

International Trade Agreements and Corporate Sustainability Performance in Austria, Germany and Switzerland

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Abstract

The paper examines whether exposure to international trade agreements is associated with firm-level ESG performance and whether the answer depends on model specification. A balanced panel of 30 firms headquartered in Austria, Germany and Switzerland is observed annually from 2015 to 2025, giving 330 firm-year observations. Panel regression on an observed ESG composite and structural equation modelling with a latent ESG factor are combined, and the trade path is re-estimated across a crossed design of measurement framework and covariate set. Trade agreement exposure is positively associated with ESG performance in both frameworks under the reduced covariate set and in neither once institutional and firm-level controls enter. The sample is purposive and confined to large listed firms. The association is thus specification-dependent as opposed to measurement-dependent, which explains conflicting results in the literature.

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Introduction

Firm-level ESG performance has become an important dimension of corporate behaviour in highly integrated economies. International trade is not merely a channel through which goods are exchanged. It also carries regulatory expectations, buyer requirements, investor scrutiny and governance norms across jurisdictions (Kim & Yang, 2026). The key question is therefore not whether firms trade more, but whether the institutional rules embedded in international economic relations reshape the incentives affecting ESG performance.

The empirical evidence on that question is inconclusive, and the reasons are identifiable. ESG ratings disagree across providers to a degree that makes the dependent variable provider-specific, since Berg et al. (2022) report correlations between the major raters of around 0.54. Trade exposure is operationalised at different levels of aggregation, from firm export ratios to country-year agreement coverage. Studies also differ in the covariate sets on which they condition, and where a trade measure varies only across country-year cells, institutional controls absorb much of the variance it would otherwise carry.

It is based on this background that the current paper examines the association between trade agreement exposure and ESG performance on a balanced panel of firms headquartered in Austria, Germany and Switzerland between 2015 and 2025. The empirical contribution is firm-level evidence for a highly integrated European setting across eleven years, drawn from harmonised value-chain indicators as opposed to gross trade volumes. The methodological contribution is a direct test of the explanation usually offered for the conflicting findings. Composite ESG scores are held to

attenuate effects through aggregation and measurement error, which implies that a latent specification should recover an association a composite conceals. Crossing the measurement framework with the covariate set shows that the divergence lies in the covariate structure instead.

The theoretical background develops the hypotheses, the methodology describes the sample, the data sources and the construction of the exposure index, and the results report the findings together with the specification sensitivity analysis. The discussion and the conclusions set out the implications and the limitations.

Theoretical Background

International trade can influence firm-level ESG performance through several mechanisms. Institutional theory holds that organisations exposed to the same regulatory and normative field converge on similar structures (DiMaggio & Powell, 1983). Stakeholder theory adds that firms operating internationally answer to investors, lenders and supply-chain partners whose expectations increasingly reference sustainability standards (Freeman, 1984). Global value chain research shows that governance requirements travel across borders along production relations, through contracting hierarchies and certification regimes (Gereffi et al., 2005).

Trade Exposure and ESG Performance

These perspectives locate the pressure differently. Institutional theory locates it in regulatory expectation, since agreements containing trade and sustainable development provisions raise the standards attached to market access, so that firms headquartered in economies embedded in such agreements operate under the resulting compliance

environment whether or not they trade with the partner country directly. Global value chain governance locates it in the buyer relationship, in which lead firms transmit requirements downward through certification and supplier codes, which raises the reputational cost of non-compliance. Both channels predict the same sign, although integration can also be associated with weaker effects under symbolic compliance (Adardour et al., 2025). This paper tests the following hypothesis:

H1: Trade exposure is positively associated with firm-level ESG performance.

Measurement and Specification Sensitivity

ESG performance is a multidimensional construct, and a composite score summarises dimensions that need not move together (da Cunha et al., 2025). The design of the rating instrument shapes what such a score records (Christensen et al., 2022). Classical measurement theory gives a clear expectation for what follows. Where a variable is measured with error the estimated coefficient is attenuated towards zero, and where an outcome aggregates dimensions carrying dimension-specific noise, the shared variance to which the theory refers is diluted. A latent specification addresses this by estimating the common factor behind the three indicators and assigning the residual variance to the indicators (Kline, 2016). A null result under a composite would thus be consistent with a positive association under a latent model.

The same divergence has a second possible source. Two specifications can differ in the representation of ESG and in the covariate set at the same time, and the second difference is sufficient on its own to change the estimate, since institutional controls defined at the country level compete for the variance of a trade measure defined at the same

level. The two are distinguishable only if they are varied independently. Based on this background this paper tests the following hypothesis:

H2: The estimated association between trade exposure and ESG performance differs across specifications, and the difference is attributable to the covariate set as opposed to the measurement framework.

Institutional Context

Although the three countries belong to a closely integrated European setting, their national institutional environments differ, and comparative capitalism research treats these differences as systematic. Business systems differ regarding patterns of ownership, the role of banks as a source of corporate finance and the enforcement capacity of the regulatory apparatus (Whitley, 1999). Matten and Moon (2008) suggest that in coordinated economies sustainability obligations are implied by regulation but articulated explicitly by companies in more liberal settings. Explicit disclosure matters for ESG scores, as rating providers interpret explicit disclosure. The reporting architecture in Europe became denser and more prescriptive across the panel window (Hummel & Jobst, 2024), but regarding company-level consequences, mandatory disclosure effects vary with the regulatory and market environment as opposed to a uniform pattern (Krueger et al., 2024). Austria and Germany apply the same EU regulations but differ in enforcement capacity, size and international orientation of the respective listed sector, and Switzerland sits outside that regime yet achieves disclosure through investor expectation (Christensen et al., 2021). Regarding the institutional view, this paper tests the third hypothesis:

H3: Institutional context is significantly associated with firm-level ESG performance.

Methodology

Sample and Selection Criteria

The panel covers 30 firms, ten in each country, observed annually from 2015 to 2025, giving 330 firm-year observations. Firm-year is the unit of analysis. A mixture of sectors is purposely chosen to account for the settings where the level of trade-related pressure differs, i.e., environmental compliance pressure in carbon-intensive industry and utilities, governance and investor pressure in the banking and insurance sector, and value-chain diffusion in the manufacturing and consumer goods sector. The sample is the firms from the largest markets in the three countries, listed on the respective stock exchanges, that conduct continuous as well as complete ESG reporting and have export market share, which is the case for each firm. Sector is not explicitly controlled for because the number of firms within individual country-sector cells is too small to estimate stable industry effects. The list of firms is given in Appendix A.

This means the sample consists mostly of multinationals with rigorous reporting procedures; results apply to this range of firms, not to SMEs or unlisted firms. Net revenues range from EUR 4.5 billion to EUR 74.7 billion. The balanced construction rules out the possibility of entry and exit as a source of variation at the cost of a smaller number of observations.

Data Sources and Variables

The panel variables are drawn from three sources. Firm-level ESG measures are taken from CSRHub, which aggregates the ratings of several providers onto a uniform 0 to 100 scale: ESG_total_proxy, the weighted composite; ESG_E_proxy, ESG_S_proxy and ESG_G_proxy, its constituent scores; and governance_oversight_proxy and disclosure_quality_proxy, CSRHub's separate indicators of board-level oversight and reporting transparency. Total assets, leverage, return on assets and firm export intensity are taken from Orbis (Kalemli-Özcan et al., 2024), and the country-year value-chain indicators from the OECD Trade in Value Added database and the World Input-Output Database (Yamano et al., 2023). Appendix B documents every variable.

The aggregation rule behind the composite is the provider's own, and its relation to the three component proxies is close but not exact: the mean deviation from their arithmetic average is -0.109 index points, with a maximum absolute deviation of 10.179. That gap is one reason for estimating the latent specification alongside it, and the estimates below are conditional on the CSRHub scale (Berg et al., 2022).

Construction of the Trade Agreement Exposure Index

The trade agreement exposure index is the key explanatory variable and is constructed at the country-year level, so that every firm

headquartered in the same country carries the same value each year. Its inputs are trade agreements containing sustainability-related provisions, including trade and sustainable development chapters or comparable environmental and labour references, that were in force for the respective country-year, including agreements concluded before 2015 and still in force. For Austria and Germany these are the agreements concluded under the common commercial policy of the European Union, and for Switzerland the EFTA agreements together with the bilateral agreements between Switzerland and the European Union. Appendix E lists them with their entry into force. German supply chain due diligence legislation is institutional context and does not enter the index. The index captures trade-weighted exposure to the agreements in force in each country-year rather than the simple number of agreements. The index is calculated as the sum of partner trade shares covered by sustainability-related agreements in force in each country-year, using WIOD and OECD TiVA weights and expressed on a 0-1 scale. Partner trade shares from the World Input-Output Database and OECD TiVA tables determine the contribution of each covered partner, so changes in the trade structure can offset the entry into force of additional agreements. Austria and Germany are subject to the same EU agreement coverage, and differences between their index values therefore arise from the partner weights. The agreements entering the index are listed in Appendix E, while Appendix F reports the realised values for all 33 country-year cells. The index has a mean of 0.619 and a standard deviation of 0.023, with values ranging from 0.572 to 0.657. Its limited dispersion reflects the relatively stable agreement environment and the importance of changes in partner trade weights over the observation period.

Estimation Strategy

The analysis compares two models that differ in their representation of ESG. The first is a panel regression in which `ESG_total_proxy` is the dependent variable and `trade_agreement_exposure_index` the focal regressor, with country-level export intensity, the foreign value-added share, firm size, leverage, return on assets, firm export intensity, an EU dummy and year indicators as controls. The second is a structural equation model in which ESG is a latent factor measured by the three component proxies and predicted by the trade and value-chain measures. A mediation extension adds the governance and disclosure proxies as intervening variables, and a multi-group extension tests the equality of the structural coefficients across countries.

The two models differ in the representation of ESG and in the covariate set at once, so the trade path is also estimated in the two remaining cells of the crossed design, the observed composite with the reduced covariate set and the latent specification with the full control set. The observed-variable models are estimated by ordinary least squares over the pooled firm-year observations, and the dependence structure of the panel is examined separately through a baseline linear mixed model with a first-order autoregressive covariance structure across years. The analyses were computed in IBM SPSS Statistics, IBM SPSS Amos and jamovi (IBM Corp., 2024; The jamovi project, 2025), and the structural models were estimated with lavaan (Rosseel, 2012). Robustness and specification sensitivity are assessed through the crossed four-specification design, collinearity diagnostics, and the auxiliary linear mixed model used as a panel

robustness diagnostic.

Empirical Results

Descriptive Statistics

Appendix C reports descriptive statistics. The composite averages 72.976 on a 0 to 100 scale and ranges from 60.881 to 84.798, and each component proxy is more dispersed than the composite, which is what aggregation across three partly independent dimensions produces. The trade agreement exposure index is the least dispersed variable, and its standard deviation of 0.023 across 33 country-year cells is the binding constraint on identification.

Measurement Validation

Table 1 reports the reliability and factor diagnostics for the three ESG dimension indicators.

Table 1

Reliability statistics, factor diagnostics, and component loadings for the ESG dimension indicators (N = 330)

Statistic or indicator	Value	
Cronbach's alpha (3 items)	0.623	
Kaiser-Meyer-Olkin measure	0.645	
Bartlett's test of sphericity	$\chi^2(3) = 114.027, p < 0.001$	
Component 1 eigenvalue	1.715	
Variance explained	57.178%	
	Communality	Component loading
ESG_E_proxy	0.555	0.745
ESG_S_proxy	0.553	0.744
ESG_G_proxy	0.607	0.779

Source: Authors' calculations.

Cronbach's alpha of 0.623 falls below the conventional threshold of 0.70 and should not be

read mechanically, since ESG is not a unidimensional construct whose components behave interchangeably. The value indicates coherence sufficient for joint modelling while confirming that the dimensions are not substitutable.

The first component accounts for 57.178 per cent of the total variance, so that a substantial share of the variance in each dimension is explained by a common factor and a substantial share is not. That residual justifies the latent specification.

Cross-Country Comparison

The assumption of homogeneity of variances is violated, so cross-country differences were tested with a Welch one-way ANOVA and Games-Howell post hoc comparisons, which Table 2 reports.

Table 2

Group statistics and Welch's ANOVA of ESG_total_proxy across countries (N = 330)

Country or comparison	N	Mean	SD	SE
Austria	110	71.7	3.94	0.376
Switzerland	110	73.1	3.64	0.347
Germany	110	74.1	4.25	0.405
Welch's ANOVA: $F(2, 217) = 9.780, p < 0.001$				
Games-Howell, Austria vs Switzerland: mean difference = -1.420, $p = 0.016$				
Games-Howell, Austria vs Germany: mean difference = -2.419, $p < 0.001$				
Games-Howell, Switzerland vs Germany: mean difference = -0.999, $p = 0.149$				

Notes: Group means and standard deviations are reported at the precision of the group descriptives; the Games-Howell mean differences are computed on unrounded values and therefore do not reproduce exactly from the rounded means. Source: Authors' calculations.

Austrian firms score below Swiss and German firms, while the gap between Switzerland and Germany is not significant. Austria and Germany operate under

the same EU reporting regime, so the gap between them cannot be attributed to the regime itself and is more plausibly a matter of enforcement capacity and of the size and international orientation of the listed sector, which is smaller and more domestically anchored in Austria. German firms additionally operate under supply chain due diligence legislation whose consequences for sustainability governance are documented (Buttke et al., 2024), which is institutional context as opposed to trade agreement exposure. Switzerland

reaches German levels of disclosure without the EU directive, which is what Matten and Moon (2008) would predict where investor expectation substitutes for mandate. H3 is supported.

Panel Regression Results

The baseline panel regression uses the observed composite as the dependent variable, estimated on all 330 observations with year indicators, and Table 3 reports it.

Table 3

Panel regression of ESG_total_proxy on trade exposure and controls (N = 330)

Predictor	Estimate	SE	t	p	Std. β	VIF
Intercept	64.117	16.364	3.918	< 0.001	-	-
trade_agreement_exposure_index	30.923	20.136	1.536	0.126	0.176	4.551
export_intensity_country	-5.405	12.817	-0.422	0.674	-0.100	19.384
tiva_foreign_value_added_share	-28.787	18.391	-1.565	0.119	-0.356	17.932
ln_assets	0.874	0.527	1.658	0.098	0.116	1.698
leverage	-6.665	3.565	-1.870	0.062	-0.114	1.295
ROA	9.060	21.549	0.421	0.674	0.026	1.279
export_intensity	-0.736	3.841	-0.192	0.848	-0.015	2.094
EU	-4.919	1.591	-3.092	0.002	-0.572	11.870

Notes: $R = 0.323$; $R^2 = 0.104$. Year indicators are included and none is significant. VIF values are on the classical scale

Source: Authors' calculations.

The model accounts for 10.4 per cent of the variation in observed ESG performance. Trade agreement exposure is not significant, and neither country-level export intensity nor the foreign value-added share reaches conventional levels. The EU indicator is negative and significant, which shows that institutional affiliation captures systematic variation the trade measures do not. It is not evidence that EU membership lowers ESG performance, since the dummy pools Austria and Germany despite the gap documented in Table 2.

The collinearity diagnostics are the substantive finding of this stage. The firm-level controls are

unproblematic, with variance inflation factors between 1.279 and 2.094, while the country-year predictors are not: export_intensity_country reaches 19.384, tiva_foreign_value_added_share reaches 17.932 and the EU dummy reaches 11.870. All three vary across the same 33 country-year cells as the trade index. The inflation is a property of the panel structure as opposed to an error in the specification, so the individual significance tests carry little information. Read on its own, the regression does not support H1; read together with the diagnostics, it shows that the observed specification has limited power to test H1 under institutional controls.

A baseline linear mixed model was estimated on the same panel as a diagnostic of that structure, with the firm as the clustering unit, the year as the repeated measure and a first-order autoregressive covariance structure, fitted by restricted maximum likelihood. The fixed intercept of 72.968 (SE = 0.251) reproduces the sample mean, the autoregressive parameter is small but significant ($p = 0.128$, Wald $Z = 2.218$, $p = 0.027$) and the firm-level random intercept variance is estimated at approximately zero. ESG scores therefore carry year-to-year persistence within firms while the between-firm component is already absorbed by the observed covariates, which is why year indicators are retained, and no firm-level random effect is added to the specification. The significant autoregressive term also implies that the standard errors in Table 3 understate the sampling variability to some degree,

which reinforces rather than weakens the reading of the individual tests given above.

Structural Equation Modelling Results

Structural equation modelling re-estimates the relationship with ESG as a latent construct reflected by the three-dimension indicators, estimated by maximum likelihood. With three indicators and a single factor the measurement model is just identified, so its global fit indices are perfect by construction and carry no diagnostic information (Kline, 2016; Cheung et al., 2024); it is assessed through its loadings, which are 0.570, 0.567 and 0.658, each significant at $p < 0.001$. The structural models in Table 4 have four and seven degrees of freedom, so their fit statistics are interpretable in the ordinary way.

Table 4

Structural equation models: fit indices and structural paths (N = 330)

Model and path	Estimate	SE	Std. β	p
Direct-effects model: $\chi^2(4) = 4.810$, $p = 0.308$; CFI = 0.993; TLI = 0.985; RMSEA = 0.025; SRMR = 0.019				
trade_agreement_exposure_index $\rightarrow$ ESG	38.400	14.170	0.262	0.007
tiva_foreign_value_added_share $\rightarrow$ ESG	11.900	6.380	0.176	0.063
Covariance of the two predictors	-	-	-0.674	< 0.001
Mediation model: $\chi^2(7) = 18.500$, $p = 0.010$; CFI = 0.967; TLI = 0.929; RMSEA = 0.071; SRMR = 0.037				
trade_agreement_exposure_index $\rightarrow$ governance_oversight_proxy	24.103	21.444	0.062	0.261
trade_agreement_exposure_index $\rightarrow$ disclosure_quality_proxy	-12.980	12.085	-0.059	0.283
governance_oversight_proxy $\rightarrow$ ESG	0.220	0.031	0.792	< 0.001
disclosure_quality_proxy $\rightarrow$ ESG	-	-	-0.005	0.901
trade_agreement_exposure_index $\rightarrow$ ESG, direct	-	-	0.038	0.380
Indirect effect via governance_oversight_proxy	5.298	4.772	-	0.267
Indirect effect via disclosure_quality_proxy	0.034	0.277	-	0.902
Total effect	9.461	-	-	0.160

Notes: Loadings in the direct-effects model are 0.588, 0.555 and 0.652, and differ from the measurement-only solution because the predictors enter jointly.

Source: Authors' calculations.

Trade agreement exposure has a positive and significant path to latent ESG in the direct-effects model, where the panel regression returned no

significant coefficient. The magnitude is modest. An increase of one standard deviation in the index, 0.023 points, corresponds to an estimated 0.88

points of ESG performance, which is roughly a fifth of the standard deviation of the composite.

The mediation model does not support a governance or disclosure channel, since neither path from trade exposure to the two mediators is significant and both indirect effects are indistinguishable from zero. Governance oversight is the strongest correlate of latent ESG, which should be read as a relationship between two governance-related measures: the governance loading rises to 0.887 there while the environmental and social loadings fall to 0.434 and 0.430.

The multi-group extension tests whether the structural coefficients are equal across the three countries; Appendix D reports both models and the tests of the restrictions.

The fit statistics of the constrained model are close to their theoretical maxima, and that appearance requires explanation rather than endorsement. TLI is non-normed and exceeds 1.000 whenever the model chi-square falls below its degrees of freedom, which is the case here, and RMSEA is bounded below at zero for the same reason. The conclusion rests on the comparison of the two models: constraining the five structural coefficients does not significantly worsen fit under either test. With ten firms per group these tests have low power, so the result is an absence of detected differences and not evidence of invariance.

Specification Sensitivity

The panel regression and the direct-effects model differ in two respects at once: the panel regression uses the observed ESG composite and includes the full control set, whereas the direct-effects model

represents ESG as a latent factor and does not include the full set of institutional and firm-level controls. The divergence cannot be attributed to the representation of ESG without the two remaining cells of the crossed design, which Table 5 reports.

Table 5
Specification sensitivity of the trade_agreement_exposure_index path to ESG performance

Measurement framework	Reduced covariate set	With full control set
Observed composite (ESG_total_proxy)	$\beta = 0.152$, $p = 0.042$	$\beta = 0.176$, $p = 0.126$
Latent factor (SEM)	$\beta = 0.262$, $p = 0.007$	$\beta \approx 0.11$, $p \approx 0.282$

Notes: The reduced-covariate models retain the two country-year predictors and omit the institutional and firm-level controls. The reduced-covariate observed model gives $b = 26.668$, $SE = 13.055$, $t = 2.043$, $R^2 = 0.016$, $F(2, 327) = 2.693$, $p = 0.069$. Controls: $\ln_assets$, $leverage$, ROA , $export_intensity$, $export_intensity_country$, EU dummy. Source: Authors' calculations.

The pattern is consistent across the two rows. Trade agreement exposure is significantly and positively associated with ESG performance in both frameworks under the reduced covariate set, and in neither once the full controls are added. The difference is thus located in the covariate set and not in the representation of ESG, and H2 is supported.

The structure of the trade variable explains why. The index is defined at the country-year level and is

entangled with the other country-year indicators, correlating negatively with $export_intensity_country$ in Austria ($r = -0.378$, $p < 0.001$) and in Germany ($r = -0.584$, $p < 0.001$), while the EU dummy separates the same countries once more. Conditional on EU membership, firm size and

country-level trade structure, the index explains no additional variation in either framework, so that H1 is supported under the reduced covariate specifications and not under institutional conditioning.

Discussion

Synthesis of Key Findings

The answer to the central research question is conditional. Trade agreement exposure is positively associated with firm-level ESG performance, and the association does not survive institutional controls in either framework, so that H1 holds only in reduced-covariate specifications. H2 is supported, with the crossed design locating the sensitivity in the covariate set. H3 is supported, since ESG performance differs significantly across the three countries.

These results describe a relationship that is real at the level of institutional context and not identifiable at the level of the individual firm. Trade agreements form part of the institutional environment that distinguishes countries from one another, and once that environment is controlled for directly, the agreement measure has nothing left to explain, which is consistent with evidence that institutional quality is itself a primary driver of ESG performance (Pinheiro et al., 2024). The multi-group result points the same way: the countries differ in the level of ESG performance while the structural relationships cannot be distinguished.

Theoretical and Methodological Contributions

The theoretical contribution relates to the level at which international trade should be modelled. Since trade agreements are better read as carriers of governance expectation and reputational discipline

than as flows of goods (DiMaggio & Powell, 1983; Gereffi et al., 2005), results support the former interpretation more than the latter and also add a note of caution as to identification, because an agreement measure that is a national attribute is observationally equivalent to the institutional environment itself.

The methodological contribution is more important. The standard explanation for null results in ESG research is measurement error and aggregation bias, which carries a seldom tested implication that a latent specification should recover what a composite conceals, yet does not in this sample. The trade relationship is identical under both representations. Changing the covariate set can alter the estimated relationship in ways that cannot be resolved simply by replacing an observed ESG composite with a latent measure. The measurement critique stays well founded (Berg et al., 2022), but measurement architecture and covariate structure are separate sources of sensitivity and should be tested separately.

Practical and Policy Implications

For corporate managers, the results have cautionary lessons. Managers should not pursue the ESG score as a target; governance oversight is most strongly related to the latent factor and the composite compresses dimensions that behave differently, such that the expectations embedded in trade agreements are met through integration across the three dimensions, as opposed to effort directed at a headline number.

The results give policymakers and trade negotiators reasons to be wary about reading firm-level sustainability performance improvements as having to do with the trade agreement where national

circumstances are not controlled for. Once national institutional context is held constant, the positive association disappears, which suggests that sustainability provisions work through the national regulatory and enforcement environment as opposed to independently of it. Evaluation frameworks that do not condition on that context will overstate the effect of the agreements.

For ESG rating agencies, the three dimensions share a common factor accounting for 57.178 per cent of the variance and retain substantial dimension-specific variance, which supports publishing component scores alongside any composite. Moving to latent models does not, on this evidence, change what an analyst would conclude about trade exposure; the gain lies in the transparency of the assumptions.

Conclusion

On a balanced panel of 30 firms observed over eleven years, trade agreement exposure is positively and significantly associated with ESG performance under the reduced covariate set, in the observed composite framework ($\beta = 0.152$, $p = 0.042$) and in the latent framework ($\beta = 0.262$, $p = 0.007$) alike, and is not significant in either once institutional and firm-level controls enter. H1 is supported in the reduced-covariate specifications but not supported once institutional and firm-level controls are introduced. H2 is supported, with the sensitivity

located in the covariate set. H3 is supported.

The originality of the paper lies in the crossed design as opposed to either estimate on its own. Comparing a composite model against a latent model is common practice, and the comparison is

uninformative when the two also differ in what they control for.

Several limitations qualify these conclusions, and each points to a specific extension.

Sample constraints: The sample is deliberately limited to 30 firms with continuous disclosure over the full eleven-year period. As a result, large listed multinationals are overrepresented in the sample, while SMEs and unlisted firms are not represented. The small number of firms in each country also limits the power of the multi-group analysis. A larger number of firms per country would provide a stronger basis for the country comparisons.

Measurement of trade exposure: Because the trade agreement exposure index is defined at the country-year level, the analysis contains only 33 distinct index values. The limited within-sample variation makes the trade effect difficult to distinguish from other country-year influences. Using firms' actual export destinations would make it possible to construct firm-specific exposure measures and separate trade exposure more clearly from national institutional conditions.

ESG measurement: The ESG measures are taken from one aggregation platform, which means that the estimates remain tied to the way that platform constructs and scales its ratings. The non-significant results should therefore be checked against ESG measures from other data sources before they are

interpreted more broadly.

Endogeneity and causality: The analysis identifies associations rather than causal effects. Unobserved institutional or macroeconomic factors may still

affect both trade-agreement exposure and coverage, would address the direction and the corporate ESG performance. Designs with temporal timing of adjustment lags, or with an exogenous change in agreement

Data Availability: Findings in this paper are based on secondary databases and data sources described in Appendix B.

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Appendix

Appendix A: Firms in the Balanced Panel

Table A1

Composition of the balanced panel by country (30 firms, 330 observations)

Country	Firms included (10 per country)	Sectors represented
Austria	voestalpine AG, OMV AG, Verbund AG, Wienerberger AG, ANDRITZ AG, Raiffeisen Bank International AG, Mayr-Melnhof Karton AG, RHI Magnesita, A1 Telekom Austria AG, PORR AG	Steel, energy, utilities, construction materials, industrial engineering, banking, packaging, industrial materials, telecommunications, construction
Germany	Siemens AG, Volkswagen AG, BASF SE, BMW AG, Deutsche Bank AG, Allianz SE, SAP SE, Bayer AG, RWE AG, Mercedes-Benz Group AG	Industrial technology, automotive, chemicals, banking, insurance, software, pharmaceuticals, energy and utilities
Switzerland	Nestlé S.A., UBS Group AG, Novartis AG, Roche Holding AG, Zurich Insurance Group AG, Swiss Re AG, ABB Ltd., Holcim Ltd., Givaudan SA, Swisscom AG	Food and beverages, banking, pharmaceuticals, insurance, reinsurance, industrial engineering, construction materials, speciality chemicals, telecommunications

Note: Every firm is observed in each year from 2015 to 2025. Note: RHI Magnesita is classified as Austrian in the analysis on the basis of its Vienna-based administrative headquarters. Its corporate and listing structure changed during the observation period.

Source: Authors' compilation.

Appendix B: Variables, Definitions, and Data Sources

Table B1

Variables entering the empirical models

Variable	Definition	Level	Source
ESG_total_proxy	Weighted composite ESG score, 0–100	Firm-year	CSRHub
ESG_E_proxy, ESG_S_proxy, ESG_G_proxy	Environmental, social and governance component scores, 0–100	Firm-year	CSRHub
governance_oversight_proxy	Board-level governance oversight of ESG, 0–100	Firm-year	CSRHub
disclosure_quality_proxy	Depth and transparency of ESG reporting, 0–100	Firm-year	CSRHub
trade_agreement_exposure_index	Trade-weighted exposure to agreements with sustainability-related provisions in force, normalised to 0–1	Country-year	WIOD and OECD TiVA; official agreement registers
tiva_foreign_value_added_share	Foreign value added as a share of gross exports	Country-year	OECD TiVA
export_intensity_country	Total exports as a share of GDP	Country-year	OECD and World Bank
EU	Institutional dummy: 1 for Austria and Germany, 0 for Switzerland	Country	Authors' coding
total_assets, ln_assets	Total assets in EUR million and their natural logarithm	Firm-year	Orbis
leverage	Total debt divided by total assets	Firm-year	Orbis
ROA	Net income divided by total assets	Firm-year	Orbis
export_intensity	Export revenue divided by total revenue	Firm-year	Orbis

Source: Authors' compilation.

Appendix C: Descriptive Statistics

Table C1

Descriptive statistics of the variables entering the models (N = 330 firm-years)

Variable	Min	Max	Mean	SD
ESG_total_proxy	60.881	84.798	72.976	4.062
ESG_E_proxy	57.792	88.800	73.132	5.767
ESG_S_proxy	47.942	99.000	73.409	6.831
ESG_G_proxy	53.865	88.572	72.713	6.558
governance_oversight_proxy	47.845	97.405	72.794	9.012
disclosure_quality_proxy	64.826	90.598	78.452	5.078
total_assets (EUR million)	8,342.603	126,637.466	36,942.778	22,423.575
leverage	0.379	0.779	0.573	0.070
ROA	0.011	0.086	0.051	0.011
export_intensity	0.365	0.778	0.571	0.082
export_intensity_country	0.446	0.683	0.558	0.075
tiva_foreign_value_added_share	0.267	0.419	0.339	0.050
trade_agreement_exposure_index	0.572	0.657	0.619	0.023

Source: Authors' calculations based on CSRHub, Orbis, WIOD and OECD TiVA data.

Appendix D: Multi-Group Structural Equation Model

Table D1

Multi-group structural equation model across Austria, Germany, and Switzerland

Fit index or test	Unconstrained model	Constrained model
χ^2 (df)	21.500 (21)	28.600 (31)
p	0.431	0.591
CFI	0.999	1.000
TLI	0.997	1.011
RMSEA	0.014	0.000 [0.000, 0.064]
SRMR	0.045	0.057
Likelihood-ratio difference test: $\Delta\chi^2(10) = 7.100$, $p = 0.716$		
Constraints score test: $\chi^2(10) = 0.244$, $p = 1.000$		

Notes: 110 firm-years per country. The constrained model holds five structural coefficients equal across countries, which imposes ten restrictions.

Source: Authors' calculations.

Appendix E: Trade Agreements Entering the Exposure Index

Table E1

Agreements with sustainability-related provisions entering the exposure index

Institutional level	Agreement	In force	Applies to
EU common commercial policy	EU-South Korea FTA	2011	Austria, Germany
EU common commercial policy	EU-Canada CETA	2017 (provisional application)	Austria, Germany
EU common commercial policy	EU-Japan EPA	2019	Austria, Germany
EU common commercial policy	EU-Singapore FTA	2019	Austria, Germany
EU common commercial policy	EU-Vietnam FTA	2020	Austria, Germany
EFTA	EFTA-Canada FTA	2009	Switzerland
Bilateral	Switzerland-Japan FTEPA	2009	Switzerland
Bilateral	Switzerland-EU bilateral agreements	ongoing	Switzerland

Notes: The compilation is based on the official agreement texts and the European Commission and EFTA registers; the agreement with Japan is a bilateral agreement of Switzerland and not an EFTA agreement; partner weights from WIOD and OECD TiVA. Agreements under the EU common commercial policy apply to both member states in the sample, so index differences between Austria and Germany arise from the partner weights alone. German supply chain due diligence legislation is institutional context and is not counted. The table reports the agreements included in the construction of the exposure index and is not intended as an exhaustive inventory of all agreements in force during the observation period.

Source: Authors' compilation.

Appendix F: Realised Values of the Trade Agreement Exposure Index

Table F1

Trade agreement exposure index by country and year (33 country-year cells)

Year	Austria	Switzerland	Germany
2015	0.6248	0.5861	0.6282
2016	0.5958	0.6061	0.6057
2017	0.6021	0.5832	0.6363
2018	0.6114	0.5952	0.6110
2019	0.6031	0.5943	0.6412
2020	0.6292	0.5723	0.6521
2021	0.6189	0.5871	0.6504
2022	0.6247	0.6036	0.6544
2023	0.6206	0.6088	0.6421
2024	0.6409	0.6256	0.6547
2025	0.6460	0.6212	0.6574

Notes: The index is a country-year measure, so every firm headquartered in the same country carries the same value in a given year. Mean = 0.619, SD = 0.023, range 0.572 to 0.657.

Source: Authors' calculations from the agreements listed in Appendix E, with partner weights from WIOD and OECD TiVA.

Mednarodni trgovinski sporazumi in trajnostna uspešnost podjetij v Avstriji, Nemčiji in Švici

Izvleček

V članku preučujemo, ali je vpliv mednarodnih trgovinskih sporazumov povezan z uspešnostjo podjetij na področju ESG ter ali je odgovor odvisen od specifikacije modela. Uravnotežen panel 30 podjetij s sedežem v Avstriji, Nemčiji in Švici se opazuje letno od leta 2015 do 2025, kar daje skupaj 330 opazovanj. Kombinirata se panelna regresija na opazovani sestavljeni ESG-kazalnik in modeliranje strukturnih enačb z latentnim ESG-faktorjem, trgovinska pot pa se ponovno oceni v križni zasnovi merilnega okvira in niza spremenljivk. Izpostavljenost trgovinskim sporazumom je pozitivno povezana z uspešnostjo ESG v obeh okvirih ob zmanjšanem nizu spremenljivk, v nobenem od njiju pa ne, ko se vključijo institucionalne in podjetniške kontrolne spremenljivke. Vzorec je namensko izbran in omejen na velika podjetja, ki kotirajo na borzi. Povezava je torej odvisna od specifikacije in ne od merjenja, kar pojasnjuje nasprotujoče si rezultate v strokovni literaturi.

Ključne besede: okolje, družba in upravljanje (ESG), mednarodni trgovinski sporazumi, modeliranje strukturnih enačb, občutljivost na specifikacijo