

Modelling Trade Policies Using the KITE Model

OECD Chief Economists Meeting — 23 April 2026

Julian Hinz — Kiel Institute for the World Economy

Today's Talk

1. Why we need a new generation of trade policy models
2. Example applications
3. The KITE framework: architecture and design
4. Model variants and capabilities
5. Data and scenario definition
6. Outlook: KITE-Transfer and the road ahead

Motivation



A New Era of Trade Policy

- Trade policy has returned as a central macroeconomic instrument
 - Tariffs, export controls, industrial policy, supply chain security
- Policy makers need rapid, rigorous quantitative assessments
 - General equilibrium effects, not just bilateral partial equilibrium
 - Supply chain propagation and cascading effects
 - Short-run vs. long-run adjustment dynamics
- Three recent examples from our work at the Kiel Institute

A New Era of Trade Policy

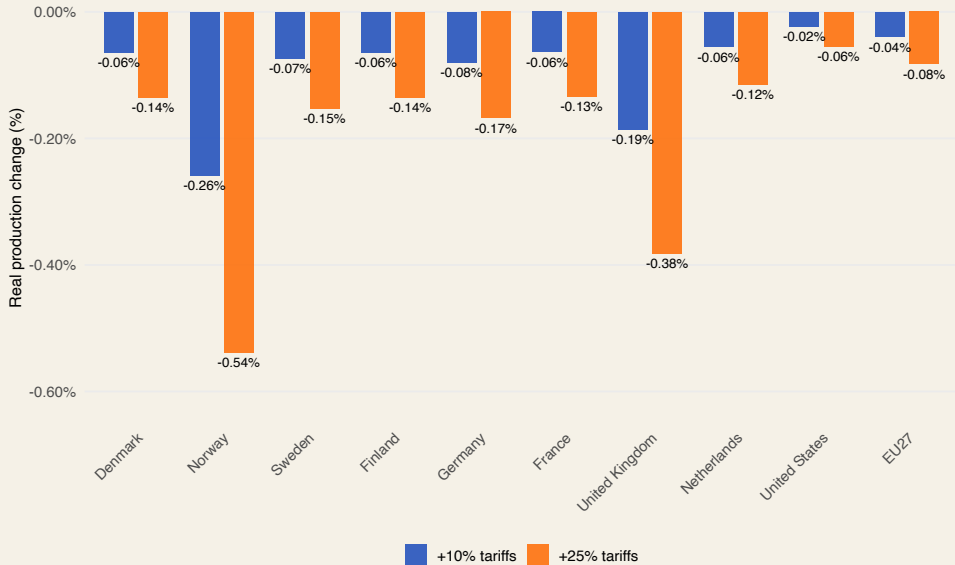
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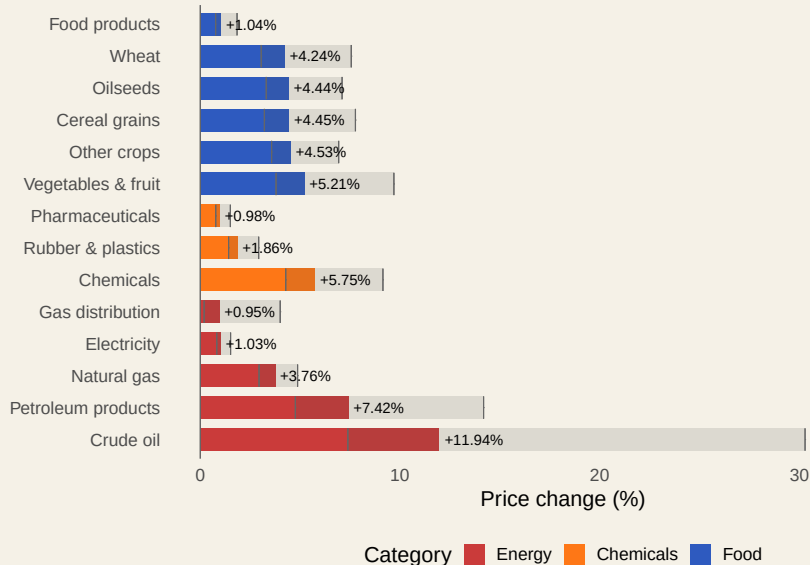
Short-run real production change: Greenland tariffs

Trump's tariff threat on DK, NO, SE, FI, DE, FR, GB, NL (vs. EU-US Deal baseline)



The Price Cascade: From Energy to Food

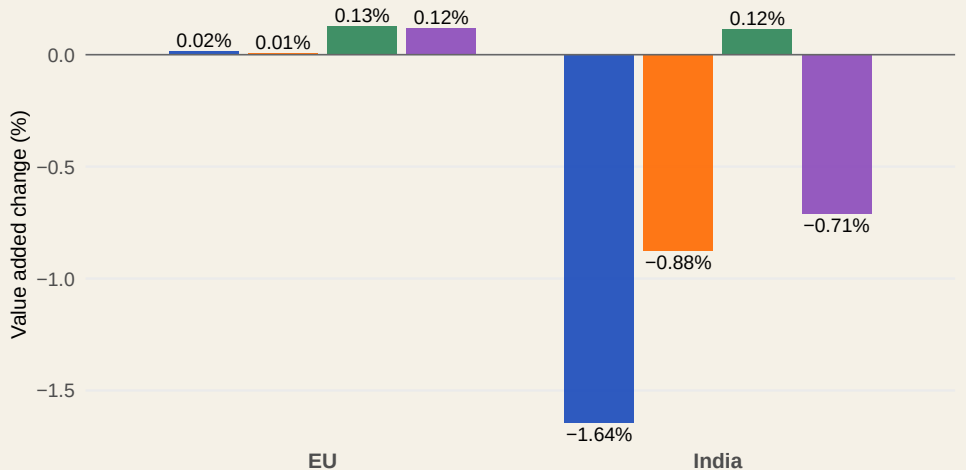
S1: Full closure | Error bars: 90% CI (100 MC draws)



Source: KITE model (Hinz, Mahlkow & Sogalla, 2026)

Real Value Added Changes

Percentage change relative to baseline



Scenario

- S1: US 50% Tariff (short-run)
- S2: US-India Deal (long-run)
- S3: EU-India FTA (long-run)
- S4: FTA + US De (long-run)

The KITE Framework

KITE: Design Philosophy

- **One framework, many models**

- All models share the same API, data structures, and output format
- Switch models at runtime depending on the policy question

- **Hat algebra throughout**

- Solves for changes relative to observed baseline (Dekle, Eaton & Kortum, 2008)
- Minimal data requirements (no unobservable structural parameters)

- **Production-grade software**

- R package with C++ backends for performance-critical solvers
- YAML-based model contracts, automated testing, CI/CD

- **Coverage:** up to 160 countries $\times$ 65 sectors (GTAP 11 basis)

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Core Mechanism: General Equilibrium in Hat Algebra

- Unit cost changes propagate through input-output linkages:

$$\hat{c}_d^j = \frac{1}{\hat{A}_d^j} \hat{w}_d^{\beta_d^j} \prod_k (\hat{p}_d^k)^{(1-\beta_d^j) \gamma_d^{k,j}}$$

- Price indices aggregate across origins:

$$\hat{p}_d^j = \left[\sum_o \pi_{od}^j \left(\hat{c}_o^j \hat{\tau}_{od}^j \right)^{-\theta^j} \right]^{-1/\theta^j}$$

- System solved simultaneously for wages, prices, trade shares

→ All feedback loops internalised: tariff → prices → wages → demand → trade

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Model Variants

Model	Authors	Key extension	Application
CP 2015	Caliendo & Parro	Multi-sector + IO	Tariff analysis
AC 2018	Antràs & Chor	GVC positioning	Value chain disruption
AV 2019	Alviarez	Multinational ownership	FDI policy
MW 2021	Mahlkow & Wanner	Carbon border adj.	Climate policy
CHKW 2022	Chowdhry et al.	Coalition transfers	Sanctions design
BF 2024	Baqaei & Farhi	CES nesting	Heterogeneous elast.
HW 2025	Hinz & Wanner	VA tariffs, clubs	Trade defence
FHKMW 2025	Felbermayr et al.	Labour mobility	Migration-trade
HMS 2026	Hinz, Mahlkow, S.	Bottleneck penalty	Energy/food security

- All variants: same API, same data pipeline, same output structure
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Policy Instruments

What KITE can shock:

- Ad valorem tariffs
- Non-tariff barriers
- Export taxes and subsidies
- Content based restrictions (e.g. rules-of-origin)
- Route shocks
- Coalitions, transfers, etc.

What KITE reports:

- Welfare, real GDP, value added
- Bilateral trade flows by sector
- Consumer and producer prices
- Sectoral production shifts
- GVC content decomposition
- Shipping mode and route use

Data Sources and Baseline Calibration

- **Input-output tables** (choose at runtime):

Database	Countries	Sectors	Coverage
OECD ICIO	82	46	1995–2022
GTAP 11	160+	65	2004–2023
WIOD	43	56	2014
EORA	190	26	2021

- **Tariff data:** MacMap (HS6), updated to 2026 baseline
- **Projections pipeline:** continuously updated initial conditions
 - Incorporates observed trade flows, macro projections, current policy baselines
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The Workflow

1. **Load baseline:** choose IO table, load initial conditions
2. **Define scenario:** modify tariff/NTB matrices
 - Bilateral, sectoral, or region-wide changes
3. **Run model:** call `update_equilibrium()`
 - Choose model variant, set convergence parameters
 - Short-run ($\times 0.25$ elasticities), medium-run ($\times 0.5$), long-run (full)
4. **Process results:** `process_results()` extracts welfare, trade, prices
5. **Sensitivity:** Monte Carlo over elasticities for confidence intervals

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Outlook

KITE-Transfer: Democratising Trade Policy Analysis

- Challenge: GE modelling requires technical expertise
 - Limits use by policy advisors, ministry staff, international organisations
- **KITE-Transfer**: web interface for non-expert users
 - Define scenarios via intuitive UI (countries, sectors, tariff rates)
 - Run pre-configured KITE models in the cloud
 - Download publication-ready results and visualisations
- Goal: reduce turnaround from days to minutes
 - Maintain full general equilibrium rigour
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- **Model extensions in development**

- Dynamic adjustment paths (not just comparative statics)
- Firm heterogeneity (Melitz-type selection)
- Product-level

- **Data infrastructure**

- Real-time baseline updates from observed trade data

- **Open science**

- All models documented with YAML contracts and test suites
- Reproducible scenario pipelines for policy briefs

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