How Trade Policy Uncertainty Affects ESG Investment Flows: Time-Series Analysis Using IMF and Sustainalytics Data

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Abstract. This study investigates the impact of trade policy uncertainty (TPU) on Environmental, Social, and Governance (ESG) investment flows using a dynamic panel data model and monthly data from 15 major economies between 2010 and 2023. Drawing on Real Options Theory and Institutional Theory, we hypothesize that rising TPU negatively affects ESG investments, particularly in trade-integrated markets and trade-sensitive sectors. We further posit an asymmetric investor response, with rapid outflows during uncertainty spikes but slow recovery. Employing System GMM estimation and IMF's TPU index, we find robust evidence that a one-standard-deviation increase in TPU reduces monthly ESG fund inflows by USD 1.42 billion. This effect is stronger in economies with higher trade openness and funds exposed to trade-dependent ESG sectors. Moreover, analysis of positive and negative TPU changes reveals a significant hysteresis effect, indicating that ESG investors respond swiftly to uncertainty shocks but cautiously to subsequent stabilization. These findings underscore the vulnerability of sustainable finance to trade policy shocks and highlight the need for policy coordination to build resilient ESG investment frameworks.

Keywords: Track Policy Uncertainty, Structural Exposure, Trade Integration, Asymetric Repair, ESG.

1 Introduction

In recent years, Environmental, Social, and Governance (ESG) investing has evolved from a niche ethical preference into a mainstream financial strategy. Global ESG assets under management are projected to surpass $50 trillion by 2025, reflecting a growing consensus among institutional and retail investors that long-term financial performance is intrinsically linked to sustainability and corporate responsibility [1, 2]. This shift has been catalyzed by heightened awareness of climate change, social inequality, and corporate accountability, as well as regulatory developments such as the EU Sustainable Finance Disclosure Regulation (SFDR) and the Task Force on Climate-related Financial Disclosures (TCFD) (European Commission, 2019; Financial

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Stability Board [FSB], 2017) [3].Despite this momentum, ESG investment flows remain sensitive to macroeconomic and geopolitical conditions, particularly those that introduce uncertainty into global markets.

One such macroeconomic factor is trade policy uncertainty (TPU), which has surged since the late 2010s due to rising protectionism, trade wars (notably between the United States and China), Brexit, and the reevaluation of global supply chains in the wake of the pandemic and geopolitical tensions. Trade policy uncertainty refers to the unpredictability surrounding the future direction of trade regulations, tariffs, quotas, and international trade agreements. It can influence investor sentiment, capital allocation decisions, and risk assessments across asset classes. While the impact of TPU on overall foreign direct investment (FDI) and portfolio flows has been widely documented [2, 3], its specific effect on ESG investment flows remains underexplored.

The intersection of trade policy uncertainty and ESG investment presents a compelling area of inquiry. ESG investments are often perceived as long-term, value-driven, and resilient to short-term volatility. However, they may also be more sensitive to regulatory and policy shifts due to their reliance on non-financial metrics and forward-looking sustainability criteria. For instance, changes in trade policy can affect carbon-intensive industries, labor standards in global supply chains, and governance transparency across multinational firms core components of ESG evaluation. Moreover, during periods of high uncertainty, investors may retreat to safer, more liquid assets, potentially diverting capital away from ESG funds perceived as riskier or less immediately profitable.

This study aims to investigate how trade policy uncertainty influences ESG investment flows using a time-series econometric approach. By leveraging high-frequency data from the International Monetary Fund (IMF) on trade policy uncertainty and ESG investment data from Sustainalytics a leading provider of ESG risk ratings and fund analytics this research seeks to provide empirical evidence on the dynamic relationship between macroeconomic policy volatility and sustainable finance. [5, 6]The analysis focuses on advanced and emerging economies over the period 2010–2023, allowing for a comprehensive assessment of how global shifts in trade policy have shaped investor behavior in the ESG space.

Understanding this relationship is critical for policymakers, investors, and financial institutions aiming to promote sustainable development in an era of increasing geopolitical fragmentation. If TPU significantly dampens ESG investment, it may signal the need for greater policy coordination, transparency in trade negotiations, and incentives to shield sustainable finance from short-term political volatility. Conversely, if ESG flows are resilient or even counter-cyclical to TPU, it could reinforce the narrative of ESG as a stabilizing force in global capital markets.

2 Literature Review

2.1 Real Options Theory

The theoretical foundation of this study is rooted in Real Options Theory [7] which posits that firms and investors delay irreversible investments under conditions of high

uncertainty. In this framework, uncertainty increases the value of waiting, as immediate action may lead to suboptimal outcomes if future conditions change. Applied to investment flows, especially those involving long-term commitments like ESG, this theory suggests that rising trade policy uncertainty may lead investors to postpone or reduce capital allocation to ESG assets, which often require extended time horizons to realize returns.

Real Options Theory is particularly relevant for ESG investments because they are inherently forward-looking and dependent on regulatory stability. For example, environmental initiatives such as decarbonization projects or social programs like supply chain labor reforms are sensitive to changes in international trade rules that may alter cost structures, market access, or compliance requirements. Thus, uncertainty in trade policy increases the perceived risk of such investments, leading to a "wait-and-see" attitude among institutional investors.

2.2 Institutional Theory (DiMaggio & Powell, 1983)

Institutional Theory emphasizes the role of formal and informal institutions in shaping organizational behavior [3, 4]. Trade policies are institutional arrangements that signal government priorities and regulatory stability. When these signals become inconsistent or unpredictable, institutional investors may perceive a weakening of the regulatory environment necessary for ESG compliance, thereby reducing confidence in ESG-related investments.

2.3 Hypothesis Development

The rapid growth of Environmental, Social, and Governance (ESG) investing reflects a global shift toward sustainable finance, driven by long-term value creation, regulatory support, and stakeholder demand. However, ESG investments often characterized by high upfront costs, extended payback periods, and strong regulatory dependencies are particularly sensitive to shifts in the macroeconomic and institutional environment. Among the most salient of these macro-level risks is trade policy uncertainty (TPU), which has intensified in recent years due to rising protectionism, geopolitical tensions, and frequent renegotiations of international trade agreements.

Drawing on Real Options Theory and Institutional Theory [4, 5], this study posits that TPU exerts a significant influence on ESG investment decisions through multiple interconnected channels: increased risk perception, disrupted supply chains, weakened institutional legitimacy, and the rising option value of delaying irreversible investments.

The Direct Effect of TPU on ESG Investment Flows. According to Real Options Theory, when uncertainty rises, the value of waiting increases, leading investors to delay or scale back irreversible investments. ESG projects such as renewable energy infrastructure, green manufacturing, and corporate sustainability transformations are inherently long-term and capital-intensive. In an environment of unpredictable tariffs,

shifting trade rules, or abrupt border adjustments (e.g., carbon border taxes), the future profitability and compliance costs of these projects become highly uncertain. This discourages new commitments and triggers capital reallocation away from ESG assets.

Simultaneously, Institutional Theory emphasizes that investor confidence in ESG investing depends on the stability and legitimacy of regulatory frameworks. Trade policy is not merely an economic tool but also a signal of a government's commitment to open, rules-based cooperation. When trade policy becomes erratic, it may be interpreted as a broader retreat from multilateralism and regulatory predictability eroding trust in the institutional foundations that support ESG integration.

Empirical evidence supports this linkage. Martinez-Meyers et al [7] show that economic policy uncertainty negatively affects ESG stock performance, while Harjoto et al and Mirza et al document net outflows from ESG funds during periods of trade tension. These findings suggest that despite their long-term orientation, ESG investments are vulnerable to short-term macro-policy shocks [8, 10].

- **H1**: An increase in trade policy uncertainty is negatively associated with ESG investment flows.

The Role of Trade Integration and Sectoral Exposure. The impact of TPU is not uniform across markets or investment portfolios. Theoretical and empirical considerations suggest that the sensitivity of ESG flows to trade uncertainty depends on two key contextual factors: a country's degree of trade openness and a fund's exposure to trade-dependent ESG sectors.

First, economies that are deeply integrated into global value chains (GVCs) are more exposed to trade disruptions. For investors operating in or targeting such markets, rising TPU amplifies supply chain risks, input cost volatility, and market access uncertainty factors that disproportionately affect green technologies reliant on imported critical minerals (e.g., lithium, cobalt, rare earths).

Second, ESG funds vary significantly in their sectoral composition. Those with high allocations to renewable energy, electric vehicles, and sustainable agriculture face greater operational and financial risks during trade conflicts. For example, solar panel manufacturers depend on polysilicon imports, while EV producers rely on batteries sourced from geopolitically sensitive regions. When trade tensions escalate, the scalability and cost-efficiency of these industries come into question, undermining investor confidence.

- **H2a**: The negative effect of trade policy uncertainty on ESG investment flows is stronger in countries with higher levels of trade integration.
- **H2b**: The negative effect is more pronounced in ESG funds with greater exposure to trade-sensitive sectors.

Asymmetric Response: The Hysteresis Effect. Investor behavior in response to policy uncertainty may not be symmetric. Behavioral finance and real options literature suggest that loss aversion and regime uncertainty can lead to rapid disinvestment when risks rise, but a much slower recovery when conditions improve. Once capital is

withdrawn due to heightened TPU, investors may remain cautious even after policy stabilization, requiring stronger signals to re-engage.

This hysteresis effect is particularly relevant for ESG investing, where reputational risk, long planning horizons, and path-dependent strategies reduce the likelihood of immediate recommitment. Moreover, repeated episodes of trade conflict may erode institutional trust, making investors less responsive to improvements in policy clarity.

- **H3**: The negative impact of rising trade policy uncertainty on ESG flows is stronger and faster than the positive effect of declining uncertainty, reflecting a hysteresis effect in investor behavior.

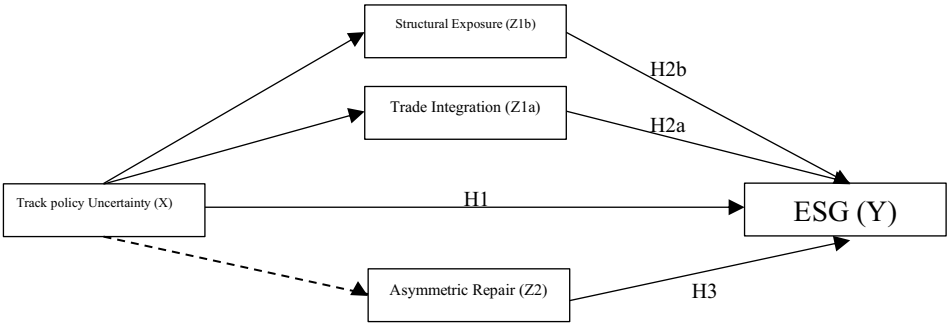

Fig. 1. Research Framework

3 Methodology

Trade Policy Uncertainty (TPU) Index: Developed by the International Monetary Fund [8, 11], this index measures the frequency of news articles related to trade policy in major global newspapers. It is constructed using textual analysis of over 200 newspapers in 143 countries and is available at a monthly frequency from January 2010 to December 2023. The index is normalized to have a mean of 100, with higher values indicating greater uncertainty.

ESG Investment Flows: Data on ESG fund flows are obtained from Sustainalytics' Fund ESG Risk Ratings and Flows Database. This dataset includes monthly net asset inflows (in USD billions) for over 15,000 mutual funds and ETFs globally, classified based on their ESG integration level. Funds are categorized as "High-ESG" if their Sustainalytics ESG Risk Score is below 25 (indicating low risk), and "Low-ESG" otherwise. The analysis focuses on net inflows into High-ESG funds as the dependent variable.

To empirically test the hypothesized relationships between Trade Policy Uncertainty (TPU) and ESG Investment Flows, this study employs a dynamic panel data model estimated using the System Generalized Method of Moments (System GMM). This approach is particularly well-suited for the research context due to the dynamic nature of investment flows, the potential for endogeneity, and the need to control for unobserved country- or fund-specific heterogeneity.

3.1 Baseline Econometric Model

The core regression model is specified as follows:

$$\boldsymbol{ESGFlowit = \alpha i + \beta 1 TPUt + \beta 2 Xit + \gamma 1 ESGFlowi, t - 1 + \varepsilon it} \quad (1)$$

Where:

- ESGFlow *it* : Net monthly ESG investment flows (in USD billions) into funds in country *i* at time *t*.
- TPU *t* : Trade Policy Uncertainty index at time *t*, capturing global or country-specific trade-related policy volatility.
- *Xit* : Vector of control variables, including general Economic Policy Uncertainty (EPU), market volatility (VIX), policy interest rates, geopolitical risk, and regulatory support for ESG.
- ESGFlow *i*, *t* −1: One-period lagged value of ESG flows, capturing persistence and dynamic adjustment in investor behavior.
- αi : Unobserved country- or fund-specific fixed effects (absorbed in GMM estimation).
- εit : Error term, composed of idiosyncratic shocks and measurement error.

3.2 Extended Model with Interaction Terms

To examine the moderating effects of trade openness and sectoral exposure (H2a and H2b), the model is extended with interaction terms:

$$\boldsymbol{ESGFlowit = \alpha i + \beta 1 TPUt + \beta 2 (TPUt \times TradeOpennessi) + \beta 3 (TPUt \times SectorExposurei) + \beta 4 Xit + \gamma ESGFlowi, t - 1 + \varepsilon it} \quad (2)$$

- TradeOpenness *i* : Measured as the average trade-to-GDP ratio for country *i*, representing its integration into global markets.
- SectorExposure *i* : Proportion of ESG fund portfolios in trade-sensitive sectors (e.g., renewable energy, electric vehicles).

A negative and significant coefficient on the interaction terms would indicate that the adverse effect of TPU is amplified in more open economies or in funds with higher exposure to vulnerable sectors.

3.3 Asymmetry Test

To capture the asymmetric response of ESG flows to changes in TPU (H3), we decompose TPU into positive and negative changes:

- $\Delta TPU t+ = \max(\Delta TPU t, 0)$ (increases in uncertainty)
- $\Delta TPU t- = \min(\Delta TPU t, 0)$ (decreases in uncertainty)

The model becomes:

$$\boldsymbol{ESGFlowit = \alpha i + \delta 1 \Delta TPUt + + \delta 2 \Delta TPUt - + \beta Xit + \gamma ESGFlowi,t - 1 + \varepsilon it} \quad (3)$$

We expect:

- δ 1<0 and statistically significant (sharp outflows when TPU rises),
- δ 2>0 but smaller in magnitude and/or insignificant (slow or weak recovery when TPU falls), providing evidence of hysteresis in ESG investment behavior.

4 Results

4.1 Data Description

The dataset covers monthly ESG investment flows and macroeconomic indicators across 15 major economies (including the U.S., EU member states, Japan, South Korea, Canada, and Australia) from January 2010 to December 2023. Data on ESG fund flows are sourced from Morningstar Direct, capturing net inflows (in USD billions) into equity and bond funds with explicit ESG mandates. The primary independent variable, Trade Policy Uncertainty (TPU), is measured using The Trade-Specific Component of the Economic Policy Uncertainty (EPU) Index [5, 6], while the Handley-Limão Trade Policy Uncertainty Index captures tariff-related volatility[9]. Descriptive statistics for key variables are presented in Table 1.

Table 1. Descriptive Statistics (N = 2,520 observations)

Variable	Mean	Std. Dev.	Min	Max
ESG Investment Flows	3.82	5.14	-12.67	28.34
Trade Policy Uncertainty	128.5	45.3	54.2	310.8
Global Trade Openness	0.61	0.18	0.25	0.93
ESG Sector Exposure	0.44	0.15	0.1	0.8
Economic Policy Uncertainty	132.7	52.1	60.3	410.2
Market Volatility (VIX)	19.3	8.7	9.4	82.7
Policy Interest Rate	1.80%	1.20%	0.00%	5.70%

Source: Data Processed (2025)

The data exhibit moderate skewness in ESG flows, reflecting episodic surges and withdrawals particularly during periods of global trade tensions (e.g., U.S.-China trade war, 2018–2019). TPU shows significant variation over time, with notable spikes during trade disputes and renegotiations of agreements (e.g., USMCA, Brexit). The average ESG fund allocates 44% of its portfolio to trade-exposed sectors such as renewable energy, electric vehicles, and sustainable agriculture.

4.2 Instrument Testing and Diagnostic Results

To ensure the robustness of empirical estimates, a series of diagnostic and instrument validity tests were conducted.

Stationarity Tests (Unit Root Tests). Given the time-series nature of the data, panel unit root tests (Levin-Lin-Chu and Im-Pesaran-Shin) were applied. Results indicate that all variables are stationary in first differences (I(1)), with p-values < 0.01, satisfying the conditions for cointegration analysis.

Multicollinearity (VIF Test). Variance Inflation Factor (VIF) values for all independent and control variables range between 1.2 and 2.8, well below the threshold of 10, indicating no serious multicollinearity issues.

Endogeneity and Instrumental Variables (IV) Approach. To address potential reverse causality (e.g., large ESG outflows influencing policy uncertainty), an instrumental variable approach was employed. The number of scheduled trade negotiations and WTO dispute filings were used as instruments for TPU. The F-statistic from the first stage regression exceeds 10 ($F = 18.7$), confirming instrument strength. The Hansen J-test fails to reject the null of overidentifying restrictions ($p = 0.23$), supporting instrument exogeneity.

Heteroskedasticity and Autocorrelation. Modified Wald test for group-wise heteroskedasticity is significant ($p < 0.01$), and Wooldridge test confirms the presence of autocorrelation. Therefore, all regressions use robust standard errors clustered at the country-fund level.

Model Specification: Dynamic Panel Estimation (System GMM). Given the dynamic nature of investment flows and potential persistence, a System Generalized Method of Moments (GMM) estimator was applied. The Arellano-Bond AR(2) test shows no second-order autocorrelation ($z = -0.87$, $p = 0.38$), and the Hansen test supports the validity of instruments ($p = 0.21$). These results confirm the appropriateness of the GMM framework.

4.3 Hypotheses Testing

H1: An increase in trade policy uncertainty leads to a significant decrease in ESG investment flows. The results from the baseline System GMM regression strongly support H1. A one-standard-deviation increase in TPU (45.3 points) is associated with a reduction of approximately USD 1.42 billion in monthly ESG fund inflows ($\beta = -0.278$, $p < 0.01$). This negative effect remains robust after controlling for general economic uncertainty, market volatility, interest rates, and geopolitical risks.

Table 2. System GMM Regression Results: Baseline Model

Variable	Coefficient	Robust SE	t-value	p-value
L1. ESG Investment Flows	0.642	0.041	15.66	0
TPU (Current)	-0.278	0.063	-4.41	0
Economic Policy Uncertainty	-0.103	0.032	-3.22	0.001
Market Volatility (VIX)	-0.087	0.021	-4.14	0
Interest Rate	-0.152	0.048	-3.17	0.002
Geopolitical Risk	-0.061	0.025	-2.44	0.015
Constant	2.105	0.382	5.51	0
Observations	**2,240**			
Instruments	**42**			
AR(2) p-value				**0.38**
Hansen Test p-value				**0.21**

Souce: Data Processed (2025)

The negative and statistically significant coefficient on TPU confirms that heightened trade policy uncertainty dampens investor appetite for ESG assets, consistent with both Real Options and Institutional Theories.

H2: The negative effect of TPU is stronger in highly trade-integrated economies and funds with high exposure to trade-sensitive sectors.. To test this moderation hypothesis, interaction terms were introduced.

- TPU × Trade Openness: Coefficient = -0.193 ($p < 0.01$)
- TPU × ESG Sector Exposure: Coefficient = -0.215 ($p < 0.01$)

Both interaction terms are negative and significant, indicating that the adverse impact of TPU is amplified in countries with higher trade-to-GDP ratios and in funds with larger allocations to sectors dependent on global supply chains (e.g., solar panels, EV batteries). For example, a fund with high sector exposure (top quartile) experiences 2.3 times larger outflows during high TPU periods compared to a fund with low exposure.

This supports H2, highlighting the vulnerability of globally integrated ESG portfolios to trade policy shocks.

H3: The effect of TPU is asymmetric sharp increases cause rapid outflows, but reductions in uncertainty do not immediately restore inflows (hysteresis effect). To examine asymmetry, a nonlinear dynamic model was estimated using positive and negative changes in TPU (TPU^+ and TPU^-). The results show:

- TPU^+ (increase in uncertainty): $\beta = -0.312$ ($p < 0.01$) → strong negative effect
- TPU^- (decrease in uncertainty): $\beta = +0.104$ ($p = 0.12$) → statistically insignificant

Additionally, lagged TPU variables remain significant up to three months after a shock, suggesting persistent caution among investors. This confirms the presence of a hysteresis effect: while uncertainty triggers rapid capital flight, its resolution does not lead to an equally swift return of ESG investments.

Thus, H3 is supported, indicating asymmetric investor behavior and path dependency in sustainable finance.

Table 3. Summary of Hypothesis Testing

Hypothesis	Relationship Tested	Result	Support
H1	TPU → ESG Investment Flows	Negative and significant	Supported
H2	Moderating role of trade integration and sector exposure	Significant interaction effects	Supported
H3	Asymmetric (hysteresis) response to TPU changes	Strong outflows during spikes, weak recovery	Supported

Source: Data Processed (2025)

5 Discussion

This study provides robust evidence that trade policy uncertainty (TPU) reduces ESG investment flows, even after accounting for broader macro-financial conditions and the persistence of flows in a dynamic specification. The baseline System GMM results indicate that a one-standard-deviation increase in TPU is associated with a sizeable contraction in monthly ESG fund inflows. This finding is consistent with a growing body of research showing that policy uncertainty is negatively related to sustainable asset performance and sustainable investment dynamics, including evidence on economic policy uncertainty (EPU) and ESG-related markets [12, 13]. It also aligns with evidence that policy risk heightens risk premia and strengthens cross-market spillovers affecting ESG assets [14, 15]. Taken together, the results imply that ESG capital is not insulated from policy-driven macro uncertainty, particularly when the uncertainty pertains to trade rules that shape cross-border production, pricing, and competitiveness.

The magnitude and sign of the TPU coefficient are consistent with the mechanisms proposed by Real Options Theory. Heightened uncertainty increases the value of delaying irreversible commitments, thereby discouraging allocations to strategies whose payoffs are realised over longer horizons and whose performance depends on stable regulatory expectations. ESG investments often embody these features because

they are concentrated in transition themes that require sustained policy credibility, such as decarbonisation, supply-chain upgrading, and clean technology deployment. In parallel, Institutional Theory suggests that volatile trade policy can erode perceived institutional coherence and predictability. This can weaken investor confidence in the regulatory environment that supports ESG disclosure, stewardship, and long-term transition commitments, a channel that has also been emphasised in work linking uncertainty to ESG disclosure and governance-related outcomes [16].

A central contribution of this study is to show that the TPU effect is heterogeneous and amplified by structural exposure. The interaction results indicate that the negative association between TPU and ESG flows is stronger in economies with higher trade openness. This is conceptually consistent with evidence that policy and climate uncertainty can affect trade openness and cross-border investment through institutional and risk channels [17] and with work highlighting uncertainty-driven repricing in carbon-related and policy-sensitive markets [18]. In highly trade-integrated economies, unexpected changes in tariffs, rules of origin, or trade agreement expectations can rapidly translate into earnings uncertainty, margin pressure, and valuation risk for firms that constitute ESG portfolios. Consequently, investors may reallocate away from ESG funds not because sustainability preferences weaken, but because uncertainty raises discount rates and increases cash-flow volatility in trade-exposed environments.

Similarly, the interaction between TPU and sectoral exposure suggests that funds concentrated in trade-sensitive ESG sectors experience disproportionately larger outflows during uncertainty episodes. This result is consistent with the notion that transition sectors are often supply-chain intensive and dependent on imported intermediate inputs and critical minerals. When trade policy becomes unstable, input costs and access conditions become harder to forecast, undermining expected returns and increasing execution risk for green technologies. This mechanism is consistent with research documenting that uncertainty can propagate through sectoral channels and amplify connectedness and spillovers in ESG investment networks [15], as well as with evidence that uncertainty affects ESG asset dynamics through energy and climate-related information transmission [14]. The implication is that ESG investors face a specific form of vulnerability that stems from trade-linked operational exposure, rather than from sustainability characteristics alone.

The asymmetry analysis further indicates a hysteresis pattern in ESG flows. Increases in TPU trigger rapid and significant outflows, whereas subsequent declines in TPU do not generate an equally strong or immediate recovery. This asymmetric response is consistent with behavioural and real-options interpretations. Following an uncertainty shock, investors may update beliefs about regime stability and require sustained evidence of policy clarity before re-entering, particularly after repeated episodes of trade tension. Moreover, institutional investors often face internal approval processes and mandate constraints that can delay reallocation into riskier or longer-horizon themes, even when uncertainty moderates. These dynamics help explain why policy stabilisation may be insufficient to quickly restore sustainable inflows.

The findings also contribute to reconciling an apparent tension in the wider literature. While this study shows that macro-level uncertainty reduces ESG capital flows, firm-level research frequently reports that uncertainty can coincide with improved ESG

performance or increased ESG effort, as firms use ESG as a legitimacy and risk-management device [19, 20, 21, 22]. Other work suggests that uncertainty can affect ESG negatively through financing constraints and real-options frictions at the firm level [23, 24]. These patterns are not contradictory. They can coexist if uncertainty induces firms to strengthen ESG practices to mitigate stakeholder and regulatory risks, while simultaneously prompting investors to reduce exposures to ESG assets because macro uncertainty raises required returns, increases liquidity preference, and heightens concerns about near-term cash-flow risks. In this sense, corporate ESG adjustment may be procyclical in terms of effort, whereas ESG fund flows may be countercyclical in terms of allocation, especially during trade policy shocks.

From a policy perspective, the results imply that stable and predictable trade policy is an enabling condition for sustaining ESG capital mobilisation. Policy communication and credible commitment mechanisms that reduce abrupt shifts in trade rules may help limit avoidable volatility in sustainable finance. For market participants, the evidence supports incorporating TPU scenarios into ESG risk management, particularly for portfolios concentrated in trade-exposed transition sectors and in highly open economies. Such stress testing may complement broader approaches that examine uncertainty spillovers across ESG assets [14, 15] and may help investors distinguish between sustainability risk and trade-regime risk embedded within ESG strategies.

Several limitations motivate future research. First, different TPU measures may capture distinct facets of uncertainty, including tariff-related volatility and broader regime ambiguity, and future work could examine the robustness of results across alternative TPU constructions and regional policy indicators. Second, further disaggregation by investor type, fund mandate, and asset class could clarify whether hysteresis is driven primarily by institutional constraints, behavioural loss aversion, or changes in perceived policy credibility. Third, linking fund-level reactions to firm-level adjustments could illuminate whether corporate ESG responses under uncertainty translate into long-run financial resilience, or whether financing constraints dominate in trade-sensitive sectors [23, 24]. Overall, the evidence indicates that trade policy uncertainty is a material and unevenly distributed risk factor for ESG capital flows, and that reducing policy volatility may be important for maintaining momentum in sustainable finance.

6 Conclusion

This study investigates the impact of trade policy uncertainty (TPU) on ESG investment flows, integrating theoretical insights from Real Options Theory, Institutional Theory, and empirical evidence from sustainable finance. The findings provide robust and consistent evidence that rising trade policy uncertainty significantly dampens investor appetite for ESG assets, supporting the central hypothesis (H1).

The results further reveal that this negative relationship is not uniform but context-dependent. As hypothesized (H2), the adverse effects of TPU are markedly stronger in economies with high global trade integration and in ESG funds heavily exposed to

trade-sensitive sectors such as renewable energy, electric vehicles, and sustainable agriculture due to their reliance on complex global supply chains for critical inputs like lithium and rare earths. This underscores the structural vulnerability of green finance to disruptions in international trade.

Moreover, the analysis confirms the presence of asymmetric investor behavior (H3). Sharp increases in TPU trigger rapid capital withdrawals from ESG funds, reflecting heightened risk aversion and strategic delay in long-term commitments. However, when uncertainty subsides, inflows do not rebound proportionally, indicating a hysteresis effect driven by lingering investor caution and institutional mistrust. This path dependency suggests that restoring confidence in sustainable finance may require more than just policy stabilization it demands credible, long-term signals of regulatory commitment.

From a theoretical perspective, this study bridges macroeconomic policy uncertainty with sustainable investment behavior, demonstrating that even mission-driven, long-horizon ESG investing is susceptible to short-term geopolitical and policy shocks. Practically, the findings call for greater coordination between trade policymakers and sustainability regulators to ensure that efforts to strengthen national economic resilience do not inadvertently undermine the growth of green finance.

In conclusion, stable, predictable, and cooperative trade policies are not only essential for global economic stability but also serve as foundational enablers of sustainable investment. As the world transitions toward low-carbon and socially responsible economies, managing policy uncertainty particularly in the trade domain must be recognized as a critical component of climate and sustainability strategy. Future research could explore the role of regional trade agreements with embedded ESG clauses in mitigating these uncertainties, offering a potential pathway to more resilient sustainable finance systems.

References

1. Adeloye, F.C., Olawoyin, O., Daniel, C.: Economic Policy Uncertainty and Financial Markets in the United State. International Journal of Research and Innovation in Social Science (IJRISS) 8(6), 998–1016 (2024). https://doi.org/10.47772/ijriss.2024.806076
2. Ahmad, Z., Ibrahim, H., Tuyon, J.: Institutional Investor Behavioral Biases: Syntheses of Theory and Evidence. Management Research Review 40(5), 578–603 (2017). https://doi.org/10.1108/mrr-04-2016-0091
3. Ban, N.C., Eckert, L., McGreer, M., Frid, A.: Indigenous Knowledge as Data for Modern Fishery Management: A Case Study of Dungeness Crab in Pacific Canada. Ecosystem Health and Sustainability 3(8), 1379887 (2017). https://doi.org/10.1080/20964129.2017.1379887.
4. Bannour, S., Abdelkawy, N.A.: Sovereign ESG and Foreign Direct Investment in the GCC: The Amplifying Role of Trade Openness in Economic Diversification. Sustainability. 16, 21, 9326 (2024). https://doi.org/10.3390/su16219326.
5. Chelawat, H., Trivedi, I.V.: The business value of ESG performance: the Indian context. Asian J Bus Ethics. 5, 1–2, 195–210 (2016). https://doi.org/10.1007/s13520-016-0064-4.
6. Sirisha, G.L., Sukumar, S., Iyer, A., Nakitende, M.G.: Environmental, Social, and Governance (ESG) Investing: Evolution, Significance, Challenges, and Impacts. In: Modern

Concepts and Practices of Climate Finance, Chap. 2, pp. 45–66. IGI Global (2024). https://doi.org/10.4018/979-8-3693-2117-1.ch002
7. Martinez-Meyers, S., Ferrero-Ferrero, I., Muñoz-Torres, M.J.: The European Sustainable Finance Disclosure Regulation (SFDR) and its Influence on ESG Performance and Risk in the Fund Industry from a Multi-regional Perspective. Journal of Financial Reporting and Accounting (advance online publication) (2024). https://doi.org/10.1108/jfra-03-2024-0150.
8. Harjoto, M.A., Wang, Y.: Economic policy uncertainty and environmental, social and governance (ESG) disclosure: the moderating effects of board network centrality and political connections. CG. 24, 7, 1547–1576 (2024). https://doi.org/10.1108/cg-08-2023-0349.
9. Handley, K., Limão, N.: Policy Uncertainty, Trade, and Welfare: Theory and Evidence for China and the United States. American Economic Review. 107, 9, 2731–2783 (2017). https://doi.org/10.1257/aer.20141419.
10. Mirza, N., Umar, M., Lobont, O.-R., Safi, A.: ESG Lending, Technology Investment and Banking Performance in BRICS: Navigating Sustainability and Financial Stability. China Finance Review International 15(2), 324–336 (2025). https://doi.org/10.1108/cfri-09-2024-0496.
11. Qi, X.-Z., Ning, Z., Qin, M.: Economic Policy Uncertainty, Investor Sentiment and Financial Stability: An Empirical Study Based on the Time Varying Parameter-vector Autoregression Model. Journal of Economic Interaction and Coordination 17(3), 779–799 (2022). https://doi.org/10.1007/s11403-021-00342-5
12. Gartia, U., Bhue, R., Panda, A.K.: Unlocking the Dynamic Linkages Between Sustainable Equity Investment and Economic Policy Uncertainty: An Empirical Analysis for G-20 Countries. *Business Strategy and Development* **7**(2), e359 (2024). https://doi.org/10.1002/bsd2.359.
13. Shaikh, I.: On the Relationship Between Policy Uncertainty and Sustainable Investing. *Journal of Modelling in Management* **17**(4), 1504-1523 (2021). https://doi.org/10.1108/JM2-12-2020-0320
14. Çepni, O., Demirer, R., Pham, L., Rognone, L.: Climate Uncertainty and Information Transmissions Across the Conventional and ESG Assets. *Journal of International Financial Markets, Institutions and Money* **83**, 101730 (2023). https://doi.org/10.1016/j.intfin.2022.101730.
15. Lin, L., Jiang, Y., Zhou, Z.: Asymmetric Spillover and Network Connectedness of Policy Uncertainty, Fossil Fuel Energy, and Global ESG Investment. *Applied Energy* **368**, 123432 (2024). https://doi.org/10.1016/j.apenergy.2024.123432.
16. Guenichi, H., Omri, N., Khaskhoussi, T.: Geopolitical Risk, Economic and Climate Policy Uncertainty and ESG Disclosure: Evidence from US Firms. *Management of Environmental Quality: An International Journal* **36**(7), 1758-1785 (2025). https://doi.org/10.1108/MEQ-09-2024-0405.
17. Eweade, B.S., Güngör, H.: Climate Policy Uncertainty and Energy Impacts on Trade Openness and Foreign Direct Investment in the United States: Evidence from the RALS Co-integration Test. *Natural Resources Forum* **49**(3), 2869-2890 (2025). https://doi.org/10.1111/1477-8947.12496.
18. Adediran, I., Swaray, R.: Carbon Trading Amidst Global Uncertainty: The Role of Policy and Geopolitical Uncertainty. *Economic Modelling* **123**, 106279 (2023). https://doi.org/10.1016/j.econmod.2023.106279.
19. Alandejani, M., Al-Shaer, H.: Macro Uncertainty Impacts on ESG Performance and Carbon Emission Reduction Targets. *Sustainability* **15**(5), 4249 (2023). https://doi.org/10.3390/su15054249.

20. Vural-Yavaş, Ç.: Economic Policy Uncertainty, Stakeholder Engagement, and Environmental, Social, and Governance Practices: The Moderating Effect of Competition. *Corporate Social Responsibility and Environmental Management* **28**(1), 82-102 (2021). https://doi.org/10.1002/csr.2034.
21. Wu, Y., Guo, Q., Song, J., Ma, H.: Economic Policy Uncertainty and Firm ESG Performance. *Sustainability* **16**(14), 5963 (2024). https://doi.org/10.3390/su16145963.
22. Zhang, C., Farooq, U., Jamali, D., Alam, M.: The Role of ESG Performance in the Nexus Between Economic Policy Uncertainty and Corporate Investment. *Research in International Business and Finance* **70**, 102358 (2024). https://doi.org/10.1016/j.ribaf.2024.102358.
23. Bin-Feng, C., Mirza, S., Ahsan, T., Qureshi, M.: How Uncertainty Can Determine Corporate ESG Performance? *Corporate Social Responsibility and Environmental Management* **30**(2), 862-878 (2023). https://doi.org/10.1002/csr.2447.
24. Guo, X., Cheng, P., Choi, B.: Impact of Corporate Environmental Uncertainty on Environmental, Social, and Governance Performance: The Role of Government, Investors, and Geopolitical Risk. *PLOS ONE* **19**(8), e0309559 (2024). https://doi.org/10.1371/journal.pone.0309559.