Beyond Borders: How Trade Policies Affect Deforestation

Abstract

Trade restrictions on high-deforestation commodities are increasingly being used to curb tropical deforestation, yet their actual impact remains largely unquantified. Understanding their effectiveness is crucial for designing policies that balance the environmental and economic goals. This study evaluates trade restrictions on high-deforestation commodities for three scenarios: two based on the EU Deforestation Regulation and one exploring a globally coordinated implementation of import restrictions from High Deforestation Regions (HDR). This approach allows us to examine the effects of these measures when enforced by a single country or region versus multiple countries working together. For the analysis, we use a policy assessment framework based on MAGNET, a global general equilibrium model. Results show that global restrictions achieve the highest reductions in HDR exports, limiting trade diversion and cutting managed forestland in HDR regions by 40 million hectares. In contrast, EU-only restrictions mainly shift trade to alternative markets like China and MENA, with limited impact on global deforestation.

Keywords: Deforestation, Trade restrictions, GTAP, EU Deforestation Regulation.

1. Introduction

As deforestation accelerates, import restrictions on products produced under conditions of resource extraction-driven land-use change have gained increasing attention. Policies such as the European Union Deforestation Regulation (EUDR) aim to restrict market access for deforestation-linked goods, and promote more sustainable practices in high deforestation regions.

Effective from December 2025, the EUDR replaced the EU Timber Regulation (EUTR) and extended restrictions to palm oil, soy, coffee, cocoa, beef and tightened the requirements for timber imports. Companies must ensure that their imports are "deforestation-free", complying with local laws through due diligence, including geolocation data and proof that sourcing excludes land deforested after 2020 (European Commission, 2021). While the EUDR aims to internalize environmental costs, its impact on supply chains and deforestation remains uncertain (Abman et al., 2024b). The successful implementation of this measure requires careful consideration of enforcement, cost-effectiveness, and adaptability. At the same time, the potential consequences of trade diversion, must be considered to ensure that EU-efforts to reduce deforestation are not undermined. In this line, previous literature argue that effective tropical deforestation control requires trade regulations complemented by international support to strengthen territorial policies and social movements addressing forest loss (Fuchs et al., 2024; Muradian et al., 2025).

Studies, such as those by Robalino et al. (2009) and Gardiner (2022) assess the theoretical impact of trade restrictions on commodity flows and associated deforestation rates. Few studies have quantitatively modeled these impacts using scenario-based analyses or employed high-resolution data frameworks (e.g., Busch et al., 2022; Abman et al., 2024b). However, these studies primarily focus on other types of restrictions (e.g. demand restrictions) and use different global trade models.

The present study aims to evaluate the effectiveness of trade restriction policies, implemented by the EU27 and globally. To estimate the potential impacts of the EUDR, we adopt the following approach: We estimate the level of the restrictions based on existing EU Timber Regulation (EUTR) and extend this to other products because there are no other comprehensive estimates available regarding the actual costs associated with the EUDR. We incorporated these estimates into the Computable General Equilibrium (CGE) model MAGNET and conduct simulations under three scenarios: (1) EU-wide restrictions on deforestation-related commodities from all countries, (2) EU restrictions targeting high-deforestation regions, and (3) global restrictions on deforestation-linked commodities. We assess the impact of these policies on deforestation and land use, examine economic and environmental trade-offs - particularly in the agri-food sector - and explore how trade policies can be implemented to reduce deforestation impacts.

The key contribution of this study is the development and application of restriction scenarios based on the EUDR's using a general equilibrium model. This quantitative approach provides insights into the policy's effectiveness, offering a basis for decision-makers for designing trade policies aligned with global conservation objectives.

2. Literature review: The Impact of EU Trade Restrictions on Deforestation

Trade restrictions on deforestation-linked commodities aim to curb global deforestation by reducing demand for products like palm oil, soy, beef, and timber from high-deforestation regions. Grounded in economic theory, these policies address market failures by internalizing environmental costs (Pigou, 1920). Empirical evidence supports the effectiveness of trade regulations, but their impact depends on enforcement. Prestemon (2015) suggests that amendments to the US Lacey Act led to a 30–40% rise in import prices and reduced timber imports, demonstrating a supply contraction effect. However, enforcement challenges and market shift complicate outcomes. To maximize impact, robust enforcement and international cooperation are crucial. Meyfroidt et al. (2010) show that trade restrictions often divert exports to less-regulated markets, reducing net environmental benefits.

Global studies highlight trade policies' complex effects on deforestation. Beckman et al. (2017) used a general equilibrium model to show that removing tariffs on forest-risk products can exacerbate deforestation, while banning illegal timber exports globally can help curb it. Tsurumi and Managi (2014) report that trade liberalization accelerates deforestation in developing countries but mitigates it in wealthier nations due to regulatory differences. These findings stress the importance of context in evaluating trade policies.

The theory of comparative advantage explains why land-abundant countries like Brazil and Indonesia specialize in land-intensive commodities. EU trade restrictions disrupt these patterns by limiting market access, potentially lowering deforestation due to reduced profitability (Angelsen & Kaimowitz, 1999). However, environmental leakage remains a concern. Strict regulations in one region often shift production to areas with weaker policies rather than reducing global deforestation (Meyfroidt et al., 2010). Peters et al. (2011) find that carbon tariffs cause emissions to relocate to less-regulated regions, a trend seen in forest product trade restrictions. Exporters frequently turn to alternative markets, such as China and the United States, where demand for deforestation-linked goods remains high. Without synchronized policies across major consumer markets, trade restrictions risk having a limited global impact.

Gilbert (2024) notes that commodities like beef, rubber, palm oil, and soybeans may be redirected to other markets, undermining the EUDR. Muradian et al. (2025) similarly argue that the EUDR primarily influences EU consumption rather than global deforestation trends. The effectiveness of trade restrictions depends on international cooperation, particularly with China, a major importer of deforestation-linked commodities. In this sense, Beckman et al. (2017) show that rising soybean demand in Asia drives deforestation, while Vasconcelos et al. (2024) warn that the EUDR could push exports toward less-regulated markets. Although China's food security policies limit alignment with EU standards, market incentives and collaboration could encourage partial convergence. Coordinated global action is necessary for trade restrictions to effectively combat deforestation.

Environmental leakage is further driven by price and income effects. A decline in EU demand could lower global prices for deforestation-linked commodities, making them more affordable elsewhere and potentially increasing land-use conversion in less-regulated countries, which may ultimately undermine the EUDR's intended benefits (Persson et al., 2014; Gilbert, 2024). Meanwhile, European consumers may face higher prices for compliant commodities, especially for coffee and cocoa, where EU market shares are significant. Over time, improved compliance systems could mitigate these costs (Gilbert, 2024).

Despite trade restrictions' potential, several critical gaps remain. Global coordination is necessary to prevent trade diversion, but major importers like China and the United States have yet to adopt similar regulations. While environmental leakage is widely recognized, its scale and specific impact on deforestation require further study. Moreover, most research focuses on short-term outcomes, leaving long-term effects on production practices, governance, and sustainability underexplored. Addressing these gaps is crucial for designing trade policies that achieve lasting deforestation reductions.

3. Method and Data

The Modular Applied General Equilibrium Tool (MAGNET model extends the standard GTAP framework for greater flexibility in analyzing global economic, trade, and environmental policies (Woltjer et al., 2014). It introduces five key extensions: (1) improved agricultural sector modeling with differentiated land types, structured land use allocation, and flexible animal feed substitution; (2) explicit representation of agricultural policies like production quotas and land-related payments; (3) a dynamic CDE expenditure function capturing income elasticity shifts with GDP changes; (4) differentiation in capital returns between agricultural and non-agricultural activities (Dixon et al., 2016); and (5) a modular design enabling targeted analysis of sectoral interactions, such as agriculture and energy, while assessing environmental policy impacts (Woltjer & Kuiper, 2014). Our MAGNET version is calibrated to GTAP database version 11 (base year 2017), aggregated into 10 regions and 77 sectors to align with the study's focus.

3.1. Land Use Modeling in MAGNET

In the MAGNET model, land use is represented through a nested Constant Elasticity of Transformation (CET) structure, which extends the standard approach employed in GTAP. In the traditional GTAP framework, land allocation among different agricultural uses is modeled with a single-level CET, assuming that various land uses—such as for crops, livestock, and forestry—are imperfect substitutes for one another. This structure captures the idea that shifting land between uses is not perfectly flexible; rather, there are varying degrees of ease in reallocating land across different activities (Hertel et al., 1997).

MAGNET improves upon this by introducing a three-level CET structure to account for the differential degrees of substitutability between types of land use. This nesting allows for a more granular representation of how land use shifts occur in response to changes in economic conditions, such as policy interventions or market dynamics. Each level of the nested structure reflects varying degrees of substitution possibilities between different categories of land uses—ranging from high substitutability between similar crops, such as cereals and oilseeds, to lower substitutability between broad categories, such as cropland and pasture (van Meijl et al., 2006; Banse et al., 2011). A key consideration in modeling long-run land supply for agriculture and forestry is whether new land can be used for production. Eickhout et al. (2009) propose a land supply schedule in which rising land rents drive the expansion of land used for cultivation. Building on this concept, the MAGNET model adopts a comprehensive approach by integrating both optimization and supply-curve methods to model land supply more dynamically and realistically. Initially, the total supply of land allocated to different agricultural activities is determined using a supply-curve function, where land availability is treated as an endogenous variable that responds dynamically to changes in land rents. In this framework, the supply of land is modeled as a function of the real rental price of land (Dixon et al., 2016):

3.2. Scenario Design and Definitions

According to EUDR, the EU Commission will classify countries or regions based on their likelihood of producing non-deforestation-free commodities. Using the framework from Pacheco et al. (2021), we categorize countries by deforestation rates, with a specific focus on high-deforestation regions (HDR) as primary exporters of commodities associated with deforestation (Figure 2). Next, we identified key deforestation-linked products from the EUDR's official list, which classifies products using Harmonized System (HS) codes. These commodities include palm oil, oilseeds, beef, and timber, among others.

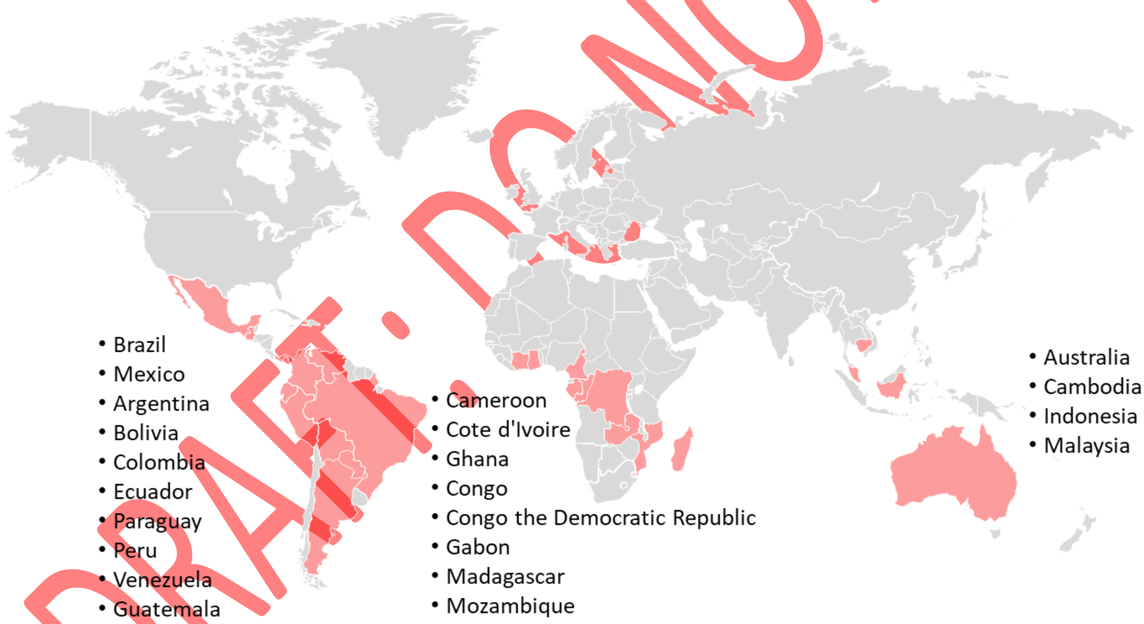


Figure 2: Regions with high or moderate deforestation rates
Source: Own elaboration based on Pacheco et al. (2021).

Since specific ad valorem tariff equivalents for EUDR-related non-tariff measures (NTMs) are not available, we used World Bank estimates on the EUTR for NTM as a proxy. Data from the World Bank suggests a maximum tariff equivalent of 150% for NTMs of similar products as EUDR, which we applied this as an upper boundary. The EUDR regulation is designed based on the HS6 code. However, to evaluate policies, we first needed to calculate trade-weighted rates for NTMs based on MAGNET sectors. Using trade weights at the HS6 level, this maximum tariff equivalent of 150% effectively translates to an import restriction of approximately 10% to 50% on deforestation-linked goods. In the model we added the NTMs as technical costs using an approach developed by Warmsley et al. (2018). Additionally, we perform a sensitivity analysis to simulate the impact of a global trade restriction equivalent to a 50% increase in the ad valorem tariff equivalent[1]. Finally, we developed three scenarios to assess the impact of trade restrictions:

Baseline (SSP2): A reference scenario following the Shared Socioeconomic Pathway 2 (SSP2), representing a "business-as-usual" trajectory with no additional deforestation-related trade restrictions.

Targeted EU27 Trade Restrictions (Res_HD): A 150% tariff equivalent (EQV) imposed only on imports from high-deforestation regions into the EU27, representing a more focused approach to restricting trade with countries exhibiting significant deforestation rates.

EU27-Wide Trade Restrictions (Res_All): A 150% tariff EQV applied to all deforestation-linked commodity imports into the EU27, regardless of their country of origin.

Global Trade Restrictions (Res_GL): A scenario imposing a 150% EQV on all deforestation-linked commodity imports from High-Deforestation Regions worldwide, simulating a global application of the EUDR.

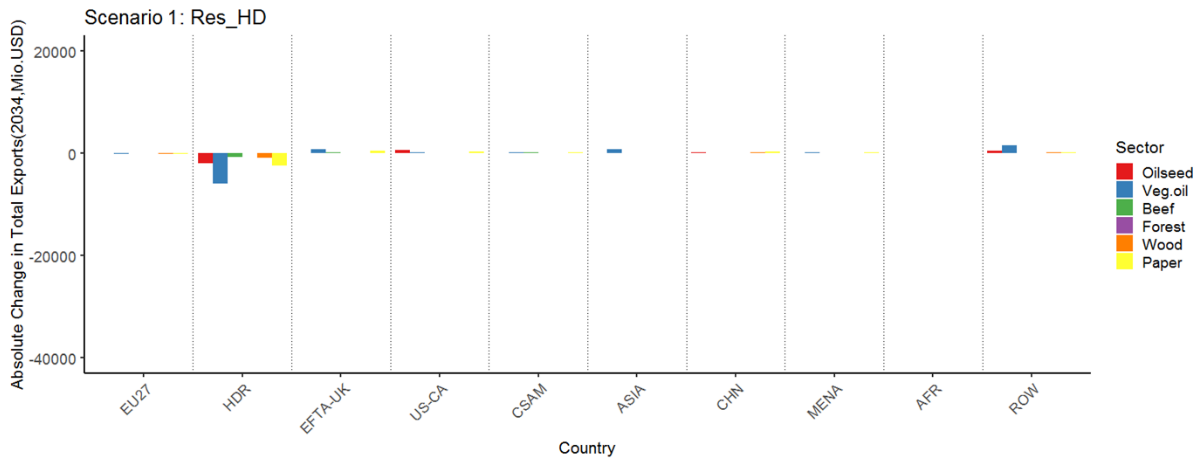
4. Results

We begin by assessing trade restrictions on deforestation-linked commodities through regional trade shifts, directly measuring their impact. Figure 3 presents total export changes for six agricultural and forestry commodities across countries. Overall, our findings show that total exports from HDR regions drop significantly, especially for oilseeds, vegetable oil, and paper, due to global NTMs on their imports. These NTMs act as trade barriers, distorting trade, lowering export demand, and causing oversupply in HDR regions. This oversupply could further reduce both production and imports, as discussed in the next section. These findings are consistent with previous studies highlighting the profound impact of NTMs on global trade patterns, particularly in agricultural and forestry sectors (Bouët & Debucquet, 2010; Cadot et

[1] To maintain generality, we limit the sensitivity analysis to the first scenario. Results for the other scenarios are available upon request.

al., 2012). However, EU27 restrictions on deforestation-related commodities, whether applied to HDR or globally (scenarios 1: Res_HD and 2: Res_All), have minimal impact on global trade. This is likely due to the EU's relatively small market share and the redirection of surplus HDR production to alternative markets. The redistribution mechanisms and their implications are examined in the next section.

Global restrictions on HDR commodity exports (scenario 3: Res_GL) significantly boost US-Canada agricultural exports, driven by increased domestic production to meet shifting global demand (Baldos & Hertel, 2015). North America's high productivity, efficient supply chains, and scalability give it a comparative advantage (Fuglie et al., 2007). Most additional US-Canada oilseed exports go to China, while vegetable oils and beef are primarily sold in Asia, Africa, and MENA. Moreover, the sensitivity analysis in the bars for the first scenario shows that when a lower ad valorem equivalent of NTMs (equal to a 50% ad valorem tariff) is applied, the overall pattern remains similar, but the impact is less pronounced. This consistency highlights the robustness of our findings across varying rates[2].



[2] To maintain generality and ensure consistency in presenting sensitivity analysis throughout the paper, we have applied this analysis exclusively to the first scenario.

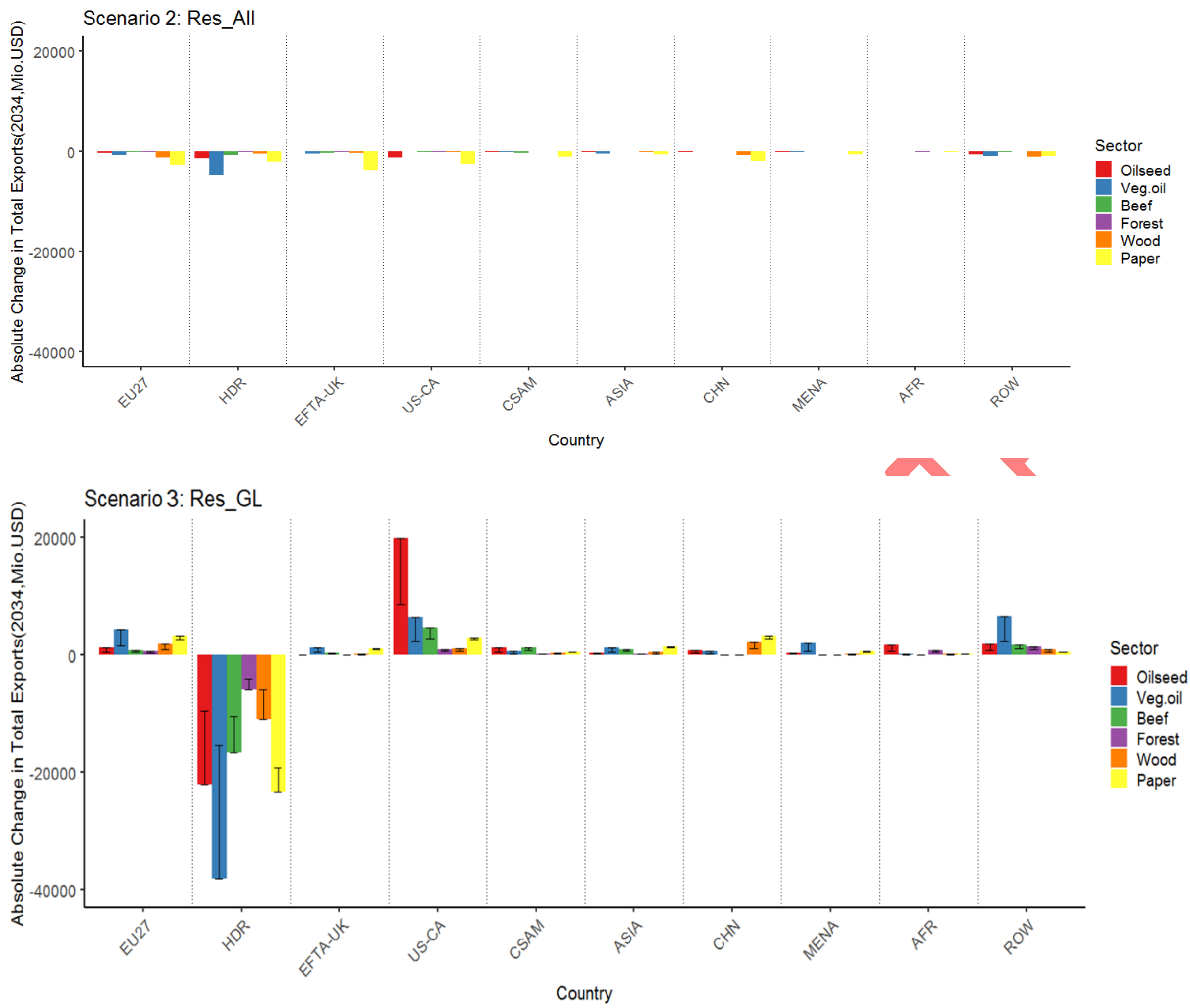


Figure 3: Total net change in exports compared to the baseline in 2034 (in Mio. USD).

Note: The interval in the first scenario graph represents a sensitivity analysis, simulating the impact of a global trade restriction equivalent to a 50% ad valorem tariff. However, the main scenario is based on the assumption of a 150% ad valorem equivalent of NTMs.

Next, we assess the scenarios' impact on total imports, which are less affected than exports (Figure 4). In the first scenario, with less stringent restrictions on HDR-origin commodities, forest product import reductions are smaller, indicating lower EU27 reliance on HDR sources. Partial restrictions allow greater flexibility in substitution and alternative sourcing, reducing trade disruptions. In the second scenario, EU27 imports decline significantly due to restrictions on deforestation-related commodities from all trading partners. Oilseeds, vegetable oils, wood, and paper see the steepest drops, reflecting the EU27's heavy dependence on these imports, while forest and beef product declines are less pronounced.

Global restrictions on HDR-origin imports reduce deforestation-related commodity imports for most countries, except China. In the first scenario, China increases oilseed imports to meet demand for cooking oil, animal feed, and industry, sourcing primarily from Brazil and US-

Canada. As global restrictions limit HDR-origin imports, China turns to alternative suppliers, mainly US-Canada. The Asian market relies on vegetable oil from HDR regions. The decline in Asia's vegetable oil imports is driven by supply disruptions from HDR regions and rising global prices.

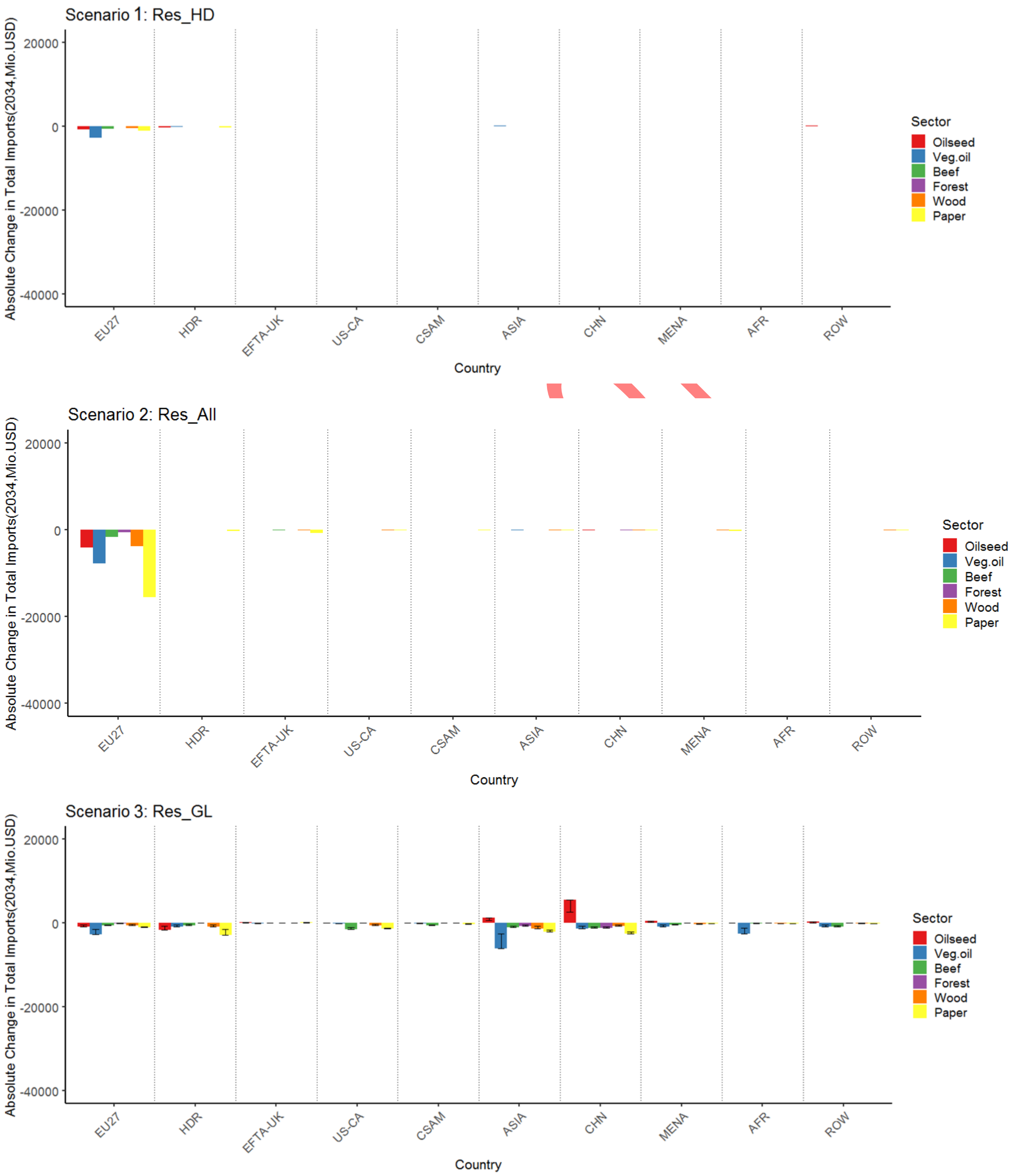


Figure 4: Total net change in imports compared to the baseline in 2034 (in Mio. USD).

Note: The interval in the first scenario graph represents a sensitivity analysis, simulating the impact of a global trade restriction equivalent to a 50% ad valorem tariff. However, the main scenario is based on the assumption of a 150% ad valorem equivalent of NTMs.

Trade shifts in the EU27 and globally are expected to boost domestic production which may offset supply shortfalls. Table 1 presents the percentage point difference (Baseline vs. Scenario) in agricultural and forestry commodity production from 2024 to 2034, compared to SSP2. Restrictions on deforestation-linked imports from HDR regions will likely reduce production there due to lower external demand while increasing production in regions that rely on these imports as they ramp up domestic output.

In the EU27, restrictions on high-deforestation commodities are expected to raise domestic oilseed and vegetable oil production by 19–33% (scenario 3: Res_GL) and 33–45% (scenario 2: Res_All), respectively, depending on whether they apply only to HDR regions or globally. The beef market sees smaller changes, while paper, wood, and forest products grow modestly by 2–8% in both scenarios. This reflects a substitution effect, where domestic industries compensate for reduced imports. Additionally, vegetable oil production is set to rise in MENA, Africa, EFTA-UK, and CSAM if all countries restrict imports from HDR regions. Similarly, oilseed production in CSAM and US-Canada is projected to increase, capturing a larger share of the HDR vegetable oil market as trade patterns adjust.

Due to global import restrictions (scenario3: Res_GL), HDR regions experience significant production declines, primarily driven by reduced international demand for their products. Vegetable oil, oilseed, and beef production decline by 46%, 31%, and 21%, respectively, while forest, wood, and paper production decrease by 19%, 14%, and 17%, respectively. Other regions show mixed trends; for instance, oilseed and beef production in Latin America varies based on restriction scope. These shifts highlight the complex interplay of regional production, trade adjustments, and policy stringency. The EU27's ability to offset shortages through alternative imports mitigates domestic production impacts under EU-only restrictions. This dynamic warrants further examination of trade parameters in the next section.

Table 1. Difference in Percentage Points (Baseline vs. Scenario) in Agricultural and Forestry Commodity Productions (2024-2034).

Countries	Scenario	Oilseed	Veg. oil	Beef	Forest	Wood	Paper
EU27	Res_HD	7.88	15.5	2.31	0.46	0.52	0.56
	Res_All	33.35	45.37	6.91	5.11	4.05	8.1
	Res_GL	19.34 [9.31]	33.81 [15.18]	4.6 [2.89]	3.56 [2.20]	2.6 [1.44]	1.92 [1.48]
HDR	Res_HD	-3.63	-7.05	-1.26	-0.49	-1.02	-1.76
	Res_All	-1.49	-5.58	-1.1	-0.45	-0.57	-1.42
	Res_GL	-31.45 [-13.30]	-45.97 [-18.50]	-21.24 [-12.67]	-18.89 [-12.00]	-14.22 [-7.51]	-16.89 [-13.16]
EFTA-UK	Res_HD	8.71	33.44	2.51	0.88	0.37	1.34
	Res_All	-3.59	-17.13	-1.87	-4.95	-0.08	-8.04
	Res_GL	22.44 [10.66]	56.41 [23.05]	5.41 [3.38]	4.01 [2.54]	2 [1.09]	3.21 [2.49]
US-CA	Res_HD	1.53	0.44	0.04	0.09	0.04	0.12
	Res_All	-1.89	-0.43	-0.43	-0.44	-0.33	-1.13
	Res_GL	46.22 [19.85]	19.64 [7.33]	7 [4.27]	5.45 [3.32]	2.77 [1.56]	2.22 [1.83]
CSAM	Res_HD	1.97	9.89	1.79	0.16	-0.06	0.77
	Res_All	-1.74	-5.54	-2.83	-1.58	-0.4	-6.26
	Res_GL	51.97 [22.22]	36.36 [14.90]	27.59 [16.57]	7.73 [5.08]	5.31 [2.90]	7.67 [6.61]
ASIA	Res_HD	0.74	1.68	-0.47	-0.02	-0.04	0.02
	Res_All	-0.08	-1.15	-0.33	-0.14	-0.09	-0.33
	Res_GL	24.08 [11.03]	41.21 [18.20]	19.41 [12.69]	3.43 [2.15]	3.98 [2.21]	2.33 [1.91]
CHN	Res_HD	-0.17	-0.05	-0.03	0.04	0.06	0.06
	Res_All	-0.56	-0.21	-0.35	-0.42	-0.43	-0.59
	Res_GL	30.65 [14.53]	6.8 [3.35]	5.69 [3.66]	5.75 [3.80]	2.33 [1.30]	2.32 [1.87]
MENA	Res_HD	1.8	1.8	-0.11	0.16	0.04	0.27
	Res_All	0.27	-1.02	-0.14	-0.13	0.22	-1.09
	Res_GL	24.92 [11.45]	51.98 [22.39]	8.81 [5.82]	2.42 [1.37]	2.02 [1.14]	2.95 [2.35]
AFR	Res_HD	0.48	-0.09	0.09	-0.03	0.03	0.07
	Res_All	-0.52	-0.33	-0.22	-0.3	-0.24	-0.5
	Res_GL	20.29 [8.70]	32.36 [14.94]	1.18 [0.64]	2.6 [1.66]	2.2 [1.22]	3.35 [2.75]
ROW	Res_HD	7.48	10.61	-0.02	0.11	0.84	0.39
	Res_All	-1.94	-6	-0.41	-1.26	-3.59	-2.11
	Res_GL	42 [18.20]	63.78 [25.23]	12.23 [7.31]	9.49 [6.28]	4.4 [2.37]	3.51 [2.78]

Note: The interval in the first scenario graph represents a sensitivity analysis, simulating the impact of a global trade restriction equivalent to equivalent to a 50% ad valorem tariff. However, the main scenario is based on the assumption of a 150% ad valorem equivalent of NTMs. Source: Our calculation using MAGNET.

When the EU27 restricts only imports, trade flows shift to other regions. This section examines trade pattern changes under the second and third scenarios, where EU27 restrictions apply solely to imports. Figure 5 shows HDR exports redirecting primarily to China and other Asian countries, creating a "cushioning effect" (Zamani et al., 2022). A similar pattern occurs in the beef market, with the MENA region and North America (US and Canada) absorbing some redirected exports, reflecting global supply chain adaptability to trade barriers. In forestry, EU restrictions drive a surge in HDR forestry exports to other regions, potentially increasing land use for forest-related activities, a topic explored further in the next section.

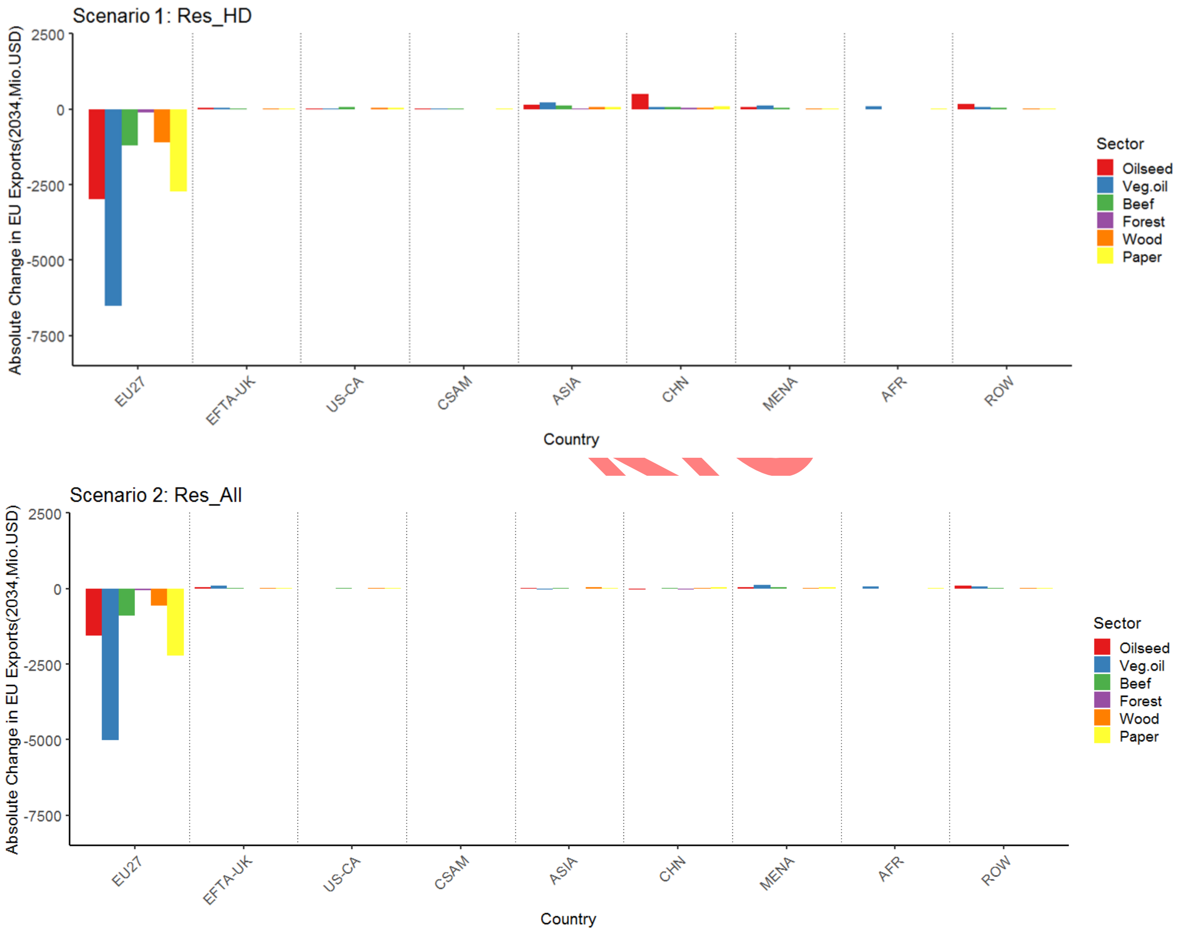


Figure 5: Absolute Change in Commodity Exports from High-Deforestation Regions Compared to Baseline in 2034.

When the EU27 imposes trade restrictions on HDR countries (scenario 1: Res_HD), market gaps are filled by imports from other regions. Figure 4 shows how the EU's import shares shift under Scenario 2. In the oilseed market, imports from the US and Canada rise significantly, highlighting their role as key alternative suppliers. For vegetable oil, the EU27 compensates by increasing imports from Asia, EFTA-UK, and other regions, demonstrating the market's flexibility. Additionally, exports from EFTA-UK, China, and the US-Canada surge, reinforcing their capacity to meet EU27 demand and the interconnected nature of global commodity markets. This redistribution of trade flows is particularly evident in markets like vegetable oil, where the presence of multiple global suppliers allows the EU27 to source from a variety of regions without a significant rise in supply-chain disruptions. However, this adaptive capacity may not extend uniformly to all commodities, as certain sectors, such as forestry, may face more pronounced challenges due to limited alternative suppliers.

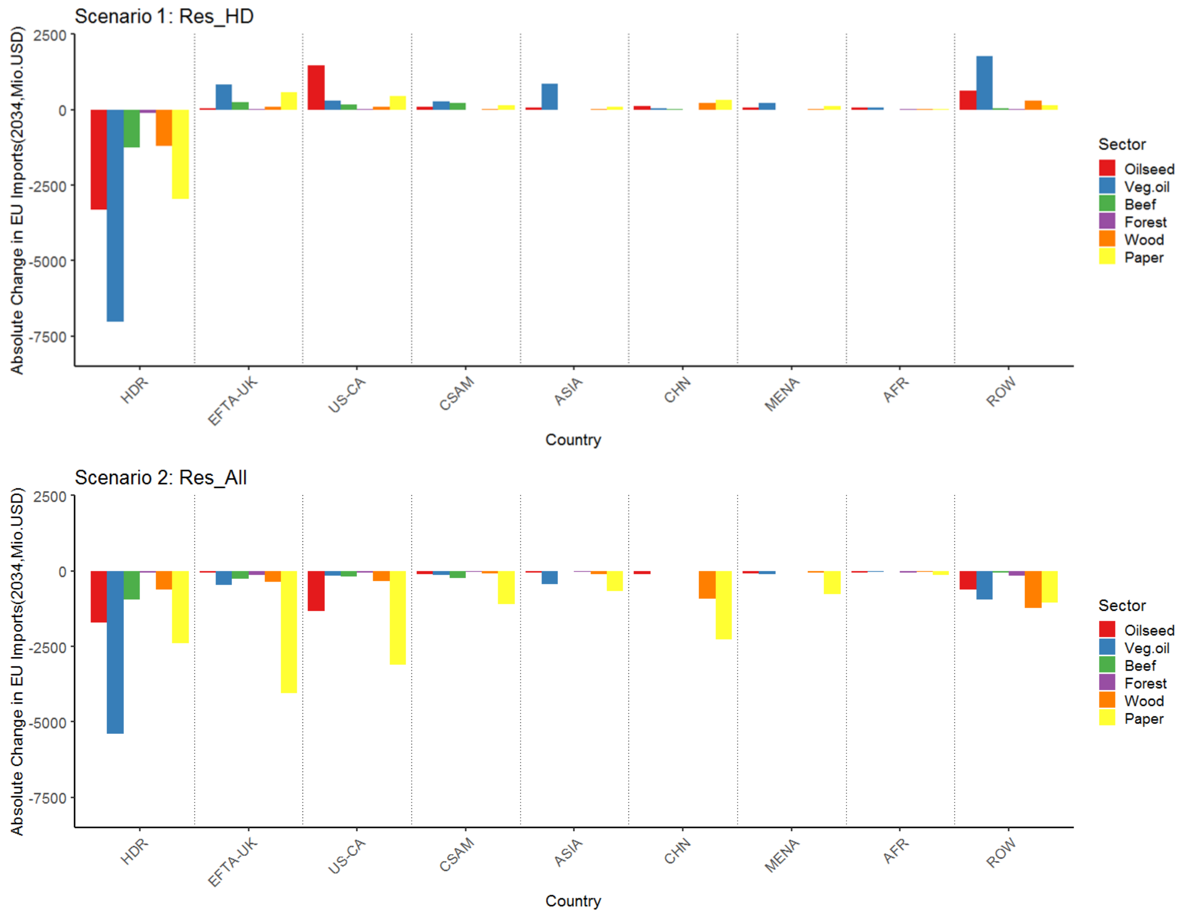
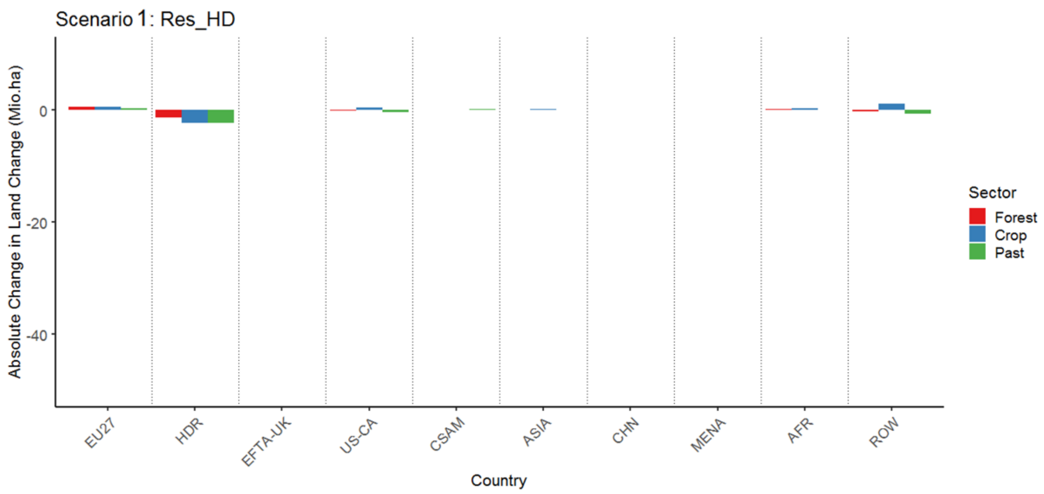


Figure 6: Absolute Change in EU Imports Compared to Baseline Under Second Scenario (Restrictions Targeting High-Deforestation Regions) in 2034.

Figure 7 illustrates the changes in land use under both trade-restriction scenarios. Under the first, less restrictive scenario, the reductions in forestland in HDR regions are less pronounced. This can be attributed to the relatively lower impact of partial trade restrictions on the export and production of forest products. The lesser scope of the restrictions allows HDR regions to maintain some level of trade in forest commodities, thereby mitigating the adverse effects on managed forestland. This dynamic highlight the critical role of market access in shaping land-use decisions and the extent of deforestation-related pressures in HDR regions.

When EU27's restrictions are applied to all deforestation-driven commodities from all countries (scenario 2: Res_All), land use for forest land increases by 3.7 million hectares in the EU. This increase may be due to the conversion of unmanaged forests into managed forests within the EU27, reflecting efforts to meet domestic and regional demand for forest products amidst import restrictions. The reduction in forestland is significantly greater compared to pasture and cropland. This can be attributed to the substitution between different types of cropland and the conversion of cropland from oilseeds to grains and horticultural crops.

The results show a significant reduction in managed forestland by around 40 million hectares within HDR regions when all countries impose restrictions on deforestation-related commodities from these areas (scenario3: Res_GL). In HDR regions, managed forestland declines as a consequence of reduced forest land rent. This reduction is driven by the EU27's trade restrictions, which limit market access for HDR-origin forest products, and by trade diversion to Asian countries that offer lower prices compared to the EU27. These factors collectively decrease incentives for maintaining managed forestland in HDR regions.



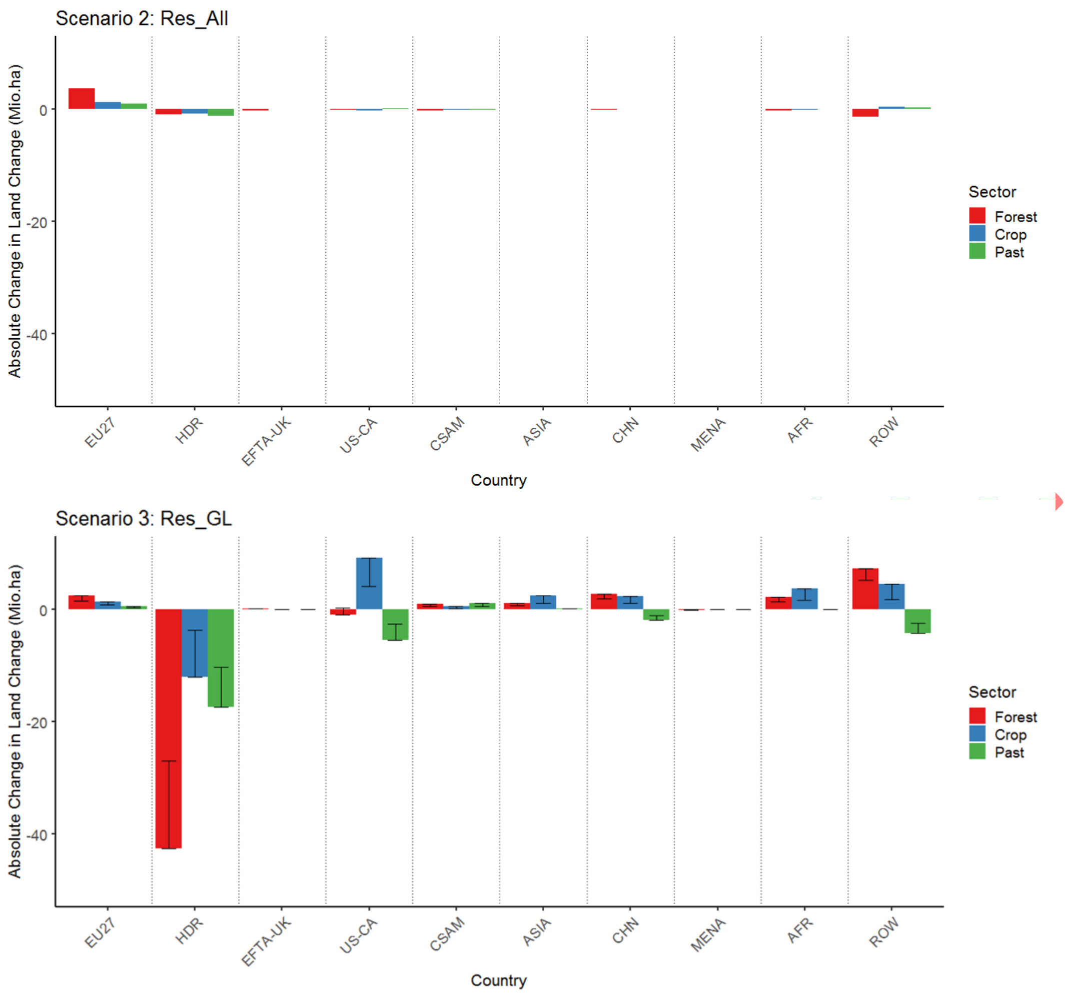


Figure 7: Absolute Change in Land Use Compared to Baseline.

Note: Forestland refers to managed forestland, which is determined endogenously within the MAGNET model. The interval in the first scenario graph represents a sensitivity analysis, simulating the impact of a global trade restriction equivalent to a 50% ad valorem tariff. However, the main scenario is based on the assumption of a 150% ad valorem equivalent of NTMs.

5. Conclusion and policy implications

This study evaluates the impacts of trade restrictions on deforestation-related commodities and their implications for global deforestation. Using a global computable general equilibrium (CGE) model, we evaluate scenarios inspired by the EUDR. The analysis considers three scenarios: restrictions imposed by the EU27 alone on HDR regions and all countries, as well as global restrictions on deforestation-risk commodities imports from HDR regions. These scenarios compare the proposed EUDR by the EU27 with a global restriction on deforestation-linked commodities originating from regions with high deforestation rates. Given the lack of specific data to estimate the ad valorem equivalent of the EUDR, we adopt the ad valorem equivalent of NTMs for similar products under the European Union Timber Regulation (EUTR) to design our scenarios. Trade weights are applied to convert the NTM scenarios into the sectoral classifications of the CGE model.

Our findings indicate that global trade restrictions are significantly more effective in reducing deforestation-linked exports compared to an EU-only approach. Under global restrictions (Scenario 3), exports of oilseeds, vegetable oils, beef, and forest products from high-deforestation regions (HDR) decline by up to 46%, 31%, 19%, and 17%, respectively. This substantial reduction is due to the broad geographic coverage of the policy, which limits market relocation effects. From a land-use perspective, global restrictions lead to a net reduction in managed forestland within HDR regions by approximately 40 million hectares, primarily due to declining forestland rent and reduced demand for deforestation-linked products. The EU27, however, experiences an expansion of managed forestland by 3.7 million hectares under global restrictions, compensating for reduced imports by increasing domestic production.

In contrast, an EU-only approach (Scenarios 1 and 2) leads to regional trade shift rather than a comprehensive reduction in deforestation. While the EU27 reduces imports from HDR, these exports are redirected to alternative markets, such as China, Asia, and MENA, mitigating the impact on global deforestation. This is especially the case when the EU restricts trade for all countries that export products under EUDR (Scenario 2). Furthermore, domestic production within the EU increases significantly in all scenarios - by 8-33% for oilseeds and 15-45% for vegetable oils - highlighting the EU’s capacity for self-sufficiency but also potential shifts in land use within Europe.

According to our results and in line with previous literature (e.g., Fuchs et al., 2024; Muradian et al., 2025), policymakers should recognize that trade restrictions targeting HDR regions often lead to trade diversion rather than absolute reductions in deforestation-related commodities. For instance, while EU27 restrictions caused a notable decline in HDR exports to the EU27, alternative markets, such as China and the US-Canada, absorbed the surplus. This redistribution highlights the need for coordinated global action to avoid merely shifting environmental pressures across regions. The EU27's ability to offset reduced HDR imports through increased imports from other regions and domestic production highlights the importance of supply chain resilience. To enhance global sustainability, trade restrictions should be coupled with measures encouraging all regions to adopt deforestation-free supply chains, ensuring that market adaptation does not undermine environmental goals.

Moreover, a global restriction on deforestation-related commodities reduces environmental degradation in HDR regions by curbing incentives for deforestation-driven production. However, they also risk economic instability in these regions. Complementary policies, such as investment in sustainable agricultural practices and incentives for land conservation, are critical to mitigate the socioeconomic impacts while achieving environmental objectives. Further studies should investigate the long-term implications of trade restrictions on global land-use patterns, biodiversity, and carbon emissions. Additionally, future research could leverage actual trade patterns under the EUDR to more precisely estimate the ad valorem equivalent of non-tariff measures. Moreover, examining the effectiveness of complementary measures, such as subsidies for sustainable production or consumer-driven initiatives, would provide a more comprehensive understanding of strategies to mitigate deforestation.

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