	R^2	0.370	0.371	0.388	0.377	0.366	0.349	0.349	0.346
	N	38456	39354	40495	40399	40402	40609	40236	39392
Price of goods sold	ξ	0.273*	0.210*	0.168	0.174	0.104	0.162	0.0155	0.169
	se	(0.139)	(0.123)	(0.140)	(0.129)	(0.137)	(0.184)	(0.250)	(0.134)
	R^2	0.399	0.394	0.387	0.384	0.383	0.376	0.378	0.378
	N	40460	41405	42585	42459	42457	42709	42270	41447
Prices of goods sold expectations	ξ	0	0	0.188	0.0406	0.152	0.234	0.0952	0.0928
	se	(.)	(.)	(0.169)	(0.145)	(0.146)	(0.175)	(0.147)	(0.102)
	R^2	0.332	0.332	0.359	0.351	0.354	0.343	0.323	0.315
	N	25406	25406	28433	28274	28321	28512	28154	27334

Notes: Table presents estimated effects for different non-overlapping post-treatment windows. The variables are ordinal outcomes indicating the direction of change of a given variable ie. if it increased or decreased in the survey reference period. The data granularity is at the ruref level and the specification includes ruref fixed effects. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors by 2 digit industry with stars indicating *** p<0.01, ** p<0.05, * p<0.10

Table C.47: Average treatment effects on firms' processes at different post-treatment windows, large firms

Process $f()$		Estimate (ξ Treatment $\times$ Energy intensity) Dec21	Dec21-Feb22	Mar-May22	Jun-Aug22	Aug-Nov22	Nov22-Feb23	Mar-May23	Jun-Jul23
Stock levels	ξ	-0.158	-0.223	0.0288	0.130	-0.119	-0.0129	0.0641	0.0811
	se	(0.207)	(0.163)	(0.210)	(0.193)	(0.197)	(0.237)	(0.237)	(0.224)
	R^2	0.497	0.494	0.462	0.463	0.464	0.457	0.463	0.477
	N	26862	27608	28384	28306	28282	28430	28078	27486
Hybrid working	ξ	6.668*	18.55***	-11.77*	-9.724*	-18.54***	-20.11***	-15.82***	-10.10**
	se	(3.644)	(6.555)	(6.426)	(5.775)	(6.267)	(6.754)	(5.833)	(4.908)
	R^2	0.859	0.769	0.843	0.839	0.845	0.844	0.816	0.824
	N	5946	8971	8552	7049	7027	7401	6825	5752
Working from home	ξ	48.29***	36.48***	64.15***	69.03***	71.28***	70.66***	70.14***	67.34***
	se	(12.65)	(9.795)	(16.24)	(16.28)	(16.68)	(16.52)	(15.77)	(15.96)
	R^2	0.834	0.821	0.812	0.822	0.820	0.819	0.823	0.830
	N	49739	52778	52349	50908	50878	51242	50724	49712
Working from normal place of work	ξ	6.466	12.00	11.05	9.872	15.64	12.28	14.21	9.808
	se	(8.697)	(8.012)	(9.231)	(9.113)	(9.937)	(10.51)	(9.076)	(9.096)
	R^2	0.759	0.754	0.755	0.758	0.757	0.757	0.756	0.761
	N	49739	52778	52349	50908	50878	51242	50724	49712

Notes: Table presents estimated effects for different non-overlapping post-treatment windows. The variables are ordinal outcomes indicating the direction of change of a given variable ie. if it increased or decreased in the survey reference period. The data granularity is at the ruref level and the specification includes ruref fixed effects. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors by 2 digit industry with stars indicating *** $p<0.01$, ** $p<0.05$, * $p<0.10$

Table C.48: Average treatment effects on firms' survival (debt) at different post-treatment windows, large firms

Survival (Debt & liquidity)		Estimate (ξ Treatment × Energy intensity)							
		Dec21	Dec21-Feb22	Mar-May22	Jun-Aug22	Aug-Nov22	Nov22-Feb23	Mar-May23	Jun-Jul23
Cash reserve duration (5 cat)	ξ	0.267	0.152	0.140	0.353	0.486**	-0.0690	0.506***	0.250
	se	(0.205)	(0.177)	(0.219)	(0.258)	(0.238)	(0.201)	(0.172)	(0.247)
	R^2	0.825	0.820	0.818	0.822	0.820	0.820	0.821	0.819
	N	39633	41135	40657	39536	39588	39544	39413	39396
Confidence will meet debt obligations (5 cat)	ξ	0	-0.275**	-0.315**	-0.444***	-0.283*	-0.248	-0.0677	-0.403*
	se	(.)	(0.128)	(0.150)	(0.128)	(0.163)	(0.149)	(0.153)	(0.211)
	R^2	0.689	0.680	0.662	0.667	0.649	0.642	0.644	0.645
	N	7828	10595	10135	8861	9875	11338	10227	9950
Repayments compared to turnover (5 cat)	ξ	0	-0.00709	-0.373	-0.707	-0.256	-0.365*	-0.0801	-0.126
	se	(.)	(0.175)	(0.283)	(0.429)	(0.263)	(0.185)	(0.254)	(0.324)
	R^2	0.692	0.694	0.688	0.692	0.684	0.684	0.681	0.679
	N	10101	10942	10797	10401	10702	11260	11168	10845

Notes: Table presents estimated effects for different non-overlapping post-treatment windows. The variables are ordinal outcomes indicating the direction of change of a given variable ie. if it increased or decreased in the survey reference period. The data granularity is at the ruref level and the specification includes ruref fixed effects. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors by 2 digit industry with stars indicating *** $p<0.01$, ** $p<0.05$, * $p<0.10$

Table C.49: Average treatment effects on firms' survival (trading status) at different post-treatment windows, large firms

Survival (Trading status)		Estimate (ξ Treatment × Energy intensity)							
		Dec21	Dec21-Feb22	Mar-May22	Jun-Aug22	Aug-Nov22	Nov22-Feb23	Mar-May23	Jun-Jul23
Risk of insolvency	ξ	0.0131	-0.0694	-0.141	-0.00589	-0.0827	0.0101	-0.116	-0.0970
	se	(0.134)	(0.0957)	(0.0949)	(0.139)	(0.157)	(0.136)	(0.153)	(0.150)
	R^2	0.719	0.716	0.709	0.714	0.704	0.696	0.700	0.702
	N	32715	34414	33934	32652	33667	35135	34712	33790
Change in risk of insolvency	ξ	0	0.0361	0	0	0	0	0	0
	se	(.)	(0.108)	(.)	(.)	(.)	(.)	(.)	(.)
	R^2	0.492	0.475	0.492	0.492	0.492	0.492	0.492	0.492
	N	23269	24954	23269	23269	23269	23269	23269	23269
Trading status (2 cat)	ξ	0.0384	0.0362	0.0399	0.0421	0.0485	0.0579	0.0627	0.0552
	se	(0.0579)	(0.0565)	(0.0582)	(0.0580)	(0.0608)	(0.0718)	(0.0698)	(0.0661)
	R^2	0.439	0.431	0.422	0.424	0.427	0.416	0.422	0.428
	N	62798	65838	69112	67631	66554	70426	67867	65490
Confidence of 3m survival	ξ	0.0382	0.0616	-0.00368	0	0.0265	0	0	0
	se	(0.0662)	(0.0837)	(0.104)	(.)	(0.0972)	(.)	(.)	(.)
	R^2	0.713	0.703	0.710	0.716	0.706	0.716	0.716	0.716
	N	30599	33635	30612	29432	30506	29432	29432	29432

Notes: Table presents estimated effects for different non-overlapping post-treatment windows. The variables are ordinal outcomes indicating the direction of change of a given variable ie. if it increased or decreased in the survey reference period. The data granularity is at the ruref level and the specification includes ruref fixed effects. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors by 2 digit industry with stars indicating *** p<0.01, ** p<0.05, * p<0.10

Table C.50: Average treatment effects on firms' survival from the LBD at different post-treatment windows, large firms

Survival (LBD)		Estimate (ξ Treatment $\times$ Energy intensity)			
		2021 Q4	2022 Q1	2022 Q2	2022 Q3
Survival (LBD)	ξ	0.00812	0.0137	0.00592	0.00556
	se	(0.0152)	(0.0166)	(0.0291)	(0.0375)
	R^2	0.648	0.635	0.614	0.600
	N	51168	51032	51007	50976
Local sites (LBD)	ξ	-1.306	-1.987	-1.668	-3.205
	se	(2.006)	(2.147)	(2.273)	(2.815)
	R^2	0.964	0.963	0.963	0.963
	N	50175	50014	49954	49890
Log employment (LBD)	ξ	-0.0192	-0.0634***	-0.0812***	-0.0815***
	se	(0.0177)	(0.0213)	(0.0253)	(0.0286)
	R^2	0.991	0.989	0.988	0.987
	N	51168	51032	51007	50976
Employment (LBD)	ξ	-42.21	-167.2***	-215.8***	-198.7**
	se	(81.85)	(59.01)	(79.70)	(78.38)
	R^2	0.997	0.996	0.995	0.994
	N	51168	51032	51007	50976

Notes: Table presents estimated effects for different non-overlapping post-treatment windows. The data granularity is at the ruref level and the specification includes ruref fixed effects. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors by 2 digit industry with stars indicating *** p<0.01, ** p<0.05, * p<0.10

Table C.51: Average treatment effects on firms' output at different post-treatment windows, small and medium sized firms

Output		Estimate (ξ Treatment × Energy intensity)							
		Dec21	Dec21-Feb22	Mar-May22	Jun-Aug22	Aug-Nov22	Nov22-Feb23	Mar-May23	Jun-Jul23
Turnover change (3 cat)	ξ	-0.0763	-0.0846	0.225	0.151	0.0109	0.0780	0.0779	0.500
	se	(0.160)	(0.171)	(0.318)	(0.339)	(0.274)	(0.371)	(0.318)	(0.333)
	R^2	0.518	0.510	0.498	0.490	0.496	0.504	0.495	0.492
	N	27653	30135	30074	29265	29293	27491	28909	28266
Turnover expectations (3 cat)	ξ	0	-0.0837	-0.0762	-0.538***	-0.402*	-0.153	0.110	-0.149
	se	(.)	(0.106)	(0.175)	(0.124)	(0.235)	(0.274)	(0.174)	(0.133)
	R^2	0.371	0.364	0.361	0.359	0.362	0.367	0.365	0.361
	N	24264	26859	27317	26557	26549	24779	26170	25569
Export status (3 cat)	ξ	-0.166**	-0.123*	-0.0914	-0.0701	0.0226	0.00393	-0.187	-0.187
	se	(0.0775)	(0.0675)	(0.0902)	(0.0857)	(0.103)	(0.115)	(0.144)	(0.147)
	R^2	0.964	0.961	0.958	0.961	0.963	0.959	0.959	0.960
	N	12645	13731	14829	14852	14327	15573	14066	12249

Notes: Table presents estimated effects for different non-overlapping post-treatment windows. The variables are ordinal outcomes indicating the direction of change of a given variable ie. if it increased or decreased in the survey reference period. The data granularity is at the ruref level and the specification includes ruref fixed effects. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors by 2 digit industry with stars indicating *** p<0.01, ** p<0.05, * p<0.10

Table C.52: Average treatment effects on firms' input at different post-treatment windows, small and medium sized firms

Input mix		Estimate (ξ Treatment $\times$ Energy intensity)							
		Dec21	Dec21-Feb22	Mar-May22	Jun-Aug22	Aug-Nov22	Nov22-Feb23	Mar-May23	Jun-Jul23
Capital	ξ	0.236	0.204	0.236	0.236	0.236	0.236	0.236	0.236
	se	(0.277)	(0.231)	(0.277)	(0.277)	(0.277)	(0.277)	(0.277)	(0.277)
	R^2	0.683	0.682	0.683	0.683	0.683	0.683	0.683	0.683
	N	9892	10467	9892	9892	9892	9892	9892	9892
Capital mix	ξ	0.333	0.221	0.289	0.0801	0.328*	0.358*	0.228	0.536***
	se	(0.209)	(0.201)	(0.267)	(0.266)	(0.196)	(0.195)	(0.183)	(0.171)
	R^2	0.629	0.625	0.611	0.609	0.604	0.599	0.600	0.599
	N	8392	8925	8805	8782	8785	8745	8704	8750
Redundancies (share)	ξ	-0.263	-0.408	-0.268	-0.476	1.899	1.420	0.131	0.123
	se	(0.528)	(0.591)	(0.730)	(0.673)	(1.759)	(1.345)	(0.400)	(0.294)
	R^2	0.278	0.268	0.273	0.277	0.272	0.273	0.280	0.279
	N	32334	34261	34108	33253	33282	33249	32881	32206
Redundancy expectations	ξ	0.0333	0.0353	0.0121	-0.00399	0.0164	0.0866*	0.0331	0.0164
	se	(0.0389)	(0.0429)	(0.0476)	(0.0438)	(0.0358)	(0.0457)	(0.0418)	(0.0358)
	R^2	0.600	0.593	0.597	0.601	0.605	0.586	0.584	0.605
	N	12660	13219	12477	12394	11994	13160	12392	11994

Notes: Table presents estimated effects for different non-overlapping post-treatment windows. The variables are ordinal outcomes indicating the direction of change of a given variable ie. if it increased or decreased in the survey reference period. The data granularity is at the ruref level and the specification includes ruref fixed effects. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors by 2 digit industry with stars indicating *** $p<0.01$, ** $p<0.05$, * $p<0.10$

Table C.53: Average treatment effects on firms' prices at different post-treatment windows, small and medium sized firms

Prices		Estimate (ξ Treatment × Energy intensity)							
		Dec21	Dec21-Feb22	Mar-May22	Jun-Aug22	Aug-Nov22	Nov22-Feb23	Mar-May23	Jun-Jul23
Price of materials	ξ	0.371***	0.524***	0.491***	0.436***	0.315**	0.583***	0.476***	0.621***
	se	(0.130)	(0.100)	(0.103)	(0.124)	(0.130)	(0.190)	(0.161)	(0.109)
	R^2	0.458	0.465	0.480	0.469	0.451	0.441	0.437	0.433
	N	21366	21935	22973	22927	22962	22873	22545	21944
Price of goods sold	ξ	0.251*	0.330**	0.582***	0.354*	0.258	0.515**	0.381**	0.381**
	se	(0.146)	(0.154)	(0.187)	(0.204)	(0.179)	(0.226)	(0.153)	(0.148)
	R^2	0.453	0.459	0.465	0.452	0.445	0.436	0.430	0.432
	N	22075	22620	23693	23662	23675	23634	23295	22669
Prices of goods sold expectations	ξ	0	0	0.532***	0.229	-0.00763	0.195	0.132	0.0764
	se	(.)	(.)	(0.175)	(0.198)	(0.169)	(0.174)	(0.102)	(0.102)
	R^2	0.393	0.393	0.497	0.462	0.431	0.416	0.391	0.377
	N	12419	12419	14456	14459	14512	14477	14205	13612

Notes: Table presents estimated effects for different non-overlapping post-treatment windows. The variables are ordinal outcomes indicating the direction of change of a given variable ie. if it increased or decreased in the survey reference period. The data granularity is at the ruref level and the specification includes ruref fixed effects. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors by 2 digit industry with stars indicating *** p<0.01, ** p<0.05, * p<0.10

Table C.54: Average treatment effects on firms' processes at different post-treatment windows, small and medium sized firms

Process $f()$		Estimate (ξ Treatment × Energy intensity)							
		Dec21	Dec21-Feb22	Mar-May22	Jun-Aug22	Aug-Nov22	Nov22-Feb23	Mar-May23	Jun-Jul23
Stock levels	ξ	0.0378	-0.0148	0.259*	0.187	0.160	0.190	0.144	0.0484
	se	(0.0835)	(0.114)	(0.150)	(0.209)	(0.184)	(0.168)	(0.125)	(0.121)
	R^2	0.551	0.550	0.532	0.524	0.522	0.509	0.515	0.519
	N	15446	15875	16573	16532	16567	16535	16196	15760
Hybrid working	ξ	-1.714	4.292	-9.669**	-6.708	-6.530	-0.261	8.098	4.879
	se	(2.985)	(3.674)	(4.014)	(5.391)	(5.730)	(4.177)	(5.410)	(4.659)
	R^2	0.866	0.774	0.863	0.872	0.893	0.916	0.891	0.904
	N	3686	5606	5372	4435	4461	4398	4015	3293
Working from home	ξ	21.11***	10.12	25.20***	25.08***	30.64***	37.24***	38.60***	35.72***
	se	(7.009)	(7.303)	(8.878)	(8.303)	(7.428)	(7.650)	(8.048)	(6.620)
	R^2	0.819	0.807	0.807	0.813	0.816	0.813	0.810	0.814
	N	27669	29625	29498	28643	28672	28628	28249	27548
Working from normal place of work	ξ	14.20	19.12*	28.32***	23.77**	23.68***	16.84**	12.48	8.225
	se	(10.93)	(11.15)	(9.884)	(8.971)	(8.229)	(8.322)	(8.609)	(8.102)
	R^2	0.745	0.741	0.749	0.750	0.750	0.746	0.741	0.748
	N	27669	29625	29498	28643	28672	28628	28249	27548

Notes: Table presents estimated effects for different non-overlapping post-treatment windows. The variables are ordinal outcomes indicating the direction of change of a given variable ie. if it increased or decreased in the survey reference period. The data granularity is at the ruref level and the specification includes ruref fixed effects. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors by 2 digit industry with stars indicating *** $p<0.01$, ** $p<0.05$, * $p<0.10$

Table C.55: Average treatment effects on firms' survival (debt) at different post-treatment windows, small and medium sized firms

Survival (Debt & liquidity)		Estimate (ξ Treatment × Energy intensity)							
		Dec21	Dec21-Feb22	Mar-May22	Jun-Aug22	Aug-Nov22	Nov22-Feb23	Mar-May23	Jun-Jul23
Cash reserve duration (5 cat)	ξ	0.332	0.140	0.0985	0.133	0.0452	0.238	0.833**	0.563*
	se	(0.212)	(0.223)	(0.248)	(0.300)	(0.357)	(0.455)	(0.320)	(0.294)
	R^2	0.830	0.823	0.820	0.828	0.823	0.824	0.824	0.824
	N	22409	23422	23044	22224	22247	22167	22126	22142
Confidence will meet debt obligations (5 cat)	ξ	0	-0.232	-0.573***	-0.412	-0.646*	-0.397	-0.106	0.0513
	se	(.)	(0.164)	(0.158)	(0.249)	(0.380)	(0.295)	(0.264)	(0.247)
	R^2	0.711	0.712	0.719	0.704	0.732	0.753	0.710	0.722
	N	4707	6558	6092	5076	6039	6897	6038	5869
Repayments compared to turnover (5 cat)	ξ	0	-0.490	-0.372	-0.653	-0.453	-1.184***	-1.225***	-1.091***
	se	(.)	(0.361)	(0.409)	(0.542)	(0.507)	(0.344)	(0.418)	(0.320)
	R^2	0.746	0.737	0.741	0.741	0.744	0.745	0.738	0.739
	N	6676	7294	7150	6830	7141	7464	7418	7187

Notes: Table presents estimated effects for different non-overlapping post-treatment windows. The variables are ordinal outcomes indicating the direction of change of a given variable ie. if it increased or decreased in the survey reference period. The data granularity is at the ruref level and the specification includes ruref fixed effects. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors by 2 digit industry with stars indicating *** $p<0.01$, ** $p<0.05$, * $p<0.10$

Table C.56: Average treatment effects on firms' survival (trading status) at different post-treatment windows, small and medium sized firms

Survival (Trading status)		Estimate (ξ Treatment × Energy intensity)							
		Dec21	Dec21-Feb22	Mar-May22	Jun-Aug22	Aug-Nov22	Nov22-Feb23	Mar-May23	Jun-Jul23
Risk of insolvency	ξ	-0.101	0.00194	-0.0175	0.160	-0.209	-0.364*	-0.507**	-0.621***
	se	(0.116)	(0.119)	(0.126)	(0.167)	(0.171)	(0.183)	(0.241)	(0.198)
	R^2	0.713	0.709	0.711	0.709	0.710	0.706	0.700	0.702
	N	19629	20705	20288	19357	20284	21131	20784	20165
Change in risk of insolvency	ξ	0	0.0274	0	0	0	0	0	0
	se	(.)	(0.0835)	(.)	(.)	(.)	(.)	(.)	(.)
	R^2	0.548	0.542	0.548	0.548	0.548	0.548	0.548	0.548
	N	14067	15083	14067	14067	14067	14067	14067	14067
Trading status (2 cat)	ξ	0.00358	-0.0106	0.00123	0.0108	0.0184	0.0388	0.0681	0.0420
	se	(0.0246)	(0.0275)	(0.0354)	(0.0353)	(0.0332)	(0.0420)	(0.0489)	(0.0387)
	R^2	0.510	0.506	0.494	0.496	0.497	0.483	0.485	0.499
	N	35055	36979	39294	38430	37793	40135	38193	36617
Confidence of 3m survival	ξ	0.167**	0.190**	0.00537	0	0.119	0	0	0
	se	(0.0817)	(0.0911)	(0.116)	(.)	(0.313)	(.)	(.)	(.)
	R^2	0.727	0.724	0.727	0.730	0.723	0.730	0.730	0.730
	N	18564	20464	18376	17784	18232	17784	17784	17784

Notes: Table presents estimated effects for different non-overlapping post-treatment windows. The variables are ordinal outcomes indicating the direction of change of a given variable ie. if it increased or decreased in the survey reference period. The data granularity is at the ruref level and the specification includes ruref fixed effects. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors by 2 digit industry with stars indicating *** p<0.01, ** p<0.05, * p<0.10

Table C.57: Average treatment effects on firms' survival and input mix from the LBD at different post-treatment windows, small and medium sized firms

Survival (LBD)		Estimate (ξ Treatment $\times$ Energy intensity) 2021 Q4	2022 Q1	2022 Q2	2022 Q3
Survival (LBD)	ξ	-0.0643***	-0.0860***	-0.106***	-0.144***
	se	(0.0164)	(0.0213)	(0.0261)	(0.0299)
	R^2	0.630	0.615	0.599	0.585
	N	166658	166577	166553	166507
Local sites (LBD)	ξ	0.0649**	0.0213	0.0369	0.0664
	se	(0.0264)	(0.0652)	(0.0472)	(0.0426)
	R^2	0.947	0.930	0.937	0.938
	N	160102	159825	159562	159276
Log employment (LBD)	ξ	0.0217	0.0353**	0.0493***	0.0548***
	se	(0.0134)	(0.0172)	(0.0168)	(0.0182)
	R^2	0.985	0.983	0.982	0.981
	N	166578	166495	166468	166420
Employment (LBD)	ξ	0.989*	1.761***	2.125***	1.870***
	se	(0.505)	(0.641)	(0.670)	(0.695)
	R^2	0.984	0.981	0.980	0.979
	N	166658	166577	166553	166507

Notes: Table presents estimated effects for different non-overlapping post-treatment windows. The data granularity is at the ruref level and the specification includes ruref fixed effects. Standard errors are reported in parentheses. Stars denote statistical significance obtained from estimating clustered standard errors by 2 digit industry with stars indicating *** p<0.01, ** p<0.05, * p<0.10