Roy Sorting: Climate and Status Quo Strategies*

Thomas Cauthorn Samuel Drempetic Andreas G.F. Hoepner
Christian Klein Adair Morse

This draft: March 2025

Abstract

Firms may enact competitive sorting to value-optimizing transition or status quo production opportunities. We draw inspiration from Roy (1951), where the best fishers fish, and the best hunters hunt. If firms Roy sort, then the information arrival of a firm's competitive strategy should result in a positive equity price reaction, both for fishing (status quo) and hunting (transition) signals. We apply latent variable techniques from Heckman, Stixrud, Urzua (2006) using a novel dataset of active manager self-edits -- costly monitoring -- of ESG scores, focusing on the industrial base economy sectors. We find positive 18-83 basis point stock reactions in industrial base firms when information arrives that firms competitively sort toward transition or status quo growth strategies. Our effects largely go away in countries with high environmental stringency (much of Europe and East Asia), suggestive of unobservability in our data or a pooling toward transition investment induced by policy. We validate our results in firms with grey zone strategies, not signaling to be fishers or hunters.

Keywords: Climate Finance, Corporate Climate Strategy, Transition Economy, ESG Scores, Roy Model for Climate Sorting, Signaling Latent Strategies, Business Development in Green versus Brown Growth, Confirmatory Factor Analysis

* Cauthorn and Klein are with the University of Kassel, Drempetic is with the Steyler Ethik Bank, Hoepner is with the University College Dublin and the European Commission's Platform for Sustainable Finance and Morse is with the University of California-Berkeley and NBER. Cauthorn and Klein are pleased to acknowledge funding from the *Stiftung Mercator* for a project entitled *Wissenschaftsplattform Sustainable Finance*, grant number 19026202. We would like to thank Florian Berg, Julie Byrne, Lauren Cohen (AFA discussant), Mariassunta Giannetti, Gunnar Gutsche, Diego Guisande, Johannes Klausmann, Sandeep Rao, Laura Starks, Xiaoyun Yu, Bernhard Zwergel, and conference or seminar participants at the American Finance Association's Annual Meeting (2025), C.r.e.d.i.t. (2024), the Irish Academy of Finance's Annual Meeting (2024), the University of Kassel, the University of North Carolina at Chapel Hill, the 6th Summar School on Sustainable Finance, and the Baruch Climate Finance Conference for their helpful comments. The views in the paper are not necessarily shared by the European Commission or its Platform on Sustainable Finance.

I. Introduction

Operating in an ever-evolving landscape of competition, corporate executives must make complex strategic decisions to participate in select growth opportunities while passing on others. Today, an extra dimension of complexity exists, the consideration of transition-oriented growth opportunities. Transition opportunities result from shifts in production and value chains (e.g., climate-oriented efficiencies or exposures in processes and inputs), from security shocks to supply chains (e.g., the pandemic, wars, trade shocks, shortages), and from innovation shocks in technology (e.g., AI, advanced manufacturing, new energy). In this paper, we start from the insight that firms' strategies toward transition or status quo opportunities within their sectors should reflect an optimal competitive sorting. Some firms may optimally reach for market share and valuation in status quo implementations, while others optimally sort to grab new competitive opportunities in transition spaces.

We focus on status quo versus transition implementations as it relates to climate (i.e., green versus brown opportunities). Our consideration of climate competitive sorting builds off the active green-versus-brown literature. This literature has largely considered value-relevance of green versus brown by focusing on the firm as a whole. For example, a robust research considers whether investors may expect a risk premium in holding brown firms to the extent that brown firms have higher exposure to transition risks.[2] Yet, such a return spread over green investments might also be due to green preference investors being willing to invest with a lower monetary return from holding green investments.[3] Another active literature considers the value proposition of green versus brown from the lens of banking risks and opportunities.[4] A second literature delves into green versus brown actions. For example, Darendeli, Law, Shen (2022) study green new hiring; Kruse, Mohnen, Sato, Pope (2020), Chiu, Hsu, Li, Tong (2024), and Klausmann, Krueger, Matos (2024) study green revenues and products; Blickle, Morse, Pari (2025), and Gormsen, Huber, Oh (2023) study transition investment; and Bolton, Kacperczyk, Wiedemann (2023), Cohen, Gurun,

[2] Bolton and Kacperczyk (2021); Giglio, Kelly, Stroebel (2021); Li, Shan, Tang, Yao (2023); Sautner, van Lent, Vilkov, Zhang (2023a); Huij, Laurs, Stork, Zwinkels (2021); Faccini, Matin, Skiadopoulos (2023)

[3] Barber, Morse, Yasuda (2021), Pedersen, Fitzgibbons, Pomorski (2021); Goldstein, Kopytov, Shen, Xiang (2021); Dimson, Karakaş, Li (2015); Hoepner, Oikonomou, Sautner, Starks, Zhou (2024); Oemke and Opp (2024). In an alternative viewpoint, investors' tastes for sustainability may increase demand for green firm equities, leading to higher prices and a short-term outperformance over brown firms (Pástor, Stambaugh, Taylor (2021); Angelis, Tankov, Zerbib (2023), Cauthorn, Klein, Remme, Zwergel (2023)), with the longer-term implication of any short-term outperformance disappearing given a green-brown equilibrium a la Pástor, Stambaugh, Taylor (2021).

[4] Kacperczyk and Peydro (2024); Morse and Sastry (2024); Beyene, Delis, Ongena (2024); Giannetti, Jasova, Joumioti, Mendicino (2023); Sastry, Verner, Marquez-Ibanes (2024); Green and Vallee (2024).

Nguyen (2023), Kwon, Lowry, Verardo (2023), Hege, Pouget, and Zhang (2022), and Sautner, van Lent, Vilkov, Zhang (2023b) study green versus brown innovation.[5] These contributions open the idea that firms are deciding within their own business development as to growth toward the status quo in their industry versus transition growth, a value-relevant proposition.

Our starting point is the idea of competitive sorting, that within a sector, some firms optimally should sort toward status quo growth opportunities and others toward transition options. We are motivated by the classic Roy model (1951). In Roy (1951), there is hunting and fishing to be done. The question is whether those best at hunting hunt, and those best at fishing fish. The problem Roy sets out to identify is how to understand signals supporting that realization and the properties of those determinants. In our case, we are interested in uncovering whether fishing (growing in the status quo economy) and hunting (growing in transition spaces) is playing out in value-relevant competitive positioning[6] of firms in the industrial base of the economy.

This transition sorting innovation closely reflects the work of Suri (2011) from the development economics context, who uses the Roy insights to study the choices made by farmers to adopt new technologies or to keep the status quo processes. In our context, an example of sorting toward a transition strategy might be found in the actions of U.S. Steel, investing in green hydrogen based direct reduction of iron and electric arc furnace capacities to produce steel more efficiently,[7] or Albemarle Corporation, pioneering solutions for sustainable mining.[8]

Our agenda has two goals. First, we test whether value-relevant climate strategies are at work in the industrial base sectors, with inference to the importance of such competitive positioning. Second, we investigate the extent to which regulation[9] inhibits competitive sorting. To identify value-relevant status quo and transition strategies, we employ a novel dataset of active managerial edits to ESG fundamentals, allowed within the London Stock Exchange Group's (LSEG) Refinitiv databank. We capture nine dataset snapshots taken between September 2020 and January 2021 encompassing the complete LSEG ESG universe and identify 3,781 managerial edits

[5] The innovation case is particularly relevant to our contribution. Cohen, Gurun, Nguyen (2023) document that it is brown economy firms who are most responsible for the growth in green patenting, while Bolton, Kacperczyk, Wiedemann (2023) counter, that the increasing green innovation over time is being driven by firms with lower emissions within each sector.

[6] For examples of competitive positioning literature, please see Harford, Piotrowski, and Qian (2023), Suri (2011), and Elfenbein, Hamilton, Zenger (2010).

[7] https://www.ussteel.com/roadmap-to-2050

[8] https://www.albemarle.com/sites/default/files/2024-09/albemarle-sustainability-report-2023-21b.pdf

[9] Inderst and Opp (2025) discuss the role environmental policy can play in addressing environmental externalities.

in the industrial base sectors. We focus on the industrial base of the economy – sectors such as energy, mining & metals, and industrials & basic materials[10] – both for our ability to identify transition versus status quo growth and because these sectors are likely representing the front line of competitive sorting in the climate transition.

Importantly, editing actions, which can be edits toward better or worse ESG scores, are not required. We use these edits as a moment of information provision to the market, through the link between ESG databases and the asset allocation of large investment companies. Of course, there are other methods of signaling like speeches at the annual general meeting; thus, our identification is one slice of the information the market may glean, making any estimations of valuation effects conservative.

Methodologically, we begin with a signed motivations approach following the spirit of Erickson and Whited (2005). In this methodology, we attempt to posit all systematic reasons why a manager would edit ESG data (upwards and downwards), when not editing is an option and knowing that ESG fundamentals would eventually update through the usual processes. We then use the literature to predict whether such actions would have a positive or negative market reaction. The motivations include stories of agency (compensation contracts), investor portfolio rebalancing effects, litigation and shock uncertainty avoidance, social pressure effects, and signaling of transition or status quo strategies. Only the signaling stories result in a positive return prediction, allowing us to posit that Edit Better alongside a positive return impact from the information would be evidence of competitive sorting of the hunters hunting (transition). Likewise, Edit Worse alongside a positive return impact would be evidence of competitive sorting of the fishers fishing (status quo).

Based on our signing methodology predictions, we find evidence for societal pressures causing an across-the-board devaluation; firms devalue when editing their ESG fundamentals to the better. We also find evidence supporting litigation and shock avoidance in firms without high stringency environmental regulations (which includes the United States). Market valuations decline when firms edit downwards. Our key signed-motivations result provides evidence for

[10] We define the industrial base as firms in energy, industrials & basic materials, and mining & metals, with the oversized role these industries are playing in the transition to a net zero economy, both in the regulatory and transition opportunities realms. See for example, Boer, Pescatori, Stuermer (2023); Davis, Lewis, Shaner, Aggarwal, Arent, Azevedo, Benson, Bradley, Brouwer, Chiang, Clack, Cohen, Doig, Edmonds, Fennell, Field, Hannegan, Hodge, Hoffert, Ingersoll, Jaramillo, Lackner, Mach, Mastrandrea, Ogden, Peterson, Sanchez, Sperling, Stagner, Trancik, Yang, Caldeira (2018); Sautner, van Lent, Vilkov, Zhang (2023a).

competitive sorting toward hunting (transition opportunities). Market valuations increase for energy firms and industrial & basic materials firms when signaling a sorting towards transition strategies. This signing of returns evidence helps rationalize why firms might edit their fundamental ESG data. Yet, this methodology may be confounded by endogenous overall actions of the firm, a concern we call operational precision in that firms may be editing ESG scores along with doing other precision-oriented management. Thus, we turn to our main methodology.

Our methodology builds on the fact that a firm's climate strategy is latent. Information that emerges from companies is awash in communication strategies and blended with predetermined physical, human, and intangible capital fundamentals. To overcome the challenge of eliciting growth strategies evidence from the noise, we apply latent estimation techniques from labor econometrics in the form of confirmatory factor analysis (CFA) (e.g., Heckman, Stixrud, Urzua, 2006). The idea of CFA is that one might have measures indictive of a latent action. In our case, these indicators are the editing (better or worse) of ESG scores. Yet, these variables may be correlated with other causal drivers of returns, causing an omitted variable problem. The CFA solution is to find a confirmatory variable to identify the latent strategy. We use future revelations of growth strategies toward transition or status quo opportunities as evidenced in M&A and revenue realizations. The CFA process takes the shared variation among the indicators (the edit variables) that maximally explains the confirmatory factor (the future transition or status quo strategy enacted) as the latent variable that can then be deployed in a returns estimation.

Using these common correlations, we estimate the latent relationship between climate strategy and stock returns in a simultaneous structural equation model. Notably, by applying confirmatory factor analysis we do *not* argue that every edit towards a better value (i.e., environmentally more desirable) or a worse value represents a climate transition or status quo strategy. Rather, the identification of a Roy strategy relies only the proportion of edit better or edit worse observations confirmed by the relevant strategy outcome variables. The exogeneity assumptions for inferring a causal effect of competitive sorting on stock returns are as follows. First, the part of the future transition and status quo growth variables not captured by latent strategy cannot predict unexplained components of stock returns. We measure future growth via variables from a future period (2021 to 2023). One might argue that current stock performance could predict future growth or that plans of future growth could explain current stock performance. However, both arguments would be capturing what we want, a firm's strategy. We discuss potential

violations to this assumption. The second exogeneity assumption is that of independence between measurement variables' and future growth variables' error terms, which is standard to latent variable extraction.

For the energy and mining & metals sectors, we find evidence for competitive sorting towards both transition and status quo strategies. Information revealed with a transition strategy results in a positive revaluation in the energy sector and mining & metals sector of 52 and 83 basis points, respectively, in a two-week period. Importantly for the validation of our Roy sorting, information revealed with a status quo strategy also results in a positive revaluation in the energy sector and mining & metals sector by 24 and 77 basis points, respectively. Multiplying these effects by the average market valuation, leads to the inference that the transition (status quo) strategy revelations lead to an increase in average market value of +41.9 (+19.3) million USD for energy companies in the public firm dataset and +51.7 (+47.9) million USD for mining & metals firms. In the industrials & basic materials sector, on the status quo side, we find a 18-basis point positive revaluation, a +14.4 million USD market value increase per firm. On the transition side, if we focus on organic growth as our confirmatory variable, we also observe a transition strategy revaluation of 20 basis points, a +16.1 million USD market value increase per firm.

Our findings indicate that Roy-like sorting is present, and the market values both transition and status quo strategies when carried out by base industrial firms. Metaphorically, the market rewards fishers for fishing and hunters for hunting. However, our findings point out that the market does not reward hunters and fishers equally. Hunters see across the board higher return implications for hunting. Why does the market value hunting more than fishing when both can be optimal strategic choices? While we feel investigating this question is outside the scope of this paper, we highlight this interesting difference for future research to pursue. Furthermore, our findings naturally lead one to reflect on the costs and benefits of Roy-like sorting in a broader context. What would a cost/benefit analysis look like when considering firms, investors, and society? We look forward to future research examining this tradeoff between benefits to firms and potential costs to society.

Our second objective was to investigate regulatory effects on optimal climate strategy. Our energy, and industrials & basic material findings for transition and status quo strategies are driven by firms in countries not exposed to high environmental regulation, including the United States. This finding would be consistent with an interpretation that high environmental regulation hinders

value-relevant climate transition or status quo sorting, potentially because all firms are sorting toward transition strategies, induced by policy. We do not speak to the social planner welfare implication but only draw attention to what we learn in firm-level effects.

Finally, we validate Roy sorting by testing if the market values grey zone growth strategies. We define grey zone growth strategies as those of firms for whom we do not have evidence of a transition or status quo growth strategy. We use these grey zone growth strategies both as validation and as robustness to a future growth potential confounding effect. If we are capturing timing effects from a general future growth strategy in our main analysis, we would expect a positive return signal related to grey zone growth similar to the return signals seen in our transition and status quo strategies. If the grey zone firms instead reflect a lack of competitive sorting when competitive sorting information arrives, we would instead expect a negative return implication. Focusing on low environmental policy countries, where the incidence of Roy sorting happens most robustly, we find strong evidence for Roy sorting in that the grey zone firms across all base industrials sectors exhibit negative returns when sorting of transition and status quo investment may arrive for other firms in their sectors.

In summary, our results shed light on the need for more work to understand competitive landscapes in the transition economy. Our results bring to light evidence that latent climate transition and status quo strategies are value relevant. These results are, however, just the tip of the iceberg in understanding corporate strategies in this period of economic disruptions and transitions. Policy and financing decisions, and even optimal portfolio construction should be affected by optimal mixes of transition and status quo strategy firms and within-firm actions.

II. Methodology

Our goal is to test the existence of optimal competitive sorting towards optimal climate transition or status quo strategies a la the classical Roy model (Roy 1951).[11] In Roy, society has two professions, hunting and fishing. Roy addresses the determinants driving the extent to which optimal sorting happens so that the best hunters are hunting and the best fishers fishing. In our case, we focus on the idea of competitive sorting in terms of present-day strategy toward or against

[11] A possible alternative to Roy's model could be Ricardo's theory of comparative cost advantage (Ricardo, 1817), which explains why countries specialize in certain goods based on their relative productivity. However, since our analysis focuses on firm-level decision-making rather than national trade patterns, Roy's model provides a more fitting theoretical foundation.

the transition economy. We impose the nomenclature of Roy's hunters and fishers into two types of firms – firms that value maximize in the status quo economy (fishers) and firms that value maximize in the transition economy (hunters), allowing for the possibility of firms' having no or both climate strategies. Information evidencing Roy-like sorting should be rewarded in the valuation of firms. Our empirical objective is to test (i) whether hunters and fishers are rewarded for their competitive sorting and (ii) whether regulation inhibits competitive sorting, to the detriment of lost valuation gains.[12]

Although our objective is not complex, estimating this objective is. To fix ideas, imagine a simple OLS setup to estimate corporation *i's* excess returns over the risk-free rate, $R_{it} - Rf_t$, as a function of the 5 Fama-French factors (Fama and French 2015) as in:

$$R_{it} - Rf_t = \alpha + b(Mkt_t - Rf_t) + sSMB_t + hHML_t + rRMW_t + cCMA_t \qquad (1)$$
$$+\gamma_1 I_{it}^{Transition} + \gamma_2 I_{it}^{StatusQuo} + \epsilon_{it}$$

where $Mkt_t - Rf_t$ is the excess market return, *SMB* is the size factor, *HML* is the value factor, *RMW* is the profitability factor, and *CMA* is the investment factor. We include two additional terms $I_t^{Transition}$ and $I_t^{StatusQuo}$, which are indicators denoting an information arrival of firm *i* having undertaken a strategy to take advantage of a sorting into a transition (and/or status quo) market opportunity. If these sorts reflect fishers fishing and hunters hunting, the information arrival to the market should imply that both γ_1 and γ_2 should be positive.

Of course, estimating equation (1) is not so simple. Information arrivals from firms on transition or status quo strategies – including sustainability reports / website updates, ESG reporting, and news releases, – likely reflect optimal communication policies given investor, media, and regulatory pressures. These communication flows may or may not align with underlying strategies. Like much of corporate finance, inference that any return correlation with information releases is reflective of optimal sorting requires exogeneity conditions on why that information was released. Furthermore, transition and status quo information may reflect an updating on transition and status quo endowment of physical and intangible assets, not reflecting the Roy value updating of optimal sorting of strategic effort toward fishing or hunting.

Our empirical strategy starts with a novel dataset that allows us to see active editing of ESG scores by corporate managers in between ESG fundamentals updating. Most rating agencies

[12] We leave the question of whether such regulation leads to net societal gains for future research.

depend on public information and questionnaires filled out by the rated firm. LSEG, however, is the only rating agency (to our knowledge)[13] that actively encourages firms to correct and update their already-realized ESG information via LSEG's back-end ESG Contributor Tool (Refinitiv 2023). Specifically, LSEG explicitly invites firms to "*review and edit the historical ESG data that is already available for your company*".[14] We build off the import work of Berg, Fabisik, Sautner (2021), who use similar data to study the changing nature of ESG ratings. Our purposes, however, would be to use active editing as being reflective of corporate attention to climate strategies,[15] over and above the existing information of the underlying ESG fundamentals already emerging in the public domain.[16]

We approach our empirical use of edit data in two steps. First, we implement a methodology which relies on a structural understanding of active editing and the sign of returns, in the spirit of Erickson and Whited (2005). We step through all possible motivations that we can rationalize for why a manager chooses to invest scant human capital resources in editing ESG fundamentals when simply not editing is also an option. We then use an empirical technique of looking for exclusive signing of returns predictability based on the literature.

Second, we make arguments under which our signing methodology could generate results from confounding relationships. Thus, we implement a confirmatory factor analysis commonly used in latent variable settings in labor economics to disentangle measures from confounding effects. We discuss these methodologies below.

---

[13] https://sustainabilitymag.com/top10/top-10-esg-platforms

[14] https://www.lseg.com/en/data-analytics/sustainable-finance/esg-scores

[15] We assume ESG fundamental data editing, most likely carried out by employees in, e.g., the sustainability department and not by top management, is driven by an overarching strategy set by top management. One might, however, ask: if ESG editing is indeed strategic or reflective of some high-level strategy, how is it communicated and executed within the organization? We believe that a firm's employees, especially those in the sustainability department (or other reporting area), can be presumed to have knowledge of the strategic position their firm is taking vis-à-vis climate transition and status quo strategies. At the very least, these employees should have a sense of their firm's culture regarding climate strategies. We base our assumption that monitoring and editing ESG fundamentals is a result of the implementation of a firm's climate strategy on a vast previous literature investigating how firms set strategies and incorporate them throughout the firm. See for example, Mintzberg and Waters (1985); Porter (1996); Epstein and Roy (2001); and Engert and Baumgartner (2016).

[16] Two possible ways the ESG fundamental data might change are via the ESG Contributor Tool or LSEG editing the data based on updated public information. In our writing, we focus on the first case, but the second case can and most likely does occur. For our arguments, it is simply important that firms are actively monitoring and updating historic ESG fundamentals either through public restatements (picked up by LSEG) or logging into the backend of LSEG's system. However, we do think the majority of edits are coming from the ESG Contributor Tool based on conversations with LSEG and their practice to generally update ESG fundamentals "once a year in line with companies' own ESG disclosure", since the distributions of edits in our data points to a misalignment with a typical reporting period. https://www.lseg.com/en/data-analytics/sustainable-finance/esg-scores#methodology

II.a. Signing Methodology

Erickson and Whited (2005) speak to occasions when a proxy variable is available for an unobserved regressor of interest, where the econometrician's interest is in the sign (not the magnitude) of the relationship in explaining a dependent variable. As a starting point, we are interested in using the edit data to proxy for information emerging as to a transition or status quo strategy that is positively correlated with returns. Although we cannot speak to magnitudes in this methodology, per Erickson and Whited (2005), we can disentangle evidence of Roy competitive sorting by speaking to the other systematic motivations for edit actions, which convey alternative signs. To see this, we alter equation (1), replacing the information arrival variables with edit better ($I_{it}^{Edit\ Better}$) and edit worse ($I_{it}^{Edit\ Worse}$) as well as changes in ESG fundamentals ($\Delta ESG\ Fundamentals$) according to:

$$R_{it} - Rf_t = \alpha + b(Mkt_t - Rf_t) + sSMB_t + hHML_t + rRMW_t + cCMA_t \qquad (2)$$
$$\xi_0\ \Delta ESG\ Fundamentals + \xi_1 I_{it}^{Edit\ Better} + \xi_2 I_{it}^{EditWorse} + \epsilon_{it}.$$

To be able to interpret ξ_1 and ξ_2 as the Roy effect of optimal sorting, we step through an exercise considering the sign predictions of the other reasons for editing.

(1) Signaling a Transition Strategy: A firm with transition growth opportunities might want to signal its transition strategy to the market. Edit management toward better ($I_{it}^{Edit\ Better}$) might be a way to signal such a setting, especially if the signaling is costly (Spence 1973), as in the case of dedicating staff and effort to monitor and edit ESG fundamentals. Under this argument, the joint observation of $I_{it}^{Edit\ Better}$ and positive returns would be evidence of optimal competitive sorting toward transition opportunities.

(2) Signaling a Status Quo Strategy: Why would a manager ever choose to edit worse ($I_{it}^{Edit\ Worse}$), when simply choosing not to edit is an option? It may be that firms want to signal their status quo strategy. Firms may do this by indicating that they are acting in a reduced way vis-a-vis environmental management, reinforcing their positioning in the status quo economy. Under this argument, the joint observation of $I_{it}^{Edit\ Worse}$ and positive returns would be evidence of optimal competitive sorting toward status quo opportunities.

(3) Agency Model: $I_{it}^{Edit\ Better}$ might reflect personal compensation motives if sustainability metrics enter the compensation contract. In an appendix analysis we investigate

whether this correlation might be at play and find no evidence for such action.[17] Furthermore, such a prediction should have no effect on stock returns, following Cohen, Kadach, Ormazabal, Reichelstein (2023).

(4) Investor ESG Demand: Managers may undertake $I_{it}^{Edit\ Better}$ actions to induce stock demand that may result from algorithmic portfolio rebalancing on ESG fundamentals. However, evidence suggests that this scenario should result in zero measurable market reaction (Hartzmark and Sussman 2019; Pástor, Stambaugh, Taylor 2022; Starks 2023).

(5) Societal Pressures Model: Managers may undertake $I_{it}^{Edit\ Better}$ with motives either of providing compliance or targets achievement information to reduce societal pressures. For example, Pinnuck, Ranasinghe, Soderstrom, Zhou (2021) find that firms are increasingly under pressure to maintain a higher sustainability standard and editing/revising sustainability data is commonplace. However, such actions to comply with societal pressures should predict a negative return, a signal of expected costs (Barrett and Stavins 2003; Gantchev, Giannetti, Li 2022; Beccarini, Ferraro, Guisande, Hoepner 2024), unless the edit action is a signal of an optimal transition strategy, collapsing to the first motivation.

(6) Litigation and Shock Prevention Model: Finally, a manager may take actions $I_{it}^{Edit\ Worse}$ in the hopes of lowering uncertainty around shocks, reputation risks, and litigation costs.[18] We return to the question of why a firm would actively engage in editing down ESG scores, when not editing is a possibility? It may be that the precision on information (in particular, lower ESG fundamentals than reported) matters in removing risks of litigation, greenwashing accusations, or negative media campaigns. In such a case, the market should infer that $I_{it}^{Edit\ Worse}$ implies heightened liability or other expected cost concerns, a negative return prediction.

Taken together, active editing only leads to a positive return prediction if such editing were to be editing for reason of signaling a Transition Strategy ($I_{it}^{Edit\ Better}$) or a Status Quo Strategy ($I_{it}^{Edit\ Worse}$). Empirical evidence of this joint prediction would provide our first set of evidence of Roy optimal competitive sorting.

II.b. Confirmatory Factor Analysis Methodology

[17] In Appendix Table 1, we investigate whether our edit data are related to compensation.
[18] For an interesting investigation of financial reporting quality and litigation risk, please see Franke, Huang, Li, Wang 2024.

Our motivations and signing returns *predictions* methodology rationalizes the incentives for ESG edit management, aligned with the signing of returns predicted from the literature. However, it might be that active editing reflects some underlying attribute of the firm being enacted upon, not a motivation of editing per se. For example, perhaps editing happens when the firm embarks on an overall increase in operational precision. The reason a firm implements an operational precision action may cause a firm revaluation, not because of anything specific about fishing or hunting strategies. For example, the action may reflect a spring cleaning or corporate re-alignment throughout the corporate structure, not specific to the transition or status quo strategy of the firm. In any of these stories, any effect we may find in OLS estimations of equation (2) may be an artifact of an omitted causal variable.

The starting point for our second methodology is casting our setting in latent variable econometrics. We are trying to uncover the price relevance of a set of corporate strategies, where these strategies are latent variables. We utilize a novel edit management dataset coupled with confirmatory factor analysis (CFA) estimation techniques pioneered in labor economics by Heckman, Stixrud, Urzua (2006). We follow Dyck, Manoel, Morse (2022) in applying CFA to financial economics.

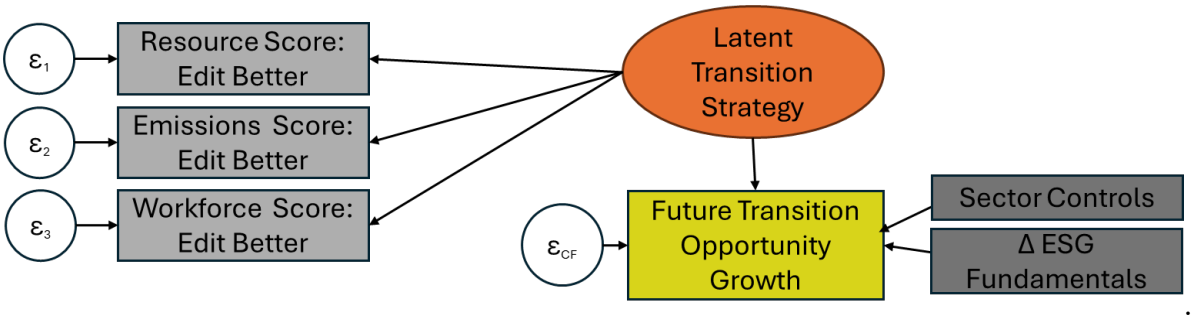
In labor economics, a typical example of a latent concern is that of estimation of wages, when ability is latent. Wages are a function of observables and latent ability. Ability cannot be seen, but a set of measurement variables including test scores and other performance indicators can be collected. The labor econometrician would like to use the shared variance among these performance indicators that captures ability, as in a principal component. Yet, this technique does not ascertain that any scoring of latent ability is orthogonal to a confounding economic effect. For example, test scores might be a function of school quality, which is in turn a function of family wealth rather than ability.

One solution, originally from Heckman, Stixrud, Urzua (2006), but applied widely in labor econometrics is CFA.[19] In CFA, only the shared variance of the measurement variables that maximally correlates with a confirmatory factor is kept as the latent ability score. For causal interpretation, the choice of the confirmatory factor should be guided by economics and subject to an exogeneity condition. We describe our methodology with the aid of the CFA graphic. We depict

[19] See Carneiro, Hansen, Heckman 2003; Hansen, Heckman, Mullen 2004; Heckman, Stixrud, Urzua 2006; Hanushek and Woessmann 2008; Cunha, Heckman, Schennach 2010; Heckman, Pinto, Savelyev 2013 for other examples.

the transition opportunity strategy (hunting) graphic, a similar graphic applies for status quo fishing. The graphic, once we add in the full set of relationships, will be the Structural Equation Modeling (SEM) Diagram for estimation.

The first piece is the confirmatory factor extraction, as in:



Basic SEM Diagram: Measurement Model

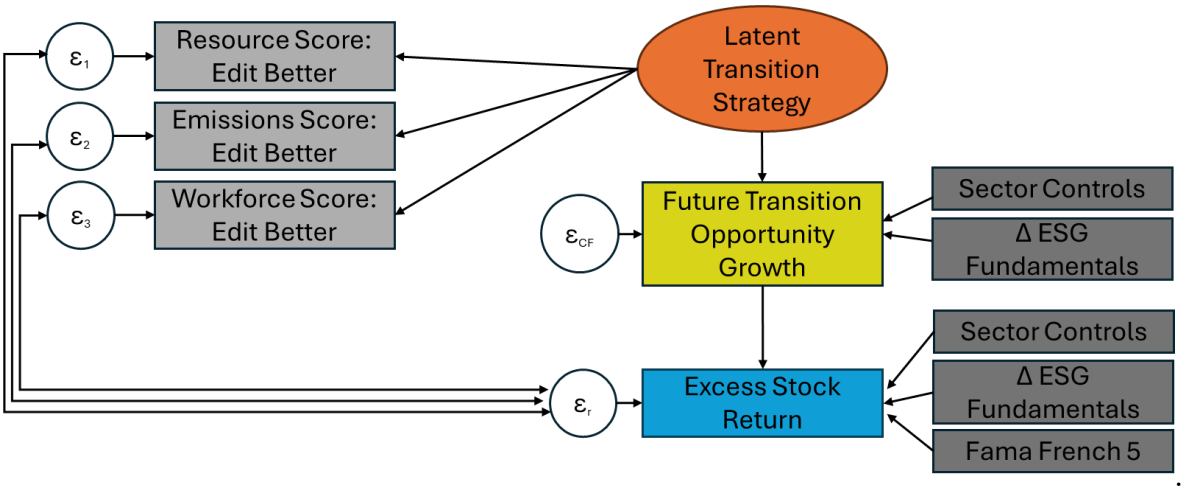
The latent variable appears as an oval. The direction of an effect is depicted with arrows pointing at a dependent variable. Thus, a (latent) corporate strategy toward hunting in transition opportunities affects the decision of managers to edit better ESG fundamentals used to construct the resource use ESG score, the emissions score, and/or the workforce score, each independently as in three estimations. Residuals for each part of the SEM are depicted by ε. These errors can be, and surely are, correlated.

The key to the CFA is in extracting the variation from the measurement edit better variables that maximally explains the yellow rectangle, the confirmatory factor. The way that the labor econometricians evolved to this structure is to imagine extracting a first principal component that is maximally correlated to the confirmatory factor. Because of the confirmation correlation requirement, the component extraction is not formally a principal component, but that thinking is helpful to understand the diagram.

We have labeled the confirmatory factor as Future Transition Opportunity Growth. The timing is important. We have in mind that a firm may decide on a strategy toward transition opportunities. Later, the market can see fruits from that strategy, as the firm enacts growth efforts toward that strategy. Our CFA extraction picks up only the edit actions that maximally explain this future growth (organic and by acquisition) toward transition opportunities. We control for sector effects and the change in the ESG fundamentals in this estimation to allow this maximal correlation

to be orthogonal to the change in ESG fundamentals (realized in the current time) and the sector in which a firm operates.

We will return to the exogeneity conditions needed momentarily, but we first add in the rest of the SEM diagram, as follows:



Complete SEM Diagram: Full Structural CFA

Once we have extracted the latent strategy (i.e., simplifying our language from latent transition strategy extracted from edit that maximally explains future transition growth), we use this variable in an estimation of excess stock returns via a five factor Fama-French model (Fama and French 2015), again including the change in ESG score fundamentals and sector controls.

With this full SEM Diagram of the CFA structure, we now need to consider the exogeneity assumptions. We start with what we do not need to assume. The two-way arrows connecting error terms depict the correlations allowed by the SEM, under the CFA assumptions for causality of Heckman, Stixrud, Urzua (2006).

We do not need to assume that the residual of the edit variables variation not extracted in the CFA are orthogonal to returns. Errors ε_1, ε_2, and ε_3 can be correlated with ε_r. This property of the CFA was the objective of our second methodology. We were concerned that active editing might correlate with some omitted operational precision (or other corporate governance attribute), driving the returns results. Here, that possibility does not hinder us from interpreting the latent strategy extraction, assuming the other exogeneity assumptions hold.

The first exogeneity condition is that ε_{CF} should be uncorrelated to $\varepsilon_{r..}$[20] The future transition growth variable component not used to extract the latent strategy cannot predict unexplained components of stock returns. We appeal to the timing of our setup. As we describe more fully in the data section, our edit management variables are defined at two-week intervals, within the period of September 2020 until early January 2021. We measure future growth via variables covering a future period of 2021-2023.

The violation to this assumption would be that there is a systematic correlation between firms' two-week returns (residualized of the Fama-French factors, sector, and ESG fundamentals) in fall-winter 2020 and predicted future acquisition or organic growth in either transition or status quo endeavors over the next three years. Importantly any possible correlation that violates the exogeneity condition cannot be the latent strategy of the company to pursue transition opportunity growth. It is surely possible that current performance forecasts growth. We believe it must do so through firm strategy that gets enacted in the future. Nevertheless, we take up robustness to this possibility by including an investigation of growth strategies that fall not within transition or status quo measurements, in the *grey zone*. This grey strategy robustness check allows us to analyze whether we are simply picking up strategies for future growth.

The other condition is that ε_{CF} cannot correlate with the measurement variables' error terms ($\varepsilon_1, \varepsilon_2, \varepsilon_3$). This is a standard exclusion assumption in extracting the relevant variation as a latent variable.

III. Data and Descriptive Statistics

We focus on the energy, industrials & basic materials, and mining & metals sectors due to their oversized importance for the transition. They vary in context though with some sectors offering alternative business models (e.g., electric vehicles, renewable energy) and others needing to increase production of key transition ingredients such as rare earth elements.

III.a. Editing of ESG Scores Data

We downloaded the LSEG ESG fundamentals data for the complete universe of rated companies from LSEG Workspace nine times over the course of three days in a two-week rhythm

[20] The insignificant correlations are -0.006 (p-value of 0.411) for the baseline transition and 0.045 (p-value of 0.215) for the baseline status quo.

starting on the week of September 9, 2020, and ending on the week of January 17, 2021.[21] We identify edits if there is a change between the ESG fundamentals of a particular firm from one download to the next. This ESG fundamentals edit management interacts immediately with algorithmic coding and API downloads of ESG fundamentals from market users, making the timing of ESG edits we observe immediately of market relevance.[22]

We focus on three ESG category scores that are of particular interest in measuring climate strategy: Resource Use, Emissions, and Workforce[23], defined by LSEG [24] as follows.

1) "[The] Resource use category score reflects a company's performance and capacity to reduce the use of materials, energy or water, and to find more eco-efficient solutions by improving supply chain management."
2) "[The] Emission category score measures a company's commitment and effectiveness towards reducing environmental emission in the production and operational processes."
3) "[The] Workforce category score measures a company's effectiveness towards job satisfaction, healthy and safe workplace, maintaining diversity and equal opportunities, and development opportunities for its workforce."

As shown in Table 1, we observe 2,149 edits resulting in an improvement to a firm's ESG fundamentals in these three category scores and 1,632 edits resulting in worse ESG fundamentals. These edits were made by 1,738 of the 8,031 firms in our sample. Industrial base firms that edited (did not edit) their ESG fundamentals are as follows: 98 (266) energy firms, 373 (1,039) industrials & basic materials firms, and 100 (197) mining & metals firms. 1,167 firms in all other sectors

[21] There was a four-week period between the seventh and eighth download due to the Christmas break. We chose this time period to avoid the methodological change announced by LSEG in April of 2020 (Refinitiv 2020). For an in depth discussion of how firms respond to methodological changes in how ESG ratings are calculated, please see Cornaggia and Cornaggia (2023).

[22] Our argument is consistent with the efficient market hypothesis from Fama (1970) and is based on the observation that large investment firms with actively or passively managed funds incorporate raw ESG data from different ESG rating agencies in their investment decisions.

[23] We view the workforce as a critical component of any transition or status quo growth strategies. Others have also examined the intersection of climate and the workforce: Heal and Park (2016) provide an overview of how climate change can affect the workforce; Curtis and Marinescu (2022) provide evidence on the creation of green jobs; Hanson (2023) delves into labor market effects from the energy transition; Maestas, Mullen, Powell, Von Wachter, Wenger (2023) investigate workers non-pecuniary job characteristics in a non-climate context; and Curtis, O'Kane, Park (2024) investigate how workers move from dirty to green jobs.

[24] These definitions are from the LSEG Workspace platform.

edited their ESG fundamentals while 4,791 firms in all other sectors never edited their ESG fundamentals.

III.b. Market and Corporate Data

We use financial data from LSEG, to match our sample of LSEG's ESG rated universe. We line up returns data as you would in an event study, i.e., we take the closing price from the last trading day before a download began and the closing price from two weeks later. This window allows us to capture the price effect triggered by the fundamental ESG data editing. We start with the universe of LSEG's rated firms, a total of 10,246 unique firms, and remove delisted firms and other firms with static prices for five consecutive trading days. We focus on log biweekly returns, covering eight two-week periods from September 25th, 2020, to January 29th, 2021. We download daily Fama-French factors from Kenneth French's data library,[25] to implement the Fama-French (2015) five-factor model of returns at the global level.

Table 2 reports summary statistics of the two-week returns, and Fama-French factors used in our analysis. The average two-week return across all firms in our sample is 2.80% with a wide distribution evidenced by a standard deviation of 9.41%. The average two-week returns for the base industrial sectors are larger than the average firm's return with energy firms leading the way at 4.66%, followed by mining & metals firms at 3.09%, and industrials & basic materials firms at 2.83%. The standard deviation of returns of energy firms (14.50%) and mining & metals firms (10.67%) is higher than the average firm's return deviation while that of industrials & basic materials firms is slightly lower (8.96%). The average excess market return (1.85%) is also lower than that of the average firm in our sample and has a tight distribution evidenced by its standard deviation (2.27%). The SMB, HML, and CMA factor loadings are all positive and small on average with SMB being the largest at 1% followed by HML at 0.72% and CMA at 0.15%. RMW is the odd factor out at -0.87%. The factor loading standard deviations range from a high of 3.44% (HML) to a low of 1.09% (SMB).

III.c. Environmental Policy Stringency Data

Our second objective outlined in the methodology is to explore the extent of regulation's effect on unwinding the competitive sorting of hunters hunting and fishers fishing. We utilize data

[25] https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/Data_Library/f-f_5developed.html

from the 2020 OECD country-level EnvPS index for this investigation.[26] The structure of the weighting of scores in the creation of the EnvPS index is described in Botta and Koźluk (2014).[27] We subdivide firms into high and low EnvPS based on sorting around the median EnvPS index, as shown in Appendix Table 2. The higher stringency countries are European (many EU countries, UK, Switzerland, Norway) plus east Asia (Japan, South Korea, and China). The lower stringency countries include the U.S. and Canada, some European countries (Ireland, Greece, etc.) plus the BRICS, and Australia.

III.d. Future Growth Data and Confirmatory Factor

Our last piece of data is the measure of future growth of a firm toward transition or status quo strategies that will serve as the confirmatory factor. Because we are interested in both organic growth and growth by acquisition, we create a synthesizing variable. We have four variables of interest for status quo and transition investment – a revenue-based measure of organic growth, a 0-1 M&A measure of growth by acquisition (a. horizontally and b. vertically), and a market perception of growth opportunity measure from the Inflation Reduction Act (IRA) passage. We describe each of these in turn.

Transition M&A are defined as M&A of acquiring firms with 3-digit primary SIC codes in industries with growth opportunities in IRA relevant activities.[28] For status quo M&A SIC codes, we use the 'dirty industry' classification from Greenstone (2002) and Cui and Moschini (2020) and extend their dirty industry definition to include further fossil fuel SIC codes since their definition focuses on firms with high SO_2, CO, O_3, and TSPs. Our final definition accounts for 39 3-digit SIC codes.[29] This dirty industry classification is restrictive in the sense that only certain industrial base sectors will have M&A in these 3-digit SIC codes. In both measures, we capture these activities from 2021-2023 and let the variable equal one if a firm had a strategy acquisition in any of these years. We differentiate between vertical acquisitions, acquiring firms with the same

[26] Wang, Zhong, Zhou, Hoepner, Rogelj (2025) use the OECD EnvPS index when investigating the role various carbon transition policies have in determining energy firm's stock returns.
[27] https://www.oecd.org/economy/greeneco/how-stringent-are-environmental-policies.htm.
[28] IRA relevant industries are defined as these 3-digit sic codes: 071, 072, 081, 083, 085, 101, 102, 103, 106, 108, 109, 132, 144, 149, 154, 161, 162, 171, 173, 176, 179, 243, 261, 262, 263, 281, 286, 291, 308, 321, 324, 327, 329, 331, 332, 333, 334, 335, 336, 343, 344, 346, 349, 351, 352, 353, 354, 355, 356, 358, 359, 361, 362, 367, 369, 371, 379, 382, 411, 415, 417, 491, 493, 508, 509, 516, 517, 562, 737, 871, 873, 951, 953
[29] 3-digit brown SIC codes: 122, 131, 132, 138, 261, 262, 263, 286, 291, 301, 302, 305, 306, 308, 321, 322, 323, 324, 325, 326, 327, 328, 329, 331, 332, 333, 341, 342, 343, 344, 345, 346, 347, 348, 349, 353, 461, 492, 517

3-digit SIC code as their target firms, and horizontal acquisitions, firms with different 3-digit SIC codes than their target firms. As seen in Table 2, more firms made vertical (7.04% of the sample) and horizontal (12.15%) transition acquisitions than vertical (2.02%) and horizontal (2.47%) status quo transitions.

For transition revenues, we employ the green revenue data from FTSE available in LSEG Workspace[30] to construct a percentage of revenues that are green relative to overall revenues. For status quo revenues, we use product segment revenue from LSEG to determine the percentage of a firm's revenue from product segments with a 3-digit SIC code in the augmented Greenstone (2002) SIC code list and fossil fuel revenue percentages from LSEG.[31] We then average these revenue percentage variables across the years 2021-2023. The average firm in our sample has transition revenues of 7.3% and status quo revenues of 5.55% but larger median revenues of 19.81 and 20.96%, respectively, coupled with 75th-percentile revenues of 1.39% and 0% point to a skewed distribution, where a subset of firms have either green or status quo revenues, while the majority of firms in our sample do not.

To capture the market's perception of transition and status quo growth we leverage the U.S. Congress's passage of the IRA as a shock to the stock markets on July 27th, 2022. For a more in-depth discussion of this event's effects on stock prices and why this event can be considered a shock[32], please see Bauer, Offner, Rudebusch (2023). This shock allows us to determine how the market views individual firm's growth position in relation to the IRA. For firms with known transition strategies, the IRA shock should be positive in returns. For status quo firms, the prediction is ambiguous. On one hand, the IRA would favor more transition investment, but some of the provisions supported status quo efforts for the interim, were sector-wide in implications, and/or represented a resolution of climate policy without a penalty-based regulatory updating of the future, at least for the United States.

We take the simple returns from the trading day after the IRA was announced (the S&P 500 rose 1.21% that day and the MSCI World rose 1.27%) and standardize them at the 2-digit SIC

[30] For an in depth analysis of this revenue data, please see Klausmann, Krueger, Matos (2024).
[31] LSEG Workspace codes: SOPRDP160, SOPRDP156, SOPRDP164, SOPRDP152, SOPRDP168, SOPRDP172, SOPRDP136, SOPRDP140
[32] Speaking to the surprising nature of the IRA passing, the New York Times released an article on July 28th, 2022 with the title "What the Surprise Spending Deal Means for Climate Change" https://www.nytimes.com/2022/07/28/climate/manchin-deal-spending-climate.html USA Today released as similar article emphasizing the unexpectedness of the act passing https://eu.usatoday.com/story/news/2022/07/28/whats-inflation-bill-manchins-reversed-attempt-fight-climate-change/10175099002/

code level. This standardized IRA stock reaction variable has a mean of 0, a standard deviation of 1, a median of -0.03%, and 25th and 75th percentiles of -0.44 and 0.42, respectively. To better understand the relevance of the IRA passing on stock returns, we include summary statistics of the simple return following the IRA announcement for the industrial base sectors, and all other sectors both in the United States and the rest of the world in Appendix Table 3. Both the mean and the median returns for each sector are positive in both the United States and the rest of the world. The mean returns for the industrial base sectors are larger than the mean return for all other sectors (except for the slightly smaller energy return in the United States). These across-the-board positive returns point to the importance of the resuscitation of the IRA for firms.

Our interest is in compiling the future transition or status quo growth variables as a measure of realization of a strategy. We could simply make an index, but the variables are not parametrically comparable. Thus, we take the first principal component of the IRA reaction, organic growth, and growth-by-acquisition. We make three robustness variables; one that focuses only on growth by acquisition (the IRA and M&A variables), a second variable that focuses only on organic growth (the IRA and revenues variables), and a third variable that focuses on growth without the IRA variable (M&A variables and revenues variables). The first eigenvalue for the transition (status quo) score ranges from 1.0509 to 1.5073 (1.0020 to 1.4988) and explains on average 41.6% (39.0%) of the variables' variance.

IV. Results

We look for evidence of value-relevant competitive sorting toward climate strategies, first in OLS estimations under the signing motivations methodology and then in a CFA setup. Along the way, we study how our findings might vary in high and low environmental regulation countries, to see the extent regulation may be impacting competitive sorting. We estimate results for all sectors, but primarily focus on the industrial base sectors, where we can understand competitive sorting in terms of use of processes and inputs directly.

IV.a. Signing Motivations Results

Table 3 present OLS estimations of the impact of $I_{it}^{Edit\ Better}$ and $I_{it}^{Edit\ Worse}$ on a panel of eight sets of two-week returns, where we control for the five Fama-French factors, Δ ESG Fundamentals, and sector fixed effects. For the odd columns, the Edit variable (and its interactions

with industries as denoted down the rows) is defined as $I_{it}^{Edit\ Better}$, and for the even columns, $I_{it}^{Edit\ Worse}$. Columns (1) and (2) begin our analysis with the sample of all countries. We then divide the countries into low environmental policy stringency (Low EnvPS) and high environmental policy stringency (High EnvPS) in columns (3)-(4) and (5)-(6), respectively.

Estimates on Fama-French factors are in line with expectations. Note that the change in ESG fundamentals is never a significant predictor of returns. This non-result is not surprising given the conflicting predictive power of ESG information found in the literature.[33]

We now can ask whether the Table 3 results line up with value-relevant competitive sorting of climate strategies or any other of the stories for active editing of EGS data. Column (1) studies the effect of $I_{it}^{Edit\ Better}$. We find that the act of editing better is penalized in the average industry by the market. This result is consistent with the costs associated with complying with societal pressures. When a company reveals that it is actively updating to have better ESG scores, the market perceives a valuation cost of 79 basis points. The societal pressures motivation suggests that the cause of this devaluation is a direct compliance and climate adaptation cost or a reallocation of effort inside the firm relative to that which is value maximizing to the firm. Turning to columns (3) and (5), we find that this effect is being driven by low EnvPS countries. This finding may be puzzling in that one might expect that high environmental regulation strategies have higher societal pressure costs. This indeed might be the case, but our identification is a sorting of companies based on active editing. This active editing may not be a signal of societal pressures in high EnvPS countries if firms have borne compliance costs already. A final note on the societal pressure result is that it is beyond our scope here to understand the aspects of these cost, but important in the macroeconomy in speaking to the question of who bears / who should bear the incidence of firm-level and societal-level costs associated with climate adaptation and mitigation.

We do not find any effect of $I_{it}^{Edit\ Worse}$ in column (2), but we do find that $I_{it}^{Edit\ Worse}$ has a negative effect on firm valuation on average across firms in all industries in low EnvPS countries. Our signed motivation methodology stories would interpret this result as being consistent with the litigation and uncertainty motivation. The story is that if a firm realizes that its ESG fundamentals are too high relative to the truth, it will actively edit the data downward to avoid the cost of litigation or other costs associated with a bad ESG event occurring. The market rationale takes

[33] For example, Hartzmark and Sussman (2019); Galema, Gerritsen (2022); Pástor, Stambaugh, Taylor (2022); Cauthorn, Dumrose, Eckert, Klein, Zwergel (2023); Starks (2023)

such an edit as implying that the firm chooses to reveal this information, even though it could stay quiet, as a negative signal as to the size of the exposure of the company to such risks. Given that 67 percent of the low EnvPS observations are from the United States, this argument is quite intuitive.

Thus far, our evidence has little to say about competitive sorting. The first evidence for competitive sorting comes from column (6). In high EnvPS countries (consider, for example, northern Europe and parts of East Asia), we find a positive coefficient on $I_{it}^{Edit\ Worse}$. The interpretation of this result under our signing motivation methodology is one of evidence supporting a competitive sorting toward status quo strategies. It perhaps is intuitive that such a result might be applicable in countries where firms are pushed by policy to be hunters (transition strategy firms), perhaps in a way that is optimal for society but suboptimal for the shareholders of a firm with the possibility of being optimal fishers.

When we focus on the base industrial sectors interactions with active editing, however, the positive effects which would be indicative of the competitive sorting emerge. For energy sectors, we find evidence consistent with competitive sorting, but only for transition climate strategies (i.e., for $I_{it}^{Edit\ Better}$) and only in low EnvPS economies. We do not speak to the magnitude of this coefficient per Erickson and Whited (2005)'s arguments on signing-based methodologies. Furthermore, we do not interpret this evidence as more than suggestive until we can analyze the CFA results. However, the story that the 0.0212 coefficient on Energy * Edit for column (1) – and similarly for column (3) – tells is that for energy companies, editing better as a signal of a transition climate strategy cause a positive market revaluation. For industrials & basic materials, we find a similar story: editing better as a signal of a transition climate strategy also cause a positive market revaluation in column (1) and (3).

We find no such effect for metals & mining. We do, however, find evidence that metals & mining in low EnvPS countries (column (3)) are exposed more to societal pressures and to the litigation and uncertainty risks story (column (4)). Possibly because the consequences of risks for adverse events in mining implies high costs to the firm, the magnitude of the coefficient on mining & metals is large relative to the level effect of edit in column (4).

IV.b. CFA-SEM Results

A potential problem with a causal interpretation of competitive sorting from our signed motivations methodology could be the existence of a confounding factor. We have given the idea of 'operational precision' as a possible confounder, but other causes could exist. In this story, the editing happens not because the firm is specifically thinking of its climate strategy, but because it is redoubling efforts in all firm operations towards precision. Our CFA methodology tackles this confounding by using the confirmatory factor approach via the future growth confirmatory variables.

IV.b.1. Confirmatory Scoring

Tables 4 and 5 present the CFA results estimated through structural equation modeling for the transition strategy (Table 4) and status quo strategy (Table 5). In each table, Panel A presents the extraction of the scorings that are the common variance of Resource, Emissions and Workforce editing ($I_{it}^{Edit\ Better}$ for Table 4 and $I_{it}^{Edit\ Worse}$ for Table 5) that maximally explains the future growth confirmatory variable.[34] The confirmatory factor varies by column. Column (1) presents the future growth agglomeration variable, using all growth measures described in the data section. For robustness, we also analyze growth agglomerations using only the IRA reaction variable and growth by acquisition (column (2)), only the IRA reaction variable and organic growth (column (3)) and both growth variables without the IRA reaction (column (4)).

Interpretation of Panel A is important before we move to main CFA results in Panel B. Panel A is akin to the relevance criteria if one were estimating an IV specification. It must be that the common components of the edit variables have a common component, such that the growth variable statistically significantly explains a common component edit variation statistically related to some or all the edit variables. Because of the setup of the system, the loadings displayed in Panel A should be positive (in both Table 4 and Table 5) and significant for at least some of the edit variables. The economic size of the loadings is not important, but the relative size among edit variables is important.

For Table 4 (hunting in transition opportunities), we find that all loadings have high levels of statistical significance. The emissions editing loading is the strongest in magnitude, consistently across columns. Resource use and workforce score edits have more similar loadings in magnitude,

[34] Sectoral effects are removed from the estimation of these loadings.

perhaps a surprise but reflecting the importance for workforce for transition strategies. For Table 5 (fishing in status quo growth), we find weaker statistical significance (5% confidence levels rather than 1% in Table 4). The weakest estimation is that of column (4), without the IRA reaction variable. Emissions edits again carry the largest scoring impact, with a steeper gradient to resource use scoring and then workforce edits.

IV.b.1. CFA-SEM Main Results

Following the CFA-SEM Equation Diagram in the methodology, we simultaneously take the climate strategy scoring variable ('latent strategy') as the dependent variable in a return estimation. Panel B presets the simultaneously regressed return estimations where we control for the five Fama-French factors, Δ ESG Fundamentals, and sector fixed effects and focus on the extent to which (and sign) our latent strategies predict returns. Under our assumptions, a positive sign on a strategy (either fishing or hunting) would be evidence of competitive sorting. We estimate the system simultaneously via maximum likelihood.

Our first result is a non-result. We do not find that a latent transition (Table 4) or status quo (Table 5) strategy leads to return impact when looking at industries on average. We find no evidence of competitive sorting in this CFA setup without focusing on specific industries.

However, when we focus on the industrial base of the economy, our evidence draws a different picture. For the energy sector, we find statistically significant and economically meaningful evidence that the market values a strategic positioning in the transition economy. Under the CFA, energy firms with a latent transition strategy exhibit a significant +52-basis point stock return in the two-week period following the edit information (Table 4, column (1)). Comparing this result across columns (2) and (3), the evidence points to organic growth being the driver of such competitive sorting toward transition opportunities. Importantly, from Table 5, column (1), we find that energy firms that competitively sort towards status quo opportunities also have a positive +24-basis point revaluation when the edit information emerges. This competitive sorting seems to be more associated with acquisitions, presumably for fossil fuel endeavors.

Likewise, we find competitive sorting in mining & metals. For mining & metals firms, latent strategies toward transition growth result in an 83-basis point increase in valuation, and latent strategies toward status quo opportunities result in a 77-basis point positive return. The mining & metals hunting result toward transition growth holds in both growth-by-acquisition

growth (column (2), Table 4) and organic growth (column (3)) confirmatory specifications. For the status quo specification, the positive competitive sorting is driven by acquisition strategies.

Finally, in industrials and basic materials, we find competitive sorting toward the status quo economy. Industrials that have a climate strategy toward status quo positioning exhibit an 18-basis point abnormal two-week return. We find some weaker evidence that industrials competitively sort toward transition, but only when we focus on the organic growth confirmatory factor without M&As.

IV.b.2. Robustness of CFA-SEM Main Results

Tables 6, 7 and 8 reproduce the baseline specification of column (1) of Tables 4 and 5 for transition and status quo strategies respectively, with robustness tests. While we believe the workforce is key to the transition economy, arguments could be made that the workforce is not normally viewed as an environmental indicator. Furthermore, the edits to the Workforce score indicators are more frequent than for the Emissions or Resource Use score indicators. Consequently, we chose to exclude edits to the Workforce score indicators from the list of latent transition and status quo strategy measurement variables as a robustness test. Table 6 presents these robustness results. Column (1) contains the results for the transition strategy and column (2) those of the status quo strategy. The latent strategy loadings in Panel A are all significant and of similar magnitudes to those in Panel A of Tables 4 and 5. The return estimations are also robust.

Next, in columns (1) of Tables 7 and 8, respectively, for latent strategies of transition hunters and status quo fishers, we include country-level fixed effects. It could be that the coefficients might reflect a geography that lends itself to more editing (because of litigation risk or societal requirements) and this country happens to have high growth and performance during this period. We do not find this to be the case: our results are robust to country fixed effects. In columns (2) of Tables 7 and 8, we limit our edit variable to intensive margin edits to address concerns that extensive margin edits[35] might confuse our signaling variable. Again, our results do not change. Finally, in columns (3) of Tables 7 and 8, we add in the interaction of the ESG

[35] Intensive margin edits capture if an ESG fundamental was edited to the better or worse (based on polarity) between downloads. Extensive edits capture if an ESG fundamental changed from an NA to a value (edit better) or a value to an NA (edit worse) between downloads. The argument could be made that not all deletions are negative and not all additions are positive, while we argue that reducing the amount of information available can reasonably be assumed to be negative, we nevertheless remove extensive margin edits in robustness checks.

fundamentals changes with the sectors. It could be that our specification from Tables 4 and 5 are picking up valuation implications of changes in ESG fundamentals over the concurrent period rather than strategy signals. We find that the results from Tables 4 and 5 do not change.

IV.b.3. CFA-SEM Results across Environmental Regulation Regimes

Our second objective was to explore any potential implication of environmental regulation on Roy-like sorting. For instance, it could be that regulation forces firms to move toward transition opportunities, thus hindering competitive sorting that would maximize firm valuations for some. Of course, this outcome might be optimal for the social planner perspective. Our job here is just to analyze whether it is happening. We spilt countries by the stringency of environmental policies, to isolate settings where the regulatory setting might induce more transition growth or discourage status quo strategies using the OECD's country-level Environmental Policy Stringency (EnvPS) index, as outlined in the data section, with the country sort list appearing as Appendix Table 2. Then, we reproduce column (1) of Tables 4 and 5, by high and low EnvPS for transition and status quo strategies respectively in Tables 9 and 10.

We find that our energy results are entirely driven by firms in countries without high EnvPS. This might happen if firms in high EnvPS countries have a more consistent transition strategy induced by policy. They pool in the transition strategy and cannot enact status quo strategies. Thus, we find no effects. Similarly, when we look to industrials & basic materials, we find that the positive market valuation result from Table 5 of competitive sorting toward the status quo economy is driven by firms not in high EnvPS countries. In the United States for example, a company in energy or industrials & basic materials would be rewarded with 38 basis points and 28 basis points, respectively, in stock appreciation when information arrives that this company has a competitive advantage in status quo growth strategies, interpreted in our CFA model. The upside on the transition side is higher in the energy sector. In the United States, a company in energy would be rewarded with 72 basis points in stock appreciation when information arrives that this company has a competitive advantage in transition growth, interpreted in our CFA model.

In mining & metals, however, we find that firms in both high and low EnvPS can enact climate transition strategies, differentiating themselves in a way that induces a positive return. However, firms in the high stringency EnvPS countries cannot enact value-inducing status quo strategies. We find that the competitive sorting toward status quo growth is done in countries in

the low EnvPS group, including important mining countries of the United States, Australia, and Russia. Furthermore, this mining & metals status quo positioning has the largest return impact of any of our industrial base CFA results. Firm competitive sorting toward the status quo in non-stringent countries results in a 109-basis point revaluation in our estimates.

IV.b.4. CFA: Grey Zone Strategies Validation Results

Another way to validate our finding is by exploring a further implication from Roy sorting. Under Roy sorting information arrivals, our results imply that for low environmental stringency countries, the industrial base sector firms that do not sort into a strategy may perform worse. Thus, we consider these firms in the grey zone by reconstructing our CFA analysis focusing on the large set of firms that do not edit. We exclusively study the low environmental stringency countries, which includes the United States, because the evidence for competitive sorting in high environmental policy counties do not exhibit much Roy sorting in our estimate. As described in the methodology, this grey zone analysis also allows us to provide a robustness to the possibility that our growth confirmatory factor is simply picking up firms that have returns that forecast future M&A, that is not due to a strategy of transition or status quo growth.

Our confirmatory factor is the first principal component of grey zone revenue and grey zone M&A. Grey zone revenues are defined as all non-transition and status quo revenues. As Table 2 reports, the average firm in our sample has 87.15% grey zone revenue averaged in the three years 2021-2023. Grey zone M&A is defined as all M&A activity not in the transition or status quo 3 digit SIC codes. Twelve and fourteen percent of firms have vertical and horizonal grey zone M&A in those forward years. The first eigenvalue for the grey zone score is 1.2199 and explains 40.7% of the variables' variance.

Table 11 presents the results of the grey zone CFA analyses, testing the effect of a grey zone strategy on 2-week stock returns. We measure grey zone growth strategy as the variation explaining the choice to not edit the resource, emissions or workforce scores that is confirmed by future grey zone growth, whereby our confirmatory variable is defined via future grey zone vertical and horizontal M&As and grey zone revenues. If we are capturing timing effects from a general future growth strategy in our main analysis, we would expect a positive return signal related to grey zone growth similar to the return signals seen in our transition and status quo strategies. If the

grey zone firms reflect a lack of competitive sorting when competitive sorting information arrives, we would instead expect a negative return implication.

We find highly significant negative return implications. Interpreting column (1), the evidence suggests that when evidence arrives placing a firm in the grey zone for its growth strategies, the firm devalues by 65 bps if it is in the energy sector, by 23 bps if in the industrial & basic materials sector, and by 121 bps if in the mining & metals sector. Furthermore, in column (4), the results are robust to just focusing on grey revenues as a percentage of the firm total revenues. In columns (2) and (5), we introduce country fixed effects, and our results hold. Finally, as a further placebo test, we interact firms in the healthcare sector[36] with the latent grey zone growth strategy and find no return implications. These validations suggest that our transition and status quo strategy results are unlikely to be simply picking up a confounding future growth unrelated to firm's Roy sorting strategy. Devaluation of grey zone growth strategies offers strong contextual evidence for the interpretation of our transition and status quo climate strategy results. We infer that Roy sorting is valued by the market in transition critical sectors.

V. Conclusion

We set out to investigate whether firms self-sort into climate transition and status quo strategies along the lines of Roy's (1951) hunters and fishers. Given the intra and inter-industrial restructuring required to transition to a net-zero economy, our question is important in understanding the value propositions for firms, on both sides. While the costs and risks borne by industrial base firms in response to decarbonization mandates have been center stage for some time, our research highlights the crucial yet overlooked dimension of the opportunities emerging from Roy-like sorting in the context of the decarbonizing economy. In the absence of stringent regulation, we expect firms to either sort into a status quo strategy where firms maximize status quo investments or into a climate transition strategy where firms maximize climate opportunities. We use this simple construct to uncover latent climate strategies in a CFA-SEM framework, using concurrent manual changes in LSEG ESG fundamentals as a measurement variable and future

[36] A sector of little meaning in the realm of climate strategies according to the US Sustainable Investment Forum (US SIF Foundation 2024) while the sector also rose by circa 20% during our sample period. In an unreported further placebo test, we replace healthcare with consumer products and services, the results do not change.

strategy outcomes such as status quo or transition M&As and organic growth as respective confirmatory variables.

In the empirical analysis, we focus on three key ESG categories—Resource Use, Emissions, and Workforce—within the key industrial base sectors, namely energy, industrials & basic materials, and mining & metals. Our findings reveal compelling evidence of the possibilities of competitive sorting. We find evidence of climate transition and status quo strategies leading to positive revaluations in the three key industrial base sectors while grey zone strategies receive negative revaluations. Hence, we conclude that Roy-like sorting exists. It is valued by the market. In contrast, strategies with less clarity on the brown to green spectrum are discouraged by the market.

Our second main piece of evidence concerns environmental stringency. We find evidence consistent with the story that high environmental regulation may cause a pooling of firm strategies toward transition opportunities, hindering value-relevant competitive sorting, but perhaps inducing other social planner goals (e.g., mitigating climate change). Given that the OECD's high environmental policy stringency group includes core European Union countries such as France and Germany where stringent climate finance regulations such as the Green Taxonomy or the Corporate Sustainability Reporting Directive have recently forced corporate actions, our results can serve to remind regulators that standardization via regulation may have considerable upsides, but it also decreases variation in outcomes and thereby opportunities for the skilled. Policies can be a crucial factor in determining the cost benefit analysis between corporate strategies towards the climate transition economy or the status quo economy.

Our research contributes valuable insights into the dynamic relationship between firms' climate strategies, market signals, and their impact on shareholder value within the context of a transitioning global economy. As the world moves towards a net-zero economy, understanding the intricate dynamics of climate strategies becomes increasingly essential for both firms and investors navigating this complex terrain.

References

Angelis, T., de, Tankov, P., & Zerbib, O. D. (2023). Climate impact investing. *Management Science, 69*(12), 7669–7692.

Barrett, S., & Stavins, R. (2003). Increasing participation and compliance in international climate change agreements. *International Environmental Agreements: Politics, Law and Economics, 3*(4), 349–376.

Barber, B., Morse, A., & Yasuda, A. (2021). Impact investing. *Journal of Financial Economics, 139*.

Bauer, M. D., Offner, E. A., & Rudebusch, G. D. (2023). The effect of U.S. climate policy on financial markets: An event study of the Inflation Reduction Act. *CESifo Working Paper* No. 10739. Munich: Center for Economic Studies and Ifo Institute.

Beccarini, I., Ferraro, F., Guisande, D. P., & Hoepner, A. G. F. (2024). Soothing whispers: Shareholder engagement in the wake of stakeholder controversies. Working Paper, IESE Business School.

Berg, F., Fabisik, K., & Sautner, Z. (2021). Is history repeating itself? The (un)predictable past of ESG ratings. Available at SSRN.

Beyene, W., Delis, M., & Ongena, S. (2024). Too-big-to-strand? Bond versus bank financing in the transition to a low-carbon economy. *Swiss Finance Institute Research Paper* No. 24-43.

Blickle, K., Sastry, P., & Morse, A. (2025). Specialized banks solve corporate short-termism: Evidence from transition investment. Working Paper.

Boer, L., Pescatori, A., & Stuermer, M. (2023). Energy transition metals: Bottleneck for net-zero emissions? *Journal of the European Economic Association.*

Bolton, P., & Kacperczyk, M. (2021). Do investors care about carbon risk? *Journal of Financial Economics, 142*(2), 517–549.

Bolton, P., Kacperczyk, M. T., & Wiedemann, M. (2023). The CO2 question: Technical progress and the climate crisis. Working Paper.

Botta, E., & Koźluk, T. (2014). Measuring environmental policy stringency in OECD countries: A composite index approach. OECD (No. 1177).

Cauthorn, T., Dumrose, M., Eckert, J., Klein, C., & Zwergel, B. (2023). Rating changes revisited: New evidence on short-term ESG momentum. *Finance Research Letters, 54*, 103703.

Cauthorn, T., Klein, C., Remme, L., & Zwergel, B. (2023). Portfolio benefits of taxonomy-oriented and renewable European electric utilities. *Journal of Asset Management, 24*, 558–571.

Carneiro, P., Hansen, K., & Heckman, J. (2003). Estimating distributions of treatment effects with an application to the returns to schooling and measurement of the effects of uncertainty on college. Working Paper.

Chiu, W.-C., Hsu, P.-H., Li, K., & Tong, J. T. (2024). Environmental scandals and green products. Working Paper.

Cohen, L., Gurun, U., & Nguyen, Q. (2023). The ESG-innovation disconnect: Evidence from green patenting. Working Paper.

Cohen, S., Kadach, I., Ormazabal, G., & Reichelstein, S. (2023). Executive compensation tied to ESG performance: International evidence. *Journal of Accounting Research, 61*(3), 805–853.

Cornaggia, J., & Cornaggia, K. (2023). ESG ratings management. Available at SSRN 4520688.

Cui, J., & Moschini, G. (2020). Firm internal network, environmental regulation, and plant death. *Journal of Environmental Economics and Management, 101*, 102319.

Cunha, F., Heckman, J., & Schennach, S. (2010). Estimating the technology of cognitive and noncognitive skill formation. *Econometrica, 78*(3), 883–931.

Curtis, E. M., O'Kane, L., & Park, R. J. (2024). Workers and the green-energy transition: Evidence from 300 million job transitions. *Environmental and Energy Policy and the Economy*, *5*(1), 127-161.

Curtis, E. M., & Marinescu, I. (2022). *Green energy jobs in the US: What are they, and where are they?* (No. w30332). National Bureau of Economic Research.

Darendeli, A., Law, K. K. F., & Shen, M. (2022). Green new hiring. *Review of Accounting Studies, 27*(3), 986–1037.

Davis, S. J., Lewis, N. S., Shaner, M., Aggarwal, S., Arent, I. L., Benson, S. M., ... Caldeira, K. (2018). Net-zero emissions energy systems. *Science, 360*(6396).

Dimson, E., Karakaş, O., & Li, X. (2015). Active ownership. *Review of Financial Studies, 28*(12), 3225–3268.

Dyck, A., Manoel, P., & Morse, A. (2022). Outraged by compensation: Implications for public pension performance. *Review of Financial Studies, 35*(6), 2928–2980.

Elfenbein, D. W., Hamilton, B. H., & Zenger, T. R. (2010). The small firm effect and the entrepreneurial spawning of scientists and engineers. *Management Science, 56*(4), 659–681.

Engert, S., & Baumgartner, R. J. (2016). Corporate sustainability strategy–bridging the gap between formulation and implementation. *Journal of cleaner production*, *113*, 822-834.

Epstein, M. J., & Roy, M. J. (2001). Sustainability in action: Identifying and measuring the key performance drivers. *Long range planning, 34(5),* 585-604.

Erickson, T., & Whited, T. M. (2005). Investment-cash flow sensitivity and proxy quality thresholds. Working Paper.

Faccini, R., Matin, R., & Skiadopoulos, G. (2023). Dissecting climate risks: Are they reflected in stock prices? *Journal of Banking & Finance, 155*, 106948.

Fama, E. F. (1970). Efficient capital markets. *Journal of finance*, *25*(2), 383-417.

Fama, E. F., & French, K. R. (2015). A five-factor asset pricing model. *Journal of Financial Economics, 116*(1), 1–22.

Franke, B., Huang, A. H., Li, R. Z., & Wang, H. (2024). Securities law precedents, legal liability, and financial reporting quality. *Review of Finance, 28*(2), 413–445.

Galema, R., & Gerritsen, D. (2022). ESG rating score revisions and stock returns. Available at SSRN 4218969.

Gantchev, N., Giannetti, M., & Li, R. (2022). Does money talk? Divestitures and corporate environmental and social policies. *Review of Finance, 26*(6), 1469–1508.

Giannetti, M., Jasova, M., Loumioti, M., & Mendicino, C. (2023). Glossy green banks: The disconnect between environmental disclosures and lending activities. Working Paper.

Giglio, S., Kelly, B., & Stroebel, J. (2021). Climate finance. *Annual Review of Financial Economics, 13*(1), 15–36.

Goldstein, I., Kopytov, A., Shen, L., & Xiang, H. (2021). On ESG investing: Heterogeneous preferences, information, and asset prices. Working Paper.

Gormsen, N. J., Huber, K., & Oh, S. (2023). Climate capitalists. Available at SSRN 4366445.

Green, D., & Vallee, B. (2024). Measurement and effects of bank exit policies. Working Paper.

Greenstone, M. (2002). The impacts of environmental regulations on industrial activity: Evidence from the 1970 and 1977 Clean Air Act Amendments and the Census of Manufactures. *Journal of Political Economy, 110*(6), 1175–1219.

Hansen, K. T., Heckman, J. J., & Mullen, K. J. (2004). The effect of schooling and ability on achievement test scores. *Journal of Econometrics, 121*(1–2), 39–98. https://doi.org/10.1016/j.jeconom.2003.10.011

Hanson, G. H. (2023). *Local labor market impacts of the energy transition: Prospects and policies* (No. w30871). National Bureau of Economic Research.

Hanushek, E. A., & Woessmann, L. (2008). The role of cognitive skills in economic development. *Journal of Economic Literature, 46*(3), 607–668.

Harford, J., Piotrowski, S., & Qian, Y. (2023). Geographic overlap, agglomeration externalities, and post-merger restructuring. *Agglomeration Externalities and Post-Merger Restructuring*.

Hartzmark, S. M., & Sussman, A. B. (2019). Do investors value sustainability? A natural experiment examining ranking and fund flows. *The Journal of Finance, 74*(6), 2789–2837.

Heal, G., & Park, J. (2016). Reflections—temperature stress and the direct impact of climate change: a review of an emerging literature. *Review of Environmental Economics and Policy*.

Heckman, J., Pinto, R., & Savelyev, P. (2013). Understanding the mechanisms through which an influential early childhood program boosted adult outcomes. *American Economic Review, 103*(6), 2052–2086.

Heckman, J. J., Stixrud, J., & Urzua, S. (2006). The effects of cognitive and noncognitive abilities on labor market outcomes and social behavior. *Journal of Labor Economics, 24*(3), 411–482.

Hege, U., Pouget, S., & Zhang, Y. (2022). The impact of corporate climate action on financial markets: Evidence from climate-related patents.

Hoepner, A. G. F., Oikonomou, I., Sautner, Z., Starks, L. T., & Zhou, X. Y. (2024). ESG shareholder engagement and downside risk. *Review of Finance, 28*(2), 483–510.

Huij, J., Laurs, D., Stork, P. A., & Zwinkels, R. C. J. (2021). Carbon beta: A market-based measure of climate risk. Available at SSRN.

Inderst, R., & Opp, M. M. (2025). Sustainable finance versus environmental policy: Does greenwashing justify a taxonomy for sustainable investments? *Journal of Financial Economics, 163,* 103954.

Kacperczyk, M., & Peydró, J.-L. (2024). Carbon emissions and the bank-lending channel. Working Paper.

Klausmann, J., Krueger, P., & Matos, P. (2024). The green transition: Evidence from corporate green revenues. Available at SSRN.

Kruse, T., Mohnen, M., Sato, M., & Pope, P. (2020). Green revenues, profitability, and market valuation: Evidence from a global firm-level dataset. Working Paper.

Kwon, S., Lowry, M., & Verardo, M. (2023). Firms' transition to green: Innovation versus lobbying. *European Corporate Governance Institute – Finance Working Paper, (921)*.

Li, Q., Shan, H., Tang, Y., & Yao, V. (2023). Corporate climate risk: Measurements and responses. Working Paper.

Maestas, N., Mullen, K. J., Powell, D., Von Wachter, T., & Wenger, J. B. (2023). The value of working conditions in the United States and implications for the structure of wages. *American Economic Review*, *113*(7), 2007-2047.

Mintzberg, H., & Waters, J. A. (1985). Of strategies, deliberate and emergent. *Strategic management journal, 6(3),* 257-272.

Morse, A., & Sastry, P. (2024). The economics of net zero banking. Working Paper.

Oehmke, M., & Opp, M. (2024). A theory of socially responsible investment. *Review of Economic Studies*. *Forthcoming*.

Pástor, L., Stambaugh, R. F., & Taylor, L. A. (2021). Sustainable investing in equilibrium. *Journal of Financial Economics, 142*(2), 550–571.

Pástor, L., Stambaugh, R. F., & Taylor, L. A. (2022). Dissecting green returns. *Journal of Financial Economics, 146*(2), 403–424.

Pedersen, L. H., Fitzgibbons, S., & Pomorski, L. (2021). Responsible investing: The ESG-efficient frontier. *Journal of Financial Economics, 142*(2), 572–597.

Pinnuck, M., Ranasinghe, A., Soderstrom, N., & Zhou, J. (2021). Restatement of CSR reports: Frequency, magnitude, and determinants. *Contemporary Accounting Research, 38*(3), 2376–2416.

Porter, M. E. (1996). What is strategy?.

Refinitiv. (2020). Refinitiv enhances ESG scoring methodology to reflect sustainable industry developments and market changes.

Refinitiv. (2023). Make your ESG impact known [Brochure].

Ricardo, D. (1817). *Principles of political economy and taxation.*

Roy, A. D. (1951). Some thoughts on the distribution of earnings. *Oxford Economic Papers, 3*(2), 135–146.

Sastry, P., Verner, E., & Marquez-Ibanes, D. (2024). Business as usual: Bank net zero commitments, lending, and engagement. Working Paper.

Sautner, Z., van Lent, L., Vilkov, G., & Zhang, R. (2023a). Firm-level climate change exposure. *The Journal of Finance, 78*(3), 1449–1498.

Sautner, Z., van Lent, L., Vilkov, G., & Zhang, R. (2023b). Pricing climate change exposure. *Management Science*.

Spence, M. (1973). Job market signaling. *The Quarterly Journal of Economics, 87*(3), 355–374.

Starks, L. T. (2023). Presidential address: Sustainable finance and ESG issues—Value versus values. *The Journal of Finance, 78*(4), 1837–1872.

Suri, T. (2011). Selection and comparative advantage in technology adoption. *Econometrica, 79*(1), 159–209.

US SIF Foundation. (2024). US sustainable investing trends 2024/2025 report. Retrieved from https://www.ussif.org/research/trends-reports/us-sustainable-investing-trends-2024-2025-executive-summary

Wang, J., Zhong, R., Zhou, X., Hoepner, A. G. F., & Rogelj, J. (2025). Policies for transitioning away from fossil fuels: Renewables support destabilises fossil firms more than current carbon tax and trading schemes. Available at SSRN.

Table 1 Editing Data

Panel A – Edits by Category, Sector and Sign

		Edit Better	Edit Worse
Industrials & Basic Materials	Emission Score	137	107
	Resource Use Score	119	97
	Workforce Score	201	160
Energy	Emission Score	55	41
	Resource Use Score	42	34
	Workforce Score	60	42
Mining & Metals	Emission Score	44	44
	Resource Use Score	43	33
	Workforce Score	55	42
All Other Sectors	Emission Score	390	336
	Resource Use Score	376	258
	Workforce Score	627	438
Edit Type Totals		2,149	1,632

Panel B – Within Industry Distribution of Firms

		Industrials & Basic Materials	Energy	Mining & Metals	All Other Sectors
Sector Totals	Edit	373 (26.4%)	98 (26.9%)	100 (33.7%)	1,167 (19.6%)
	No edit	1,039 (73.6%)	266 (73.1%)	197 (66.3%)	4,791 (80.4%)
	Total	1,412 (100%)	364 (100%)	297 (100%)	5,958 (100%)

This table presents a summary of editing at the edit-observation level in panel A and at the firm-level in panel B. Panel A presents the number of editing observations by sign, sector, and category score. The Edit Type Totals are the total number of edits by edit type. We identify two types of editing between downloads and categorized them as either better if the ESG fundamental was better or changed from NA to a value; or worse if the ESG fundamental was worse or changed from a value to NA. Panel B presents firm observations by sector. The Sector Totals are the number (and percentage) of firms by sector with and without an edit to their ESG fundamentals.

Table 2: Summary Statistics

	Mean	SD	25th	Median	75th
Two-week Returns					
All Firms	0.0280	0.0941	-0.0243	0.0184	0.0702
Industrials & Basic Materials	0.0283	0.0896	-0.0230	0.0195	0.0692
Energy	0.0466	0.1450	-0.0366	0.0288	0.1174
Mining & Metals	0.0309	0.1067	-0.0288	0.0258	0.0844
Factors					
SMB	0.0100	0.0109	-0.0002	0.0102	0.0217
HML	0.0072	0.0344	-0.0307	0.0165	0.0406
CMA	0.0015	0.0160	-0.0174	-0.0008	0.0157
RMW	-0.0087	0.0132	-0.0206	-0.0054	-0.0013
Mkt-Rf	0.0185	0.0227	-0.0055	0.0147	0.0347
IRA Stock Reaction (standardized)	0.0000	0.9994	-0.4445	-0.0260	0.4172
Strategy Future Growth Measures Average over 2021-2023					
Status Quo Vertical M&A	0.0202	0.1405	0	0	0
Status Quo Horizontal M&A	0.0247	0.1552	0	0	0
Transition Vertical M&A	0.0704	0.2558	0	0	0
Transition Horizontal M&A	0.1215	0.3267	0	0	0
Grey Zone Vertical M&A	0.1244	0.3300	0	0	0
Grey Zone Horizontal M&A	0.1395	0.3464	0	0	0
Status Quo Revenue	0.0555	0.2096	0.0000	0.0000	0.0000
Transition Revenue	0.0730	0.1981	0.0000	0.0000	0.0139
Grey Zone Revenue	0.8715	0.2980	0.9419	1.0000	1.0000

This table presents summary statistics for the 2-week returns by sector, five Fama-French Factors, the IRA stock reaction, and the strategy future growth measures. All Firms, Industrials & Basic Materials, Energy, Mining & Metals are the continuous two-week returns for all the firms in the sample (n= 56,760), the firms in the Industrials & Basic Materials, Energy, and Mining & Metals sectors, respectively. Mkt-Rf is the excess market return, SMB is the size factor, HML is the value factor, RMW is the operating profitability factor, and CMA is the investment style factor. The five Fama-French Factors are the natural logarithm of the developed market factors downloaded from Kenneth French's data library. The IRA Stock Reaction is the one-day simple return following the IRA announcement standardized at the 2-digit SIC code level.

Table 3: Competitive Sorting Results in Signed Motivation OLS Estimation

Dependent Variable:	Two Week Excess Returns					
	All Regions		Low EnvPS Countries		High EnvPS Countries	
	(1)	(2)	(3)	(4)	(5)	(6)
Edit Variable is Signed as:	*Better*	*Worse*	*Better*	*Worse*	*Better*	*Worse*
Edit [*Sign by column*]	-0.0079***	-0.0011	-0.0141***	-0.0073*	0.0017	0.0085**
	(0.0022)	(0.0025)	(0.0031)	(0.0039)	(0.0039)	(0.0038)
Energy * Edit	0.0212*	-0.0051	0.0282**	-0.0004	0.0284	-0.0111
	(0.0117)	(0.0109)	(0.0135)	(0.0148)	(0.0386)	(0.0194)
Industrials & Basic Materials * Edit	0.0149***	-0.0028	0.0153**	-0.0001	0.0119	-0.0083
	(0.0053)	(0.0057)	(0.0074)	(0.0087)	(0.0094)	(0.0086)
Mining & Metals * Edit	-0.0154	-0.0143	-0.0210*	-0.0231**	0.0101	0.0265
	(0.0100)	(0.0100)	(0.0121)	(0.0113)	(0.0203)	(0.0222)
Mkt-Rf	1.1085***	1.1084***	1.1837***	1.1824***	1.0895***	1.0885***
	(0.0175)	(0.0175)	(0.0257)	(0.0257)	(0.0281)	(0.0281)
SMB	0.8513***	0.8481***	1.3680***	1.3597***	0.3285***	0.3282***
	(0.0536)	(0.0535)	(0.0803)	(0.0802)	(0.0855)	(0.0851)
HML	0.4589***	0.4571***	0.6493***	0.6454***	0.1896***	0.1903***
	(0.0353)	(0.0353)	(0.0526)	(0.0526)	(0.0558)	(0.0557)
RMW	0.3131***	0.3110***	0.3812***	0.3763***	0.2996***	0.3005***
	(0.0490)	(0.0490)	(0.0725)	(0.0725)	(0.0793)	(0.0793)
CMA	-0.3051***	-0.3006***	-0.6225***	-0.6111***	0.2167**	0.2163**
	(0.0700)	(0.0701)	(0.1056)	(0.1056)	(0.1088)	(0.1088)
Δ ESG Fundamentals	-0.0000	-0.0000	-0.0001	-0.0001	0.0000	0.0000
	(0.0000)	(0.0000)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Observations	56,712	56,712	29,702	29,702	19,636	19,636
R^2	0.1492	0.1490	0.1544	0.1541	0.1258	0.1258

This table presents the results of panel OLS regressions where the dependent variable is a series of continuous 2-week stock returns for firm *f* from the end of week w_{-1} to the end of w_{+1} where w_0 is the week of the respective download d. We identify two types of editing between downloads: edit management better (based on polarity) and edit management worse (based on polarity). These editing variables are coded as dummy variables that take the value of 1 if indicator *i* was edited for firm *f* in download *d* and zero otherwise. We report the interactions between each type of editing and energy firms (Energy * Edit), industrials & basic material firms (Industrials & Basic Materials * Edit) and mining & metals firms (Mining & Metals * Edit). The unreported base contains all other sectors. The ESG Fundamentals Δ variable is the absolute difference between the respective category scores from t_{-1} to t_0 for each firm *f* in download *d* averaged over the three edit management categories. The 5 Fama-French factors are the natural logarithm of the developed market factors downloaded from Kenneth French's data library. 7,374 observations are from firms headquartered in countries not classified in the OECD environmental policy stringency index which is why the observations from the low and high groups together do not equal the full sample observation count. Heteroskedasticity robust standard errors clustered at the firm level are reported in parentheses. *p<0.1; **p<0.05; ***p<0.01.

Table 4: CFA Results for Transition Strategy Competitive Sorting

Panel A – Scoring Parameters that Construct the Latent Transition Strategy

	Main	Robustness		
	(1)	(2)	(3)	(4)
Resource Edit Better	2.1534***	2.3299***	4.9185***	2.1951***
Emissions Edit Better	2.5356***	2.7447***	5.7962***	2.5849***
Workforce Edit Better	2.0241***	2.1906***	4.6246***	2.0631***
Confirmatory Factor is	*Growth*	*Growth by Acquisition*	*Organic Growth*	*Without IRA Perception of Growth*

Panel B - Dependent Variable: 2-Week Returns

Transition Strategy (Latent) *				
[Level Effect]	-0.0004	-0.0003	-0.0006	-0.0002
	(0.0005)	(0.0004)	(0.0006)	(0.0004)
* Energy	0.0052**	0.0026	0.0054**	0.0055**
	(0.0023)	(0.0023)	(0.0021)	(0.0023)
* Industrials & Basic Materials	0.0011	0.0003	0.0020**	0.0007
	(0.0007)	(0.0007)	(0.0010)	(0.0007)
* Mining & Metals	0.0083***	0.0063***	0.0064**	0.0074***
	(0.0019)	(0.0019)	(0.0025)	(0.0017)
Mkt-Rf	1.1111***	1.1111***	1.1112***	1.1092***
	(0.0181)	(0.0181)	(0.0181)	(0.0179)
SMB	0.8369***	0.8370***	0.8375***	0.8508***
	(0.0553)	(0.0553)	(0.0553)	(0.0548)
HML	0.4572***	0.4573***	0.4578***	0.4581***
	(0.0374)	(0.0374)	(0.0374)	(0.0370)
RMW	0.2993***	0.2995***	0.2998***	0.3136***
	(0.0503)	(0.0503)	(0.0503)	(0.0502)
CMA	-0.3107***	-0.3109***	-0.3121***	-0.3036***
	(0.0737)	(0.0737)	(0.0737)	(0.0730)
Δ ESG Fundamentals	-0.0000	-0.0000	-0.0001	-0.0001
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Sector Fixed Effects	Yes	Yes	Yes	Yes
Observations	56,712	56,712	56,712	56,712

This table presents the coefficients for the structural equation model where the Transition Strategy latent variable is assumed to causally affect log excess 2-week stock returns. We run four different confirmatory factors: 1) growth, 2) growth by acquisition, 3) organic growth, and 4) Without IRA Perception of Growth. Panel A contains the coefficients for the latent Transition Strategy variable (right-hand side) on each latent variable measurement variable (left-hand side). In an unreported part of the SEM where we also control for sector fixed effects and changes to ESG fundamentals, the latent Transition Strategy is set to maximally explain the confirmatory variable by restricting the loading to 1. The endogenous part of the latent Transition Strategy then explains log excess 2-week stock returns while controlling for the five Fama-French factors, sector fixed effects and changes to ESG fundamentals. We report the baseline Transition Strategy effect on stock returns [Level Effect] and its interaction with energy firms (* Energy), industrials and basic materials firms (* Industrials & Basic Materials) and mining & metals firms (* Mining & Metals). The unreported base contains all other sectors. The Δ ESG Fundamentals variable is the absolute difference between the respective category scores from t_{-1} to t_0 for each firm *f* in download *d* averaged over the three edit management categories. The 5 Fama-French factors are the natural logarithm of the developed market factors downloaded from Kenneth French's data library. All parameters are jointly estimated using maximum likelihood, and robust standard errors are reported in parentheses. *p<0.1; **p<0.05; ***p<0.01.

Table 5: CFA Results for Status Quo Strategy Competitive Sorting

Panel A – Scoring Parameters that Construct the Latent Status Quo Strategy

	Main	Robustness		
	(1)	(2)	(3)	(4)
Resource Edit Worse	3.4124**	2.6746**	15.0392**	3.0780*
Emissions Edit Worse	4.6137**	3.6155**	20.3264**	4.1609*
Workforce Edit Worse	3.0452**	2.3866**	13.4190**	2.7464*
Confirmatory Factor is	*Growth*	*Growth by Acquisition*	*Organic Growth*	*Without IRA Perception of Growth*

Panel B - Dependent Variable: 2-Week Returns

Status Quo Strategy (Latent) *				
[Level Effect]	-0.0011	-0.0007	-0.0001	-0.0009
	(0.0007)	(0.0007)	(0.0008)	(0.0007)
* Energy	0.0024**	0.0022**	0.0002	0.0024**
	(0.0010)	(0.0011)	(0.0016)	(0.0010)
* Industrials & Basic Materials	0.0018**	0.0012	-0.0006	0.0016*
	(0.0008)	(0.0009)	(0.0011)	(0.0008)
* Mining & Metals	0.0077***	0.0055***	-0.0063***	0.0075***
	(0.0018)	(0.0019)	(0.0024)	(0.0017)
Mkt-Rf	1.1110***	1.1110***	1.1111***	1.1092***
	(0.0181)	(0.0181)	(0.0181)	(0.0179)
SMB	0.8370***	0.8371***	0.8377***	0.8509***
	(0.0554)	(0.0554)	(0.0554)	(0.0549)
HML	0.4573***	0.4574***	0.4578***	0.4582***
	(0.0373)	(0.0374)	(0.0373)	(0.0370)
RMW	0.2994***	0.2995***	0.3000***	0.3137***
	(0.0503)	(0.0503)	(0.0503)	(0.0502)
CMA	-0.3109***	-0.3111***	-0.3121***	-0.3039***
	(0.0737)	(0.0737)	(0.0737)	(0.0730)
Δ ESG Fundamentals	-0.0000	-0.0000	-0.0001	-0.0001
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Sector Fixed Effects	Yes	Yes	Yes	Yes
Observations	56,712	56,712	56,712	56,712

This table presents the coefficients for the structural equation model where the Latent Status Quo Strategy is assumed to causally affect log excess 2-week stock returns. We run four different confirmatory factors: 1) growth, 2) growth by acquisition, 3) organic growth, and 4) Without IRA Perception of Growth. Panel A contains the coefficients for the latent Status Quo Strategy variable (right-hand side) on each latent variable measurement variable (left-hand side). In an unreported part of the SEM where we also control for sector fixed effects and changes to ESG fundamentals, the latent Status Quo Strategy is set to maximally explain the confirmatory variable by restricting the loading to 1. The endogenous part of the latent Status Quo Strategy then explains log excess 2-week stock returns while controlling for the five Fama-French factors, sector fixed effects and ESG fundamentals. We report the baseline Status Quo Strategy effect on stock returns [Level Effect] and its interaction with energy firms (* Energy), industrials and basic materials firms (* Industrials & Basic Materials) and mining & metals firms (* Mining & Metals). The unreported base contains all other sectors. The Δ ESG Fundamentals variable is the absolute difference between the respective category scores from t_{-1} to t_0 for each firm *f* in download *d* averaged over the three edit management categories. The 5 Fama-French factors are the natural logarithm of the developed market factors downloaded from Kenneth French's data library. All parameters are jointly estimated using maximum likelihood, and robust standard errors are reported in parentheses. *p<0.1; **p<0.05; ***p<0.01.

Table 6: CFA Robustness Results without Workforce

Panel A – Scoring Parameters that Construct the Latent Strategy

	(1)	(2)
Resource Edit	2.6786***	3.1937*
Emissions Edit	1.8345***	1.4773***
Strategy	*Transition*	*Status Quo*
Edit defined as	*Better*	*Worse*
Confirmatory Factor is	*Growth*	*Growth*

Panel B - Dependent Variable: 2-Week Returns

Strategy (Latent) *		
[Level Effect]	-0.0004	-0.0011
	(0.0005)	(0.0007)
* Energy	0.0052**	0.0024**
	(0.0023)	(0.0010)
* Industrials & Basic Materials	0.0011	0.0018**
	(0.0007)	(0.0008)
* Mining & Metals	0.0083***	0.0077***
	(0.0019)	(0.0018)
Δ ESG Fundamentals	-0.0000	-0.0000
	(0.0000)	(0.0000)
5 Fama-French Factors	Yes	Yes
Sector Fixed Effects	Yes	Yes
Observations	56,712	56,712

This table presents the coefficients for the structural equation model where the Transition Strategy (column 1) and the Status Quo Strategy (column 2) latent variables are assumed to causally affect log excess 2-week stock returns. We exclude edits to the Workforce score indicators from the list of measurement variables. The confirmatory factor used in these robustness tests is growth. Panel A contains the coefficients for the latent Transition Strategy (column 1) and Status Quo Strategy (column 2) variables (right-hand side) on each latent variable measurement variable (left-hand side). In an unreported part of the SEM where we also control for sector fixed effects and changes to ESG fundamentals, the latent strategy is set to maximally explain the confirmatory variable by restricting the loading to 1. The endogenous part of the latent strategy then explains log excess 2-week stock returns while controlling for the five Fama-French factors, sector fixed effects and ESG fundamentals. Edit better captures if the Resource Use or Emissions score indicators were edited to the better (based on polarity). The edit management variable is coded as a dummy variable that takes the value of 1 if indicator *i* was edited for firm *f* in download *d* and zero otherwise. We report the baseline Strategy effect on stock returns [Level Effect] and its interaction with energy firms (* Energy), industrials & basic materials firms (* Industrials & Basic) and mining & metals firms (* Mining & Metals). The unreported base contains all other sectors. The Δ ESG Fundamentals variable is the absolute difference between the respective category scores from t_{-1} to t_0 for each firm *f* in download *d* averaged over the three edit management categories. The 5 Fama-French factors are the natural logarithm of the developed market factors downloaded from Kenneth French's data library. All parameters are jointly estimated using maximum likelihood, and robust standard errors are reported in parentheses. *p<0.1; **p<0.05; ***p<0.01.

Table 7: CFA Robustness Results for Transition Strategy Competitive Sorting

Dependent Variable: 2-Week Returns

	(1)	(2)	(3)
Transition Strategy (Latent) *			
[Level Effect]	-0.0003	-0.0004	-0.0004
	(0.0005)	(0.0005)	(0.0005)
* Energy	0.0052**	0.0052**	0.0052**
	(0.0023)	(0.0023)	(0.0023)
* Industrials & Basic Materials	0.0004	0.0011	0.0010
	(0.0007)	(0.0007)	(0.0007)
* Mining & Metals	0.0060***	0.0083***	0.0084***
	(0.0019)	(0.0019)	(0.0019)
Δ ESG Fundamentals	-0.0000	-0.0000	-0.0001*
	(0.0000)	(0.0000)	(0.0001)
Energy * Δ ESG Fundamentals			0.0000
			(0.0003)
Industrials & Basic Materials * Δ ESG Fundamentals			0.0001
			(0.0001)
Mining & Metals * Δ ESG Fundamentals			0.0001
			(0.0003)
5 Fama-French Factors	Yes	Yes	Yes
Sector Fixed Effects	Yes	Yes	Yes
Country Fixed Effects	Yes	No	No
Only Intensive Margin Edits	No	Yes	No
Confirmatory Factor is	Growth	Growth	Growth
Observations	56,712	56,712	56,712

This table presents the coefficients for the structural equation model where the Transition Strategy latent variable is assumed to causally affect log excess 2-week stock returns. The confirmatory factor used in these robustness tests is growth. The first column reports country fixed effects; the second column reports results only using intensive margin edits; and the third column reports changes to ESG Fundamentals interacted with sectors. In an unreported part of the SEM, each latent variable measurement variable (left-hand side) is regressed on the latent Transition Strategy variable (right-hand side). In another unreported part of the SEM, where we also control for sector fixed effects and changes to ESG fundamentals, the latent Transition Strategy is set to maximally explain the confirmatory variable by restricting the loading to 1. The endogenous part of the latent Transition Strategy then explains log excess 2-week stock returns while controlling for the five Fama-French factors, sector fixed effects and ESG fundamentals. We report the baseline Transition Strategy effect on stock returns [Level Effect] and its interaction with energy firms (* Energy), industrials & basic materials firms (* Industrials & Basic Materials) and mining & metals firms (* Mining & Metals). The unreported base contains all other sectors. The Δ ESG Fundamentals variable is the absolute difference between the respective category scores from t_{-1} to t_0 for each firm *f* in download *d* averaged over the three edit categories. The 5 Fama-French factors are the natural logarithm of the developed market factors downloaded from Kenneth French's data library. All parameters are jointly estimated using maximum likelihood, and robust standard errors are reported in parentheses. *p<0.1; **p<0.05; ***p<0.01.

Table 8: CFA Robustness Results for Status Quo Strategy Competitive Sorting

Dependent Variable: 2-Week Returns

	(1)	(2)	(3)
Status Quo Strategy (Latent) *			
[Level Effect]	-0.0015**	-0.0011	-0.0011
	(0.0007)	(0.0007)	(0.0007)
* Energy	0.0024**	0.0024**	0.0024**
	(0.0010)	(0.0010)	(0.0010)
* Industrials & Basic Materials	0.0019**	0.0018**	0.0018**
	(0.0009)	(0.0008)	(0.0009)
* Mining & Metals	0.0072***	0.0077***	0.0077***
	(0.0018)	(0.0018)	(0.0018)
Δ ESG Fundamentals	-0.0000	-0.0000	-0.0001*
	(0.0000)	(0.0000)	(0.0001)
Energy * Δ ESG Fundamentals			0.0001
			(0.0003)
Industrials & Basic Materials * Δ ESG Fundamentals			0.0001
			(0.0001)
Mining & Metals * Δ ESG Fundamentals			0.0001
			(0.0003)
5 Fama-French Factors	Yes	Yes	Yes
Sector Fixed Effects	Yes	Yes	Yes
Country Fixed Effects	Yes	No	No
Only Intensive Margin Edits	No	Yes	No
Confirmatory Factor is	Growth	Growth	Growth
Observations	56,712	56,712	56,712

This table presents the coefficients for the structural equation model where the Status Quo Strategy latent variable is assumed to causally affect log excess 2-week stock returns. The confirmatory factor used in these robustness tests is growth. The first column reports country fixed effects; the second column reports results only using intensive margin edits; and the third column reports changes to ESG Fundamentals interacted with sectors. In an unreported part of the SEM, each latent variable measurement variable (left-hand side) is regressed on the latent Status Quo Strategy variable (right-hand side). In another unreported part of the SEM, where we also control for sector fixed effects and changes to ESG fundamentals, the latent Status Quo Strategy is set to maximally explain the confirmatory variable by restricting the loading to 1. The endogenous part of the latent Status Quo Strategy then explains log excess 2-week stock returns while controlling for the five Fama-French factors, sector fixed effects and ESG fundamentals. We report the baseline Status Quo Strategy effect on stock returns [Level Effect] and its interaction with energy firms (* Energy), industrials & basic materials (* Industrials & Basic Materials) and mining & metals firms (* Mining & Metals). The unreported base contains all other sectors. The Δ ESG Fundamentals variable is the absolute difference between the respective category scores from t_{-1} to t_0 for each firm *f* in download *d* averaged over the three edit management categories. The 5 Fama-French factors are the natural logarithm of the developed market factors downloaded from Kenneth French's data library. All parameters are jointly estimated using maximum likelihood, and robust standard errors are reported in parentheses. *p<0.1; **p<0.05; ***p<0.01.

Table 9: CFA Results for Transition Strategy by High and Low Environmental Policy

Dependent Variable: 2-Week Returns

	Low EnvPS Countries (1)	High EnvPS Countries (2)
Transition Strategy (Latent) *		
[Level Effect]	-0.0017**	0.0015**
	(0.0007)	(0.0006)
* Energy	0.0072**	0.0024
	(0.0031)	(0.0027)
* Industrials & Basic Materials	0.0016	-0.0003
	(0.0011)	(0.0010)
* Mining & Metals	0.0101***	0.0060*
	(0.0023)	(0.0043)
Δ ESG Fundamentals	-0.0001	0.0000
	(0.0001)	(0.0001)
5 Fama-French Factors	Yes	Yes
Sector Fixed Effects	Yes	Yes
Confirmatory Factor is	Growth	Growth
Observations	29,702	19,636

This table presents the coefficients for the structural equation model where the Transition Strategy latent variable is assumed to causally affect log excess 2-week stock returns. The confirmatory factor used in these robustness tests is growth. The first column reports the results for low environmental policy stringency countries and the second column results for high environmental policy stringency countries. In an unreported part of the SEM, each latent variable measurement variable (left-hand side) is regressed on the latent Transition Strategy variable (right-hand side). In another unreported part of the SEM, where we also control for sector fixed effects and changes to ESG fundamentals, the latent Transition Strategy is set to maximally explain the confirmatory variable by restricting the loading to 1. The endogenous part of the latent Transition Strategy then explains log excess 2-week stock returns while controlling for the five Fama-French factors, sector fixed effects and ESG fundamentals. We report the baseline Transition Strategy effect on stock returns [Level Effect] and its interaction with energy firms (* Energy), industrials & basic materials firms (* Industrials & Basic Materials) and mining & metals firms (* Mining & Metals). The unreported base contains all other sectors. The Δ ESG Fundamentals variable is the absolute difference between the respective category scores from t_{-1} to t_0 for each firm *f* in download *d* averaged over the three edit categories. The 5 Fama-French factors are the natural logarithm of the developed market factors downloaded from Kenneth French's data library. 7,374 observations are from firms headquartered in countries not classified in the OECD environmental policy stringency index which is why the observations from the low and high groups together do not equal the full sample observation count. All parameters are jointly estimated using maximum likelihood, and robust standard errors are reported in parentheses. *p<0.1; **p<0.05; ***p<0.01.

Table 10: CFA Results for Status Quo Strategy by High and Low Environmental Policy

Dependent Variable: 2-Week Returns

	Low EnvPS Countries (1)	High EnvPS Countries (2)
Status Quo Strategy (Latent) *		
[Level Effect]	-0.0029***	0.0012
	(0.0010)	(0.0010)
* Energy	0.0038***	-0.0005
	(0.0014)	(0.0017)
* Industrials & Basic Materials	0.0028**	0.0004
	(0.0012)	(0.0012)
* Mining & Metals	0.0109***	0.0026
	(0.0025)	(0.0027)
Δ ESG Fundamentals	-0.0001	0.0000
	(0.0001)	(0.000)
5 Fama-French Factors	Yes	Yes
Sector Fixed Effects	Yes	Yes
Confirmatory Factor is	Growth	Growth
Observations	29,702	19,636

This table presents the coefficients for the structural equation model where the Status Quo Strategy latent variable is assumed to causally affect log excess 2-week stock returns. The confirmatory factor used in these robustness tests is growth by acquisition and organic growth. The first column reports the results for low environmental policy stringency countries and the second column results for high environmental policy stringency countries. In an unreported part of the SEM, each latent variable measurement variable (left-hand side) is regressed on the latent Status Quo Strategy variable (right-hand side). In another unreported part of the SEM, where we also control for sector fixed effects and changes to ESG fundamentals, the latent Status Quo Strategy is set to maximally explain the confirmatory variable by restricting the loading to 1. The endogenous part of the latent Status Quo Strategy then explains log excess 2-week stock returns while controlling for the five Fama-French factors, sector fixed effects and ESG fundamentals. We report the baseline Status Quo Strategy effect on stock returns [Level Effect] and its interaction with energy firms (* Energy), industrials & basic materials (* Industrials & Basic Materials) and mining & metals firms (* Mining & Metals). The unreported base contains all other sectors. The Δ ESG Fundamentals variable is the absolute difference between the respective category scores from t_{-1} to t_0 for each firm *f* in download *d* averaged over the three edit management categories. The 5 Fama-French factors are the natural logarithm of the developed market factors downloaded from Kenneth French's data library. 7,374 observations are from firms headquartered in countries not classified in the OECD environmental policy stringency index which is why the observations from the low and high groups together do not equal the full sample observation count. All parameters are jointly estimated using maximum likelihood, and robust standard errors are reported in parentheses. *p<0.1; **p<0.05; ***p<0.01.

Table 11: CFA Grey Zone Strategy in Low Environmental Policy Countries

Panel A – Scoring Parameters that Construct the Grey Zone Strategy

	(1)	(2)	(3)	(4)	(5)	(6)
No Resource Edit	10.4556**	10.4596*	13.7139**	17.5332***	17.5209**	19.6837**
No Emissions Edit	11.1972**	11.2015*	14.6867**	18.7634***	18.7502**	21.0662**
No Workforce Edit	9.0499**	9.0534*	11.8703**	15.1689***	15.1582**	17.0302**
Confirmatory Factor is	Grey Revenue & Grey M&A			Grey Revenue		

Panel B - Dependent Variable: 2-Week Returns

Grey Zone Strategy (Latent) *						
[Level Effect]	-0.0000 (0.0005)	-0.0002 (0.0005)	0.0003 (0.0005)	0.0112*** (0.0027)	0.0107*** (0.0027)	0.0085*** (0.0022)
* Energy	-0.0065** (0.0030)	-0.0060** (0.0030)	-0.0068** (0.0030)	-0.0247*** (0.0071)	-0.0225*** (0.0072)	-0.0243*** (0.0071)
* Industrials & Basic Materials	-0.0023** (0.0011)	-0.0023** (0.0011)	-0.0026** (0.0011)	-0.0122*** (0.0042)	-0.0119*** (0.0042)	-0.0118*** (0.0042)
* Mining & Metals	-0.0121*** (0.0025)	-0.0109*** (0.0025)	-0.0124*** (0.0025)	-0.0311*** (0.0069)	-0.0260*** (0.0069)	-0.0307*** (0.0069)
* Healthcare			0.0028 (0.0025)			-0.0846 (0.0724)
Δ ESG Fundamentals	-0.0001 (0.0001)	-0.0001 (0.0001)	-0.0001 (0.0001)	-0.0001 (0.0001)	-0.0001 (0.0001)	-0.0001 (0.0001)
5 Fama-French Factors	Yes	Yes	Yes	Yes	Yes	Yes
Sector Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	No	Yes	No	No	Yes	No
Observations	29,702	29,702	29,702	29,702	29,702	29,702

This table presents the coefficients for the structural equation model where the Grey Zone Growth Strategy latent variable is assumed to causally affect log excess 2-week stock returns. The confirmatory factor is either the grey revenue and grey M&A index or grey revenue. Column 1 (column 4) reports the baseline results for the grey revenue and grey M&A index (grey revenue) variable, column 2 (column 5) with country fixed effects, and column 3 (column 6) with the healthcare sector also interacted with the latent strategy. Panel A contains the coefficients for the Grey Growth Strategy variable (right-hand side) on each latent variable measurement variable (left-hand side). In an unreported part of the SEM where we also control for sector fixed effects and changes to ESG fundamentals, the latent Grey Zone Growth Strategy is set to maximally explain the confirmatory variable by restricting the loading to 1. The endogenous part of the latent Grey Zone Growth Strategy then explains log excess 2-week stock returns while controlling for the five Fama-French factors, sector fixed effects and ESG fundamentals. No edit captures if the Resource Use, Emissions or Workforce Score indicators were never edited. The edit variable is coded as a dummy variable that takes the value of 1 if indicator *i* was never edited for firm *f* in and zero otherwise. We report the interactions between the latent Grey Zone Growth Strategy and energy firms (* Energy), industrials & basic materials firms (* Industrials & Basic) and mining & metals firms (* Mining & Metals). The unreported base contains all other sectors. The Δ ESG Fundamentals variable is the absolute difference between the respective category scores from t_{-1} to t_0 for each firm *f* in download *d* averaged over the three edit management categories. The 5 Fama-French factors are the natural logarithm of the developed market factors downloaded from Kenneth French's data library. All parameters are jointly estimated using maximum likelihood, and robust standard errors are reported in parentheses. *p<0.1; **p<0.05; ***p<0.01.

Appendix Table 1: Agency and Edit Management

Dependent Variable: Total Executive Compensation in 2021

	Resource Use Score		Emissions Score Edit		Workforce Score Edit	
	(1)	(2)	(3)	(3)	(5)	(6)
	Better	Worse	Better	Worse	Better	Worse
Edit Coefficient	0.003	0.06	-0.01	0.01	0.18***	0.04
	(0.06)	(0.07)	(0.06)	(0.07)	(0.06)	(0.08)
ESG Compensation Plan	0.19**	0.21**	0.15*	0.16**	0.17***	0.14***
	(0.09)	(0.09)	(0.08)	(0.07)	(0.03)	(0.03)
Edit * ESG Compensation Plan	-0.01	-0.22	-0.05	-0.17	-0.29***	-0.17
	(0.24)	(0.29)	(0.18)	(0.21)	(0.09)	(0.12)
Δ ESG Fundamentals	-0.01	-0.01	0.15	0.15	0.07	0.11
	(0.13)	(0.13)	(0.13)	(0.13)	(0.13)	(0.13)
Market Capitalization	0.20***	0.20***	0.20***	0.20***	0.20***	0.20***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Revenue	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***
	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Leverage	0.13***	0.13***	0.13***	0.13***	0.13***	0.13***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Observations	1,599	1,599	1,599	1,599	1,599	1,599
Adjusted R^2	0.43	0.43	0.43	0.43	0.44	0.44

This table presents the results of an investigation of the influence of managerial editing, the presence of an ESG compensation plan, and their interaction on the total executive compensation for 2021, the year after managerial editing, using pooled OLS regressions. We investigate whether executives are incentivized to edit their ESG data if their compensation is at least partially dependent on meeting ESG targets. ESG Compensation Plan is a dummy equal to one if a firm ties executive compensation to ESG targets. The data for this variable was provided by ESGAUGE. We also introduced an interaction term between edit management and the presence of an ESG compensation plan. We leverage this data to address concerns that the managerial ESG editing we identify might not be due to climate strategy for some firms but rather executive compensation gaming. The Δ ESG Fundamentals variable is the absolute difference between the respective category scores from t_{-1} to t_0 for each firm *f* in download *d*. The natural logarithms of Market Capitalization and Revenue are from 2020. Leverage is from 2020 and is defined as Long Term Debt + Short Term Debt & Current Portion of Long-Term Debt) / Common Equity * 100. Standard errors are reported in parentheses. Significance is denoted by *p<0.1; **p<0.05 and ***p<0.01, respectively. The regressions have adjusted R^2s ranging from 0.43 to 0.44 and 1,599 observations. We split managerial editing of each of the three category scores into two types: edit better (even columns) and edit worse (odd columns). Of the 6 regressions, we only find an effect from editing when managers edit the Workforce score to the better (column 5), which is related to higher executive compensation. We find that firms with an ESG compensation plan pay their executives more in 2021 than those without such a plan in each specification. However, when we examine the interaction between managerial editing and the presence of an ESG compensation plan, we only find an effect on total compensation in firms that edit the Workforce score to the better (column 5), which is related to a lower executive compensation. However, if managers edit ESG fundamentals to game their compensation, we expect a positive coefficient on the interaction between edit and ESG compensation plan. This lack of evidence leads us to conclude that managerial editing is not driven by a desire to game executive compensation.

Appendix Table 2: Environmental Policy Stringency (EnvPS) Scores

High EnvPS		*Low EnvPS*	
Country	Index	Country	Index
France	4.89	Canada	3.03
Switzerland	4.50	United States	3.03
Finland	4.11	Ireland	3.00
Norway	3.94	Czechia	2.94
Sweden	3.83	Australia	2.92
Japan	3.78	Greece	2.89
Denmark	3.72	Türkiye	2.89
Italy	3.72	India	2.83
United Kingdom	3.61	Hungary	2.81
Germany	3.47	Portugal	2.78
Netherlands	3.47	Slovak Republic	2.50
Poland	3.47	Spain	2.50
Belgium	3.44	Indonesia	1.64
Austria	3.31	Russia	1.17
Slovenia	3.22	South Africa	0.92
South Korea	3.17	Brazil	0.89
China	3.14		

This table presents the countries and their index score from the 2020 OECD Environmental Policy Stringency index used in creating a high environmental policy stringency group (High EnvPS) and a low environmental policy stringency group (Low EnvPS). The index is the score assigned by the OECD where a higher score is assigned to countries with stricter environmental policies.

Appendix Table 3: Inflation Reduction Act Stock Return Shock

	Mean	SD	25th	Median	75th
United States					
Energy	0.0071	0.0583	-0.0186	0.0004	0.0150
Industrials & Basic Materials	0.0154	0.0345	0.0040	0.0167	0.0288
Mining & Metals	0.0156	0.0180	0.0043	0.0180	0.0234
All other sectors	0.0091	0.0324	-0.0022	0.0095	0.0239
Rest of the World					
Energy	0.0135	0.0323	0.0000	0.0090	0.0232
Industrials & Basic Materials	0.0151	0.0239	0.0013	0.0139	0.0256
Mining & Metals	0.0278	0.0328	0.0083	0.0234	0.0421
All other sectors	0.0128	0.0340	0.0000	0.0106	0.0235

This table presents the mean, standard deviation (SD), 25th-percentile (25th), median, and 75th-percentile (75th) for the simple return of the trading day directly after the IRA resurrection shock on July 27th, 2022.